TADANO FAUN

Operating, Service and Maintenance Manual

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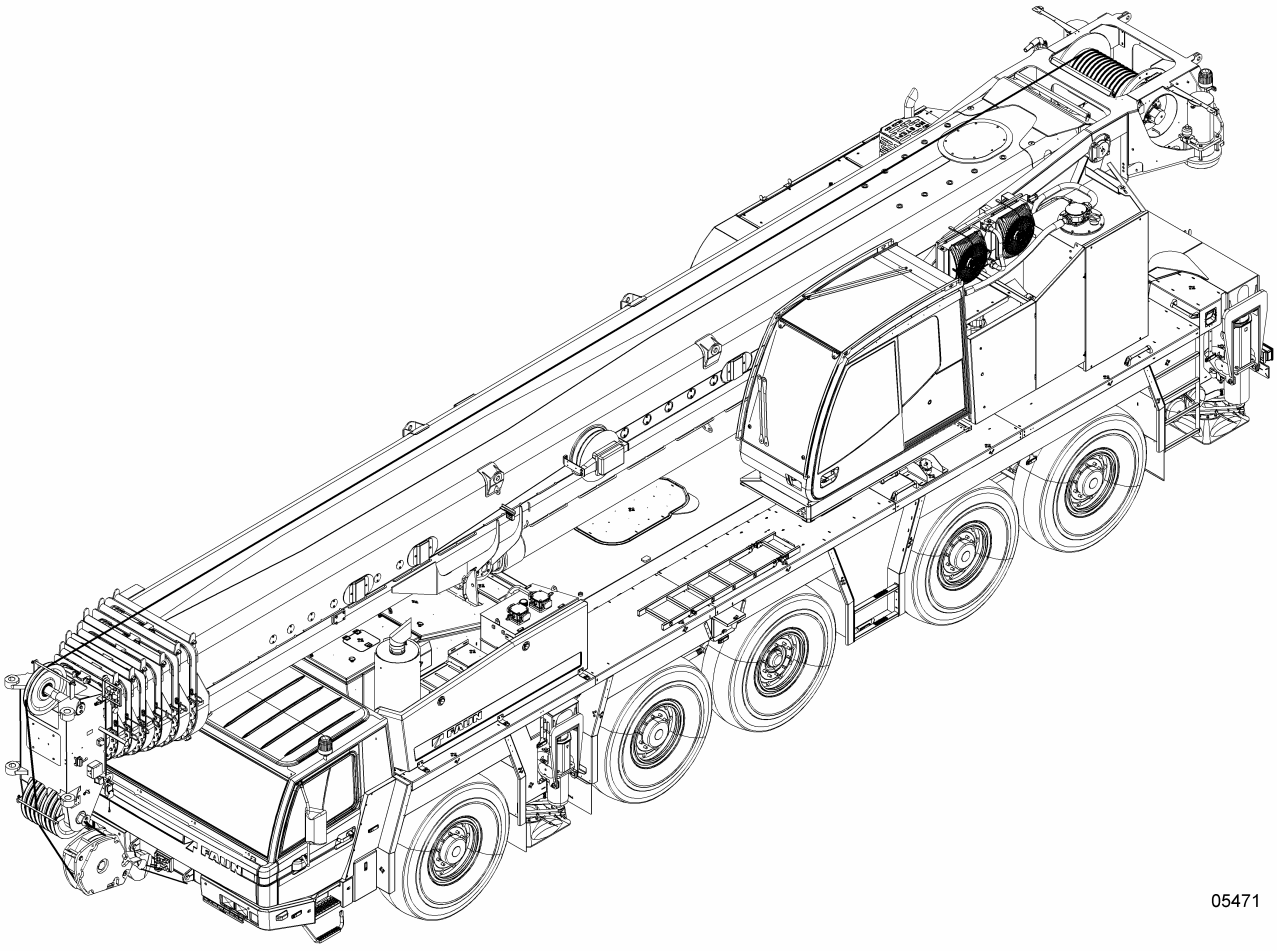

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Vehicle identification no: WFN5 RUG R1 62036…

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TADANO FAUN

Dear Customer,

We have gone to great lengths to provide the conditions for a long service life of your FAUN crane.
High-grade coatings, multi-layer paint systems and high-performance application procedures with a high process reliability characterize the excellent visual appearance of our FAUN cranes. Service and upkeep are indispensable to maintain this finish:

1. Paint takes some time to develop its maximum resistance. Thus, please do not clean your crane with excessively hot water, nor with excessive water pressure during the first 8 weeks. Avoid steam-jet units.

2. When using the crane on construction sites, when loading it with load take-up equipment and wooden planks, damage to the paint is inevitable. Such damage will result in corrosion or rust and must therefore be repaired in an expert fashion without delay.

3. Damage may also be caused by stone impact during travel. This also requires immediate action.

4. The paintwork is also vulnerable to weather conditions and thawing salt. Thus, regular cleaning of the crane and preservation of connectors, welts and screw couplings is necessary.

Customer satisfaction is our aim !

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**) Optional equipment

PREFACE

1 How to use this Operating Manual

This Operating Manual provides vital information which is a prerequisite for working safely with the machine. The chassis (undercarriage) and the superstructure are covered by separate sections.

This Operating Manual is intended primarily for the crane operator and for maintenance specialists. It must be available to the operator and maintenance staff at all times. The Operating Manual must thus always be kept within easy reach of the operator's workplace, i.e. in the driver's cab in the undercarriage, or in the crane cab. The Operating Manual is an integral part of the vehicle.

Before putting your FAUN crane carrier into operation, please study the Operating Manual thoroughly. Familiarize yourself with Part B.0) "SAFETY INSTRUCTIONS" and with Part E) "CRANE TESTING INSTRUCTIONS", as well as with the instruction plates mounted on the machine, and their meaning. You must also be informed about the arrangement, functions and direction of operation of all the controls before you start up the machine for the first time.

Whenever you work with the crane, be sure to observe the instructions laid down in this Operating Manual!

Memo:

2 Technical data, operation, maintenance, troubleshooting

The performance and the availability of your FAUN crane will be influenced considerably by correct operation and conscientious maintenance. Operating errors or incorrect maintenance will cause malfunctions which can be avoided. Only expert handling and conscientious maintenance will ensure the permanent, satisfactory and reliable operation of your machine. On principle, the crane may only be operated and serviced by well-trained, qualified specialist staff.

Part A) "TECHNICAL DETAIL" contains all the important technical data. Part B) "OPERATING INSTRUCTIONS" contains all the information which is required to operate the machine correctly.

The driver is expected to have good knowledge of cranes and their fields of application. Such knowledge is imparted, e.g. by a driver's training course held at TADANO FAUN.

Part C) "SERVICE AND MAINTENANCE" contains all the inspection and maintenance jobs; they are described in sufficient detail, so that the work can be performed in an expert fashion. The After-Sales Service Department of TADANO FAUN will be pleased to give you further information.
Parts D) "CIRCUIT AND PIPING DIAGRAMS" and F) "TROUBLESHOOTING" are intended to help you locate and eliminate faults and malfunctions more speedily.
Part G) “Annex” contains documents supplied by subcontractors regarding vehicle components (e.g. gearbox, operation of the Automatic Safe Load Indicator (AML)) and specific optional equipment, separated according chassis and superstructure.

This Operating Manual is no working instruction document enabling you to perform major repair work. The After-Sales Service Department of TADANO FAUN will be pleased to perform such repairs for you.

Use only genuine TADANO FAUN spare parts. We cannot accept any warranty claims for damage resulting from the neglect of the Operating Manual and the information it contains, or due to the crane carrier being used outside its intended fields of application. This Operating Manual shall not be considered as an extension of our General Conditions of Sale and Delivery.

Whenever you have any queries, the After-Sales Service Department of TADANO FAUN will be pleased to answer your questions. If you have any queries after studying this Manual, please contact this Department.

Whenever you have any queries, please quote the type and the vehicle identification no. of your FAUN crane.

Memo:

3 Handling of this Operating Manual

This Operating Manual covers the machine model supplied plus any optional equipment that may be available. To find the information you need, please consult the Table of Contents. Moreover, the headline of the corresponding chapter appears in the header of each page.

The controls, gauges and switches installed in the driver's cab (at the operator's place) are mentioned on many pages of this Operating Manual. They are illustrated on fold-out pages at the end of Part B1 and B2 "Operating Instructions" for the chassis and/or the superstructure.

The Figures shown in the Operating Manual may differ from the machine model actually supplied. They are still relevant, however.

Your attention is also drawn to the additional brochures included with the set of vehicle documents.

In the Operating Manual, the terms "**NOTE**", "**Attention**" and "**DANGER**" are used to draw your attention to particularly important information.

These terms have the following meaning:

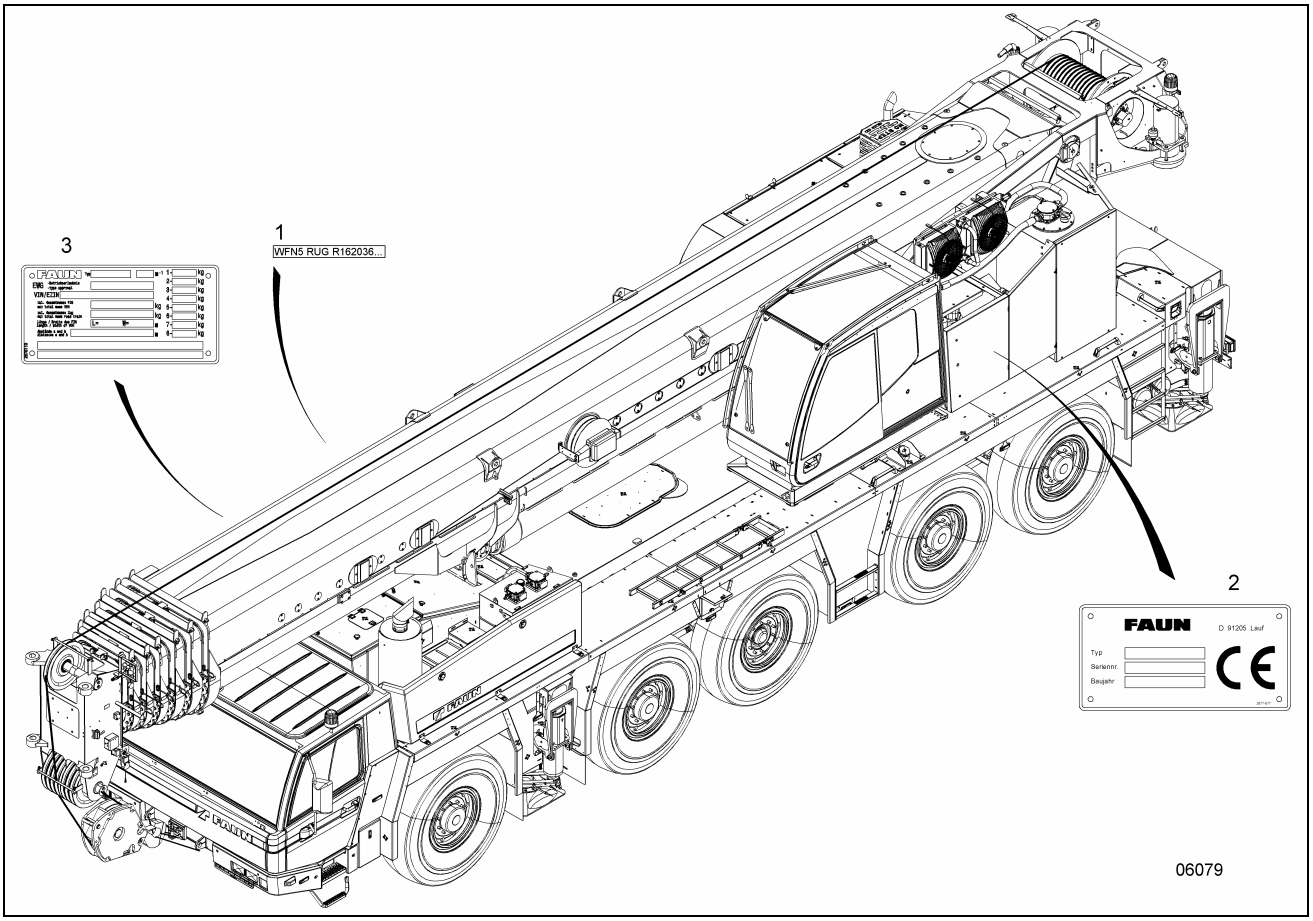
NOTE	This term is used whenever compliance with certain instructions is important for economical application of the machine.
Attention	This term is used whenever non-compliance with the Operating Manual may result in damage to the machine.
DANGER	This term is used whenever non-compliance with the appropriate instruction results in accidents with considerable material damage, the risk of injury or danger of life of the persons involved.

Memo:

4 Mounting locations of the vehicle identification number and of the nameplates

These plates are provided on the chassis in the following locations:

The vehicle identification number (**1**) is stamped on the frame, on the right side of the chassis, between the 2nd and 3rt axles.
The nameplates bearing all the relevant vehicle data are located in the driver's cabin in the undercarriage (**3**) to the right of the passenger's seat, next to the cab door, and on the rear outside of the superstructure cabin (**2**).



1 Vehicle Identification Number (VIN); 2 nameplate, superstructure; 3 nameplate, chassis

Memo:

Part A

Technical Details

1 General technical details (chassis)

1.1 Dimensions and weights

1.1.1 Dimensions of the chassis

Overall width	mm	3000	with tires 445/95 R 25 (16.00 R 25)
	mm	3200	with tires 525/80 R 25 (20.5 R 25)**)
Overall length	mm	15105	
Length of chassis	mm	13425	
Overall height	mm	3990	with tires 445/95 R 25 (16.00 R 25)
in driving condition			
Height variable via suspension cylinders	mm	by + 158 mm -118 mm	
Wheel toe on ground	mm	2549	with tires 445/95 R 25 (16.00 R 25)
	mm	2628	with tires 525/80 R 25 (20.5 R 25)**)

Turning radii (approx.)	
Inside	5,300 mm
Track radius	9,500 mm
Over outer edge of chassis	10,900 mm
Over boom	11,600 mm
Over jib	12,300 mm

1.1.2 Axle loads (according to DIN 70020)

NOTE **Axle loads exceeding 12 t are not admissible for travelling on public roads in the countries of the European Community, according to EC regulations. Regarding axle loads, a distinction must be made moreover between the axle loads permitted by the road traffic regulations and the technically admissible axle loads. When the technically admissible axle loads are exceeded, a speed reduction is required, depending on the actual extent by which the specified axle loads are exceeded. The notes regarding tire load ratings and the maximum travelling speeds according to Part B0.1 Safety Instructions, item 1.1, must be complied with.**
The legal regulations in force in the country where the crane is to be registered must be observed. To conform with the registration requirements valid in the countries of use, it may be necessary to deviate from the standard equipment, and provide the vehicle with certain optional equipment, which may result in a changed distribution of the counterweights and different axle loads.

Weights:

Drive 10 x 8, tires 445/95 R 25 (16.00R25):
Total weight 60 t (5 x 12t axle load)

The indicated axle loads only apply to the corresponding rig arrangements described above. Modifications of the rig arrangement may result in different axle loads. Due to manufacturing tolerances, slight deviations are possible.

**) Optional equipment

1.2 Driving performance data (according to DIN 70020)

In manoeuvring mode, speeds as of 0 km/h are possible. At the same time, the clutch position is controlled electronically via the accelerator pedal position (slipping clutch). With the clutch engaged, a minimum speed of 1.0 km/h is possible in the 1st gear (off-road), at 800 rpm.

Tires 445/95 R 25 (16.00R25), gross vehicle weight: 60 t		
Gear step (Off-road / on-road gear)	Travelling speed at max. engine power (off-road/on-road) (km/h)	Gradability**) (off-road/on-road) (%)
1	3 / 6	61 / 47
2	3 / 7	47 / 39
3	4 / 8	37 / 31
4	4 / 10	30 / 25
5	5 / 12	24 / 20
6	7 / 15	19 / 16
7	8 / 18	16 / 14
8	9 / 21	13 / 11
9	11 / 26	11 / 9
10	14 / 31	8 / 7
11	17 / 38	7 / 6
12	20 / 46	5 / 4
13	24 / 56	4 / 3
14	30 / 68	3 / 3
15	35 / 80	3 / 2
16	42 / 85*	2 / 1
1st rev.	3 / 6	55 / 45
2nd rev.	3 / 7	43 / 36

* reduced by electronic engine management system
** depending on ground condition

2 Details of components (chassis)

2.1 Engine

Mercedes-Benz 8 cylinder diesel engine, type OM502LA, certified for EUROMOT III A and EPA Tier 3, water-cooled, hydrostatically driven fan, controlled by thermostat.

Power	**KW (HP)** **at r.p.m.**	380 (517) 1,800
Max. torque	**Nm** **at r.p.m.**	2,400 1,300
Lubrication		Forced-feed circulating lubrication
Operation		Four-stroke direct injection
Piston displacement	**liters**	15.928

(Engine power output according to 80/1269/EEC)

Exhaust system made of special steel.

For further details, please refer to operating manual of the engine manufacturer.

2.2 Gearbox

ZF-AS-Tronic 16 AS 2602, mechanical gearbox with integrated intarder. Electronically-pneumatically actuated dry clutch and fully automatic gearbox control.
The starting gear is selected manually or automatically. If necessary, semi-automatic mode (Tip-Tronic) possible with manual gear selection. For extremely slow driving operation, manoeuvring in 1st forward and reverse is possible. In manoeuvring mode, the vehicle can be moved particularly gently by actuation of the accelerator pedal.
The gearbox features 16 forward speeds and 2 reverse gears.

Gear step/ gear	Reduction ratio i:
1st gear	14.12
2nd gear	11.68
3rd gear	9.54
4th gear	7.89
5th gear	6.52
6th gear	5.39
7th gear	4.57
8th gear	3.78
9th gear	3.09
10th gear	2.56
11th gear	2.09
12th gear	1.73
13th gear	1.43
14th gear	1.18
15th gear	1.00
16th gear	0.83
1st reverse gear	13.07
2nd reverse gear	10.81

2.3 Transfer box

Two-step transfer box, type VG 3750, with on-road and off-road gear, neutral position for towing.

Reduction ratios:
On-road gear: 0.8
Off-road gear: 1.836

2.4 Axles

	Drive 10x6	Drive 10x8
1st axle:	Steering axle, non-driven	Driven, steering axle, i = 8.47
2nd axle:	Driven, steering axle, I = 8.47	Driven, steering axle (connectable), i = 8.47
3rd axle:	Non-driven, non-steered axle, can be lifted for diagonal steering	Non driven, non-steered axle, can be lifted for diagonal steering
4th axle:	Driven steering axle I = 8.47, with lockable inter-axle differential	Driven steering axle I = 8.47, with lockable inter-axle differential
5th axle:	Driven, steering axle, i = 8.47	Driven, steering axle, i = 8.47

Inter-wheel locks in all drive axles. All stub axle bearings designed for minimum maintenance; maintenance interval: once per year.

2.4.1 Drive variants

Drive variant 10x6:

10 x 6 drive for on-road travel: 2nd, 4th and 5th axle are permanently driven; inter-axle differentials between the 2nd and 4th axles (in transfer box) and between 4th and 5th axles are lockable; all inter-wheel differentials are also lockable.
10 x 6 drive for off-road travel: Inter-axle and inter-wheel differentials locked.

Drive variant 10x8:

10 x 6 for on-road travel: 1st, 4th and 5th axles are driven; inter-axle differentials between the 1st and 4th axles (in transfer box) and between the 4th and 5th axles.
10 x 8 drive for off-road travel: 2nd axle drive connected; inter-axle differential in transfer box locked. Inter-wheel differential locks and the inter-axle differential between the 4th and 5th axes are additionally lockable.

2.5 Axle suspension

Hydro-pneumatic suspension with level control system; suspension cylinders electro-hydraulically lockable. The axles are guided in longitudinal guide struts and transverse control arms. Inclination adjustment is possible to all sides while the suspension is locked. The stroke of each suspension cylinder can be influenced via push-buttons. Thus, it is possible to compensate unevennesses of the terrain within the stroke of the cylinders. Control in the driver's cab, or from the control panel of the outriggers.

2.6 Power transmission

Via maintenance-free propeller shafts with cross-serrated flanges.

2.7 Wheels and tires

2.7.1 Rims

Steel disc rims 9.50-25 / 1.7 (385/95 R 25/14.00 R 25)**).
Steel disc rims 11.00-25 / 1.7 (445/95 R 25/16.00 R 25).
Steel disc rims 17.00-25 / 1.7 (525/80 R 25/20.5 R 25)**).

2.7.2 Tires

Tires 385/95 R 25 (14.00 R25) with on-road and off-road tread pattern**).
Tires 445/95 R 25 (16.00 R25) with on-road and off-road tread pattern.
Tires 525/80 R 25 (20.5 R25) with on-road and off-road tread pattern**).

2.7.3 Tire inflating pressures in bar

Tires	Tire pressure
385/95 R 25 (14.00 - R 25)**)	10.0
445/95 R 25 (16.00 - R 25)	9.0
525/80 R 25 (20.5 - R 25)**)	7.0

The tire inflating pressures are indicated on the instruction plate in the driver's cab.

2.8 Brakes

Air-operated dual-circuit brake system with air drier. Parking brake acting on 2nd, 4th and 5th axles as air accumulator brake. Continuous service brake: intarder and constant throttle system with exhaust flap brake. On downhill gradients, the “Bremsomat” function keeps a selected driving speed constant by electronically controlled activation of the intarder.

2.8.1 Service brake

1. Service brake circuit, acting on axles 3, 4 and 5.
2. service brake circuit, acting on axles 1 and 2.

2.8.2 Parking brake

(Parking brake) Parking brake acting on 2nd, 4th and 5th axles as air accumulator parking brake.

2.8.3 Non-wearing brake

Intarder and constant throttle system with exhaust flap brake.

**) Optional equipment

2.9 Steering

ZF Servocom dual-circuit hydraulic steering, mechanical with hydraulic assistance. The permanent steering is effective on the 1st and 2nd axles with mechanical connection to the steering gear. In on-road mode, the 4th and 5th axles are steered electronically depending on the speed according to the current steering angles of the 1st and 2nd axles. At speeds exceeding 25 km/h, the 4th axle - and at speeds exceeding 50 km/h the 5th axle - are locked automatically in straight-ahead position.

The construction site mode is activated by lifting of the 3rd axle via a tip switch on the instrument panel. In construction site mode, the control device in the center console enables the operator to select the following steering configurations:

a) Minimum turning circle": The 4th and 5th axles are steered automatically according to the current steering angle of the front axle so that the minimum turning circle is performed.
b) Diagonal steering": The 4th and 5th axles are steered automatically according to the current steering angle of the front axle so that the vehicle moves diagonally.
c) Manual steering": The steering angle of the 4th axle can be adjusted via a tip switch of the control device. The 5th axle is steered automatically depending on the current steering angles of the 1st and 4th axles, so that a largely geometrically correct steering pattern results.
d) "Electronic tail-swing suppression": The 4th and 5th axles are steered automatically so that the swing-out motion of the rear part of the vehicle is suppressed.

(In the Federal Republic of Germany, it is not admissible to drive on public roads with the steering acting independently on the rear axles as well).

In case of failure of the main pump, a distance-governed emergency steering pump, which is flange-mounted to the transfer box, is connected automatically; check is effected electrically in the driver's cab.

2.10 Electrical equipment

24 V DC system with 100 A three-phase alternator, 2 batteries of 12 V 170 Ah each, 4 main headlights for dimmed and high-beam light, 2 fog lights, lateral lights, 2 seven-compartment lamps on the rear, comprising the rear fog light and the reversing lights, acoustical backup alarm, 2 rotary beacons on the chassis cab.
4 headlights to illuminate the area of the extended outriggers.
Wired with CAN bus components, integral self-test CSS (FAUN **C**ontrol & **S**ervice **S**ystem).
The electrical equipment corresponds to the EC standard.

2.11 Instruments

Tachograph, speedometer, revolution counter with hourmeter, fuel level indicator, warning light for engine temperature, CMV colour display indicating further warning signals (steering pump, engine malfunction) and operating functions (axle locking, drive, vehicle level position) and the compressed air system of circuits 1 and 2, error message and diagnosis via gearbox display.

2.12 Driver's cab

Front cab for two persons, of steel/plastic composite design, windshield made of laminated glass, side panes made of tempered glass, side panes movable.

Driver's and passenger's seats with integrated three-point seat belt systems, with height, inclination and length adjustment, and headrests. Both seats are air-suspended with automatic adjustment to occupant's weight and quick lowering device.

Windshield wiper with interval wiping circuit, windshield washing system, 2 rearview mirrors (electrically adjustable), 1 wide-angle rearview mirror and 1 startup mirror on the right (all mirrors with electric heating).

Car radio with CD player, 12 V terminal, e.g. for interphone system, 24 V and 12 V plug.

Cruise control / Bremsomat function

Single-key system for driver's cab and cabin doors, tank locks in superstructure and chassis, as well as steering lock.

2.13 Heating system

Engine-fed warm water heating with defroster nozzles for the windscreen and air vents for the foot compartment. Variable air distribution.

2.14 Frame

The frame of the five-axle crane carrier is designed as a torsion-resistant and rigid box-type welded structure of high-tensile fine grain steel, incl. the integrated outrigger casings.

Sliding coupling on the front.

Two access steps on each longitudinal side of the chassis.

Centralized lubrication system.

2.15 Outriggers

Hydraulic 4-point twin telescopic outriggers with deblockable check valves on the outrigger cylinders.

Extension width: longitudinal - 9.01 m; transverse = 8.30 m / 5.60 m.
Stroke of cylinders: front 510 mm, rear 638 mm.

Outrigger actuation is possible from either side of the chassis and from the superstructure cabin.
Actuation of outriggers on the chassis is supported visually by a display, and visualized.
Automatic levelling possible; check via electronic spirit levels; additional electronic inclination indication in the superstructure cab.
Raising / lowering the suspension and adjusting the vehicle's level position for on-road travel are possible from the control panel, as well as engine management (start, stop, engine speed).
Large-size floats which are mounted in sliding condition to the outrigger cylinders, to which they are permanently mounted. The floats can be removed to improve the overhang angle.

Outrigger floats: 600 mm x 600 mm,
Weight of outrigger floats 40 kg.

2.16 Fuel system

Approx. 530 l fuel tank with lockable cap.

2.17 Standard equipment

Tools, first-aid kit, warning light, warning triangle, 4 wheel chocks, fire extinguisher in the carrier cabin, inspection by TÜV (German technical inspection authority).

2.18 Painting

Single-color painting.

2.19 Optional equipment

1. Trailer coupling device with D value 190 kN, pin diameter 50 mm, supported load 150-500 kg, incl. light and brake connector
2. Autonomous auxiliary heating with engine-preheating and defrosting of window panes (water heater Webasto Thermo 90S); diesel-operated. A retrofit kit is additionally required if bio diesel fuel is used
3. Autonomous supplementary heater unit without engine pre-heating and defroster nozzles for the windscreen (warm air heater unit Webasto Airtop 3500), diesel-operated (not in combination with item 2.). If bio diesel is used: Webasto AT 2000 S
4. Air conditioning system
5. Refrigerator box in chassis cabin
6. ABS
7. Spark arrester
8. Eddy-current brake
9. Tool box on the rear
10. Rear view camera (image in CMV display in driver's cab)
11. Charging plugbox and plugbox for starting via an external power source
12. Emergency OFF switch
13. Tires 525/80 R 25 (20.5 R25) (vehicle width 3,200 mm).
14. Spare wheel 525/80 R 25 (20.5 R25)
15. Spare wheel 445/95 R 25 (16.00 R25)16.00 R25
16. Sliding coupling on the rear
17. Sleeping mattress

3 Technical details of components (superstructure)

3.1 Engine

Mercedes-Benz 6 cylinder diesel engine, type OM 906 LA, certified for EUROMOT III A and EPA Tier 3, water-cooled. The engine speed can be varied progressively via a pedal.

Power	**kW (HP)** **at r.p.m.**	138 (188) 1,800
Max. torque	**Nm** **at r.p.m.**	750 1,200-1,600
Lubrication		Forced-feed circulating lubrication
Operation		Four-stroke direct injection
Piston displacement	**liters**	6.37

(Engine power output according to DIN 6270/DIN 6271)

Exhaust system made of special steel.

For further details, please refer to operating manual of the engine manufacturer.

3.1.1 Fuel system

Fuel tank: 250 l, with lockable tank lid.

3.2 Hydraulic system

Diesel-hydraulic system with three hydraulic circuits, 1 power-controlled axial-piston twin pump (hydraulically adjustable) with accumulative power control for telescoping, boom elevation and hoisting gear, 1 axial-piston pump for the swing mechanism and 1 geared pump for the supply with control oil; 1 oil cooler.

3.2.1 Control of the hydraulic system

Two four-position cross-shift levers and electrically pre-controlled 4/3-way valves which enable simultaneous and independent crane movements and stepless speed regulation.

3.3 Hoisting gear

Axial-piston constant-rate motor, hoisting gear drum with integrated planetary gears and spring-loaded hydraulic multi-disc brake with integrated free wheeling (for hoisting operation). The hoisting gear is driven in an open hydraulic circuit; rope winch rotation rotation indicator, winch rope with "SUPER-STOP" rope lock.

		Hoisting gear 1	**Hoisting gear 2****
Drum diameter	**mm**	454	454
Rope diameter	**mm**	21	21
Rope length, approx.	**m**	350	350
Max. rope pull (1st layer), approx.	**kN**	109	109
Max. rope speed (4th layer), approx.	**m/min**	128	128

**) Optional equipment

3.4 Telescopic boom

Seven-section telescopic boom made of high-tensile fine grain steel, consisting of a basic boom and 6 telescopic elements with 1 telescopic cylinder to extend and retract the telescopes. The telescopes are extended and retracted fully automatically, and locked fully automatically in the working position in question. The telescopes can be extended and retracted hydraulically under partial load.

			Boom
Overall length	**retracted**	**m**	13.3
Overall length	**extended**	**m**	68.0
	max. pulley height	**m**	approx. 70
	Time for extending the telescopes	**s**	430

3.5 Boom elevation

Differential cylinder with attached lowering brake check valve

Angle of boom adjustment	°	from -1.5° to +84°
Time required for boom adjustment	sec.	approx. 95 sec./high speed approx. 50sec. (only for boom elevation movement "up")

3.6 Swing mechanism

Axial-piston constant-rate motor, three-stage planetary gear with automatic service and stop brake. Closed hydraulic circuit with swing mechanism unlocking device. Swing speed steplessly variable from 0 to 1.8 r.p.m.

3.7 Safety equipment

Electronic automatic safe load indicator with shut-off in case of an overload; prewarning system, overload warning device, safe load utilization indicator and work range limitation.
Digital displays for working radius, actually lifted load and maximum allowable load, tare indication, boom length, boom angle, height of pulley head. Hoist limitation for highest hook position. Working range limitations for telescope boom angle and pulley head height, and swing range limitation. Further indicators, e.g. for outrigger extension width, counterweight, wind velocity, rope fall arrangement, length and angle of fly jib, lights for hoist limit switch, LCD screen to display selection of telescoping sequence, boom extension ratio, telescoping target, length of tele cylinder, service information.
Lift Adjuster function, enables the load to be lifted without swinging (automatic upward elevation of the boom, which keeps the working radius constant).
Hoist limit switch, anemometer on the main boom pulley head, can be removed and placed on the pulley head of the jib.
Safety valves for protection against hose and pipe ruptures, rope winch limit switch for safety rope windings on the hoist drum.

3.8 Electrical equipment

24 V DC system with 30 A three-phase generator, 2 batteries, 12 V, 110 Ah each, 1 flashing beacon on the rotary platform, on the rear left side, near the hoisting gear, 2 working floodlights integrated in the superstructure cabin, 1 working floodlight on the basic boom, 2 lateral lights on the boom head.

3.9 Superstructure cabin

Crane cabin (extra-large and optimized ergonomically speaking) in steel / plastic design with sliding door, safety glass with tinted panes, electrically actuated hinged windscreen, glued-in skylight made of bullet-proof safety glass, and hinged backlight.

To ensure an optimum vision during crane work, the work place can be tilted progressively via the FAUN inclination technique integrated in the cab. It features an adjustable, hydraulically damped driver's seat with headrest, mechanically adjustable lumbar support, windshield wiping and washing system for windscreen and skylight, windshield wipers with interval circuit, hourmeter, sun visor, electric horn, radio with CD player, 12V and 24V Plugboxes.

Display to facilitate monitoring of e.g. fuel level and hydraulic oil temperature, vehicle voltage, superstructure locking mechanism and engine monitoring.

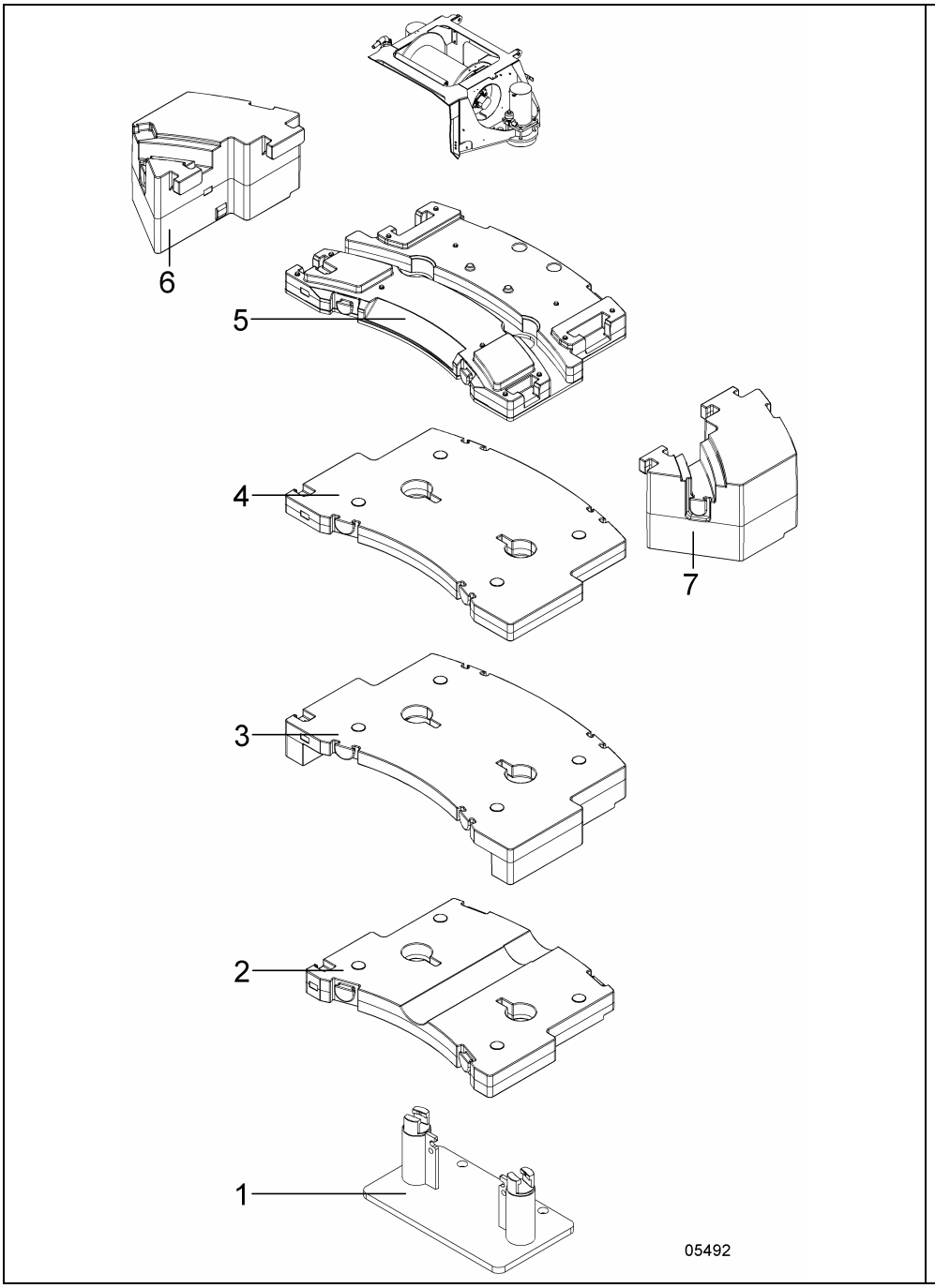
Actuation of outrigger and chassis engine functions possible from the superstructure.

Single-key system for driver's cab and cabin doors, tank locks in superstructure and chassis, as well as steering lock.

3.10 Counterweight

Total counterweight 71t, divisible. Partial counterweight can be deposited via hydraulic cylinders. Actuation from the crane cabin.
The swing radius is 4.98 m; up to a 12t counterweight, the width is 3.0m, up to 47t, the width is 3.6m, up to 71t, the width is 5.6m.
12t can be carried along on the vehicle during transport travel, technically speaking.
ASLI programming for 0t and 71t counterweights.

3.10.1 Overview of all counterweight units which can be mounted



7 = 12,0t

6 = 12,0t

5 = 12,0t

4 = 11,5t

3 = 11,5t

2 = 10,0t

1 = 2,0t

Load distribution for the various axle loads and rig arrangements, refer to item 1.1.2.
Mounting the weight units, refer to Part B2-6 item 6.6.2.

3.11 Heating system

Engine-fed warm water heater and autonomous auxiliary heating with engine pre-heating (water heater Webasto Thermo 90S), diesel-operated.

3.12 Superstructure frame

Torsion-resistant welded structure with single-race ball-bearing slewing device with external gearing, rotating through 360°.
Central lubrication system for ball-bearing slewing device, boom elevation cylinder and boom basic bearing as well as main and auxiliary winch.

3.13 Painting

Single-coloured painting, telescopes: black.

3.14 Acceptance inspection

Acceptance according to UVV (regulations for the prevention of accidents).

3.15 Optional equipment

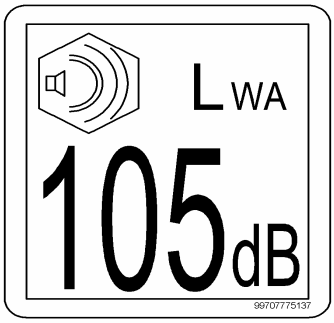
1. 5.4 m jib which can be positioned at offset angles of 0°/20°/40°, with AML extension feature, hoist limit switch and ladder for mounting the fly jib. It features 2 pulleys and a maximum lifting capacity of 33 t.
2. 5.4/13.2 m jib, can be positioned at offset angles of 0°/20°/40° with AML extension feature. This jib consists of the 5.4 m jib (item 1) and a 7.5 m fly jib. The 5.4 m base boom section can be folded separately in working position, with the 7.5 m section left at the basic boom.
3. 1 intermediate section (6 m) to extend the fly jib (item 2) to 19.2 m with AML extension feature. The intermediate section is pin-fastened between the 5.4m jib and the 7.5 m top jib.
4. 2 intermediate sections (6 m each) to extend the fly jib (item 2) to 25.2 m with AML extension feature. The intermediate sections are pin-fastened between the 5.4m jib and the 7.5 m top jib.
5. 3 intermediate sections (6 m each) to extend the fly jib (item 2) to 31.2 m with AML extension feature. The intermediate sections are pin-fastened between the 5.4m jib and the 7.5 m top jib.
6. 4 intermediate sections (6 m each) to extend the fly jib (item 2) to 37.2m with AML extension feature. The intermediate sections are pin-fastened between the 5.4m jib and the 7.5 m top jib.
7. Single top
8. Additional pulleys for lifting loads of more than 110t
9. AML extension feature for additional load chart variant of 12.0t.
10. AML extension feature for additional load chart variant of 23.5t.
11. AML extension feature for additional load chart variant of 35.0t.
12. AML extension feature for additional load chart variant of 47.0t.
13. Supported forces display in superstructure cab and the control boxes for the outriggers
14. 10t hook tackle, dead weight 300 kg
15. 25t bottom block, 1 pulley, with single hook, dead weight 450 kg
16. 63t bottom block, 3 pulley, with single hook, dead weight 850 kg
17. 63t bottom block, 3 pulleys, with double hook, dead weight 850 kg
18. 80t bottom block, 5 pulleys, with double hook, dead weight 1.150 kg
19. 125t bottom block, 7 pulleys, with double hook, dead weight 1.350 kg
20. 160t bottom block, 9 pulleys, with double hook, dead weight 1.600 kg
21. 2nd hoist winch (like main winch), rope length 350 m, can be attached and removed without auxiliary crane
22. Air conditioning system
23. 2 working floodlights on the basic boom, adjustable by motor from the cabin of the superstructure
24. Aircraft warning lamp (can be removed from the boom pulley head and plugged into the jib)
25. Supplementary oil cooler
26. Charging plugbox and plugbox for starting via an external power source
27. Spark arrester made of special steel
28. Emergency mode incl. hydraulic transformer for PAM (cradle) as required by the employers' liability insurance association
29. Lockable tool box behind the superstructure cab
30. Conversion for the use of bio diesel
31. Equipment according to the country where the machine is to be registered

3.16 Noise level when the engine is operating under load and at working speed (1,500 r.p.m)

Noise level when superstructure cabin is closed	Noise level when superstructure cabin is open	Noise at a distance of 7 m
(driver's ear)	(driver's ear)	
73 dB(A)	77 dB(A)	73 dB(A)

According to LNE (French Environmental Protection Agency) Valid until 31st December 2001.

As of 01.01.2002: 2000/14 EC

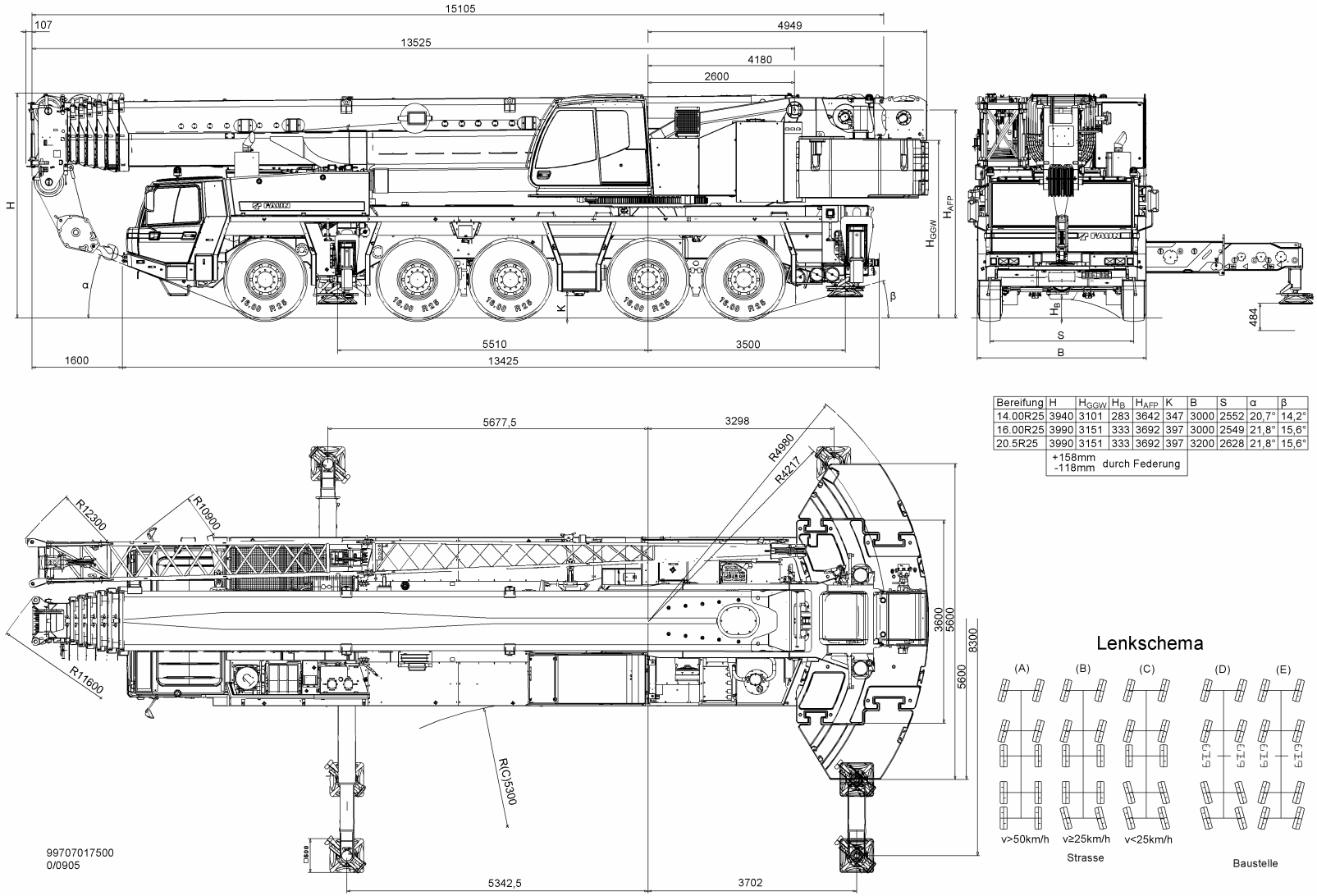


3.17 Vibration values in the crane cabin during crane work

The measured vibration values do not exceed the limits of 0.5 m/s² according to the Machinery Directive (98 / 37 / EC) during any normal working operation.

Memo:

4 Illustration of the vehicle



Bereifung	H	H_{GGW}	H_B	H_{AFP}	K	B	S	α	β
14.00R25	3940	3101	283	3642	347	3000	2552	20,7°	14,2°
16.00R25	3990	3151	333	3692	397	3000	2549	21,8°	15,6°
20.5R25	3990	3151	333	3692	397	3200	2628	21,8°	15,6°

+158mm
-118mm durch Federung

Lenkschema = Steering pattern; Strasse = On-road gear; Baustelle = Construction site; durch Federung = by suspension

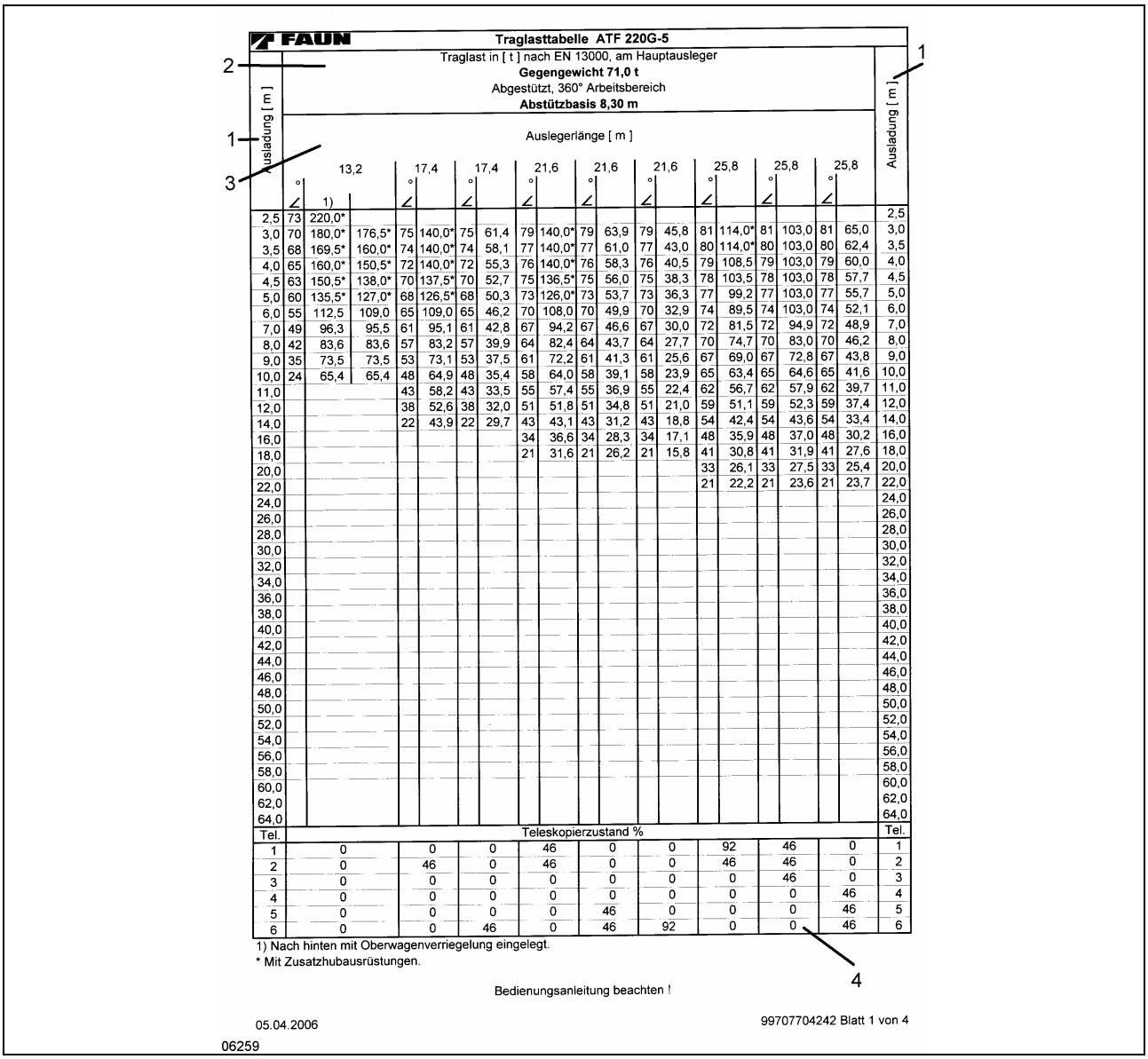
Memo:

5 Notes referring to the load (lifting capacity) and supporting forces charts

5.1 Explanation regarding a load chart

The following diagram represents **a load chart example.**
The load charts are classified in various categories, depending on the crane's working position. For each job, the operator must select the table which is as close as possible to the actual working position. It contains all the indications which are required for crane operation. All the data required for the intended crane operation must be entered into the ASLI before starting to work.

The instructions given in the "Notes referring to the load chart" must also be observed.



FAUN

Traglasttabelle ATF 220G-5

Traglast in [t] nach EN 13000, am Hauptausleger
Gegengewicht 71,0 t
Abgestützt, 360° Arbeitsbereich
Abstützbasis 8,30 m

Auslegerlänge [m]

Ausladung [m]	13,2 ° ∠	13,2	17,4 ° ∠	17,4	17,4 ° ∠	17,4	21,6 ° ∠	21,6	21,6 ° ∠	21,6	21,6 ° ∠	21,6	25,8 ° ∠	25,8	25,8 ° ∠	25,8	25,8 ° ∠	25,8	Ausladung [m]
2,5	73	220,0* 1)																	2,5
3,0	70	180,0*	176,5*	75	140,0*	75	61,4	79	140,0*	79	63,9	79	45,8	81	114,0*	81	103,0	81	65,0	3,0
3,5	68	169,5*	160,0*	74	140,0*	74	58,1	77	140,0*	77	61,0	77	43,0	80	114,0*	80	103,0	80	62,4	3,5
4,0	65	160,0*	150,5*	72	140,0*	72	55,3	76	140,0*	76	58,3	76	40,5	79	108,5	79	103,0	79	60,0	4,0
4,5	63	150,5*	138,0*	70	137,5*	70	52,7	75	136,5*	75	56,0	75	38,3	78	103,5	78	103,0	78	57,7	4,5
5,0	60	135,5*	127,0*	68	126,5*	68	50,3	73	126,0*	73	53,7	73	36,3	77	99,2	77	103,0	77	55,7	5,0
6,0	55	112,5	109,0	65	109,0	65	46,2	70	108,0	70	49,9	70	32,9	74	89,5	74	103,0	74	52,1	6,0
7,0	49	96,3	95,5	61	95,1	61	42,8	67	94,2	67	46,6	67	30,0	72	81,5	72	94,9	72	48,9	7,0
8,0	42	83,6	83,6	57	83,2	57	39,9	64	82,4	64	43,7	64	27,7	70	74,7	70	83,0	70	46,2	8,0
9,0	35	73,5	73,5	53	73,1	53	37,5	61	72,2	61	41,3	61	25,6	67	69,0	67	72,8	67	43,8	9,0
10,0	24	65,4	65,4	48	64,9	48	35,4	58	64,0	58	39,1	58	23,9	65	63,4	65	64,6	65	41,6	10,0
11,0				43	58,2	43	33,5	55	57,4	55	36,9	55	22,4	62	56,7	62	57,9	62	39,7	11,0
12,0				38	52,6	38	32,0	51	51,8	51	34,8	51	21,0	59	51,1	59	52,3	59	37,4	12,0
14,0				22	43,9	22	29,7	43	43,1	43	31,2	43	18,8	54	42,4	54	43,6	54	33,4	14,0
16,0								34	36,6	34	28,3	34	17,1	48	35,9	48	37,0	48	30,2	16,0
18,0								21	31,6	21	26,2	21	15,8	41	30,8	41	31,9	41	27,6	18,0
20,0														33	26,1	33	27,5	33	25,4	20,0
22,0														21	22,2	21	23,6	21	23,7	22,0
24,0																				24,0
26,0																				26,0
28,0																				28,0
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48,0																				48,0
50,0																				50,0
52,0																				52,0
54,0																				54,0
56,0																				56,0
58,0																				58,0
60,0																				60,0
62,0																				62,0
64,0																				64,0

Tel.	Teleskopierzustand %									Tel.
1	0	0	0	46	0	0	92	46	0	1
2	0	46	0	46	0	0	46	46	0	2
3	0	0	0	0	0	0	0	46	0	3
4	0	0	0	0	0	0	0	0	46	4
5	0	0	0	0	46	0	0	0	46	5
6	0	0	46	0	46	92	0	0	46	6

1) Nach hinten mit Oberwagenverriegelung eingelegt.
* Mit Zusatzhubausrüstungen.

Bedienungsanleitung beachten !

05.04.2006

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1 = Working radius (distance between the center of the ringgear and the center of the bottom block or the load)
2 = Extent of counterweight with outriggers, swing and/or working range and the specified outrigger extension width.
3 = Data for the actual boom length and boom angle
4 = Telescoping states as percentage values.

5.2 Supporting forces charts

Besides the load chart column, the supporting forces charts contain the maximum supporting forces which might arise when the crane is supported by outriggers, when the loads specified in the load charts are slewed through 360°.
The wheel loads occurring in the course of work with the crane "on wheels, to the rear" are also listed (if admissible; observe the notes referring to the load charts).

Part B0

Safety Instructions

SAFETY INSTRUCTIONS FOR DRIVING AND CRANE OPERATION

1 Requirements and conditions for vehicles used in public road traffic.

The crane has been approved for use in public road-traffic, and has been registered by the competent, authorized government agencies subject to the appropriate legal provisions.

According to an expertise issued by the German Technical Supervision Authority (TÜV), the following conditions and requirements have to be satisfied to this effect:

- For the admissible axle loads, please refer to Part A) (Technical Data) of this Operating Manual.
- The boom must be swung "over-front", i.e. forward in the direction of the vehicle, be retracted completely, stowed and secured.
- The superstructure must be secured and locked mechanically to prevent it from slewing.
- The base section, the intermediate sections and the top jib - if available - of the jib must be transported by an auxiliary vehicle.
- The second hoist winch - if available - must be removed and transported by an auxiliary vehicle.
- The bottom block must be attached on the front bumper cross-member and secured, as described in the Operating Manual. Any national regulations differing from those mentioned above must be taken into consideration.
- Additional bottom blocks and other items of equipment must be transported by an auxiliary vehicle.
- Counterweights must have been removed and be transported by an auxiliary vehicle.
- Any counterweights, intermediate sections and other items of equipment transported on auxiliary vehicles must be secured adequately.
- The outriggers must be retracted completely and secured mechanically.
- The outrigger floats must be slipped into place and secured.
- The axle suspension must not be locked during on-road travel. The suspension system must be set to the level required for "on-road travel" according to the Operating Manual.
- The differential locks must have been deactivated. The differential locks may only be engaged for off-road use, if this should be indispensable; no curves should be taken when the locks are engaged.
- During on-road travel, the rear axle construction site mode must be deactivated. The rear axles are steered electronically depending on the speed, according to the current steering angles of the front axles.
- The 2nd axle drive (in case of 10x8 configuration) must have been deactivated.
- The lifting axle must have been lowered for on-road travel.

(cont'd.) **1** **Requirements and conditions for vehicles used in public road traffic.**

- Attachments and superstructure components must be secured so that they cannot slip or fall down.
- Objects which are not sufficiently secured must not be deposited on the platforms of the chassis and the superstructure.
- The traffic regulations must be observed taking account of the admissible axle loads (refer to part A) and gross vehicle weights (according to the expert opinions of the technical inspection agencies, the data given in the vehicle title or the vehicle registration papers).
- The tires must be checked for the specified pressure.
- The brakes must be checked for proper working order immediately after starting. The steering and lighting systems must also be checked.
- The parking brake must be engaged while the vehicle is parked. If parking on downhill slopes is inevitable, the wheels must be blocked using additional wheel chocks.
- Before entering curves, a lower gear must be selected in good time. Make sure that the gearbox is never shifted to neutral before or while negotiating a curve, as in this case the engine speed would drop suddenly to idling level, impairing the hydraulic assistance of the steering system, which would require increased effort at the steering wheel.
- The boom head must be marked on both sides with red-and-white diagonal section bars; when the machine is operated in the darkness, additional one type-approved bordering light must be located on either side. National registration requirements may differ from those mentioned and must be taken into consideration.
- According to ***§ 41/14 StVZO*** (German Federal Motor Vehicle Safety Standards), at least 4 wheel chocks, and at least 2 warning triangles and 2 portable warning lights pursuant to ***§ 53a, section 1 StVZO***, must also be carried in the vehicle. National registration requirements may differ from those mentioned and must be taken into consideration.
- **The vehicle owner or his authorized representative must instruct the driver regarding his particular obligations concerning operation of the vehicle, as required by traffic safety, and about the requirements specified in the exception permit. The driver has to confirm this instruction in writing. The vehicle owner must keep this confirmation for 2 years.**

Moreover, the provisions of the Federal Motor Vehicle Safety Standards (in Germany: StVZO) must be complied with.

The instructions given in the following chapters are intended to help you prevent damage and to increase the machine's availability by avoiding maintenance faults.

Particular attention should be paid to unusual sounds and occurrences during the first few operating hours.

Prerequisites of trouble-free operation are, apart from thorough application planning, an optimally serviced crane and a well-trained crane operator.

1.1 Important instructions regarding the load ratings of tires depending on the maximum travelling speeds and the stress to which the rims are subject

- The axle loads of the crane carrier have to be observed in view of the legal regulations valid in the country where the machine is to be registered.
- Regarding axle loads, a distinction must be made between the ***technically admissible axle loads*** and the ***axle loads specified by the legislation*** of the country where the machine is to be registered.
- Axle loads exceeding 12 t are not admissible for travelling on public roads in the countries of the European Community, according to EC regulations.

If a machine with an axle load exceeding 12 t is used on public roads, the vehicle operating company bears sole responsibility.

- Increased wear, especially on the brake linings, must be expected.
- Driving with increased axle loads may result in a considerable increase of the stopping distance.
- Due to their technical definition, the rims used have only a limited service life.
- As the **rims are important safety components of the crane**, they must be checked at regular intervals, and these inspections must be recorded.

  Given normal operation of the crane, the normal service life to be expected of the rim is approx. 80,000 to 100,000 km.
- High, jerky strains, or e.g. driving with excessive axle loads, which exceed the basic design data, may reduce the specified service life.
- Thus, it must be ensured that regular inspections of the rims, the frequency of which depends on the vehicle's operating conditions, or checks for fissures in the critical areas, e.g. the welding seam between the disc and the rim, are carried out.
- It is not admissible to repair any cracks by welding.

The vehicle operating company may only use rims approved by the vehicle manufacturer.

1.1.1 Correlation between the maximum technically admissible axle loads and the maximum travelling speed

	Tire size		
	385/95 R 25 (14.00 - R 25)	445/95 R 25 (16.00 - R 25)	525/80 R 25 (20.5 R 25)
	Tire pressure		
	10.0 bar	9.0 bar	7.0 bar
Max. travelling speed	**Axle loads**	**Axle loads**	**Axle loads**
80 km / h	12,0 t*)	12.0 t	12.0 t
70 km / h	12.0 t	14.5 t	14.5 t
60 km / h	13.5 t	15.0 t	15.0 t
50 km / h	14.0 t	15.5 t	15.5 t

***) <u>With tires 385/95 R 25 (14.00 R 25), the maximum distance covered within one hour must not exceed 70 km.</u>**

Memo:

2 Instructions for the crane operator

As the operator of the mobile crane, you have a number of responsibilities, i.e.:

- You should ensure that the mobile crane is always in a safe operating and road condition.

Recurrent inspections according to VBG 9, § 26 (1) (2)

Cranes must be inspected as required by the application conditions and the operating circumstances, at least however once per year by a person disposing of special knowledge about cranes (1), or by an expert (2) at least every four years.
These inspections must be carried out at the instigation of the crane operating company.

- You are entitled to refuse to work in contravention of the regulations.
- Inform your principal about all incidents. He must decide which steps are to be taken.
- You must ask unauthorized persons to leave your vehicle and its working range.
- If there is a risk to persons or equipment, you must take all the steps you consider appropriate to eliminate the risk.
- You must not perform any operations contrary to the regulations, such as diagonal pulling of loads, dragging of loads and working under troughs, reservoirs or equipment that is inclined but not secured.

Moreover, we would like to refer to the ***Regulations for the Prevention of Accidents*** *(German: UVV)* ***for cranes*** (VBG 9a) *and* ***for winches, hoisting and towing equipment*** (VBG 8) of the Professional Association, and the ***"acknowledged" rules of technology,*** *the* ***notices in DIN 15020 (pages 1 and 2)*** , to the ***Road Traffic Regulations*** *(in Germany: STVO)* and the ***Federal Motor Vehicle Safety Standards*** *(in Germany: StVZO)*.

The provisions of the UVV mentioned in this Operating Manual are valid within the Federal Republic of Germany.

In other countries, the national legal regulations must be complied with.

2.1 Applications planning

The basis of trouble-free operation is thorough planning of the application.

In good time before the operator drives the machine to the site of operation, he must obtain or provide himself with all the data and documents required for the work as a whole, especially as regards:

- preparation of a precise time schedule;
- the type of crane operation in question;
- the weight and the size of the load to be lifted;
- the required working radius and lifting height;
- the stability of the ground at the site of crane installation;
- the local conditions and restrictions at the site of crane installation, if any;
- finding out approach roads the vehicle can use given its length, width, height, and its total weight, and taking account of the admissible carrying capacity of bridges, headroom of underpasses and road widths.
- electrical overhead lines and their voltage.
- If necessary, request a police escort and obtain official permits.
- The applicable travel or exception permits.
- The appropriate paragraphs of the Federal Motor Vehicle Safety Standards *(in Germany: StVZO)* and Road Traffic Regulations *(in Germany: StVO)* of the country where the machine is to be registered, must be observed.
- Admissible limits for admissible axle loads and gross vehicle weights.

The crane equipment required for execution of the planned application must be prepared in accordance with the information on hand, especially:

- load hooks or bottom blocks,
- jib,
- counterweights,
- load securing ropes, chain suspension devices, crossbeams and other, similar attachments,
- supporting plates for the ground, if necessary,
- an auxiliary vehicle for transport, if any.

DANGER **If the crane operator is not given all the data he requires, the work planned at the site of application may prove to be impossible; this may even force him to improvise. This in turn increases the risk of accidents.**

2.2 Steps to be taken before crane operation

- The ground conditions on the site of crane operation should be checked with regard to stability (load-bearing capacity); if necessary, the ground should be reinforced with sheet metal plates.
- The driveways to be used by the vehicle on the site should be cleaned; any unevenness should be eliminated.
- The lifting capacities indicated in the load charts are only valid for the vehicle standing on level ground (crane standing free on wheels), or for the crane aligned horizontally and stabilized by outriggers.
- The crane must be supported by outriggers as specified; the axle suspension must be blocked before outrigger operation, according to the Operating Manual.
- All outrigger beams must be extended completely and locked mechanically. If the outrigger beams are not extended completely, this reduces the lifting capacity.
- The outrigger cylinders must be supported with robust materials (e.g. timbers), and centered on these large-size supports. Deals or piles of bricks are not suitable.
- The outrigger cylinders must not be extended to their end positions. Wooden planks should be placed underneath the outriggers, leaving a clearance of approx. 10 to 15 mm in the cylinders.
- The vehicle must be aligned horizontally (watch spirit levels).
- The tires must be lifted clear off the ground, if this is specified in the Operating Manual.
- The tires must be checked for the specified inflating pressure, if driving with a load fixed to the boom is admissible according to the Operating Manual or the Notes referring to the load charts.
- Before starting to work with the crane, check the vehicle's hydraulic system and all controls and gauges for proper working order.
- The shortest possible boom length and working radius must be used on all accounts. The working radius is the distance between the center of the ringgear and the center of the bottom block or the load.
- The size and the weight of the load to be lifted must be known.
- The bottom block, the load securing ropes, the crossbeam etc. are parts of the load and must be deducted from the lifting capacities in question.
- The safety equipment installed in the machine must be checked for precision and proper working order. If the operating staff is not absolutely sure about its function or reliability (100 %), crane work must not be started.

2.2.1 Checking the ground quality

A fundamental prerequisite of safe crane work is that the machine is used on sufficiently solid ground. The choice of the appropriate site of installation for the crane is also decisive for correct execution of the planned work.

The site of installation must be chosen in such a way, that:

- the prevailing ground quality is sufficient to withstand the loads occurring during the work;
- the outriggers can be extended according to the value specified in the load chart;
- there are no obstacles in the slewing range of the counterweight or of the superstructure;
- the work can be effected with a minimum working radius.

DANGER **To ensure safe crane operation, it is essential for the crane to be installed on sufficiently solid ground. If ground stability is inadequate, there is an increased risk of accidents.**

When the crane is supported by outriggers during work, huge forces are introduced into the ground via the outriggers. In specific cases, almost the whole weight of the crane plus the load may be directed onto the ground via a single outrigger.

The maximum supporting forces which may occur while the loads specified in the load chart are slewed within a working range of 360° have been specified in the supporting forces charts.

Accordingly, the corresponding wheel loads for work with the crane on wheels are specified in the wheel load charts.

For information regarding specific ground pressures, please refer to the German ***DIN standard 1054 "Admissible loads acting on the construction site"***. The following table shows an excerpt of the admissible ground pressures.

Under certain circumstances, it may be necessary to check the load-bearing capacity and the stability of the ground where the crane is to be installed by means of appropriate testing methods (if necessary, have soil surveys made using a piling ring). The outrigger floats may have to be provided with suitably sized supporting material, depending on the soil's stability.

The prevailing maximum specific ground pressure can be computed on the basis of the crane's maximum supporting force (see supporting forces chart) divided by the surface area of the outrigger float.

$$\text{Ground pressure} = \frac{\textbf{Supporting force}}{\textbf{Outrigger float surface area}}$$

The calculated ground pressure must by no means exceed the ground pressure which is admissible for the ground in question.

The required minimum supporting surface can be computed on the basis of the crane's supporting forces (see supporting forces chart), divided by the admissible load bearing capacity of the ground.

$$\text{Required supporting surface} = \frac{\textbf{Supporting force}}{\textbf{admissible load bearing capacity of the ground}}$$

The existing supporting surface must by no means be less than the calculated minimum supporting surface.

2.2.2 Admissible ground pressures (**excerpt from German Industrial Standard DIN 1054**)

Nature of soil		daN/cm2
Loosely tipped soil, not artificially compacted:		0-1
Natural soil, obviously virgin soil:		
	Mud, turf, moorland	0
	Fine to medium-fine sand	1.5
	Coarse sand to gravel	2.0
Binding soil:		
	Very soft	0
	Soft	0.4
	Firm	1.0
	Semi-firm	2.0
	Hard	4.0
Rock with a low cracking rate, in good condition and position, free from weathering:		
	in compacted strata	15
	in block or pillar form	30
Artificially compacted soil		
	Asphalt	5 - 15
	Concrete B I	50 - 250
	Concrete B II	350 - 550

DANGER **No thin boards, lime sand brick or similar material may be used as supports for the outrigger floats.**
Make sure that only sufficiently rugged material, e.g. sufficiently thick wooden planks, are used.
Moreover, it is very important to place the outrigger floats centrally on their supports, for even distribution of pressure on the support.

Non-compliance signifies an
increased risk of accidents.

2.2.3 Distance of the crane from ditches, slopes and excavations

Once the site of installation of the crane has been chosen, it must be ensured that the crane is not installed too close to ditches, slopes or excavations.

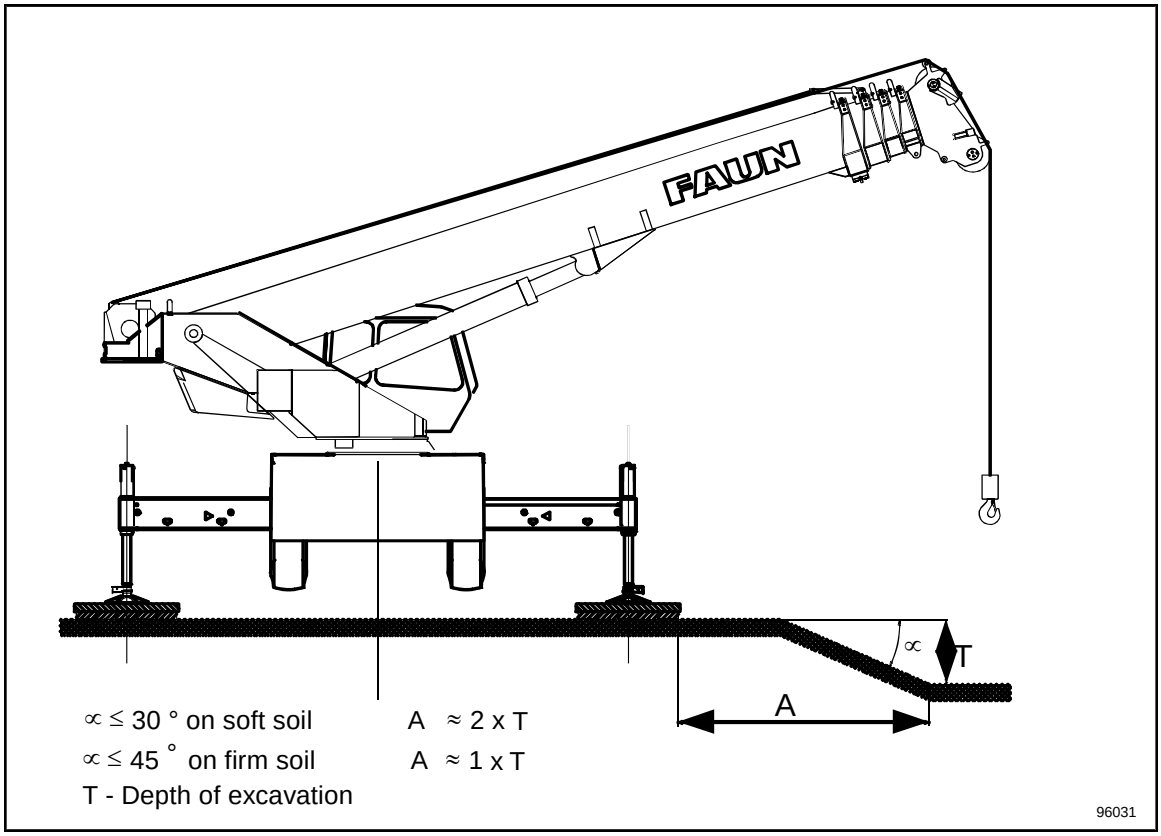
There is a risk that the edge of the slope or the excavation might slip away under the load of the outriggers, causing the crane to tip over.

Depending on the prevailing type of soil, a sufficient safety clearance must be provided between the outriggers and the edge of the excavation; this safety clearance is measured from the base of the excavation.

DANGER **In case of loose or back-filled soil (gradient of slope approx. 30°)**
the safety clearance = twice the depth of excavation (A = 2 x T)

In case of natural soil which is not loose (gradient of slope approx. 45°)
the safety clearance = once the depth of excavation (A = 1 x T)

If these minimum safety clearances cannot be guaranteed, the edge of the slope or the excavation must be supported,
as otherwise there is an
increased risk of accidents.



2.3 Supporting by outriggers

It is extremely important that the outriggers are extended according to the selected load chart and to the extension width specified there, and that the load is divided up between all outriggers.

Make sure that the crane's actual supporting base does not fall short of the extension width specified in the selected load chart.

Extension widths other than those specified in the load charts are not admissible, as the transmission of transverse forces into the outriggers is only possible at appropriately constructed points defined by design.

DANGER **Extension widths other than those specified in the load charts are not admissible.**
The outrigger beams must be locked mechanically in their appropriate positions by insertion of locking pins, so that they cannot slip.
If these instructions are not observed, there is an
increased risk of accidents.

The operator must extend the outrigger beams according to the selected load chart not only on the load side of the crane, but also on the opposite side of the load. If the outrigger beams on the opposite side of the load are not extended, there will be an increased risk of accidents for the following reasons:

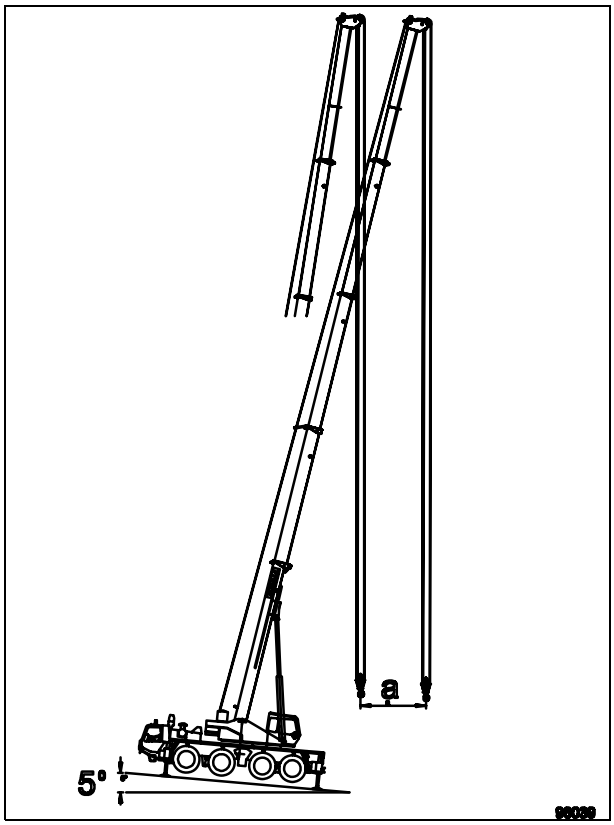
DANGER **Contrary to expectation, it might become necessary to swing the load over the other side, where the outrigger beams are not extended.**
This may cause the crane to tip over.

The load suspended on the hook deforms and consequently stresses the boom. If the winch rope or a load securing rope breaks under such circumstances, or if the load falls out of the load securing ropes, the crane would suddenly be discharged from its load and the boom would bounce up.
This may cause the crane to tip over backwards.

(cont'd.) **2.3 Supporting by outriggers**

Besides the correct and safe supporting of all outrigger floats and besides complying with the correct extension width, the horizontal alignment of the crane's plane of rotation is extremely important for safe crane operation.

In the case of a crane with a boom of 60 m, which is placed at an inclination angle of 5°, the working radius is increased by approx. 5 m ("a").



DANGER **If the crane is not aligned horizontally and if the boom is placed at right angles to the slope, pressure is exerted on the boom transverse to the main loading direction when the load is picked up, so that it may even kink under certain circumstances.**

DANGER **If the crane is not aligned horizontally and the boom is slewed towards the slope, this increases the working radius which may cause the crane to tip over under certain circumstances.**
A crane which is not aligned horizontally implies a
r i s k o f a c c i d e n t s .

2.4 Counterweight

The size of the counterweight required is determined by the working radius required for the crane work in question, and by the weight of the load to be lifted. The counterweight required has to be mounted in accordance with the counterweight data specified in the load chart which is required for the crane work in question.

Attention **None of the counterweight units belonging to the machine, which can be removed and unscrewed, may be replaced by counterweight units of other machines.**

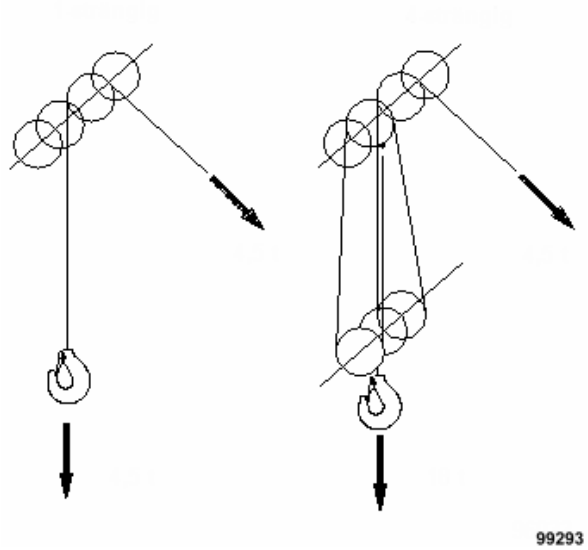
DANGER **If the crane is not equipped with the counterweight specified in the load chart, there is a**
r i s k o f i t s o v e r t u r n i n g , i . e . a r i s k o f a c c i d e n t s .

2.5 Hoist winch and reeving of the winch rope

The lifting capacity of a crane depends on the traction force of the hoist winch and on the selected number of rope falls. When the work is effected with "direct" rope arrangement (= one rope fall), the crane can only lift the weight which can be pulled by the hoist winch. (See Notes referring to the Load Charts).

If the load to be lifted exceeds the traction force of the hoist winch, the winch rope must be reeved between the rope sheaves in the boom head and the pulleys in the bottom block as many times as necessary, according to the principle of lifting tackle.

For rope reeving, please observe the "Notes referring to the load charts" and the specifications of the Operating Manual.



arrangement with a single rope fall
arrangement with four rope falls

DANGER **If the maximum admissible traction force of the hoist winch is exceeded, there is an increased risk of accidents as the winch rope may break, or as the planetary gears or the hydraulic motor of the hoist winch may be damaged.**

NOTE **The annually consumed portion of the theoretical service life of the winch must be determined according to the amendment and the supplement to the regulation for the prevention of accidents *"VBG 8, Winches, Hoisting and Towing Equipment".* If the theoretical service life of the winch has elapsed, a general overhaul of the winch is necessary. After 10 years, a general overhaul of the winch must be effected on all accounts (refer also to part E "Crane Testing Instructions").**

2.6 Taking account of the wind speeds

The maximum wind speeds at which crane operation is admissible stated in the load charts must be adhered to.

When the wind speeds exceed the specified values, crane work must be stopped and the boom must be retracted or deposited.

DANGER **If inadmissibly high wind speeds are to be expected in view of the prevailing weather conditions, before he starts working with the crane, the crane operator has to ascertain with the competent meteorological authority the wind speeds which may occur.**
Crane work must not be performed if inadmissibly high wind speeds are to be expected.
If the admissible wind speed limits are not observed, there is an enhanced risk of accidents.

(cont'd.) **2.6 Taking account of the wind speeds**

The following table contains a few reference values enabling the assessment of the prevailing wind speeds.

Wind intensity		**Wind speed**		**Evaluation of wind**
Beaufort scale	**Description**	**m/s**	**km/h**	**in continental areas**
0	calm	0-0,2	1	Calm; smoke rises in straight line.
1	light air	0,3-1,5	1-5	Direction of wind indicated only by draught of smoke, not however by vane.
2	light breeze	1,6-3,3	6-11	Wind can be felt in your face; foliage rustles, vane moves.
3	gentle breeze	3,4-5,4	12-19	Foliage and thin twigs move. Wind flattens a pennant.
4	moderate breeze	5,5-7,9	20-28	Lifts dust and loose sheets of paper, moves twigs and thin boughs.
5	fresh breeze	8,0-10,7	29-38	Small broadleaf trees begin to wave to and fro. White crests appear on lakes.
6	strong breeze	10,8-13,8	39-49	Thick boughs move; telegraph lines whistle; umbrellas can be used only with difficulty.
7	near gale	13,9-17,1	50-61	Entire trees in motion; tangible resistance felt when walking against the wind.
8	gale	17,2-20,7	62-74	Tears boughs from trees, walking outdoors is extremely difficult.
9	gale-force wind	20,8-24,4	75-88	Minor damage to houses (chimney heads and roof tiles are blown off).
10	severe gale	24,5-28,4	89-102	Uproots trees; severe damage to houses.
11	light hurricane	28,5-32,6	103-117	Extended storm damage in places (occurs very rarely inland).
12	hurricane	32,7-36,9	118-133	Extremely severe devastation.

DANGER **When a thunderstorm is brewing, crane work must be stopped <u>immediately</u>, and the boom must be retracted!**

2.6.1 Influence of and attention to the action of wind

In general, crane operation is only admissible at wind speeds which do not exceed the rating "v" indicated in the "Notes referring to the load charts". In this context, the prevailing load wind area A_{Wvorh} must not exceed the load wind area A_{Wzul} considered in the calculation. The load wind area A_{Wzul} which has been considered in the calculation, is specified in diagram 2 "Load wind area". If the load wind area is greater than that which has been considered in the calculation, crane work is only admissible at an accordingly reduced wind speed. This reduced wind speed is specified in diagram 1 "Dynamic pressure" (see the following example):

(cont'd.) **2.6.1 Influence of and attention to the action of wind**

DANGER **Before the crane operator starts any crane work, he has to obtain information about the wind speeds which must be expected; if necessary, he may have to check the wind speeds which may occur with the competent meteorological authority. Crane work must not be performed if inadmissibly high wind velocities are to be expected. The maximum admissible wind velocities specified in the "Notes referring to the load charts" must not be exceeded on any account; even if the prevailing load wind area is smaller than that which has been considered in the calculation.**

Example for the determination of the reduced wind speed

Admissible wind speed for the crane, e.g. v = 12 m/s (from "Notes referring to the load charts").
Weight of the load to be lifted G = 20 t
Prevailing wind area of the load to be lifted: A_{Wvorh} = 40 m^2

1. According to diagram 1 "Dynamic pressure", at a wind speed of 12 m/s (= 43.2 km/h), the resulting dynamic pressure amounts to 88 N/m^2.

2. According to diagram 2, an admissible load wind area of A_{WZUl} = 23 m^2 results for the load to be lifted.

Formula for calculation

$$F_w = q \times A_{wzul}$$

$$2024N = 88\ N/m_2 \times 23\ m^2$$

Thus, a load of 20 t with an admissible load wind area A_{wzul} = 23 m^2 is subject to a wind force of Fw = 2024 N.

Formula for calculation

$$q = \frac{F_w}{Aw_{vorh}}$$

$$50{,}6\ N/m^2 = 2024\ N/m^2 / 40\ m^2$$

In case of the prevailing load wind area Aw_{vorh} = 40 m^2 , at the calculated wind force Fw, the maximum admissible dynamic pressure is q = 50.6 N/m^2.

3. Thus, according to diagram 1 "Dynamic pressure", at a dynamic pressure of q = 50.6 N/m^2, the maximum admissible wind speed of V_{red} = 9 m/s (= 32.4 km/h).

A_{wvorh} Prevailing wind area of the load to be lifted in m^2
A_{wzul} admissible load wind area in m^2
F_w Prevailing wind force acting on the load to be lifted, in N
q Dynamic pressure in N/m^2
v_{red} Reduced wind speed in m/sec

noch: **2.6.1** **Influence of and attention to the action of wind**

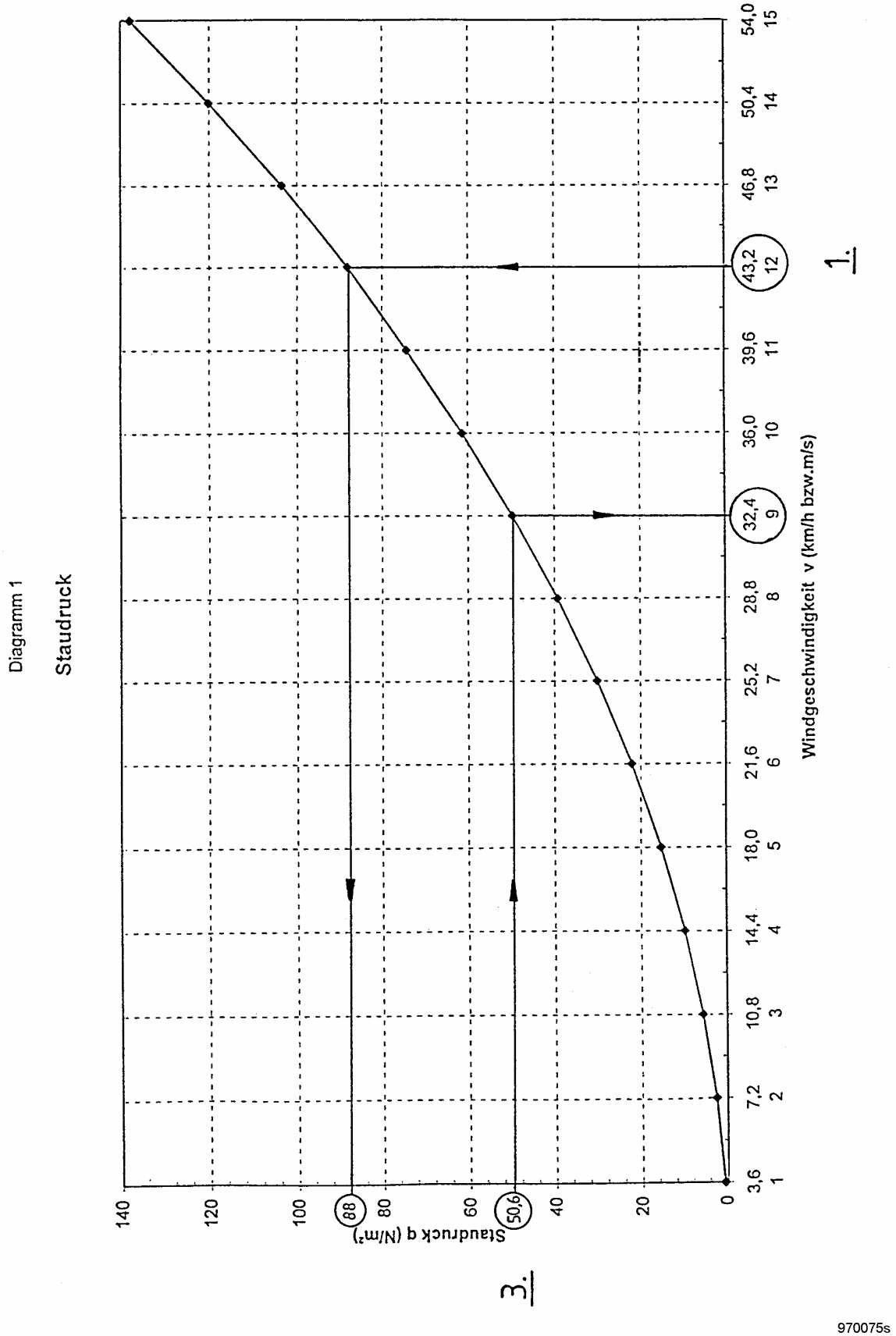


Diagram 1 - Dynamic pressure - Wind velocity (km/h or m/s)

noch: **2.6.1** **Influence of and attention to the action of wind**

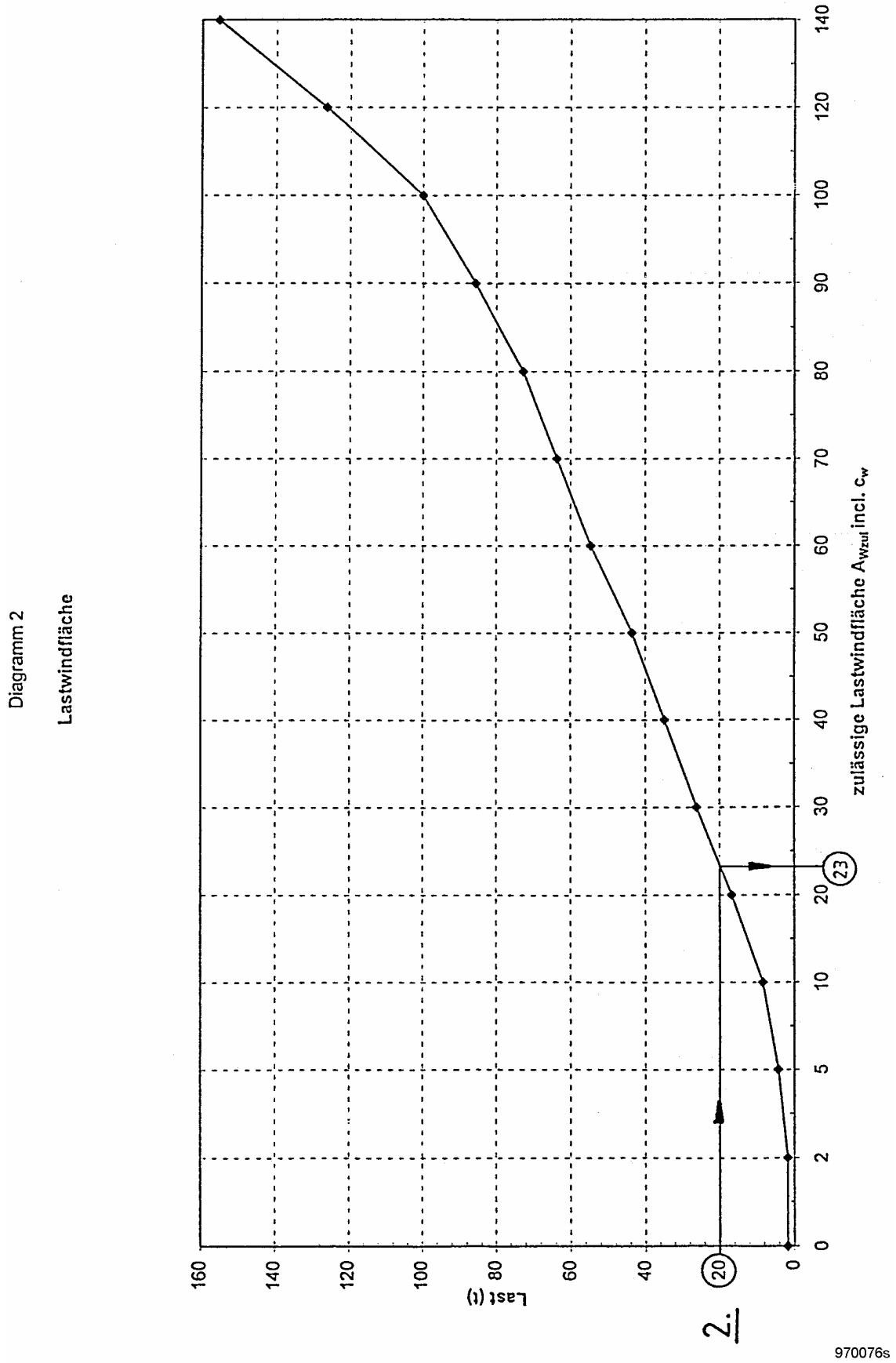


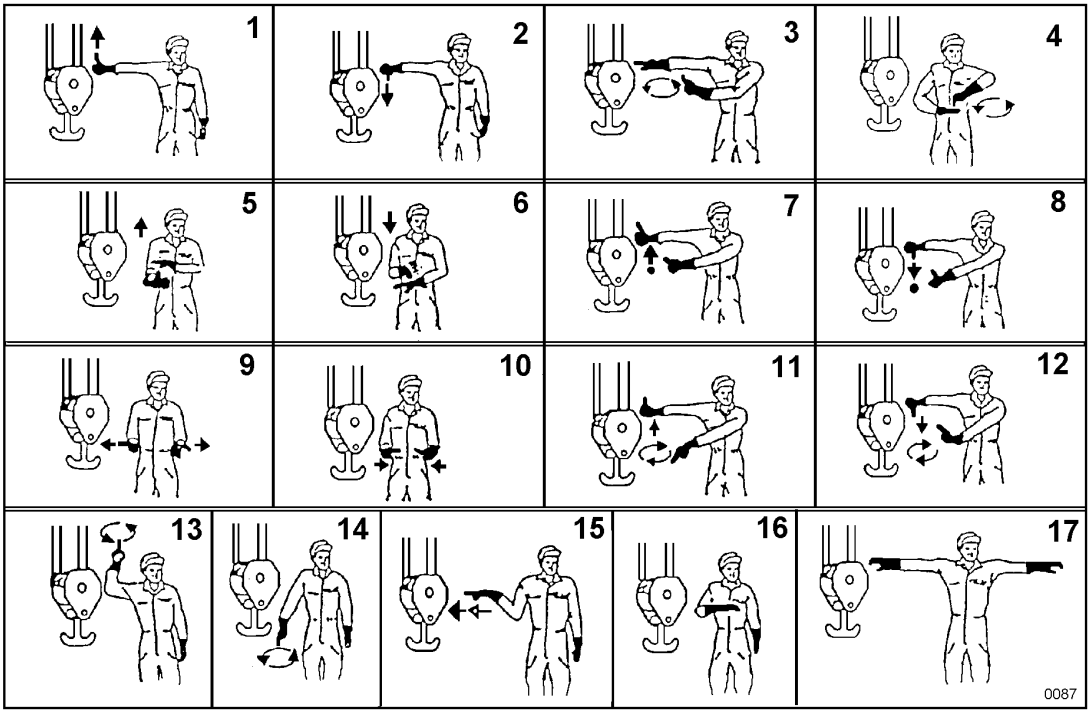
Diagram 2 - Load wind area - admissible load wind area A_{wzul} incl. c_w

2.7 Hand signals recommended for communication between the crane operator and his assistant

During all intended crane movements (with or without load), the crane operator must always have the load or the load lifting device in his field of vision. Loads fixed by hand may only be moved by the crane operator after he has received a corresponding signal from the person fixing the load or from another responsible person who has been determined in advance.
If the crane operator's field of vision is impaired by obstacles, he may only move the crane or the load with the help of an assistant determined in advance, who gives him appropriate instructions.
The instructions can be given using radio equipment or hand signals. However, clear communication free from misunderstandings must always be ensured between the assistant giving the instructions and the crane operator.

DANGER **Hand signals and special verbal expressions must be agreed between the crane operator and his assistant, and observed precisely.**
Any mistakes regarding the interpretation of the hand signals or verbal expressions may result in accidents.
The persons giving the hand signals must always be placed so that he can see the crane operator, and keep at a safe distance from the hook or the load.

The following hand signals are recommended for the working movements:



Explanation of the hand signals

1 Boom elevation "up"
2 Boom elevation "down"
3 Lifting the load slowly
4 Lowering the load slowly
5 Boom elevation slowly "up"
6 Boom elevation slowly "down"
7 Boom elevation "up" and holding the load
8 Boom elevation "down" and holding the load
9 Extending the boom
10 Retracting the boom
11 Boom elevation "up" and lowering the load
12 Boom elevation "down" and lifting the load
13 Lifting the load
14 Lowering the load
15 Swinging load in the indicated direction
16 Stopping all movements
17 Stop! Working movement finished.

Should any particular national regulations be valid in the country where the machine is to be registered, these appropriate national regulations must be observed.

2.8 Work in the vicinity of electrical overhead lines

When crane work is performed near electrical overhead lines, serious accidents may occur if the crane moves the boom or the load too close to, or even touches, the overhead line.

In case of voltages below 1000 V, only direct contact with the overhead line will in general involve a risk; however, at voltages over 1000 V, even an indirect approach of the overhead line may cause a current spark-over and consequently accidents.

Before commencing work, the rated voltages of any overhead lines in the working area must be enquired at the responsible power supply company.

If possible, the overhead line must either be switched off, or covers or barriers must be provided for the danger zone.

However, both of these measures may only be performed by well-trained electricians or by employees of the responsible power supply company.

If it is not possible to perform these measures, a sufficient safety clearance from the live lines must be kept on all accounts. The appropriate safety clearances are indicated in the following table.

According to the ***German VDE directive 0105***, the following safety clearances from live lines must be observed even in the most unfavourable crane positions, and taking account of possible oscillations of the overhead line which may be due to the action of wind.

Rated voltage	Minimum clearance to be observed
up to 1000 V (1 kV)	1 m
over 1,000 V up to 110,000 V (over 1 kV up to 110 kV)	3 m
over 110,000 V up to 220,000 V (over 110 kV up to 220 kV)	4 m
over 220.000 V up to 380.000 V (over 220 kV up to 380 kV)	5 m
if nominal voltage is not known	5 m

Work near overhead lines should only be performed with the help of a signal person. The safety clearances and the hand signals used for communication must be determined together with the signal person. The assistant must have free vision on the entire working area, and be in constant eye contact with the crane operator.

DANGER **Crane work in the vicinity of live overhead lines requires extra care.**
The minimum safety clearances specified above must be observed on all accounts, as reduced clearances would entail a considerable risk of accidents.

DANGER **When a thunderstorm is brewing, crane work must be stopped immediately, and the boom must be retracted!**
There is a risk of lightning stroke!

2.9 How to behave in case of spark-over (if the crane has touched the power line)

If an overhead line has been touched or a current spark-over has occurred in spite of all precautions, please observe the following instructions:

- Keep calm and do not leave the crane cabin.
- Warn persons outside about the danger; instruct them not to approach or touch the crane.
- Remove the crane from the danger zone by driving away or by slewing or adjusting the boom.
- Request persons outside of the danger zone to shut off the power supply.
- If it is indispensable to leave the crane cab, never touch the crane and the ground at the same time. Do not climb down, but jump to the ground.
- Leave the crane area, making small steps.

2.9.1 Inspection measures required after an electric shock or a lightning stroke

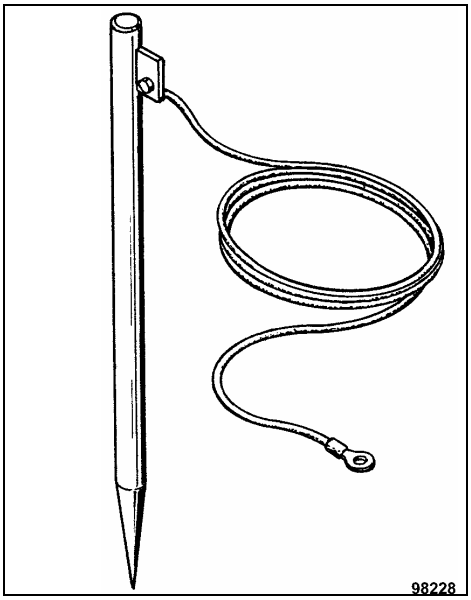
DANGER **After an electric shock or a lightning stroke, the electrical and electronic components must be checked for proper working order. The ball-bearing slewing device must be checked for damage and smooth motion.**

2.10 Grounding the crane and the load

During crane work, the crane and the load might be charged electrically under certain circumstances. This may occur, e.g., during work near powerful radio transmitters or RF change-over stations.
The crane may be electrified especially if the crane's outrigger floats are supported with insulating material (e.g. squared timbers).
The load may also be electrified (e.g. in case of hoisting tackles of non-conducting materials, or if plastic rope sheaves are used on the crane).
Thus, it may be necessary to ground the crane and the load. To this effect, the part to be grounded (crane or load) must be connected to the soil in an electrically conductive fashion.

Grounding the crane:

- Use a ground cable with a sufficient cross section ($\geq$ 16 mm^2).
- To save the ball-bearing slewing device, fasten one end of the ground cable directly to the superstructure or the boom using a screw clamp or a vise-grip wrench (do not fasten to screwed-down or bolted components).
- Fasten the other end of the ground cable to a metal bar stuck into the soil.



Attention **When slewing the crane, make sure the ground cable can move without obstruction. The ground cable must not be crushed or torn apart.**

NOTE **The ground cable and the ground spike are available as an assembly, including the connectors and the fastening point on the vehicle (optional equipment).**

Grounding the load:

- Use a ground cable with a sufficient cross section ($\geq$ 16 mm^2).
- Fasten one end of the ground cable to a metal bar stuck into the soil.
- Fasten the other end of the ground cable to a metal bar with insulated handle.
- Hold the metal bar against the load (only grasp at the insulated handle).

DANGER **During grounding work, the operator must wear safety equipment, e.g. special shoes, gloves.**

NOTE **When work is effected in the radius of action of RF transmitters, the transmitter company must be contacted. The grounded crane may give rise to interferences.**

DANGER **When a thunderstorm is brewing, crane work must be stopped immediately, and the boom must be retracted!**
There is a risk of lightning stroke!

2.11 Work in the vicinity of supply lines

DANGER **Particular caution is required in the area of exposed supply lines. Damage to such lines and any resulting leakage may have imprevisible consequences.**

Before crane work begins, it must be ensured which fluids are transported in the supply lines. To this effect, the operating company involved must definitely be contacted.
If the lines contain substances which imply a hazard to the environment or to health, all the necessary safety measures must be stipulated in cooperation with the operating company.
Such work should only be performed with the help of assistants. The assistant must also be familiar with all the safety precautions. Before work begins, hand signals must be defined for communication. The assistant must have free vision on the entire working area, and be in constant eye contact with the crane operator.

2.12 Crane work with a load

Before the crane operator starts to work with the crane, he has to verify that the operational reliability of his crane is ensured.
All safety devices, e.g. brakes, hoist limit switches, winch limit switches, automatic safe load indicator etc. must be in an operationally reliable condition.

The crane operator has to observe the following items:

- Before the crane operator starts crane work, he has to inform himself about the dimensions and the weight of the load.
- The lifting capacities specified in the load chart have to be observed and must not be exceeded.
- The crane must be placed horizontally on solid ground with the extension width specified in the load chart, and with an appropriate counterweight.
- The load moment limiter must be adjusted correctly according to the crane's rig arrangement.
- The load fixing, lifting and carrying devices must be suitable for the load to be lifted, and feature a sufficient lifting capacity.
- The load securing, lifting and carrying devices are part of the load to be lifted and must be deducted from the lifting capacities specified in the load chart.

Example for the determination of the actual payload of the crane:

Admissible lifting capacity according to the load chart (gross load)	11.100t
Dead weight of the load securing ropes	0.050t
Dead weight of the crossbeam	0.125t
Dead weight of the bottom block	0.350t
Actual payload of the crane (net load)	**10.575t**

In this case, the weight of the load to be lifted must not exceed the calculated payload of the crane, which amounts to 10.575 t.

2.13 Notes regarding work with two cranes

Sometimes two cranes may be required to move bigger and considerably heavy loads.

DANGER **Executing such work requires a high degree of operator experience and attention, as otherwise there is a considerable**

Risk of accidents !

When working with two cranes, take note of the following instructions:

- Work should be effected, as far as possible, with two identical cranes (e.g. telescopic cranes with the same capacity rating).
- The load must be picked up and distributed so that the maximum lifting capacity of the crane is not exceeded. In the case of cranes with different capacity ratings, the lifting capacity of the smaller (less powerful) crane is decisive.
- It must be ensured that the load does not exceed 2/3 of the total lifting capacity of the two cranes.
- The winch ropes must always be suspended vertically; neither of the cranes must pull to the side.
- Before commencing work, the crane operators must determine a common approach. They must agree on hand signals for communication.
- Work may only be performed with the help of an assistant. One assistant should be charged with guiding the two cranes and giving signals for both of them. The assistant must also be informed about the work approach and the hand signals. Moreover, he should be able to see the entire working range and be in constant eye contact with the crane operators.

2.14 Instructions for crane operation

- The crane is ready to operate at ambient temperatures in the range from -25°C to +40°C.
- During crane operation, the gearshift lever must be set to neutral.
- The hydraulic axle suspension must be locked for crane operation according to the operating manual, before the outriggers are set and before driving with the crane on construction sites in full rig arrangement.
- Loads may only be lifted after persons have left the danger zone.
- It is not admissible to drive with a load or to work with the crane free on wheels (observe the notes referring to the load charts).
- For moving the crane in full rig arrangement on construction sites, see Notes referring to the Load Charts, and item B2-7.4.
- The maximum admissible wind velocity and load wind area according to the load chart must not be exceeded.
- Check that the ground is completely level and sufficiently resistant.
- Construction sites must be sufficiently illuminated for work at night.

  The crane's working floodlights alone might not be sufficient for this purpose. In this case, the construction site must be illuminated sufficiently by additional light sources, independently of the crane lighting equipment.
- To enhance the crane operator's safety, appropriate safety equipment must be used for crane work.
- As long as the engine is running and/or a load is suspended freely, the operator must not leave the crane cabin.
- Before the operator leaves the superstructure cabin, he must place the load on the ground, stop the engine and remove the ignition key.

2.15 Crane application in accordance with the intended use

Crane application **in accordance with the intended use** is operation as an assembly crane, and consequently, lifting and transporting of loads.
The machine has been designed and built only for operation in areas where there is **no risk of explosion**.

2.16 Crane application not in accordance with the intended use

Crane application **not in accordance to the intended use** includes piling, vibrating and clamshell operation, and the use as a loading and unloading crane.

2.17 Potential causes of accidents

The majority of the damage caused during operation of automotive cranes is due to operating errors, whereas the minority is due to inadequate maintenance of the machine.

Consequently, to avoid accidents, it is important for the crane operator to be thoroughly trained in the operation, application and maintenance of the crane.

The crane operator must be able to recognize any risks endangering the health and safety of himself and other people, and to take the appropriate measures to avoid such risks.

2.17.1 Causes for driving faults

- Overspeed of engine and/or gearbox when driving on downward gradients.
- The gearbox has not been shifted down in time before the vehicle enters a curve. Make sure that the gearbox is never shifted to neutral before or while negotiating a curve, as in this case the engine speed would drop suddenly to idling level, thus impairing the hydraulic assistance of the steering system, which would require increased effort at the steering wheel.
- The differential locks are not disengaged during on-road travel.
- The handbrake is not applied when the vehicle is parked; no additional wheel chocks are used when the machine is parked on downward gradients.
- Loose items have been left on the machine; accessories are not secured and can fall off.
- Due to an insufficient passage clearance, the machine collides with bridges and roofs.
- The admissible axle loads or the gross vehicle weight have been exceeded.

DANGER **The machine's braking performance decreases to the same extent as the axle loads or the gross vehicle weight have been exceeded beyond the admissible limits against the admissible ratings. Thus, the entire brake system no longer satisfies the legal provisions.**

If these items are not observed, there is an
increased risk of accidents.

2.17.2 Causes for faults during crane operation

Such causes and faults may occur during crane operation for the following reasons:

- the crane is not mounted with the outrigger beams extended and secured as specified in the load chart;
- the outrigger floats are not supported with solid material, as required by the ground conditions;
- the outrigger floats are not placed centrally on their supports;
- the outrigger cylinders have been extended to their end position.
- The crane is not aligned horizontally and if the tires are not lifted off the ground as specified in the Operating Manual;
- The crane is installed too close to the edge of slopes or excavations.
- The hydraulic axle suspension is not locked.
- The crane is driven over excessively sloped or excessively uneven ground.
- The rope becomes slack on the hoist winch.
- Improper securing of loads.
- Errors committed during operations, e.g. too fast braking of the load, fast slewing of the boom under load, diagonal pulling of loads, or breaking them loose.
- Excessive loads imposed on the crane.
- Excessive wind loads acting on the load and/or the crane.
- The counterweight has not been selected according to the load chart.
- The automatic safe load indicator is not set to the actual rig arrangement of the crane.
- The automatic safe load indicator and other safety devices are faulty or not in operation.
- The admissible loads or the working radii specified in the load charts are exceeded.
- During crane work diagonal tensile stress is applied to the boom, especially in a lateral direction.
- Any obstacles impeding the crane's movements are ignored.
- The suspended load starts to swing due to negligent crane operation.
- Fixed loads are broken off using the hoisting gear. As the boom bounces up, this may cause the crane to tip over backwards.
- **The crane operator tries to lift too heavy loads from the ground using the boom elevation.**

  (In this case, the automatic safe load indicator will emit an "overload" warning signal, however the movement "boom elevation UP" is not stopped, as this is a movement which tends to reduce the load moment.)
- In the course of demolition work, too heavy loads are secured, which are suspended freely on the crane once the connections have been released.
- The minimum clearance from live overhead lines is no longer maintained during crane work.

DANGER **If these items are not observed, there is a considerable risk of accidents.**
Before the operator starts crane work, he has to check whether the safety measures have been effected as specified above.

DANGER **When a thunderstorm is brewing, crane work must be stopped immediately, and the boom must be retracted!**
There is a risk of lightning stroke!

2.17.3 Servicing faults which may cause accidents

- Lack of oil, grease or anti-freeze agent in the various assemblies.
- Only the specified lubricants and oils may be used in accordance with the chart of approved lubricants.
- Water has entered the compressed air system, in spite of the air drier installed; actuate the drainage valves at regular intervals and drain the water completely.
- Damage to the plastic tubes of the compressed air and centralized lubrication system during drilling or welding; make sure that the plastic tubes are covered or removed during all drilling or welding work.
- Apparent or hidden damage to the tires which may result in a sudden loss of pressure.
- When replacing wheels or performing other assembly jobs, observe the specified tightening torques of the nuts and bolts.
- Loosening of screw couplings; make sure that the correct tightening torques are adhered to on re-tightening.
- Loosening of wheel nuts; make sure that the correct tightening torque is adhered to on re-tightening.
- Insufficient maintenance, which may result in an unexpected malfunction of assemblies, e.g. of the braking and steering systems.
- Worn ropes which are ready for discarding and may break suddenly.
- Deficiencies in the hydraulic system, e.g. frayed hoses.
- Defective or unsatisfactorily operating safety devices, e.g. load moment limiters or hoist limit or winch limit switches.
- The brakes have to be checked for proper working order.
- During this inspection, the brake linings must be checked for wear.
- Brake linings are subject to increased wear after installation; they must be checked more frequently during this period.
- The steel structures, welded components and parts subject to increased stress must be examined visually.

DANGER **The crane operator must have undergone thorough training with the crane, to be able to detect and to avoid all dangers which may occur in the course of operation.**
If work is not effected in an expert manner, there is an
increased risk of accidents.

2.18 Fire, smoke, inflammation and explosion hazard

- The crane may on principle only be used in areas where there is no risk of explosion.
- When handling fuel or consumables and during maintenance work on the batteries, smoking and handling open flames is prohibited.
- Handling fire or open flames on the crane is prohibited.
- Maintenance work must never be performed on hot units, but only after they have cooled down. Otherwise, there is a risk of burning!
- In the vicinity of hot surfaces, insulating or sound-absorbing mats contaminated by fuel, oil or grease imply a considerable risk of fire; thus, they must be replaced by new, clean insulating or sound absorbing mats.

2.19 Instructions and regulations concerning the compressed air tanks installed in air-operated braking systems

- The **compressed air tanks installed** are in conformance with the EEC (EU) directive 87/404/EEC and are **approved exclusively for air-operated brake systems**.
- During the vehicle's service life, recurrent pressure checks are only necessary if they are required by the regulations in force in your country.
- The compressed air tanks must be checked visually in accordance to the maintenance instructions laid down in your country's regulations.
- During the vehicle's service life, the drainage valves installed in the compressed air tanks of the brake system have to be actuated at regular intervals, although an air drier is installed; accumulated water must be drained away completely.

Memo:

3 Instruction Sheet for Overload Safety Devices for Boom Cranes (excerpts)

Issued by: VDMA-Fachgemeinschaft Hebezeuge
im Verein Deutscher Maschinenbau-Anstalten e.V.

The hydraulic crane supplied to you has been equipped with an overload safety device (automatic safe load indicator), which serves to shut off the crane when the admissible load moment is being exceeded. In order to enable discharging after the overload safety device has reacted, it must still be possible to perform a contrary movement. This means, for example, that it must still be possible to lower the load after the hoisting gear has been switched OFF.

An overload safety device (automatic safe load indicator) is installed to prevent crane use for lifting of loads which endanger its stability. Thus, the overload safety device is an emergency switch which, in case of crane overloads, shuts off all movements which might increase the load moment, and thus prevents possible damage or accidents.

In order to enable the overload safety device to fulfil its functions as a safety unit, please pay special attention to the following instructions:

1) Overload safety devices (automatic safe load indicators) must not be used for switching off the hoisting gear or the boom retracting mechanism during normal operation. The crane operator has to make sure in all cases before such work that the lifting capacity is not exceeded by the load to be lifted. Loads which exceed the lifting capacity of the crane must not be lifted in spite of the fact that the overload safety device is installed. This device must not be used for weighing purposes, and the crane must not be charged with loads exceeding the individually highest admissible load.

2) Tearing off fixed loads is only admissible if the crane manufacturer has agreed to it, and only with cranes which are specially equipped for this purpose. During such operations, the overload safety device (automatic safe load indicator) must not be used as load measuring equipment for normal operation.

3) The overload safety device installed in the crane must be serviced at regular intervals and checked for safe operation before crane work. According to § 35 of the Provisions for the Prevention of Accidents (German: UVV) "Boom cranes", crane maintenance work also comprises regular inspections of the overload safety device.

4) In general, the overload safety device is not automatically adjusted to the different modes of operation of the crane. Therefore the crane operator is obliged to adjust the overload safety device to a different range of lifting capacities or load moments, when the mode of operation of the crane is altered.

3 Instruction Sheet for Overload Safety Devices for Boom Cranes (cont'd.)

Safe operation of the machine and crane work free of accidents depend to a large extent on careful compliance with these instructions. An incorrectly set overload safety device, e.g. a device which is set to a high load moment while the outriggers are retracted, is considerably more dangerous than a crane without an overload safety device, as it conveys a feeling of safety to the driver, which is in fact not justified, and which may cause severe accidents.

5) The overload safety device (automatic safe load indicator) installed must be adjusted by the crane driver to the different ranges of lifting capacities or load moments, when the crane is adjusted to different modes of operation, such as:

a) when the outriggers are extended or retracted (switching over to the high or low load moment)

b) when the boom length is changed by:
- extending or retracting (telescoping) manually, mechanically or hydraulically;
- mounting or dismounting intermediate elements;

c) when the crane is swung or slewed into the range of the higher or lower stability moment (switching over to the high or low load moment)

d) when changing over to a different load moment by fitting multiple rope falls to the hoisting gear.

6) Please note positively that the overload safety device cannot become effective, i.e. the drive assembly cannot be switched off quickly enough when the crane is operated incorrectly. In this case, accidents cannot be precluded completely in spite of the overload safety device being installed. This applies particularly to the following cases:

- the hook or the load lifting equipment is fixed underneath the load;
- excessive time-lag forces are effective;
- loads are dropped into the rope;
- the load is pulled diagonally;
- the crane is driven in an area with considerable ground inclinations, if the soil is yielding or if the wind exerts an essential load.

7) If switch-off equipment for overriding the overload safety device (automatic safe load indicator) is installed, it may only be used if particular precautions have been taken, and in the presence of the crane supervisors, e.g. during crane inspections and during the operations intended by the crane manufacturer.

Never switch off or override the overload safety device during normal operation to lift loads which exceed the crane's specifically admissible lifting capacities for the individual work performed.

Careful compliance with the provisions comprised in this instruction sheet and in the operating manual of the crane manufacturer is a prerequisite to safe operation of the overload safety device (overload disconnect unit).

Should you have any doubts, please consult the Operating Manual. If it does not provide sufficient information, it will be necessary to contact our specialist staff. Unauthorized tampering with the overload safety device's mechanical components will rule out all warranty claims.

Part B

Operating Instructions

Part B1

Operating Instructions

Chassis

1 General instructions concerning operation of the vehicle

All the controls and gauges required for operation of the vehicle are installed in the cabins of the chassis and/or the superstructure.
Before the driver puts the vehicle into operation, it is essential that he has read part "B" and “B0” of this manual.

- The driver must be absolutely familiar with the position and the purpose of all the controls and operating elements. This is a prerequisite for safe operation of the vehicle.
- **The parking brake must be engaged ("braking") before the engine is started.**
- Before the engine is started, especially if the vehicle has been immobilized for an extended period of time, it is necessary to check the fluid levels in the following components:

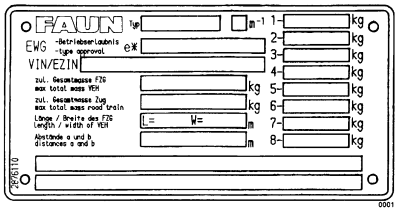
- Engine oil level,
- Oil level in hydraulic oil tank,
- Engine coolant level,
- The cooling system is filled correctly if the coolant reaches the rim of the filler socket on the expansion tank.

DANGER **Do not check the coolant level while the engine is hot; the cooling system is pressurized.**
There is a risk of scalding when the filler socket is opened while the engine is hot!

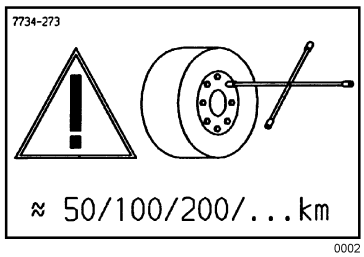
- To start the engine, make sure that the driving operation rotary switch is set to neutral.
- Before the vehicle is set into motion, the tires and the spare wheel - if provided - must be checked for good condition.

DANGER **Insufficient tread pattern depth, incorrect tire pressures and damaged tires will result in an enhanced risk of accidents.**

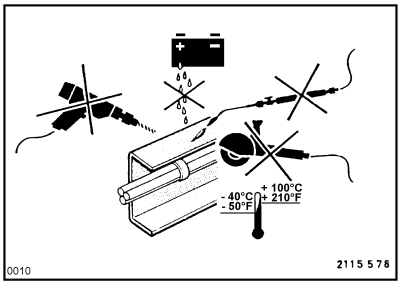
1.1 Warning and instruction plates



Nameplate

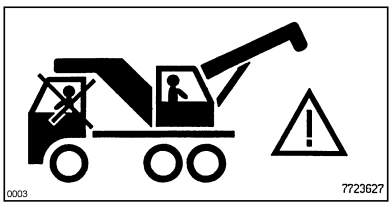


Check wheel nuts.
For the first time after 50 km traveled, then after 100 km, and once more after another 200 km traveled



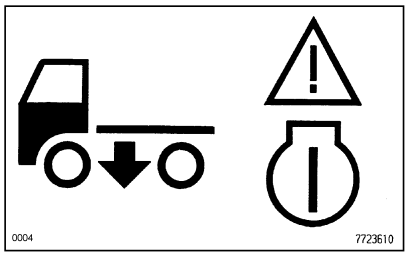
The brake system comprises plastic piping.
Caution during drilling, welding and grinding work.
Protect piping against battery acid; temperature-resistant in the range from -40°C to +100°C.

Apply the handbrake before you leave the driver's cab!

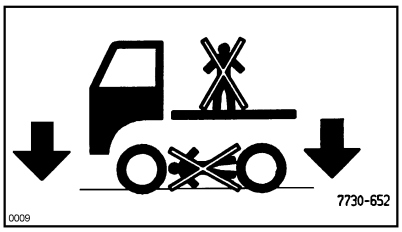


CAUTION !
Nobody is allowed to stay in the driver's cab during crane work.

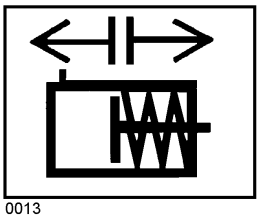
STOP !
Access prohibited to unauthorized persons.



ATTENTION !
Vehicle may only be lowered while the engine is running.

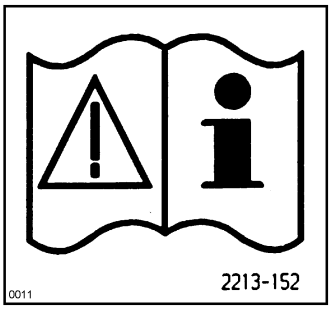


ATTENTION - RISK OF ACCIDENTS !
When lowering the vehicle, make sure that nobody stays under or on the vehicle.

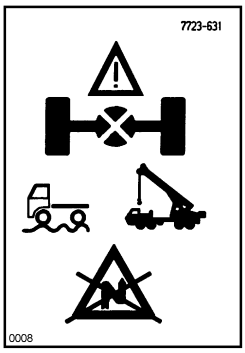


Release air accumulator cylinders

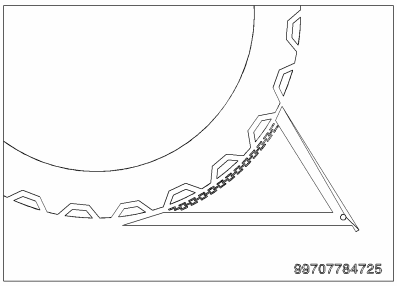
(cont'd.) **1.1 Warning and instruction plates**



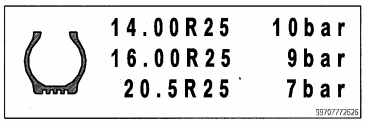
Refer to Operating Manual.



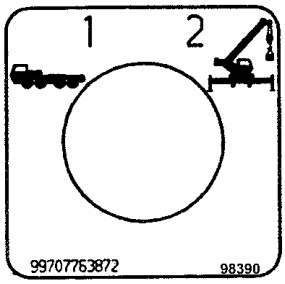
DIFFERENTIAL LOCKS
must never be engaged while driving in curves, but only briefly to overcome an obstacle.
Accelerate carefully when driving while the crane is mounted.



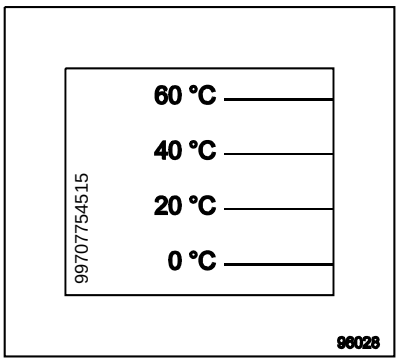
Wheel chocks



(Tires according to vehicle model)

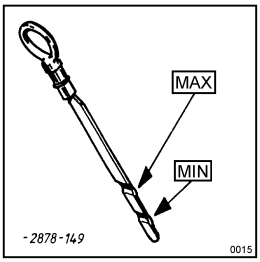


Key-actuated switch



Oil level indicator

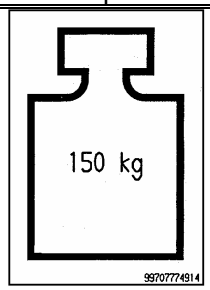
Parking brake (handbrake)



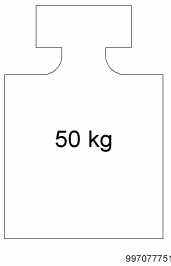
Oil dipstick

Extension width 5.6 m

Extension width 8.3 m

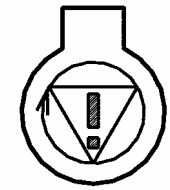
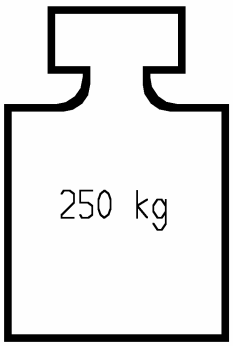


Weight unit 150 kg:



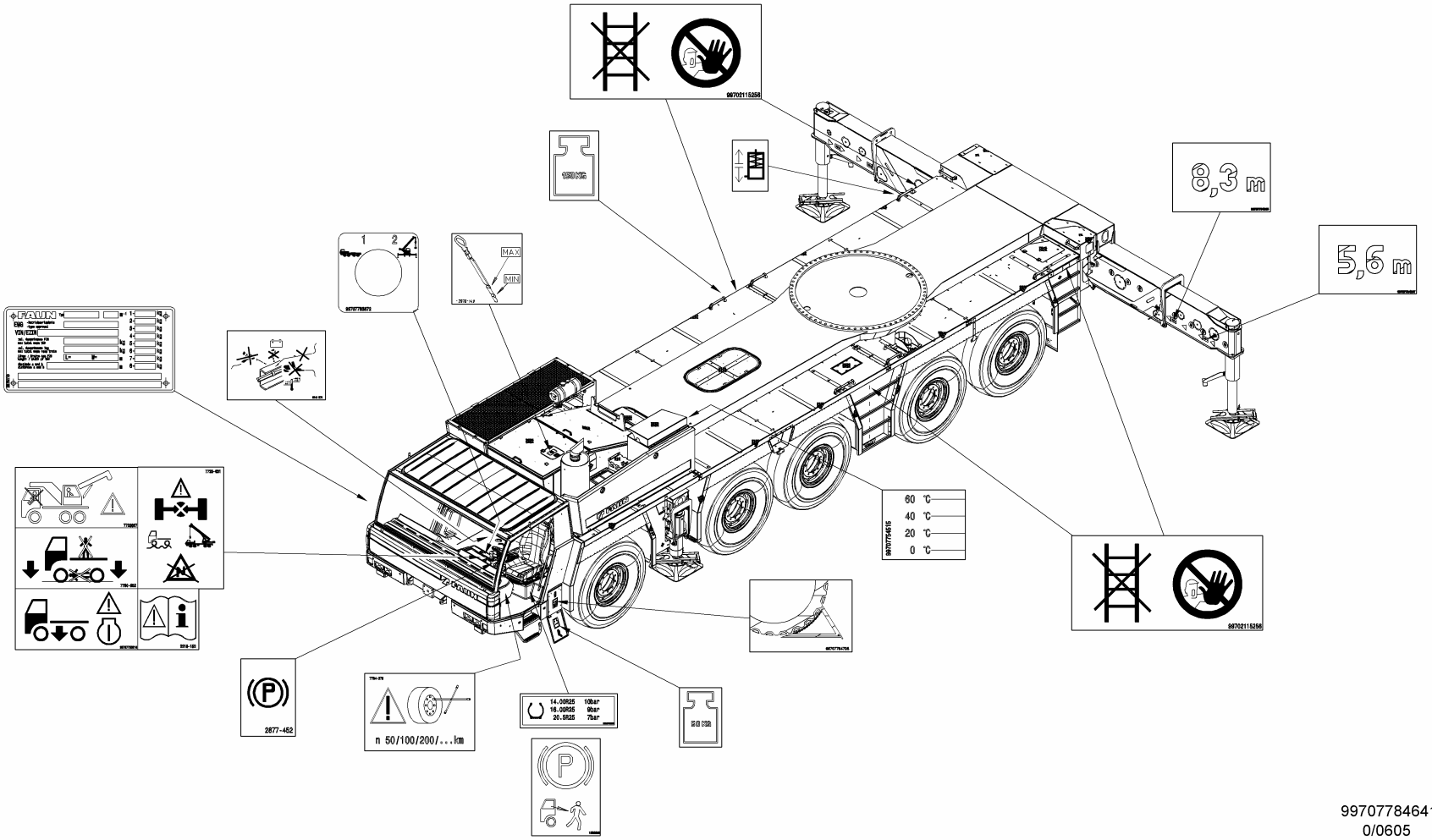
Weight unit 50 kg:

(cont'd.) **1.1 Warning and instruction plates**

24 V DC Instruction plate	**12 V DC** Instruction plate	 Plate
 $\leqslant 1500\ min^{-1}$ Only in case of optional feature "Emergency operation of the superstructure controlled from the chassis".	 Weight unit 250 kg	

1.1.1 Drawing of chassis showing the location of warning and instruction plates

The following diagram shows the position and the location of all the warning and instruction plates mounted to the chassis.



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Memo:

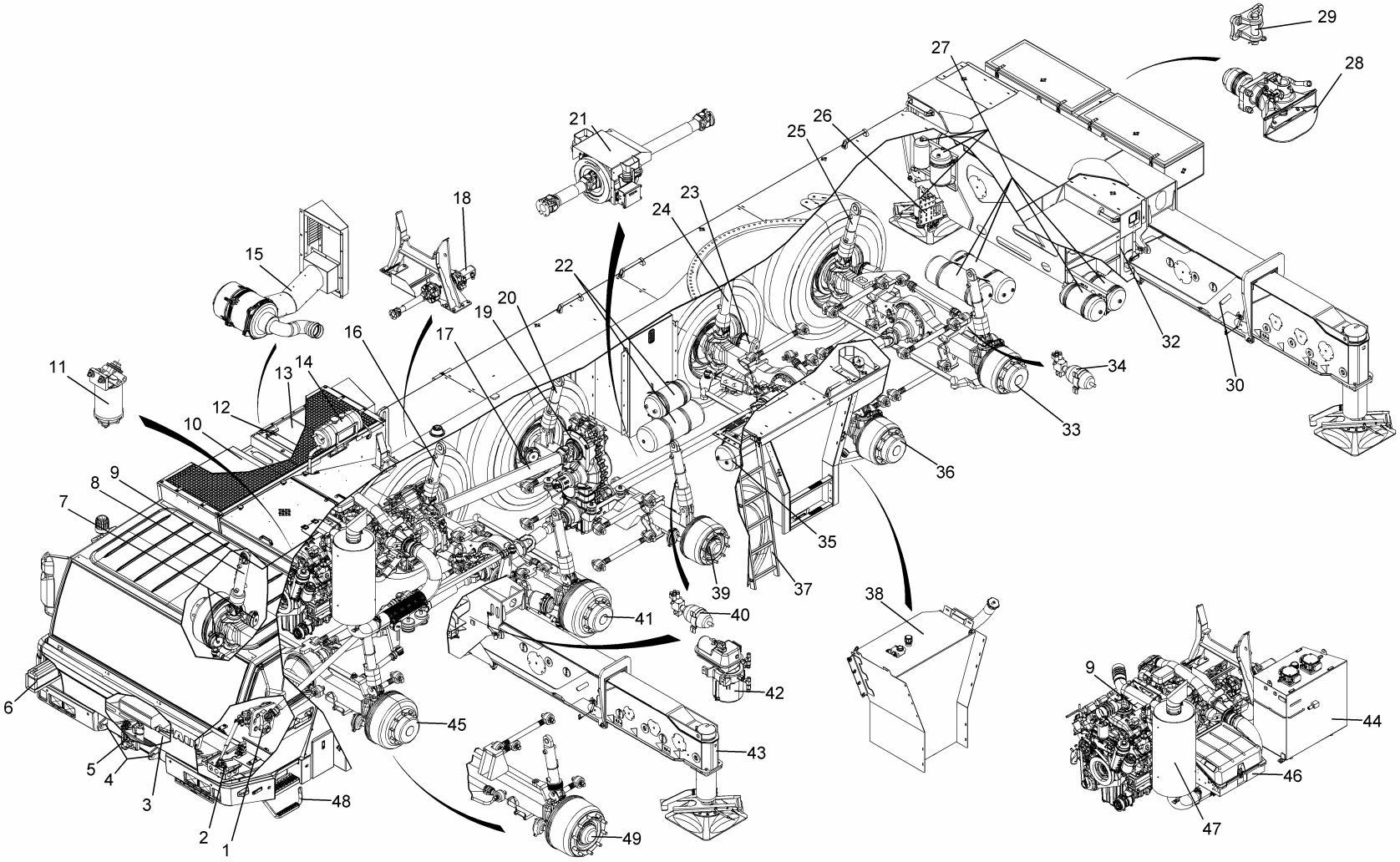
Memo:

1.3 Components, assemblies - installation location and position

1 Steering gear
2 Miter gear of steering system
3 Air conditioning**)
4 Tow lugs
5 Sliding coupling
6 Tank for windshield washing fluid
7 Brake cylinder, 1st axle
8 Suspension cylinder, 1st axle
9 Engine and gearbox
10 Radiator
11 Water separator
12 Radiator, transfer box
13 Radiator
14 Coolant overflow tank
15 Air intake duct
16 Suspension cylinder, 2nd axle
17 Propeller shafts
18 Steering pump
19 Transfer box with emergency steering pump
20 Suspension cylinder, 3rd axle
21 Eddy-current brake **)
22 Compressed air tank
23 Brake cylinder, 4th axle
24 Suspension cylinder, 4th axle
25 Suspension cylinder, 5th axle
26 Test connectors / test panel, compressed air system
27 Compressed air tank
28 Trailer coupling device**)
29 Sliding coupling**)
30 Outrigger, rear, left-hand
31 Free
32 Access
33 5th driven axle
34 Hydraulic accumulator
35 Compressed air tank
36 4th driven axle
37 Access
38 Fuel tank
39 3rd axle not driven
40 Hydraulic accumulator
41 2nd driven axle
42 Centralized lubrication system
43 Outrigger, front, left-hand
44 Hydraulic oil tank
45 1st driven axle **)
46 Batteries
47 Exhaust system
48 Access to driver's cab
49 1st axle not driven

**) Optional equipment

(cont'd.) **1.3 Components, assemblies - installation location and position**



Memo:

1.4 Transport condition of the vehicle when used in public road traffic

When the crane is used in public road traffic, it is essential that the conditions and prescriptions specified in the expertise of the Technical Inspection Authority (German TÜV) are observed.

- For the admissible axle loads, please refer to Part A) (Technical Data) of this Operating Manual.
- The boom must be placed "over-front", i.e. forward in the direction of the vehicle: it must be retracted completely, stowed and secured.
- The superstructure must be secured to prevent it from slewing.
- The bottom block must be attached on the front bumper cross-member and secured, as described in the Operating Manual. Any national regulations differing from those mentioned above must be taken into consideration.
- The base section, the intermediate sections and the top jib - if available - of the jib must be transported by an auxiliary vehicle.
- The second hoist winch - if available - must be removed and transported by an auxiliary vehicle.
- Additional bottom blocks and other items of equipment must be transported by an auxiliary vehicle.

DANGER **When the boom is completely lowered, it is not possible to slew the superstructure through 360°. Collision of boom with engine cover or driver's cab.**

- The counterweights must have been removed, and be transported by an auxiliary vehicle.
- Other items of equipment transported on supplementary auxiliary vehicles must be must be secured adequately.
- The outriggers must be retracted completely and secured mechanically.
- The outrigger floats must be slipped into place and secured.
- Attachments and superstructure components must be secured so that they cannot slip or fall down.
- Loose objects must not be deposited on the platforms of the chassis and the superstructure.
- The traffic regulations must be observed taking the admissible axle loads (refer to part A) and gross vehicle weights into account (according to the expert opinions of the technical inspection agencies, the data given in the vehicle title or the vehicle registration papers).

(cont'd.) **1.4 Transport condition of the crane when used in public road traffic**

- The engine in the superstructure has been stopped.
- Ignition starter switch for the superstructure engine in position 0.
- Key-actuated change-over switch in the chassis for "ignition, superstructure" in position 1 - ignition OFF.
- The windscreen and the sliding door of the crane cabin must be closed.
- The lids on the engine fairing or swing fairing of the superstructure must be locked to prevent unintentional opening.
- The wheel chocks **) must be available on the vehicle and stowed in the storage box so that they cannot be lost.
- Tools, accessories and loose components must be kept in a safe place or stowed in the tool box*) so that they cannot be lost. The tool box cover must be locked.
- Safety accessories**)- warning triangles, first-aid kit, warning lights and fire extinguishers - must be stored in an easily accessible place and checked for proper working order and completeness at regular intervals, or taken to authorized agencies for inspection.
- The covers on the control boxes of the outrigger actuating systems must be closed.

DANGER **All detached parts, e.g. cotter pins, retaining clips, securing pins and locking pins must be fixed to the vehicle so that they cannot be lost.**
All sliding parts, such as outrigger beams, etc., must be locked to prevent unintentional extension.

No loose objects must be placed on the platform.

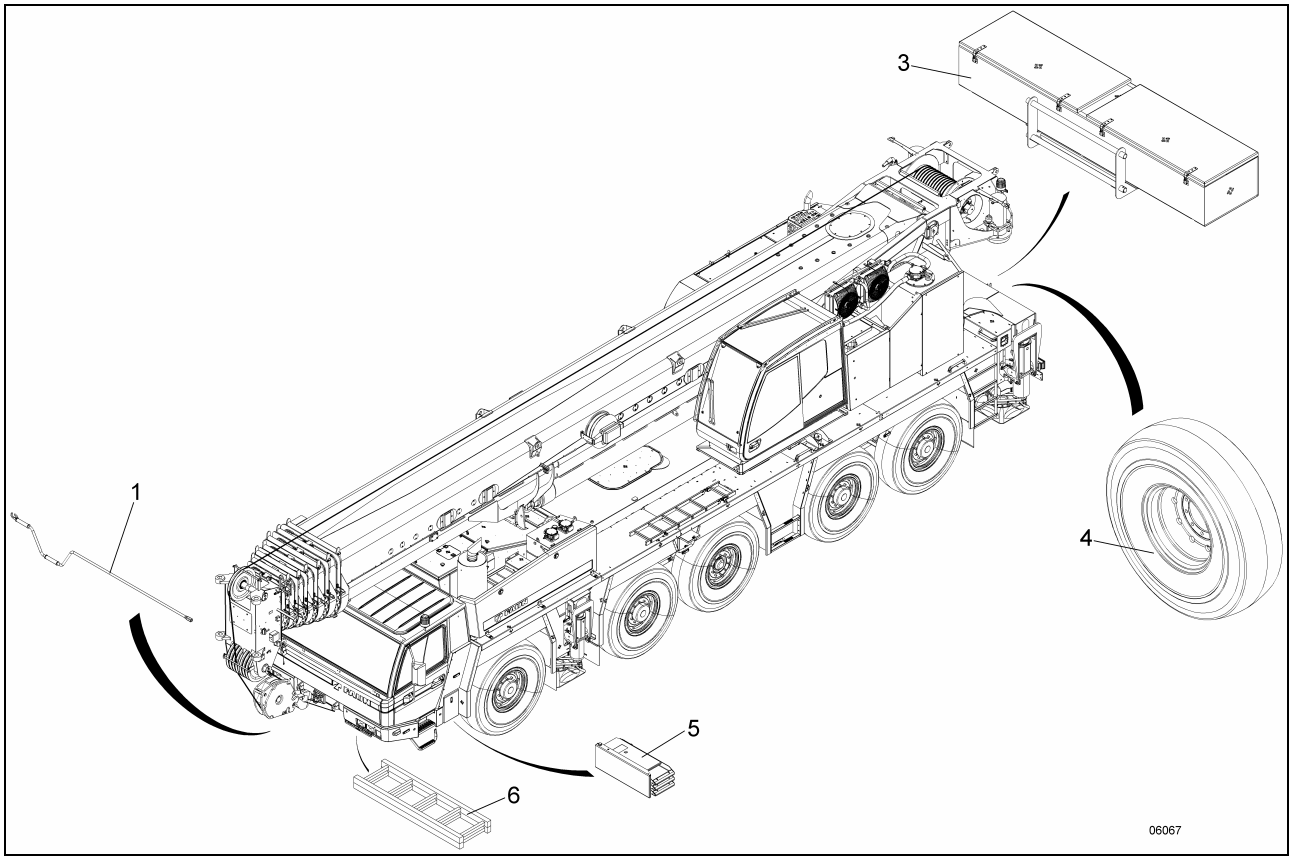
If these instructions are not observed, there is a <u>risk of accidents</u>.

*) Optional equipment
**) Specific requirement of the country where the machine is to be operated

1.4.1 Transport condition, graphic display

The safety accessories**) (warning triangles, first-aid kit, warning lights and fire extinguishers) can be stored in the storage boxes in the driver's cabin.
The wheel chocks (5) **) have been arranged on the left, in the storage box of the driver's cab.
A tool box **) (3) is located at the rear of the vehicle.
The crank (1) used to mount the jib **) is located on the vehicle's platform.
The spare wheel **) (4) is either stowed safely on the vehicle platform or secured to the spare wheel holder **)-
The ladder **) (6) is arranged in the supports underneath the driver's cab.

Attention **All covers must be closed before the superstructure can be slewed !**



**) Specific requirement of the country where the machine is to be operated, or optional equipment

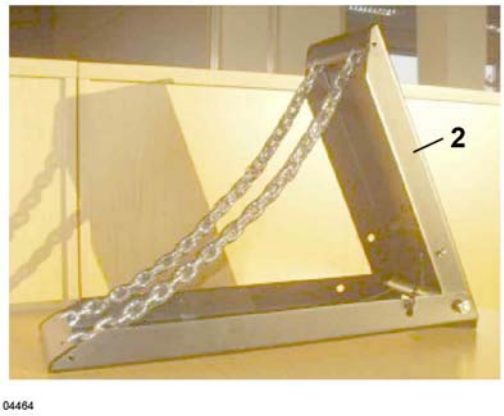
1.5 Wheel chocks

The vehicle is equipped with wheel chocks (folding wheel chocks) pursuant to the legal provisions. The wheel chocks (folding wheel chocks) have been arranged on the left, in the storage box of the driver's cab (see item 1.4.1).

Open wheel chocks to fit them to the vehicle:

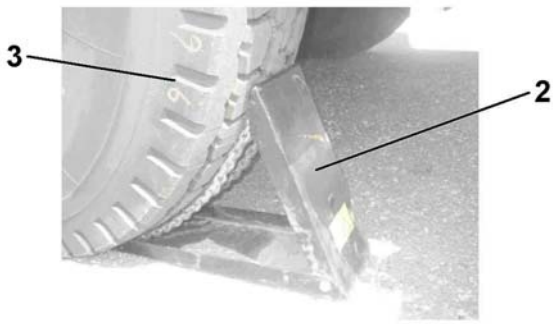
- Actuate the locking device (1).

The wheel chock (2) opens automatically into working position.



DANGER **Danger of crushing!**

- Fit opened wheel chocks (2) to the wheels (3).



Memo:

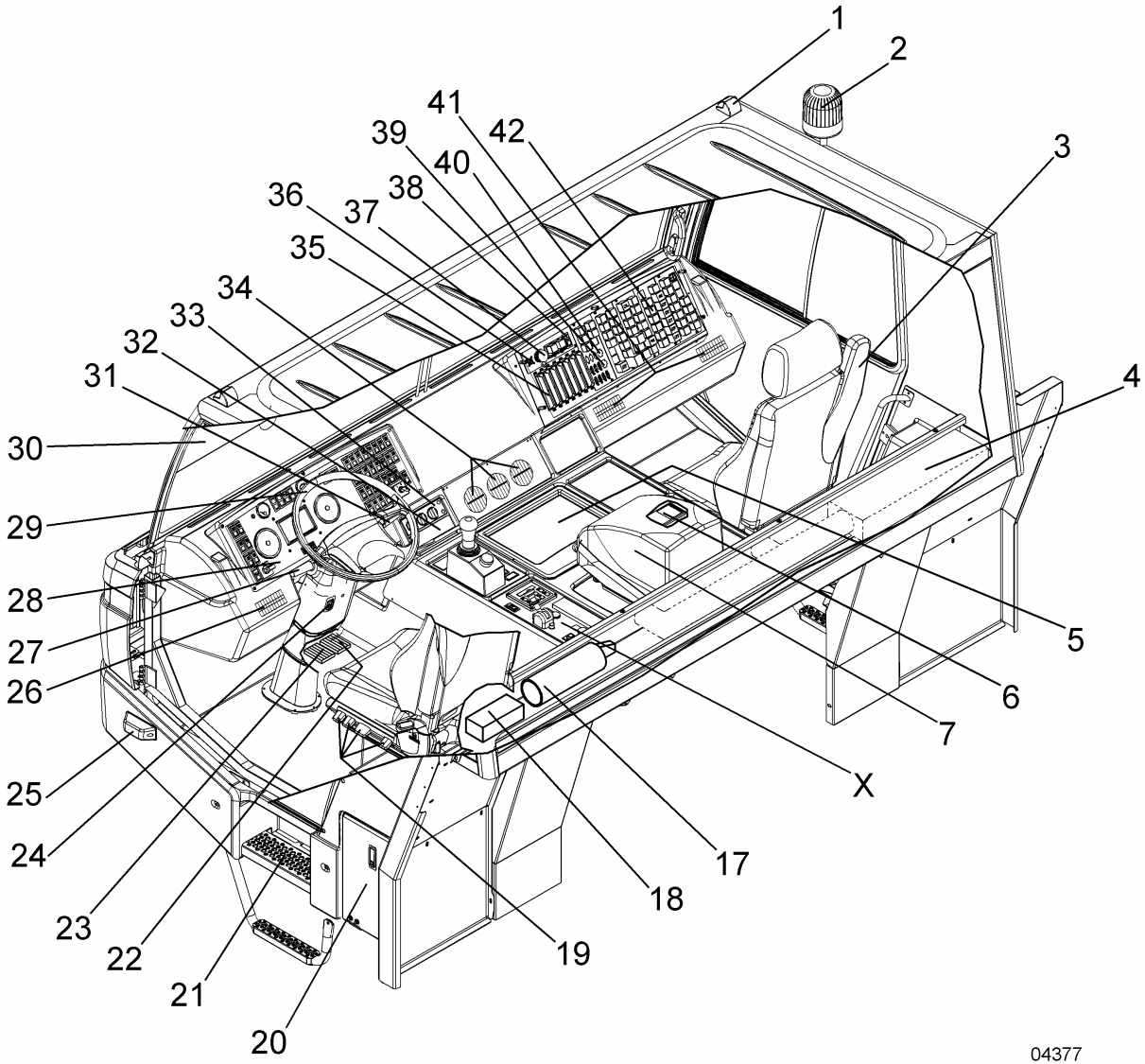
2 Driver's cab

2.1 Explanation of the control elements and of the equipment

1 Lateral bordering light
2 Rotary beacon
3 Seat belt
4 Compartment for installation of auxiliary heating
5 Storage box
6 Ashtray
7 Refrigerator box **)
8 Gearbox control device
9 Electronic control unit for actuation of rear axle steering
10 Radio
11 Plugbox 24 V
12 Plugbox 12 V
13 Ashtray
14 Electric mirror adjusting device
15 Handbrake lever
16 Rocker switch, preselection of steering mode
17 Fire extinguisher
18 First-aid kit
19 Seat adjusting lever
20 Storage box for wheel chocks
21 Access plate
22 Accelerator pedal
23 Footbrake pedal
24 Steering wheel adjustment
25 Direction indicator
26 Air distributor - side pane
27 Steering column switch (direction indicators, windshield wiper etc.)
28 Instrument panel
29 Steering wheel
30 Roller sun visor
31 Steering column switch (engine brake etc.)
32 Electronic tachograph
33 Control unit, heating, ventilation and air conditioning system**)
34 Air distributor, passenger compartment
35 Fuses
36 Diagnostic plug, ABV
37 Diagnostic plug, engine
38 CAN emergency switch
39 Diagnostic connector, intarder
40 Diagnostic connector, gearbox
41 Air distributor, passenger
42 Relays

**) Optional equipment

Driver's cab



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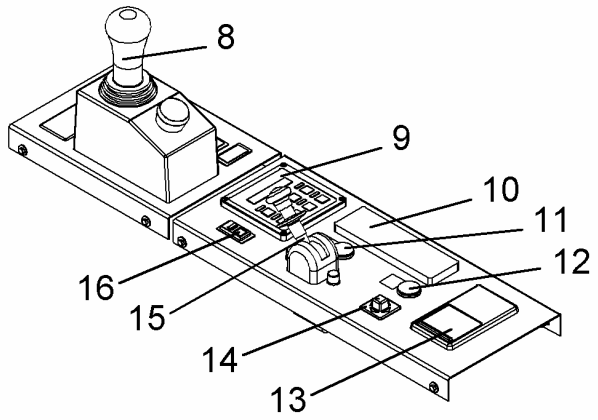


Memo:

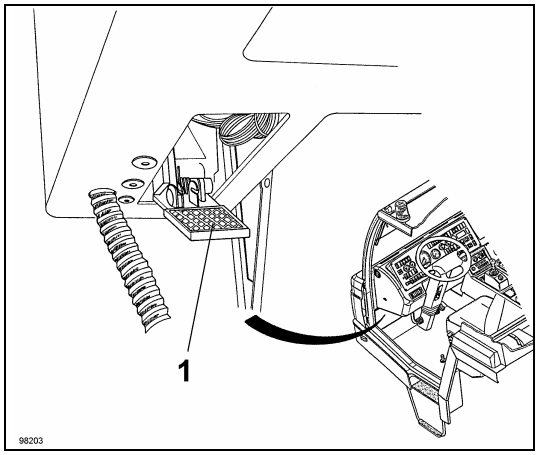
2.3 Front lid

Various assemblies have been arranged below the front cover where they are easily accessible for maintenance and repair work.

2.3.1 Unlocking the front lid

The lever used to unlock the front lid is installed on the left below the instrument panel.

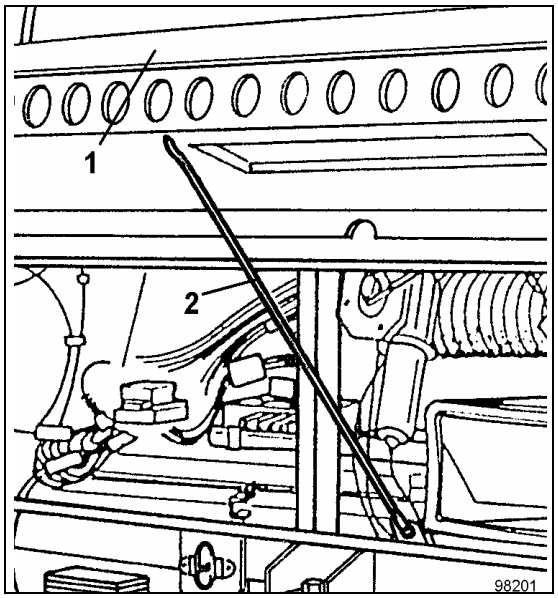
- Pull lever (1) down - the front lid is unlocked.



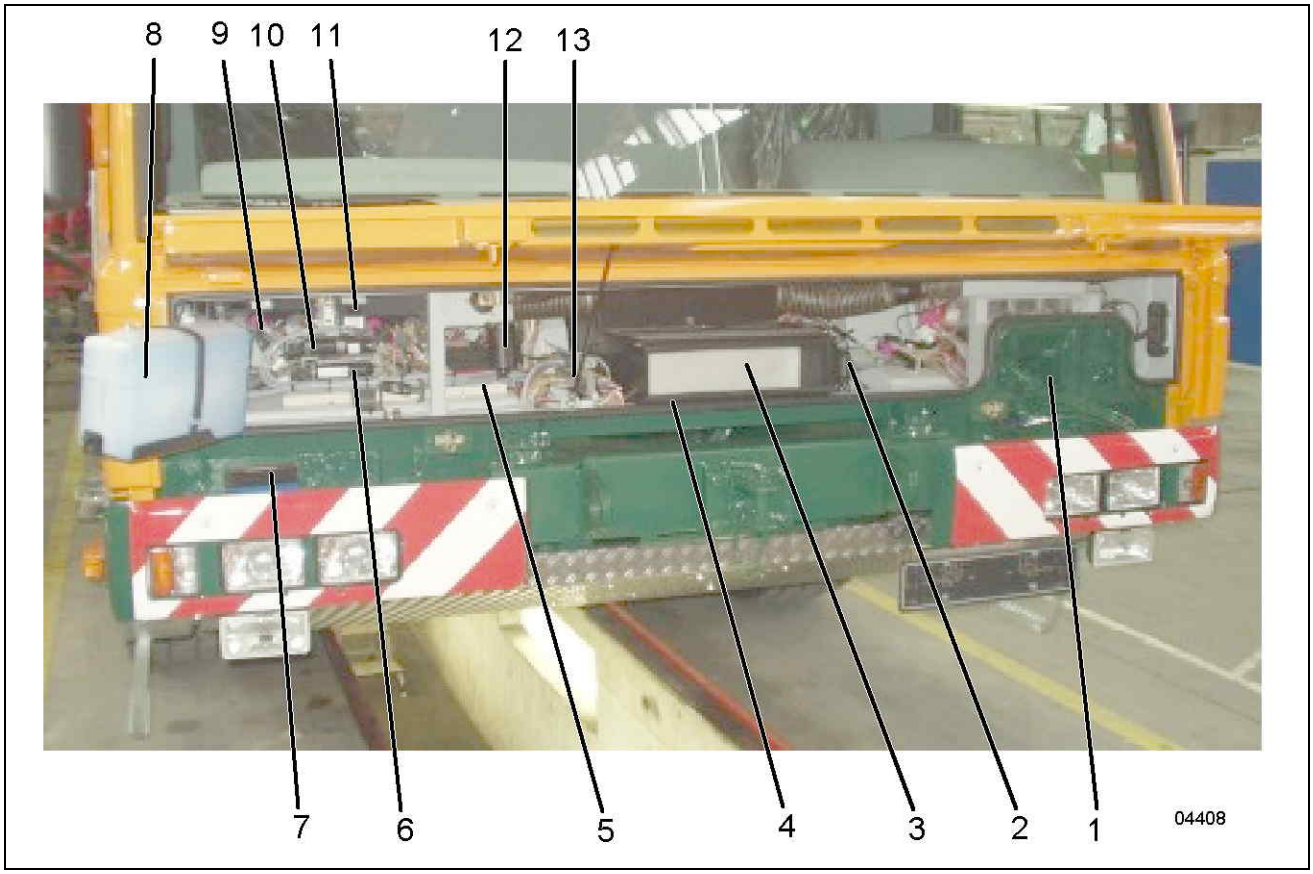
2.3.2 Opening and locking the front lid

- Fold the unlocked front lid (1) upwards and lock it in its position using the holding bar (2).

DANGER **When work is performed with the front lid open, it must be definitely secured. There is a risk of accidents should the front lid suddenly be dropped and shut.**



2.3.3 Explanation of the devices located under the front lid

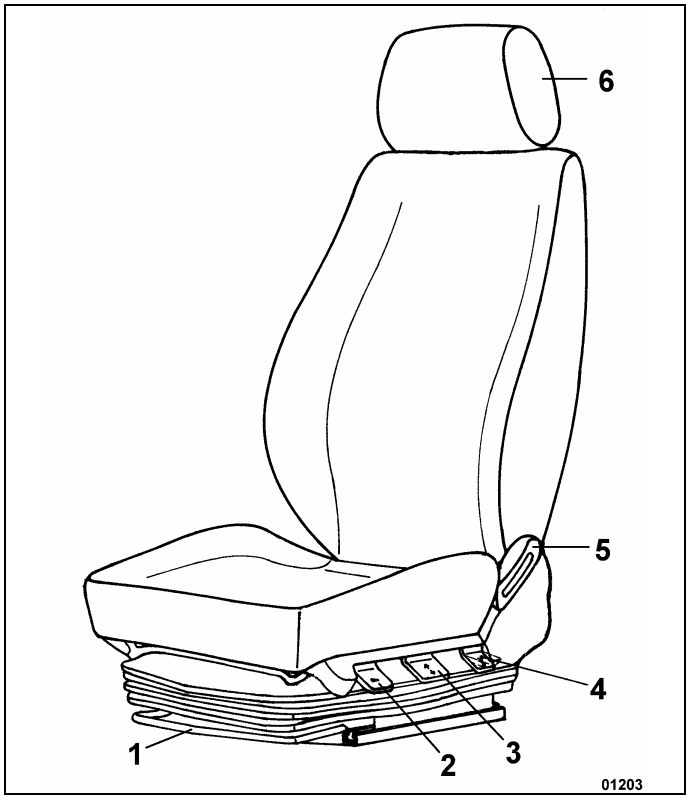


1 Brake valve
2 Servo-motor for change-over flap for outside air / circulating air
3 Change-over flap for outside air / circulating air
4 Air inlet, heating/ventilation
5 Electronic system, engine ADM
6 Gearbox control system
7 Voltage transformer 24/12 V
8 Tank for windshield washing fluid
9 Steering computer 1
10 Intarder control
11 Steering computer 2
12 Windshield wiper motor
13 Multiway connector

2.4 Seat adjustment

The driver's and the passenger's seat afford maximum comfort. Both seats are equipped with pneumatic suspension and thus adjust automatically to the driver's weight. The downwards or upwards deflection amounts to 20 mm each. To adjust the seats optimally as regards their position with reference to the control elements, the seats' longitudinal position and the inclination of the seats' surfaces can be adjusted. Moreover, the backrest and the headrest are also adjustable. The seats' height can be adjusted easily to the driver's stature by means of an air-assisted vertical adjusting device.
The driver's and the passenger's seats are equipped with identical control elements. The following illustrations and descriptions refer to the adjustment of the driver's seat.

1 Linkage - longitudinal adjustment
2 Control lever - inclination adjustment
3 Control lever - height adjustment
4 Control lever - quick lowering feature
5 Control lever - backrest adjustment
6 Headrest adjustment



2.4.1 Longitudinal adjustment

To adjust the seat position and consequently its distance from the control elements in the longitudinal direction:

- Actuate the linkage - longitudinal adjustment - (1) upwards.

Longitudinal adjustment: approx. 140 mm.

2.4.2 Inclination adjustment

To adjust the seat surface inclination steplessly by approx. 10°:

- Lift the control lever - inclination adjustment - (2)

2.4.3 Height adjustment

To adjust the seat steplessly in height by approx. 100 mm:

- Pull the control lever - height adjustment - (3) upwards and keep it in this position, until the seat is adjusted to the desired vertical position.

2.4.4 Quick-lowering feature

With the quick seat lowering feature, the seat can be lowered entirely so that the driver can leave his cab easily.

- Pull the control lever - quick lowering feature - (4) upwards.

The seat is lowered and remains in this position.

- After returning to the cab, the driver must push the control lever down.

The seat returns automatically to the position adjusted last.

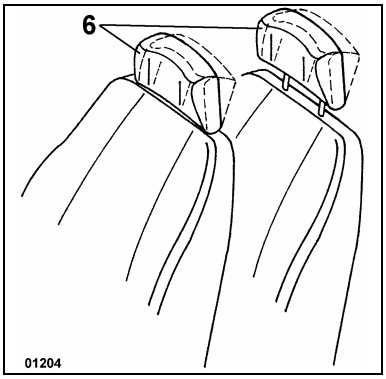
2.4.5 Backrest adjustment

To adjust the backrest inclination in steps from approx. 0° to 36°:

Actuate the control lever - backrest adjustment - (5) upwards.

2.4.6 Headrest adjustment

The headrests (6) can be adjusted as regards their vertical position and their inclination.



2.5 Adjustment of the steering wheel

The steering wheel can be adjusted to the driver's stature easily and progressively by means of an air-assisted inclination and height adjustment.

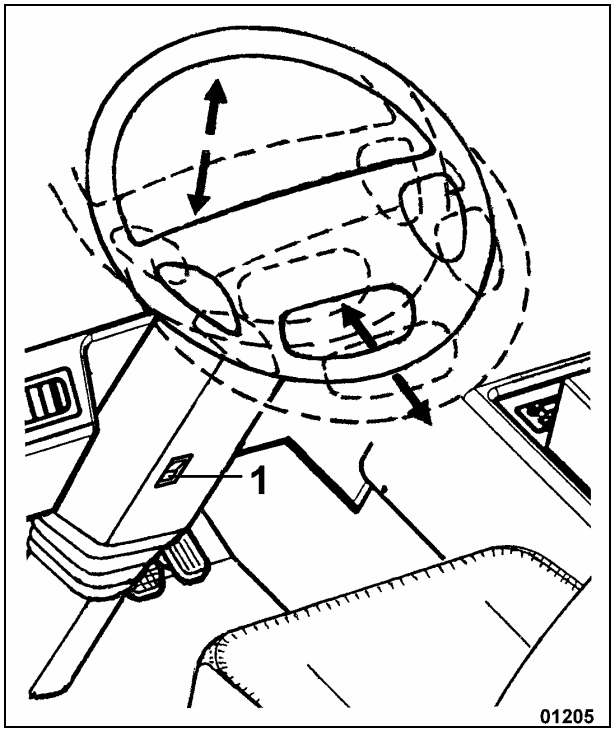
- Actuate rocker tip switch (1) down to release the steering wheel lock.

- Hold steering wheel in its position to adjust the angle of inclination and the vertical position.

- Actuate rocker tip switch (1) upwards to re-engage the steering wheel lock.

However, locking is also effected automatically after a few seconds.

DANGER **Do not adjust the seat and the steering wheel while driving.**



2.6 Actuation of the roller sun visor

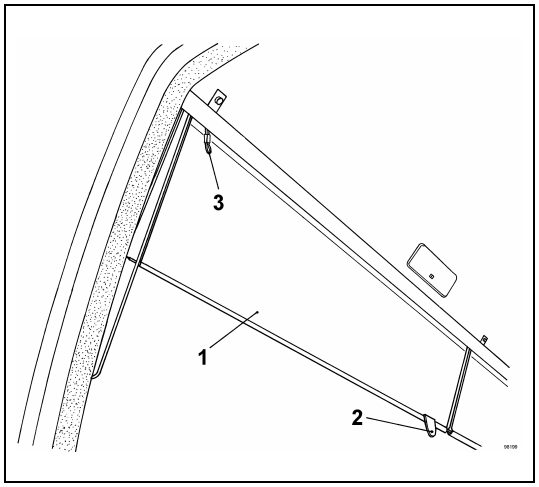
Roller sun visors are installed on the windscreen to protect the driver and the passenger against dazzle. This sun protection can be lowered approx. to the middle of the windscreen.

Actuation of the roller sun visor:

- Pick the tab (2) to pull the roller sun visor (1) down to the desired position. The roller sun visor locks automatically in any position desired.

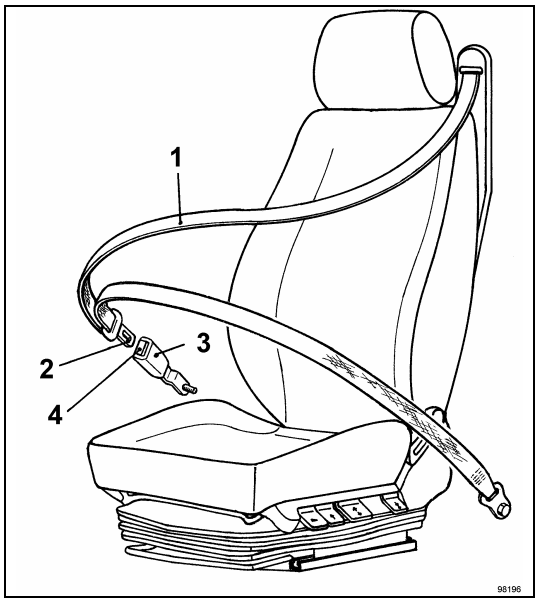
To reset the roller sun visor:

- Pull the return cord (3) downwards. When the cord is released, the roller sun visor locks automatically in any position desired, or in end position.



2.7 Seat belts

NOTE **To protect the occupants, they should fasten their seat belts even at low driving speed to ensure their proper safety (observe legal regulations regarding the use of safety belts!).**



Function:
- Pull the seat belt (1) carefully out of its holder and forward (jerky movements make the lock engage).
- Make the tongue (2) engage into the buckle (3).
- To release the belt, push the button (4) of the buckle.

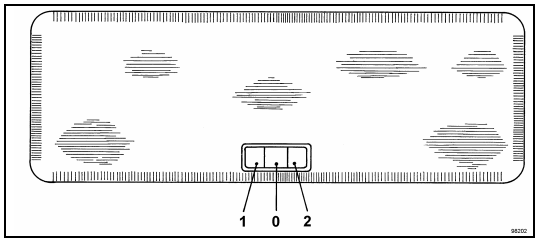
The belt retractor returns the belt automatically into its original position.

DANGER **After an accident in which the seat belt was involved, it must be ensured that it has not been damaged, i.e. possibly elongated.**
An inspection and possibly replacement by a specialist workshop are indispensable.

2.8 Cab lighting

Lamps are installed above the roller sun visor to illuminate the cabin.

0 = Lamp OFF.
1= Lamp is lit when the door is open (while the battery main switch is ON).
2= Lamp is permanently lit (while the battery main switch is ON).



3 FAUN Cockpit Graphic Control System

The chassis of the mobile crane is equipped with an electronic Cockpit Graphic Control System.
This system performs various monitoring and check functions.
It may also be used for operating and control functions.

DANGER **Before the operator puts the chassis into operation, he must have familiarized himself with the functionalities, operation and the mode of function of the FAUN Cockpit Graphic Control System.**

NOTE **Reference to the following description is made in the sections of this operating manual which are marked "refer to the Cockpit Graphic Control System". The check or control functions described in these sections are performed by the FAUN Cockpit Graphic Control System.**

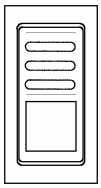
Upon switching on the ignition, it can take up to 10 sec. until the FAUN Control and Service System has been started.

A monitor **20** (Cockpit – Multi – Vision) and the appropriate control elements (rocker tip switches **26**, **27** and **28**) have been installed in the instrument panel of the chassis:

Cockpit – Multi – Vision **20**

Put the crane carrier into operation as described in section B1-4 of the operating manual.

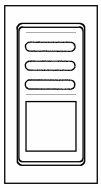
After the battery main switch and the ignition have been turned ON, the start screen appears on the monitor.
The system is being loaded.
So far, it is not possible to retrieve any information or to trigger any operation.



Rocker tip switch **26** "Menu navigation"

Actuate upper part of rocker tip switch = Exit menu

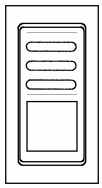
Actuate lower part of rocker tip switch = Enter in menu



Rocker tip switch **27** "selection"

Actuate upper part of rocker tip switch = Cursor upwards

Actuate lower part of rocker tip switch = Cursor downwards



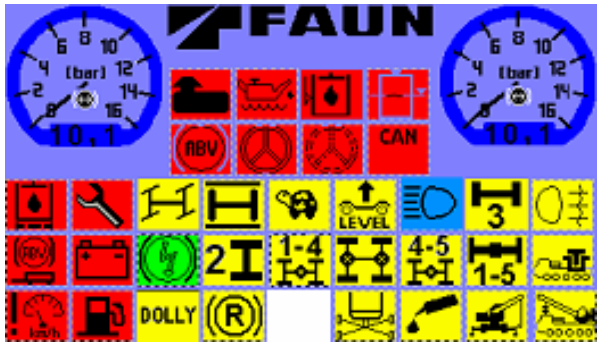
Rocker tip switch **28** "Service“

Actuate upper part of rocker tip switch = Reset

Actuate lower part of rocker tip switch = Set

3.1 Main screen

The main screen appears on the monitor after approx. 3 sec.



Information and error messages on the main screen:

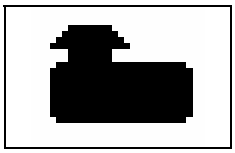
NOTE **The error messages disappear automatically as soon as the error is eliminated.**

<u>Brake pressure:</u>
Circuit I:
The indication in the top left corner of the main screen, in the working and information menus shows the brake-air pressure in brake circuit I.
Circuit II:
The indication in the top right corner of the main screen, in the working and information menus shows the brake-air pressure in brake circuit II.

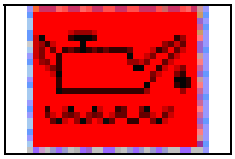
If the brake-air pressure in brake circuits I and/or II decreases below 6.5 bar, the symbol “brake” of the appropriate brake circuit is flashing in red.

If the brake-air pressure in brake circuits I and/or II decreases below 5.5 bar, the indicator appears on red background.

<u>Monitoring the air cleaner.</u>
Replacement of the air cleaner cartridge.
Symbol lights up.

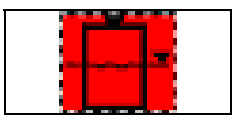


<u>Insufficient engine oil level.</u>
Symbol lights up.



<u>Insufficient coolant level.</u>

Symbol lights up.



cont'd.: **3.1 Main screen**

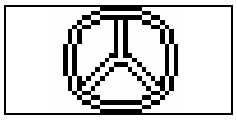
Monitoring the ABV**) - tractor.
After the ignition has been switched on, the ABV symbol must go on, and go out again after 2 to 3 seconds.
When the symbol goes on during traveling operation, this indicates a failure of the ABV components. However, in this case the functional safety of the conventional air-actuated brake system remains fully ensured.

NOTE **The function of the electronic system of the wheel sensors is monitored by the ABV Symbol. The Symbol goes on in case of malfunction. Eliminate the malfunction immediately (specialist workshop).**
This may lead to malfunction of the gearbox!

Monitoring the ABV**) - trailer.
After the ignition has been switched on, the ABV trailer symbol must go on, and go out again after 2 to 3 seconds.
If a trailer without ABV system is coupled, the symbol must not go on.
When the symbol goes on during traveling operation with a trailer, this indicates a failure of the ABV trailer components. However, in this case the functional safety of the conventional air-actuated brake system remains fully ensured.

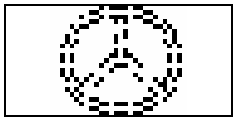
Steering pump.

Symbol lights up. In case of malfunction, it may only light up during operation.



Emergency steering pump.

Symbol lights up. If the symbol lights up while the ignition is shut off, the sensor is faulty.



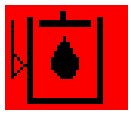
CAN error.
Refer to item 3.1.1.3.

Contamination of the hydraulic oil filter

The symbol goes on to indicate an inadmissibly high degree of contamination of the hydraulic oil filters.

Hydraulic oil level

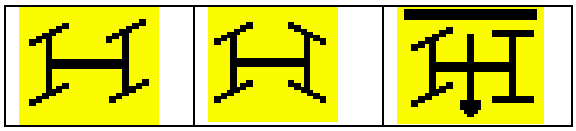
The symbol goes on to indicate an insufficient hydraulic oil level.



Sensor fault.
If the symbol goes on, the working menu "Service" must be selected. The error can be read out in the working menu "Service" (refer to item 3.1.1.3).

Steering:

Depending on the steering program selected, the appropriate symbol is lit.

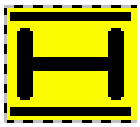


Diagonal steering. | Turning circle. | Electronic tail-swing suppression

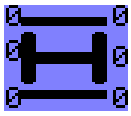
**) Optional equipment

cont'd.: **3.1 Main screen:**

Axle suspension lock.

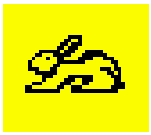

yellow = locked

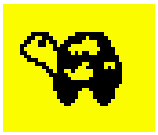
If the axle suspension lock is activated, the symbol appears in blue and the numbers change from 0 to 1.
If the axle suspension lock activation has been completed successfully, the symbol appears in yellow and the numbers go out.
If the symbol remains blue, the axle lock has not been engaged.
The numbers indicate at which place in the vehicle an error has occurred. 0 = not locked, 1 = locked.
The proximity switches are installed: 1st/ 2nd axles, left-hand and right-hand.
3rd axle, left-hand and right-hand.
4th/5th axles, left-hand and right-hand.


blue = activated

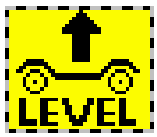
On-road, off-road modes:

Depending on the program selected, the appropriate symbol is lit.
The symbol also appears in the working and information menus.


On-road travel

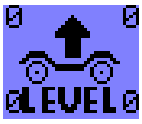

Off-road travel.

Leveling.



yellow = level

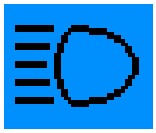
If the leveling is activated, the symbol appears in blue and the numbers change from 0 to 1.
If the leveling has been activated successfully, the symbol appears in yellow and the numbers go out.
If the symbol remains blue, the level position has not been reached. The numbers indicate at which place in the vehicle an error has occurred. 0 = Position not reached, 1 = Position reached.
The proximity switches are installed: On the front left-hand and right-hand sides, on the rear left-hand and right-hand sides.



blue = activated

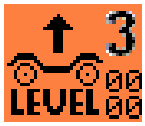
High-beam light.

Depending on the selection, the appropriate symbol is lit.


blue = high-beam light

Lifting axle.
Depending on the selection, the appropriate symbol is lit.

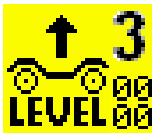

Raise 3rd axle.



Driving with the vehicle leveled, at increased height, with the 3rd axle lifted. The proximity switches are installed: On the front left-hand and right-hand sides; on the rear left-hand and right-hand sides.


3rd axle lifted.


Symbol "lower 3rd axle".



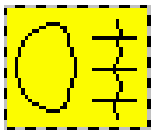
Driving with the vehicle levelled at normal height.

NOTE **Should problems occur while the 3rd axle is being lifted, lifting can be reversed as described under item 3.1.1.3.**

cont'd.: **3.1 Main screen:**

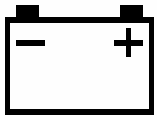
Rear fog light.

The symbol goes on if the rear fog light has been actuated.



Generator
Insufficient voltage of vehicle battery.

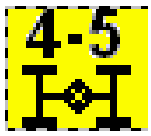
If the vehicle voltage drops (even briefly) below 18V, the symbol lights up for the duration of the voltage drop, at least however for 20 seconds.



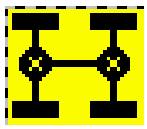
2nd axle drive assemblies engaged.
The symbol appears on the main screen while the drive of the 2nd axle is connected.

Inter-axle differential lock 1st to 4th axles.
The symbol appears on the main screen while the inter-axle differential lock of the 1st to 4th axles is connected.

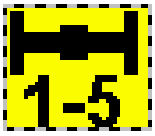
Inter-axle differential lock 4th to 5th axles.
The symbol appears on the main screen while the inter-axle differential lock of the 4th to 5th axles is connected.



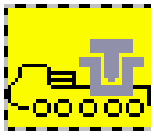
Inter-wheel differential locks.
The symbol appears on the main screen as long as the inter-wheel differential locks are engaged. The inter-wheel differential locks remain locked for 10 seconds after actuation of the rocker tip switch **46** “Inter-wheel differential locks”



Axles lifted.
The symbol appears on the main screen as soon as the vehicle is supported by outriggers and all the axles are lifted.



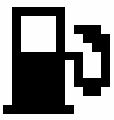
Superstructure locked.
The symbol appears on the main screen as soon as the superstructure lock has been actuated.



Tachometer fault.
The symbol appears in case of malfunction of the speedometer.

Insufficient fuel level in fuel tank.

Symbol appears.



cont'd.: **3.1 Main screen:**

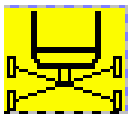
Intarder.

- Once the ignition has been switched on and if the “intarder” rocker switch **48** is set to "ON", the symbol appears for approx. 3 sec.
- If the manual control switch is actuated, the symbol appears as long as the switch is actuated.
- The symbol is flashing permanently while the intarder is switched ON: Malfunction; contact TADANO-FAUN after-sales service.

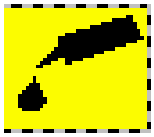
Eddy current brake**).

If the manual control switch is actuated, the symbol appears as long as the eddy current brake is in function.

Axle oscillation.
The symbol appears as long as rocker tip switch **37** “axle oscillation” is being actuated.

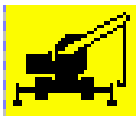


Centralized lubrication system.
The symbol appears for approx. 3 seconds on the monitor after system power-up.
For further details, refer to the enclosed operating manual of the manufacturer, part G1 Chassis.



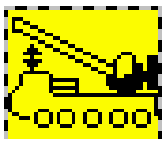
Operation from superstructure:

The symbol lights up as long as the connection to the superstructure is established.



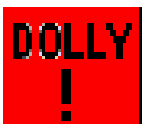
Boom raised.

The symbol lights up if the boom is not in the boom rest.



Dolly travelling operation**).

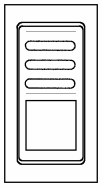
The yellow symbol appears as long as “dolly travelling operation” is established.
The red symbol appears if the pressure in the swing brake is insufficient.



Control elements of the main screen:

Change-over to the selection menu:
Working operations can be performed in the selection menu.

- Actuate the lower part of the rocker tip switch **26** "Menu navigation":

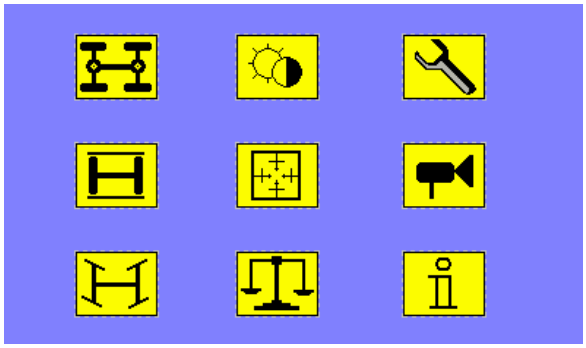


Entry to the selection screen.

**) Optional equipment

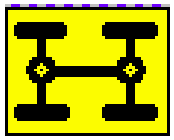
3.1.1 Selection menu

Once the lower part of the rocker tip switch **26** "Menu navigation" has been actuated, the selection menu appears on the monitor.

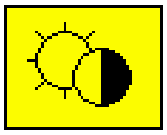


Symbols and meaning of the various selectable working menus:

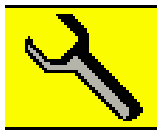
Working menu "drive".



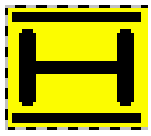
Working menu "brightness".



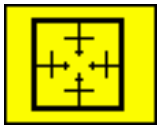
Working menu "service".



Working menu "axle suspension lock".

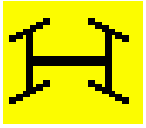


Working menu "spirit level".



Working menu "Rear area surveillance"**).

Information menu "steering".



Information menu "axle load".

Information menu "Information".

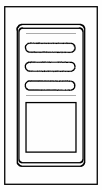
**) Optional equipment

cont'd.: **3.1.1 Selection menu**

Control elements of the selection menu:

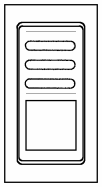
Change-over to the working screens:
Working operations can be performed via these screens.

- Actuate the top or the lower part of the rocker tip switch **27** "selection":



Select one of the working menus. The selected menu is displayed visually.

- Actuate the lower part of the rocker tip switch **26** "Menu navigation":

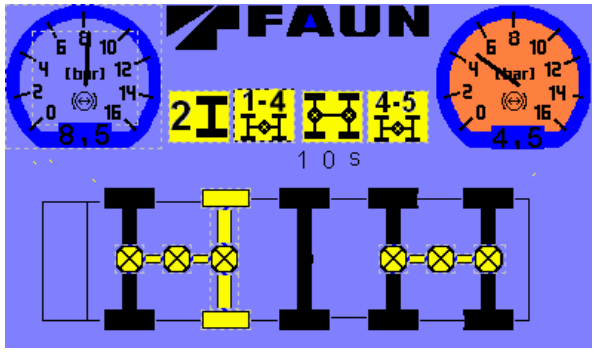


Enter into a selected working menu.

3.1.1.1 Working menu "drive"

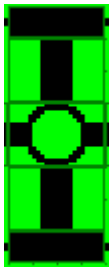
After actuation and confirmation, the working menu "drive" appears on the monitor.

This menu also appears when the rocker tip switch **46** "axle drive" is actuated.



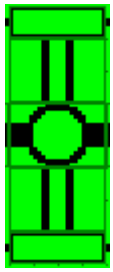
2^{nd} drive axle is not driven

The axle symbol appears (backlit) in black.



2^{nd} drive axle is driven.

The axle symbol appears (backlit) in yellow.



Differential locks are disengaged.

The circle is empty.

Differential locks are engaged.

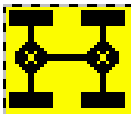
A cross appears in the circle.

The 2^{nd} axle drive is engaged.

The inter-axle lock between the 1^{st} and the 4th axles is connected.

The inter-axle lock between the 4^{th} and the 5^{th} axles is connected.

Inter-wheel differential locks are engaged.

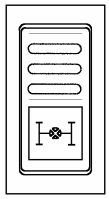


Inter-wheel differential locks remains engaged for another 10 seconds.

10 s

- Actuate the upper part of the rocker tip switch **46** "axle drive":

Drive and differential lock disengaged.

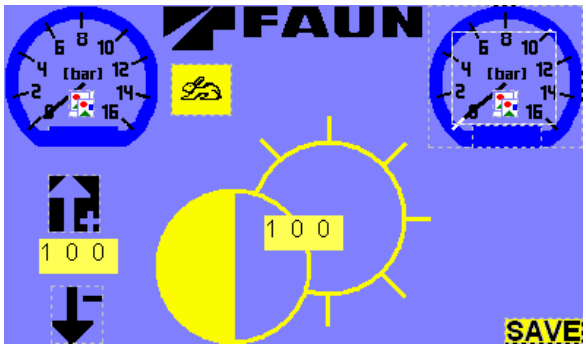


The differential locks and the 2^{nd} axle drive (refer to part B1-5, item 5.4) are engaged and disengaged via rocker tip switch **46** “axle drive” (refer to part B1-11, item 46).

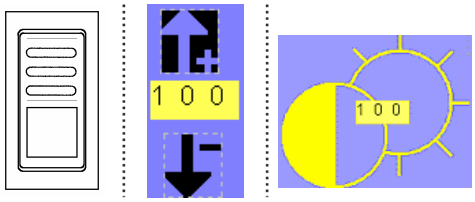
3.1.1.2 Working menu "brightness"

After actuation and confirmation, the working menu "brightness" appears on the monitor.

This menu is used to adjust and adapt the brightness of the monitor.



To adjust the brightness - to values other than programmed in the factory - actuate the rocker tip switch **27** "selection".



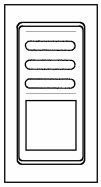
Actuate upper part of rocker switch = monitor appears brighter.
Actuate lower part of rocker switch = monitor appears darker.
The brightness value is indicated in %.

Actuate lower part of rocker tip switch **28** "Service“ =
the brightness value adjusted manually is saved.

SAVE appears (backlit) in red and the display changes automatically over into the selection menu.

NOTE **The last brightness value which has been adjusted by hand is retained even after the ignition is turned off.**

- Actuate the upper part of the rocker tip switch **26** "Menu navigation":

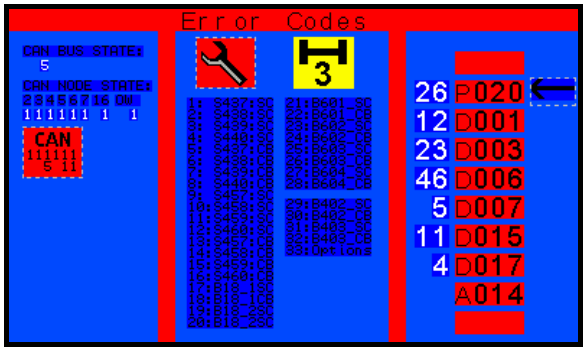


Exit the working menu.
Return to the selection menu.

3.1.1.3 Working menu "Service"

After selection and confirmation, the working menu "service" appears on the monitor.

The error codes can be read in this menu.



Error active.
If the symbol goes on, an error is active. The error codes appear below the symbol.

Example for reading out an error code:

Error code no.: Sensor designation in electric circuit diagram SC = Short Cut (Short-Circuit) CB = Cable break

1: S437_SC
2: S437_CB

Reset lifting of 3rd axle
Should an error have occurred while the axle is lifted, causing an undefined state, the function can be reset by pressing the rocker tip switch **31** “level control” - only in the working menu “Service” - for 7 seconds.

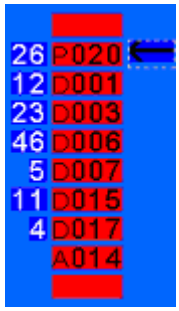
DANGER **Now the axle will fall down!**

CAN Service data.

These error codes are used by the Tadano FAUN After-Sales Service.

Internal error codes.

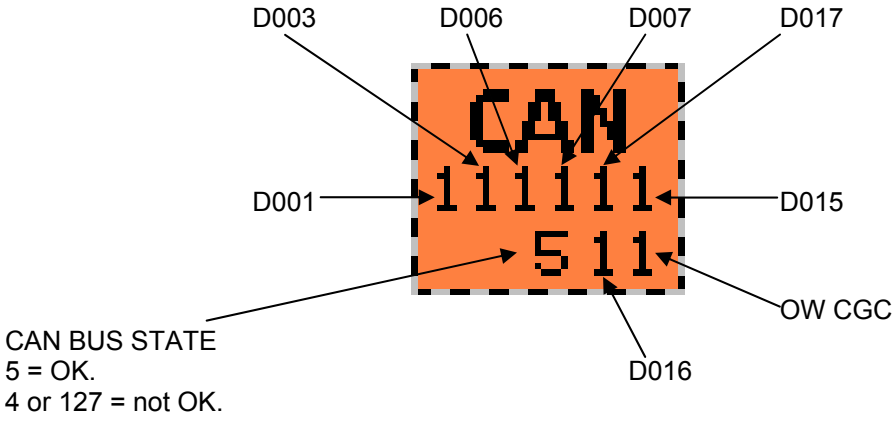
These error codes may only be read out following the instructions of the Tadano FAUN After-Sales Service, and must be communicated to the latter.



cont'd.: **3.1.1.3 Working menu "Service"**

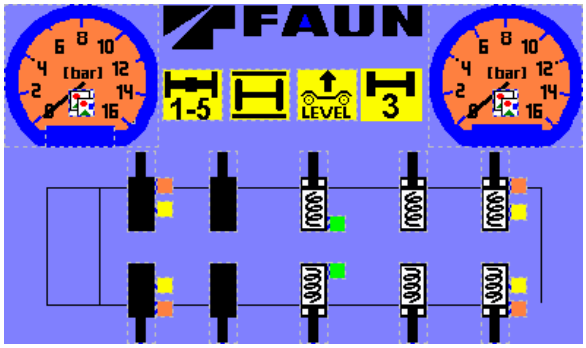
CAN errors.

1 = OK.
2 = not on the CAN BUS.
D = Designation of circuit diagram (refer to electric circuit diagram).

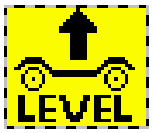


3.1.1.4 Working menu "axle suspension lock"

After actuation and confirmation, the working menu "axle lock" appears on the monitor.



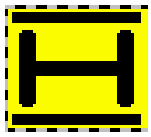
Vehicle is aligned horizontally (leveled).



Symbol lights up.

Align the vehicle completely horizontally, refer to part B1-4, item 4.7.1.2.

Axle suspension lock.



The symbol is lit as long as the axles are locked.

Axles lifted.

The symbol appears on the main screen as soon as the vehicle is supported by outriggers and all the axles are lifted.

3rd axle lifted.

The symbol is lit as long as the 3rd axle is in its upper position (lifted).

Moreover, a green field appears next to the symbol "suspension cylinders, 3rd axle".
If the field appears empty, the required position has not been reached.

Not blocked, suspension activated.

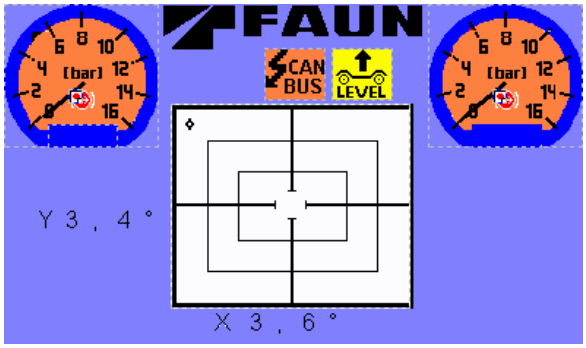
Blocked.

Moreover, a green or yellow field appears next to the symbol "suspension cylinder".
The red field appears to signalize that the higher level has been selected.
The yellow field signalizes normal level / driving level.

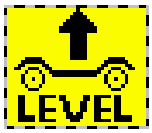
If a field appears empty, the required position has not been reached.

3.1.1.5 Working menu "spirit level"

After actuation and confirmation, the working menu "spirit level" appears on the monitor.

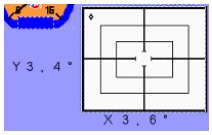


Vehicle is aligned horizontally (leveled).
Symbol lights up.
Align the vehicle completely horizontally, refer to part B1-4, item 4.7.1.2.

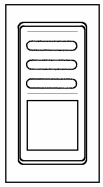


An error has occurred.
The indications of the spirit level are incorrect.
Refer to item 3.1.1.3.

The current vehicle inclination is visualized via the spirit level (±3°) and digitally via the x/y coordinates.



- Actuate the upper part of the rocker tip switch **26** "Menu navigation":



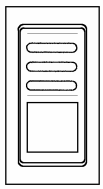
Exit the working menu.
Return to the selection menu.

*3.1.1.6 Working menu "Rear area surveillance"**)*

After actuation and confirmation of the working menu, the area to be monitored appears on the CMV monitor.

This menu also appears as long as the reverse speed is engaged.

- Actuate the upper part of the rocker tip switch **26** "Menu navigation":

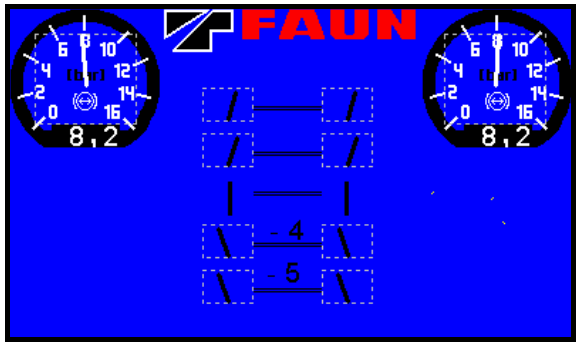


Exit the working menu.
Return to the selection menu.

**) Optional equipment

3.1.1.7 Information menu "steering"

After selection and confirmation, the information menu "steering" appears on the monitor.

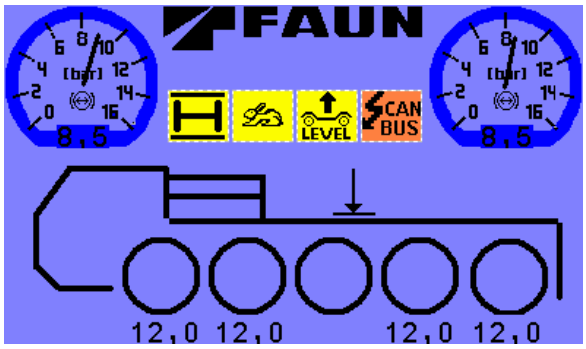


The analog steering actuation is displayed in the information menu „Steering“.
Moreover, the approximate steering actuation of the 4th and 5th axles is displayed digitally.

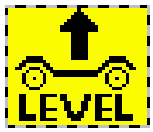
3.1.1.8 Information menu "axle load"

After actuation and confirmation, the information menu "axle load" appears on the monitor.

NOTE **The displayed axle loads are approximate values.**

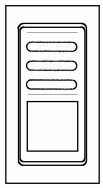


Vehicle is aligned horizontally (leveled).
Symbol lights up.
Align the vehicle completely horizontally, refer to part B1-4, item 4.7.1.2.



An error has occurred.
The vehicle weight indications are incorrect.
Refer to item 3.1.1.3.

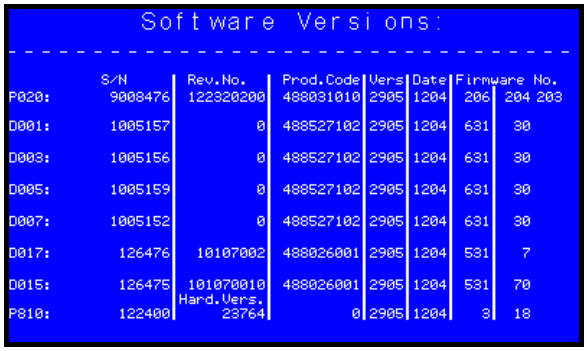
- Actuate the upper part of the rocker tip switch **26** "Menu navigation":



Exit the working menu.
Return to the selection menu.

3.1.1.9 Information menu

After selection and confirmation, the information menu "Info" appears on the monitor.



In the information menu “Info”, the software version and the hardware data are displayed.

NOTE **All the instruments, switches and indicator lamps described below are illustrated in part B1-11 "Instrument panel" and in part B1-3 "FAUN Cockpit Graphic Control System".**
The item numbers appearing in the text are printed in **bold** letters, and are identical with the item numbers appearing in the illustration "Instrument panel".

4 How to put the machine into operation

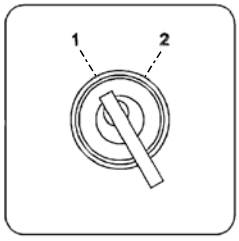
4.1 Steps to be taken and checks to be made before start-up

- Actuate the rocker switch **7** "battery main switch" (item 4.2.1).
- The parking brake (handbrake) is engaged (item 4.5).
- The gearbox selector lever is in "neutral position" (item 4.5).
- Check the engine oil level while the machine is aligned horizontally (part "C1" Service and Maintenance, Chassis).
- Check the hydraulic oil level (part "C1", Service and Maintenance, Chassis).
- Check the inflating pressure and the wear of the tires at regular intervals (part "C1", Service and Maintenance, Chassis).

NOTE **The tire inflating pressures specified in part "A", vehicle description, apply to the original equipment of the vehicle. When changing the tire brand, adhere to the prescriptions of the tire manufacturer in question.**

- Check the vehicle's electrical equipment for proper working order.
- The key-actuated change-over switch for **50** “chassis-superstructure” is set to position "1" (item 4.1.1).
- The 2nd axle drive has been disconnected (part B1-5, item 5.4).
- The differential locks in the axles are disengaged (part B1-5, item B1-5.4).
- The axle suspension must be operating (item 4.7).
- The outriggers are retracted; the outrigger beams are locked with pins; the outrigger floats are inserted and secured (item B1-6).
- The telescopes are retracted and in transport position (on-road travel); the bottom block is attached to the securing eyelet.
- The vehicle must be checked visually for precisely horizontal alignment.
- No loose objects must be placed on the platform.

4.1.1 Key-actuated change-over switch - Switching options

Switch position		Functions	Symbols in CGC*) (refer to item B1-3)	Key-actuated switch 50
Chassis Sect. 11, item 50	Super-structure			
1		Only operation from chassis (U.W.).		
2		Connection to superstructure (O.W.) is established.		
2	Ignition starter switch position: ignition OFF	Ignition in the chassis is OFF.		
2	Ignition starter switch position: ignition ON	Connection chassis - superstructure. Ignition of chassis is switched ON.		

*) FAUN Cockpit Graphic Control System

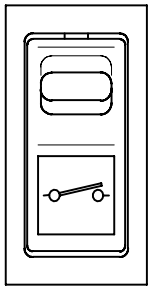
4.2 Operation of the electrical equipment

4.2.1 Battery main switch

Attention **When the engine is running, it is essential that the battery main switch is not turned OFF. The current flow between the generator and the battery must not be interrupted (destruction of the diodes of the generator).**

Switching ON:

- Unlock the rocker switch **7** "battery main switch" by actuating the lock handle down, and push the rocker switch down. The lock handle automatically returns to its locking position.



Thus, the connection between the chassis ground and the negative battery terminal ("-") has been established.

Switching OFF:

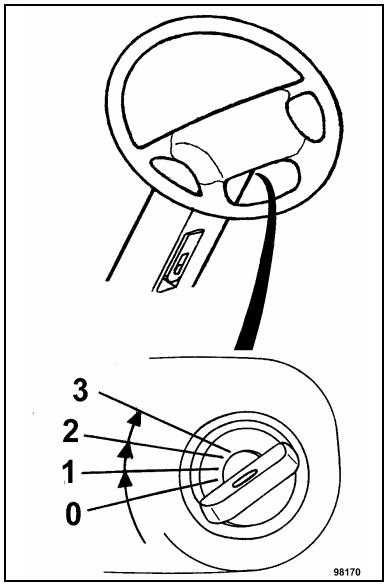
- Actuate the lock handle down and the rocker switch **7** upwards; now the electrical equipment is de-energized.

NOTE **Whenever work is interrupted for an extended period, e.g. at night, the battery main switch must be turned OFF.**

4.2.2 Ignition starter switch

The ignition starter switch is installed on the steering column and - ignition key inserted - has the following switch positions: (refer to Fig.)

Position 0: Ignition OFF, steering wheel lock active,
Position 1: Operation from superstructure, steering wheel lock open,
Position 2: Ignition ON,
Position 3: Engine start.

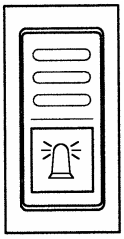


4.2.2.1 Switching the ignition on.

- Turn the ignition key to position "2"; the following indicator, pilot and warning lamps go on:

- Parking brake **17,**
- Service / parking brake **14** (in case of insufficient brake-air pressure),
- Warning lamp engine malfunction **13** goes on briefly and buzzer engine malfunction **21** is briefly activated.
- In the FAUN Cockpit Graphic Control System (refer to part B1-3), the following symbols: generator, steering pump, emergency steering pump, on-road or off-road gear.

4.2.3 Rotary beacon

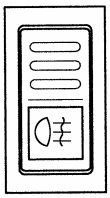


- The rotary beacon is switched on and off via the rocker switch **5** “Rotary beacon”.

- Rocker switch pressed down = rotary beacon "ON";
- Rocker switch pressed upwards = rotary beacon "OFF".

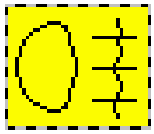
An orange function lamp in the switch goes on to indicate that the switch is turned ON.

4.2.4 Rear fog light

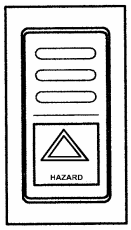


The rear fog light is switched on via the rocker tip switch **6** ”Rear fog light”.
Actuate rocker tip switch downwards: The rear fog light is switched ON.
Actuate rocker tip switch upwards: The rear fog light is switched OFF.

The symbol ”Rear fog light” is lit while the rear fog light is switched ON. Refer to the FAUN Cockpit Graphic Control System, part B1-3.



4.2.5 Hazard warning flasher system

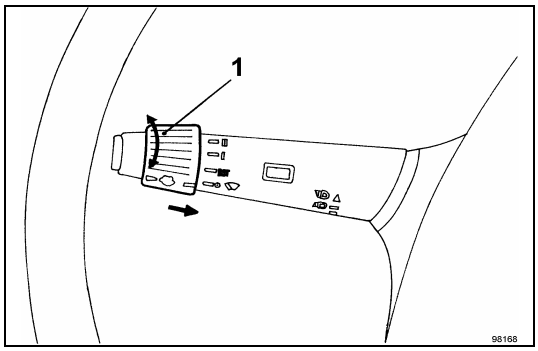


- To protect the machine in cases of emergency, actuate the rocker switch **49** "hazard warning flashers".

- Rocker switch pressed down = hazard warning flasher system "ON";
- Rocker switch pressed upwards = hazard warning flasher system "OFF".

The red function lamp in the switch flashes while the hazard warning flasher system operates.

4.2.6 Windshield wipers - windshield washing system

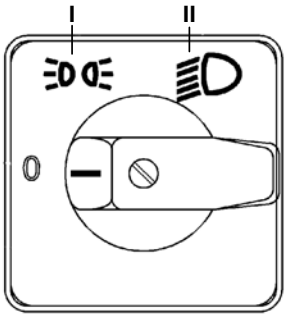


- To switch the windshield wipers ON/OFF, turn the switch ring (1) forward / back.

Switch position 0 = Wiper OFF,
Switch position INT = Interval circuit,
Switch position I = Step I - Slow wiper operation,
Switch position II = Step II - Fast wiper operation.

- To actuate the windshield washing system, shift the switch ring (1) towards the steering column.

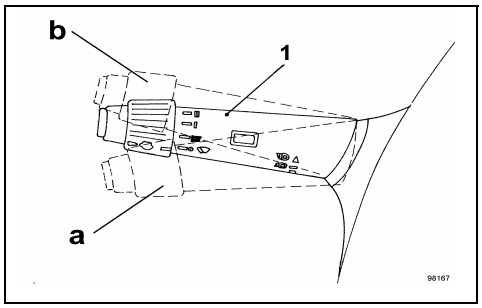
4.2.7 Parking light, dimmed light



- Actuate the rotary switch **8** “light” to switch the parking light or the dimmed light ON/OFF.

Switch position 0 = no lights ON,
Switch position I = parking light,
Switch position II = Parking light/ dimmed light.

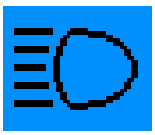
4.2.8 High-beam light, headlamp flashers



To change-over from dimmed light to high-beam light:

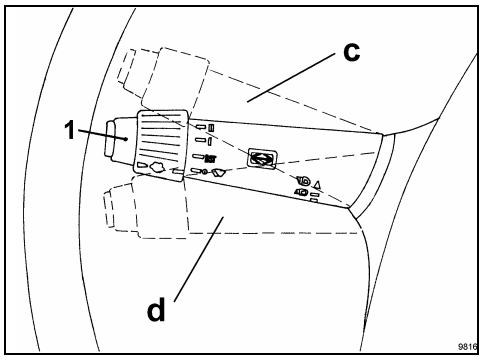
- Actuate rotary switch **8** “light” into position II.
- Lever (1) in central position (dimmed light).
- Lever (1) pushed out of its central position to
- a/ away from the driver = high-beam light (locked position).
- Lever (1) pushed out of its central position to
- b/ towards the driver = headlamp flasher

When the lever (1) is released, it returns to its central position. The headlamp flashers go out.



When the high-beam light / headlamp flashers are on, the symbol "high-beam light" is lit. Refer to the FAUN Cockpit Graphic Control System, part B1-3.

4.2.9 Direction indicator

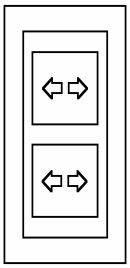


Steering column switch (1) actuated:

- c = direction indicators to the right of the vehicle are actuated;
- d = direction indicators to the left of the vehicle are actuated.

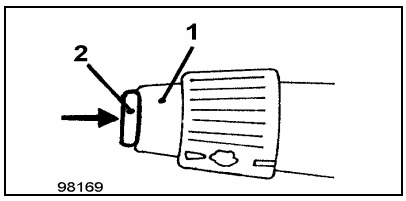
The driving direction is indicated by the direction indicators, which are flashing.

The green pilot lamp **12** "direction indicators, chassis" flashes to indicate that the chassis flasher system is operating.



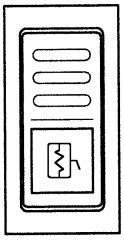
During operation with trailer, the green pilot lamp **19** "direction indicators, trailer"**) will go on additionally.

4.2.10 Electric horn



- The electric horn is switched ON by pressing the horn push-button switch (2) at the end of the steering column switch (1).

4.2.11 Mirror heating system

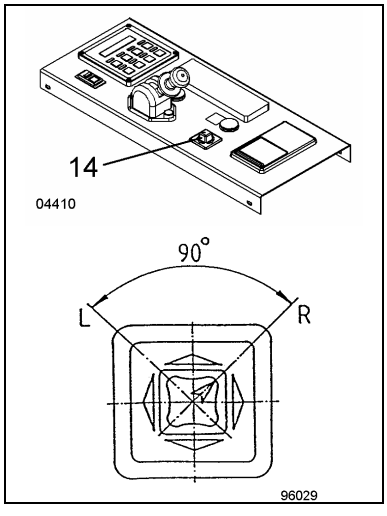


The mirrors can be heated in order to prevent misting during the cold season.

- Actuate the rocker switch **3** "mirror heating"; the green function lamp in the switch goes on to indicate the heating process.

4.2.12 Adjustment of rearview mirrors

The mirror adjusting switch on the central bracket, to the right of the driver's seat (refer to sect. B1-2, item 14), can be used to adjust the right-hand or left-hand rearview mirror horizontally and vertically.



- If the switch is turned through 90° (see Figure), the mirror adjusting function for the right-hand or left-hand rearview mirror is activated.

- Depending on the position of the arrow in the switch, the rearview mirror can be adjusted up or down to the left or right by tilting the switch in the desired position.

**) Optional equipment

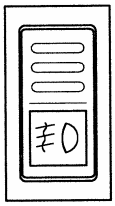
4.2.13 Plugboxes

Two plugboxes (refer to part B1-2, item 11 and 12) are installed in the center console, to the right of the driver's seat.

Pos. 11: Plugbox 24 V
Pos. 12: Plugbox 12 V

External consumers (e.g. an inspection lamp, etc.) can be connected to the plugboxes. If necessary, use an adapter.

4.2.14 Fog lights



To switch on the fog lights, actuate the rocker switch **4** “Fog lights”.

4.3 Functional check of the electrical equipment of the vehicle before starting driving operation

Before the driver sets the vehicle into motion, he has to check the hazard warning flasher system, the windshield wipers, the electric horn and the complete lighting system for proper working order.

NOTE **The inspection of the lighting system is only possible when the battery main switch and the ignition are switched ON.**

The following items of the lighting system must be checked in particular:

- Parking lights on the left and right, front and rear,
- Dimmed light / high-beam light on the left and right,
- Direction indicators on the left and right, front and rear,
- Stop lights on the left and right,
- Reversing lights on the left and right,
- License plate illumination,
- Rotary beacon,
- Rear fog lights on the left and right.
- Fog lights on the left and right.
- Border lights.

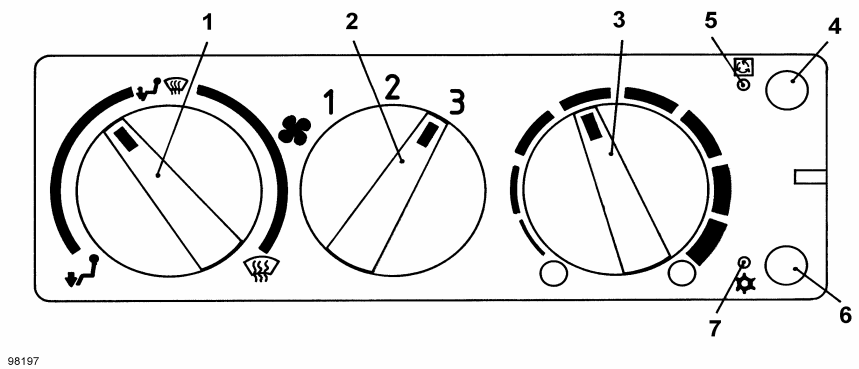
DANGER

- **Any faulty functions and missing or defective lighting equipment increase the risk of accidents.**
- **Should there be any faults, they have to be eliminated by specialists before driving is commenced.**

Attention

- **When fuses are replaced, it is essential that the new fuses have the same amperage as the defective fuses.**
- **Do not use fuses with a higher amperage on any account.**
- **It is absolutely prohibited to repair and re-use defective fuses.**
- **Non-compliance with these instructions may entail damage to the electrical equipment.**

4.4 Air distribution; fan; heater unit; air circulation and air conditioning**)



4.4.1 Air distribution (1)

The rotary switch (1) enables stepless control of the air distribution.

- Air flow to the space.
- Air distribution to the space and to the windows.
- Air flow to the windows.

4.4.2 Fan (2)

- Fan OFF.

1 - First step, low power.

2 - Second step, medium power.

3 - Third step, high power.

4.4.3 Cold-warm air regulation (3)

- The temperature of the incoming air can be controlled progressively via the rotary switch (3), from cold (rotary switch turned to the left) to warm (rotary switch turned to the right).

4.4.4 Air circulation (4) (5)

- When the pushbutton switch (4) is actuated, the supply of outside air into the driver's cabin is stopped.

The air intake and the air circulation is now only effected in a closed circuit, within the driver's cab. In ON condition, pilot lamp (5) is lit.

4.4.5 Air conditioning**) (6) (7)

Control and operation of the air conditioning system are explained in chapter B1-10 "Optional equipment".

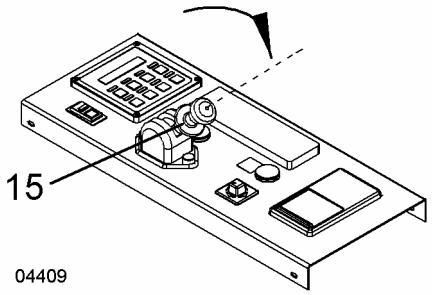
NOTE **Air conditioning systems can be retrofitted. For this reason, the control switch and the pilot lamp have already been installed and are operative. When switch (6) is actuated, the pilot lamp (7) goes on, even if no air conditioning is provided.**

**) Optional equipment

4.5 Start the engine

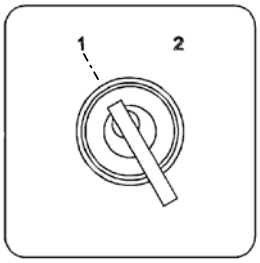
(For details, please refer to the Operating Manual of the engine manufacturer.)

lock position = braking position



DANGER **Before starting the engine, make sure that the hand brake - parking brake lever (refer to part B1-2, item 15) is in its braking position.**

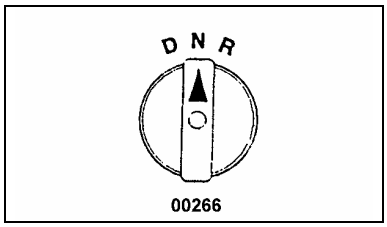
- The key-actuated change-over switch **50** is set to "position 1".



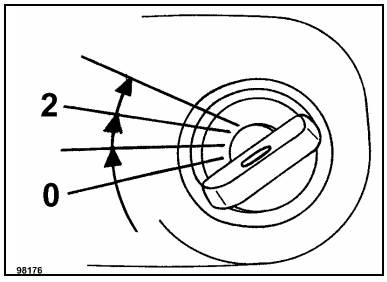
DANGER **During driving operation, do not set the key switch to position 2.**

It is recommended that the key switch be removed during driving operation.

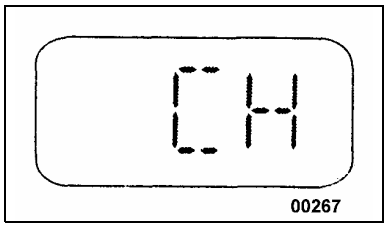
- The rotary switch - Gearbox - is in "N" position (gearbox in neutral).



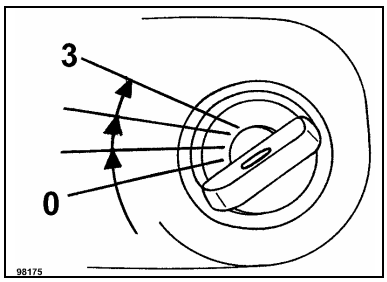
- Insert the ignition key into the ignition starter switch and turn it to "position 2" - now the ignition is switched ON.



- Self-check of the control system ("CH" appears on the display).

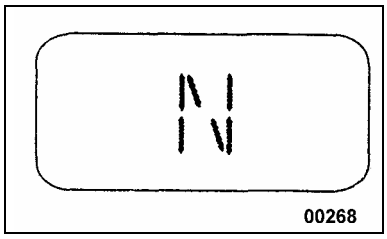


- Start the engine. To do so, turn the ignition key to its stop in position "3" (start) and hold it against the spring force. Release the key as soon as the engine starts. Do not actuate the starter for more than 20 seconds. To save the batteries, pause for approx. 60 seconds between the various starting attempts.



cont'd.: **4.5 Start the engine.**

- The self-check is terminated. "N" appears on the display, the gearbox is in neutral position.



NOTE While the engine does not run, shifting is not possible.

- After starting, only the warning lamp **17** "parking brake" may be lit.

While the engine is running, the following instruments are in operation:

- Speed indicator with integrated hourmeter **24**,
- Speedometer with tripmeter **9**,
- Modular tachograph (refer to part B1-2, item 32),
- Fuel level indicator **23**,
- Engine temperature indicator **11**,
- in the FAUN Cockpit Graphic Control System (refer to part B1-3).

Explanation of the pilot lamps and instruments while the engine is running: refer to item 4.6.

(For further details, please refer to the Operating Manual of the engine manufacturer.)

4.5.1 Stopping the engine

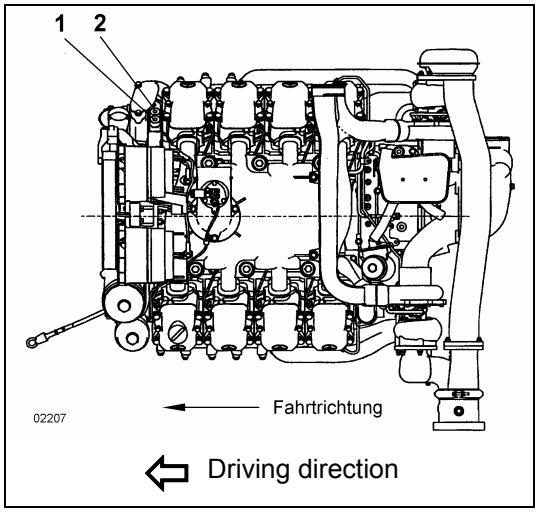
- Engage the parking brake (handbrake).
- Set rotary switch "driving operation" to neutral position "**N**".
- Stop the engine by turning the ignition key to the left, to position **0**.

Do not stop the engine immediately after working under high load, but allow it to run at idling speed for a few minutes, so that the temperature can adjust.

NOTE Do not stop the engine immediately after it has been working at high speed.

4.5.2 Emergency control: emergency start / emergency shut-off

Directly on the engine case, push-buttons are provided for starting (1) and stopping (2) the engine.



- Remove engine cover.

DANGER **Before performing an emergency start of the engine, make sure that the gearbox is set to neutral.**
The parking brake is engaged.

Engine start actuation:
- The ignition in the chassis is ON and the engine is not running.
- The gearbox is set to neutral position "N".
- Actuate push-button (1) – the engine is started and operates at idle.

Engine shut-off actuation:
- The ignition in the chassis is ON and the engine is running.
- Actuate the push-button (1) again – the engine comes to a standstill.

or

- Actuate the push-button (2) – the engine comes to a standstill.

Starting the engine and increasing the engine speed:

- The ignition in the chassis is ON and the engine is not running.
- The gearbox is set to neutral position "N".
- Actuate push-button (1) and keep it pressed – the engine is started and runs at idle; 3 seconds after the engine has started, the engine speed increases to max. level.
- Release the push-button (1) – the engine continues to run at its instantaneous speed.
- Actuate push-button (1) again, or actuate push-button (2) – the engine comes to a standstill.

Actuation of engine cranking function:
- The ignition in the chassis is ON and the engine is not running.
- The gearbox is set to neutral position "N".
- Actuate push-buttons (1) and (2) at the same time – the engine cranks, but does not start.
- Release the two push-buttons (1) and (2) – starter activation is cancelled, the engine comes to a standstill.

4.5.3 Manual fuel pump - fuel filter with water separator

The fuel strainer with water separator and integrated manual pump is located on the right side of the vehicle (refer to part B1-1.3, item 11).
Should air and/or dirt have entered into the fuel system, the filter cartridge must be replaced, and the fuel system must be cleaned and bled.

Bleeding the fuel system, and supplying fuel via the manual pump, after
- the fuel tank has been emptied completely,
- leakage has occurred in the fuel system,
- the fuel filter has been replaced (filter replacement, refer to part C1, Service and Maintenance, Chassis).

Prerequisite:
- a sufficient amount of fuel has been replenished,
- any leakage has been eliminated,
- the filter cartridge has been replaced as described in part "C1", Service and Maintenance - Chassis.

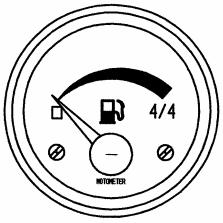
Bleeding, and supplying fuel:

- Open vent screw (1); actuate pump plunger (2) repeatedly, until fuel flows out without bubbles.
  (Collect overflowing fuel in an appropriate vessel and pour it back into the fuel tank.)

- Tighten the vent screw (1) securely again.
- Start the engine. Should the engine fail to start immediately, have an assistant actuate the pump plunger repeatedly, until the engine is operating smoothly.

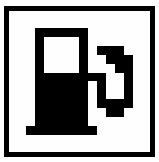
4.6 Monitoring the pilot, indicator and warning lamps and the instruments while the engine is running

4.6.1 Fuel level indicator



If the needle in the instrument **23** “Fuel level indicator” drops close to zero indication, fuel must be replenished in time. Moreover, a symbol (refer to part B1-3, FAUN Cockpit Graphic Control System) appears.

NOTE **Make sure that the fuel tank is never completely emptied, as otherwise air might get into the fuel system. Consequently, the system would have to be bled completely. Moreover, filters and piping assemblies would have to be cleansed.**



DANGER **Explosion hazard: Do not smoke, do not use any open flames; to fill the fuel tank, make sure that the engine is not running and that the machine is aligned in horizontal position.**

4.6.2 Engine

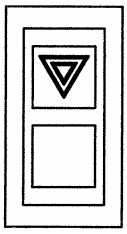
4.6.2.1 Engine oil level

The engine oil level is monitored via the symbol “Engine oil level” (refer to part B1-3, FAUN Cockpit Graphic Control System) while the engine is not running.
If the symbol appears while the ignition is ON and the engine is not running, the oil level must be checked and, if necessary, oil must be replenished.
Check oil level and, if necessary, replenish oil; if applicable, check for a loss of oil and eliminate the reason. Make the engine run for approx. 2 or 3 minutes and stop it again; after approx. 5 minutes check the oil level and, if necessary, repeat this procedure.

NOTE **The oil level may only be checked while the engine is not running.**

For further details, please refer to the Operating Manual of the engine manufacturer.

4.6.2.3 Function Engine / steering



In case of engine malfunction, the warning lamp **13** "engine malfunction" goes on.

Eliminate the fault at the next opportunity; if necessary, take the machine to a specialist workshop.

In case of serious faults, the buzzer **21** "engine malfunction" sounds simultaneously. In this case, the engine must be stopped and the reason for the malfunction must be determined and eliminated without delay.

If necessary, the vehicle must be taken to a specialist workshop to have the trouble eliminated.
If the engine malfunction buzzer sounds and pilot lamp **16** “malfunction, steering” is lit, there is a malfunction in the steering system (refer to item B1-5.9 Steering).

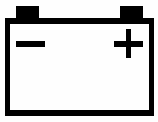
Attention **The warning lamp 13 "engine malfunction" goes on and the warning buzzer 21 "engine malfunction" are also activated when the engine speed of 2350 rpm is exceeded. To prevent the engine from being damaged, the machine must be decelerated immediately by actuation of the service brake, and the engine speed must be reduced.**
When the engine speed of 2800 rpm is exceeded, the engine brake is connected automatically by the engine's electronic system.

After the trouble has been eliminated, the error must be read out of the system by means of a diagnostic device. This should be effected in a specialist workshop or by the TADANO FAUN after-sales service.

(For further details, please refer to the Operating Manual of the engine manufacturer.)

4.6.2.4 Generator

As soon as the engine is running, the symbol "Generator" must not be lit, and must not go on again during driving operation. (Refer to the FAUN Cockpit Graphic Control System, part B1-3).

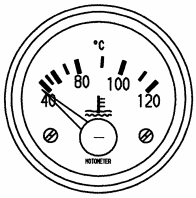


Otherwise, a malfunction is present and the batteries are not charged.

The machine must be taken to a specialist workshop immediately for the fault to be eliminated.
It must be ensured that the batteries are always fully charged.

4.6.2.5 Coolant temperature

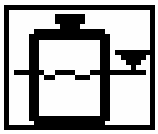
The coolant temperature is monitored via the instrument **11** (“engine temperature indicator”). The admissible service temperature is in the range from 80°C to max. 95°C.
If the coolant level drops, the coolant temperature consequently exceeds the maximum admissible rating. The needle moves into the critical range.
Eliminate the fault at the next opportunity; if necessary, take the machine to a specialist workshop.



If the warning lamp **13** “engine malfunction” goes on and the buzzer **21** “engine malfunction” sounds, stop the vehicle immediately, stop the engine, locate the reason for the malfunction and eliminate it immediately.

4.6.2.6 Coolant level

A sensor installed in the compensating tank monitors the coolant level. In case of an insufficient level, the "coolant level" indicator goes on in the FAUN Cockpit Graphic Control System (refer to item 3.1).
In this case, top up coolant via the filler port in the expansion tank. (Part "C1", Service and Maintenance, Chassis).
The reason for the loss of coolant must be determined and eliminated.
At the same time, the warning **15** “central warning” Chassis goes on.



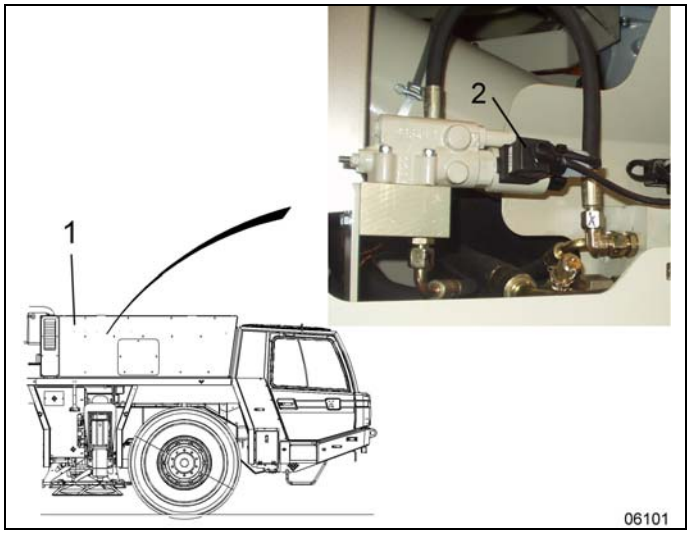
DANGER **Do not check the coolant level while the engine is hot; the cooling system is pressurized.**
There is a risk of scalding when the filler socket is opened while the engine is hot!

4.6.2.7 Cooling system

The speed of the fan provided for cooling the engine coolant is controlled via the engine's electronic system **"independently of the engine speed".**

A valve block is provided below the cover (1). The connector (2) must be inserted.

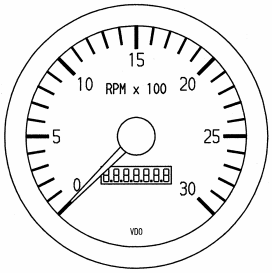
In case of failure or a deficiency of the engine's electronic system, the fan turns only at reduced speed; thus, the necessary cooling effect for the engine is not reached.
To achieve the required cooling effect, the connector (2) can be removed so that the system is reset to non-controlled operation "**independently of the engine speed**".



The symbol "coolant level" (refer to part B1-3, FAUN Cockpit Graphic Control System) must not go on and the needle of the instrument **11** "engine temperature indicator" must not be in the critical range even during operation **"governed by the engine speed"**.

4.6.2.8 Engine speed

The engine speed is indicated by the revolution counter **24**.
The max. engine speed is approx. 2,000 r.p.m.
During thrust operation, the maximum speed may be higher; however, it must not exceed 2.350 r.p.m.

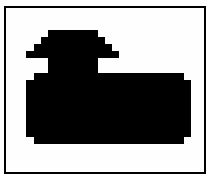


4.6.2.9 Operating hours

An hourmeter has been integrated into the revolution counter **24** to permit monitoring of the operating hours. The hourmeter is activated as soon as the engine is started.

4.6.2.10 Contamination of air cleaner

The intake air resistance or the low pressure on the clean air side of the dry air cleaner is monitored by the symbol "air cleaner contamination" (refer to part B1-3, FAUN Cockpit Graphic Control System).
At the same time, the warning lamp **15** "central warning Chassis" goes on.
If the indicator and the central warning for the chassis go on while the engine is running, replace the air cleaner cartridge. (Refer to part "C1", Service and Maintenance, Chassis).



4.6.3 Hydraulic system

4.6.3.1 Contamination of the hydraulic oil filter

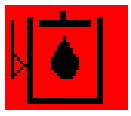
The degree of contamination of the hydraulic oil filters is monitored. The symbol “hydraulic oil filter” goes on to indicate an inadmissibly high degree of contamination of the hydraulic oil filters. (Refer to the FAUN Cockpit Graphic Control System, part B1-3).
At the same time, the warning lamp **15** “central warning Chassis” goes on.

Should this occur, the hydraulic oil filters have to checked and, if necessary, replaced immediately.

4.6.3.2 Hydraulic oil level

DANGER **Whenever the symbol “hydraulic oil level” lights up, stop the vehicle immediately and stop the engine.**

The symbol “hydraulic oil level” goes on to indicate an insufficient hydraulic oil level. (Refer to item B1-3).
In this case, hydraulic oil must be added. If necessary, the reason of the loss of hydraulic oil must be determined and eliminated.



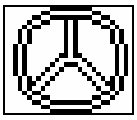
DANGER **When the „hydraulic oil level” symbol appears, the rear axle steering is automatically set to “malfunction”. The 4th and 5th axles must be centered via the emergency control (refer to item B1-7.2).**

NOTE **The “hydraulic oil level” symbol appears also when the outriggers are completely extended (function test).**

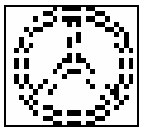
4.6.3.3 Steering hydraulics (dual-circuit steering system)

The steering pump and the steering emergency pump are checked for proper functioning via the symbols "steering pump“ and "emergency steering pump“ in the FAUN Cockpit Graphic Control System (refer to part B1-3).
Both lamps go on when the ignition is switched on.

Steering pump: In case of malfunction, the symbol may only light up during operation.



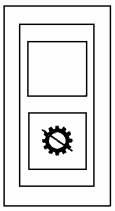
Emergency steering pump: Lights up the symbol while the ignition is shut off, the sensor is faulty.



DANGER **If a symbol goes on during travelling operation, this indicates a deficiency in the corresponding steering pump circuit. In this case, stop the vehicle immediately and determine the reason for the damage (e.g. loss of oil).**
After the deficiency has been eliminated, check the steering system for proper working order before putting the vehicle into operation again.

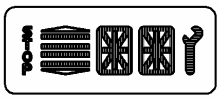
4.6.4 Gearbox

4.6.4.1 Gearbox malfunction



A warning lamp **18** "gearbox malfunction" goes on in case of a malfunction in the gearbox. At the same time, the buzzer **22** "gearbox malfunction" sounds. In this case, the vehicle must be stopped immediately and the reason for the malfunction must be determined.
If necessary, the vehicle must be taken to a specialist workshop to have the trouble eliminated.

4.6.4.2 Gearbox display



The “Gearbox Display“ **25** indicates all the necessary information about the system (e.g. gear step, malfunction, etc.).

Attention **It is essential to watch the malfunction indicators in the display. Failure to comply with this instruction may result in damage to the gearbox and/or the clutch!**

Attention **In the 1st gear / manoeuvring mode, the self-protective functions of the clutch are not active. Non-compliance with the warnings buzzer 22 “gearbox malfunction” and 25 “gearbox display ” warning CL may result in damage to the clutch.**

For further details, please refer to the Operating Manual of the gearbox manufacturer.

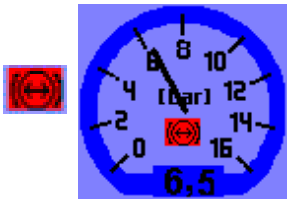
4.6.5 Brake system

4.6.5.1 Air pressure gauge

The two compressed air gauges and digital indicators (refer to part B1-13, FAUN Cockpit Graphic Control System) indicate the brake-air pressures of the service brake circuits I and II.
Air pressure gauge I = 3rd, 4th and 5th axles.
Air pressure gauge II = 1st and 2nd axles.

When the compressed air system is filled, or during driving operation, the air pressure gauges must indicate 9.0 to 10.2 bar.

If the brake-air pressure in brake circuits I and/or II decreases below 6.5 bar, the symbol “brake” of the appropriate brake circuit is flashing in red.

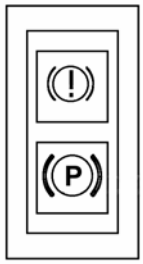


If the brake-air pressure in brake circuits I and/or II decreases below 5.5 bar, the indicator appears on red background. Moreover, the warning lamp **14** “service brake” goes on.

4.6.5.2 Pilot and warning lamps

Warning lamp 14 - "Service brake"

The red central warning lamp **14** "service brake" has been installed to monitor the brake-air pressure of the brake system (brake-air pressures of service brake system, circuits I and II, and circuit III - air accumulator system).
The red warning lamp goes out as from a brake-air pressure of approx. 5.5 bar.

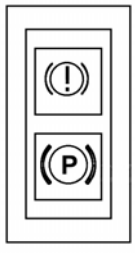


NOTE **If the red warning lamp 14 "service brake" goes on, the air pressure gauges must be checked to see whether the needle exceeds the 5.5 bar indication. If it does so in both air pressure gauges, this indicates a malfunction in the air accumulator circuit (FBA) or in the auxiliary equipment circuit.**

DANGER **Whenever the red warning lamp 14 "service brake" goes on, stop the vehicle immediately, determine the reason for the malfunction and eliminate it immediately.**

Warning lamp 17 "parking brake"

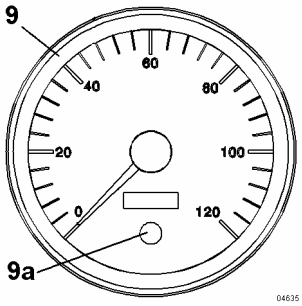
The red warning lamp **17** "parking brake" goes on when the vehicle is positively braked via the handbrake lever (air accumulator section is released), and goes out when the handbrake is released (air accumulator section is ventilated).
If the warning lamp goes on, this indicates a malfunction in the air accumulator circuit.



NOTE **Set the vehicle only into motion after the air pressure gauges indicate a brake-air pressure of at least 7.1 bar and after the red warning lamps 14 "service brake" or 17 "parking brake" have gone out.**

Attention **The warning lamp 17 "parking brake" monitors directly the proper working order of the air accumulator parking brake which acts on the 2nd, 4th and 5th axles. When the parking brake is applied, the warning lamp must go on.**

4.6.6 Speedometer with tripmeter



The instrument **9** “speedometer“ indicates the current vehicle speed.

4.6.6.1 Tripmeter

A tripmeter has been integrated into the tachometer **9** to permit monitoring of the trip mileage.
The tripmeter is reset via the pushbutton (refer to Fig., sect. 4.6.6, item 9a) in the tachometer. Keep pushbutton pressed for approx. 3 sec. to reset the tripmeter to zero.

Attention **It is absolutely inadmissible to press the pushbutton (refer to Fig., sect. 4.6.6, item 9a) in the tachometer while activating the function “ignition ON”, as thus the operator would get access to a mode in which internal settings can be changed.**

4.6.7 Modular tachograph (electronic tachograph)

The modular tachograph (refer to part B1-2, item 32) displays the current total mileage, the current vehicle speed, time, the preset work groups and symbols of the inserted diagrams.
Malfunctions of the device or of one of the system components are displayed automatically.
The vehicle speed, the distance covered and the driver-specific driving, work and rest periods are recorded on the diagram.

The device is controlled via keypads.

If an exclamation mark appears next to the total mileage indication, this signalizes a malfunction.

At the same time, the tachometer fault symbol appears In the FAUN Cockpit Graphic Control System (refer to part B1-3):

For further details, please refer to the documents of the manufacturer of the equipment supplied with the machine.

4.7 Hydraulic system of suspension, inclination adjustment, level control

Important instructions for operation of the hydraulic suspension system

NOTE **The symbols of the hydraulic suspension system, the inclination adjustment and the leveling system are located in the FAUN Cockpit Graphic Control System (refer to part B1-3).**

DANGER

- **Leveling is only admissible on horizontal and level ground. The rear axles must be set to straight-ahead position.**
- **Leveling is only admissible while the vehicle is at a standstill, and never during traveling operation.**
- **Make sure that the axle suspension is locked before lowering the suspension.**
- **When leveling the vehicle for on-road driving operation, the axle suspension must not be locked.**
- **Make sure that the axle suspension is locked before adjusting the vehicle's inclination.**

4.7.1 Inclination adjustment

If the inclination of the ground is to be compensated, e.g. during off-road operation with the vehicle in full rig arrangement, or if the outriggers on one side of the vehicle are to be extended beyond an obstacle, it is possible to correct the vehicle's inclination or to lift/lower the machine only in one position.

DANGER **Do not tilt the vehicle out of its horizontal alignment more than is absolutely necessary. The necessary stability must always be ensured - risk of overturning!**

DANGER **The leveling feature must be put into operation while the engine is running. The parking brake must be engaged. After an inclination compensation, the vehicle must be returned to horizontal alignment. However, the individual suspension cylinders must not be extended or retracted to their final position while the vehicle is driven in off-road terrain and on uneven roads.**

DANGER **For safety reasons, the inclined vehicle must not be moved while the steering is actuated!**

NOTE **Leveling is only admissible up to an engine speed of max. 1200 rpm. (in case of 12 t axle load). At a lower axle load, the engine speed must be reduced accordingly.**

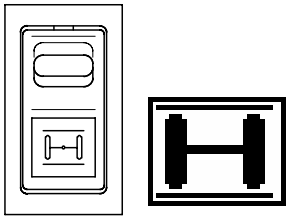
4.7.1.1 Actuation of the inclination adjustment feature

The axle suspension must be locked:

- In case of an inclination adjustment (refer to item B1-4.7).
- Before lowering the vehicle (refer to item B1-4.7).
- When driving on the construction site with the complete counterweight mounted (refer to item B1-6.7), if permitted. Comply with the Notes referring to the load charts and item B2-7.

When the suspension is locked, the axle compensation between the two front and rear axles is maintained.

Before the inclination tip switches are actuated, the axle suspension must be locked.

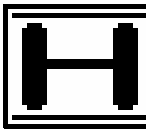


Engaging the axle suspension lock:

- Unlock the rocker switch **36** "axle suspension lock" by actuating the lock handle down, and push the rocker switch down.

The axle suspension lock is engaged. The "axle suspension lock“ symbol (refer to part B1-3, FAUN Cockpit Graphic Control System) goes on.
The lock handle automatically returns to its locking position.

Before leveling the vehicle for on-road travel, the axle suspension lock must be disengaged.



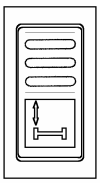
Deactivating the axle suspension lock:

- Push the lock handle in the rocker switch **36** "axle lock" down; actuate the rocker switch upwards; now the axle suspension lock is disengaged.

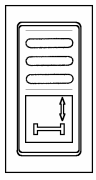
The "axle suspension lock“ symbol (refer to part B1-3, FAUN Cockpit Graphic Control System) goes out.
The lock handle automatically returns to its locking position.

The suspension cylinders are actuated via the four rocker tip switches in the instrument panel.

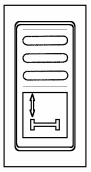
Rocker tip switch **33**	Inclination adjustment, 1st and 2nd axles, front right-hand
Rocker tip switch **32**	Inclination adjustment, 1st and 2nd axles, front left-hand
Rocker tip switch **34**	Inclination adjustment, 3rd, 4th and 5th axles, rear right-hand
Rocker tip switch **35**	Inclination adjustment, 3rd, 4th and 5th axles, rear left-hand



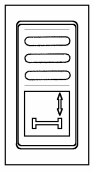
Rocker tip switch **32**



Rocker tip switch **33**



Rocker tip switch **35**



Rocker tip switch **34**

- Move rocker tip switch upwards from its central position: = suspension cylinders are extended (lifting).
- Move rocker tip switch down from its central position: = suspension cylinders are retracted (lowering).

Keep the rocker tip switches pressed until the desired inclination is reached.

cont: **4.7.1.1** Actuation of the inclination adjustment feature

DANGER **Nobody is allowed to stay below and on the vehicle while the vehicle's inclination is corrected or while individual suspension cylinders are extended or retracted.**

4.7.1.2 Leveling for on-road driving condition

Attention **Once crane work is finished, the chassis suspension must be returned into its "on-road" state. To this effect, the vehicle must be lowered completely on a level, horizontal road (refer to item 4.7.3.2) and returned to its preset position by means of rocker tip switches (refer to item 4.7.3.1)**.

NOTE **The rear axles must be set to straight-ahead position before leveling is actuated.**

4.7.2 Leveling

To return the vehicle to its predetermined level position in "on-road" condition after an inclination adjustment, it must be parked on a horizontal road and set to its lowest level position.

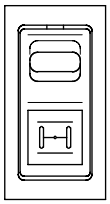
4.7.3 Lowering the suspension

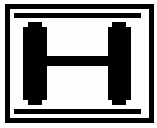
In on-road driving condition, the vehicle's suspension is set to automatic level compensation.

4.7.3.1 Lowering the suspension for leveling

DANGER **Make sure that nobody stays under or on the vehicle while it is being lowered.**

- Switch the ignition ON.

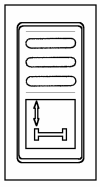


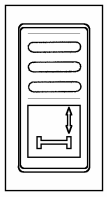


- Unlock the rocker switch **36** "axle suspension lock" by actuating the lock handle down, and push the rocker switch down.

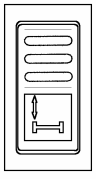
The axle suspension lock is engaged. The "axle suspension lock“ symbol (refer to part B1-3, FAUN Cockpit Graphic Control System) goes on.
The lock handle automatically returns to its locking position.

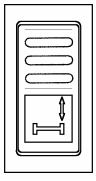
- By actuating the rocker tip switch **32** for 1st and 2nd axles on the left, and the rocker tip switch **33** for 1st and 2nd axles on the right, lower the vehicle on the front end to its lowest level.





- By actuating the rocker tip switch **35** for 3rd, 4th and 5th axles on the left, and the rocker tip switch **34** for 3rd, 4th and 5th axles on the right, lower the vehicle at the rear to its lowest level.



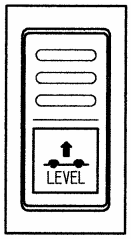


<u>After the vehicle has been lowered to its lowest level, disengage the axle suspension lock (refer to item 4.7.1.1).</u>

cont'd.: **4.7.3.1 Lowering the suspension for leveling**

NOTE **When the level control is actuated** *in "on-road" driving condition*, **the <u>axle suspension must not be locked</u>. (The rocker switch 36 "axle suspension lock"must be locked) the symbol "axle suspension lock" (refer to part B1-3, FAUN Cockpit Graphic Control System) must not be lit.**

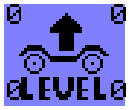
Prerequisites for leveling:



The vehicle is lowered for level control, as described under item 4.7.3.1; the axle suspension lock is disengaged, as described under item 4.7.1.1.

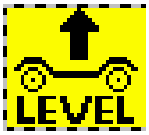
- While the engine is running (engine speed between idle and 800 rpm), actuate the rocker tip switch **31** "leveling" and keep it pressed.

During the leveling procedure, the blue symbol "leveling activated" is lit and the numbers next to the symbol change from 0 to 1 (refer to part B1-3, FAUN Cockpit Graphic Control System).



<u>Symbol "normal level"</u>

- After the chassis has reached the predetermined level, the leveling procedure is automatically terminated.



Moreover, the yellow symbol "normal level" (refer to part B1-3, FAUN Cockpit Graphic Control System) appears.

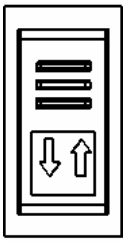
- Release the rocker tip switch **31** "leveling".

Now the vehicle is positioned again so that all its sides are aligned parallel to the road; the suspension is ready to operate for on-road travel, and set to automatic level compensation.
- Finally, check whether the vehicle is aligned perfectly in horizontal position (check visually).

4.7.3.1.1 Leveling - lift / lower all

- Switch the ignition ON.
- Start the engine.

  Lower the vehicle completely by actuating the rocker tip switch **38** "leveling - all down/up" downwards.
- Lift the vehicle completely by actuating the rocker tip switch **38** "leveling - all down/up" upwards.



DANGER **Make sure that nobody stays under or on the vehicle while the vehicle is being lowered-lifted.**

- Perform leveling as described under item B1-4-7-2.

4.7.3.2 Lowering the suspension in case of repair work

In case of repair, e.g. if there is a leakage in the hydraulic system of the suspension, a deficiency of a cylinder or hydraulic accumulator, the hydraulic system must be depressurized before repair work is effected.

- Lower the suspension as described under item 4.7.3.1.

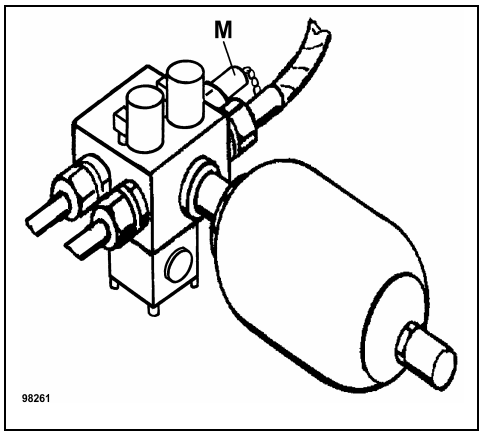
The oil contained in the suspension cylinders is drained into the hydraulic tank.

- Switch the ignition off.

- Connect a hose to the measuring connector "M" (Fig.) of the hydraulic accumulators' cylinder pair in question, and drain the residual oil separately for each accumulator into an appropriate vessel.

- After the residual oil has been drained from the accumulators, work on the suspension hydraulics can be performed, or a pressure test in the hydraulic accumulators can be effected (nitrogen end).

(For further details, refer to part "C1", Service and Maintenance, Chassis).



DANGER **The oil-bearing ends of the hydraulic accumulators are still pressurized.**

Resetting the level position of the vehicle for on-road travel, refer to item 4.7.3.1 "Leveling".

4.8 Centralized lubrication system

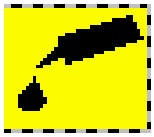
The machine is equipped with a centralized lubrication system. This ensures optimum lubrication of all points of lubrication connected, independently of the lubricating intervals indicated in the operating manual. Only the lubricating points which are not connected still have to be supplied by hand.

4.8.1 Function

The system operates fully automatically in accordance with the lubricating intervals set on the electronic control unit.
When the ignition is switched on, this triggers continuous execution of a reiterative cycle of pause times and contact times (pump operating time).
When the ignition is switched off, the pause time elapsed until then is saved. It only continues after the ignition has been switched on again.

4.8.2 Indication of malfunctions, functional check, monitoring

The symbol "central lubrication" in the FAUN Cockpit Graphic Control System (refer to item B1-3) lights only up for approx. 3 seconds when the engine is started. Thus, it indicates that the system is in proper working order. If the symbol remains lit - even during pause times - this indicates a malfunction.
The malfunction may be due, e.g. to an empty supply tank or a deficiency of the pressure switch in the control unit.

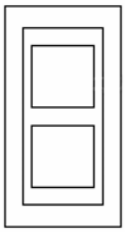


Attention **No lubrication is effected as long as the symbol is lit.**

Attention **Malfunctions must be located and eliminated immediately.**

4.9 Central warning, CGC

The red warning lamp **15** "Central warning CGC" goes on in case of electronic faults of the control system, of faults in the chassis CAN bus, sensor faults or engine malfunctions.



Attention **Observe the warning lamp 15 "central warning, CGC". If it goes on, the reason for the malfunction must be determined and eliminated without delay.**

5 Gearshift and driving operation

DANGER **During driving operation, do not set the key switch 50 to position 2.**

It is recommended that the key switch be removed during driving operation.

5.1 Gearbox

The vehicle is equipped with a gearbox featuring the automatic ZF control system, series AS Tronic. The gearbox is adapted to the engine via a standard dry clutch.
The gearbox installed, type 16 AS 2602, has 16 forward and 2 reverse speeds.

Before the engine is started, make sure that the handbrake is in "braking" position.

DANGER **There is no braking effect when the engine is not running and while the gearbox is set to neutral position.**

Even without actuation of the accelerator pedal, the vehicle might roll away.

Do not place the gearshift lever in NEUTRAL during traveling operation. In this case, the engine's braking effect would not be available, which might result in extremely dangerous situations.

Do not leave the vehicle while the engine is running and a gear is engaged.

Before leaving the vehicle while the engine is running, set the gearbox to neutral and actuate the parking brake.

Even if gear "D" is engaged, the vehicle may roll backwards. The clutch is only engaged when the vehicle is set into motion.

While the vehicle is at a standstill with the engine running and a gear engaged, simply actuate the accelerator pedal to set the vehicle in motion.

Perform brake tests immediately after starting to drive.

As the vehicle must be stalled with the gearbox in neutral position, and as no rigid connection exists between the engine and the axles, the vehicle must be prevented from rolling away on stopping and parking, especially on uphill and/or downhill gradients.
To this effect, the parking brake must be engaged and, if necessary, the vehicle must be protected with wheel chocks positioned at the tires.

Attention **Engage the reverse speed only when the vehicle does not move.**
Do not allow the vehicle to roll contrary to the driving direction of the gear engaged.
The vehicle can accelerate when driving on downhill gradients. There will be no automatic upshifting of the gearbox. To protect the engine against damage in the overspeeding range, the driver must take appropriate measures (for ex. braking) to avoid overspeeding.
In case of overspeed, however, "emergency" upshifting will take place to protect the engine.
At 2,650 rpm, "emergency" upshifting will be effected even if the service and continuous service brakes are engaged.
At 3,500 rpm, "emergency" upshifting will take place when the continuous service brake is engaged, but also in mere overrun condition.
The engine can be damaged if the vehicle accelerates during downhill driving, thus accelerating the engine to the overspeeding range.

cont'd.: 5.1 Gearbox

- When leaving the vehicle, engage the parking brake and, if necessary, block the wheels additionally by placing wheel chocks under the wheels.
- In case of irregularities of the gearbox (gearbox malfunction warning lamp, gearbox malfunction buzzer and error message in the display), stop the vehicle, look for the fault and - if it cannot be eliminated by means of the equipment available in or on the vehicle, request specialist staff.
- Before stopping the engine, set the gearbox to neutral.
- The 3rd gear has been programmed as starting gear. However, it may be useful to preselect a lower gear for starting.
- Manoeuvring is **only** admissible in the 1st forward and reverse gears.
- In case of extended stops (at traffic lights etc.), set the gearbox to neutral.

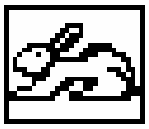
For further details on gearshift and driving operation, please refer to the enclosed operating manual of the gearbox manufacturer.

5.2 Transfer box

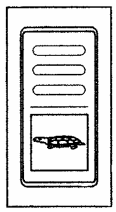
The vehicle is equipped with a two-step transfer box, type VG 3750, with three shift positions for on-road and off-road gear and a neutral position.
The "on-road/off-road" position is selected electro-pneumatically via rocker tip switch **45** “On-road / off-road gear” and is monitored by two symbol lamps in the FAUN Cockpit Graphic Control System. The "neutral" position is selected pneumatically via a change-over valve. The neutral position is only used for towing the vehicle.
The off-road gear is used if the vehicle is operating under considerable load, on long uphill gradients, in difficult terrain, during manoeuvring and under winter-time road conditions.

Attention **The gear steps "on-road / off-road / neutral" may only be changed over when the vehicle is at a standstill and when the gearbox is set to neutral.**

5.2.1 Changing over from on-road to off-road gear


On-road gear

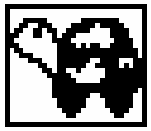
- The on-road gear has been activated in the transfer box, the symbol "on-road gear" (see FAUN Cockpit Graphic Control System, item B1-3) is lit.
- Decelerate and stop the vehicle; the engine must run at idle.
- Engage the parking brake.
- Set gearbox to neutral position "N".
- Actuate the rocker tip switch **45** "off-road / on-road gear" downwards.


Rocker tip switch **45**

The symbol "on-road gear" goes out and the symbol "off-road gear" goes on if the off-road gear is engaged correctly.

- Set gearbox to the desired position (gears 1 to 3).
- The display indicates the starting gear engaged.
- Accelerate gently and release the parking brake.

5.2.2 Changing over from off-road to on-road gear


Off-road gear

- The off-road state in the transfer box is engaged; the symbol "off-road gear" is lit.
- Decelerate and stop the vehicle; the engine must run at idle.
- Engage the parking brake.
- Set gearbox to neutral position "N".
- Actuate the rocker tip switch **45** "off-road / on-road gear" upwards.

The symbol "off-road gear" goes out and the symbol "on-road gear" goes on if the on-road gear is engaged correctly.

- Set the gearbox to the desired position.
- The display indicates the starting gear engaged.
- Accelerate gently and release the parking brake.

Shifting the transfer box into neutral position is described in section "towing" (item 5.10).

5.4 Engaging the inter-axle and inter-wheel differential locks / axle drive

NOTE **When the machine is used in rough terrain, it might be useful, under certain circumstances, to switch the ABV off-road mode ON.**

DANGER **When the vehicle is driving on public roads, the ABV off-road mode must be switched off. In ABV off-road mode, the wheels may be blocked.**
It is essential that the instructions appearing under item B1-10.3 ABV system "off-road mode" are complied with.

All drive axles are equipped with inter-wheel differential locks. Additionally, it is possible to connect inter-axle differential locks between the 1st and the 4th axles (in the transfer box), and between the 4th and the 5th axles.

NOTE **For connecting the differential locks and the 2nd axle drive, the vehicle must on principle operate under minimum load (moderate driving thrust) or, as far as possible, the vehicle should be immobilized with the gearbox set to neutral "N"; if practicable, differential locks and the 2nd axle drive should be connected immediately before the vehicle enters the difficult terrain or when one or several wheels start to spin. When setting the vehicle into motion, accelerate gently. After having left the difficult terrain, switch the differential locks and the 2nd axle drive off immediately. The inter-wheel differential locks will be engaged for 10 seconds after having been connected. Afterwards, they will be automatically disconnected.**

Attention **Never drive on a firm road while the differential locks and the 2nd axle drive are connected. When the inter-wheel differential locks are engaged, only straight-ahead driving is admissible. Connect the differential locks only if this is absolutely indispensable. The differential locks in the axles are only engaged correctly if the appropriate indicator lamps go on.**

Drive 10x6)**:**
The locks should be engaged in the following sequence:

1. Connect the inter-axle differential lock between the 2nd and the 4th axles (in the transfer box).
2. Connect the inter-axle differential lock between the 4th and the 5th axles.
3. Connect the inter-wheel differential locks. The inter-wheel differential locks are connected together.

Drive 10x8
The locks should be engaged in the following sequence:

1. Connecting the 2nd axle drive assembly.
2. Connect the inter-axle differential lock between the 1st and the 4th axles (in the transfer box).
3. Connect the inter-axle differential lock between the 4th and the 5th axles.
4. Connect the inter-wheel differential locks. The inter-wheel differential locks are connected together.

They must be disconnected in the following sequence:

All the connected drives/differential locks are disconnected together when the rocker tip switch **46** "axle drive/transfer box" is actuated upwards once.

NOTE **The 2nd axle should be driven with the least load possible (moderate driving thrust) or while the vehicle is immobilized and the gearbox is set to neutral. After having left the difficult terrain, the drive of the 2nd axle must be disconnected immediately.**

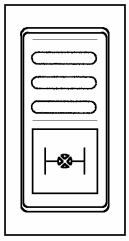
Attention **The drive of the 2nd axle is only connected when the symbol is lit, refer to FAUN Cockpit Graphic Control System, part B1-3.**

**) Optional equipment

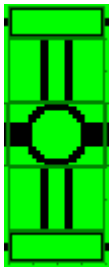
5.4.1 2nd axle drive assembly

Connection:

Actuate the rocker tip switch **46** "Axle drive/transfer box" 1 x downwards. The working menu drive appears on the monitor; refer to FAUN Cockpit Graphic Control System, part B1-3, item 3.1.1.1.

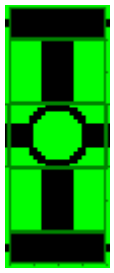


After actuating the rocker tip switch, the symbol "2nd axle drive connected" appears activated.
Once the drive has been connected, the 2nd symbol "2nd axle drive connected" appears additionally.



Disconnection:

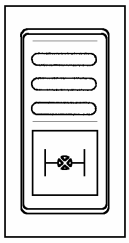
Actuate the rocker tip switch **46** "Axle drive/transfer box" upwards. The drive of the 2nd axle is disconnected if the symbols "2nd axle drive" have gone out and the symbol "2nd axle drive" in the working menu Drive does not appear "connected".



5.4.2 Inter-axle differential lock in transfer box

Connection:

Actuate the rocker tip switch **46** "Axle drive/transfer box" 2 x downwards. The working menu drive appears on the monitor; refer to FAUN Cockpit Graphic Control System, part B1-3, item 3.1.1.1.



After actuating the rocker tip switch, the symbol "Inter-axle differential lock between 1st and 4th axles" appears activated.
Once connection has been completed, the symbol "differential locks connected" appears additionally.

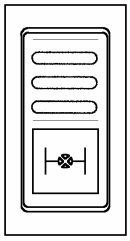
At the same time, the 2nd axle drive is connected.

Disconnection:

Actuate the rocker tip switch **46** "Axle drive/transfer box" upwards. The 2nd axle drive and the inter-axle differential lock between the 1st and 4th axles are disconnected if the symbols "inter-axle differential lock between the 1st and 4th axles" and "2nd axle drive" have gone out and the symbol "differential locks disconnected" appears in the working menu Drive.

5.4.3 Inter-axle differential lock of the 4th and the 5th axles

Connection:



Actuate the rocker tip switch **46** "Axle drive/transfer box" 3x downwards. The working menu drive appears on the monitor; refer to FAUN Cockpit Graphic Control System, part B1-3, item 3.1.1.1.

After actuating the rocker tip switch, the symbol "Inter-axle differential lock between 4th and 5th axles connected" appears activated.
Once connection has been completed, the symbol "differential locks connected" appears additionally.

At the same time, the 2nd axle drive and the inter-axle differential lock between the 1st and 4th axles is connected.

Disconnection:

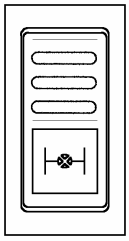
Actuate the rocker tip switch **46** "Axle drive/transfer box" upwards. The 2nd axle drive, the inter-axle differential lock between the 1st and 4th axles and the inter-axle differential lock between the 4th and 5th axles are disconnected, if the symbols "inter-axle differential lock between the 4th and 5th axles" and "2nd axle drive" have been deactivated and the symbol "differential locks disconnected" appears in the working menu Drive.

5.4.4 Inter-wheel differential locks

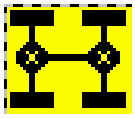
If connecting the inter-axle differential locks is not sufficient, the inter-wheel differential locks can be connected additionally. All the inter-wheel differential locks are connected and disconnected together.

NOTE **The inter-wheel connections will be automatically disconnected 10 seconds after being connected.**

Connection:



Actuate the rocker tip switch **46** "Axle drive/transfer box" 4x downwards. The working menu drive appears on the monitor; refer to FAUN Cockpit Graphic Control System, part B1-3, item 3.1.1.1.



After actuating the rocker tip switch, the symbol "inter-wheel differential locks connected" appears activated.
Once connection has been completed, the 2nd symbol "inter-wheel differential locks connected" appears additionally.

At the same time, the 2nd axle drive, the inter-axle differential lock between the 1st and 4th axles and the inter-axle differential lock between the 4th and 5th axles is connected.

Disconnection:

1. Actuate the rocker tip switch **46** "Axle drive/transfer box" upwards. The 2nd axle drive, the inter-axle differential lock between the 1st and 4th axles, the inter-axle differential lock between the 4th and 5th axles and the inter-wheel differential locks are disconnected if the symbols "inter-wheel differential locks connected" have gone out and the symbol "differential locks disconnected" appears in the working menu Drive.

2. The inter-wheel differential locks are automatically disconnected after 10 seconds. The drives and differential locks which are still connected must be disconnected by actuating the rocker tip switch **46** "axle drive/transfer box".

10 s

5.5 Lifting axle

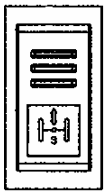
DANGER **The 3rd axle must be lifted in conjunction with the steering functions "diagonal steering, electronic tail-swing suppression, manual steering of the rear axles".**

NOTE **The steering program "minimum turning circle" does not require lifting of the 3rd axle.**

DANGER **The crane is unstable while the 3rd axle is being lifted and lowered. Warning lamp 15 "central warning - Chassis" is flashing while the axle is being lowered.**

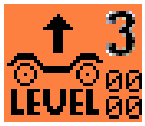
NOTE **Lifting and lowering of the 3rd axle are only allowed when the vehicle is immobilized. Moreover, the conditions specified under item 5.9 Steering for lifting the 3rd axle must be fulfilled.**

Lifting the axle:



Actuate the rocker tip switch **30** "lift-lower 3rd axle" upwards and keep it pushed.
The symbol "Lift 3rd axle" (refer to item 3.1) is flashing on the main screen while the axle is being lifted. At the same time, the warning lamp **15** “central warning chassis” goes on.

Then the symbol "Level motion at increased height, completed" appears.
The vehicle moves to the upper level with the 3rd axle lifted.



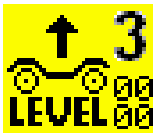
When the 3rd axle has been lifted, the symbol "Lift 3rd axle" and "level motion" goes out. The symbol "3rd axle is lifted" appears.

The construction site mode has been enabled.

Lowering the axle:

Actuate the rocker tip switch **30** "lift-lower 3rd axle" downwards and keep it pushed.
The symbol "Lower 3rd axle" (refer to item B1-3) is flashing on the main screen while the axle is being lowered. At the same time, the warning lamp **15** “central warning chassis” goes on.

If the vehicle is completely lowered, the symbol "normal level motion" appears.
The vehicle is now aligned in horizontal position at normal height.



Axle lowered:

The vehicle returns to normal level, if:

- the symbol "Normal level motion, with the 3rd axle lifted" has gone out.

DANGER **If the rocker tip switch 30 "lift-lower 3rd axle" is released, the lifting/lowering operation of the 3rd axle is interrupted. The vehicle stops in an unstable state. The symbol continues to flash, warning lamp 15 "central warning, chassis" remains lit. Continue to actuate the rocker tip switch and complete procedure, or initiate the procedure lowering process.**

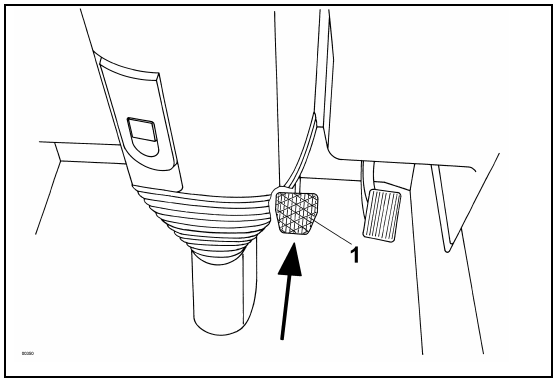
NOTE **Should problems occur while the 3rd axle is being lifted, lifting can be reversed as described under item 3.1.1.3.**

5.6 Brakes

Attention **After starting to drive, perform brake tests immediately using the service and the auxiliary brake (handbrake), if possible, on a dry road. During traveling operation, the air pressure gauges and the warning lamps 14 and 17 of the brake system must be watched permanently.**

5.6.1 Service brake (foot brake)

The foot-actuated brake pedal (1), which acts on all the wheels, must be used for slowing down and stopping the vehicle. To this effect, the brake valve pedal must be actuated gently.

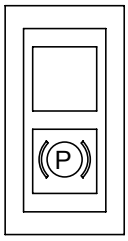


DANGER **The warning lamp 14 "service brake" and the symbol "brake pressure" - refer to FAUN Cockpit Graphic Control System, part B1-3 - must not go on during driving operation. Should they nevertheless go on, stop the vehicle immediately and determine the fault.**

NOTE **When the service brake (foot brake) is actuated, the engine brake is connected automatically.**

The brake has been designed as a dual-circuit brake; however, the effect of the auxiliary brake (handbrake) cannot be assumed by each circuit, but only a certain residual (reduced) braking effect can be reached.

5.6.2 Auxiliary brake (handbrake)



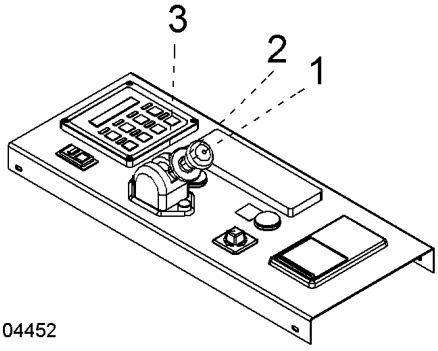
The auxiliary braking effect is achieved by the air accumulator cylinders via the handbrake.
In case of failure of the service brake (foot brake), or of a part of the service brake, the vehicle can only be braked via the handbrake valve. The warning lamp **17** "parking brake" goes on. The handbrake can be actuated gradually. To this effect, pull the handbrake lever backwards and make it lock in.

5.6.3 Parking brake (handbrake)

If the vehicle is to be stopped or parked, actuate the hand-brake valve lever backwards to pos. 1 until the vehicle is fully braked, and make it lock in. The warning lamp **17** "parking brake" goes on when the ignition is switched on.

DANGER **If the vehicle is to be parked on upward or downward gradients for an extended period of time, it must be protected against rolling away by means of wheel chocks.**

To release the handbrake, pull the handle of the lever out of its locking mechanism and push it forward to its stop (pos. 3). The warning lamp **17** "parking brake" goes out when the brake-air pressure is sufficient.



Pos. 1: lock position
Pos. 2: positively braked
Pos. 3: released

NOTE **An acoustic warning signal sounds if the parking brake is not released when setting the vehicle into motion.**

5.6.4 Engine brake and ”Bremsomat“ feature

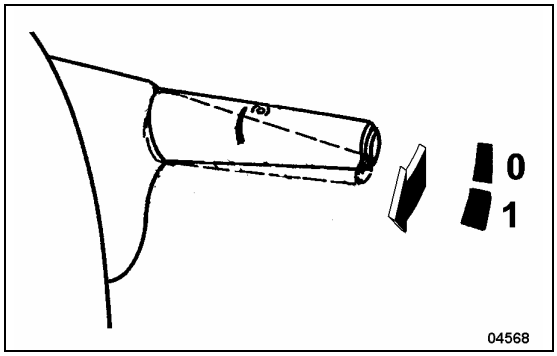
5.6.4.1 Engine brake (constant throttle valve / exhaust flap brake)

The non-wearing engine brake should be used especially on long downhill gradients and when braking down from high speeds in order to save the service brake.

The effect of the engine brake cannot be graduated.

- Move the control lever from position 0 to position 1. Thus, the engine brake has been actuated.

For control positions 2 to 5, refer to item 5.6.5.



NOTE **While the ABV control**[**)] **is activated, the engine brake is automatically deactivated.**

NOTE **The lower the gear step selected in the gearbox, the greater the resulting braking effect.**

DANGER **The engine brake is only operative while a gear is engaged.**

Attention **The engine brake is inoperative as long as the accelerator pedal is actuated.**

Switching off the engine brake:

- Move the control lever from position 1 to position 0. Thus, the engine brake has been switched off.

**) Optional equipment

5.6.4.2 Bremsomat (Intarder)

When driving on downhill slopes, the vehicle speed can be kept constant at the desired value via the “Bremsomat” feature.
The intarder electronics automatically adjust the braking torque necessary to this effect.

- Move the control lever from position 0 to position 1. The "Bremsomat" has been actuated.
- The "Intarder“ symbol (refer to FAUN Cockpit Graphic Control System, item B1-3) goes on while the Bremsomat is active.

The vehicle’s current traveling speed is now saved in the electronic system and kept constant on downhill gradients. The required braking torque is adjusted automatically and progressively.

DANGER **If the Bremsomat’s braking effort is no longer sufficient to keep the speed constant on downhill gradients, or if the vehicle is to be delayed additionally, the vehicle can be braked additionally via the service brake by the driver.**

Attention **The engine brake / Bremsomat is inoperative as long as the accelerator pedal is actuated.**

NOTE **While the ABV control**** is activated, the engine brake/Bremsomat is automatically deactivated. However, the “Intarder“ symbol does not go out.**

NOTE **The lower the gear step selected in the gearbox, the greater the resulting braking effect.**

DANGER **The engine brake/Bremsomat is only operative while a gear is engaged.**

Switching off the Bremsomat

- Move the control lever from position 1 to position 0. The "Bremsomat" has been switched off. The "Intarder“ symbol (refer to FAUN Cockpit Graphic Control System, item B1-3) must go out.

For further details on Bremsomat operation, please refer to the enclosed operating manual of the gearbox manufacturer. Refer to Part G1 chassis.

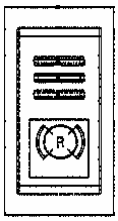
**) Optional equipment

5.6.5 Intarder

Attention **The intarder is inoperative as long as the accelerator pedal is actuated.**

The use of the intarder avoids the systematic use of the service brake. The latter, in turn, remains cool, efficient and ready for use for cases in which it is indispensable.

NOTE **With the rocker switch 48 “Intarder shut-off feature" in rest position (actuated upwards), the intarder is activated.**



DANGER **If the driver is not quite clear about the road conditions, he must switch off the intarder by actuating rocker switch 48 “Intarder shut-off feature”. Refer to item 5.6.5.3.**

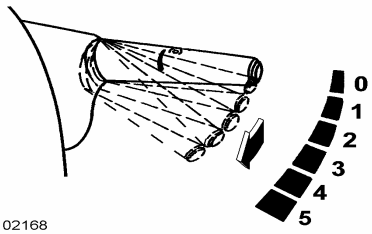
- The rocker switch **48** "Intarder shut-off feature" is in rest position, i.e. the intarder is active.

- Actuate the manual control switch to position 2 - 5; the intarder is actuated, the symbol "Intarder" (see part B1-3) is lit.

NOTE **If the symbol "Intarder" is lit with the manual control switch actuated, this indicates a malfunction. Contact TADANO-FAUN after-sales service.**

The braking effect of the intarder can be graduated.

The manual control switch has 6 positions:	
Position	**Braking effect**
0	0
1	Engine brake/Bremsomat
2	40% Intarder + engine brake
3	60% Intarder + engine brake
4	80% Intarder + engine brake
5	100% Intarder + engine brake



NOTE **While the ABV control**[**)] **is activated, the intarder function is automatically deactivated. Subsequently, the intarder returns to the previous mode selected.**

DANGER **If the required brake power is higher than the intarder’s maximum braking power, the service brake must be actuated additionally.**

5.6.5.1 Terminating the braking operation

After the braking procedure has been finished, the manual control switch must be in position 0; the symbol must go out.

**) Optional equipment

5.6.5.2 Stopping and parking the vehicle

- As soon as the vehicle has stopped completely, return the manual control switch to position "0" and engage the parking brake.

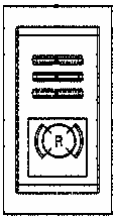
DANGER **The intarder is without function when the vehicle is not running, and thus cannot be used as parking brake. Make sure that the parking brake is engaged and that the gearbox is set to neutral "N".**

For further details on intarder operation, please refer to the enclosed operating manual of the gearbox manufacturer. Refer to Part G1 chassis.

5.6.5.3 Switching off the intarder

DANGER **If the driver is not quite clear about the road conditions, he must switch off the intarder.**

- Actuate rocker switch **48** "Intarder shut-off feature" downwards.



The intarder function is switched OFF.

5.7 Cruise Control

The Cruise Control functions enable the driver to maintain a certain speed previously selected, even under changing load conditions, without having to actuate the accelerator pedal.

The Cruise Control can be adjusted as of 38 km/h up to the vehicle's maximum speed.

DANGER **Do not use the Cruise Control under winter-time or skidding road conditions nor if the traffic conditions are not absolutely clear. Risk of accidents !**

NOTE **Only use the Cruise Control if the traffic conditions allow driving at a constant speed.**

When the Cruise Control is activated, the driver can release the accelerator pedal.

The set speed can be exceeded, e.g. in order to overtake another vehicle, by actuating the accelerator pedal accordingly.

Switch the Cruise Control off if you want to exceed the set speed for an extended period of time.

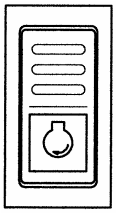
Due to the engine power output, the current speed may be lower than the set speed when driving on uphill gradients.

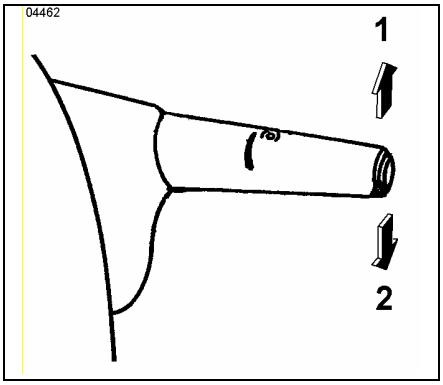
To maintain the set speed when driving on downhill gradients, the fuel flow is reduced to the flow needed at idle speed via the engine control system (FMR). If the braking effect of the engine is no longer sufficient, the set speed might be exceeded.

The set speed must not exceed the admissible maximum speed for the corresponding gear (observe the revolution counter).

5.7.1 Traveling

The Cruise Control is activated via the rocker switch **53** “Working speed” and the control lever installed on the steering column.





- Accelerate the vehicle to a traveling speed of more than 38 km/h.
- Actuate the rocker switch **53** “Working speed”.
- Accelerate until the vehicle reaches the desired speed.
- Touch the control lever in position (1); the current speed will be maintained and stored in the memory.

The control lever is used to vary the speed as follows:

- Set the control lever to position (1) and touch it slightly; the current speed will be maintained and stored in the memory, or the stored speed will be increased in steps of 2 km/h each.
- Set the control lever to position (2) and keep it in this position; the current speed will be reduced steadily.
- Release the control lever; the current speed will be maintained and stored in the memory.
- Set the control lever to position (2) and touch it slightly; the current speed will be maintained and stored in the memory, or the stored speed will be reduced in steps of 2 km/h each.

5.7.2 Switching the Cruise Control OFF

- Actuate the service brake; the Cruise Control function is interrupted. To reactivate it, refer to item 5.7.3.
- Actuate the rocker switch **53** “Working speed”; the Cruise Control function is deactivated. The speed must again be controlled by actuating the accelerator pedal. The set speed will be deleted.

5.7.3 Switching the Cruise Control ON again after actuating the service brake

- Accelerate the vehicle to the desired speed via the accelerator pedal,
- Touch the control lever in position (1); the Cruise Control is set again (rocker switch **53** “Working speed” must be ON).

NOTE **The Cruise Control system is automatically switched off and a set speed is deleted when:**

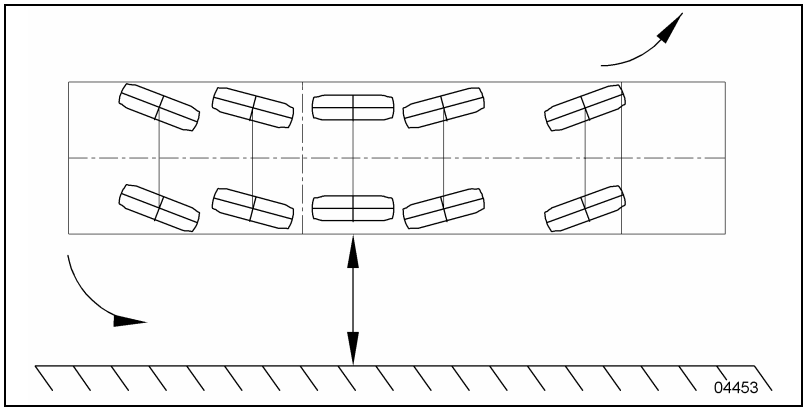
- **the service brake, the rocker switch 53 “Working speed” or the engine brake/intarder is actuated,**
- **the vehicle speed drops below 38 km/h,**
- **the ignition key is turned to the left to its stop.**

The Cruise Control function is briefly interrupted, but subsequently re-activated (standby function, the set speed remains stored) while:

- **continuous service brake/intarder is actuated,**
- **control or gearshift operations are performed,**
- **the vehicle is accelerated via the accelerator pedal with the Cruise Control system activated. After releasing the accelerator pedal, the vehicle will return to the set traveling speed.**

5.9 Steering

The crane carrier has 4 steered axles. These are the axles 1, 2, 4 and 5 (axle 3 is rigid).
The permanent steering is effective on the 1st and 2nd axles with mechanical connection to the steering gear.
In on-road mode, the 4th and 5th axles are steered electronically depending on the speed according to the current steering angles of the 1st and 2nd axles.
At speeds exceeding 25 km/h, the 4th axle - and at speeds exceeding 50 km/h the 5th axle - are locked automatically in straight-ahead position.
The axles 1 and 2 are connected by the steering rod, the axles 4 and 5 are steered hydraulically. Thus, a maximum range of movement and manoeuvring is enabled with minimum steering radii.
However, this causes the rear part of the vehicle to swing out from its straight-ahead position contrary to the steering direction of the front wheels when the steering is actuated to its maximum; refer to the figure:
The steering angle of the rear axles increases along with the distance covered. Swinging out is effected with a delay; after approx. 4 meters covered, the max. steering angle has been reached.



Make sure to take this steering behavior into account when moving the vehicle into a position from where it may only be removed:

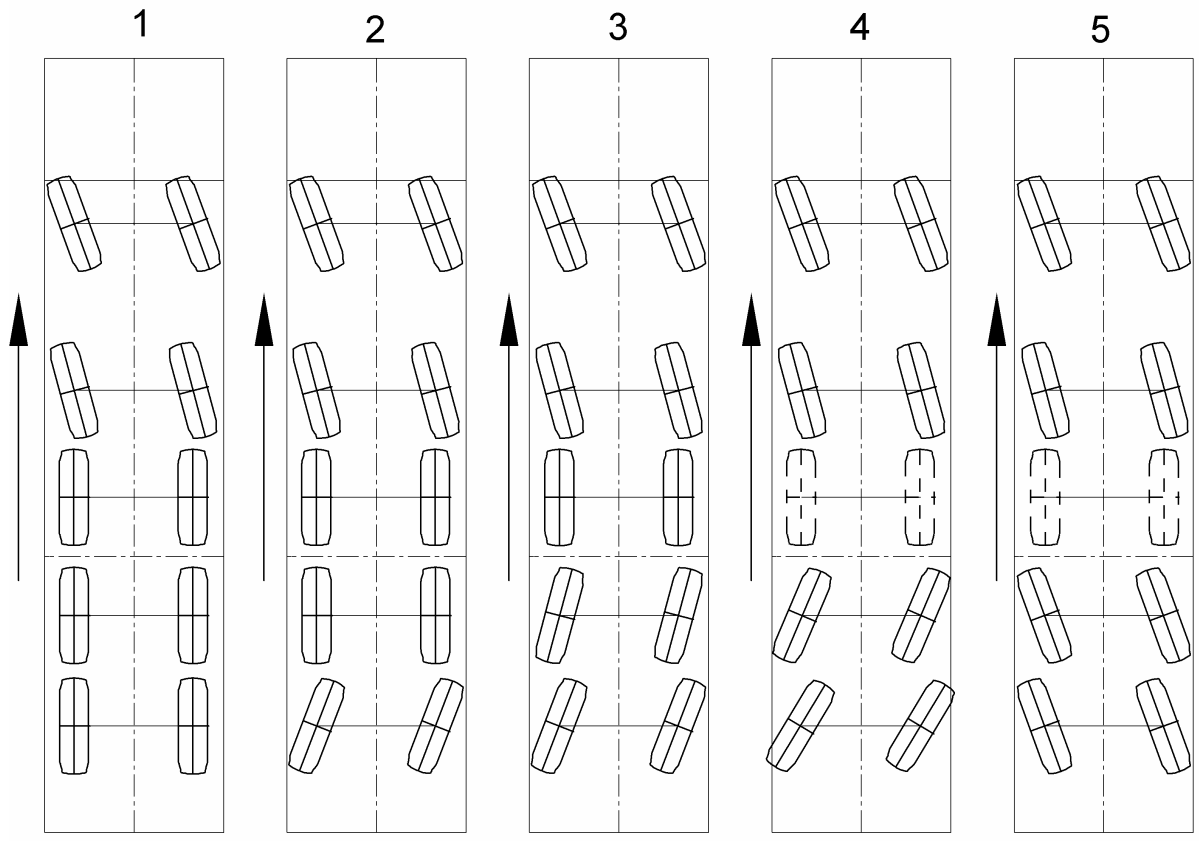
- in forward direction
  and
- with the steering actuated to its maximum.

DANGER **Act with extreme caution when manoeuvring the vehicle, setting it into motion or performing other movements which must be performed with the steering actuated to its maximum.**

Observe the minimum clearance from:

- persons,
- other road users,
- banks,
- slopes,
- walls,
- buildings,
- and other obstacles.

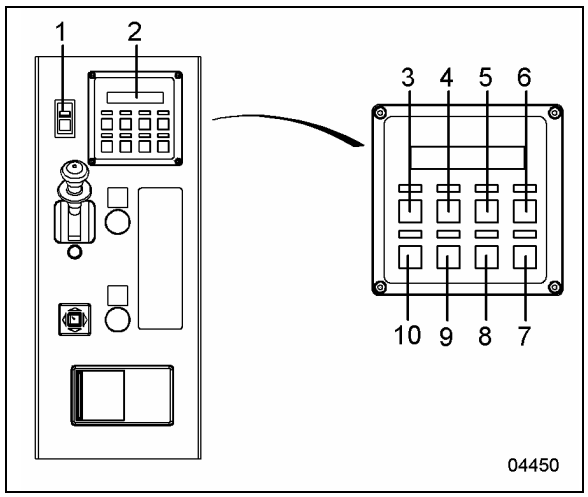
cont'd.: **5.9 Steering**



1	2	3	4	5
On-road mode Vehicle speed above 50 km/h. 1st and 2nd axles are steered mechanically.	On-road mode Vehicle speed 25 to 50 km/h. 1st and 2nd axles are steered mechanically. 5th axle connected (steered electronically).	On-road mode Vehicle speed up to 25 km/h. 1st and 2nd axles are steered mechanically. 4th and 5th axles connected (steered electronically).	Construction site mode Vehicle speed up to the 3rd gear. 1st and 2nd axles are steered mechanically. 4th and 5th axles connected (steered electronically, max. angle). Manual steering of the rear axles, 3rd axle lifted. For the steering mode “minimum turning circle”, the 3rd axle need not be lifted.	Construction site mode Vehicle speed up to the 3rd gear. 1st and 2nd axles are steered mechanically. 4th and 5th axles connected (steered electronically). Diagonal steering (crab steering, electronic tail-swing suppression). 3rd axle lifted.

5.9.1 Electronic control unit for actuation of rear axle steering

1 Rocker switch, preselection of steering mode (on-road / construction site mode)
2 Display
3 Push-button ESC Service Menu
4 Push-button manual steering, left-hand
5 Push-button manual steering, right-hand
6 Push-button, reading errors
7 Push-button, electronic tail-swing suppression
8 Push-button, diagonal steering
9 free
10 Push-button, minimum turning circle



5.9.2 Construction site mode

The construction site mode is activated via the "rocker switch Preselection of steering mode“ (item 5.9.1, pos. 1) and - depending on the steering mode selected - by lifting the 3rd axle.
In construction site mode, the following steering options are available via the electronic control unit (refer to item 5.9.1):

- Diagonal steering,
- Electronic tail-swing suppression,
- Manual steering of the rear axles,
- Minimum turning circle.

NOTE **It is not admissible to drive the vehicle on public roads with this steering variants! Please observe any specific regulations of the country where the machine is to be used, which might differ from the value mentioned before!**

cont'd. : **5.9.2 Construction site mode**

NOTE The working menu "Steering" can be called up for information. Refer to item 3.1.1.7.

1. Lifting the 3rd axle:

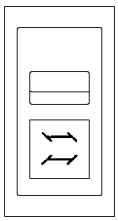
● The vehicle should be levelled.

- Lift the 3rd axle as described under item 5.5 "lifting axle".

NOTE The upshift lock of the gearbox is active when the 3rd axle is lifted. It is not possible to upshift the gearbox higher than to the 3th forward gear or 2nd reverse gear.

2. Actuate rocker switch Preselection of steering mode:

- The 3rd axle must be lifted.
- The front axles should be set to straight-ahead position.



- Unlock the rocker switch "Preselection of steering mode" in the center console (refer to item 5.9.1, pos. 1) by actuating the locking handle and push the rocker switch to the rear.

The construction site mode is activated.

Now one of the programs "diagonal steering", " Electronic tail-swing suppression", "Manual steering of the rear axles" or "Minimum turning circle" can be selected.

5.9.2.1 Diagonal steering

In diagonal steering mode, the rear axles are automatically steered together with the front axle(s) when the steering wheel is actuated. This steering function enables the machine to perform sideways driving movements.

Prerequisite:

- The front axles should be set to straight-ahead position,
- the 3rd axle has been lifted,
- the construction site mode has been selected via the rocker switch "Preselection of steering mode".

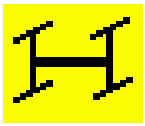
Refer to item 5.9.2.

Select the push-button "diagonal steering":

- Actuate the push-button "diagonal steering" in the center console (item 5.9.1, pos. 8).

The program "diagonal steering" is activated. The pilot lamp above the push-button is lit.

The symbol "diagonal steering active" must appear on the main screen (refer to part B1-3.1).



The display of the electronic control unit (refer to item 5.9.1, pos. 2), a bar appears which moves to the left or right, depending on the motion of the rear axles.

NOTE **It is not admissible to drive the vehicle on public roads with this steering variant! Please observe any specific regulations of the country where the machine is to be used, which might differ from the value mentioned before!**

Deactivate diagonal steering mode:

- The front axles should be set to straight-ahead position.

- Unlock the rocker switch of the rocker switch "Preselection of steering mode" (refer to item 5.9.1, pos. 1) and press rocker switch forward.
- Actuate the front axle steering; the rear axles are centered automatically.

- The symbol "diagonal steering" must go out.

NOTE **If the above mentioned symbols do not go out, this means that deactivation has not been performed correctly. Actuate the front axle steering, align axles again in straight-ahead position and repeat the procedure.**

3. Lowering the axle:

Lower the 3rd axle as described under item 5.5.

NOTE **The vehicle must be leveled again when the 3rd axle has been lowered. Check and readjust, if necessary.**

5.9.2.2 Electronic tail-swing suppression

In „electronic tail-swing suppression“ mode, the rear axles are steered automatically on acuation of the steering whell, so that any tail-swing motion isn suppressed.

Prerequisite:

- The front axles should be set to straight-ahead position
- the 3rd axle has been lifted,
- the construction site mode has been selected via the rocker switch "Preselection of steering mode".

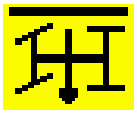
Refer to item 5.9.2.

Selecting the push-button "Electronic tail-swing suppression":

- Actuate the push-button "Electronic tail-swing suppression" in the center console (item 5.9.1, pos. 7).

The program "driving away from a wall" is activated. The pilot lamp above the push-button is lit.

The symbol "Electronic tail-swing suppression" must appear on the main screen (refer to part B1-3.1).



The display of the electronic control unit (refer to item 5.9.1, pos. 2), a bar appears which moves to the left or right, depending on the motion of the rear axles.

NOTE **It is not admissible to drive the vehicle on public roads with this steering variant! Please observe any specific regulations of the country where the machine is to be used, which might differ from the value mentioned before!**

Deactivating "Electronic tail-swing suppression":

Prerequisites:

- The front axles should be set to straight-ahead position.

- Unlock the rocker switch of the rocker switch "Preselection of steering mode" (refer to item 5.9.1, pos. 1) and press rocker switch forward.
- Actuate the front axle steering; the rear axles are centered automatically.

- The symbol "Electronic tail-swing suppression" must go out.

NOTE **If the above mentioned symbols do not go out, this means that deactivation has not been performed correctly. Actuate the front axle steering, align axles again in straight-ahead position and repeat the procedure.**

3. Lowering the axle:

Lower the 3rd axle as described under item 5.5.

NOTE **The vehicle must be leveled again when the 3rd axle has been lowered. Check and readjust, if necessary.**

5.9.2.3 Manual steering of the rear axles

In the mode "manual steering of the rear axles", the rear axles are steered manually via push-buttons in the center console, independently of the steering axles.

Prerequisite:

- The front axles should be set to straight-ahead position,
- the 3rd axle has been lifted,
- the construction site mode has been selected via the rocker switch "Preselection of steering mode".

Refer to item 5.9.2.

Selecting the push-button "manual steering":

- Actuate the push-button "manual steering, left-hand" or "manual steering, right-hand“ in the center console (refer to item 5.9.1, pos. 4 or 5).

The program "manual steering, left-hand or right-hand" is activated. The pilot lamp above the push-button is lit.

The display of the electronic control unit (refer to item 5.9.1, pos. 2), a bar appears which moves to the left or right, depending on the motion of the rear axles.

NOTE **It is not admissible to drive the vehicle on public roads with this steering variant! Please observe any specific regulations of the country where the machine is to be used, which might differ from the value mentioned before!**

Deactivating the manual steering:

Prerequisites:

- The front axles should be set to straight-ahead position.

- Unlock the rocker switch of the rocker switch "Preselection of steering mode" (refer to item 5.9.1, pos. 1) and press rocker switch forward.
- Actuate the front axle steering; the rear axles are centered automatically.

- The symbol "manual steering activated" must go out.

NOTE **If the above mentioned symbols do not go out, this means that deactivation has not been performed correctly. Actuate the front axle steering, align axles again in straight-ahead position and repeat the procedure.**

3. Lowering the axle:

Lower the 3rd axle as described under item 5.5.

NOTE **The vehicle must be leveled again when the 3rd axle has been lowered. Check and readjust, if necessary.**

5.9.2.4 Minimum turning circle

In "minimum turning circle" mode, the rear axles are automatically steered together with the front axle(s) when the steering wheel is actuated. This steering function enables the vehicle to be turned in a very narrow circle.

NOTE **The steering program "minimum turning circle" does not require lifting of the 3rd axle.**

Prerequisite:

- The front axles should be set to straight-ahead position
- the construction site mode has been selected via the rocker switch "Preselection of steering mode".

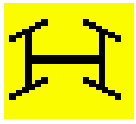
Refer to item 5.9.2.

Selecting the push-button "minimum turning circle":

- Actuate the push-button "minimum turning circle" in the center console (item 5.9.1, pos. 10).

The program "minimum turning circle" is activated. The pilot lamp above the push-button is lit.

The symbol "turning circle activated" must appear on the main screen (refer to part B1-3).



NOTE **It is not admissible to drive the vehicle on public roads with this steering variant!**

Deactivating the "minimum turning circle":

Prerequisites:

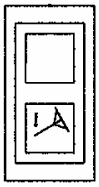
- The front axles should be set to straight-ahead position.

- Unlock the rocker switch of the rocker switch "Preselection of steering mode" (refer to item 5.9.1, pos. 1) and press rocker switch forward.
- Actuate the front axle steering; the rear axles are centered automatically.

- The symbol "minimum turning circle" must go out.

NOTE **If the above mentioned symbols do not go out, this means that deactivation has not been performed correctly. Actuate the front axle steering, align axles again in straight-ahead position and repeat the procedure.**

5.9.3 Error in steering system



If the warning lamp "malfunction, steering **16**" is lit in the instrument panel, there is a fault in the steering electronics. The buzzer "engine malfunction" **21** will sound at the same time.

Stop the vehicle immediately, shut off the engine, read out the error and - if necessary - contact the after-sales service.

NOTE **Internal malfunctions of the steering electronics can often be eliminated by stopping and re-starting the engine.**

If the error is not yet eliminated, read out the error; to do so,

- Actuate the push-button "Reading errors“ in the center console (refer to item 5.9.1, pos. 6) and keep it pressed for approx. 3 sec.

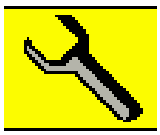
The error codes appear in the display (refer to item 5.9.1, pos. 2) of the electronic control unit.
First of all, the steering errors of the 4th axle are displayed.
If several errors are active, these are displayed successively.
To read out the steering errors of axle 5, actuate the push-button 9.
- Note down all the error codes displayed.
- To change over from axle 5 to axle 4, actuate push-button, pos. 10.

Once the error has been read, please contact our Tadano FAUN after-sales service. Communicate the error codes separately for the various axles.
If there is **no** active error, “Ready” appears in the display.

Provided that the error codes displayed so permit, the following approach is possible:

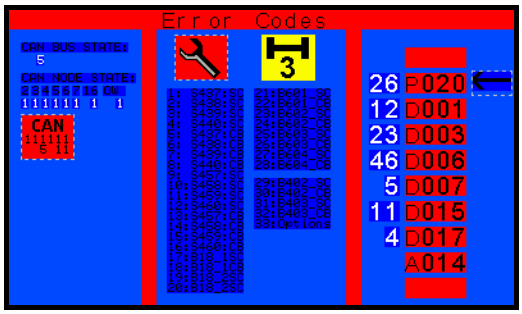
- Center the 4th and 5th axles via the emergency control „Steering“ (refer to item B1-7.1.1, B1-7.1.2.4 and B1-7.2).

If necessary, lower the 3rd axle.
To this effect:
- Actuate the rocker tip switch **26** "menu navigation" downwards.



Call up the working menu “Service” (refer to item B1-3, “FAUN Cockpit Graphic Control System”).

The error menu appears (refer to item B1-3, “FAUN Cockpit Graphic Control System”).



- Actuate the rocker tip switch **31** “leveling“ for approx. 8 seconds.
- The 3rd axle moves quickly down. The icon “3rd axle lifted” disappears.

The vehicle is in driving condition.
- Exit the working menu "Service".

Now the vehicle can be driven in “on-road” condition, however, **without** rear axle steering. However, the malfunction must be eliminated as soon as possible by a specialist workshop.

If this approach is not admissible, the operator can center the 4th and 5th axles via the emergency control “Steering“ - if this is possible - (refer to item B1-7.1.1, B1-7.1.2.4 and B1-7.2) and, if necessary, move the vehicle out of the danger zone.

DANGER **Driving operation on public roads in this case is only admissible if axles 4 and 5 are in straight-ahead position and if axle 3 is in on-road driving condition (lowered). The turning radius increases!**
Otherwise, the failure must be eliminated on site. If this is not possible, the machine must be loaded on a transport vehicle.

5.10 Towing the vehicle

DANGER **On principle, towing is only admissible if the braking ability of the crane carrier is ensured; the gearbox and the transfer box must be set to neutral "N". The two air pressure gauges (refer to item 3.1) must indicate at least 8 bar; the red warning light 14 "service brake" must have gone out. The vehicle may only be towed by means of a towing device. The parking brake may only be released when the towing process begins.**

Attention **The towing speed must not exceed 10 km/h and the distance covered during towing must not exceed 10 km. As long as the engine is not running, no steering assistance is provided up to a speed of approx. 5 km/h.**

NOTE **During towing, the rear axles must be aligned in straight-ahead position (refer to item B1-5.9 and B1-7), and the 3rd axle (lifting axle) must be lowered (refer to item 5.5). Otherwise, the machine must be loaded on a transport vehicle.**

DANGER **Perform the towing operation with due care and attention. Comply with the directives regarding towing operation!**

Setting the transfer box to "Neutral" position.

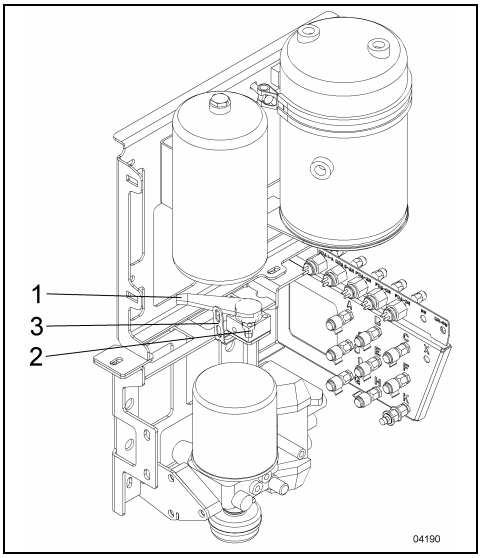
For towing, the transfer box must be set to "Neutral" position.

The change-over valve is located on the right side of the chassis behind the 5th axle.

Lever positions:

Move lever forward in driving direction (2) = Neutral position.
Move lever backwards, contrary to the driving direction (1) = driving position.

For towing, the change-over lever must be moved from position (1) to position (2). The securing yoke (3) must be bent upwards before.



After changing over to neutral position, the symbol On-road gear or Off-road gear in the FAUN Cockpit Graphic Control System goes out (refer to item 3.1).

After towing, the transfer box must be returned to driving position (1) and the securing yoke (3) must be bent to its previous position.

5.10.1 Towing device

- The towing vehicle must be equipped with a towing device.
- Fasten two bars or chains to the two towing eyelets (to the left and right of the sliding coupling) of the vehicle to be towed using ring hooks.

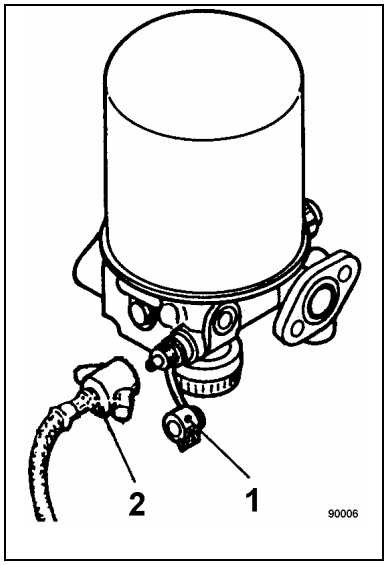
DANGER **It is not admissible to tow the vehicle via the sliding coupling!**

DANGER **Diagonal pulling of bars or chains is prohibited!**

5.10.2 Ensure the vehicle's braking ability

In case of failure of the vehicle's compressed air system, e.g. due to damage to the engine or the air compressor, the vehicle's air accumulator cylinders can be released by external filling via the pressure hose line, by means of the tire inflation socket on the pressure governor. Thus, the crane carrier's braking ability is established. The pressure governor is installed above the brake test panel on the right side of the vehicle, behind the 5th axle.

- Unscrew the cap (1) from the tire inflation socket.
- Screw-fasten the filler hose (2) and connect it to the compressed air system of the external vehicle (brake-air pressure of external vehicle ≥ 9.0 bar).
- During the filling procedure, the compressed air system is filled to a reduced level by the external vehicle.



Attention **Do not set the vehicle into motion until the air pressure gauges indicate at least 8.0 bar.**

After replenishing has been terminated, disconnect the filler hose. Screw-fasten the cap again.

Attention **On filling the compressed air system via the tire inflation socket, the compressed air is neither cleaned nor dried. The pressure relief device of the pressure governor is bypassed.**

5.10.3 Towing the vehicle in case of damage to the engine or the air compressor

The following measures must be taken before towing begins:

To make sure that during towing - e.g. in case of damage to the air compressor - at least the auxiliary braking effect of the service brake system is available, the compressed air supply tank of the brake circuit for the 1st and 2nd axles can be filled to a reduced level, and according to the pressure level of the towing vehicle via the test socket C on the brake valve mount (minimum pressure on supply coupling head of tractor vehicle = 8.0 bar).

If the engine or the air compressor are not ready to operate and if no external air source is available, the air accumulator brake cylinders of the 2nd, 4th and 5th axles can be released via the mechanical releasing device - as described under item 5.10.5 - to remove the vehicle from the danger zone.

DANGER **In this condition, neither the service nor the parking brake is operative! Protect the vehicle against rolling away.**

- Release the parking brake for towing.

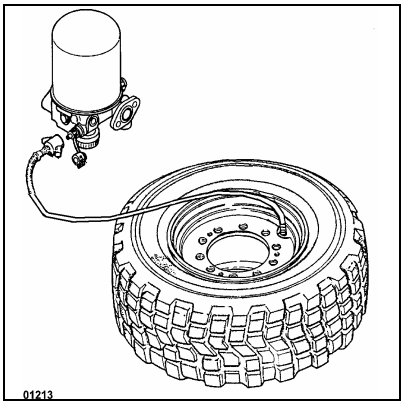
Attention **The towing speed must not exceed 10 km/h and the distance covered during towing must not exceed 10 km. As long as the engine is not running, no steering assistance is provided up to a speed of approx. 5 km/h.**

5.10.4 Pneumatic release of the air accumulator cylinders by inflating them from an external source, via the spare wheel or an auxiliary vehicle.

DANGER **In this state, the service and parking brake is <u>not operational!</u>**
Protect the vehicle against rolling away by means of wheel chocks !

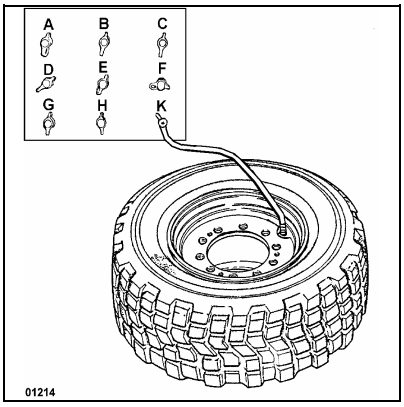
- Unscrew the cap of the tire inflation socket on the pressure governor.
- Set the parking brake in released position.
- Connect the compressed air inflator hose to the valve of the spare wheel and to the tire inflation socket on the pressure governor.

Thus, the spring load of the air accumulator cylinders is released and the vehicle can be carefully pulled out of the danger zone.



NOTE **Apart from the releasing device via the pressure governor's filler socket, the air accumulator cylinders can be filled via the filler socket "K" installed in the brake test panel, via the spare wheel, by means of a filler hose.**

Minimum pressure required to release the air accumulators: 6.5 bar.
To this effect, all the measures specified above apply.



5.10.5 Mechanical release of the air accumulator cylinders

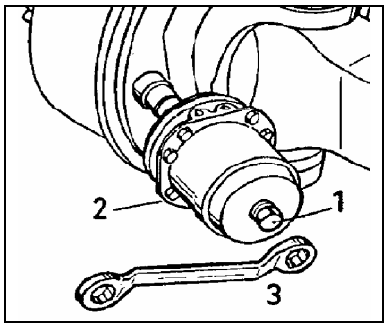
In order to be able to move the vehicle in case of failure of its compressed air system without filling from an external supply, e.g. to load it on a low-bed trailer or to pull it out of a danger zone, the spring load of the air accumulator cylinders must be released mechanically.

DANGER **Prior to all types of work on the air accumulator brake cylinders, protect the vehicle against rolling away by means of wheel chocks.**

- Unscrew the releasing bolts (1) of the air accumulator cylinders (2) to their stop using a ring spanner (3) SW 27.

Thus, the spring load of the air accumulator cylinders is released and the vehicle can be carefully pulled out of the danger zone.

(For further details, please refer to part "C1") Service and Maintenance, Chassis - chapter "Brake system".)



5.10.6 Towing the vehicle with mechanically released air accumulator cylinders in case of failure of the air accumulator circuit and external filling of the service brake via the tire inflation socket on the pressure governor

DANGER **When the air accumulator cylinders are released mechanically, the vehicle only has a reduced braking capacity via the service brake or via the circuit which is still working (via the diaphragm cylinders). The auxiliary and parking brakes (air accumulator brake) are not operative.**

- Connect the filler hose to the pressure governor, as described under item 5.10.2 and connect it to the brake air connector of the tractor vehicle (supply pressure in the external vehicle ≥ 9.0 bar).
- Towing may be commenced as soon as the red warning lamp **14** "service brake" has gone out and when the air pressure gauges indicate at least 8 bar. The vehicle retains a reduced braking ability via the service brake or the circuit which is still in proper working order.
- Set rotary switch "gear range" to neutral position "N".
- Set transfer box to Neutral position.
- Comply with the instructions specified under item 5.10.

5.10.7 Putting the air accumulator brake cylinders in operating condition

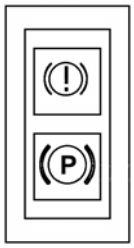
Attention **In order not to prejudice the traffic and operating safety of the vehicle, make sure that work on the entire brake system is only performed by well-trained specialized staff.**

After the damage to the engine or the brake system has been eliminated by specialist staff, the vehicle's braking ability must be restored.

- Protect the vehicle against rolling away by means of wheel chocks.
- Set the parking brake (handbrake) in released position.
- Start the engine and set the brake system to its full service pressure.

The red warning lights **14** "service brake" and **17** "parking brake" must have gone out.

The two air pressure gauges must indicate approx. 8.5 to 10 bar.



- Screw-in the air accumulator cylinder releasing bolts and tighten them safely (refer to part "C1" Service and Maintenance - Chassis; chapter "Brakes").

5.10.8 Towing in the case of damage to an axle drive assembly

DANGER **Such work may only be performed by specialist staff.**

DANGER **For removal of the sun gears of the planetary gears, the parking brake must have been released. The vehicle must have been blocked sufficiently to prevent it from rolling.**

- Use wheel chocks to prevent the vehicle from rolling away.
- Release the parking brake.
- Remove the wheel and the brake drum.
- Drain oil from planetary gears in an appropriate vessel.
- Remove the housing of the planetary gears.
- Remove the sun gears from the planetary gears of the faulty drive assembly.
- After having removed the sun gears, mount the covers again and fill the hubs with filtered/clean oil.
- Reassemble the housing of the planetary gears.
- Mount brake drum and wheels again.

- Remove the propeller shafts connected to the faulty axle. Proceed analogously as described under item 5.10.11.

- Set gearbox to neutral position "N".
- Set transfer box to Neutral position.
- Make the engine run at idle to provide steering assistance and to ensure the compressed air supply.
- Before towing, remove the wheel chocks.

5.10.9 Towing in the case of damage to the gearbox

- Shut off the engine.
- Ensure the vehicle's braking ability
- Set transfer box to Neutral position.

Attention **The towing speed must not exceed 10 km/h and the distance covered during towing must not exceed 10 km. As long as the engine is not running, no steering assistance is provided up to a speed of approx. 5 km/h.**

5.10.10 Towing in case of damage to the transfer box

- Brake the vehicle positively.
- Set gearbox to neutral position "N".
- Remove the propeller shafts connecting the 2nd axle to the transfer box and the propeller shaft connecting the transfer box to the 4th axle. Refer to item 5.10.11.
- Make the engine run at idle to provide steering assistance and to ensure the compressed air supply.
- Before commencing towing, release the parking brake.

DANGER **If the propeller shafts have been removed, there is no steering assistance from the wheel-driven emergency steering pump.**

5.10.11 Removal of propeller shafts

DANGER **Before the work is started, the vehicle must be blocked by wheel chocks and via the parking brake.**
Take all precautions possible (also as regards personal protection, e.g. hard hat).

DANGER **Only qualified specialist staff are allowed to install and remove the propeller shaft.**

Attention **It is not allowed to pull the propeller shafts completely apart. If this occurs nevertheless, the propeller shafts must be re-balanced by the manufacturer. The locating device (3) may only be released on assembly.**

DANGER **If the propeller shafts are dropped, this may cause personal injury. Block the propeller shafts. Flange catches are movable - risk of injury!**

Attention **Be careful not to squeeze, bend or damage lines and pipes.**

DANGER **Persons are not allowed to stay below the vehicle unless it is secured by means of the wheel chocks and the parking brake, and unless the propeller shafts are secured to prevent them from falling.**

- Set gearbox to „Neutral“.
- Protect the vehicle against rolling away; engage the parking brake.

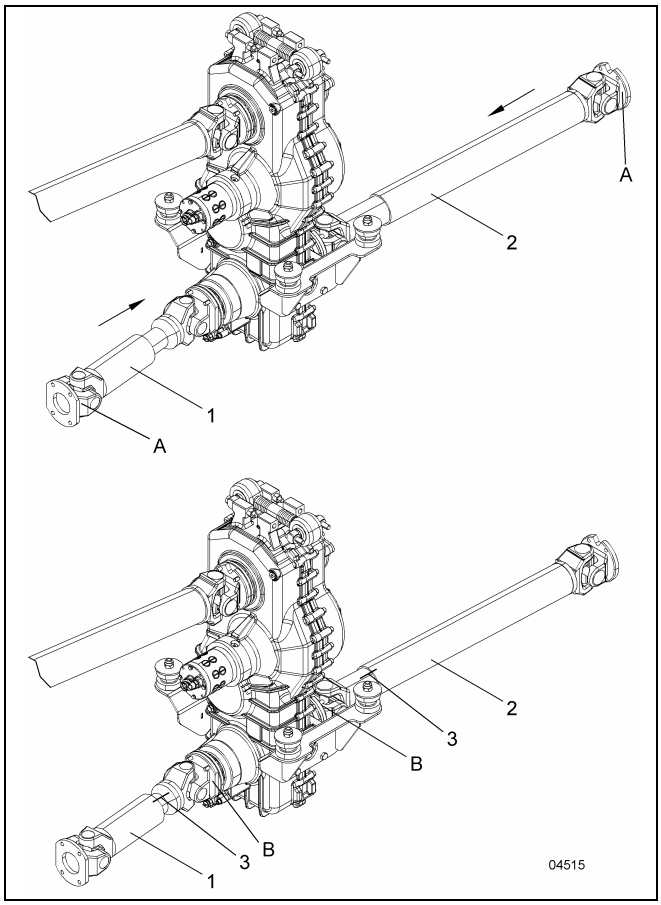
The propeller shaft (1) connecting the 2nd axle to the transfer box and the propeller shaft (2) connecting the transfer box to the 4th axle must be removed.

- Prop the propeller shafts (1 and 2) safely to obtain a sufficient stability.
- Release the flange connections (A), remove the connecting bolts.
- Telescope propeller shafts (1 and 2) together and lock them using the clips (3) to prevent them from being pulled apart.

Attention **It is not allowed to pull the propeller shafts completely apart.**

- The propeller shafts must be prevented from falling to the ground. If necessary, work with an assistant.
- Release the flange connections (B), remove the connecting bolts.
- Remove the block plates.
- Remove propeller shafts, stow them correctly on the vehicle platform and secure them.
- Keep all screws, bolts and nuts etc. in a safe place.

DANGER **If the screws of the flange couplings cannot be removed, the screws must be locked by means of nuts to ensure their tight fit.**



cont'd.: **5.10.11 Removal of propeller shaft**

DANGER **This work requires particular attention. Risk of injuries!**

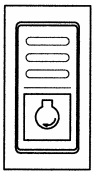
NOTE **Observe all the instructions specified for towing.**

DANGER **After having terminated towing, have the propeller shafts checked and assembled by specialist staff (authorized specialist workshop).**
The contact surfaces of the propeller shaft flanges and staggered teeth must be metallically bright; if necessary, clean!
Make sure that new lock nuts are used.
The tightening torque specified for flange screws (see item C1-7.3) must not be exceeded.
Check and, if necessary, replace electrical cables, hydraulic and compressed air lines. Before, release the fastening (3).

For assembly of the propeller shafts, proceed analogously by reversing the above sequence of operations.

5.11 Engine speed regulation (manual throttle, working speed)

Under certain circumstances - e.g. when actuating the outriggers - it may be necessary to make the engine turn at an increased speed level.



To adjust the engine speed, first actuate the working speed rocker switch **53** "Working speed". Operation with manual throttle control is activated.

The maximum working speed is 1800 r.p.m.

DANGER **It is not admissible to drive the machine using this speed regulating device. The working speed must always be reset to idling level and the rocker switch 53 "working speed" must be switched off.**

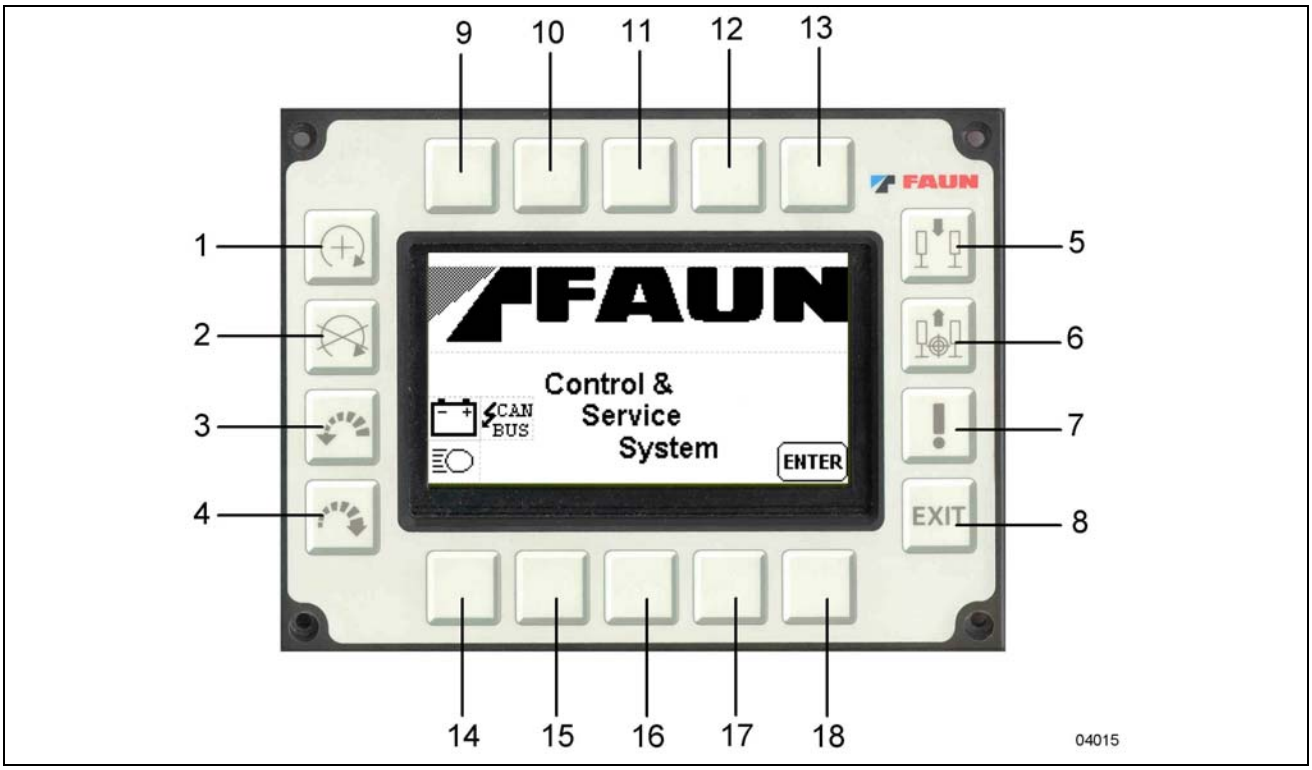
6 Stabilizing the vehicle by outriggers

- Actuate the rocker switch **7** "battery main switch".
- ● The parking brake (handbrake) is engaged.
- ● The gearshift lever is in "neutral" position.
- Switch the ignition ON (ignition key in position 2).
- Actuate rocker switch **53** "working speed".
- Turn key-actuated switch UW – OW **50** to position 2.

6.1 Control panel

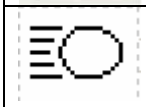
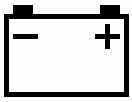
6.1.1 Start screen

The **start screen** appears automatically upon switching the ignition on.

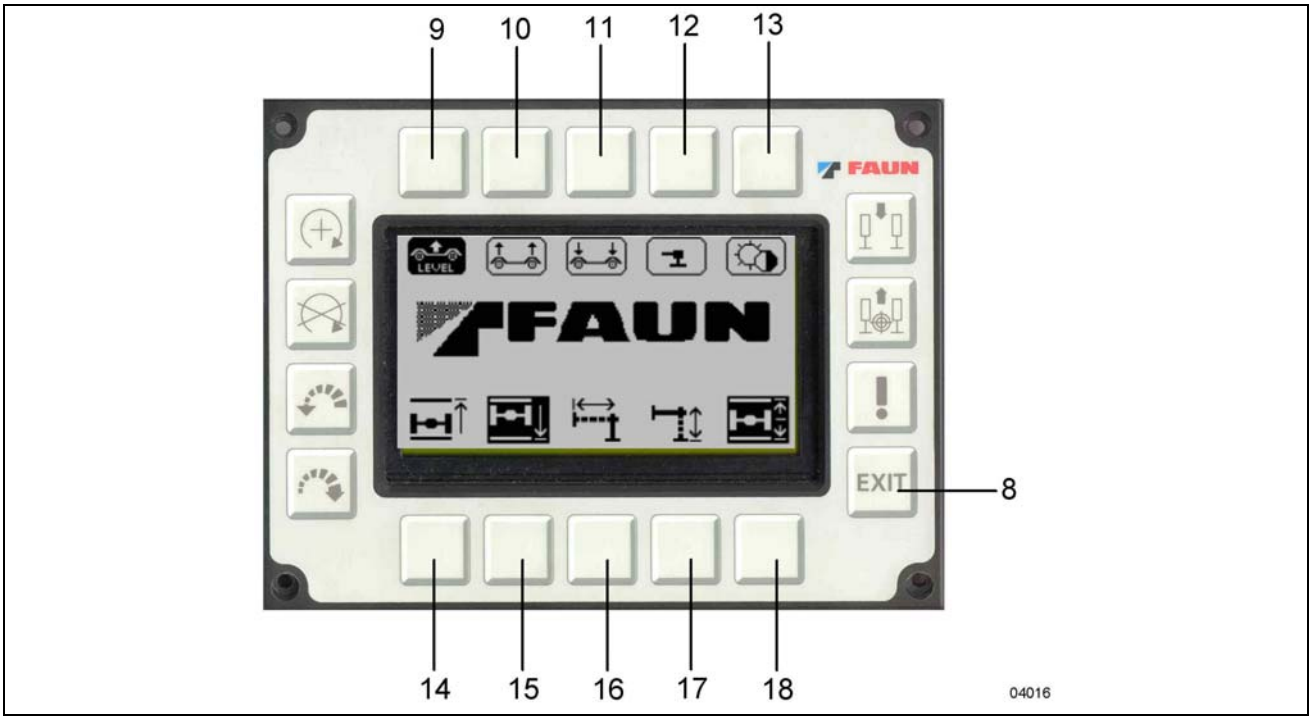


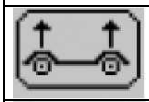
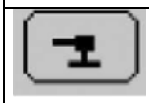
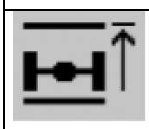
	Button no. 1 (active in each screen): → **Engine start**
	Button no. 2 (active in each screen): → **Engine stop (stalling device)**
	Button no. 3 (active in each screen): → **Reduce the engine speed**
	Button no. 4 (active in each screen): → **Increase the engine speed**

cont'd.: **6.1.1 Start screen**

	Button no. 8 (active in each screen): → **Exit active screen.**
	Keep button no. 8 pressed for about 6 seconds (active in each screen): → **Standard adjustment for display contrast and brightness.**
 	Actuate button no. 14 → **Switch working floodlights at the outriggers ON or OFF.** If the working floodlights are switched on, the symbol “working floodlight” appears inverse.
	Actuate button no. 18 → To the main menu ***→ refer to item 6.1.2.***
	Connection to CANBUS has been interrupted. Outrigger functions are no longer available The error code is displayed by the Control and Graphic System installed in the driver's cab. If necessary, take the vehicle to the TADANO-FAUN after-sales service to have the troubles eliminated.
	Generator Insufficient voltage of vehicle battery. If the vehicle voltage drops (even briefly) below 18V, the symbol lights up for the duration of the voltage drop, at least however for 20 seconds.

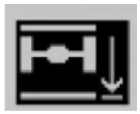
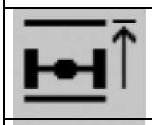
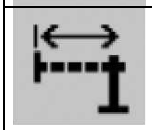
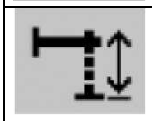
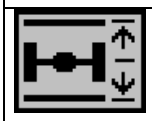
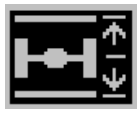
6.1.2 Main menu



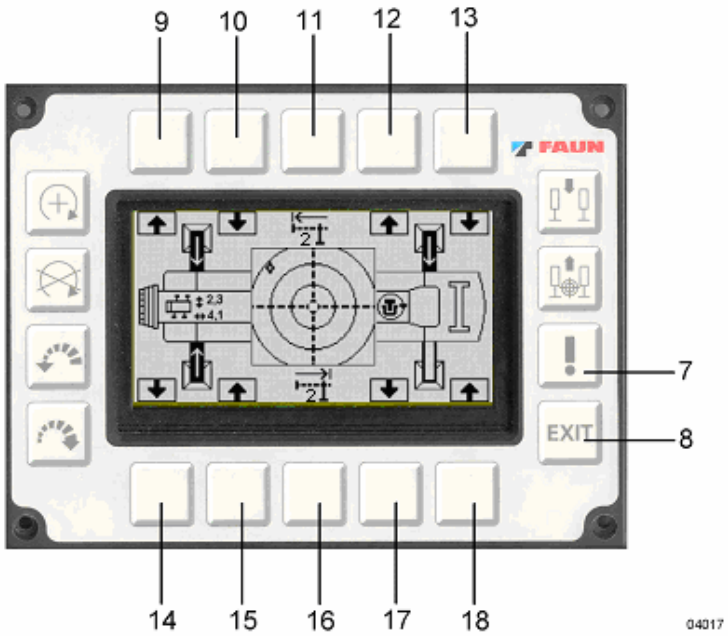
	Button no. 9: → Function: align the vehicle horizontally (actuate the button and keep it pressed until the vehicle is aligned).
	Symbol no. 9: → Goes on when vehicle is aligned horizontally.
	Button no.: 10: → Raising the vehicle.
	Button no. 11: → Lowering the vehicle.
	Button no. 12: → Change-over to the screen **Supporting pressure**[**)] ***→ refer to item 6.1.6.***
	Button no. 13: → Change-over to the **brightness/contrast** screen ***→ refer to item 6.1.5.***
	Button no. 14: → **"Lifting"** the axles with the crane stabilized by outriggers **NOTE** **Only perform this operation while the machine is stabilized by outriggers.**

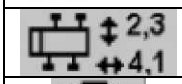
**) Optional equipment

cont'd.: **6.1.2 Main menu**

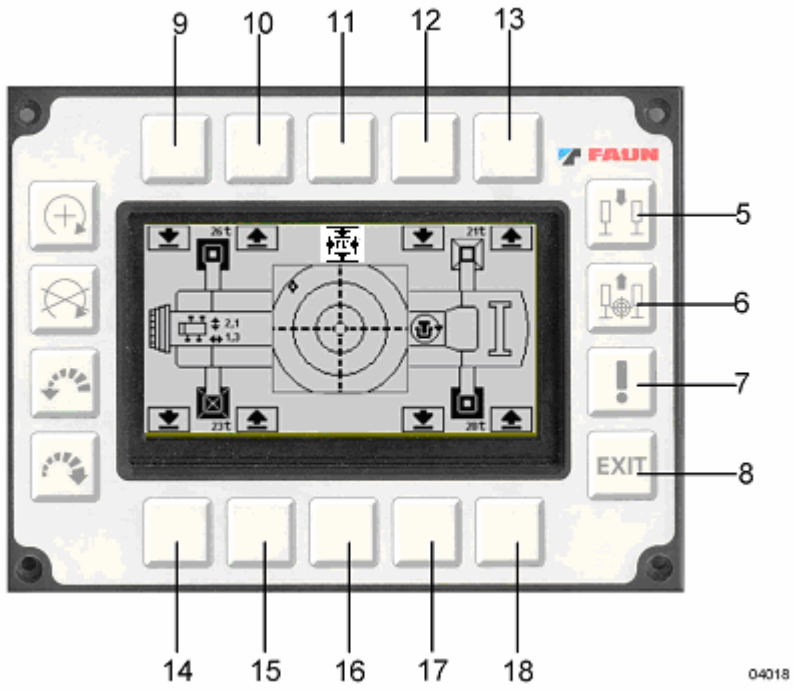
	Symbol no.15: → Condition: **"Axles lifted"** Button no. 15: → **"Lowering"** the lifted axles with the crane stabilized by outriggers **NOTE** **Only perform this operation while the machine is stabilized by outriggers.** Upon actuation of the button no. 15 the axles will ***"fall"*** down; the function can only be stopped if the button no. 14 "**lifting the axles**" is pressed again. **NOTE** **The function "lowering the axles" can also be activated by actuating the rocker tip switch 31 "Leveling".**
	Symbol no. 15 not ***inverse***: → Condition: **"Axles not lifted".**
	Button no. 16: → Change-over to the screen ***"extending/retracting outrigger beams"*** ***→ refer to item 6.1.3.***
	Button no. 17: → Change-over to the screen ***"extending/retracting outrigger cylinders"*** ***→ refer to item 6.1.4.***
 	Button no. 18: → During outrigger operation, the axles must be kept in horizontally aligned position. Actuate button **before** commencing outrigger operation. Symbol wird invers. The axles are kept in the current position. Upon another actuation of the button no. 15 the axles will ***"fall"*** down; the function can only be stopped if the button no. 18 or the button no. 14 "**lifting the axles**" is pressed. The symbol does no longer appear inverted.
	Button no. 18: → Return to "**start screen**"

6.1.3 Extending/retracting the outrigger beams



 	Button no.: 10/13/15/18 (arrow directed to the center of the vehicle): → "**Retracting the outrigger beams**". Button no.: 9/12/14/17 (arrow directed to the outside): → "**Extending the outrigger beams**".
	Button no.: 16: → Function: "**Extending the outrigger beams on the side where the operator is currently standing**" (the symbol appears inverse while being actuated).
	Button no.: 11: → Function: "**Retracting the outrigger beams on the side where the operator is currently standing**" (the symbol appears inverse while being actuated).
	Inverse arrows indicate the current direction of movement of the corresponding outrigger beam.
	→ Digital display of the crane inclination in [DEGREES].
	→Superstructure locked.
	Button no.: 8: → Return to **main menu.**
	Button no.: 7 Without function

6.1.4 Extending/retracting the outrigger cylinders



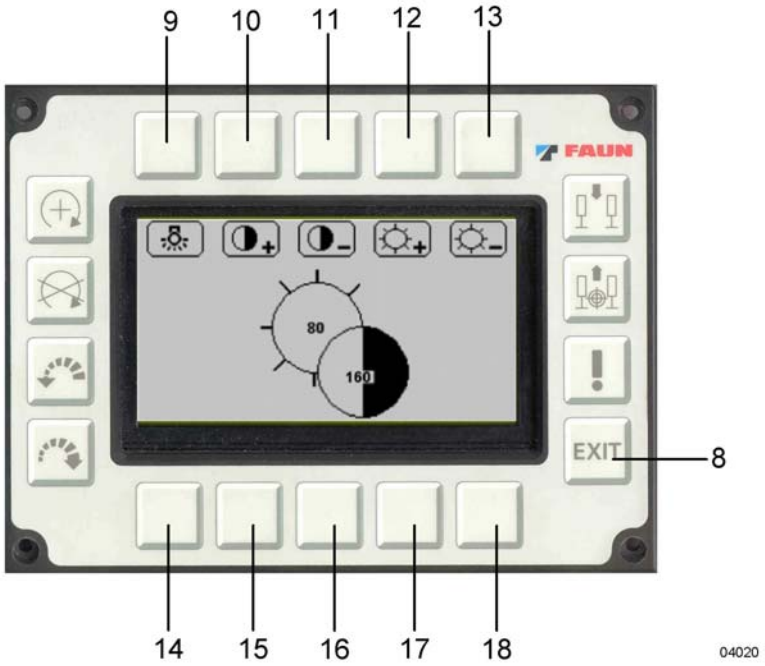
	Displays the supporting force in tons**)
	Button no.: 10/13/15/18 : → "**Retracting the outrigger cylinders**".
	Button no.: 9/12/14/17 : → "**Extending the outrigger cylinders**".
	Symbol: → The corresponding outrigger cylinder is **extended.**
	Symbol: → The corresponding outrigger cylinder is **retracted.**
	Button no. 5: → "**Retracting all outrigger cylinders together**".
	Button no. 6: → "**Extending all outrigger cylinders together**". Actuate button 1x and keep it pressed = all outrigger cylinders are extended together. Actuate button 2x and keep it pressed = all outrigger cylinders are extended together and automatic leveling is active.

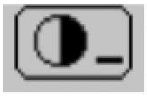
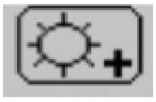
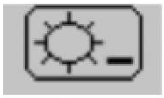
**) Optional equipment

cont'd.: **6.1.4 Extending/retracting the outrigger cylinders**

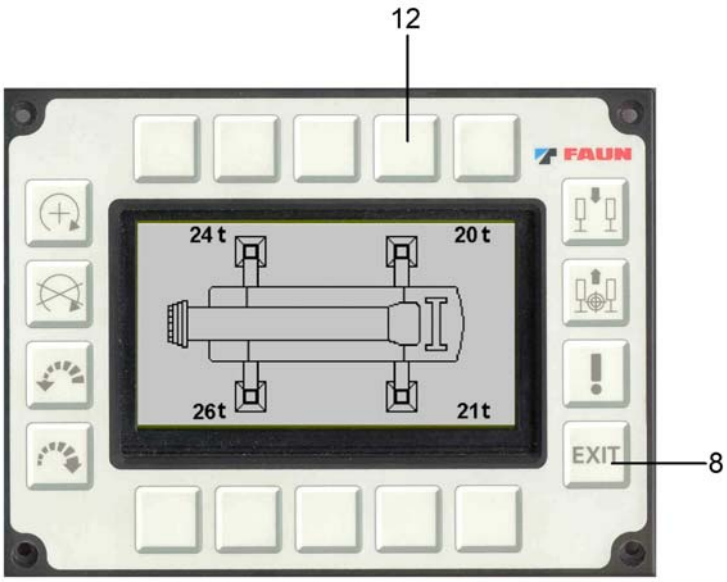
 	Symbol above the spirit level: → State: Automatic leveling active. (The symbol appears inverse while leveling is active). →State: The crane is **aligned horizontally** (leveled). (The symbol “Spirit level OK” appears.)
	→ Digital display of the crane inclination in [DEGREES].
	→Superstructure locked.
	Button no. 8: → Return to "**start screen**".
	Button no.: 7 Without function

6.1.5 Contrast and brightness



	Button no. 9: → **Display** standard adjustment for contrast and brightness
	Button no. 10: → **Increase display** contrast
	Button no. 11: → **Reduce display** contrast
	Button no. 12: → **Increase display** brightness
	Button no. 13: → **Reduce display** brightness
	Button no. 8: → Return to "**start screen**"
	Keep button no. 8 pressed for about 6 seconds (active in each screen): → Function: **Standard adjustment for display contrast and brightness**

6.1.6 Supporting pressure**)



04019

	Button no. 12: → The current supporting pressure of the individual outrigger cylinders is indicated**).
	Button no. 8: → Return to "**start screen**".

**) Optional equipment

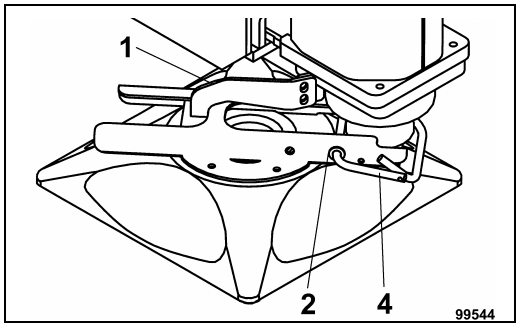
6.2 Preparation for outrigger operation

6.2.1 Changing the position of and securing the outrigger floats for outrigger operation by means of pins

Position of the outrigger floats during on-road travel

In on-road driving condition, the outrigger floats are slipped in the stay tubes (1) with the guide assemblies, and locked.

The outrigger floats must be secured with lock pins (4) inserted through the front bore-hole (2) of the guide frame, and locked.



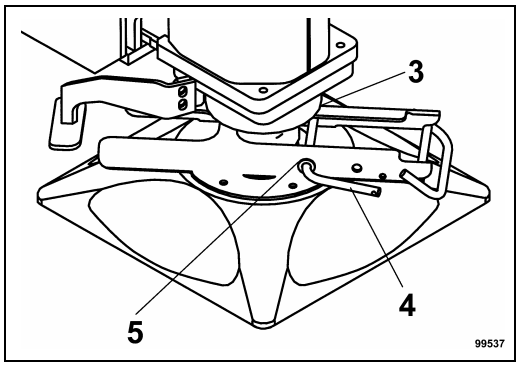
Attention **In on-road driving condition, the lock pin (4) must be secured through the bore-hole (2) behind the cylinder rod.**

Position of outrigger floats for stabilizing the vehicle

The outrigger floats must be removed from their supports before the outrigger jacks can be extended.

- Take the linch pin (3) out of the lock pin (4) and remove the lock pin.

- Pull the outrigger float forward until the guide frame touches the cylinder rod and until the rear bore-hole (5) of the guide frame can be fastened with lock bolts (4) and secured.



Attention **Before outrigger operation begins, the lock pin (4) must be inserted through the bore-hole (5) in front of the cylinder rod.**

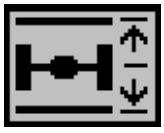
NOTE **The surface of the outrigger floats may be discoloured (turn grey) due to atmospheric exposure, e.g. to sun. However, this does not affect the outrigger floats' functional reliability.**

6.2.2 Function “holding, lifting and lowering the axles”

Before the engine is started, all the measures described under item B1-6 have been performed.
- Start the engine. (Refer to item 6.1.1).

6.2.2.1 Holding the axles

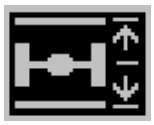
The function “**Holding the axles**“ (item 6.1.2, button no. 18) can be used to keep the axles levelled during outrigger operation.



- Actuate button **before** commencing outrigger operation. The button appears inverted now. The axles are kept in the current position.

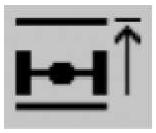
NOTE **After outrigger operation, it is not necessary to perform another leveling procedure. As soon as the vehicle is in contact with the ground, deactivate the function “holding the axles” by actuating the buttons (item 6.1.2, button n° 18) again. The button must no longer appear inverse.**

- Upon another actuation of the button no. 15 the axles will ***"fall"*** down; the function can only be stopped if the button no. 18 or the button no. 14 "**lifting the axles**" is pressed. The button does no longer appear inverted.



6.2.2.2 Lifting/lowering the axles

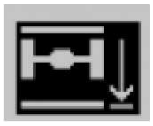
- The function “**Lifting the axles**“ (item 6.1.2, button no. 14) can be used to lift the axles while the vehicle is stabilized by outriggers. Lift the axles until all the tires are clear of the ground**.** Do not prop the wheels with supporting material.



When the button „Lifting the axles“ (item 6.1.2, item 14) has been released, the axles are kept in their current state. The symbols “lowering the axles” and “holding the axles” (item 6.1.2, button no. 15 and no. 18) appear inverse.

NOTE **Only perform this operation while the machine is stabilized by outriggers.**

- The function “**Lowering the axles**“ (item 6.1.2, button no. 15) can be used to lower the axles while the vehicle is stabilized by outriggers.



If the symbol “Lifting the axles” appears inverse, this means that the **“axles are lifted”**.
Actuate the button “lowering the axles”; the lifted axles are **lowered** while the vehicle is stabilized by outriggers.

NOTE **Only perform this operation while the machine is stabilized by outriggers.**

Upon actuation of the button “lowering the axles”, the axles will ***"fall"*** down; the function can only be stopped if the button "**lifting the axles**" is pressed again.

NOTE **The function "lowering the axles" can also be activated by actuating the rocker tip switch 31 "Leveling".**

NOTE **Once outrigger operation is completed, the vehicle must be leveled as described under item B1-4.7.1.2.**

6.3 Instructions regarding outrigger operation

NOTE **The outriggers may only be operated (extended or retracted) on principle if the operator has an unrestricted view of the supporting area during the whole supporting procedure. The outrigger beams can only be extended or retracted from the respective operator's side at the chassis. The four outrigger cylinders can be extended and retracted from both sides of the chassis.**

Attention **When the vehicle is supported by outriggers, the tires must not have ground contact, as otherwise the axles could be damaged due to load. Do not prop the tires with supporting material.**

The third axle must not be lifted.

When changing the crane's rig arrangement for on-road travel, the axle suspension lock – or, to keep the previous level, the function “holding the axles” – may only be deactivated if the wheels have full ground contact, due to the outrigger cylinders' being retracted.

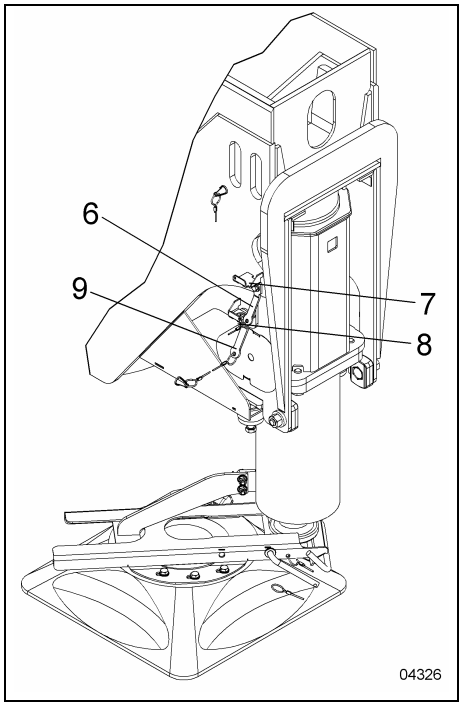
DANGER **While outriggers are extended or retracted, nobody is allowed to stay close to the outrigger beams and the outrigger cylinders.**

To prevent damage to the outrigger assembly and accidents during travelling and crane operation, it is particularly important to unlock (by removing the pins) the outrigger beams before extending and retracting them, and to lock (by means of pins) the outrigger beams during crane work.

Once crane work is finished and the crane retrofitted for on-road travel, it must be ensured that the outrigger cylinders and beams are completely retracted and locked with pins.

6.4 Extending the outrigger beams

DANGER **Make sure that the extended outrigger beams are secured with pins, as there is a risk of accidents otherwise.**



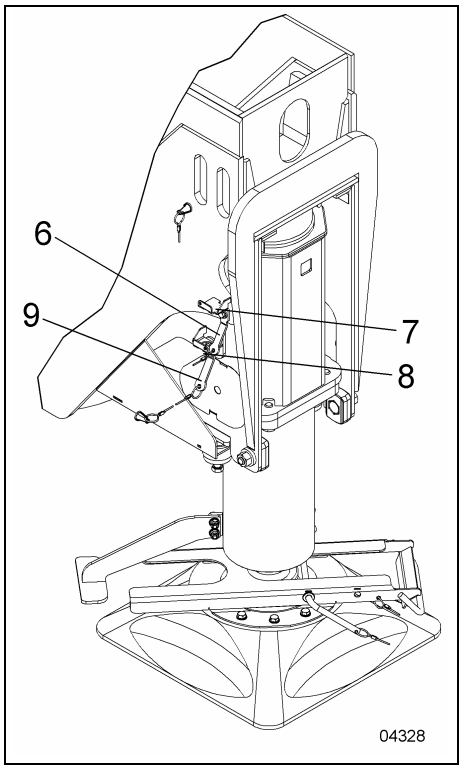
6.4.1 Outriggers in on-road driving condition

- In on-road driving condition, the lock pins (6) and (9) are inserted in the locating bore-holes of the four outrigger casings and the outrigger beam I, and locked underneath the grooves of the pin holders (7) and (8).
- The outrigger floats are fixed and locked in "on-road" travel position (item 6.2.1).

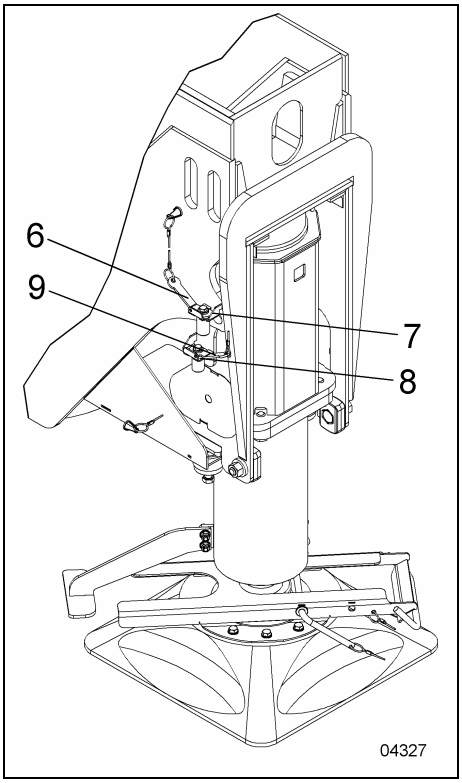
6.4.2 First extension width

- Change position of outrigger floats to "crane operation" (item 6.2.1).

- If the first extension width is selected, the lock pins (6) and (9) remain inserted in the locating bore-holes and locked underneath the grooves of the pin holders (7) and (8).



6.4.3 Extending the outriggers to the second extension width



- The position of the outrigger floats has been changed to "crane operation" (item 6.2.1).

- Remove the lock pins (6) and (9) and insert them in the bore-holes of the pin holders (7) and (8).

Extend the outrigger beams as described under item 6.1.3.

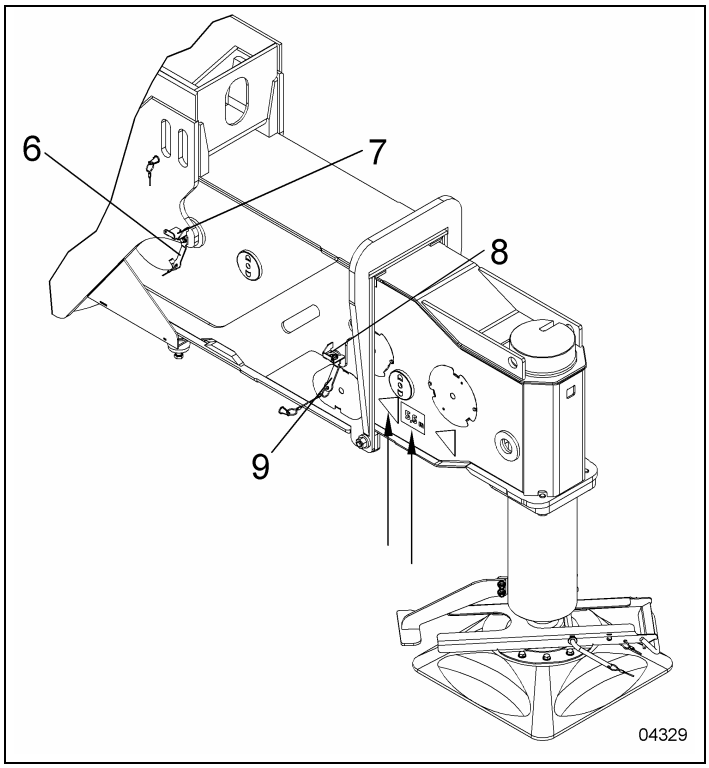
NOTE **The second extension width is reached if both the outrigger beams have been extended so that the mark for the second extension width reaches 5.6 m.**

Extend all the other outrigger beams analogously in the same way.

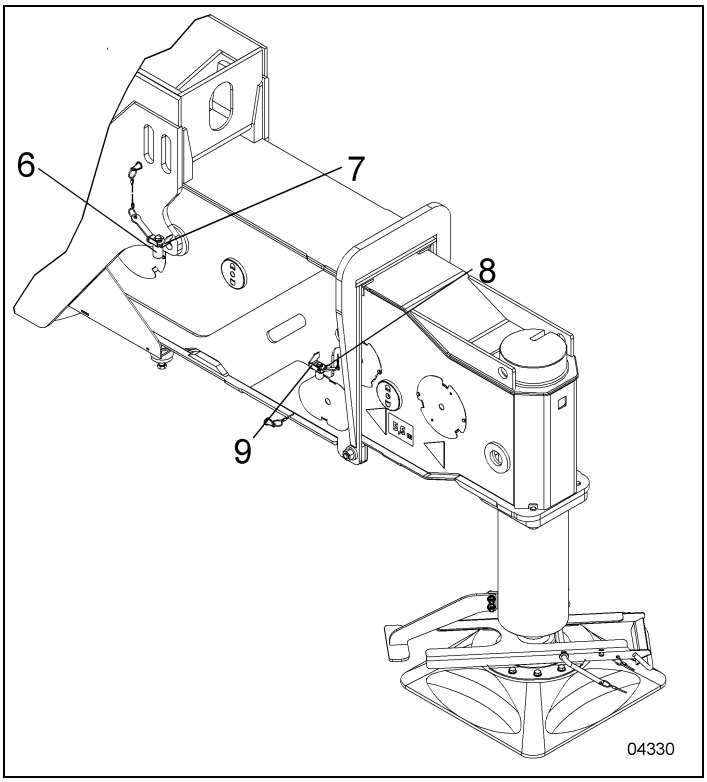
Securing the extended outrigger beams at the second extension width with pins, and locking them

- Remove lock pins (6) and (9) from the pin holders, insert them into the bore-holes of the outrigger casings and of outrigger beam I and lock them in the grooves of the pin holders (7) and (8).

Perform outrigger operation and the pin locking procedure in the same fashion for all the other outriggers.



6.4.4 Extending the outriggers to the third (full) extension width



- The outriggers have been extended to the first or second extension width (second extension width shown); the lock pins (6) and (9) are inserted and locked.
- The position of the outrigger floats has been changed to "crane operation" (item 6.2.1).

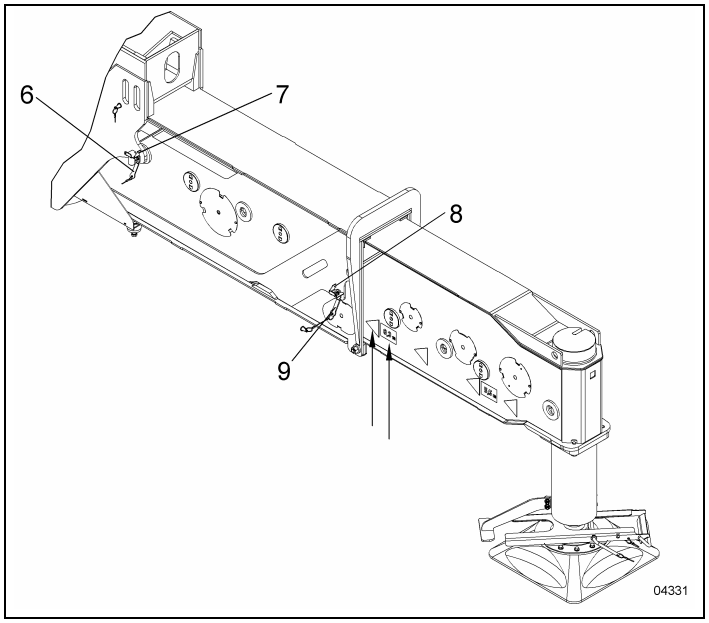
- Remove the lock pins (6) and (9) and insert them in the bore-holes of the pin holders (7) and (8).

Extend the outrigger beams as described under item 6.1.3.

NOTE **The third extension width is reached if both the outrigger beams have been extended so that the mark for the third extension width reaches 8.3 m.**

Extend all the other outrigger beams analogously in the same way.

Securing the extended outrigger beams at the third extension width with pins, and locking them

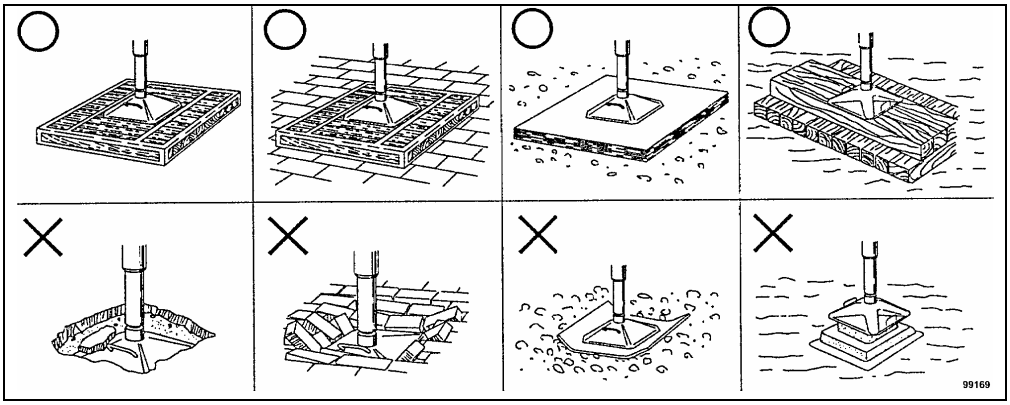


- Remove lock pins (6) and (9) from the pin holders, insert them into the bore-holes of the outrigger beams and outrigger casings and lock them in the grooves of the pin holders (7) and (8).

Perform outrigger operation and the pin locking procedure in the same fashion for all the other outriggers.

6.5 Extending the outrigger cylinders

DANGER **Use large-size, stable steel or concrete plates or wooden planks according to the ground conditions, and place them centrally below the outrigger floats (uniform supporting pressure). Do not extend the outrigger cylinders to their end position, but prop them in an appropriate manner, so that a residual stroke of at least 10 to 15 mm remains in the outrigger cylinders.**



Correct

Incorrect

6.5.1 Actuation of outrigger cylinders

- The outrigger floats are placed in position "crane operation" (item 6.2.1), the outrigger beams are extended to the appropriate extension width (item 6.4).
- The axles are being held in their present position as described under item 6.2.2 via the function “Holding the axles”, or must be lifted while the vehicle is stabilized by outriggers via the function „lifting the axles“.
- Extend the outrigger cylinder as described under item 6.1.4.
- Raise the machine until **all the tires are clear of the ground. Do <u>not</u> prop the wheels with supporting material.**
- Align the vehicle horizontally as described under item 6.1.4.

DANGER **For safety reasons, the outrigger cylinders should only be extended or retracted on the side where the operator is positioned. Actuation of all outrigger cylinders from one machine side should be restricted to cases where the vehicle is to be aligned horizontally (leveling).**

6.6 Outriggers - retracting the outrigger cylinders / outrigger beams

6.6.1 Outriggers - retracting the outrigger cylinders

- Start the engine in the chassis and make it run at idle or at low speed level.
(Engine speed setting / working speed (item 6.1.1).

- If the function "holding the axles" has been actuated, it is not necessary to perform another leveling procedure once outrigger operation is finished. As soon as the vehicle is in contact with the ground, deactivate the function "holding the axles" by actuating the buttons (item 6.1.2, button n° 18) again. The button must no longer appear inverse.

- If the function „lifting the axles" has been actuated, the suspension cylinders are no longer leveled once the outrigger cylinders have been retracted. As soon as the vehicle has ground contact, actuate the function „lowering the axles" (item. 6.1.2, button no. 15); thus, the function „lifting the axles" is deactivated. The button must no longer appear inverse. Now the vehicle must be leveled as described under item B1-4.7.1.2.

- Retract the outrigger cylinder uniformly as described under item 6.1.4.

6.6.2 Retracting the outrigger beams

Attention **Remove all lock pins from the outrigger beams / outrigger casings and insert them in the bore-holes of the pin holders.**

- Retract the outrigger beams as described under item 6.1.3.
- After the outrigger beams have been retracted completely, remove the lock pins from the pin holders, insert them in the bore-holes of the outrigger casings / outrigger beams and lock them in the grooves.
- Change position of outrigger floats to "on-road driving" (item 6.2.1), and lock them.
- Set the vehicle level to "on-road" driving condition (refer to part B1-4, item 4.7.1.2).

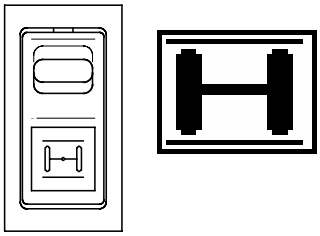
Attention **In "on-road" driving condition, the outrigger cylinders and outrigger beams must be completely retracted; the outrigger beams must be secured with pins and locked.**
The outrigger floats are changed to the "on-road driving" position, and secured with pins.

- Shut off the engine in the chassis (Refer to item 6.1.1).

6.7 Moving the vehicle with the complete counterweight mounted

DANGER **Make sure that the axle suspension is locked before the vehicle is moved with complete counterweight.**

- Switch the ignition ON.



- Unlock the rocker switch "axle suspension lock" **36** by actuating the locking handle (1) down, and push the rocker switch down.

The axle suspension lock is engaged. The symbol "axle suspension lock" is lit (see FAUN Cockpit Graphic Control System, item B1-3).

Attention **If the symbol "axle suspension lock" is not lit, this may indicate a fault in the locking system. In this case, driving is not admissible.**

DANGER **Driving on the construction site with the complete counterweight mounted is only admissible on firm, horizontal ground which is as level as possible, with the boom directed over-rear, the superstructure lock pin engaged and the swing brake actuated.**
Driving must be effected at a low speed of max. 1.4 km/h, at the specified tire pressure.
If possible, the outrigger beams should be extended and the outrigger floats be located at a minimum distance from the ground.
Comply with the Notes referring to the load charts and item B2-7.

DANGER **When driving with the complete counterweight from the chassis, the 3rd axle must be lifted in conjunction with the steering function "diagonal steering, electronic tail-swing suppression and manual rear axle steering" (Refer to item 6.7.1).**

NOTE **The steering program "minimum turning circle" does not require lifting of the 3rd axle (Refer to item 6.7.2).**

DANGER **If the 3rd axle is lifted, no axle oscillation is possible.**
There is a risk of instability! ! Risk of accidents !

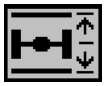
6.7.1 Steering modes "diagonal steering, electronic tail-swing suppression and manual rear axle steering"

- The key-switch **50** in the chassis is in position 2. Thus, the axles are locked; the symbol "axle suspension lock“ appears (refer to item B1-3.1).

- The vehicle is in level position; the symbol "Level“ appears (refer to item B1-3.1).

Attention **With the vehicle completely lowered, driving operation is not admissible. Otherwise, the suspension cylinders, being mechanically blocked, might be damaged.**

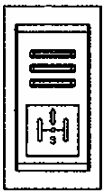
- The axles have been actuated via the button “holding the axles” in the outrigger casing (refer to item B1-6.1.2). As soon as the vehicle is in contact with the ground, deactivate the function “holding the axles” by actuating the buttons (item 6.1.2, button n° 18) again. The button must no longer appear inverse.



DANGER **The crane is unstable while the 3rd axle is being lifted and lowered. Warning lamp 15 "central warning - Chassis" is flashing while the axle is being lowered.**

NOTE **Lifting and lowering of the 3rd axle are only allowed when the vehicle is immobilized. Moreover, the conditions specified under item 5.9 Steering for lifting the 3rd axle must be fulfilled.**

Lifting the 3rd axle:



- Actuate the rocker tip switch **30** "lift-lower 3rd axle" upwards and keep it pushed.
  The symbol "Lift 3rd axle" (refer to item 3.1) is flashing on the main screen while the axle is being lifted. At the same time, the warning lamp **15** “central Chassis” goes on.

When the 3rd axle has been lifted, the symbol "Lift 3rd axle" goes out. The symbol "3rd axle is lifted" appears.

- Activate construction site mode (refer to part B1-5.9.2).

The steering modes "diagonal steering,electronic tail-swing suppression and manual rear axle steering" have been enabled (refer to item B1-5.9 “Steering”).

cont'd.: **6.7.1 Steering modes "diagonal steering, electronic tail-swing suppression and manual rear axle steering"**

To lower the 3rd axle after the vehicle has been moved, proceed as follows:

Lowering the axle:

- Actuate the rocker tip switch **30** "lift-lower 3rd axle" downwards and keep it pushed.
  The symbol "Lower 3rd axle" (refer to item B1-3) is flashing on the main screen while the axle is being lowered. At the same time, the warning lamp **15** “central Chassis” goes on.

Once the vehicle is completely lowered, the symbol "lower 3rd axle" goes out.

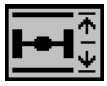
Now the vehicle can be stabilized again.

6.7.2 Steering mode "minimum turning circle"

- The key-switch **50** in the chassis is in position 2. Thus, the axles are locked; the symbol "axle lock“ appears (refer to item B1-3.1).

- The vehicle is in level position; the symbol "Level“ appears (refer to item B1-3.1).

Attention **With the vehicle completely lowered, driving operation is not admissible. Otherwise, the suspension cylinders, being mechanically blocked, might be damaged.**

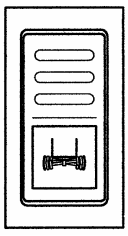


- The axles have been actuated via the button “holding the axles” in the outrigger casing (refer to item B1-6.1.2). As soon as the vehicle is in contact with the ground, deactivate the function “holding the axles” by actuating the buttons (item 6.1.2, button n° 18) again. The button must no longer appear inverse.

- Activate construction site mode (refer to item B1-5.9.2).

The steering mode "minimum turning circle" has been enabled. Refer to item B1-5.9 “Steering”.

6.7.3 Axle oscillation



- In uneven terrain, should a front wheel spin, the front axle oscillation can be engaged via the rocker tip switch **37** "axle oscillation" in the chassis, provided that the boom is stowed over-rear and the superstructure locking pin engaged.
- The rocker tip switch must be kept pressed during driving operation, until all wheels grip again.
- When the rocker tip switch is released, the axle oscillation is deactivated; the axle suspension is locked again.

Now the vehicle can be stabilized again.

7 Emergency control functions and elements

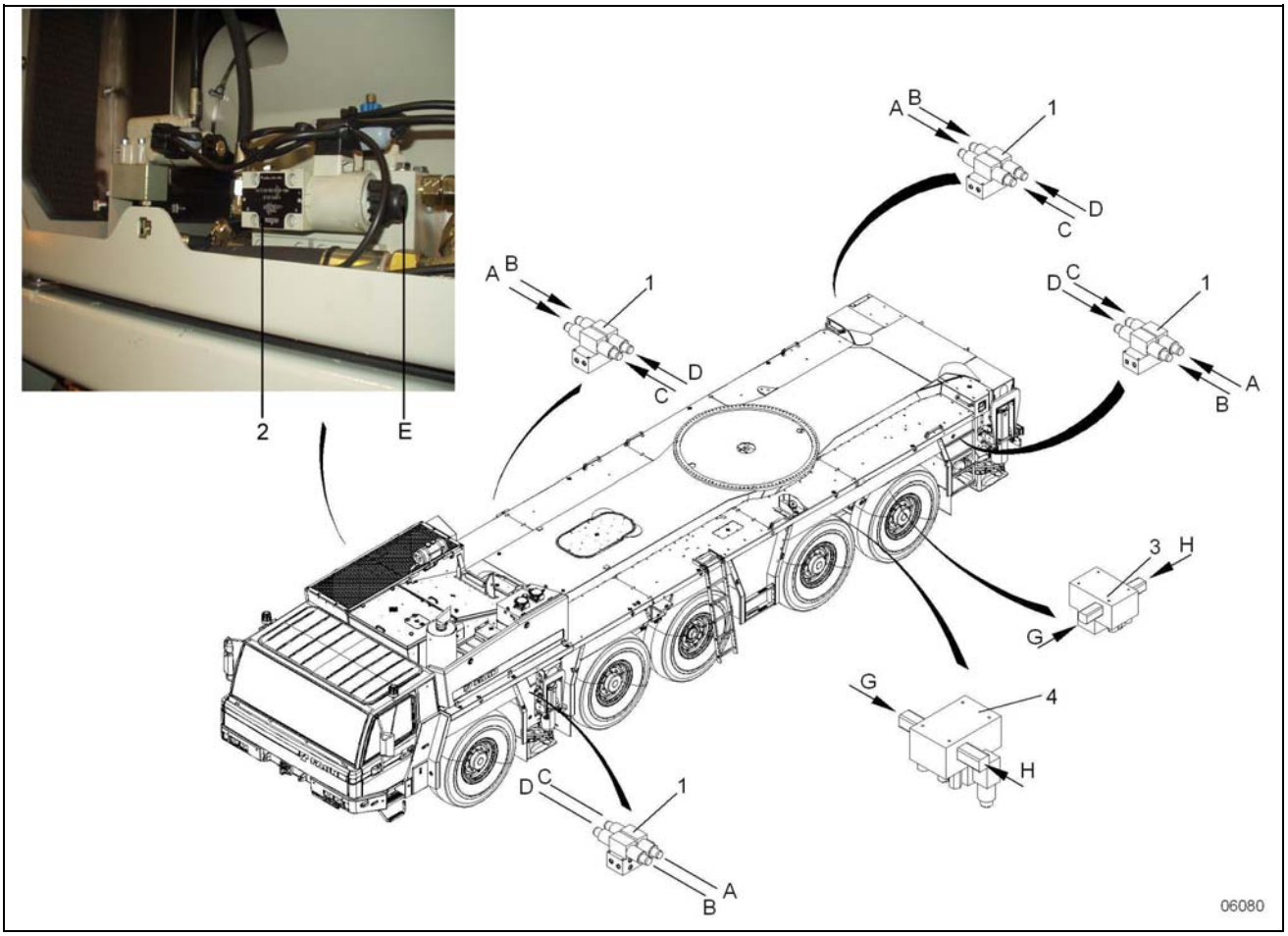
7.1 Hydraulic system

In case of failure or malfunctions of various control and operating elements, or in case of malfunctions of the electric equipment, the functions failed might be effected, e.g. via emergency controls. For the position of the solenoid valves, refer to the figure.

NOTE **To ensure the oil supply of the hydraulic system for outrigger operation, the emergency control (E) of the solenoid valve (2) located on the valve block must be kept pressed down by an assistant at the same time.**

Attention **Make sure that emergency control devices with rubber caps are never actuated with sharp-edged or pointed objects! Should the rubber caps be damaged, this may result in failure of the valves.**

DANGER **Emergency control devices must never be used instead of the operating elements for normal operation. Any damage to the control and operating elements must be eliminated immediately.**



7.1.1 Functionalities of the emergency push-buttons on the solenoid valves:

Solenoid valves (1) Emergency control of outriggers.

A = retract outrigger cylinders. B = retract outrigger beams.
C = extend outrigger cylinders. D = extend outrigger beams.

Solenoid valve (2) Oil supply.

E = Oil supply.

Solenoid valves (3 and 4) Emergency control of rear steering.

G = Steering actuated to the left
H = Steering actuated to the right

7.1.2 Actuation of the emergency tip switches

- Start the engine.
- Set the engine to idling speed.
- Set gearbox to neutral position "N"
- Engage the parking brake (handbrake).
- Block the vehicle, if necessary, using wheel chocks.

7.1.2.1 Retracting and extending the outrigger cylinders

Solenoid valve 1:
Tip switch A = retract outrigger cylinders.
Tip switch C = extend outrigger cylinders.
Solenoid valve 2:
additionally: Tip switch E = oil supply.

7.1.2.2 Retracting and extending the outrigger beams

Solenoid valve 1:
Tip switch B = retract outrigger beams.
Tip switch D = extend outrigger beams.
Solenoid valve 2:
additionally: Tip switch E = oil supply.

DANGER **On actuation of the tip switches, the outrigger cylinders and the outrigger beams on the opposite side of the machine will be retracted or extended. Therefore, for safety reasons, an assistant must be posted to watch the working area which is not within the operator's vision.**

7.1.2.3 Fan drive

Refer also to item 4.6.2.7 "Function of the valve block in the cooling system".

7.1.2.4 Rear axle steering

Solenoid valve 3:
Tip switch H = 5th axle steering actuated to the right
Tip switch G = 5th axle steering actuated to the left

Solenoid valve 4:
Tip switch H = 4th axle steering actuated to the right
Tip switch G = 4th axle steering actuated to the left

DANGER **During actuation of the solenoid valves (3, 4), the rear axles are steered; risk of crushing !**

7.2 Centering the 4th and 5th axles

If problems occur in the electronic system while the rear axle steering is actuated, the rear axles can be centered via the emergency control.

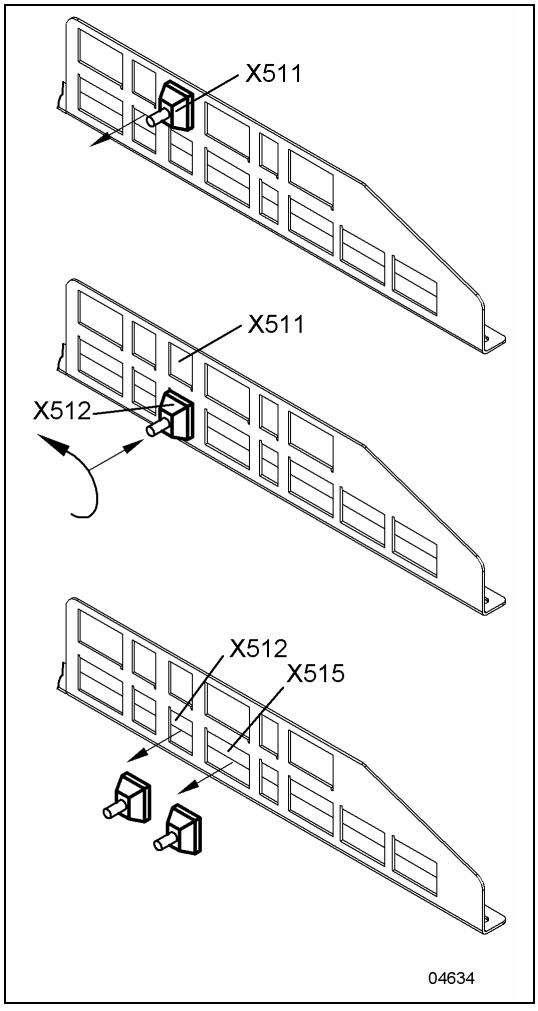
The connectors are located below the front lid (part B1-2.3.3, item 13).

- Release the connector X511, turn it by 180° and plug it onto the free connector X512.
- Center the 4th and 5th axles as described under item B1-7.1 and 7.1.2.4 - in straight-ahead position.
- Remove connector X511 from X512 and leave it unconnected.

Overriding the upshift lock's function:

- Remove connector X515 and leave it unconnected.

DANGER **Now the vehicle is ready to operate for limited duties. Driving operation is possible with the front axle steering. The turning radii increase.**
The elimination of the malfunction or the damage in the steering system must be initiated and executed immediately.



Memo:

8 Operation in winter

Depending on the climatic conditions of the area where the crane is to be used, the weather conditions may be more or less extreme during the winter months. Thus, the instructions mentioned below must definitely be observed to ensure trouble-free and safe operation in winter.

DANGER **Particular care is required when climbing up or using steps, ladders and platforms in damp weather and snow.**

- Access steps and platforms must be cleaned to remove dirt, oil, grease and smeary substances.

! Risk of slipping !

- Loose snow, frozen layers of snow and ice may form a dangerous coating on the boom surfaces, counterweights and platforms on the chassis.

! Risk of accidents!

- Snow and ice must be removed from the vehicle before the machine is set into motion.
- Snow or lumps of ice which are blown down or which fall down during crane work may endanger the road users.

! Risk of accidents !

DANGER **In case of extremely low freezing temperatures, do not touch metal surfaces with your naked hands - danger of freezing to metal surfaces!**

NOTE **The recommendations regarding oil sorts provided in part "C1" service and maintenance chassis must be observed for the following assemblies.**

Under extreme weather conditions, it may be advisable to use snow chains.
The instructions of the snow chain manufacturer regarding assembly, speeds and other data must be observed.

8.1 Engine

8.1.1 Engine oil

In order to ensure a sufficient lubrication in case the vehicle is to be started at low ambient temperatures, the viscosity of the engine oil must be selected according to the ambient temperatures prevailing at the time when the engine is started.
Adhere to the specifications of the engine manufacturer supplied in the separate brochure.

8.1.2 Coolant

Attention **The engine must be filled with anti-corrosion - anti-freeze agent all the year round.**

The engine must be checked for a sufficient portion of coolant or anti-freeze agent in time, before the temperature drops below zero.
Adhere to the specifications of the engine manufacturer supplied in the separate brochure.

8.1.3 Diesel fuel

In order to avoid operating malfunctions, the winter diesel fuel available on the market during the cold season must be used. If only summer-type diesel fuel is available, or if winter-type diesel fuel is used at very low ambient temperatures, a certain amount of petroleum, the quantity of which depends on the ambient temperatures, must be added to the fuel in order to avoid segregation of paraffin.
Refer to Operating Manual of engine manufacturer which is supplied with the vehicle!

The approximate values for the amount of additive are indicated in the operating manual of the engine manufacturer.
There is a simple method to check the diesel fuel for its suitability at the prevailing low temperatures:

- Fill diesel fuel into a flask and expose it to the ambient temperatures. If flakes develop in the fuel (paraffin), the latter is only suited for operation at higher temperatures.

8.1.4 Starting the engine at low ambient temperatures

For the steps to be taken and for further details, please refer to the user manual of the engine manufacturer.

8.2 Gearbox

8.2.1 Start-up, vehicle operation and parking the vehicle at low temperatures

For information on operation in winter, refer to the enclosed operating manual of the gearbox manufacturer.

(For recommended oil types, refer to ZF Chart of Lubricants in part "G1" chassis.)

8.3 Warming up the hydraulic oil or changing the oil

At low ambient temperatures, the hydraulic oils recommended in part "C1" service and maintenance chassis must be used.

If the oils to be used at the appropriate ambient temperatures approach the limits (values of max. 10°C below the minimum temperature limit are admissible), the hydraulic oil can be warmed up without requiring a change of the oil type.

The admissible service temperature is approx. 70°C to 80°C.

Attention **Avoid relatively high engine speeds while the hydraulic oil is still cold. Allow the oil to warm up at least until it reaches the lower service temperature level.**

If the hydraulic system is filled e.g. with hydraulic oil HLP 68 or HLP 46, the oil type must be replaced by the specified pressure fluids at low ambient temperatures.

8.4 Batteries

Well-charged batteries are a prerequisite for starting the engine at low ambient temperatures.

At ambient temperatures lower than -30°C, when the machine is standing in the open air for an extended period of time without being operated (for ex. at night), the batteries must be heated or removed from the vehicle and stored in a warm room.

In winter, the current consumption should be kept as low as possible.

Check the acid density and the acid level as described in part "C1" service and maintenance chassis.

Discharged batteries freeze already at temperatures as from -10°C.

Adhere to the instructions of the battery manufacturer.

8.5 Adjustable air vents

The supply of warm / fresh air can be controlled by means of the adjustable air vents item. 2, Pos. **26; 34** and **41**.

8.6 Windshield washing system

During the winter months, a certain amount of antifreeze agent for windshield washing systems, the quantity of which depends on the temperature, must be added to the water of the windshield washing system.

The washer water is made frost-proof by adding washer additives (cleaning agent and antifreeze agent for windshield washing systems). Observe the manufacturer's instructions for use.

Memo:

9 Devices facilitating access to the superstructure

Devices facilitating access to the superstructure have been provided to the right (2) and left (4) of the chassis. The access devices are firmly mounted.
An additional access (1) to the superstructure have been provided to the left of the chassis.

These access devices enable the operators to access the vehicle platform and the superstructure cabin safely and comfortably.

Stationary ladder (5) on left side of vehicle; facilitates refueling.

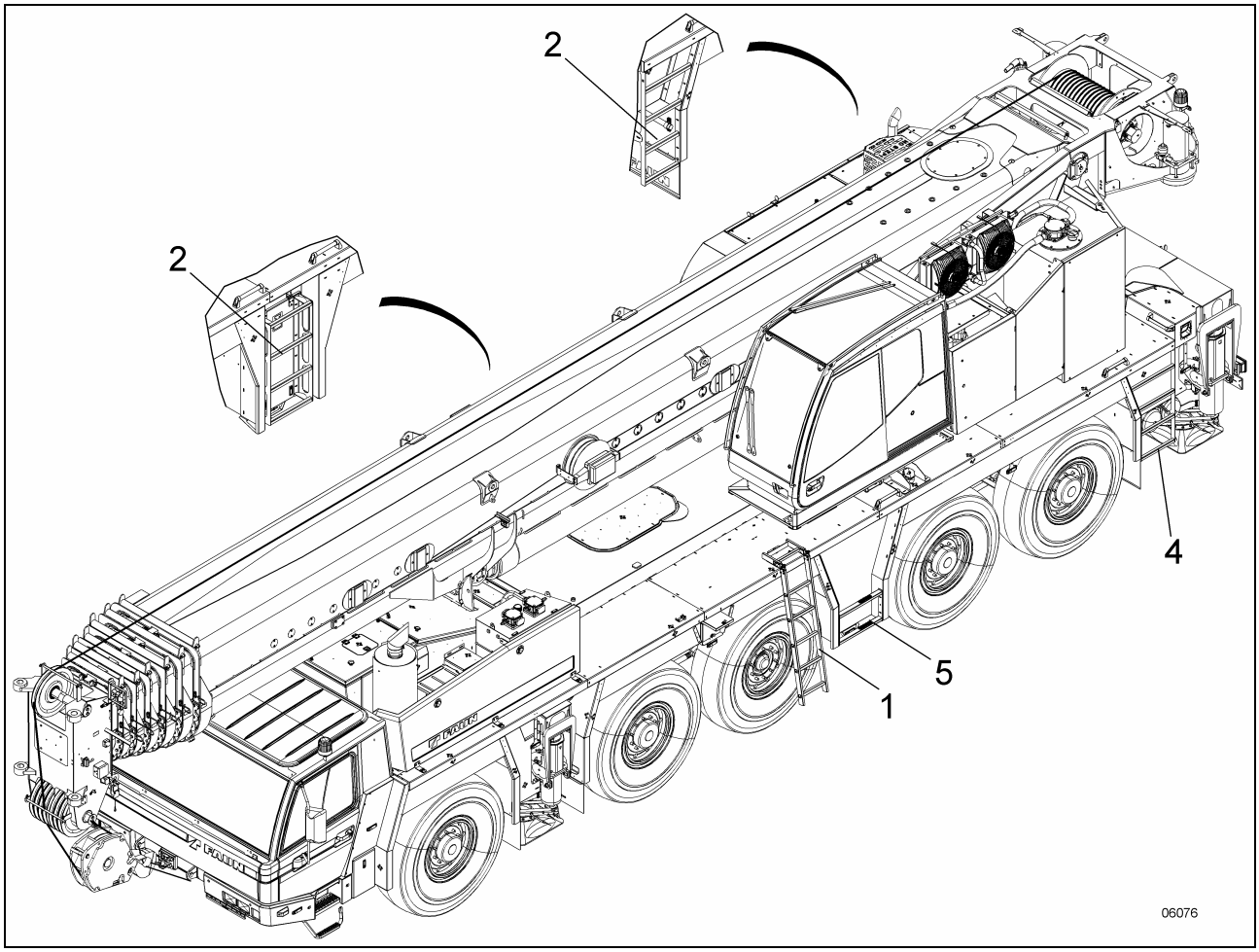
DANGER **When climbing up ladders, make sure that you grasp the side rails with your hands. When climbing up the stationary ladders, make sure that you grasp the handles in the access plates with your hands. Otherwise, there is a RISK OF ACCIDENTS!**

DANGER **Access devices and platforms must always be kept clean!**
Dirt and other smeary substances must be eliminated immediately and thoroughly !

Risk of slipping and accidents !

Particular caution is required when climbing up and stepping on access steps and platforms, even in humid and damp weather - in rain, fog and snow.

Increased risk of slipping and accidents here, too!



cont'd.: **9** **Devices facilitating access to the superstructure**

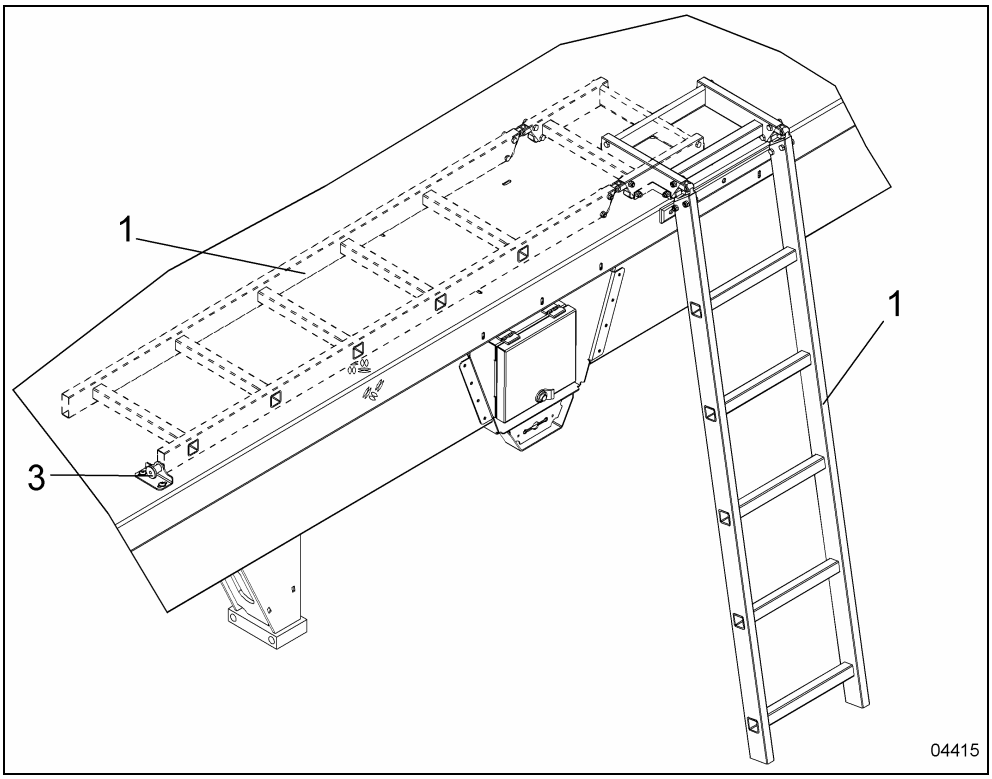
In transport position (during on-road travel), the ladder (1) is placed in its support on the access plate of the vehicle, and secured. The ladder (1) must be locked via the knob (3) of the support.

Swinging the ladder (1) to its access position:

The wheels must be aligned in straight-ahead driving position.

- Pull the knob (3) of the support, until the ladder is released; then swing the ladder outwards.

To swing the ladder (1) into its transport position, proceed analogously by reversing the above procedure.



10 Attachments, optional equipment and accessories

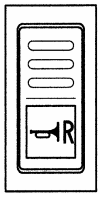
The optional equipment of the vehicle is listed and explained in this chapter. The following list is an overview of the optional equipment which has been described and explained in other sections.

Optional equipment mentioned in other sections:

- Pilot lamp, direction indicators, trailer. Refer to part B1-4, item: 4.2.9.
- Air conditioner. Refer to part B1-4, item: 4.4.5.
- Connecting the axle drive. Refer to part B1-5, item: 5.4.

10.1 Acoustic reversing signal - warning device

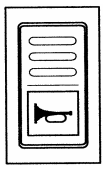
- Actuate the rocker switch **2** "Reversing signal" down; the warning device is switched ON.
- Actuate the rocker switch upwards; the warning device is switched OFF.



When the reverse gear is engaged, an acoustic warning signal sounds. It is to warn persons within the manoeuvring area of the vehicle.

10.2 City / country horn (Supertone horn)

To change over from the electric horn to the super-tone horn or to set one of them, actuate the rocker switch **1** "city / country horn".



- Rocker switch pressed down: The super-tone horn sounds,
- Rocker switch pressed upwards: The electric horn sounds.

10.3 ABV system (Automatic Anti-Lock System)

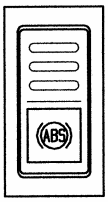
The ABV system prevents the individual wheels from blocking in case of excessively powerful actuation of the service brake system, when the appropriate electronic system detects skidding or otherwise varying road conditions.

Thus, the vehicle's driving and steering stability remains ensured to a large extent, due to non-blocking wheels, as far as this is possible considering the prevailing physical possibilities, even during full braking operations.

When the engine is started, the safety circuit checks actively the sensor-based monitoring of the wheels and axles, as well as the other components of the ABV system.

The vehicle is equipped with the following instruments which ensure detection of the functions and the continuous monitoring of the ABV system:

Rocker tip switch 51 “ABV system, off-road mode”



The ABV system can be switched over to an increased brake slip via the rocker tip switch **51** “ABV OFF-road mode” in the instrument panel.
If this mode is selected, the braking distance in rough terrain and on dirt tracks (e.g. on soft or extremely uneven ground and on downhill gradients) can be reduced.
The off-road mode in the tractor vehicle and in the trailer can be actuated while the vehicle is at a standstill (key in steering lock in "driving" position), or during driving operation.
Once the engine has been stopped and re-started, the off-road mode ABV function is reset automatically.

When driving in rough terrain, the function can be switched off again via the rocker tip switch **51** “ABV off-road mode”.

Driving in rough terrain: The off-road mode has been switched ON via the rocker tip switch **51**; the symbol “ABV - tractor vehicle” flashes, or – with a trailer coupled – the symbols “ABV – tractor vehicle” and “ABV – trailer” are flashing in the FAUN Cockpit Graphic Control system (refer to item 3.1).

Driving on solid roads: The off-road mode has been switched OFF via the rocker tip switch **51**; the symbols (refer to item 3.1) “ABV – tractor vehicle” and “ABV – trailer” have gone out.

cont'd.: **10.3 ABV system (Automatic Anti-Lock System)**

Attention **On public roads, the ABV system must not be in “off-road mode”, as otherwise the wheels may be blocked.**

Symbol “ABV - tractor vehicle”

The symbol „ABV- tractor vehicle” is used to monitor the chassis. Once the ignition has been switched on, the symbol must go on, and go out again after 2 to 3 seconds.

When the symbol "ABV - tractor vehicle" goes on during traveling operation, this indicates a failure of the ABV components. However, in this case the functional safety of the conventional air-actuated brake system remains fully ensured.

NOTE **The function of the electronic system of the wheel sensors is monitored by the ABV Symbol. The Symbol goes on in case of malfunction. Eliminate the malfunction immediately (specialist workshop).**
This may lead to malfunction of the gearbox!

Symbol "ABV - trailer"

The symbol „ABV- trailer” is used to monitor the trailer. Once the ignition has been switched on, the symbol must go on, and go out again after 2 to 3 seconds.
If a trailer without ABV system is coupled, the symbol must not go on.

When the symbol "ABV - trailer" goes on during operation with trailer, this indicates a failure of the trailer’s ABV components. However, in this case the functional safety of the conventional air-actuated brake system remains fully ensured.

10.4 Electronc immobilizer (FinTronic Car Bloc TTS 24/12)

The immobilizer is operated via a keyring pendant fastened to the ignition key, i.e. the so-called transponder. The transponder as such is passive, i.e. it is maintenance-free and does not require any battery.

Activation of the immobilizer

- Stop the engine by turning the ignition key from position 2 into position 0.
- Remove the ignition key.

The immobilizer is activated automatically after approx. 20 seconds. The red LED **10** starts flashing in the instrument panel.

Deactivation of the immobilizer

- Insert the ignition key into the ignition switch and turn it in position „ignition ON“ (position 2).
- Hold the ignition key in this position until the red LED **10** goes out.
- Turn the ignition key to its stop in position 3 and start the engine.

NOTE **The immobilizer is only deactivated when the LED 10 has gone out.**

10.5 Air conditioner

10.5.1 Instructions to ensure optimum function of the air conditioner

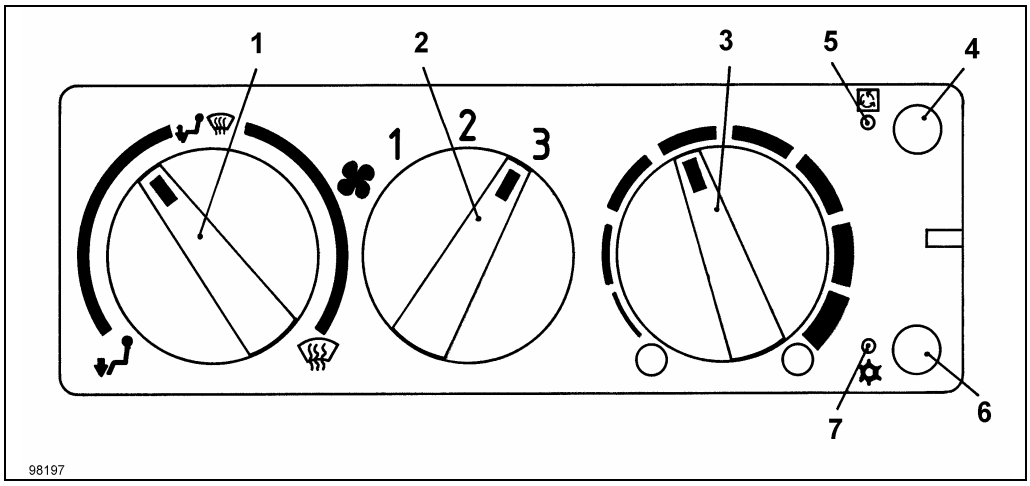
Vehicle owners are frequently unaware of the fundamental fact that air conditioners only function properly if they are operated in an enclosed space. The air circulation must be a directed flow. The interior of the cabin must be kept clean.

If the filter installed upstream of the evaporator is clogged, it reduces the air flow.

10.5.2 Starting-up the air conditioner

The air conditioner can only be operated while the engine of the vehicle is running. Before the engine is stopped, the air conditioner must be switched off.

- Start the engine.
- Adjust the rotary switch (3) "Cold-warm air regulation" as required.
- Actuate the pushbutton switch (4) to connect the air circulation. When the air circulation is switched ON, the pilot lamp (5) is lit.
- Actuate the pushbutton switch (6) to switch ON the air conditioner. When the air conditioner is switched ON, the pilot lamp (7) is lit.
- Regulate the air flow via the rotary switch (1) and the air vents (keep air flow away from the windscreen, as far as possible).
- Regulate air quantity via the three-stage blower fan (three-stage fan switch (2)) as required.
- Actuate the pushbutton switch (6) again to switch OFF the air conditioner. The pilot lamp (7) goes out.



In this context, refer also to item B1-4, Pos. 4.4.5.

10.5.3 Utilization of the air conditioner

In hot weather at normal air humidity:
The heating is switched off; switch off the blower fan (fresh / warm air); switch ON air conditioning.

In very hot weather at high air humidity:
The heating is switched OFF; switch ON the blower fan (fresh / warm air); switch ON air conditioning.

In autumn and early winter, at high air humidity, in rain/snow and mist on the window panes:
Adjust heating as required; switch ON the blower fan (fresh / warm air); switch ON the air conditioning.

During cold weather in winter:
Switch OFF the air conditioning; adjust heating as required; switch OFF the blower fan (fresh / warm air), if necessary.

In very cold weather and at very low air humidity:
Switch OFF the air conditioning; adjust heating as required; switch ON the blower fan (fresh / warm air).

During cold and dry periods in winter and when the air conditioning is seldom used:
Operate the compressor or the air conditioner every week for a few minutes.

10.6 WEBASTO - Thermo 90 S / with engine pre-heating

A heater unit, type Thermo 90 S, is installed in the chassis as supplementary heater unit.
The heating is programmed and operated via the timer.
Operation and maintenance of the heating are described in detail in the operating instructions of the heater unit's manufacturer which is supplied with the machine.

10.6.1 Use of the supplementary heater unit Webasto - Thermo 90S

The supplementary heater unit Thermo 90S can be used for preheating of the engine alone, or as a heater unit for engine preheating combined with heating of the cab in the chassis.

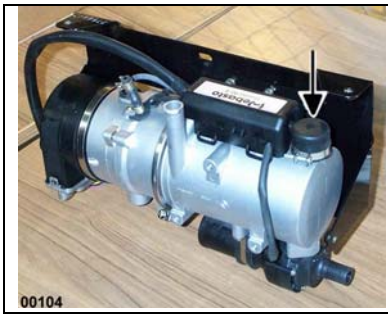
Only engine preheating:	Engine preheating and preheating of cab in the chassis:
● The heating is programmed and operated via the timer. Operation and maintenance of the heating are described in detail in the operating instructions of the heater unit's manufacturer which are supplied with the machine.	● Switch on battery main switch (**7**). ● Set blower fan (refer to item B1-4.4.2) to step 1. ● Set air regulation (refer to item B1-4.4.3) to position “warm”. ● Program the timer.

NOTE **The heater unit must be switched off during traveling operation.**

10.6.2 Do-it-yourself troubleshooting in case of malfunction

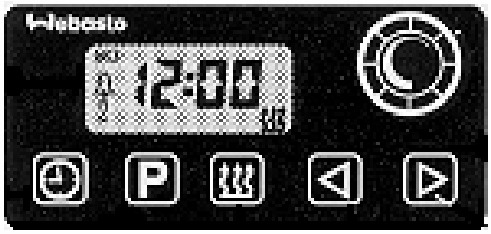
Shut-down on faults in case of overheating of the heater unit with error code F10 "overheating":

- Allow the heater to cool down.
- Check the coolant in the expansion tank and, if necessary, top up as described in part C1-3.5.1.
- Press button of the temperature limiting device on the heater unit (refer to Fig.). The heater unit is installed below the driver's cabin, on the right side.
- Deaerate the heater unit.
- Put the heater unit into operation.



10.7 WEBASTO diesel heater unit

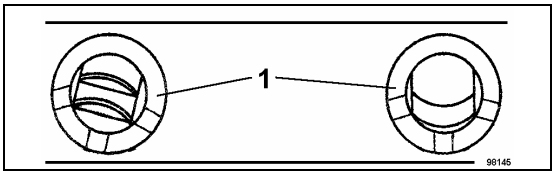
When a supplementary diesel-operated heating is installed, the driver's cab can be heated independently of the engine-fed warm water heating. The operating element is provided for control and inspection of this unit.
Service, operation and maintenance of the WEBASTO diesel-operated heater unit are described in detail in the operating instructions of the heater unit's manufacturer supplied with the machine.



AIR-TOP 3500

10.7.1 Adjustable air vents

The supply of warm/fresh air of the driver's cab can be controlled by means of the adjustable air vents (1).



Operation of the engine-fed warm-water heating system, refer to item B1-4.4.

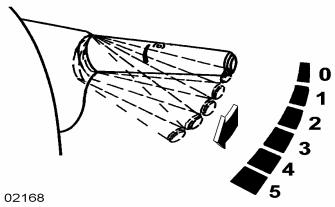
10.8 Eddy-current brake

Attention **The eddy-current brake is inoperative as long as the accelerator pedal is actuated.**

The use of the eddy-current brake avoids the systematic use of the service brake. The latter, in turn, remains cool, efficient and ready for use for cases in which it is indispensable.

The braking effect of the eddy current brake can be graduated.

The hand-actuated switch has 6 positions:	
Position	**Braking effect**
0	0
1	Engine brake/Bremsomat
2	¼ (eddy-current brake) + 40% Intarder + engine brake
3	½ (eddy-current brake) +60% Intarder + engine brake
4	¾ (eddy-current brake) +80% Intarder + engine brake
5	Total (eddy-current brake) 100% Intarder + engine brake



NOTE **The eddy-current brake is ready to operate as soon as the vehicle starts moving (as from approx. 3 - 5 km/h). The various steps of the control device enable the driver to obtain the desired braking effect.**
It is however necessary to make the switch lock in briefly for each step (i.e. no switch position must be skipped), in order to prevent the limits of adherence from being exceeded on slippery surfaces.

- While the manual switch is being actuated, the symbol “eddy-current brake active” appears in the FAUN Cockpit Graphic Control System (refer to item B1-3) during actuation.

10.8.1 Terminating braking operation with the eddy-current brake

Once braking has been finished, the manual control switch must be in position 0, the symbol must go out.

10.8.1.1 Stopping and parking the vehicle

Attention **As soon as the vehicle has stopped completely, return the manual control switch to position "0" and engage the parking brake. This is to prevent unnecessary power consumption and overheating of the eddy-current brake.**

- When the machine is parked for an extended period of time, shut the engine off and set the battery main switch to OFF.

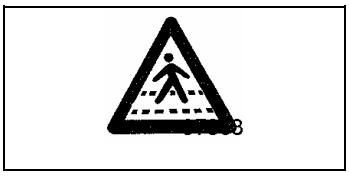
10.8 Eddy-current brake (cont'd.)

Attention **The eddy-current brake is without function when the vehicle is not running, and thus cannot be used as parking brake. Make sure that the parking brake is engaged and that the gearbox is set to neutral "N".**

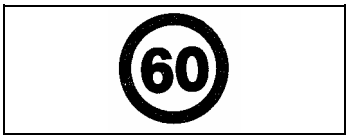
NOTE **The braking effect of the eddy-current brake and the engine exhaust flap brake should be coordinated with the operation of the service brake, i.e. they should be actuated alternately, to obtain an optimum braking effect and to save the service brake, i.e. to have the full service brake effect available for unforeseen cases.**

10.8.2 Examples for application of the eddy-current brake

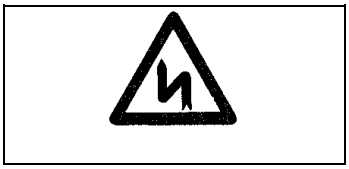
In "city" mode
- At very low speeds, the eddy-current brake is highly effective for the most common braking operations in city travel (at junctions, around bends, at turning points etc.) and when stopping the vehicle, without actuating the service brake.



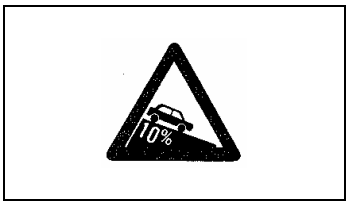
On roads / trunk roads
- The eddy-current brake enables the necessary deceleration procedures even from a relatively high speed, to save the wheel brakes.



Hilly terrain
- It is recommended to couple the effect of the eddy-current brake with that of the engine brake by utilizing the correct reduction ratios. Thus, the appropriate speed for the existing slopes and routes can be reached as fast as possible.



On long downhill slopes
- As soon as the vehicle has been braked down to the desired speed, only the second eddy-current brake step should be engaged to obtain the optimum continuous braking effect. It may be useful to utilize the effect of the service brake, continuous service brake and continuous service brake/eddy-current brake alternately to adapt the speed of the vehicle.



On slippery roads, in snow, ice and dirt
- When the tires' adherence is diminished considerably, the eddy-current brake is particularly effective. It not only allows progressive braking, but can also be used to set the machine smoothly into motion on slippery roads.

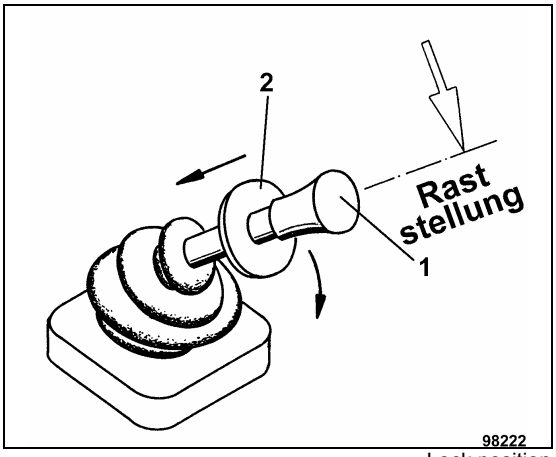
Attention **The fact that the machine is equipped with an eddy-current brake does not exclude extreme caution. Thus, if the road conditions are not absolutely safe, the driver should operate first step 2, and then, while watching the roadholding and the general behaviour of the vehicle, the next step up.**

10.9 Checking the air accumulator retaining force on upward gradients - vehicles equipped with trailer coupling device

In the case of vehicles with trailer coupling device, it must be possible to check the tractor's air accumulator retaining force for the whole tractor-trailer combination.

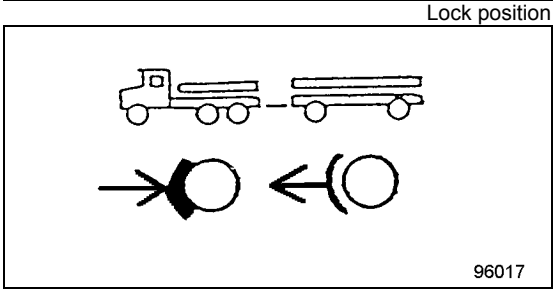
This check position has been integrated in the valve of the handbrake.
Checking the air accumulator retaining force:

- The valve of the handbrake is engaged (refer also to item B1-4.5).
- Push the handle (2) down and pull the lever (1) back to its stop.
- Check whether the air accumulator retaining force is capable of holding the whole vehicle combination (the whole tractor-trailer combination does not move).
- Return the lever (1) to its locking position (braking position).



Lock position

The check should be effected whenever the vehicle combination is to be parked on upward or downward gradients.
The tractor's air accumulator system must be capable of holding the whole vehicle combination up to a gradient of 12% while the handbrake is engaged.



NOTE **While the vehicle is parked, it must be protected from rolling by additional wheel chocks placed under the tires.**

10.10 Trailer Coupling Device

10.10.1 Ringfeder

DANGER **For coupling or uncoupling, the regulations of the employers' liability insurance association must be adhered to.**

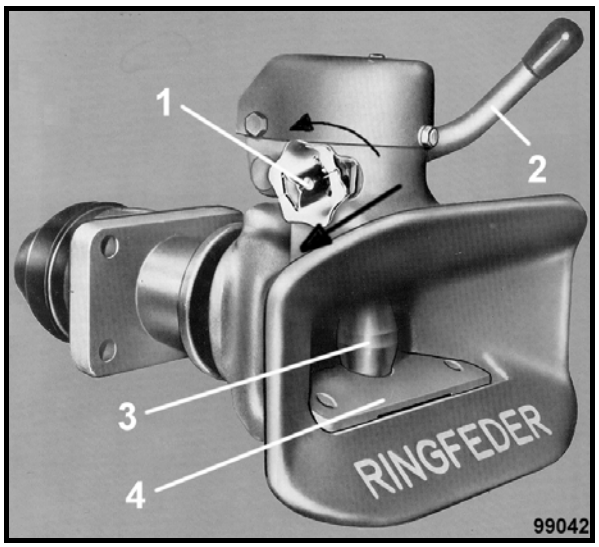
10.10.1.1 Opening and closing the trailer coupling device

- Turn the knob locking device (1) to the left by 90°, pull it out and make it engage in the locking device.

- To open the coupling with the hand lever (2), the coupling jaw must be placed centrally, or be turned into one of its lateral end positions by hand.

NOTE **The coupling can only be opened and locked in one of the above-mentioned positions.**

When the trailer's towing eyelet is moved in, the automatic coupling mechanism is released as the coupling bolt (3) is lifted.



When the coupling bolt is in its lower position, the second, independent knob locking device secures the coupling bolt automatically.

Attention **After coupling, it must be checked whether the knob locking device (1) is engaged correctly.**

A special plastic plate (4) in the coupling jaw saves the towing eyelet and dampens sound.

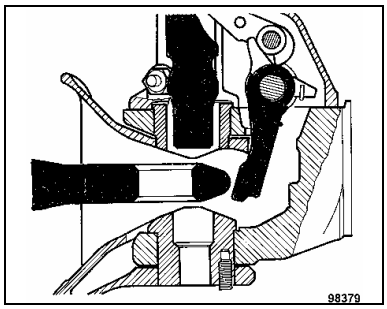
10.10.2 Rockinger

10.10.2.1 Coupling

DANGER **For coupling or uncoupling, the regulations of the employers' liability insurance association must be adhered to.**

The trailer must be equipped with a towing eyelet ∅ 40 DIN 74054 with bushing.

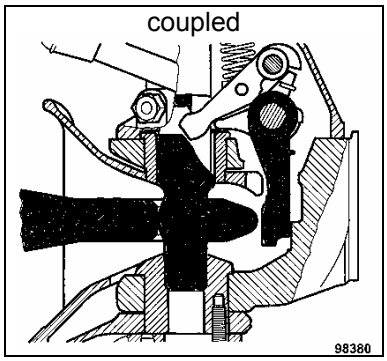
Coupling



- Push manual lever upwards to its second stop location.
- Check whether the coupling jaw is positioned firmly.
- Back the tractor up.

On coupling, the front axle of the trailer with pivoting bolster must not be braked.

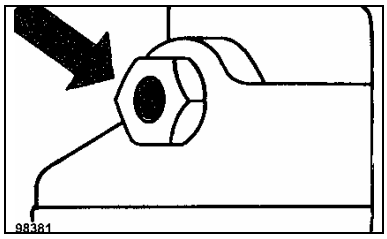
NOTE **When coupling a central-axle trailer, proceed as follows:**



- Back the tractor up carefully.
- The towing eyelet must touch the coupling jaw in its center.

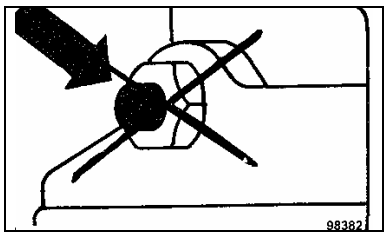
Attention **Non-observance of this instruction may result in damage to the coupling jaw, the towing eyelet and the supporting device.**

Check:
After each coupling operation, **make sure** that the coupling is checked for proper working order.



After coupling, the check pin must **not** protrude from its guide bushing.

When the check pin is protruding from its guide bushing, this means that the coupling process has not been completed correctly; there is a



R I S K O F A C C I D E N T S !

10.10.2.2 Closing the coupling by hand

- Pull hand lever down.

10.10.2.3 Uncoupling

- Actuate the hand lever to its stop (1st stop location).
- Move the tractor forward.

NOTE **When the towing eyelet slides out of the coupling jaw, the latter is automatically locked by the releasing lever.**
During operation without trailer, the coupling must be kept closed to protect the lower bushing from dirt.
During operation without trailer, the pneumatic coupling heads (reserve and brake connectors) must be kept closed to protect them against dirt.

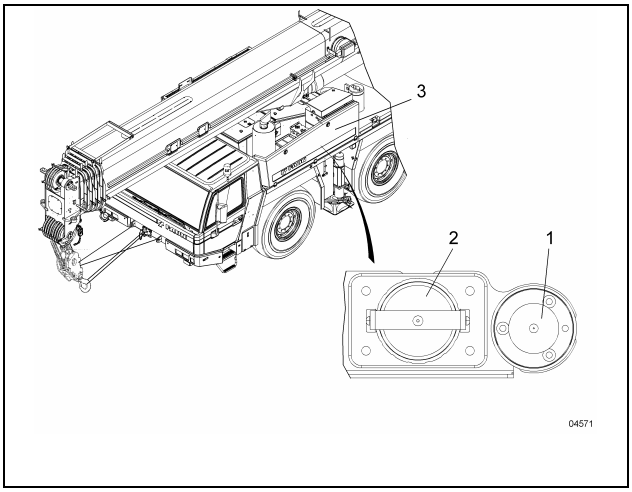
10.11 Starting the engine in the chassis with current supplied from an external power source

If the vehicle's batteries are discharged or if their capacity is insufficient, the engine can be started with power supplied from an external source.

Such an external power source are the batteries of another vehicle with 24 V system, or the batteries of the superstructure or the chassis of the vehicle in question.

However, this requires that the vehicle supplying power is equipped with a plugbox for starting via an external power source.

The plugbox for starting via an external power source (2) of the vehicle to be supplied with power is installed on the left side of the vehicle, on the battery box underneath the cover (3) (refer to Fig.).



The batteries of the vehicle supplying power should have the same or a higher capacity (Ampere) than those of the vehicle to be supplied with power.

To avoid damage to the generator, make sure that the following sequence of operations is observed:

Vehicle to be supplied with power	Vehicle supplying power
1. The ignition is switched off.	The ignition is switched off
2. The battery main switch is turned off	The battery main switch is turned off
3. Connect jumper cables to plugbox	Connect jumper cables to plugbox
	4. Switch battery main switch on. 5. Switching the ignition on. 6. Start the engine and make it run at half-load.
7. Switch the ignition on. (Do **not switch on** the battery main switch). 8. Start the engine. 9. Switch battery main switch on.	
	10. Shut off the engine, switch the ignition off. Switch battery main switch off.
11. Disconnect the jumper cables	Disconnect the jumper cables

Attention **Make sure that the engine is never running without connection to the battery (either to the vehicle's own battery or to the battery of another vehicle) (destruction of the rectifier diodes in the three-phase generator).**

NOTE **Current can also be supplied via the plugbox for starting the vehicle by means of an external power source, i.e. another vehicle can be started.**

10.12 Battery charging plugbox

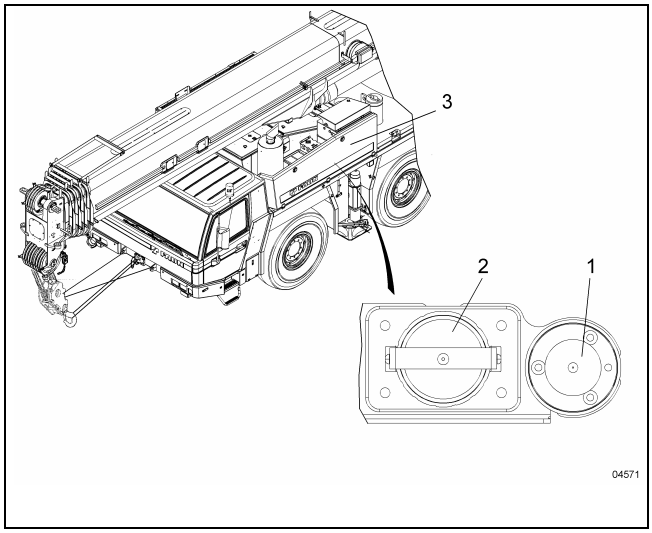
The battery charge condition is checked by measurement of the acid density.

If the acid density is below 1.21 kg/l - referred to a temperature of 20°C and the specified acid level - the battery must be charged.

The battery may only be charged with direct current (DC).

To charge the batteries, connect the charging plugbox (1) to the battery charger directly via a cable; it is not necessary to remove the batteries.

The plugbox for starting via an external power source (1) is installed on the left side of the vehicle, on the battery box underneath the cover (3) (refer to Fig.).



For further details, refer to the brochures of the battery manufacturer.

Attention **The charging plugbox (1) must not be used to start the vehicle via an external power source with the charging unit connected. It is only used for charging the battery.**

10.13 Switch "Emergency OFF, engine in chassis"

One switch is installed on the left and right sides of the vehicle.
To stop the running engine in the chassis in cases of emergency, press the push-button.
If it is intended to restart the engine, press the push-button once more; now it will return to its initial position.

Engine stop (stalling device)

10.14 Underride guard

The underride guard (1) is provided at the rear of the vehicle and can be detached and folded upwards (Fig. 2) for off-road travel to increase the overhang angle.

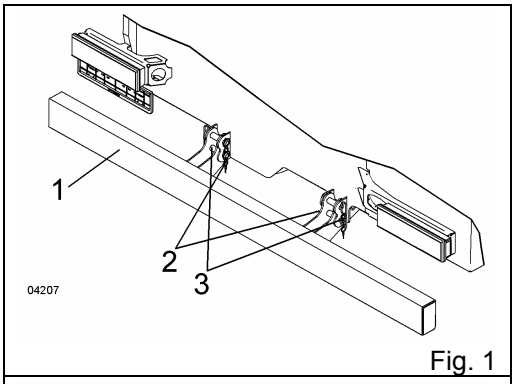


Fig. 1

DANGER **For folding up the guard, the operator needs (an) assistant(s).**

- Block the underride guard to prevent it from falling.
- Remove spring clips (2) and remove the lower pins (3).
- Swing underride guard (1) upwards and hold it until the pins (3) have been reinserted in their bore-holes and locked by means of the spring clips (2).
- Place the underride guard (1) on the pins (3).

NOTE **Operation of the vehicle with the underride guard folded upwards is not admissible on public roads. The underride guard must be mounted and pin-fastened as shown in Fig. 1.**

For folding down the underride guard, proceed analogously by reversing the above sequence of operations.

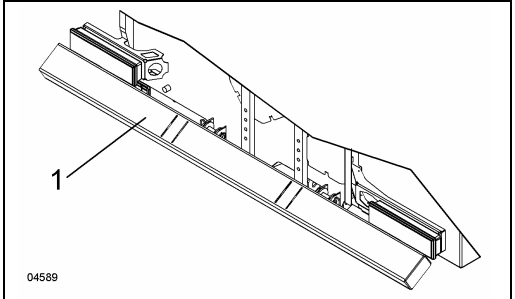


Fig. 2

NOTE **If a trailer coupling device or various special attachments is / are mounted, the underride guard cannot be folded up.**

10.15 Rear area surveillance

The rear area of the vehicle can be monitored by means of a video camera (1).
If the “reverse gear” is engaged or the rear view camera selected in the “Selection menu of the FAUN Cockpit Graphic Control System via the rocker tip switch **26** (refer to item B1-3.1.1)”, the area to be monitored appears in the monitor of the FAUN Cockpit Graphic Control System.

If a warning message is activated during this time, it is not displayed on the monitor of the FAUN Cockpit Graphic Control System.

10.16 Spare wheel

Prerequisite:

- The crane is supported by outriggers as specified.

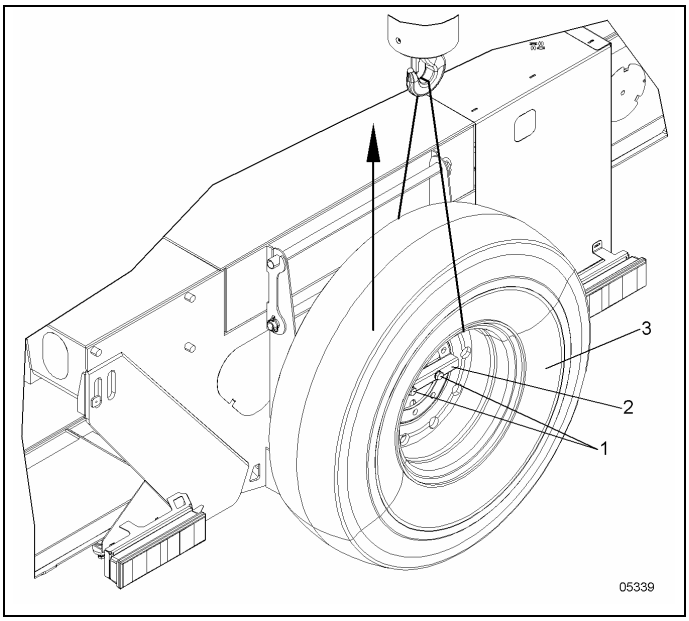
- The superstructure is slewed to the rear, the boom is raised, the telescopes are completely retracted. The mechanical swing lock is engaged.

- Fasten the spare wheel (3) with an appropriate securing device.
- Release the securing bolts (1) and remove the holder (2).

- Remove the spare wheel from the spare wheel holder, lifting it in the direction of the arrow, and place it on the ground.

DANGER **Secure the spare wheel against falling over.**

- To fasten, the faulty wheel in the spare wheel holder, reverse the above sequence of operations.



Memo:

Memo:

11 Instrument panel

(for drawings, refer to the following page)

11.1 Pilot, indicator and warning lamps

Item

10		Immobilizer**)
12	(gn)	Direction indicators 1 (chassis)
13	(rt)	Engine malfunction
14	(rt)	Service brake
15	(rt)	Central warning, chassis
16	(rt)	Steering malfunction
17	(rt)	Parking brake
18	(rt)	Gearbox malfunction
19	(gn)	Direction indicators 2 (trailer)**)

11.2 Other components

20	CMV Cockpit-Multi-Vision
21	Buzzer, engine/steering malfunction
22	Buzzer, gearbox malfunction
25	Gearbox display

11.3 Instruments

Item

9	Speedometer with tripmeter
11	Engine temperature indicator
23	Fuel level indicator
24	Revolution counter with hourmeter

11.4 Switches, rocker switches (WS) and rocker tip switches (WT)

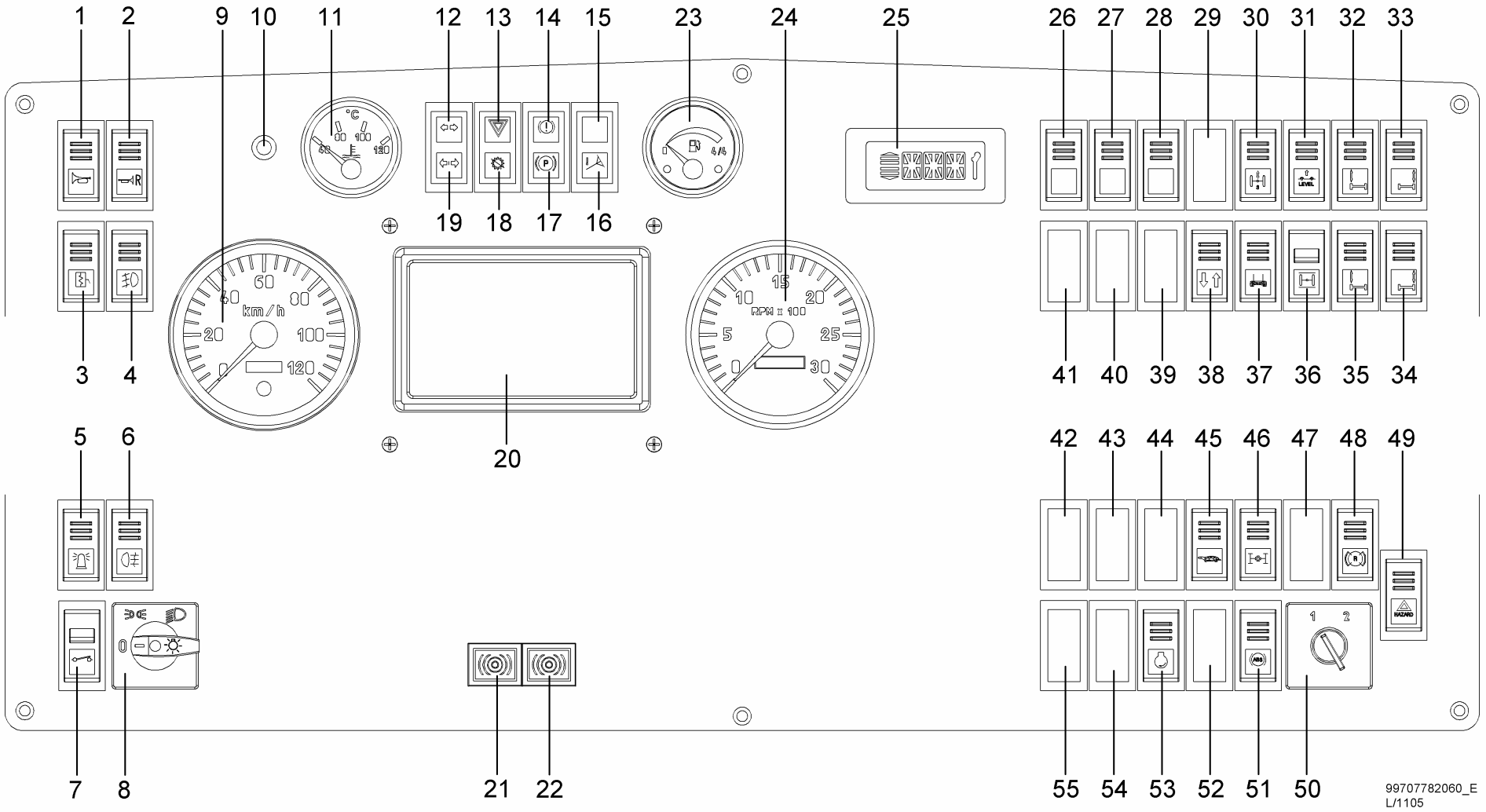
1	WS	- super-tone horn**)
2	WS	- Reversing signal
3	WS*)	- Mirror heating system
4	WS	- Fog lights**)
5	WS *)	- Rotary beacon
6	WT	- Rear fog light
7	WS*)	- Battery main switch
8	Rotary switch, lighting equipment	
26	WT	- Menu guidance
27	WT	- Selection
28	WT	- Service
29	free	
30	WT	- 3rd axle - lifting-lowering
31	WT	- Leveling
32	WT	- Inclination adjustment VL
33	WT	- Inclination adjustment VR
34	WT	- Inclination adjustment HR
35	WT	- Inclination adjustment HL
36	WS	- Axle suspension lock
37	WT	- Axle oscillation
38	WT	- Level control - lift/lower all
39 – 44		free
45	WT	- On-road / off-road gear
46	WT	- connection of 2nd axle / differential locks
47	free	
48	WS	- Intarder
49	WS*)	- Hazard warning flashers
50	Key-actuated change-over switch, chassis - superstructure	
51	WT	- ABV system “off-road mode”**)
52	free	
53	WS	- Working speed
54 - 55	free	

Pilot lamps = (gn)green
Indicator lamps = (ge) yellow
(or) orange
(bl) blue
Warning lamps = (rt) red
ABV = Anti-lock system

UW = Chassis , OW = Superstructure
HR = rear, right-hand HL = rear, left-hand
VR = front, right-hand VL = front, left-hand
WS*) = Rocker switch with function lighting

**) Optional equipment

Instrument panel



Memo:

Memo:

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(for drawings, refer to the following page)

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17	(rt)	Parking brake
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11	Engine temperature indicator
23	Fuel level indicator
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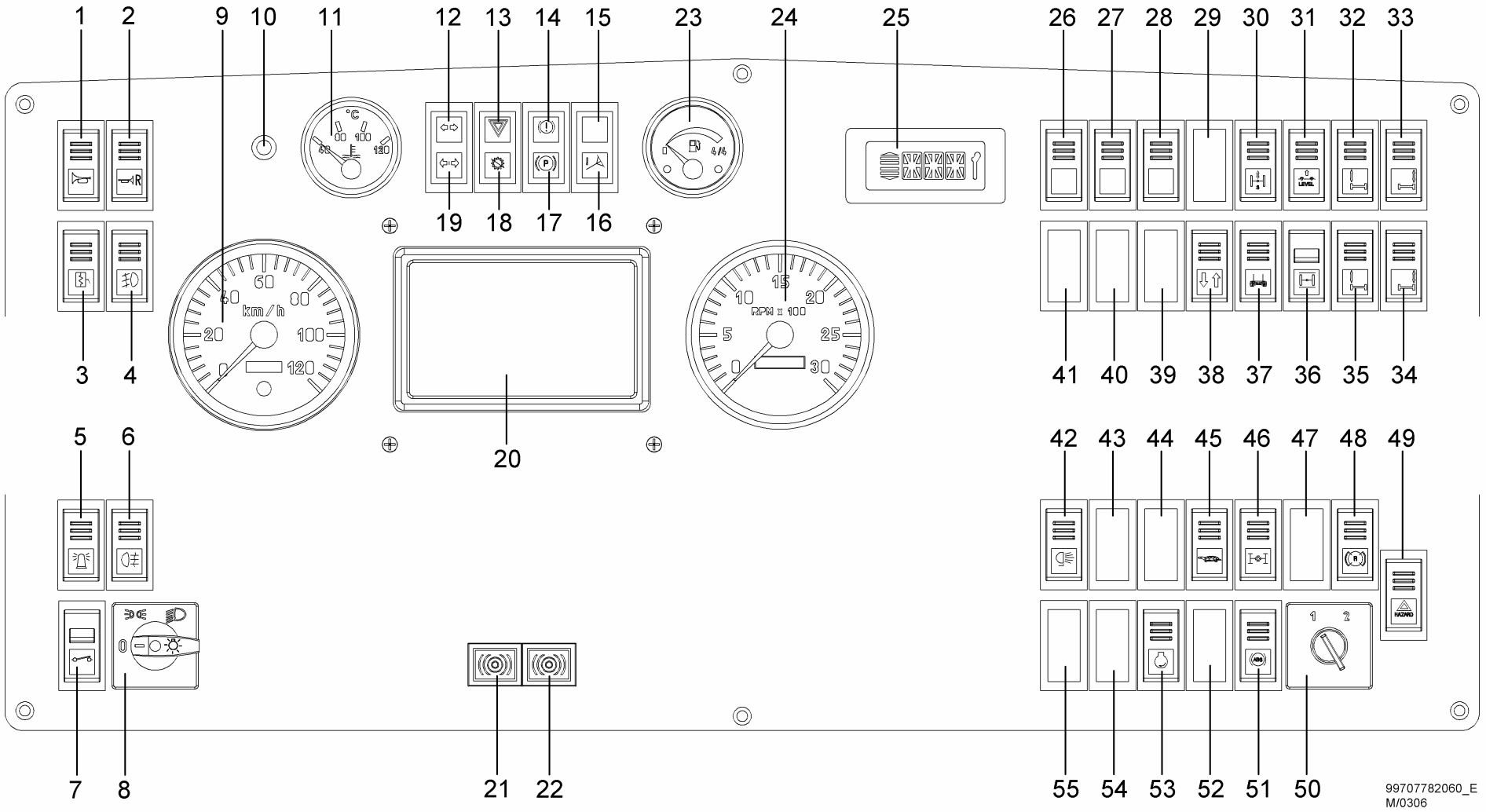
**) Optional equipment

Instrument panel



Memo:

Part B2

Operating Instructions

Superstructure

1 General information about operation

All control elements and monitoring instruments which are required for operation of the chassis and the superstructure are installed in the cabin of the superstructure.

Before the operator puts the superstructure into operation, he should absolutely read the following operating instructions for the superstructure, and the *Safety Provisions* (part B.0).

- The driver must be absolutely familiar with the position and the purpose of all the controls and operating elements. This is a prerequisite for safe operation of the machine.

- **Before the engine in the superstructure is started, the parking brake lever in the chassis must be set to "braking" position.**

- Before the engine is started, especially if the vehicle has been immobilized for an extended period of time, it is necessary to check the fluid levels in the following components:

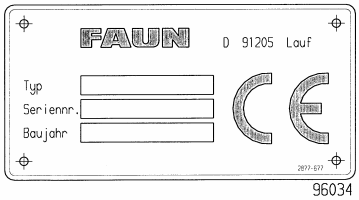
- Engine oil level,
- Oil level in hydraulic,
- Check coolant level for the engine,
- The cooling system is filled correctly if the coolant level is between the "Max. and Min." marks on the expansion tank.

DANGER **Do not check the coolant level while the engine is hot; the cooling system is pressurized.**
There is a risk of scalding when the filler socket is opened while the engine is hot!

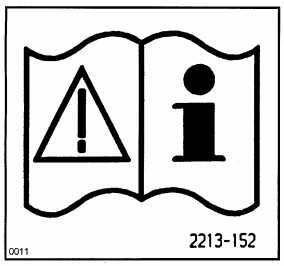
- To start the engine in the chassis from the superstructure, the gearbox must be set to "N" in the chassis.

DANGER **During operation from the superstructure, nobody is allowed to stay in the driver's cabin in the chassis.**

1.1 Warning and instruction plates

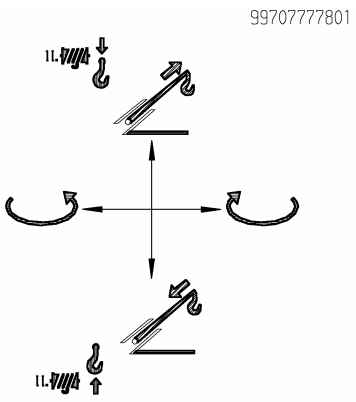


Nameplate - Superstructure

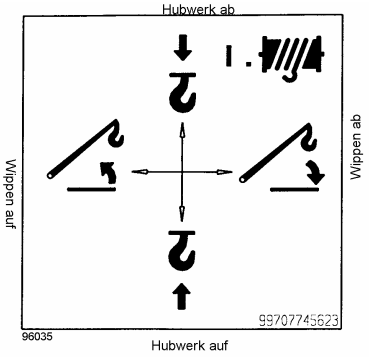


Refer to Operating Manual.

Danger of crushing



Standard equipment with optional equipment
Left-hand control lever
Multifunction



Hubwerk ab/auf - Hoisting down/up; Wippen ab/auf - Lowering/raising boom
Standard equipment
Right-hand control lever
Boom elevation and hoisting gear (main winch)

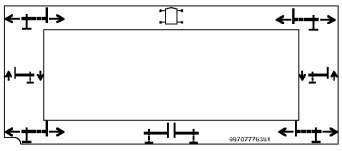
Nobody is allowed to stay in the swing range

max.—

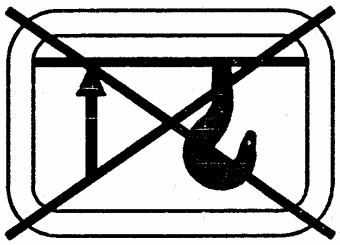
Max. fluid level in expansion tank

min.—

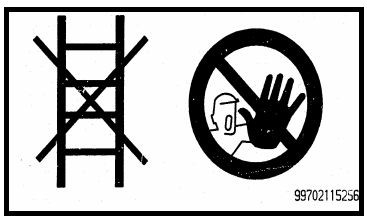
Min. fluid level in expansion tank



Outriggers



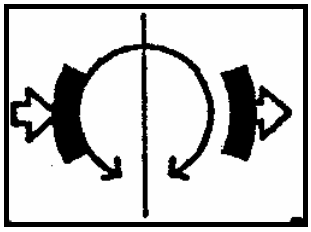
Hoist limit switch override feature



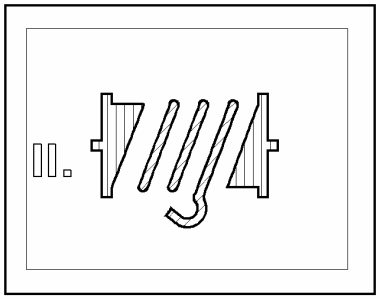
Access prohibited to unauthorized persons.

Danger due to suspended load

(cont'd.) **1.1 Warning and instruction plates**

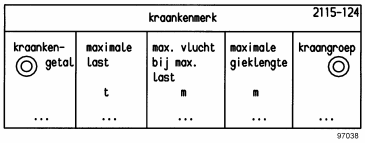


Slewing gear brake engaged / released

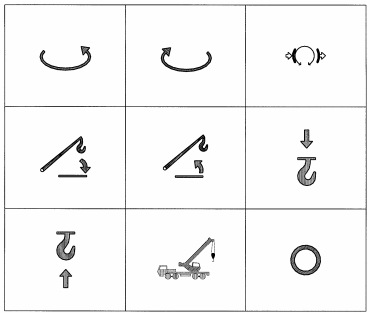


99707777846

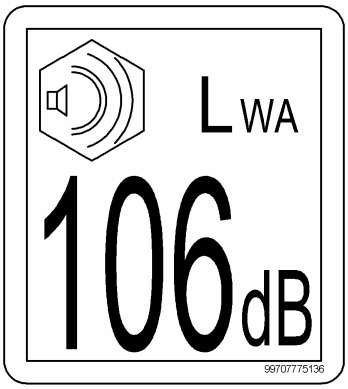
Change-over: 2nd winch



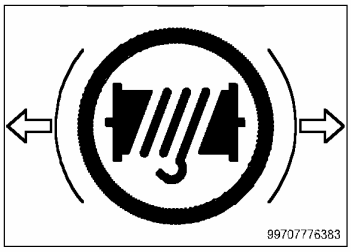
Instruction plate
(Only in the Netherlands)



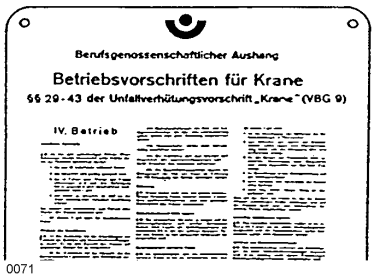
Only in case of optional feature "Emergency operation of the superstructure controlled from the chassis".



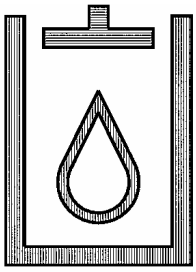
Instruction plate sound power



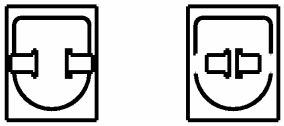
Release hoisting gear brake. Only in case of optional feature "Emergency operation of the superstructure controlled from the chassis".



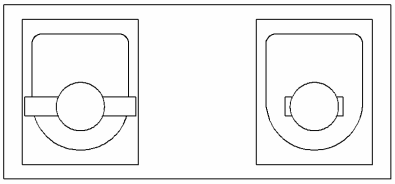
Operating prescription
(Only in Germany)



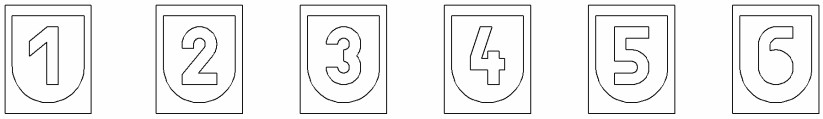
Hydraulic oil



Display telescope emergency mode

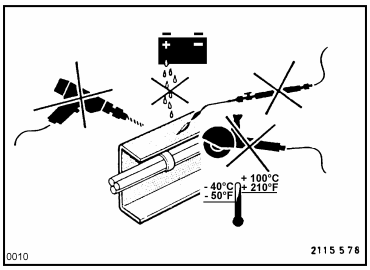


Display telescope emergency mode



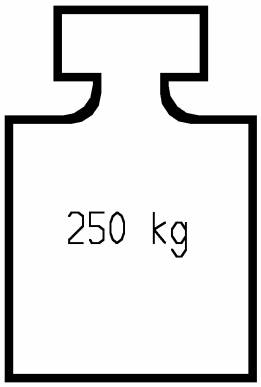
Symbol 1…6

(cont'd.) **1.1 Warning and instruction plates**



The brake system comprises plastic piping.
Caution during drilling, welding and grinding work.
Protect piping against battery acid; temperature-resistant in the range from -40°C to +100°C.

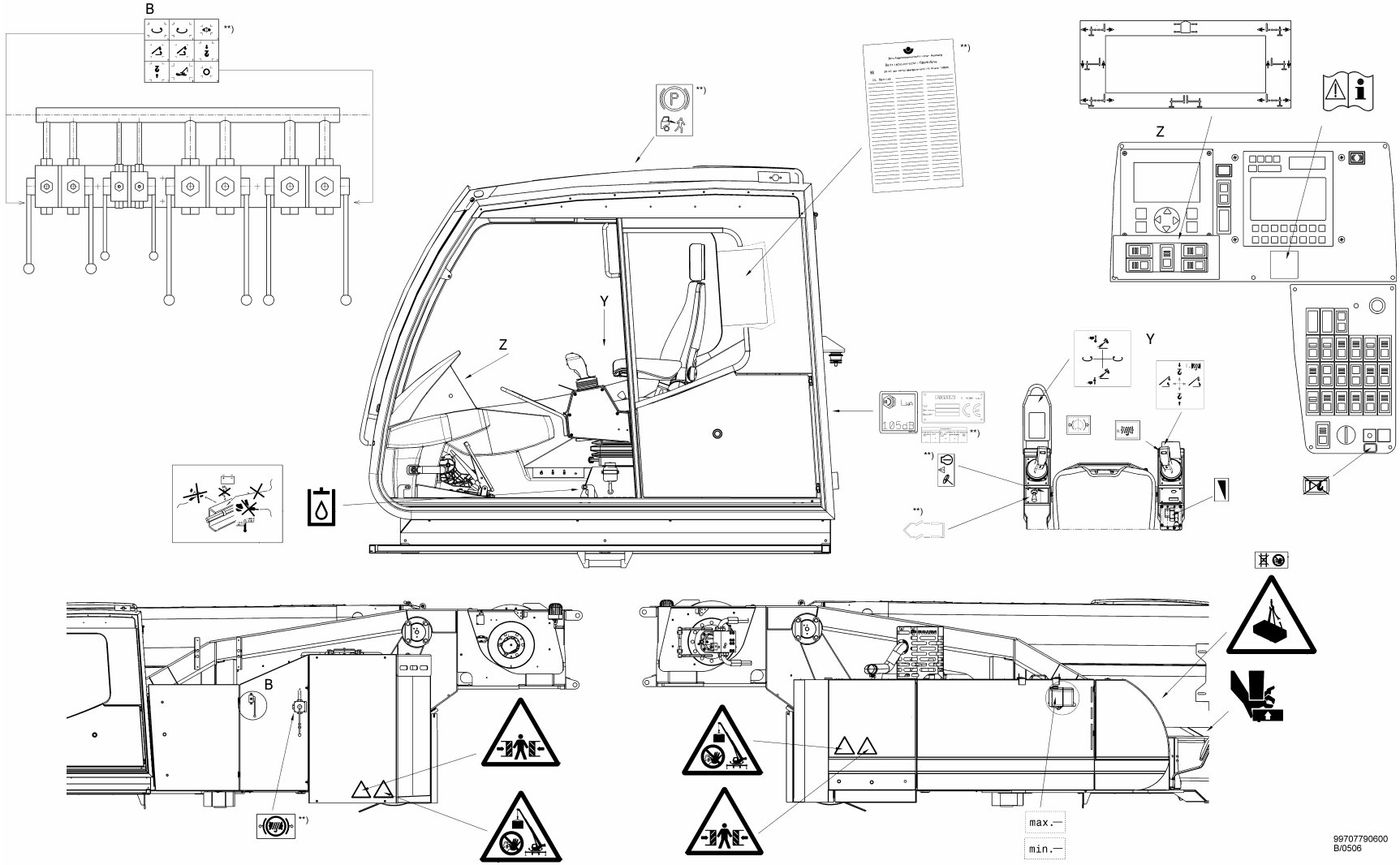
Danger of crushing



Weight unit 250 kg

1.2 Location of the warning and instruction plates

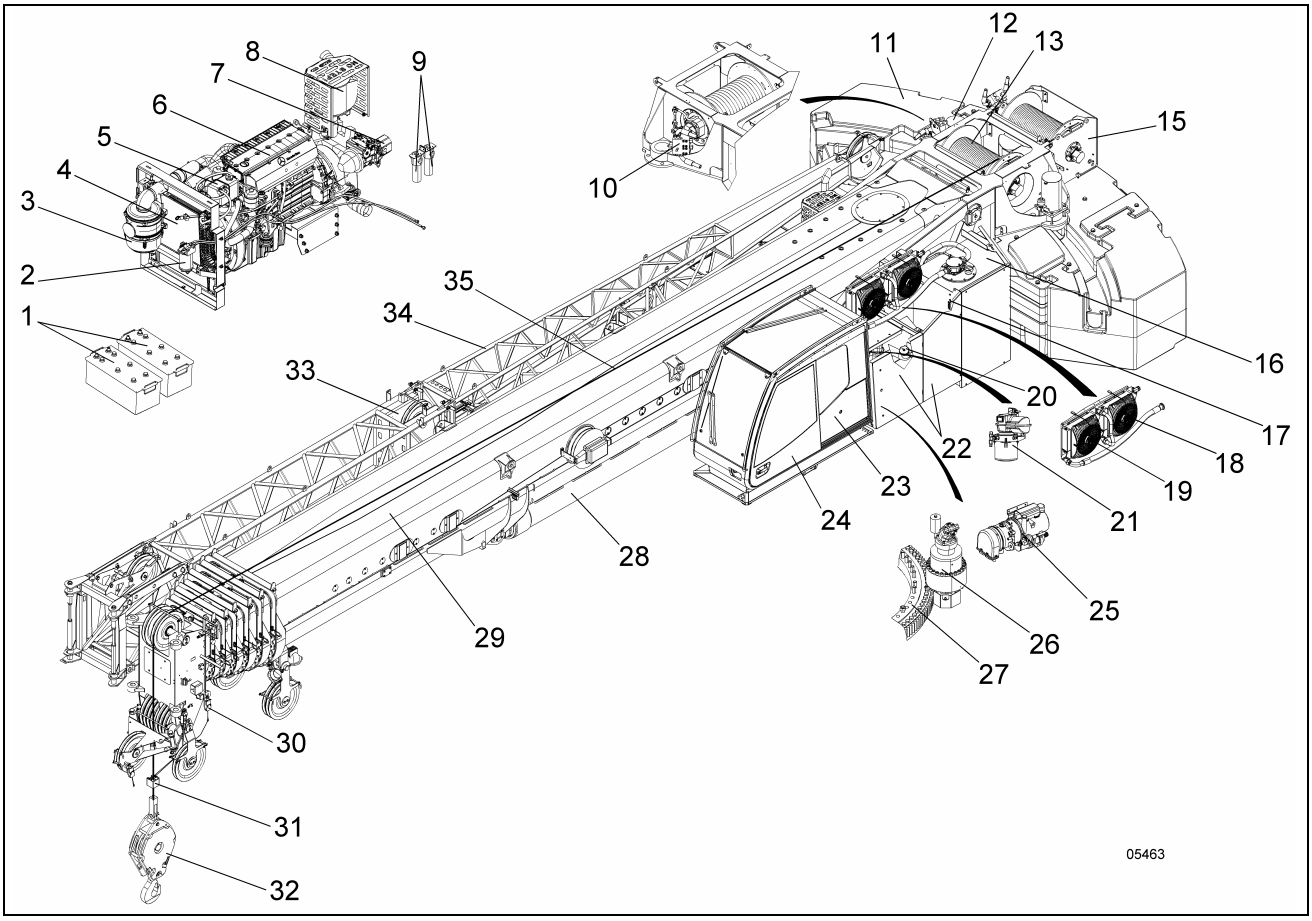
The following diagram shows the position and location of all the warning and instruction plates mounted to the superstructure.



**) Specific requirement of the country where the machine is to be used, or according to vehicle model

Memo:

1.3 Components, assemblies - installation location and position



1	Batteries	20	Fuel tank
2	Water separator/fuel strainer	21	Centralized lubrication system
3	Air cleaner	22	Servicing lid
4	Radiator	23	Servicing lid, crane cab
5	Expansion tank, cooling system	24	Crane cab
6	Engine	25	Supplementary heater unit
7	Hydraulic pumps	26	Gearbox of swing mechanism
8	Exhaust system	27	Ring gear - slewing device
9	High pressure filter	28	Boom elevation cylinder
10	Hoisting gear motor	29	Crane boom
11	Counterweight	30	Hoist limit switch override feature
12	Hoist cylinder, counterweight	31	Releasing weight, hoist limit switch
13	Hoist winch	32	Bottom block
14	free	33	Jib**) 1
15	Auxiliary hoisting gear**)	34	Jib **) 2
16	Hydraulic oil tank	35	Winch rope
17	Oil level indicator, hydraulic oil		
18	Supplementary oil cooler**)		
19	Oil cooler		

**) Optional equipment

Memo:

Memo:

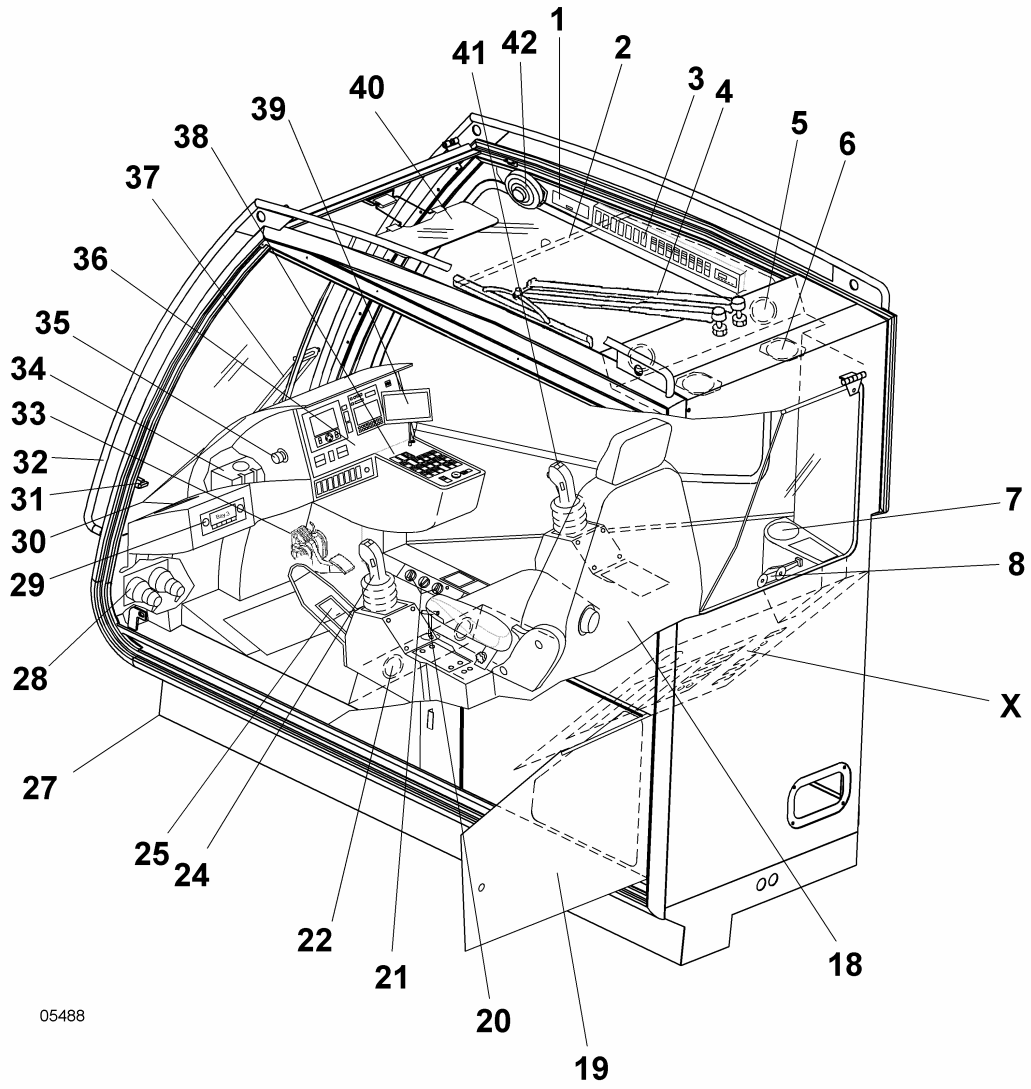
2 Crane cabin

2.1 Explanation - control elements

1 Cab lighting
2 Roller sun visor
3 Instrument panel 1
4 Wiper, skylight
5 Heated air / fresh air vent
6 Loudspeaker - radio
7 Storage tray
8 Locking mechanism, rear window
9 Key-actuated tip switch, AML override feature
10 Plugbox 24 V
11 Plugbox 12 V
12 Hourmeter
13 Hourmeter, hoist winch 1**)
14 Fuses
15 Hourmeter, hoist winch 2**)
16 Relays
17 Diagnostic plug, engine
18 Seat
19 Servicing lid
20 Superstructure locking pin
21 Control element, heating/ventilation (air conditioner**)
22 Heated air / fresh air vent
23 Free
24 Crane control lever
25 Ashtray
26 Free
27 Kick-strip, access
28 Working floodlight
29 Radio
30 Heated air / fresh air vents
31 Locking mechanism, windshield
32 Handhold
33 Accelerator pedal, superstructure engine
34 Tank for windshield washing fluid
35 Mushroom-head emergency OFF pushbutton
36 Instrument panel 2
37 Windshield wipers
38 Instrument panel 3
39 Monitor
40 Sun visor
41 Crane control lever
42 Blower fan**)
43 Diagnostic plug, AML

**) Optional equipment

Crane cabin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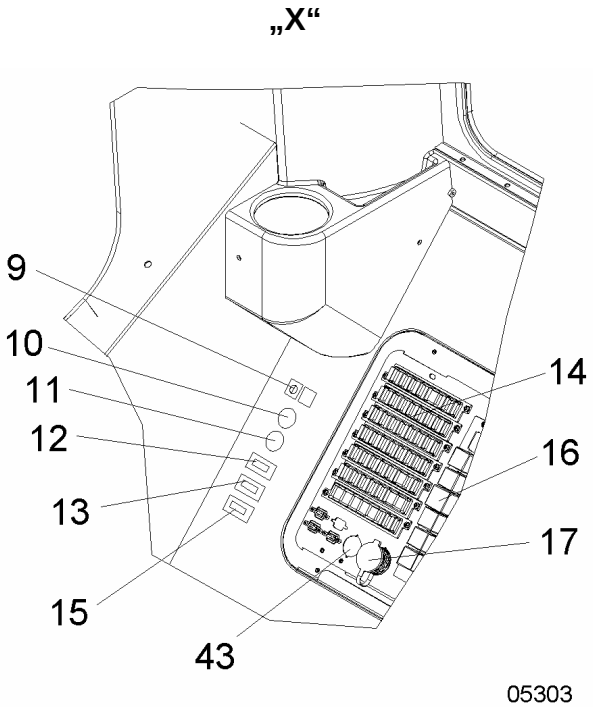
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Memo:

2.2 Adjustment of the seat

The seat is equipped with a weight-dependent suspension system. Its height and longitudinal position are adjustable as are the surface's distance and inclination with reference to the control levers and switches and the backrest inclination, and it is equipped with a lumbar support. The seat must be adjusted so that the control levers and the pedals are within easy reach for the driver. The headrest can be removed, but it cannot be adjusted. The armrests on the left and right are adjustable vertically and with regard to their inclination. Thus, the appropriate seat position can be adjusted for any operator. To facilitate entering, the left bracket can be tilted upwards.

NOTE **When the bracket is tilted up, all crane movements are switched off.**

DANGER **Make sure that the bracket is tilted up when getting into and out of the crane cabin. Otherwise, there is a risk that crane movements might be triggered by touching of the control levers unintentionally. This results in an increased**
! R i s k o f a c c i d e n t s !

2.2.1 Vertical adjustment of armrests

- Loosen the star grip (1) to set the armrests to the desired height.

2.2.2 Adjustment of armrest inclination

- Turn adjusting wheel (2) to set the armrest inclination.

2.2.3 Longitudinal adjustment of seat in the direction of the control device

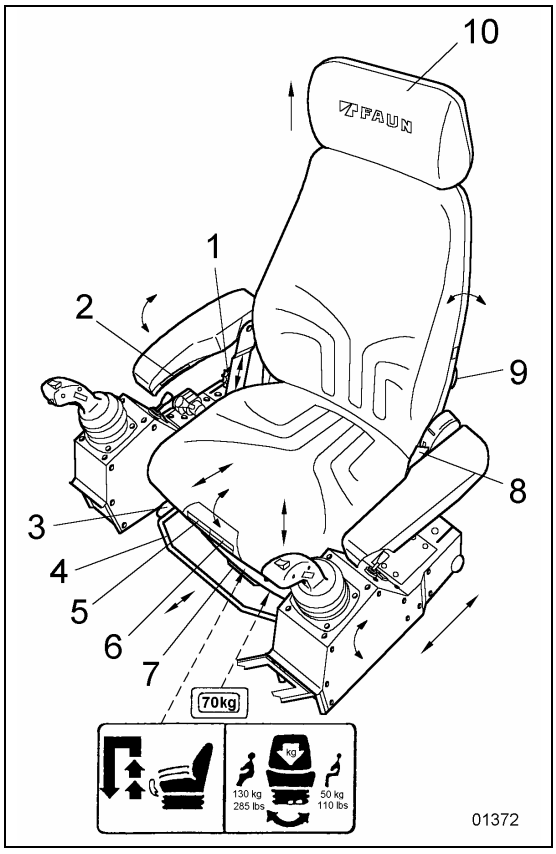
- When the lever (3) is actuated, only the longitudinal position of the seat is changed.

The control device remains in its original position. Thus, the distance from the control device can be adjusted at random.

2.2.4 Longitudinal seat adjustment

- Actuate the linkage (4).

Longitudinal adjustment of the seat, incl. the control device.



2.2.5 Adjustment of seat's position with regard to the levers and switches.

- Actuate lever (5) to set the seat's position.

2.2.6 Seat inclination adjustment

- Actuate lever (6) to set the inclination of the seat's surface.

2.2.7 Adjustment of seat suspension

- Turn lever (7) to adjust the operator's weight. This permits an optimum suspension effect. The weight to be adjusted is displayed visually in no-load condition.

2.2.8 Vertical seat adjustment

Seat upwards: Lift seat until it locks in with a click (1st stage). Lift seat once more until it locks in (2nd stage).

Seat down: - Lift seat up to its stop (beyond the 2nd stage); then lower it to its lowest position.

2.2.9 Adjustment of backrest inclination

- Actuate handle (8) to set the backrest inclination.

2.2.10 Adjustment of the lumbar support

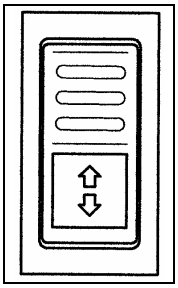
- Turn adjustment wheel (9) - the lumbar support is adjusted steplessly.

2.2.11 Headrest

The headrest (10) cannot be adjusted.
- To remove the headrest, pull it up.

2.2.12 Electrical seat adjustment

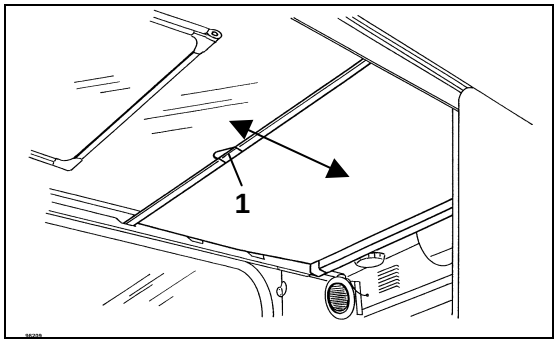
- Actuate rocker tip switch **57**. The inclination of the seat, incl. the console, can be adjusted.



2.3 Roller sun visor - skylight

A roller sun visor (1) has been installed as a protection against exposure to the sun through the skylight.

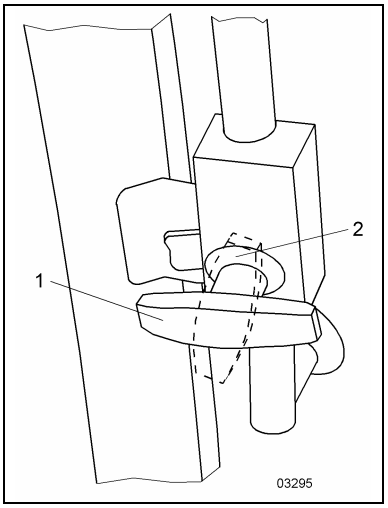
The roller sun visor can be set to various locking positions.



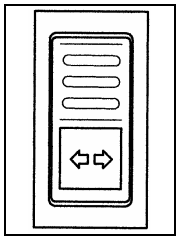
2.4 Opening the windscreen

Lock/unlock windshield

Lever in position (1) - windshield locked.
Lever in position (2) - windshield unlocked.



- Actuate rocker switch **56**. The windscreen can be opened or closed steplessly.



Attention **Unlock the windshield before opening it.**

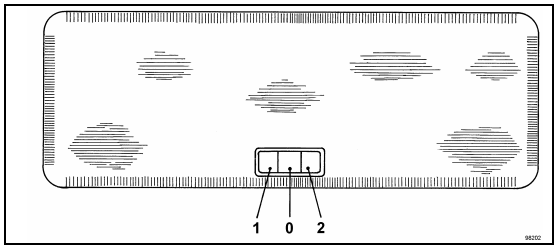
2.5 Opening the rear window

- Actuate the rear window locking mechanism (sect. 2, item 8) and open the rear window.

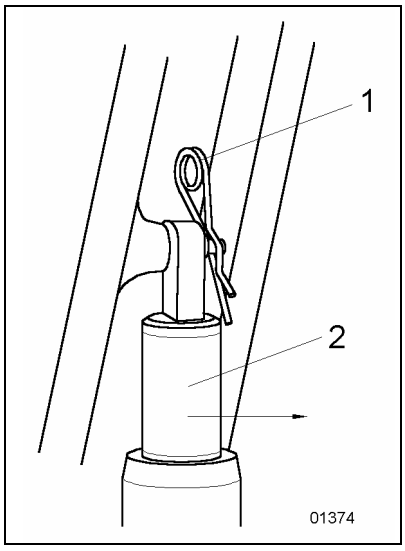
2.6 Cab lighting

Switch positions:

0 = Lamp OFF.
1 = Lamp is permanently lit (while the battery main switch is ON).
2 = No function



2.7 Emergency exit



If it is not possible to leave the crane cabin through the cabin door in case of an emergency, open the windshield and leave the crane cabin in this way.

Opening the crane cabin:

1. Actuate rocker tip switch **56**, open windshield,

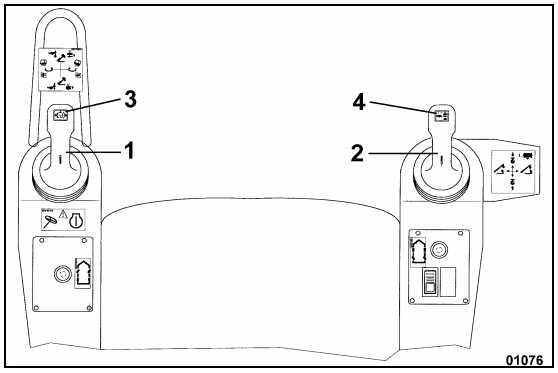
or:

2. Remove spring clip (1), remove the adjusting cylinder (2) from the pin, open windshield by hand.

Attention **Unlock the windshield before opening it.**

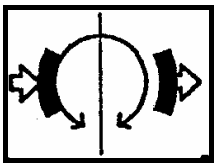
2.8 Assignment of functions to the crane control levers

Pos. 1: Left-hand crane control lever
Pos. 2: Right-hand crane control lever
Pos. 3: WT slewing gear brake
Pos. 4: WS change-over; assignment of functions to the left crane control lever



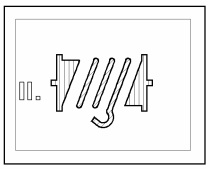
Rocker tip switch (3) slewing gear brake

Rocker tip switch not actuated = slewing gear brake engaged.
Actuate rocker tip switch = slewing gear brake released.



Rocker switch (4) change-over - assignment of functions to the left-hand crane control lever:

Actuate rocker switch to the right = telescoping / slewing.
Actuate rocker switch to the left = 2nd winch**) / slewing.



Right-hand crane control lever (2):

Right-hand crane control lever
forward - bottom block of 1st winch **down**;
backwards - bottom block of 1st winch **up**;
to the left - boom is **raised,**
to the right - boom is **lowered.**

Left-hand crane control lever (1):

Rocker switch (4) positioned to the right.

Left-hand crane control lever
forward - telescopes **are extended;**
to the rear - telescopes **are retracted.**
to the left - superstructure **swings to the left**
to the right - superstructure **swings to the right**

Left-hand crane control lever (1):

Rocker switch (4) positioned to the left.

Left-hand crane control lever
forward - bottom block of 2nd winch**) **down**;
backwards - bottom block of 2nd winch**) **up**;
to the left - superstructure **swings to the left**
to the right - superstructure **swings to the right**

**) Optional equipment

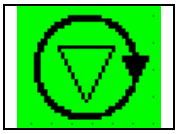
2.9 Superstructure locking system

DANGER **Moving the crane in full rig arrangement - if admissible, see Notes referring to the Load Charts, and item B2-7 - and picking up the counterweights from their rest and depositing them is only admissible if the superstructure has been locked by means of the lock pin.**
Slewing the superstructure is only admissible when the machine is supported by outriggers.

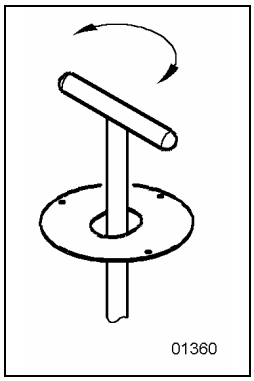
Attention **The slewing gear may only be locked while the superstructure is immobilized.**

2.9.1 Locking the superstructue:

Prerequisite:
- The symbol "superstructure can be rotated" is lit.



- Swing the superstructure in its position "over-rear".
- Raise the locking pin by approx. 10 mm, turn it 45° to the left and lower it.
- If necessary, slew the superstructure slightly until the pin and the bore-hole coincide.



After the slewing gear has been locked, the symbol "superstructure locked" is lit.

2.9.2 Unlocking

For unlocking, proceed analogously by reversing the above sequence of operations.

If necessary, swing the superstructure slightly until the pin can be pulled out of the bore-hole.

The symbol "superstructure locked" goes out, the symbol "superstructure can be rotated" appears.

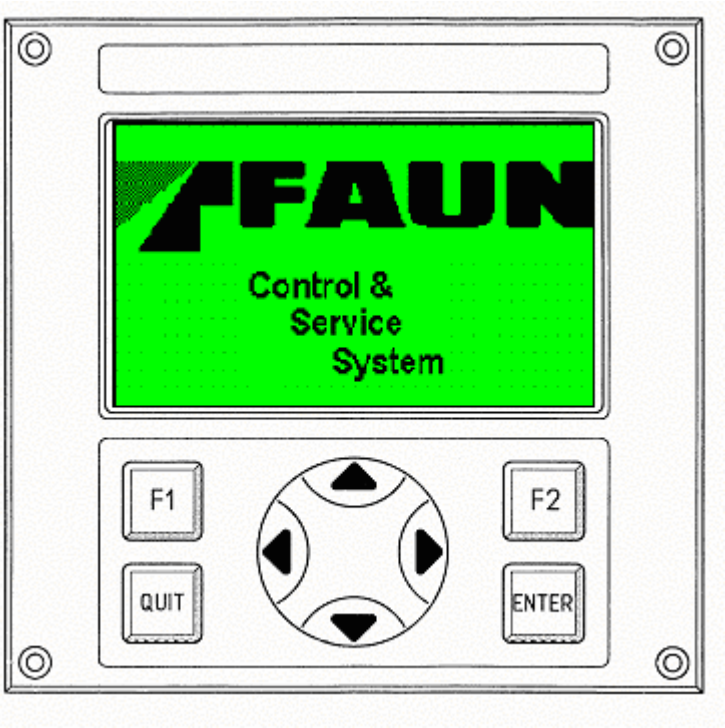
3 FAUN Cockpit Graphic Control System

The superstructure of the mobile crane is equipped with an electronic Cockpit Graphic Control System.
This system performs various monitoring and check functions.
It may also be used for operating and control functions.

DANGER **Before the operator puts the superstructure into operation, he must have familiarized himself with the functionalities, operation and the mode of function of the FAUN Cockpit Graphic Control System.**

NOTE **Reference to the following description is made in the sections of this operating manual which are marked "refer to the Cockpit Graphic Control System". The check or control functions described in these sections are performed by the FAUN Cockpit Graphic Control System.**

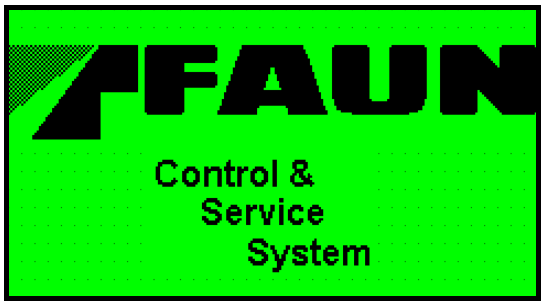
A monitor and the control elements pertaining to it are installed in the instrument panel of the superstructure.



cont'd.: **3** **FAUN Cockpit Graphic Control System**

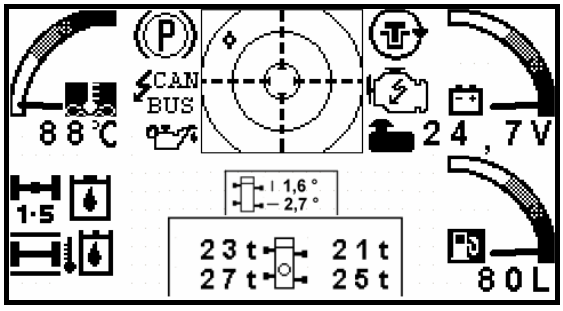
Put the vehicle into operation as described in section B2-4 of the operating manual.

After the battery main switch (**58**) and the ignition (**42**) in the superstructure have been turned ON, the start screen appears on the monitor.
The system is being loaded.
So far, it is not possible to retrieve any information or to trigger any operation.



3.1 Main screen

The main screen appears on the monitor after approx. 3 sec.
Information is displayed via symbols.
Other screens can be selected by actuation of buttons.



Information and error messages on the main screen:

NOTE **The error messages disappear automatically as soon as the error is eliminated.**

Fuel level indicator:

A needle and a digital display show the filling level of the fuel tank. The critical range is marked.

The symbol flashes if the tank contains less than 60 l.
The symbol is permanently lit if the tank contains less than 40l.

Coolant temperature indicator:

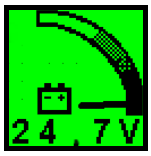
A needle and a digital display show the engine coolant temperature.
The critical range is marked.

If the critical range is reached, the symbol lights up.

cont'd.: 3.1 Main screen

Voltage of the vehicle battery:

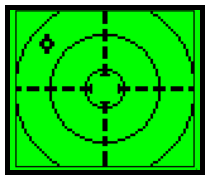
A needle and a digital display show the vehicle voltage of the electrical system. The critical range is marked.



The symbol goes on if the vehicle voltage decreases below 17 V.

Spirit level:

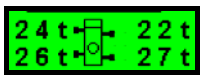
The electronic spirit level indicates the current inclination of the vehicle (± 3°).



Digital angle indicator:

The display shows the current inclination of the vehicle.

Display of supporting pressure:**)

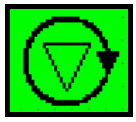


The display shows the current supporting pressure.

Superstructure locked

The symbol lights up when the superstructure is locked.

Superstructure can be slewed



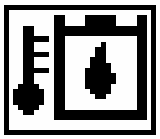
The symbol lights up when the superstructure can be slewed (unlocked).

The handbrake in the chassis is set to braking position = symbol is lit.
The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

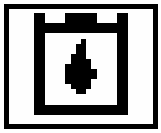
Excessive hydraulic oil temperature.

Symbol lights up.



Replacement of hydraulic oil filter:

Symbol lights up.



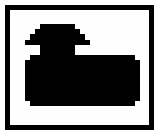
**) Optional equipment

cont'd.: 3.1 Main screen

Low engine oil level.

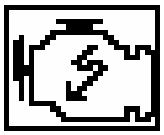
Symbol lights up.

Monitoring the air cleaner.
Replace the air cleaner.



Symbol lights up.

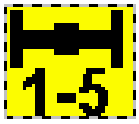
Malfunction in engine electronics.



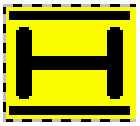
Symbol lights up.

CAN error.
There is no connection to the superstructure.
The symbol appears.

Axles lifted.
The symbol appears as soon as the vehicle is supported by outriggers and all the axles are lifted.



Axle suspension lock = symbol is lit.
The symbol "axle suspension lock" goes on if the key switch in the chassis is set to position 2.



Axle suspension activated.
The symbol appears and flashes (backlit).

Control elements of the main screen:

Change-over to the working screens:

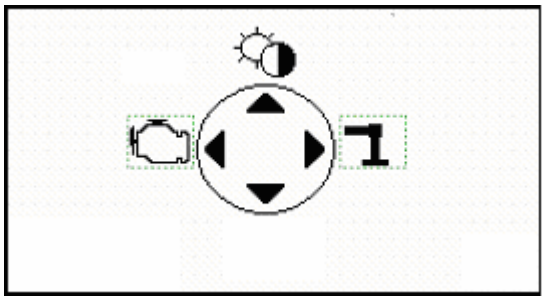
- Actuate the function key F2.

Working operations can be performed via these screens.

No functions are assigned to any of the other keys !

3.1.1 Selection menu

After actuation of the F2 key, the selection menu appears on the monitor.



Symbols and meaning of the various selectable working menus:

Contrast / brightness.

Outriggers,

Engine control system.

Control elements of the selection menu:

Change-over to the working screens:
Working operations can be performed via these screens.

- Actuate the arrow key "up".
The working menu "contrast / brightness" appears.

- Actuate the arrow key "right".
The working menu "outriggers" appears.

- Actuate the arrow key "left".
The working menu "engine control" appears.

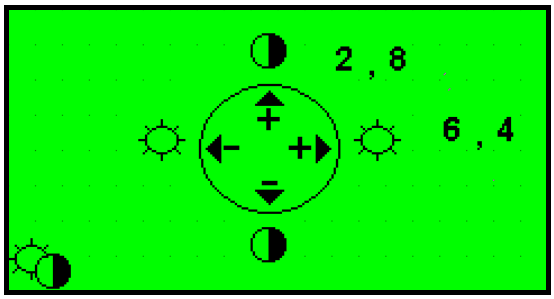
- Actuation of the key "Quit":

Return to working menu "start screen".

No functions are assigned to any of the other keys !

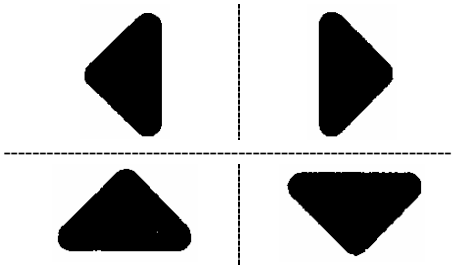
3.1.1.1 Operation of the working menu "contrast / brightness"

After actuation of the arrow key "up", the working menu appears on the monitor.
"Contrast / brightness".



Any adjustments of contrast and brightness - other than the values programmed in the factory - are effected via the cursor control keys.

- Actuate arrow key "right" or " left".

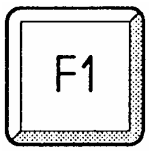


Setting the monitor's brightness within the specified limits.

- Actuate arrow key "up" or "down".

Setting the monitor's contrast within the specified limits.

- Actuation of the F1 key:



All the contrast and brightness values set by hand are deleted.
The programmed initial settings are activated.

NOTE **The last contrast and brightness values set in manual mode are stored after the ignition is turned off.**

- Actuation of the key "Quit":

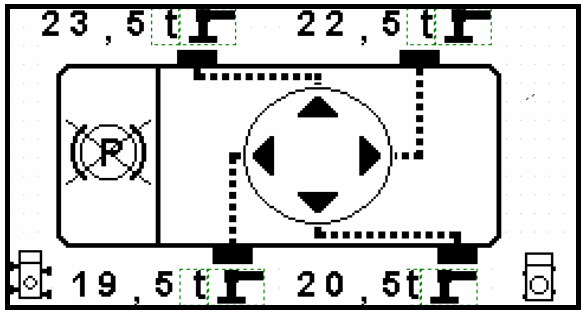
Return to working menu "start screen".

No functions are assigned to any of the other keys !

3.1.1.2 Working menu - outriggers

After actuation of the arrow key "right-hand", the working menu appears on the monitor.
outriggers

This working menu is used to actuate the outriggers in the chassis from the superstructure.



- When one of the outriggers is selected, the corresponding outrigger beam and outrigger cylinder can be actuated jointly.
- When two, three or four outriggers are selected, only the selected outrigger cylinders can be actuated.
- When all four outriggers are selected, the vehicle can be aligned to horizontal position.

3.1.1.2.1 Operation of the working menu "outriggers"

The outrigger cylinders are selected via the cursor control system.

- Actuate the arrow key "up":

The front right-hand outrigger has been selected.

- Actuate the arrow key "left":

The front left-hand outrigger has been selected.

- Actuate the arrow key "down":

The rear left-hand outrigger has been selected.

- Actuate the arrow key "right":

The rear right-hand outrigger has been selected.

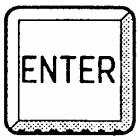
cont'd.: **3.1.1.2.1 Operation of the working menu "outriggers"**

The handbrake in the chassis is set to braking position = symbol is lit.
The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

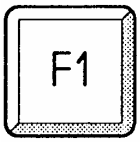
- Actuation of the key "ENTER":

The selected outriggers are confirmed.



- Actuation of the F1 key:

All the four outriggers are selected.



- Actuation of the F2 key:

The outriggers selected before are deselected.

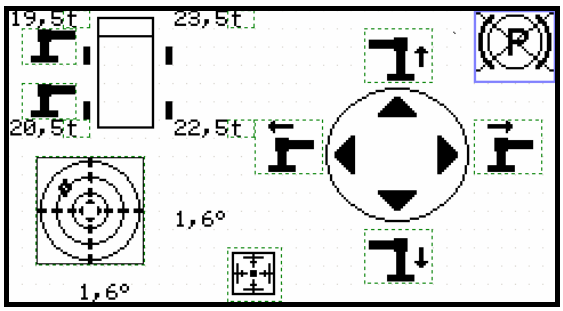
- Actuation of the key "Quit":

Return to working menu "start screen".

3.1.1.2.2 Working menu - outrigger actuation "left-hand"

After the selected arrow key "left" or "down" has been confirmed, the menu "outrigger left-hand" appears on the monitor.

This menu is used to actuate the outriggers on the front or rear left side of the vehicle.



The various actuation operations are selected via the cursor control system.

- Actuate arrow key "down" and keep it pressed:

Extending the outrigger cylinders.

- Actuate arrow key "up" and keep it pressed:

Retracting the outrigger cylinders.

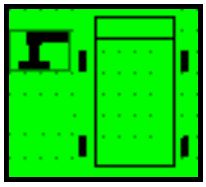
- Actuate arrow key "left" and keep it pressed:

Extending the outrigger beams.

- Actuate arrow key "right" and keep it pressed:

Retracting the outrigger beams.

Indicates the outrigger being selected.

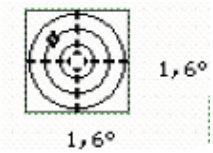


The display shows the current supporting pressure**).

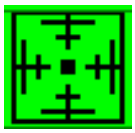
**) Optional equipment

cont'd.: **3.1.1.2.2 Working menu - outrigger actuation "left-hand"**

The electronic spirit level indicates the current inclination of the vehicle.



Symbol goes on when vehicle is aligned horizontally.



The handbrake in the chassis is set to braking position = symbol is lit.
The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

- Actuation of the key "Quit":

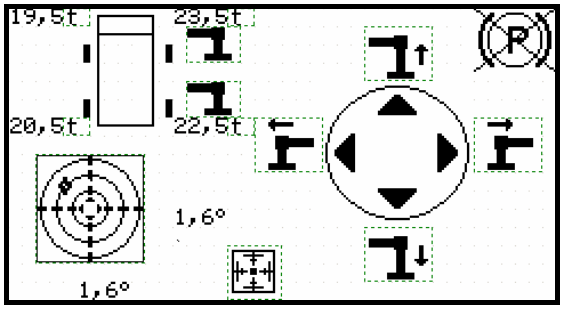
Return to working menu "outriggers".

No functions are assigned to any of the other keys !

3.1.1.2.3 Working menu - outrigger actuation "right-hand"

After the selected arrow key "right" or "up" has been confirmed, the menu "outrigger right-hand" appears on the monitor.

This menu is used to actuate the outrigger on the front or rear right side of the vehicle.



The various actuation operations are selected via the cursor control system.

- Actuate arrow key "down" and keep it pressed:

Extending the outrigger cylinders.

- Actuate arrow key "up" and keep it pressed:

Retracting the outrigger cylinders.

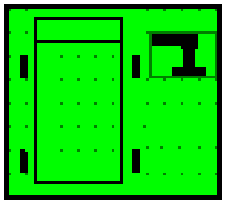
- Actuate arrow key "right" and keep it pressed:

Extending the outrigger beams.

- Actuate arrow key "left" and keep it pressed:

Retracting the outrigger beams.

Indicates the outrigger being selected.

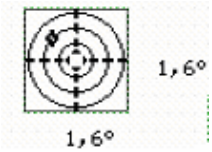


The display shows the current supporting pressure**).

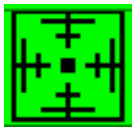
**) Optional equipment

cont'd.: **3.1.1.2.3 Working menu - outrigger actuation "right-hand"**

The electronic spirit level indicates the current inclination of the vehicle.



Symbol goes on when vehicle is aligned horizontally.



The handbrake in the chassis is set to braking position = symbol is lit.

The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

- Actuation of the key "Quit":

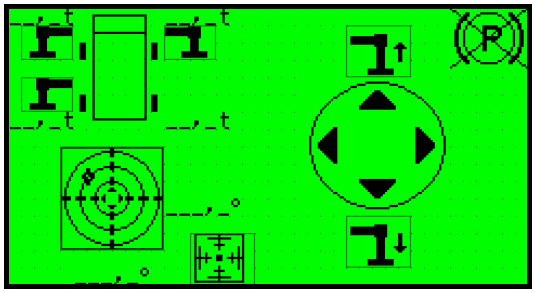
Return to working menu "outriggers".

No functions are assigned to any of the other keys !

3.1.1.2.4 Working menu - outrigger actuation if two or three outriggers are selected

After the two or three outriggers selected have been confirmed, the working menu "outriggers 2/3" appears on the monitor.

This menu can be used to actuate 2 or 3 outriggers.



The various actuation operations are selected via the cursor control system.

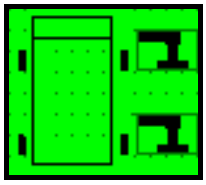
- Actuate arrow key "down" and keep it pressed:

Extending the outrigger cylinders.

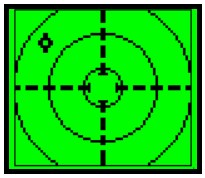
- Actuate arrow key "up" and keep it pressed:

Retracting the outrigger cylinders.

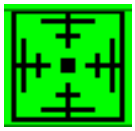
Indicates the outriggers being selected.



The electronic spirit level indicates the current inclination of the vehicle.



Symbol goes on when vehicle is aligned horizontally.



The display shows the current supporting pressure**).

**) Optional equipment

cont'd.: **3.1.1.2.4 Working menu - outrigger actuation in case two or three outriggers are selected**

The handbrake in the chassis is set to braking position = symbol is lit.

The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

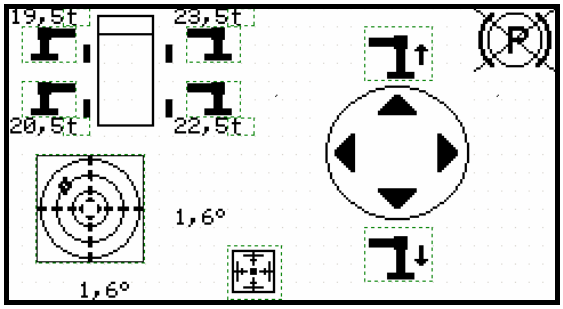
- Actuation of the key "Quit":

Return to working menu "outriggers".

No functions are assigned to any of the other keys !

3.1.1.2.5 Working menu - outrigger actuation in case of all four outriggers are selected

After the four selected outriggers have been confirmed or key F1 has been actuated, the working menu "outriggers 4" appears on the monitor.



This menu can be used to actuate all 4 outriggers.

The various actuation operations are selected via the cursor control system.

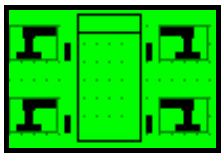
- Actuate arrow key "down" and keep it pressed:

Extending the outrigger cylinders.

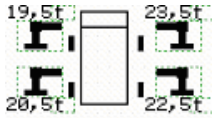
- Actuate arrow key "up" and keep it pressed:

Retracting the outrigger cylinders.

Indicates the outriggers being selected.

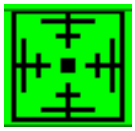


The display shows the current supporting pressure**).



The electronic spirit level indicates the current inclination of the vehicle.

Symbol goes on when vehicle is aligned horizontally.



The handbrake in the chassis is set to braking position = symbol is lit.
The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

**) Optional equipment

cont'd.: **3.1.1.2.5** **Working menu - outrigger actuation in case of all four outriggers are selected**

- Actuate the key F2 and keep it pressed.

The vehicle is aligned in horizontal position.

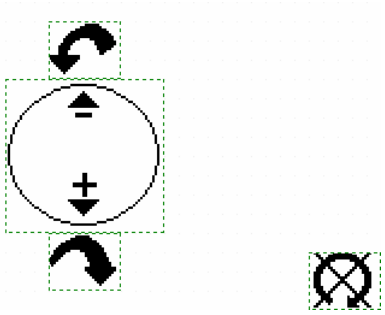
- Actuation of the key "Quit":

Return to working menu "outriggers".

No functions are assigned to any of the other keys !

3.1.1.3 Working menu - engine management of chassis

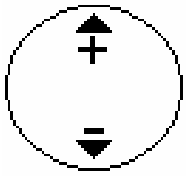
After actuation of the arrow key "left ", the working menu appears on the monitor.
Engine functions (engine speed regulation, engine start-stop function, engine in chassis).



This menu can be used to increase or reduce the engine speed.

3.1.1.3.1 Operation of the working menu "engine functions"

The engine speed is regulated via the cursor control system.



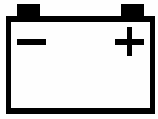
- Actuate the arrow key "up":

The engine speed increases.

- Actuate the arrow key "down":

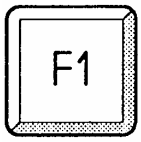
The engine speed is reduced.

<u>Generator</u>
Insufficient voltage of vehicle battery.



If the vehicle voltage drops (even briefly) below 18V, the symbol lights up for the duration of the voltage drop, at least however for 20 seconds.

- Actuation of the F1 key:



Start the engine in the chassis.

- Actuation of the F2 key:

Shut off the engine in the chassis.

- Actuation of the key "Quit":

Return to working menu "start screen".

cont'd.: 3.1.1.3.1 **Operation of the working menu "engine functions"**

The handbrake in the chassis is set to braking position = symbol is lit.

The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The handbrake in the chassis is **not** in braking position = symbol goes on and flashes (backlit).

No functions are assigned to any of the other keys !

NOTE **All the instruments, switches and indicators described in this chapter are illustrated in part B2-12 "Instrument panel" and B2-3 "FAUN Cockpit Graphic Control System".**
The item numbers appearing in the text are printed in **bold** letters, and are identical with the item numbers appearing in the illustration "Instrument panel".

4 How to put the machine into operation

DANGER **The parking brake (hand brake lever) in the chassis must be engaged.**

DANGER **During operation from the superstructure, nobody is allowed to stay in the driver's cabin in the chassis.**

4.1 Steps to be taken and checks to be made before start-up

- **Before putting the crane superstructure into operation, perform all the necessary inspections in the chassis, as described under item B1-4.1.**

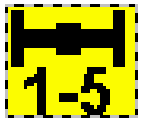
In the chassis:

- Switch on battery main switch.
- Turn ignition switch to position 1,
- set key-actuated switch to position 2 (the connection to the superstructure is established).

(Control positions of key-actuated switch, refer to item B1-4.1.1).

NOTE **When the key-actuated switch in the chassis is set to position 2, the axle suspension is locked automatically. The symbol "axle suspension lock engaged" in the FAUN Cockpit Graphic Control System (refer to part B2-3) must be lit.**
If the symbol is not lit, the suspension is not locked, or there is a fault in the axle suspension locking system.

The symbol "Axles 1-5 lifted" must go on during crane work; the symbol "axle suspension activated" must not appear during crane work.



DANGER **If the symbols "axles locked" and "axles lifted" go out and if the symbol "axle suspension activated" appears during crane work, crane work must be interrupted immediately, the reason for the malfunction must be located and eliminated.**

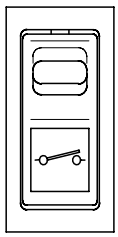
In the superstructure:

- The boom is completely retracted and deposited on the mast rest (on-road driving condition).
- Switch the battery main switch **58** in the superstructure on (item 4.2.1).
- Rocker tip switch „Swing brake“ **not actuated** (refer to item B2-2.8).
- Insert the ignition key into the ignition starter switch **42**.
- Check the engine oil level in the superstructure (refer to part "C2-2", item 2.1).
- Check the hydraulic oil level in the superstructure (refer to part "C2-3", item 3.1).
- Check the superstructure electrical system for proper working order (refer to item 4.3).

4.2 Operation of the electrical equipment

4.2.1 Battery main switch

Attention **When the engine is running, the battery main switch definitely must not be turned OFF. The current flow between the generator and the battery must not be interrupted (destruction of the diodes of the generator).**



Switching ON:

- Unlock the rocker switch **58** "battery main switch" by actuating the lock handle down, and actuate the rocker tip switch downwards.

The lock handle automatically returns to its locking position.

Thus, the connection between the superstructure ground and the negative battery terminal ("-") is established.

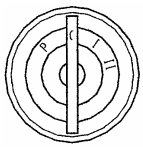
Switching OFF:

- Actuate the locking handle down and the rocker switch upwards; now the electrical equipment is de-energized.

NOTE **Whenever crane work is interrupted for an extended period, e.g. at night, the battery main switch must be turned OFF.**

4.2.2 Ignition starter switch

While the ignition key is inserted, the ignition starter switch **42** has the following positions:



Position P: No function,
Position 0: Ignition OFF,
Position I: Ignition ON,
Position II: Engine start.

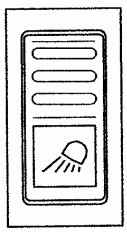
4.2.2.1 Switching the ignition on.

- Turn the ignition key into "**position 1"**; the following indicator and pilot and warning indicators go on:

- In the FAUN Cockpit Graphic Control System (refer to part B2-3) symbol: Vehicle voltage, tank level, coolant temperature, spirit level, superstructure lock.

4.2.3 Working floodlight on the basic boom

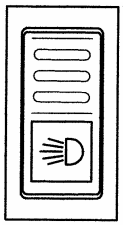
Switch working floodlight ON / OFF by actuating the rocker switch **51** "working floodlight on basic boom".



- Actuate rocker switch **51** downwards to switch it ON.
- Actuate rocker switch **51** upwards to switch it OFF.

4.2.4 Working floodlight on crane cabin, and instrument illumination

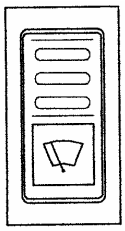
- Actuate rocker switch **52** „working floodlight on the cab and instrument illumination”:



Upper position OFF,
Central position Instrument illumination,
Lower position Instrument illumination/working floodlight on the crane cabin.

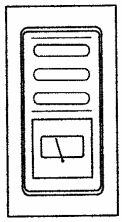
4.2.5 Wiper system

- Rocker switch **54** "Windshield wiper, windscreen of cabin":



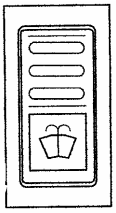
Top position OFF,
Central position Interval action,
Bottom position Wiper operation.

- Rocker switch **53** "Windshield wiper, skylight":



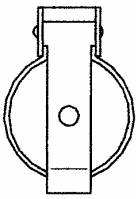
Upper position OFF,
Central position Interval action,
Lower position Wiper operation.

4.2.6 Windshield washing system



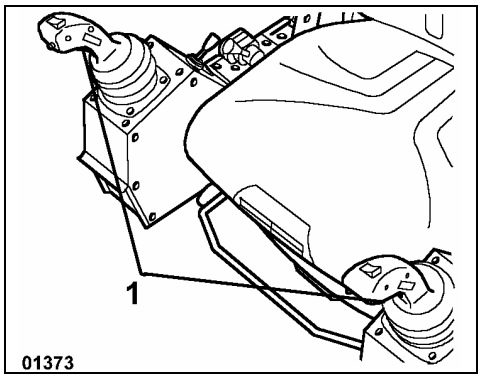
- Actuate the rocker tip switch **55** "windshield washing system". The windshield washing system for the windscreen and the skylight is actuated. Both wipers move once.

4.2.7 Plugboxes



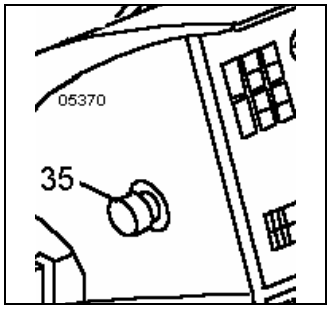
External consumers (24 V DC), such as an inspection lamp, etc., can be connected via the plugbox (sect. B2-2, item 10).
External consumers (12 V DC), such as an inspection lamp, etc., can be connected via the plugbox (sect. 2-2, item 11).

4.2.8 Electric horn



The electric horn serves as a warning signal before starting or while performing crane work; it is actuated via a tip switch (1).

4.2.9 Mushroom-head emergency OFF pushbutton



The mushroom-head emergency off button is located in the superstructure cabin (sect. B2-2, item 35).
To stop the running engine in the superstructure in cases of emergency, press the push-button.
To re-start the engine in the superstructure, turn the releasing ring in the push-button to the right, in the direction of the arrow; then the push-button will return to its original position.

4.3 Functional check of the electrical equipment of the vehicle before starting work

Before starting work, the driver has to check the wipers, the electric horn and the entire lighting system (working floodlights) for proper working order.

NOTE **The inspection of the lighting system is only possible when the battery main switch and the ignition are switched ON.**

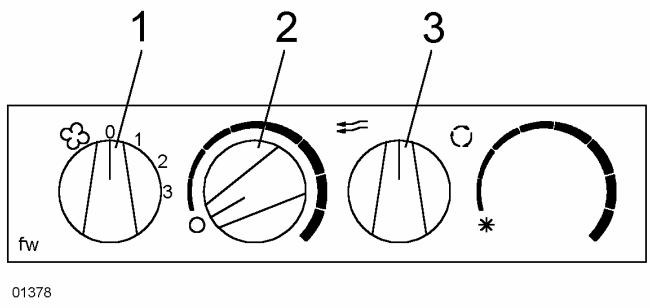
DANGER

- **Any faulty operating elements and missing or defective lighting equipment increase the risk of accidents.**
- **Should there be any faults, they have to be eliminated by specialists before working is commenced.**

Attention

- **When fuses are replaced, it is essential that the new fuses have the same amperage as the defective fuses.**
- **Do not use fuses with a higher amperage on any account.**
- **It is absolutely prohibited to repair or jumper and re-use defective fuses.**
- **Non-compliance with these instructions may entail damage to the electrical equipment**.

4.4 Blower fan, heating, air regulation



Fan (1)

✽ - Fan OFF.

1 - First step, low power.

2 - Second step, medium power.

3 - Third step, high power.

Heating (2)

The rotary control device (2) serves to progressively regulate the temperature of the inflowing air.
- Rotary control device in left-hand position cold,
- Rotary control device in right-hand position warm.

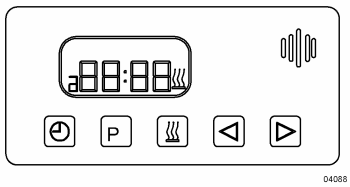
Air regulation (3)

The rotary control device (3) serves to progressively regulate the relationship between external and recirculating air.

- Rotary control device in left-hand position outside air only,
- Rotary control device in right-hand position only recirculating air.

4.4.1 Supplementary heater unit Webasto Thermo 90 S with engine pre-heating

A heater unit, type Thermo 90 S, is installed in the superstructure as supplementary heater unit.
Programming and operation are effected via the timer **59** heating.
Operation and maintenance of the heating are described in more details in the operating instructions of the heater unit's manufacturer which are supplied with the machine.



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4.4.1.1 Use of the supplementary heater unit Webasto - Thermo 90S

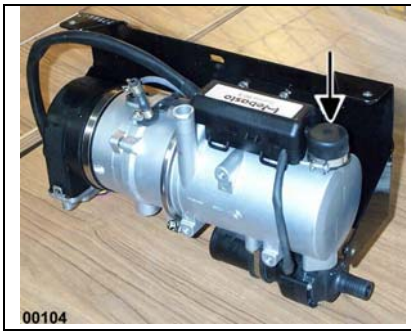
The supplementary heater unit Thermo 90S can be used for preheating of the engine alone, or as a heater unit for engine preheating combined with heating of the superstructure cabin.

Only engine preheating:	Preheating of engine and of superstructure cabin:
●Programming the timer (refer to manufacturer's operating manual).	●Switch on battery main switch (**58**). ●Set blower fan (refer to item 4.4) to step 1. ●Programming the timer (refer to manufacturer's operating manual).

4.4.1.2 Do-it-yourself troubleshooting in case of malfunction

Shut-down on faults in case of overheating of the heater unit with error code F10 "overheating":

- Allow the heater to cool down.
- Check the coolant in the expansion tank and, if necessary, top up as described in part C2.
- Actuate button of the temperature limiting device on the heater unit (refer to Fig.). (The heater unit is installed behind the rear wall of the superstructure cabin.)
- Deaerate the heater unit.
- Put the heater unit into operation again.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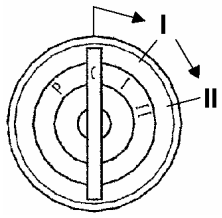
4.5 Start the engine.

(For details, please refer to the Operating Manual of the engine manufacturer.)

DANGER **Before the engine is started, make sure that the handbrake / parking brake lever in the chassis is in "braking" position.**

● The measures described under item 4.1 have been taken and the corresponding inspections have been made.

- Insert the ignition key into the ignition starter switch **42** and turn it to "position I" - now the ignition is switched ON.
- Turn the ignition key into position "II" (starting) to its stop and hold it against the spring force.
- As soon as the engine ignites, release the key; the key returns to position I.



● Do not actuate the starter for more than 20 seconds. To save the batteries, pause for approx. 60 seconds between the various starting attempts.

While the engine is running, the following instruments are in operation:

- hourmeter,
- FAUN Cockpit Graphic Control System (refer to part B2-3).

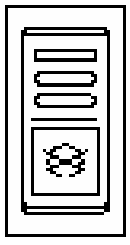
Explanation of the pilot lamps and instruments while the engine is running: refer to item 4.6.

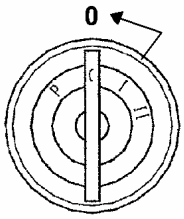
(For further details, please refer to the Operating Manual of the engine manufacturer.)

4.5.1 Stopping the engine

NOTE **Do not stop the engine immediately after it has been working at high speed.**

- Actuate the rocker switch **41** "engine stop" until the engine has come to a standstill.
- Switch off the ignition by turning the ignition key to the left, to position "0".
- Remove the ignition key.



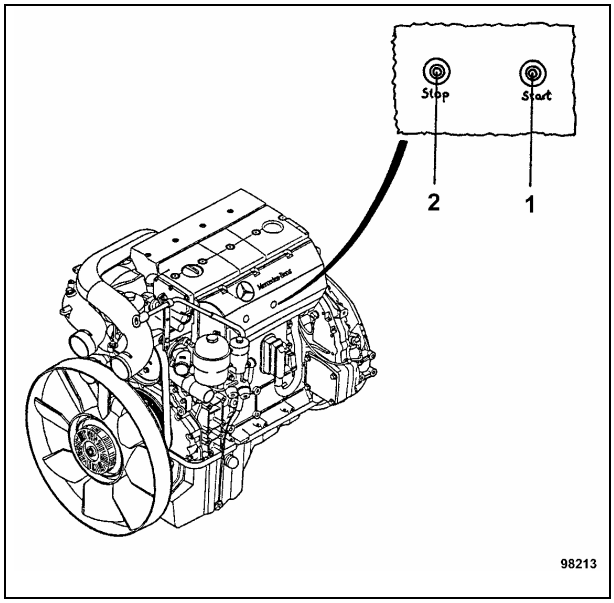


● Do not stop the engine immediately after working under high load, but allow it to run at idling speed for a few minutes, so that the temperature can adjust.

4.5.2 Emergency control of engine : emergency start / emergency shut-off

NOTE **To get access to and to actuate the emergency control elements, the operator has to open the engine cover.**

Directly on the engine case, push-buttons are provided for starting (1) and stopping (2) the engine.



- Remove engine cover.

Engine start actuation:

● The ignition in the superstructure is ON and the engine is not running.

- Actuate push-button (1) – the engine is started and operates at idle.

Engine shut-off actuation:

● The ignition in the superstructure is ON and the engine is running.

- Actuate the push-button (1) again – the engine comes to a standstill.
  or
- Actuate the push-button (2) – the engine comes to a standstill.

Starting the engine and increasing the engine speed:

● The ignition in the superstructure is ON and the engine is not running.

- Actuate push-button (1) and keep it pressed – the engine is started and runs at idle; 3 seconds after the engine has started, the engine speed increases to max. level.

- Release the push-button (1) – the engine continues to run at its instantaneous speed.

- Actuate push-button (1) again, or actuate push-button (2) – the engine comes to a standstill.

Actuation of engine cranking function:

● The ignition in the superstructure is ON and the engine is not running.

- Actuate push-buttons (1) and (2) at the same time – the engine cranks, but does not start.

- Release the two push-buttons (1) and (2) – starter activation is cancelled, the engine comes to a standstill.

4.5.3 Manual fuel pump - fuel filter with water separator

The fuel filter with water separator and integrated manual pump is installed on the right-hand side of the vehicle, below the radiator cover, in front of the radiator.
Should air and/or dirt have entered into the fuel system, the filter cartridge must be replaced, and the fuel system must be cleaned and bled.

Bleeding the fuel system, and supplying fuel via the manual pump, after

- the fuel tank has been emptied completely,
- leakage has occurred in the fuel system,
- the fuel filter has been replaced (filter replacement, refer to part C2, Service and Maintenance).

Prerequisite:

- a sufficient amount of fuel has been replenished,
- any leakage has been eliminated,
- the filter cartridge has been replaced as described in part C2, Service and Maintenance.

Bleeding, and supplying fuel:

- Open vent screw (1); actuate pump plunger (2) repeatedly, until fuel flows out without bubbles.

(Collect overflowing fuel in an appropriate vessel and pour it back into the fuel tank.)

- Tighten the vent screw (1) securely again.
- Start the engine. Should the engine fail to start immediately, have an assistant actuate the pump plunger repeatedly, until the engine is operating smoothly.

4.6 Monitoring the pilot, indicator and warning lamps and the instruments while the engine is running

4.6.1 Fuel level indicator

If the needle drops close to zero indication, fuel must be replenished in time. Moreover, a symbol (refer to part B2-3, FAUN Cockpit Graphic Control System) appears.

NOTE **Make sure that the fuel tank is never completely emptied, as otherwise air might get into the fuel system. Consequently, the system would have to be bled completely. Moreover, filters and piping assemblies would have to be cleansed.**
If the engine does not start after several vain attempts, the fuel system must be checked for contamination or leakage.

DANGER **Explosion hazard: Do not smoke, do not use any open flames; to fill the fuel tank, make sure that the engine is not running and that the machine is aligned in horizontal position.**

For further instructions, please refer to the Operating Manual of the engine manufacturer.

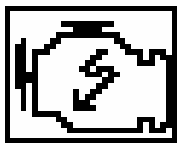
4.6.2 Engine

4.6.2.1 Engine oil level

The engine oil level is monitored by the symbol "Engine oil level“ (refer to part B2-3, FAUN Cockpit Graphic Control System) and the warning lamp **3** “Central warning CGC“.
If the symbol appears, stop all operations immediately, stop the engine, check the oil level and correct it.

For further details, please refer to the Operating Manual of the engine manufacturer.

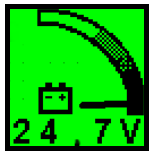
4.6.2.2 Engine function



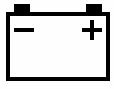
In case of an engine malfunction, the symbol "Engine malfunction" goes on and the warning lamp **3** "Central warning CGC“ goes on (refer to part B2-3, FAUN Cockpit Graphic Control System).
In this case, all works must be stopped immediately and the reason for the malfunction must be determined.

If necessary, the vehicle must be taken to a specialist workshop to have the trouble eliminated.

4.6.2.3 Generator



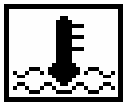
During operation, the symbol "vehicle voltage insufficient" and the warning lamp **3** "Central warning CGC“ must not go on (refer to part B2-3, FAUN Cockpit Graphic Control System).
If it does, a malfunction is present and the batteries are not charged.



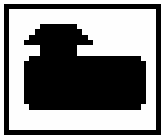
The machine must be taken to a specialist workshop immediately for the fault to be eliminated.
It must be ensured that the batteries are always fully charged.

4.6.2.4 Coolant temperature

The coolant temperature is monitored by the coolant temperature indicator; the symbol "coolant level" (refer to part B2-3, FAUN Cockpit Graphic Control System) and the warning lamp **3** "Central warning CGC“ goes on. The admissible service temperature is in the range from 80°C to max. 95°C.
If the coolant level drops, the coolant temperature consequently exceeds the maximum admissible rating.
The symbol lights up and the needle moves to the critical range.
For information on remedial measures in case of excessive temperatures, please refer to the operating manual of the engine manufacturer.



4.6.2.5 Contamination of air cleaner



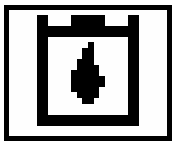
The intake air resistance or the low pressure on the clean air side of the dry air cleaner is monitored by the symbol "air cleaner contamination“ (refer to part B2-3, FAUN Cockpit Graphic Control System) and the warning lamp **3** "Central warning CGC“.
If the symbol goes on with the engine running, replace the air cleaner cartridge (refer to part “C2” Service and Maintenance, Superstructure).

4.6.2.6 Operating hours

The engine operating hours are monitored via an hourmeter (sect. B2-2, item. 12).
The hourmeter is activated as soon as the engine is started.

4.6.3 Hydraulic system

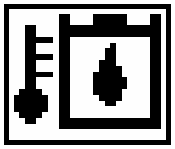
4.6.3.1 Contamination of the hydraulic oil filter



The degree of contamination of the hydraulic oil filters is monitored. The symbol "hydraulic oil filter" and the warning lamp **3** "Central warning CGC" goes on if the hydraulic oil filters are contaminated to an inadmissible degree.

Should this occur, the hydraulic oil filters have to checked and, if necessary, replaced immediately.

4.6.3.2 Hydraulic oil temperature



The temperature of the hydraulic oil is monitored. The symbol "hydraulic oil temperature" and the warning lamp **3** "Central warning CGC" go on at oil temperatures in excess of approx. 80°C. If it does, crane work must be interrupted.

4.7 Centralized lubrication system

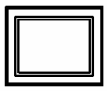
The vehicle has been equipped with a centralized lubrication system which ensures optimum lubrication of all points of lubrication connected. Only the lubricating points which are not connected still have to be supplied by hand.

For operating instructions and data regarding the lubricating points, please refer to the documents of the unit's manufacturer (see Annex G2 Superstructure).

4.7.1 Function

When the ignition is switched on, the piston pump assembly and the stirrer are activated by actuation of the rocker switch **47** "centralized lubrication system". The points of lubrication are supplied with grease. A green pilot lamp in the switch goes on to indicate that lubrication is in progress. To terminate the lubricating procedure, turn the rocker switch OFF; the pilot lamp in the switch goes out. The lubrication time (contact time) and the duration of the regular lubrication intervals depend on the frequency of working movements and can be determined by the operator. However, it is recommended to adhere to the intervals specified in the maintenance scheme.

4.8 Central warning, CGC



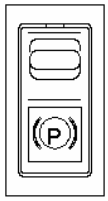
The red warning lamp **3** “Central warning CGC Superstructure” goes on simultaneously if a symbol for the engine management system (indicating an error) appears in the CGC (see part B2-3, FAUN Cockpit Graphic Control System).
It is also lit as long as a malfunction or a failure of the CMV monitor is present.

Attention **Observe the warning lamp 3 "central warning, CGC". If it goes on, the reason for the malfunction must be determined and eliminated without delay.**

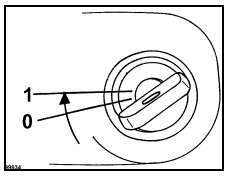
5 Outrigger operation from the superstructure

5.1 Changing-over to outrigger operation from the superstructure

- The measures described under items B1-4.1 and B2-4.1 have been taken and the corresponding checks have been made.
- Turn key-actuated change-over switch in chassis from position 1 to position 2.
- The parking brake in the chassis has been engaged.
- The battery main switch in the chassis must be turned on.
- The ignition key in the chassis must be in position 1.



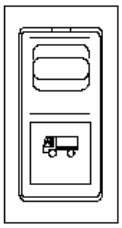
Attention **The engine in the chassis cannot be stopped from the superstructure, while the ignition in the chassis is switched on (ignition key in ignition starter switch must be set to "1").**



Positions of key-actuated change-over switch in chassis and of rocker switch in superstructure

Position of key-actuated change-over switch in chassis (part B1-11, item 50)	Position of rocker switch 10 "ignition, chassis, ON" in the superstructure	Functions
2	**OFF**	Ignition in chassis OFF = only operation from superstructure possible
2	**ON**	Ignition in chassis ON = The engine in the chassis can be started from the superstructure, outrigger operation is possible from the superstructure

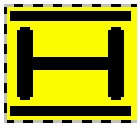
5.1.1 Establishing the connection "chassis / superstructure" in the superstructure



- Switch on rocker switch **10** "Ignition chassis ON" (function lighting in the rocker switch is lit). The ignition in the chassis is switched ON; the engine in the chassis can be started from the superstructure; the outriggers can be actuated from the superstructure.

5.1.2 Axle suspension lock indicator lamp

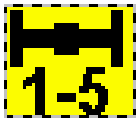
The axle suspension lock is switched on as the key-actuated change-over switch in the chassis (part B1-11, item **50**) is turned from position 1 to position 2.
During superstructure operation, the symbol "axle suspension lock engaged" (refer to FAUN Cockpit Graphic Control System, part B2-3) is lit all the time.



DANGER **If the symbol "axles locked" goes out and the symbol "axle suspension activated" appears during crane work, crane work must be interrupted immediately, the reason for the malfunction must be located and eliminated.**

5.1.3 Indicator lamp "axles lifted"

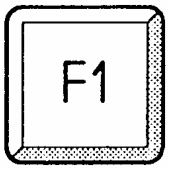
During superstructure operation, the symbol "axles lifted" (refer to FAUN Cockpit Graphic Control System, part B2-3) is lit all the time.



DANGER **Crane operation is only admissible with the axles lifted. If the symbol "axles lifted" goes out during crane work, work must be stopped immediately, the reason for the malfunction must be determined and eliminated.**

5.2 Starting the engine in the chassis from the superstructure

- Actuate key F1 (refer to part B2-3, item 3.1.1.3) "engine start, chassis" until the engine ignites. Do not actuate the starter for more than 20 sec.



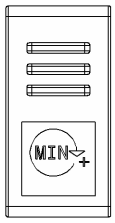
After the engine has started, the red warning lamp **3** "central warning, CGC" goes out.

5.2.1 Stopping the engine in the chassis from the superstructure

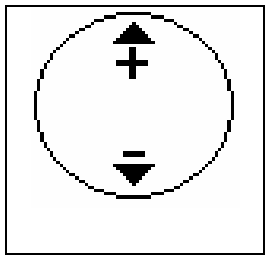
- Return engine speed to idling level.
- Actuate the push-button F2 (refer to part B2-3, item 3.1.1.3) "Engine stop, chassis" until the engine in the chassis comes to a standstill, or switch the rocker switch **10** "ignition, chassis“ OFF to stop the engine.

5.2.2 Speed regulation of the engine in the chassis from the superstructure

- Actuate WT **12** “Engine speed regulation, chassis”. The speed of the engine in the chassis can be adjusted steplessly.



The engine speed is adjusted via the FAUN Cockpit Graphic Control System (part B2-3).

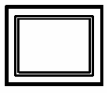


- The speed of the engine in the chassis can be adjusted steplessly (refer to part B2-3, item 3.1.1.3).

Actuate arrow key upwards = engine speed increases.
Actuate arrow key down = engine speed decreases.

5.2.3 Central warning, CGC

The red warning lamp **3** "Central warning CGC" goes on in case of electronic faults of the control system, of faults in the chassis CAN bus, sensor faults or engine malfunctions in superstructure and chassis.



Attention **Observe the warning lamp 3 "central warning, CGC". If it goes on, the reason for the malfunction must be determined and eliminated without delay.**

5.2.4 Pilot and warning light, parking brake in chassis

The symbol "parking brake in chassis engaged" goes on when the vehicle is braked positively via the handbrake lever in the chassis, or when the brake-air pressure of the parking brake in the chassis is no longer sufficient.

The symbol "parking brake in chassis not engaged" appears and flashes (backlit), if the handbrake in the chassis is not in braking position.

5.6 Outrigger operation from the superstructure

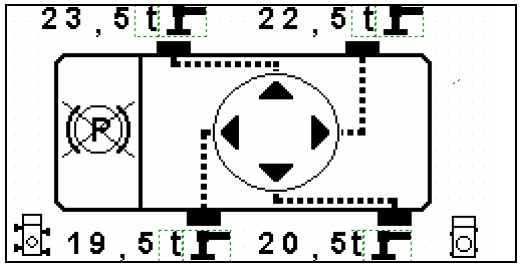
NOTE

- **Before actuating the outriggers, take all the necessary measures and perform all the checks described under item B2-4.1. Comply with the instructions regarding outrigger operation (item B1-6).**
- **The parking brake (handbrake lever) in the chassis is in "braking" position.**
- Set the key-actuated change-over switch in the chassis to position 2 and switch on the rocker switch **10** in the superstructure "ignition, chassis, ON". The axle suspension is locked automatically.
- **The symbol "axle suspension lock engaged" must be lit in the superstructure (refer to item B2-3).**
- **The position of the outrigger floats must be changed and the extended and retracted outrigger beams must be secured with pins as described under item B1-6.2.1 and B1-6.4.**
- Start the engine in the chassis from the superstructure and make it run at medium speed.
- The red warning lamp **3** "central warning, CGC" must not go on.
- **Before outrigger operation, the operator must sound a warning signal (actuate horn).**

DANGER **While outriggers are being extended or retracted, nobody is allowed to stay close to the outrigger beams and the outrigger cylinders. During extension and retracting, the crane operator must constantly have unrestricted visibility of the moving outrigger components. If necessary, have an assistant watch these components, for safety reasons.**

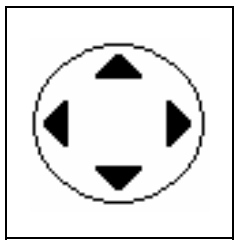
5.6.1 Outrigger operation

Actuation of the outriggers from the superstructure is effected via the FAUN Cockpit Graphic Control System (refer to part B2-3, item 3.1.1.2).
The four outrigger beams can only be extended and/or retracted one by one.
The four outrigger cylinders can be actuated individually and jointly, depending on the mode selected.



- The outrigger cylinders and outrigger beams are selected via the cursor control system (arrow keys).

▲ = Outrigger, front, right-hand
◀ = Outrigger, front, left-hand
▼ = Outrigger, rear, left-hand
▶ = Outrigger, rear, right-hand



5.6.2 Extending the outrigger beams

- Change the position of the outrigger floats, as described under item B1-6.2.1, and secure them with pins.
- The areas where the outrigger floats are to be positioned must be propped with large-size, sturdy supports.
- Remove the lock pins from the four outrigger beams (refer to item B1-6.4).
- Select the desired outrigger beam using an arrow key (refer to item B2-3.1.1.2).
- Actuate the ENTER key - the selection is confirmed.
- Change of menu
- Extend the selected outrigger beam via the arrow keys (refer to item B2-3.1.1.2) to the required extension width and secure it with a pin.
- Select all the four outrigger beams in the way described above, extend them to the required extension width and secure them with pins.

DANGER **Make sure that the extended outrigger beams are secured with pins, as there is a risk of accidents otherwise.**

5.6.3 Extending the outrigger cylinders

Comply with the information specified under item B1-6.5.

- Select the desired outrigger cylinder using the arrow keys or key F1 (refer to item B2-3.1.1.2).
- Actuate the ENTER key - the selection is confirmed.
- Change of menu
- Extend the selected outrigger cylinders via arrow keys (refer to item B2-3.1.1.2).
- Raise the machine just enough for all the tires to be clear of the ground. Do not prop the wheels with supporting material.
- Align the vehicle in horizontal position (watch the electronic spirit level, refer to B2-3.1). The marking must be in the center of the reticule (max. deviation from the horizontal line: $\pm$ 0.3°).
- Stop the engine in the chassis by actuating the rocker switch **10** “Ignition chassis off”.

5.6.4 Retracting the outriggers

Actuate the rocker switch **10** “ignition chassis on”.

- Start the engine in the chassis from the superstructure and make it run at medium speed.

  The warning lamp **3** "central warning, CGC" must not go on; the indicator lamps "axle suspension lock engaged" and "all axles lifted" (refer to item B2-3) must be lit.

5.6.5 Retracting the outrigger cylinders

- Select the desired outrigger cylinder using the arrow keys or key F1 (refer to item B2-3.1.1.2).
- Actuate the ENTER key - the selection is confirmed.

● Change of menu

- Retract the selected outrigger cylinders via arrow keys (refer to item B2-3.1.1.2).

5.6.6 Retracting the outrigger beams

- **Remove the lock pins from the four outrigger beams.**
- Select the desired outrigger beam using an arrow key (refer to item B2-3.1.1.2).
- Actuate the ENTER key - the selection is confirmed.

● Change of menu

- Retract the selected outrigger beam via arrow key (item B2-3.1.1.2) and secure it with a pin.
- Select, retract and secure all the four outrigger beams in the way described above.
- Slip the outrigger floats on as specified for on-road travel, as described under item B1-6.2.1, fasten and lock them.

DANGER **Make sure that the retracted outrigger beams are secured with pins, as there is a risk of accidents otherwise.**

- Stop the engine in the chassis by actuating the rocker switch **10** “Ignition chassis on”.

Attention **Do not change key-actuated change-over switch in the chassis over to position 1 until all wheels are resting completely on the ground.**

5.6.7 Outrigger actuation from the superstructure via rocker tip switch and rocker switch

NOTE

- **Before actuating the outriggers, take all the necessary measures and perform all the checks described under item B2-4.1. Comply with the instructions regarding outrigger operation (item B1-6).**
- **The parking brake (handbrake lever) in the chassis is in "braking" position.**

- Set the key-actuated change-over switch in the chassis to position 2 and switch on the rocker switch **10** in the superstructure "ignition, chassis, ON". The axle suspension is locked automatically.

- **The symbol "axle suspension lock engaged" must be lit in the superstructure (refer to item B2-3).**
- **The position of the outrigger floats must be changed and the extended and retracted outrigger beams must be secured with pins as described under item B1-6.2.1 and B1-6.4.**

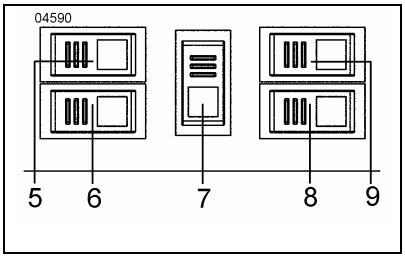
- Start the engine in the chassis from the superstructure and make it run at medium speed.

- The red warning lamp **3** "central warning, CGC" must not go on.
- **Before outrigger operation, the operator must sound a warning signal (actuate horn).**

DANGER **While outriggers are being extended or retracted, nobody is allowed to stay close to the outrigger beams and the outrigger cylinders. During extension and retracting, the crane operator must constantly have unrestricted visibility of the moving outrigger components. If necessary, have an assistant watch these components, for safety reasons.**

Rocker switch **7**, preselection of outriggers

Switch position:
- Rocker switch actuated upwards = preselection, actuation of outrigger beams.
- Rocker switch actuated down = preselection, actuation of outrigger cylinders.



Rocker tip switches, outrigger operation

5 = Rocker tip switch, extending/retracting outrigger beam / outrigger cylinder, front, left-hand
9 = Rocker tip switch, extending/retracting outrigger beam / outrigger cylinder, front, right-hand
8 = Rocker tip switch, extending/retracting outrigger beam / outrigger cylinder, rear, right-hand
6 = Rocker tip switch, extending/retracting outrigger beam / outrigger cylinder, rear, left-hand

5.6.7.1 Extending the outrigger beams

- Change the position of the outrigger floats, as described under item B1-6.2.1, and secure them with pins.
- The areas where the outrigger floats are to be positioned must be propped with large-size, sturdy supports.
- Remove the lock pins from the four outrigger beams (refer to item B1-6.4).
- Move rocker switch **7** "preselection, outriggers" upwards.
- Actuate the rocker tip switch **5** to the left and keep it pressed until the front outrigger beam on the left is extended, and can be secured with pins.
- Extend the rear outrigger beam by actuating the rocker tip switch **6** to the left according to the required outrigger extension width.
- Extend the outrigger beams on the right side of the vehicle in the same way, by selecting the rocker switch **7** "preselection, outriggers" and by actuation of the rocker tip switches **9** or **8** to the right, according to the appropriate outrigger extension width, and secure them using pins.
- Reset rocker switch **7** "preselection, outriggers" to their central position.

DANGER **Make sure that the extended outrigger beams are secured with pins, as there is a risk of accidents otherwise.**

5.6.7.2 Extending the outrigger cylinders

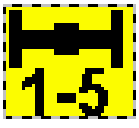
Comply with the information specified under item B1-6.3.

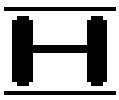
- Move rocker switch **7** "preselection, outriggers" down.
- To extend the outrigger cylinders on the left side of the chassis, actuate the rocker tip switch **5** or **6** to the left, and keep it pressed.
- To extend the outrigger cylinders on the right side of the chassis, actuate the rocker tip switch **7** or **8** to the right, and keep it pressed.
- Raise the machine just enough for all the tires to be clear of the ground. Do not prop the wheels with supporting material.
- Align the vehicle in horizontal position (watch the electronic spirit level, refer to item B2-3). The marking must be in the center of the reticule (max. deviation from the horizontal line: $\pm$ 0.3°).
- When the crane is aligned in horizontal position, set the rocker tip switch **7** "preselection, outriggers" to its central position.
- Stop the engine in the chassis by actuating the rocker switch **10**.

5.6.7.3 Retracting the outriggers

Actuate the rocker switch **10** “Ignition chassis on”.

- Start the engine in the chassis from the superstructure and make it run at medium speed level.





The warning lamp **3** "central warning, CGC" must not go on; the indicator lamps "axle suspension lock engaged" and "all axles lifted" (refer to item B2-3) must be lit.

5.6.7.4 Retracting the outrigger cylinders

- Move rocker switch **7** "preselection, outriggers" from its central position "downwards". Actuate the rocker tip switches **5** and **6** to the right, or the rocker tip switches **9** and **8** to the left, and retract outrigger cylinders uniformly.
- After all outrigger cylinders have been retracted completely, move the rocker switch **7** "preselection, outriggers" to its central position (upwards).

5.6.7.5 Retracting the outrigger beams

- Remove the lock pins from the outrigger beams.

- Move rocker switch **7** "preselection, outriggers" from its central position "upwards". Actuate rocker tip switches **5** and **6** to the right, or rocker tip switches **8** and **9** to the left, and retract the outrigger beams uniformly; keep the rocker tip switches pressed until the outrigger beams have been retracted and can be secured using pins.
- Reset rocker switch **7** "preselection, outriggers" to their central position.
- Slip the outrigger floats on as specified for on-road travel, as described under item B1-6.2.1, fasten and lock them.

DANGER **Make sure that the retracted outrigger beams are secured with pins, as there is a risk of accidents otherwise.**

- Stop the engine in the chassis by actuating the rocker switch **10** “Ignition chassis on”.

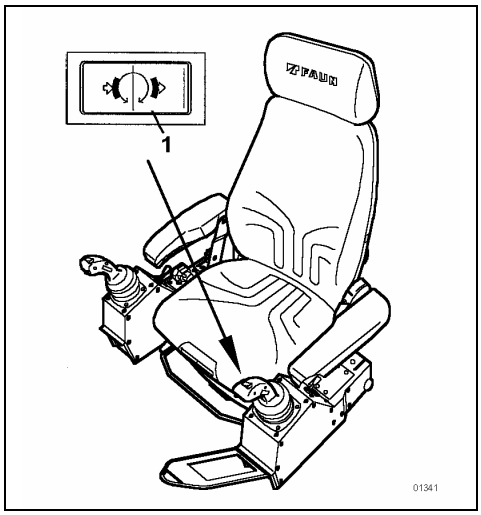
Attention **Do not change key-actuated change-over switch in the chassis over to position 1 until all wheels are resting completely on the ground.**

DANGER

To avoid operating errors during crane operation, please make sure that the safety provisions contained in part B.0 are complied with !

6 Crane movements in no-load condition

- The checks required and the measures to be taken in the chassis have been accomplished.
- The crane is supported by outriggers as specified.
- Key-actuated switch in the chassis in position 2, refer to part B1-4.11.
- Start the engine in the superstructure as described under item 4.5.
- Swing brake engaged (rocker tip switch (1) is not actuated).



The superstructure must not be locked; the icon “Superstructure can be slewed” is lit.

6.1 Instructions regarding actuation of the crane control levers

The actuation of the crane control levers described in the following text applies to the standard machine model.
Any differing special models have not been taken into account.
For the crane operator, the instruction plates mounted in the cabin will be decisive in any case.

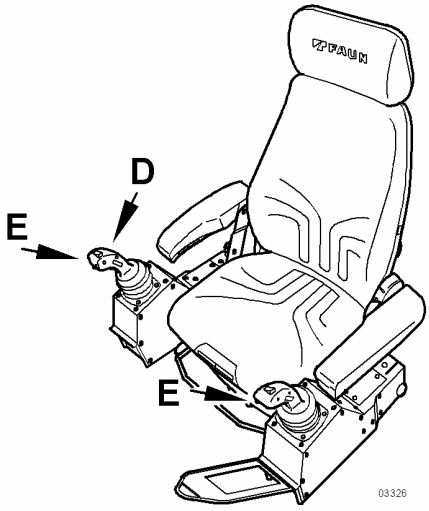
- The speed of the working movements is controlled by gentle actuation of the crane control levers and by varying the engine speed.
- All crane movements can be performed independently of the load pressure. Depending on the work cycle, one or both crane control levers are moved in longitudinal direction, laterally or diagonally.
- The crane movements can be regulated precisely even when the engine operates at idling speed.

6.1.1 High speed circuit

NOTE **To avoid control pressure peaks, the high speed must be connected before the crane control levers are actuated.**

By actuation of one of the push-buttons **"E"** in both crane control levers, the high speed can be connected for the crane movements "hoisting gear/ auxiliary hoisting gear up/down", boom elevation "up" and "extending" telescopes.

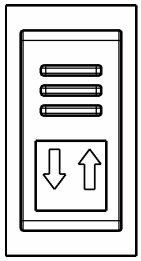
NOTE **The high speed circuit's unlimited function is available if only one of the above-mentioned direction of motion is activated. If several directions of motion are activated, the high speed decreases.**



6.1.2 Rope winch rotation indicator (D)

The integrated rotation indicator informs the crane operator about each motion of the rope drum. When the right-hand crane control lever is actuated to position "hoisting gear raising/lowering" (or the left-hand crane control lever, if the machine is equipped with an optional second hoisting gear), the pulse generator installed in the handle vibrates as soon as the rope drum moves. The pulses are also indicated acoustically.

6.1.2.1 Actuation of rope winch rotation indicator



- Actuate the rocker switch **32** "rope winch rotation indicator". The function "rope winch rotation indicator" is activated.

6.2 Actuation of the hoisting gear (main hoisting gear)

Right-hand crane control lever
forward - bottom block moves **down,**
to the rear - bottom block moves **up**

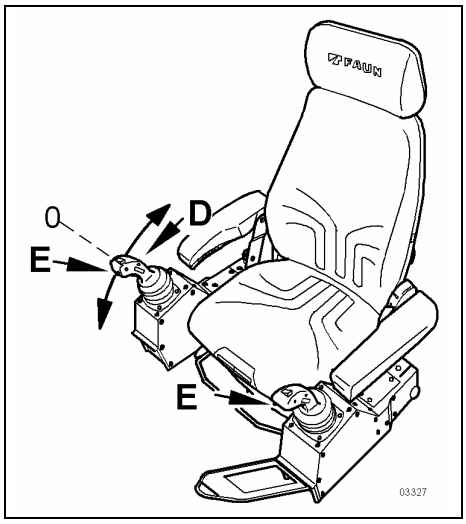
The hoisting speed can be controlled depending on the travel of the crane control lever and by varying the hoisting gear speed.

The hoisting speed can be increased further by connection of the fast speed, before actuation of the crane control lever.

When the highest bottom block position is reached, the hoisting gear is switched off via the hoist limit switch. However, lowering is still possible.

If the maximum admissible load per rope fall is reached in the course of lifting, the system is also switched off. However, the bottom block can still be lowered.

Before the rope end is reached on the hoist drum, the hoisting gear is switched off by the rope limit switch (approx. 3 windings remain on the rope drum).

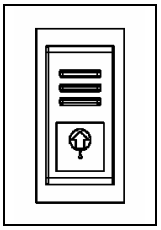


DANGER **If the hook block is lowered quickly without a load, it must be ensured in particular that the rope does not get slack on the rope drum.**

- **Make sure that the load is not lifted or lowered by jerks.**
- **If the load is decelerated or accelerated too quickly, this will cause an overload on the drive elements and the rope, and may cause accidents, such as overturning.**

Attention **The high speed for "hoisting gear UP/DOWN" may only be connected at low or zero load. If up to 3 rope falls are used, the high speed must not be connected if the crane, depending on the working radius used in the present application, is subject to a load of over 50 % of the lifting capacity admissible for the current rig arrangement.**
The high speed must be connected before a load is moved. The high speed must not be connected during the lifting or lowering procedure with a load fixed to the boom.

Rocker tip switch **23** indication / reset bottom block height



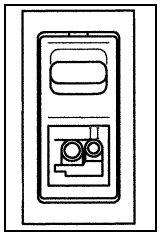
- Actuation into the second position - rocker tip switch. Bottom block height of the hoisting gear is in switched to 0 in actual position.
- Actuate the rocker switch downwards into its central position. The height of the bottom block of the hoisting gear is displayed with reference to the previously set 0 position in the AML.

NOTE **If the vehicle is equipped with an auxiliary hoisting gear, the lifting height of the auxiliary hoisting gear is also set to position 0.**

For further details, please refer to the description of the AML in part G2 Superstructure.

6.2.1 Auxiliary hoisting gear (2nd hoisting gear**))

6.2.1.1 Connecting the auxiliary hoisting gear



1st step:

- Actuate rocker switch **25** „Activating the auxiliary hoisting gear“. The connecting of the auxiliary hoisting gear is activated, the indicator lamp in the rocker switch is lit.

2nd step:

- Actuate the rocker switch (Fig. 1, item 1) to the left. The auxiliary hoisting gear is connected.

The allocation of functions to the left-hand crane control lever is changed as described under item 6.2.1.2.

Attention **As long as the left-hand crane control lever's function allocation is changed, the telescoping movement is not available.**

To disconnect the auxiliary hoisting gear, proceed analogously by reversing the above sequence of operations.

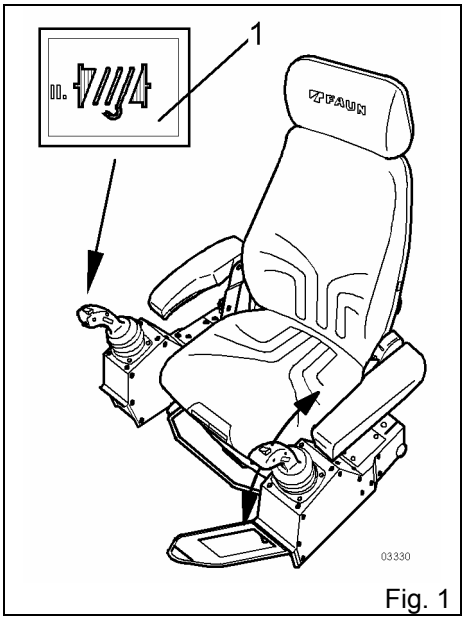


Fig. 1

6.2.1.2 Allocation of functions to the left-hand crane control lever and work using the auxiliary hoisting gear:

Left-hand crane control lever **forward** - bottom block moves **down,** **to the rear** - bottom block moves **up**

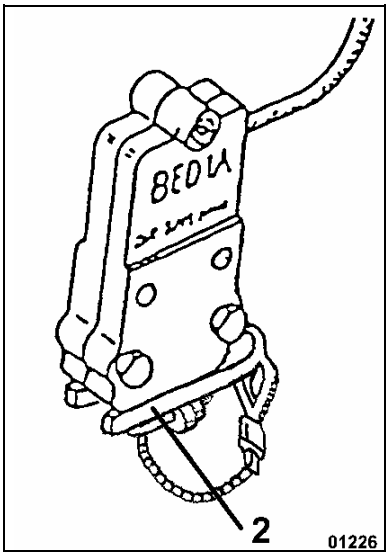
The hoisting gear speed can be controlled depending on the travel of the crane control lever (see Fig. 1) and by increasing the hoisting gear speed.

The auxiliary winch is mainly used during operation with a jib.
In case of failure of the main winch, the rope falls of the auxiliary winch can also be fixed to the pulley head of the main boom.
In this case, the hoist limit switch weight of the main winch must be installed to the rope of the auxiliary winch.
When the highest bottom block position is reached, the hoisting gear is switched off via the hoist limit switch. However, lowering is still possible.
If the maximum admissible load per rope fall is reached in the course of lifting, the system is also switched off. However, the bottom block can still be lowered.
Before the rope end is reached on the hoist drum, the hoisting gear is switched off by the rope limit switch (approx. 3 windings remain on the rope drum).

**) Optional equipment

(cont'd.) **6.2.1.2 Allocation of functions to the left-hand crane control lever and work using the auxiliary hoisting gear:**

NOTE **If work is only performed with the auxiliary winch via the jib, the hoist limit switch on the pulley head of the main boom must be set free via a clamping piece (2), as otherwise the hydraulic system is switched off.**



DANGER **If the bottom block is lowered quickly without a load, it must be ensured that the rope does not get slack on the rope drum.**
Make sure that the load is not lifted or lowered by jerks.
If the load is decelerated or accelerated too quickly, this will cause an overload on the drive elements and the rope, and may cause accidents, such as overturning.

6.2.1.3 Switching off the auxiliary hoisting gear

- Change over rocker switch (Fig. 1, item 1) and rocker switch **25**; now the auxiliary hoisting gear is switched OFF.

The standard allocation of the left-hand crane control lever - telescoping - is active again.

DANGER **A double ladder must be positioned at the superstructure to enable placing the rope of the auxiliary hoisting gear. The double ladder is located below the driver's cab and secured by means of supports (see part B2, item 11.2.).**

6.3 Boom elevation

Right-hand crane control lever
to the left - boom is **raised,**
to the right - boom is **lowered**

NOTE **While the boom elevation is actuated, the telescopes must not be extended or retracted.**

The hoisting speed can be controlled depending on the travel of the crane control lever and by varying the speed for raising the boom via the boom elevation.

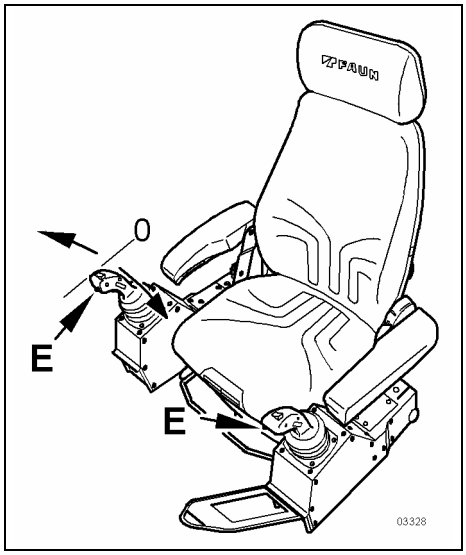
To enable a faster boom elevation movement "up", the high speed (E) can be connected before the crane control lever is actuated.

To increase the working radius ("boom down") under load, proceed slowly and carefully, as the automatic safe load indicator (AML) switches off as soon as the maximum working radius is reached (for a description of the AML, please refer to part G2, superstructure).

After switching off, only a movement tending to reduce the load moment (boom elevation "up") can be performed.

Fast movements of the boom cause the load to swing out.

As the load swings away from the boom during the movement "boom elevation down", the working radius is necessarily increased.



DANGER **When the load swings out quickly and far, this implies an overload and can result in accidents (tipping over).**

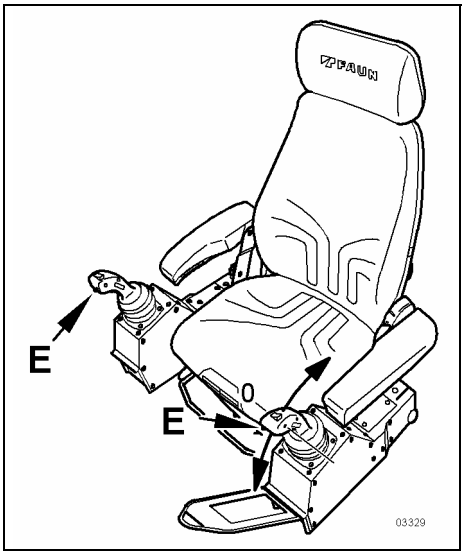
Attention **The high speed for "boom elevation UP" may only be connected at low or zero load. When the jib is mounted to the telescopic boom head, while the telescopic boom is completely or partially extended, the fast speed must not be connected.**

NOTE **Slow-stop function override, refer to item 6.5.2.**

6.4 Telescoping

Left-hand crane control lever
forward - telescopes **are extended;**
to the rear - telescopes **are retracted.**

The telescoping speed can be controlled depending on the travel of the crane control lever and by increasing the engine speed.
To enable a faster telescope extension movement, the high speed (E) can be connected, if at all possible, before the crane control lever is actuated. **A load must not be fixed to the hook!**
The tele sections are extended to their length required by the rig arrangement in question; this length is monitored by the AML.



Attention **Work should not be performed with a longer boom length than is actually required to perform the crane operation.**

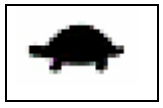
The telescope target state must be entered in the AML control unit. The desired boom length must be determined via the load charts and the hook height diagram.
The data for changing the counterweight variants or outrigger variants can only be entered while the telescopes are retracted.

NOTE **The boom elements must be extended to the desired length in no-load condition, and subjected to load only afterwards.**

During the telescoping process, the boom elevation must not be actuated.

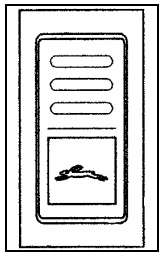
DANGER **In case of a deficiency in the length transmitter cable (break of a strand, etc.), which implies failure of the AML, work must not be continued. Place the load on the ground and retract the boom elements in manual mode, as described under item 15.4.6 and for the AML. Repair any damage immediately.**

DANGER **During the telescoping procedure, the symbol shown to the right may appear in the display monitor item 39 (part B2-2.1). During this period, the superstructure must not be slewed.**



6.4.1 Telescope high speed

- Actuate rocker switch **26** „Telescope high speed“. The telescope high speed is connected now. The input is only possible with the function "Extend telescope":



NOTE **The high speed must be connected before the crane control lever is actuated.**

6.4.2 Telescoping

DANGER **Before starting crane work, the user must carefully read the AML operating manual and familiarize himself thoroughly with its contents, and with the method of operation of the AML.**

In conjunction with the AML system, the telescoping control automatically ensures the correct telescoping sequence.

Attention **During the telescoping process, the boom must be elevated at an angle of min. 75°.**

Telescoping:

- Switch on the ignition, start the engine.

The AML program is started.
The start menu appears.
- The data required for crane work (load, boom length etc.) must be determined before crane work is started.
- This data must be entered in the AML.

The AML guides the operator through the program in a user-friendly fashion.
- The AML must be programmed with the data determined previously as described in the operator manual.

- Actuate the crane control lever.

The tele sections are automatically extended in the correct sequence, starting from the smallest section, until the required telescoping configuration is reached.
Telescoping sequence: 6, 5, 4, 3, 2 and 1.

NOTE **The required boom length must be determined precisely before work is started.**

Depending on the telescoping configuration, it may not be possible to change to another telescoping configuration (e.g. from 100/100/50/50/50/0 to 100/100/100/50/50/0) without resetting the crane to its former rig arrangement.
For further information, please refer to the notes regarding the load chart, or to the AML operating manual.

- Perform crane work as described in Part B2, items 6 and 7.

DANGER **If a malfunction occurs in the control program during telescoping, proceed as described under item 6.4.2.**

6.4.3 Emergency control

If the automatic mode fails while the hoist cylinder or a telescope section is unlocked (removing the pin), the tele sections must be reset to their former rig arrangement in manual mode.

DANGER **The emergency control feature may only be used to retract the tele sections (resetting them to their former rig arrangement). This requires maximum care and caution.**
During a telescoping movement, the bottom block must always be watched.
During the resetting procedure, persons are not allowed to stay in the work range.
The vehicle is supported by outriggers as specified.

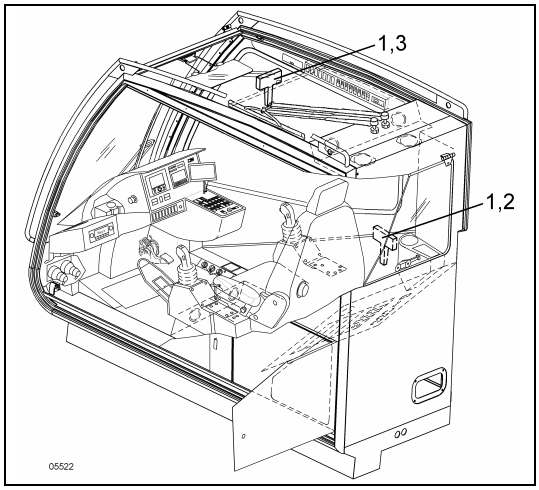
Before the telescopes are reset to their former arrangement in manual mode, an attempt can be made whether the fault is eliminated automatically after a restart of the system.
To this effect, the following steps must be taken:

- Raise boom to > 70° via the boom elevation.
- If the jib is mounted, raise boom to > 75° via the boom elevation.
- Shut off the engine.
- Switch battery main switch off.
- Wait for approx. 1 minute.
- Switch battery main switch on.
- Start the engine.
- Enter the data required for crane work into the AML.
- Actuate the crane control lever.
- Actuate the crane control lever.

If actuation of the tele sections is possible, crane work can be continued.
If the automatic control is still in failure mode, the telescopes must be reset to their former rig arrangement by hand, as described under item 6.4.3.1.

6.4.3.1 Resetting the crane to its former rig arrangement in manual mode

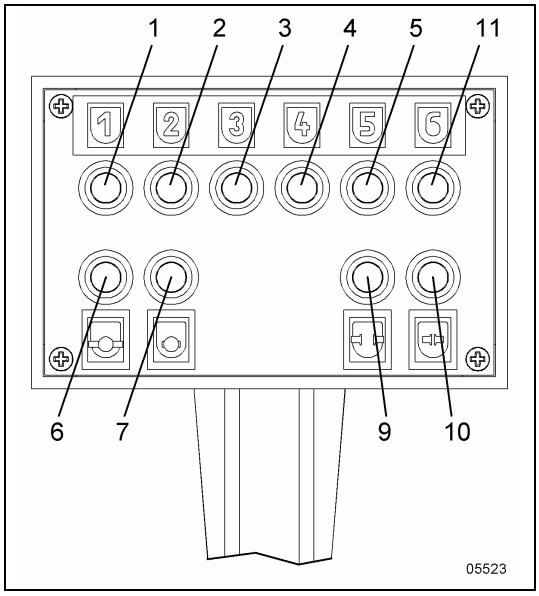
The indicator element (1) is located in the crane cab. When resetting the crane to its former rig arrangement, remove the indicator element (1) from its support (2) and place it in the support (3).



Prerequisite:

- Boom raised to > 70° via the boom elevation.
- With the jib mounted, the boom must have been raised to > 75° via the boom elevation.

Indicator element



1 = Pilot lamp, position tele cylinder in teles section 1
2 = Pilot lamp, position tele cylinder in teles section 2
3 = Pilot lamp, position tele cylinder in teles section 3
4 = Pilot lamp, position tele cylinder in teles section 4
5 = Pilot lamp, position tele cylinder in teles section 5
6 = Pilot lamp, tele cylinder (C pin) locked
7 = Pilot lamp, tele cylinder (C pin) unlocked
8 = free
9 = Pilot lamp, telescope (B pin) locked
10 = Pilot lamp, telescope (B pin) unlocked
11 = Pilot lamp, position tele cylinder in teles section 6

Example:

Fig. 1:

The tele cylinder can be moved.
Pin C - tele cylinder - is unlocked; pin B - tele section - is locked.
The pilot lamps (7) and (9) are lit.

Fig. 2:

The tele section 5 can be moved.
Tele cylinder in tele section (5), Pin C - tele cylinder - is locked; pin B - tele section - is unlocked.
The pilot lamps (5), (6) and (10) are lit.

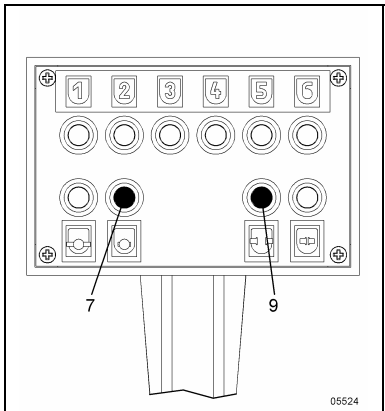


Fig. 1

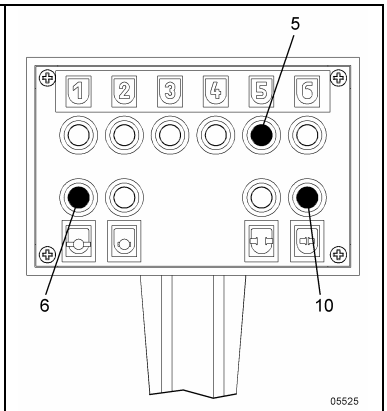
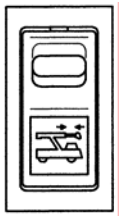


Fig. 2

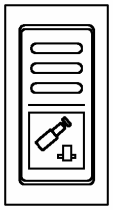
(cont'd.) **6.4.3.1 Resetting the crane to its former rig arrangement in manual mode**

Control elements



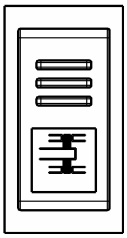
Rocker switch **35** „Emergency control telescope“.
Switching ON: Unlock the locking handle by actuating it downwards; press the rocker switch down and lock it. The green function lamp in the switch is lit.
Switching OFF: Actuate the locking handle by actuating it upwards. The green function lamp in the switch goes out.

DANGER **As long as the rocker switch 35 “Tele section emergency control” is actuated, all control functions are effected in emergency mode. All the automatic shut-off features on overload are inoperative. All crane motions must be performed with extreme caution.**



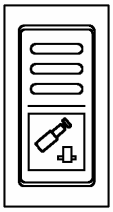
Rocker tip switch **36** “Emergency control, locking/unlocking telescope”

- Actuate rocker tip switch upwards to unlock the telescope.
- Actuate rocker tip switch downwards to lock the telescope.



Rocker tip switch **37** “Emergency control, locking/unlocking tele cylinder”

- Actuate rocker tip switch upwards to unlock the tele cylinder. The pilot lamp (7) goes out, wheras pilot lamp (6) goes on.
- Actuate rocker tip switch downwards to lock the tele cylinder. The pilot lamp (9) goes out, wheras pilot lamp (10) goes on.



If the pilot lamps (1) to (5); (11) do not go on, the rocker switch **38** “interlock override - tele control” must be actuated.

(cont'd.) **6.4.3.1 Resetting the crane to its former rig arrangement in manual mode**

Resetting the tele sections to their former rig arrangement:

NOTE **The assignment of functions of the crane control lever always corresponds to the EURO control system.**

Prerequisite:

- It is not possible to reset the tele sections automatically to their former rig arrangement.
- The position of the indicator element has been changed as described above.
- The hoist cylinder is locked in one of the tele sections.

In the indicator element, one of the pilot lamps (1-5), (11) - tele cylinder in telescope - and pilot lamp (6) - tele cylinder locked - and pilot lamp (9) - telescope locked - must be lit.

- Unlock the telescope. To do so, actuate the rocker tip switch **36** upwards. The pilot lamp (9) goes out, whereas pilot lamp (10) goes on.
- Actuate the **left**-hand crane control lever. Retract the telescope completely. At the end of the tele cylinder travel, actuate crane control lever carefully; if necessary, adjust engine idle speed and tele cylinder to their final setting. Observe the boom length indicator in the display of the AML. The tele pin fastening positions are listed up in the following table.

If the tele cylinder has left its initial position by approx. 5-10 cm, the pilot lamp in question, i.e. “tele cylinder in telescope”, goes out. If the tele cylinder has been retracted until a distance of approx. 5-10 cm from its final position is left, the pilot lamp in question, i.e. “tele cylinder in telescope” goes on (not if tele section 1 is retracted).

- Lock the telescope. To do so, actuate the rocker tip switch **36** down. The pilot lamp (9) goes on, whereas pilot lamp (10) goes out.

If resetting only concerned one telescope, the procedure is terminated now:

If two or more telescopes must be reset to their former rig arrangement, proceed additionally as follows:

- Unlock the tele cylinder. To do so, actuate the rocker tip switch **37** upwards. The pilot lamp (6) goes out, whereas pilot lamp (7) goes on.
- Actuate the left-hand crane control lever. Extend tele cylinder. At the end of the tele cylinder travel, actuate crane control lever carefully; if necessary, adjust engine idle speed and tele cylinder to their final setting. Observe the boom length indicator in the display of the AML. The tele pin fastening positions are listed up in the following table.

If the tele cylinder has left its initial position by approx. 5-10 cm, the pilot lamp in question, i.e. “tele cylinder in telescope”, goes out. If the tele cylinder has been retracted until a distance of approx. 5-10 cm from its final position is left, the pilot lamp in question, i.e. “tele cylinder in telescope” goes on.

(cont'd.) **6.4.3.1 Resetting the crane to its former rig arrangement in manual mode**

- Unlock the tele cylinder. To do so, actuate the rocker tip switch **37** down. The pilot lamp (7) goes out, whereas pilot lamp (6) goes on.
- Unlock the telescope. To do so, actuate the rocker tip switch **36** upwards. The pilot lamp (9) goes out, whereas pilot lamp (10) goes on.

- Actuate the left-hand crane control lever. Retract the telescope completely. At the end of the tele cylinder travel, actuate crane control lever carefully; if necessary, adjust engine idle speed and tele cylinder to their final setting. Observe the boom length indicator in the display of the AML. The tele pin fastening positions are listed up in the following table.

If the tele cylinder has left its initial position by approx. 5-10 cm, the pilot lamp in question, i.e. “tele cylinder in telescope”, goes out. If the tele cylinder has been retracted until a distance of approx. 5-10 cm from its final position is left, the pilot lamp in question, i.e. “tele cylinder in telescope” goes on (not if tele section (1) is retracted).

- Lock the telescope. To do so, actuate the rocker tip switch **36** down. The pilot lamp (9) goes on, whereas pilot lamp (10) goes out.

Reset all other tele sections to their former rig arrangement as described above.

- Switch OFF the rocker switch **35** „Emergency control“ and - if actuated - the rocker switch **38** „Interlock override - tele control“. Switch OFF emergency control.
- Remove the indicator element

Subsequently an attempt can be made to find out whether the fault is eliminated automatically after the system has been restarted.

To this effect:

- Shut off the superstructure engine, disconnect the battery main switch.
- Wait for approx. 1 minute.
- Put the superstructure into operation as described under item B2-4.
- Enter the data required for crane work into the AML.
- Actuate the left-hand crane control lever. If the automatic mode can be used, work can be resumed.

If the automatic mode cannot be used, have the problem eliminated in a specialist workshop; if necessary, consult the TADANO FAUN After-Sales Service.
The crane must not be used before the fault has been eliminated.

Tele pin fastening positions if the system is reset to its former rig arrangement.

	0%	46%	92%	100%
Tele section 1	0.000 m	4.180 m	8.360 m	9.215 m
Tele section 2	0.300 m	4.480 m	8.660 m	9.515 m
Tele section 3	0.600 m	4.780 m	8.960 m	9.815 m
Tele section 4	0.900 m	5.080 m	9.260 m	10.115 m
Tele section 5	1,200 m	5.380 m	9.560 m	10.300 m
Tele section 6	1.500 m	5.680 m	9.860 m	10.300 m

6.5 Slewing the superstructure

Move **left-hand** crane control lever
right - superstructure **swings to the right**
left - superstructure **swings to the left**

DANGER **Slewing the superstructure is only admissible while the crane is stabilized by outriggers.**

- Otherwise, the crane might tip over. -

The superstructure must not be locked; the icon “Superstructure can be slewed” is lit.

- If necessary, release the mechanical superstructure lock as described under item B2-2.9.

DANGER **Before starting any swing movement, make sure that there are no obstacles in the swing area.**

The slewing movement must be initiated and decelerated gently.

The movement is automatically decelerated when the crane control lever is returned to central position "0". The swing brake is engaged while the crane control lever is not actuated.

The slewing speed can be controlled depending on the travel of the control lever and by increasing the engine speed.

DANGER **If the superstructure is slewed and decelerated abruptly, the load may start to oscillate. The greater the load, or the greater the boom length, the lower the speed must be at which slewing is commenced/decelerated.**

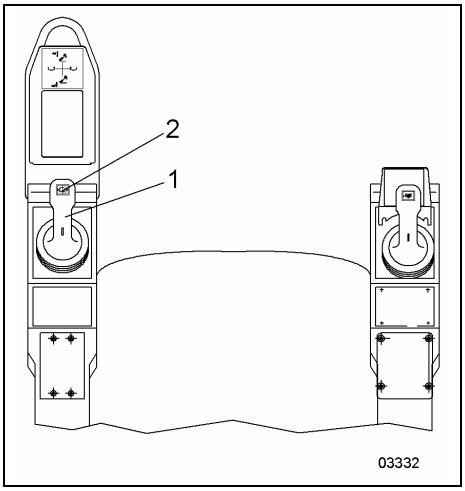
Fig. 1

DANGER **During the telescoping procedure, the symbol shown to the right may appear in the display monitor item 39 (part B2-2.1). During this period, the superstructure must not be slewed.**

6.5.1 Releasing the swing brake

- Actuate push button (2) "Swing release circuit" (in upper part of crane control lever (1)). The swing brake is released as long as the push button is actuated.

Attention **The push button (2) swing release circuit may only be actuated while the superstructure is not moving, to center the crane over the load.**
Actuation of this push button is not admissible while the superstructure is slewing.

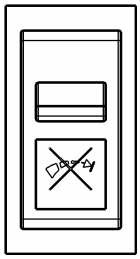


6.5.2 Slow-stop function override

If a range for the work range limit values (swing angle, boom angle) has been entered in the AML and if the crane approaches this limit range, the speed (slewing, boom elevation) is reduced, and the motion is stopped as soon as the range limit is reached.
An acoustic and visual warning is issued.

Override:

- Unlock the rocker tip switch **21** "Deactivating swing range limitation" by actuating the lock handle downwards, and actuate the rocker tip switch downwards.



The lock handle automatically returns to its locking position.
The slow-stop function has been bypassed (override feature).
The preset slewing range can be exceeded. The acoustical and visual warnings are still issued.

If the boom reaches the preset range, the boom elevation movement is not decelerated, but stops abruptly. The acoustical and visual warning are still issued.

DANGER **If the motion is stopped abruptly, uncontrolled swinging out of the load is possible. Risk of accidents.**

Cancelling the override feature:

- Actuate the lock handle downwards, and the rocker switch upwards. The swing angle limitation is activated.

6.6 Counterweights

☞ Important instructions to be observed before commencing assembly and disassembly. ☜

- Before the counterweight units are picked up or deposited, the vehicle must be supported by outriggers and aligned in horizontal position, as specified.

- **Before commencing a slewing movement, make sure that the ballast cylinders are completely retracted.**

- **There must not be any persons or objects in the swing range - *risk of accidents*.**

- **Before picking up the total counterweight, make sure that the individual counterweights are correctly piled.**

- **When picking up the counterweights from the chassis, make sure that the counterweight cylinders are inserted in the grooves of the counterweights without touching them. The boom should be raised to approx. 30°. If necessary, check visually.**

- Before picking up, depositing the counterweights or slewing the superstructure, the operator must sound a warning signal.

- **The counterweight units required for crane work must be identical with the load chart in question; there is a *risk of accidents* otherwise.**

- **When the basic boom is elevated and counterweights are mounted to the superstructure, the outriggers must be fully extended; otherwise there is a *risk of the superstructure tipping* towards the ballast side while it is being slewed.**

- **Counterweights which are transported by an auxiliary vehicle must be located as close as possible to the supported chassis, so that they can be picked up with the crane's bottom block. To this effect, a second crane may be used.**

- **The legal regulations regarding "ropes and hosting gear" in force in the country where the crane is to be registered must be observed.**

- **To pick up or deposit counterweight units which have been transported by auxiliary vehicles using the crane's bottom block, the pertaining "set-up program = 0,0 t" must be programmed. The working radii and boom lengths specified in it must not be exceeded. *Risk of overturning, i.e. risk of accidents.***

- Damaged counterweight units must not be used; they might *fall to the ground* and involve a *risk of accidents*.

- **Counterweight units of other crane carriers must not be used.**

- **When depositing partial counterweights on the chassis, the locking pin must be actuated.**

- When the counterweight units are deposited, no ropes, wooden bars etc. must be located between them, which would prejudice the safe support of the counterweights.
  There is a *risk of accidents due to sliding.*

- **After crane work has been terminated, to prepare the crane for on-road travel, the counterweights must be removed and transported by another vehicle, taking account of the legally admissible axle loads.**

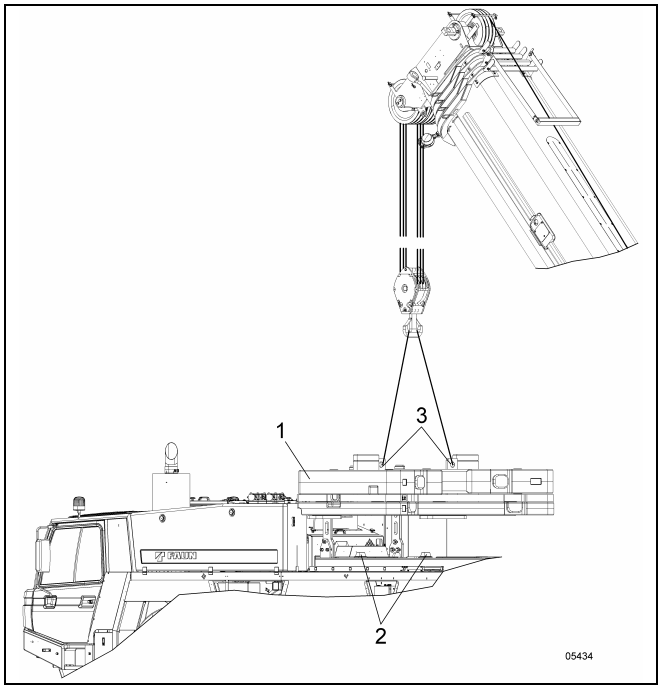
- For reasons regarding vehicle registration, the crane may only participate in public road traffic when its rig arrangement has been changed accordingly.

6.6.1 Picking up counterweights

Counterweights which are transported by an auxiliary vehicle can be picked up by the crane itself, and deposited in the counterweight rest of the chassis.

DANGER **It is essential that the safety provisions in Chapter B0 are complied with to avoid accidents.**
The load chart for counterweights 0.0 t must be used for setting up the crane.
The counterweight elements may only be attached to the fastening points provided to this effect.
When picking up or removing individual counterweights, there is a risk of crushing between the counterweight elements and the vehicle components, especially when swinging the superstructure.
When counterweights are lifted and lowered to the chassis, they must neither be suspended aslant nor swing. There is a risk of accidents and of damage to vehicle components.
The counterweights must be stowed safely and firmly in the counterweight rest.
Stowing counterweight elements in the counterweight rest of the chassis requires the help of another well-instructed person. The crane operator must be in constant eye contact with that person.
Before swinging the superstructure and before taking up crane work, the crane operator must ensure that this person has left the crane and its working area.
The crane has been supported by outriggers as specified (see "Notes referring to the Load Charts").

- Fasten counterweights (1) to the eyelets (3) provided to this effect using the approved, suitable load securing devices, and lift them onto the chassis.
- Carefully lower the counterweights (1) onto the chassis as shown in the drawing. The centering bore-holes of the counterweights must slip onto the centering pins (2).

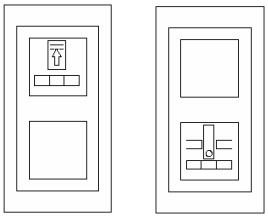


6.6.2 Mounting the individual counterweight variants

6.6.2.1 Picking up and depositing the counterweights

Prerequisite:

- The crane is supported by outriggers as specified.
- The counterweight variant required for crane work is deposited in the counterweight rest.
- The ballast cylinders (Fig. 1, item 1) are retracted, the **red** warning lamp **28** "Counterweight not UP" **must not be lit**, the locking cylinders have been retracted, the yellow indicator lamp **34** "Counterweight unlocked" is lit.

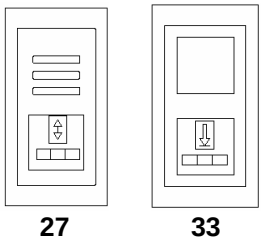


Please refer also description AML, item 8 “counterweight status”, part G2 superstructure.

- Swing the superstructure until the retracted ballast cylinders (Fig. 1, item 1) are located above the grooves of the counterweights. However, do not swing to its central position!

- Actuate rocker tip switch **27** - "Counterweight up - down" to position **"DOWN"** and keep it pressed until the ballast cylinders (Fig 2, Pos. 1) are **extended completely**. The green pilot lamp **33** "counterweight down" is lit.

While the cylinders are being extended, the red warning lamp **28** "counterweight not up" is lit.



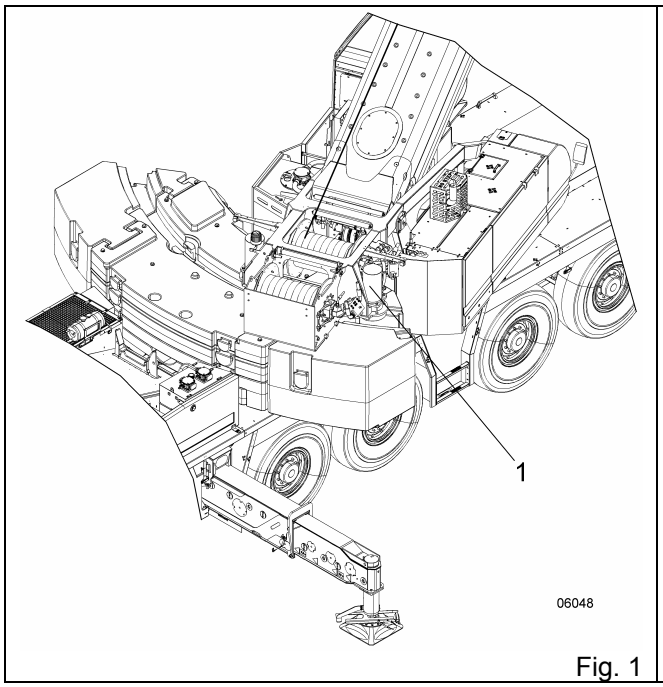


Fig. 1

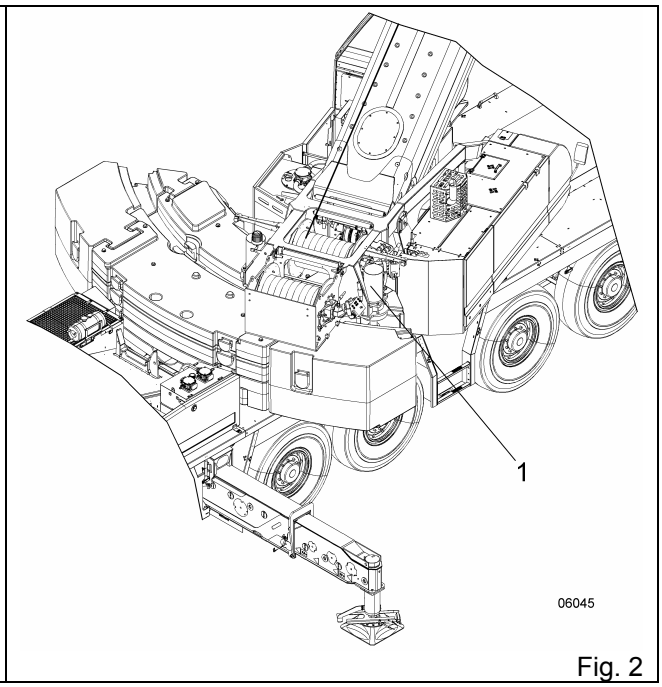


Fig. 2

(cont'd.) 6.6.2.1 Picking up and depositing the counterweights

- Continue to swing the superstructure slowly until it can be locked as described under item B2-2.9 (Fig. 3).
- Engage superstructure lock.

- Actuate rocker tip switch **27** - "Counterweight up - down" to position **"UP"** and keep it pressed until the ballast cylinders (Fig 4, Pos. 1) are **completely retracted**. The green pilot lamp **33** "counterweight down" goes out.

Attention **The counterweight must be centered in its locating devices.**

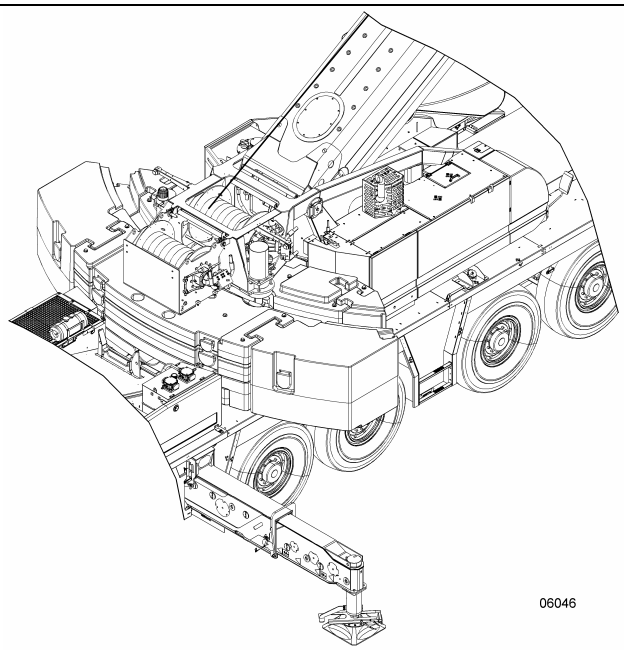


Fig. 3

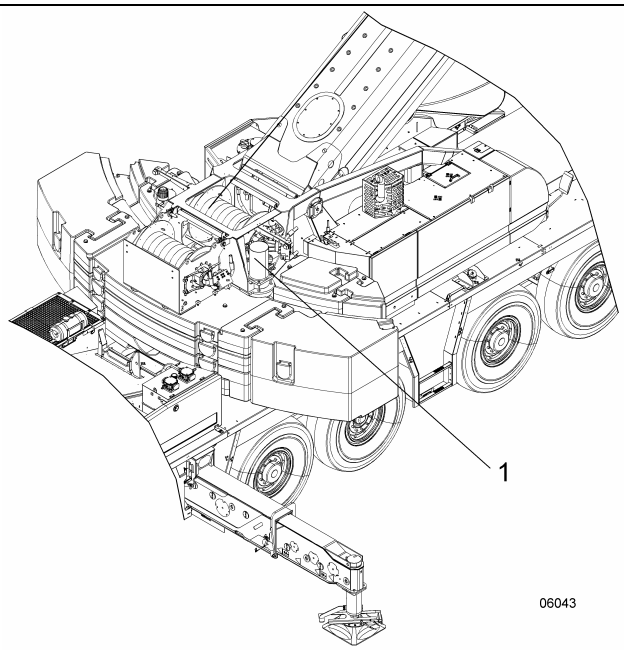
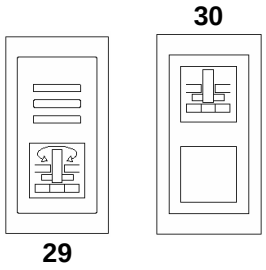


Fig. 4

- While the cylinders are retracted, the red warning lamp **28** "counterweight not up" is lit.

If the ballast cylinders are completely retracted, the red warning lamp **28** "counterweight not UP" goes out.

- Actuate the rocker tip switch **29** "lock / unlock counterweight", and lock the counterweight. The green pilot lamp **30** „Counterweight locked“ is lit, the yellow indicator lamp **34** „counterweight unlocked“ goes out.



Attention **The counterweight can only be locked and unlocked if the ballast cylinders are completely retracted. The red warning lamp 28 "Counterweight not UP" must not be lit.**

NOTE **Before unlocking the counterweight, it may be necessary to actuate the rocker tip switch 27 "counterweight UP/DOWN" to position "UP".**

DANGER **The red warning light 28 "counterweight not UP" must not be lit during crane operation. If it does, no rotary motion is possible. Actuate rocker tip switch 27 - "Counterweight up - down" to position "UP" and keep it pressed until the ballast cylinders are completely retracted. The red warning light 28 "Counterweight not UP" must go out. When it goes on again, stop crane work immediately, find out the reason of the malfunction and eliminate it.**

To deposit and remove the counterweights, proceed analogously by reversing the above procedure.

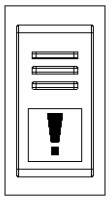
(cont'd.) 6.6.2.1 Picking up and depositing the counterweights

Overriding the swing mechanism/counterweight (emergency control in case of crane shut-off).

If the counterweight is raised to its stop, the indicator "counterweight DOWN" must have gone out.

If the red warning light **28** "counterweight not UP" goes on during crane operation, this may indicate a fault e.g. leaky hoist cylinder.
No rotary movement can be performed!
- Actuate rocker tip switch **31** „Swing mechanism/counterweight override“.

Now, the counterweight can be lifted again and the superstructure can be slewed.



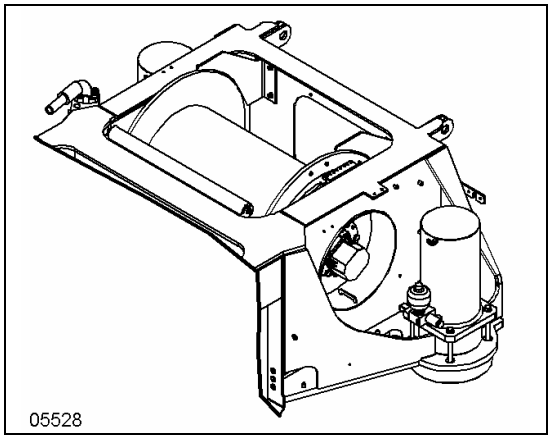
DANGER **To avoid damaging the chassis body components while the counterweight has not reached its upper stop position, rotary motions must be performed with extreme caution.**

6.6.2.2 0.00 t counterweight

No counterweight is mounted.

Driving on public roads is admissible with this counterweight distribution. EC approval.

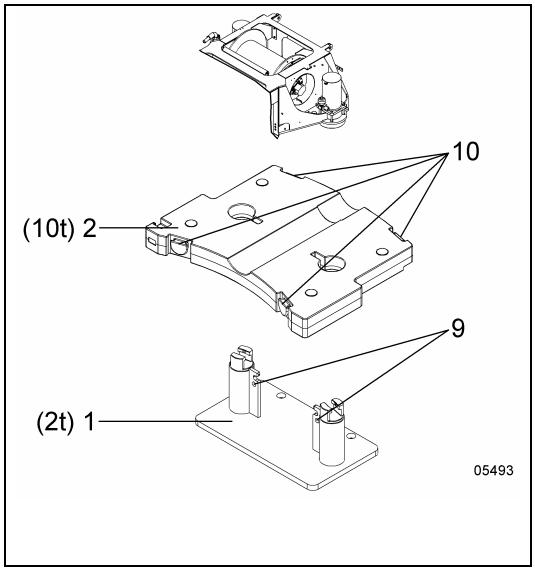
NOTE **Only the 0.00 t load chart data may be used to adjust the AML.**



6.6.2.3 Mounting the 12.0 t counterweight

Attention **Driving on public roads is prohibited with this counterweight distribution. No EC approval.**

DANGER **For driving on the construction site with the counterweight mounted, refer to item 7.4.**



Picking up and fastening the 12.0 t counterweight to the superstructure

Prerequisite:

- The crane is supported by outriggers as specified.
- Fasten counterweight (1) to points (9) using appropriate securing devices, and lift it to the counterweight rest. Pick up counterweight (2) on points (10) and place it on the counterweight (1).

- Mount counterweight to the superstructure as described under item 6.6.2.1.

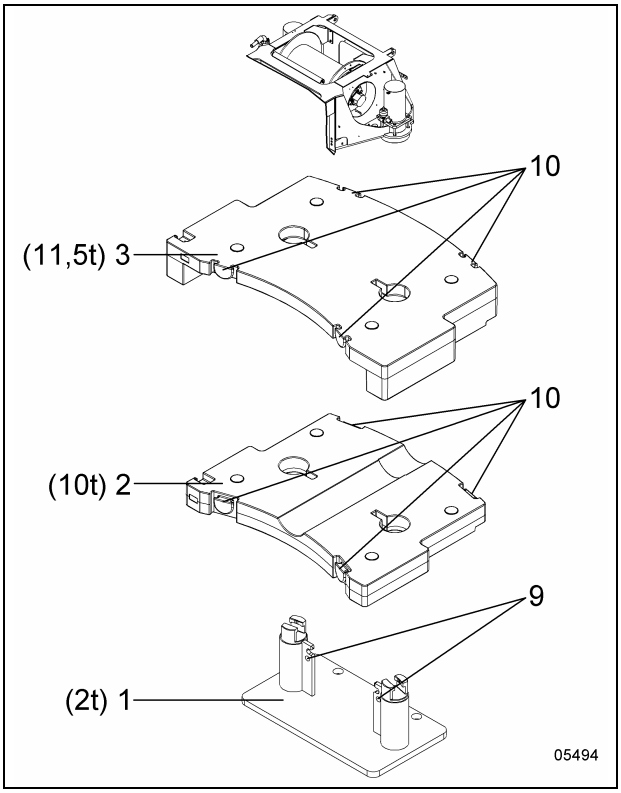
Check visually.

NOTE **Only the 12.0 t load chart data may be used to adjust the AML.**

6.6.2.4 Mounting the 23.5 t counterweight

Attention **Driving on public roads is prohibited with this counterweight distribution. No EC approval.**

DANGER **Driving with mounted counterweight on the construction site refer to item 7.4.**



Picking up and fastening the 23.5 t counterweight to the superstructure

Prerequisite:

- The crane is supported by outriggers as specified.
- Fasten counterweight (1) to points (9) using appropriate securing devices, and lift it to the counterweight rest. Pick up counterweights (2) and (3) on points (10) and place it on the counterweight (1).

- Mount counterweight to the superstructure as described under item 6.6.2.1.

Check visually.

NOTE **Only the 23.5 t load chart data may be used to adjust the AML.**

6.6.2.5 Mounting the 35.0 t counterweight

Attention **Driving on public roads is prohibited with this counterweight distribution. No EC approval.**

DANGER **Driving with mounted counterweight on the construction site refer to item 7.4.**

<u>Picking up and fastening the 35.0 t counterweight to the superstructure</u>

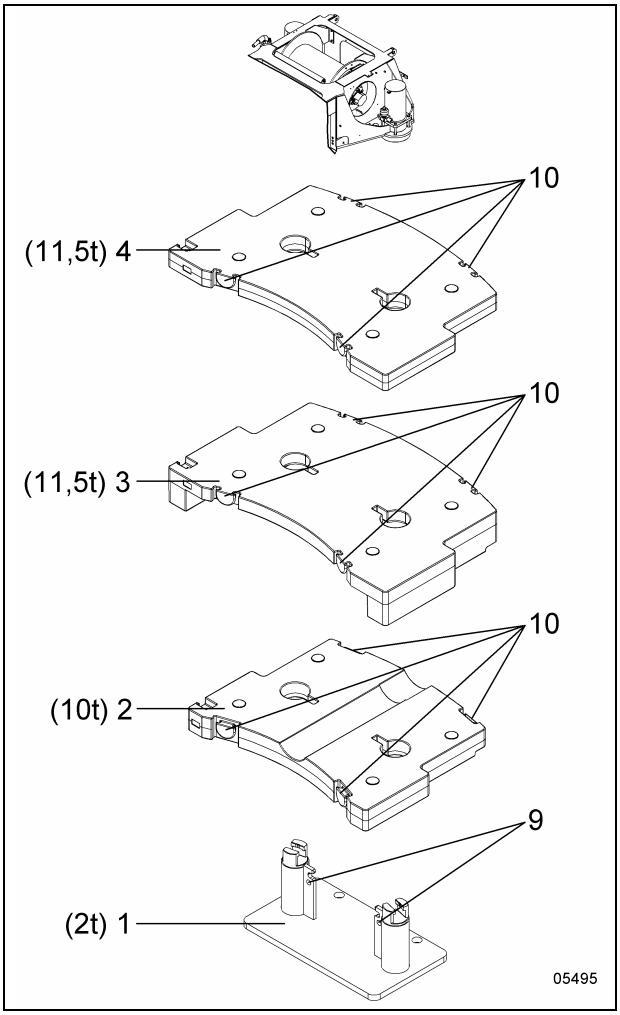
Prerequisite:

- The crane is supported by outriggers as specified.
- Fasten counterweight (1) to points (9) using appropriate securing devices, and lift it to the counterweight rest. Pick up counterweights (2, 3) and (4) on points (10) and place them on the counterweight (1).

- Mount counterweight to the superstructure as described under item 6.6.2.1.

Check visually.

NOTE **Only the 35.0 t load chart data may be used to adjust the AML.**



6.6.2.6 Mounting the 47.0 t counterweight

Attention **Driving on public roads is prohibited with this counterweight distribution. No EC approval.**

DANGER **Driving with mounted counterweight on the construction site refer to item 7.4.**

Picking up and fastening the 47.0 t counterweight to the superstructure

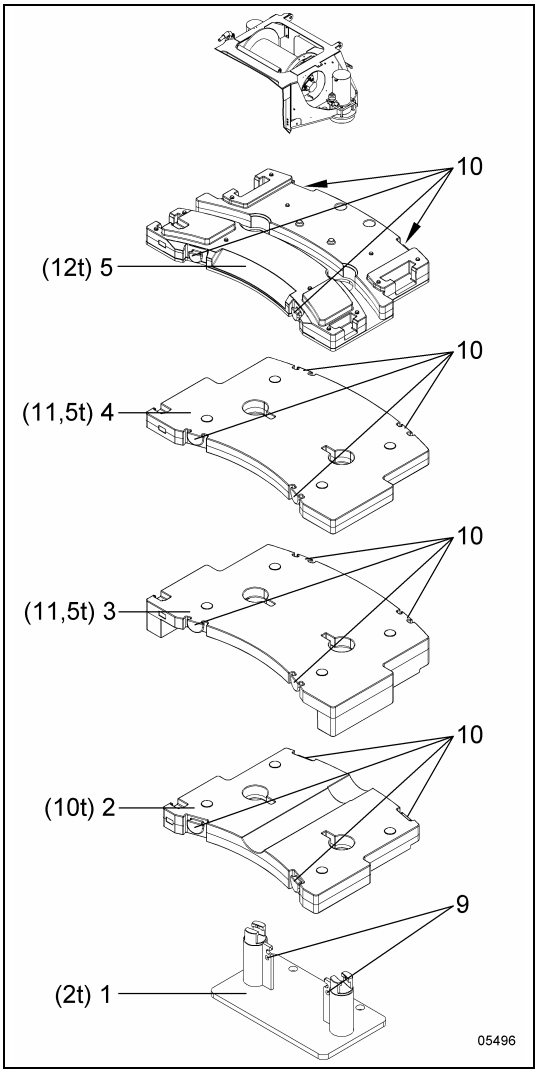
Prerequisite:

- The crane is supported by outriggers as specified.
- Fasten counterweight (1) to points (9) using appropriate securing devices, and lift it to the counterweight rest. Pick up counterweights (2, 3, 4) and (5) on points (10) and place them on the counterweight (1).

- Mount counterweight to the superstructure as described under item 6.6.2.1.

Check visually.

NOTE **Only the 47.0 t load chart data may be used to adjust the AML.**



6.6.2.7 Mounting the 71.0 t counterweight

Attention **Driving on public roads is prohibited with this counterweight distribution. No EC approval.**

DANGER **Driving with mounted counterweight on the construction site refer to item 7.4.**

Picking up and fastening the 71.0 t counterweight to the superstructure

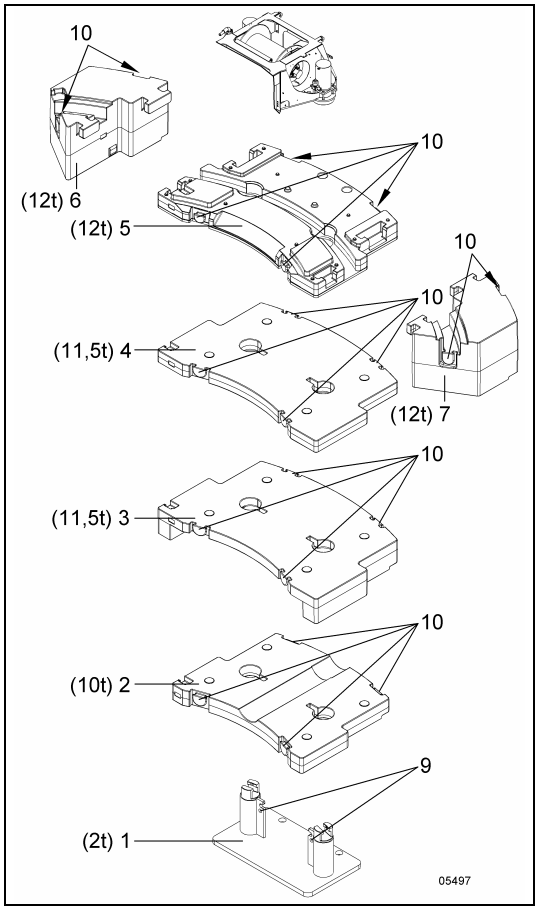
Prerequisite:

- The crane is supported by outriggers as specified.
- Fasten counterweight (1) via points (9) using appropriate securing devices, and lift it to the counterweight rest. Pick up the counterweights (2, 3, 4 and 5) via points (10) and deposit them on counterweight (1). Pick up the counterweights (6) and (7) via points (10) and attach them to counterweight (5).

- Mount counterweight to the superstructure as described under item 6.6.2.1.

Check visually.

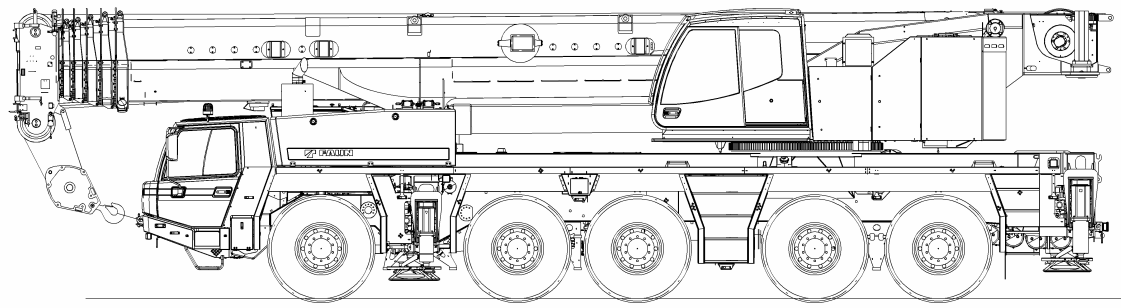
NOTE **Only the 71.0 t load chart data may be used to adjust the AML.**



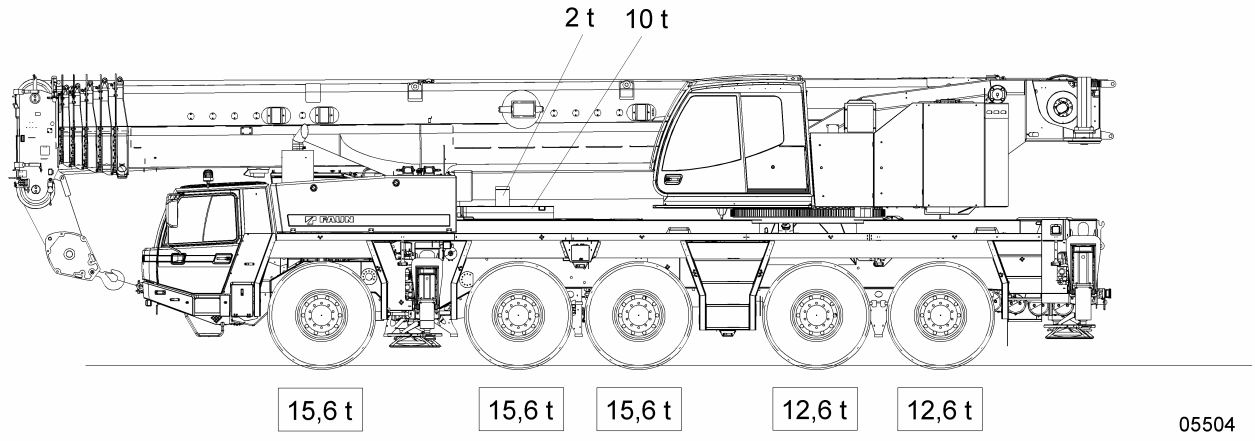
6.6.3 Removal of the various counterweight variants

For removal of the counterweights, proceed analogously by reversing the above sequence of operations.

6.6.4 Distribution of counterweights depending on rig arrangement



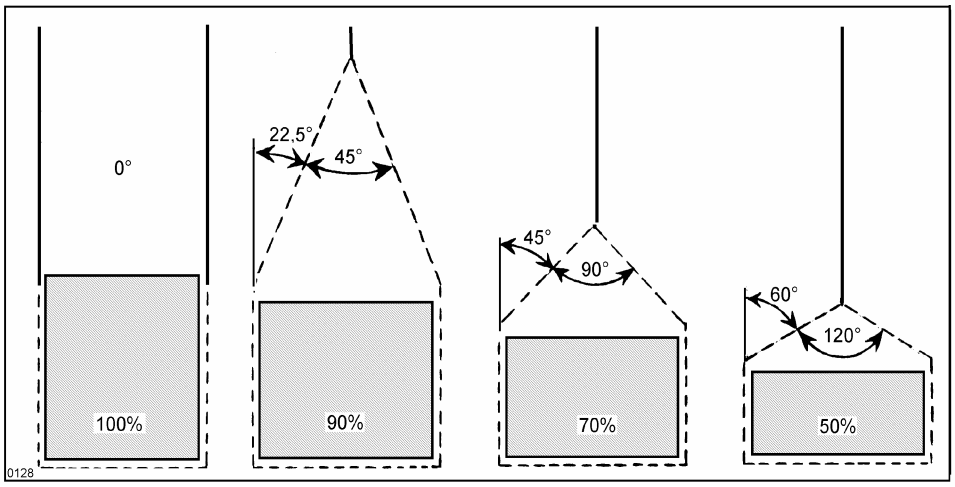
Model	Counterweight (kg)				Remark
	total	deposited on front end	Rear montiert	Auxiliary vehicle	
with driver 25 t hook block attached Tires 445/95 R 25 (16.00 R25) Drive 10 x 8	71000			71000	12t axle load EC homologation



Model	Counterweight (kg)				Remark
	total	deposited on front end	Rear montiert	Auxiliary vehicle	
with driver 25 t hook block attached Tires 445/95 R 25 (16.00 R25) Drive 10 x 8	71000	2000 10000 12000		59000	Axle load exceeding 12 t **no** EC homologation

6.7 Work involving metallic ropes

- On principle, the maximum admissible load bearing capacities of ropes must not be exceeded.
- When attaching ropes, make sure that the spreading angle of 120° is not exceeded. (The spreading angle is the angle included by the ropes). In this case, the angle of inclination is 60°.
- With an angle of inclination of 60°, the tractive force, e.g. in the load securing ropes, has doubled. In this case, the ropes must be designed for twice the load rating.



- Check ropes for wear, breakage of wires and breakage of a strand. Check the fastening of the rope socket.
- Never use old, cut-off load-lifting ropes as load-securing ropes.
- When attaching loads with sharp edges, make sure that rope protective devices are used, e.g. wooden devices, to prevent the rope from being damaged.

DANGER **Make sure that metallic ropes are not knotted.**

- Precise specifications concerning the application and the design of ropes are laid down for Germany in the *"Guidelines for ropes used for hoisting applications".*
- The end connections of ropes must correspond to the application concerned.

Moreover, the legal regulations of the country where the machine is to be used must be observed.

For "Care to the rope", refer to part "C2-6", item 6.6.

6.7.1 Rope reeving

The number of rope falls used depends on the load to be lifted.

The lifting and lowering speeds of the hook block are necessarily reduced by the same number by which the rope falls are increased.

The weights of the bottom block, the jib in transport position, the load-securing ropes etc. are part of the load and must be deducted from the lifting capacities.

The rope socket is fastened depending on the desired number of rope falls.

with an **even** number of rope falls
on the boom head (Fig. 1)

with an **odd** number of rope falls
on the bottom block (Fig. 2).

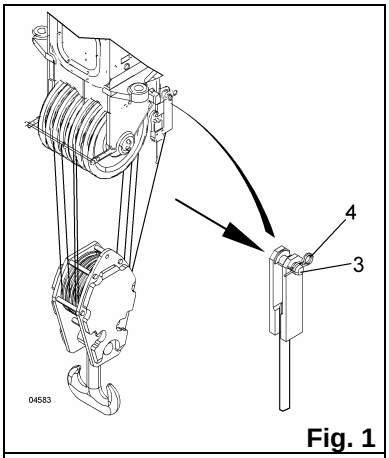


Fig. 1

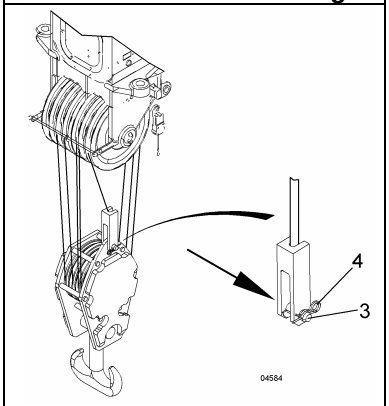


Fig. 2

DANGER **Pin (3) must always be inserted in the direction of the arrow, and be secured by the spring clip (4). Otherwise, there is a risk of collision.**

Attention **With all rope reeving arrangements, the rope end must be guided through the releasing weight of the hoist limit switch before it is secured to the rope socket.**

6.7.2 Placing the rope in the bottom block

NOTE **The bottom block (1) comprises two sheet metal plates (2 and 3) which can be folded off so that the winch rope can be positioned.**

To place the winch rope, remove the two split rivets (4 and 5).
Pull the two pins (6 and 7) out of the bottom block and fold down the sheet metal plates at the sides.

DANGER **Secure sheet metal against to come off.**

After positioning the winch rope, fold the two plates on the left and right back in place, insert the two pins and position the split rivets.

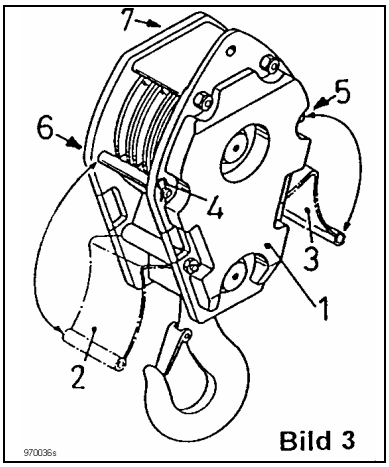


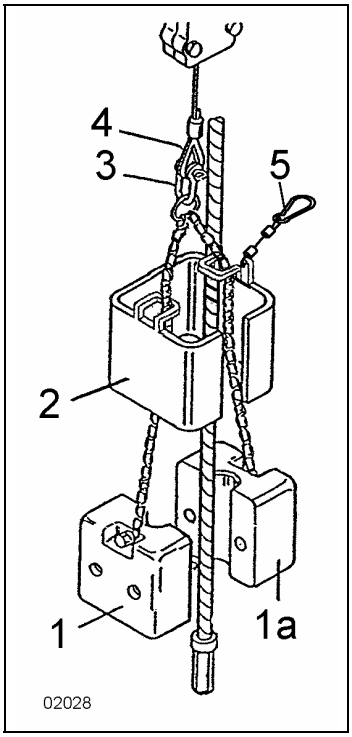
Bild 3

Fig. 3

6.7.3 Releasing weight

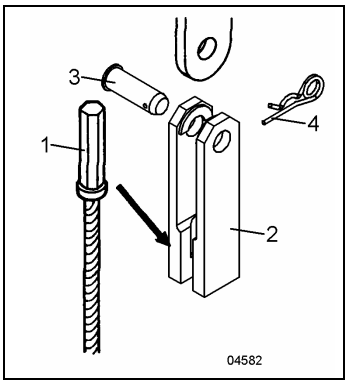
After rope reeving has been finished and the rope socket has been secured to the boom head or the bottom block, depending on the number of rope falls, the releasing weight must be mounted to the rope again.
The releasing weight (1 and 1a) consists of two halves with a retaining device (2).

- Fasten the shackle (3) of the chain in the thimble (4) of the hoist limit switch.
- Arrange the two halves of the releasing weight around the rope and secure them so that the pins of one half of the weight can be inserted into the bore-holes of the other half of the weight.
- Press the weight halves together and push the retaining device (2) over the releasing weight.
- Attach the snap hook (5) in the first chain link above the retaining device.



6.7.4 Rope fastening

When the mobile crane is equipped with its original components, a winch rope with steel wire rope clamp (1) and a rope socket (2) are provided.
In the case of an even number of rope falls, the rope socket is fastened to the boom head; in the case of an odd number of rope falls, it is fastened to the bottom block (refer to item 6.7.1).
The steel wire rope clamp of the winch rope is attached in the rope socket as shown in the illustration. If the locking pin is inserted (3) in the direction of the arrow (refer to item 6.7.1, Fig. 1 and 2) and fastened to the boom head or the bottom block, it is ensured that the steel wire rope clamp cannot be detached from the rope socket. Once the pin has been inserted in the direction of the arrow (refer to item 6.7.1, Fig. 1 and 2), it is essential to secure it by means of the spring clip (4).



Attention **When installing a new rope socket or winch rope, make sure to use only original TADANO FAUN spare parts (refer to data marked on the rope socket).**

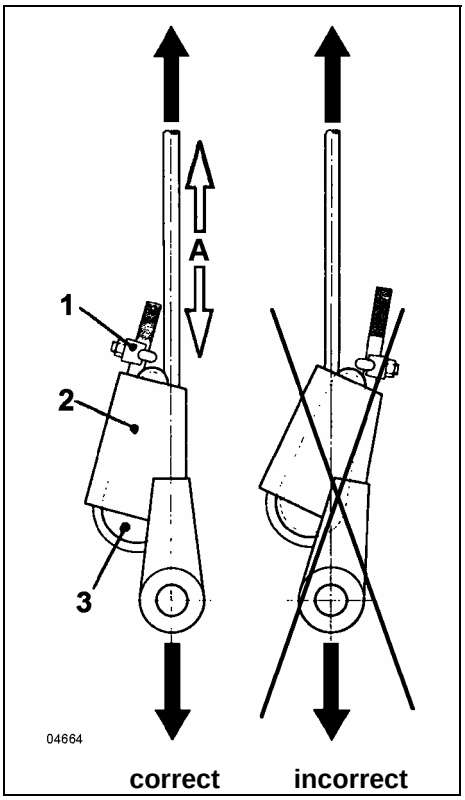
To enable also the use of conventional lifting ropes (without steel wire rope clamp), a conventionally designed rope socket is also provided with the crane (rope end clamp) (refer to item 6.7.4.1).

6.7.4.1 Conventional rope socket (rope end clamp)

If a conventional rope socket is used, the rope must be fastened as described below:

The rope end is fastened to the hook block (in case of an odd number of rope falls) or to the boom head (in case of an even number of rope falls) using a rope socket.

As the rope socket (2) is actually a connecting device which is only closed safely when subject to traction, the free rope end should be secured against pulling through even if a rope key (3) with self-locking function is provided.



The following important instructions must be observed:

- Insert the rope always so that the pulling rope moves in the traction axis of the rope socket (Fig. item "A").

  Should the rope be inserted incorrectly, it would be subject to kinking, breaking and premature wear.

- The free rope end must be locked using a rope clamp (1).

- It is not admissible to use implements as securing devices by means of which the free rope end is connected so that force is transmitted directly to the rope fall carrying the load.

- After the rope socket has been pin-fastened to the boom head or to the bottom block, make sure that the load is gradually increased, until the rope key has reached its end position.

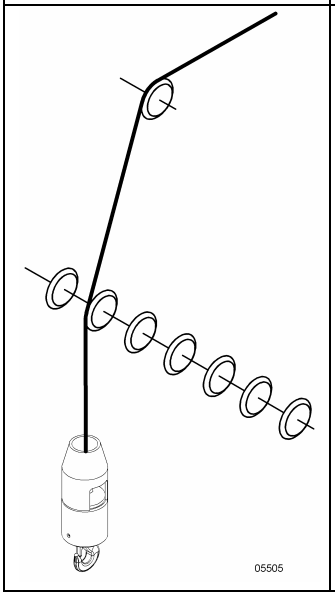
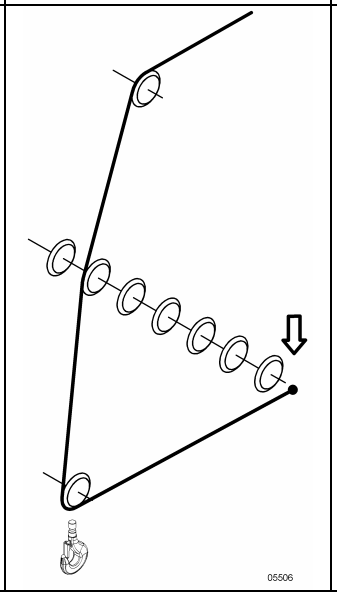
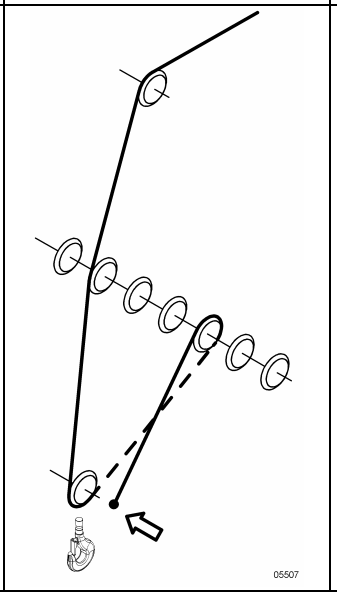
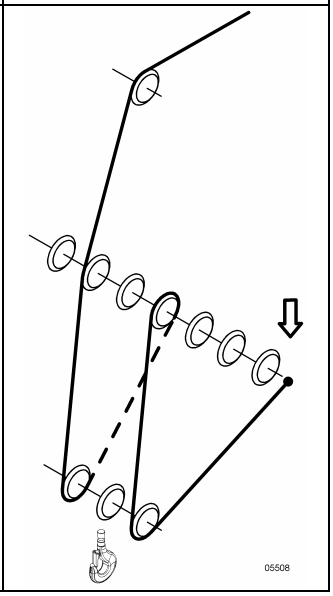
DANGER **Avoid jerky load situations before the rope key is definitely fitted.**

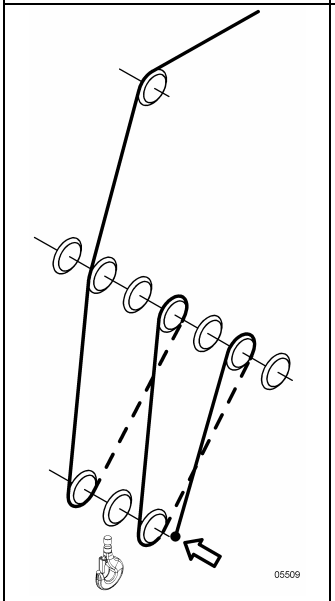
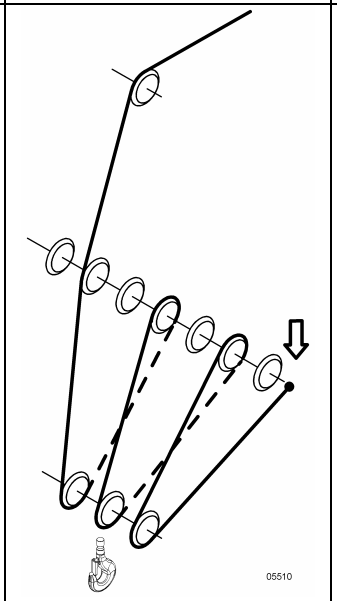
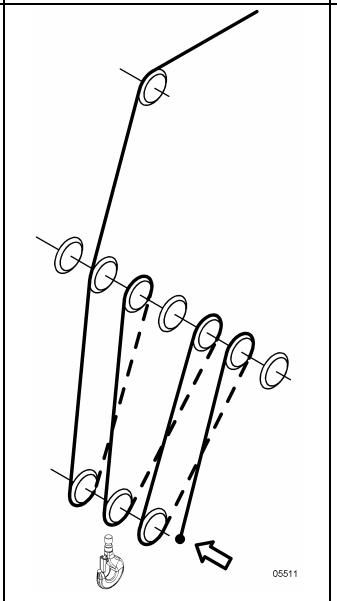
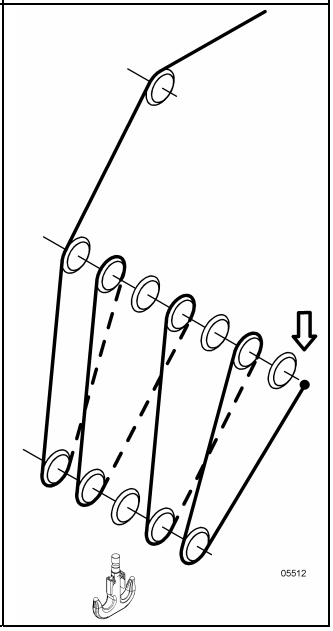
6.7.5 Examples for rope reeving

Depending on the required load to be lifted, the required bottom block and the number of rope falls required for the case in question are indicated in the "Notes referring to the load chart".

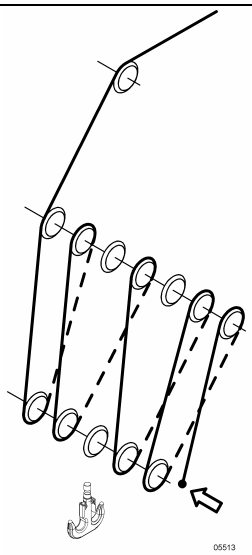
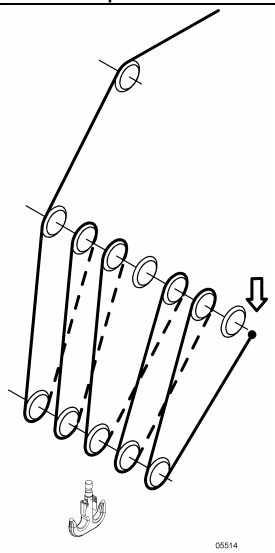
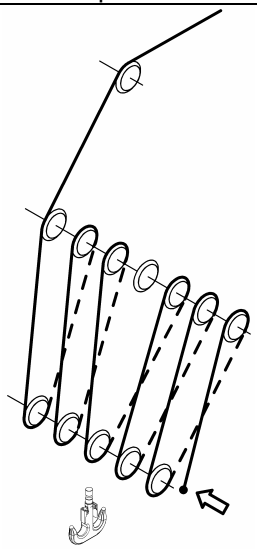
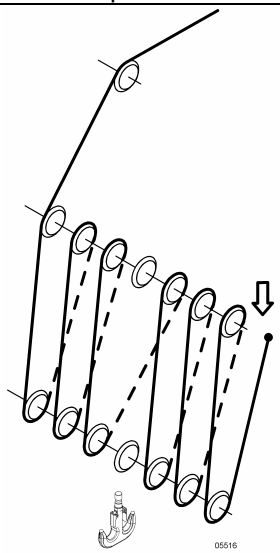
The appropriate number of winch rope falls required must be arranged as follows:

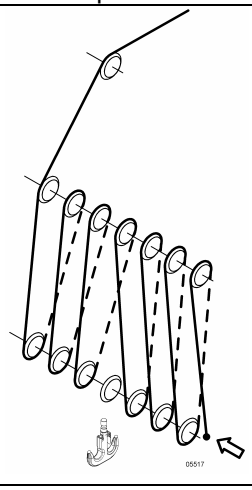
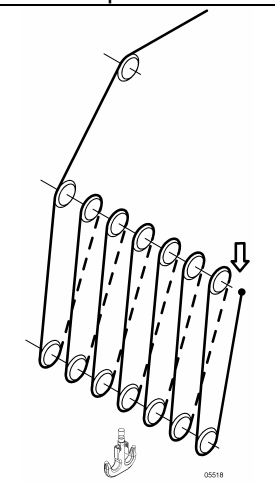
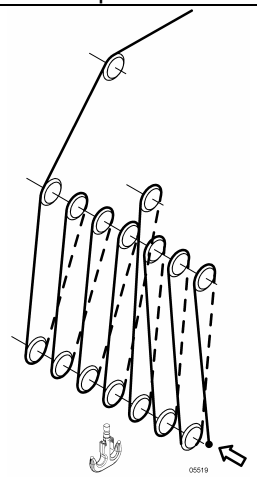
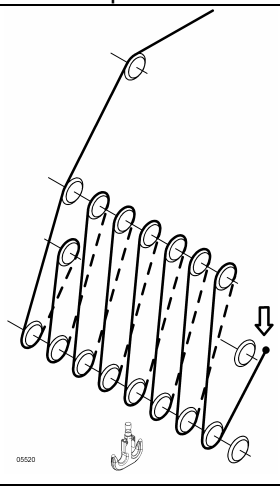
NOTE **The rope should be arranged in the bottom block - especially if few rope falls are used - so that the bottom block is suspended vertically, as far as possible (refer to example with four rope falls).**

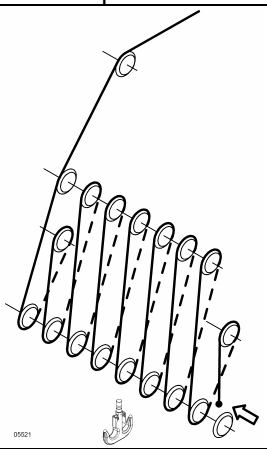
Bottom block, 1 pulley	**Bottom block, 1 pulley**	**Bottom block, 1 pulley**	**Bottom block, 3 pulleys**
arrangement with **1** rope fall	arrangement with **2** rope falls	arrangement with **3** rope falls	arrangement with **4** rope falls
			

Bottom block, 3 pulleys	**Bottom block, 3 pulleys**	**Bottom block, 3 pulleys**	**Bottom block, 5 pulleys**
arrangement with **5** rope falls	arrangement with **6** rope falls	arrangement with **7** rope falls	arrangement with **8** rope falls
			

(cont'd.) **6.7.5. Examples for rope reeving**

Bottom block, 5 pulleys	**Bottom block, 5 pulleys**	**Bottom block, 5 pulleys**	**Bottom block, 7 pulleys**
arrangement with **9** rope falls	arrangement with **10** rope falls	arrangement with **11** rope falls	arrangement with **12** rope falls
			

Bottom block, 7 pulleys	**Bottom block, 7 pulleys**	**Bottom block, 7 pulleys**	**Bottom block, 9 pulleys**
arrangement with **13** rope falls	arrangement with **14** rope falls	arrangement with **15** rope falls	arrangement with **16** rope falls
			

Bottom block, 9 pulleys
arrangement with **17** rope falls


6.7.6 Attaching the bottom block for on-road travel

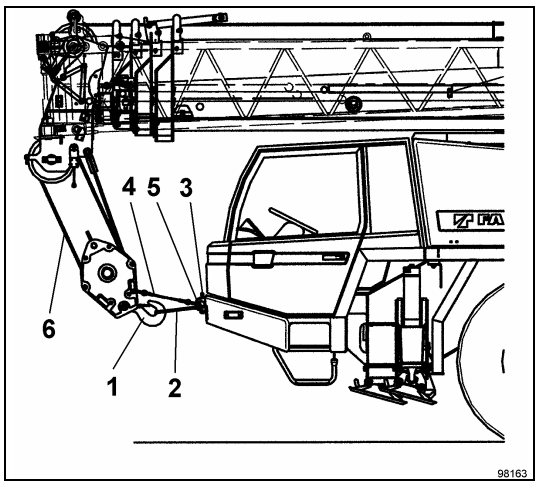
For on-road travel, the bottom block must be attached and secured in the front bumper crossmember as specified.

- The machine is supported by outriggers.
- Retract all telescopes completely.
- Raise the bottom block near the boom head.
- Swing the superstructure forward, in driving direction.
- Raise the basic mast via the boom elevation, until the bottom block is suspended vertically in front of the cabin in the chassis.
- Pass the rope loop (2) through the sliding coupling (3).
- Lower the hook block carefully, until the hook (1) can be attached in the rope loop (2).
- Now continue to lower the bottom block, until the two load securing ropes (4) supplied with the machine can be attached by means of ring hooks between the two towing eyelets (5) (on the left and right of the towbar coupling) and in the openings to the right and left of the bottom block.
- Deposit the basic mast in its end position, while winding up the winch rope (6) slowly and carefully until the two load securing ropes (4) are positioned horizontally and the winch rope is no longer slack.

Attention **To prevent damage to the bumper cross-member, do not tighten the rope more than absolutely necessary. If necessary, have the procedure watched by an assistant.**

6.7.7 Detaching the bottom block for crane operation

- Raise the basic mast via the boom elevation while unwinding the winch rope (6) until the two load securing ropes (4) located between the bottom block and the towing eyelets can be detached.
- Now raise the basic mast via the boom elevation until the hook (1) of the bottom block can be detached from the rope loop (2).
- Remove the rope loop (2) and the load securing ropes (4) and stow them in the tool box.
- Raise the bottom block carefully.



NOTE **Moreover, within the scope of the Federal Motor Vehicle Safety Standards *(in Germany: StVZO)*, the entries in the expert opinion required to obtain the operating license must be complied with.**
Please observe any specific regulations of the country where the machine is to be used which might differ from those mentioned above.

6.8 Inspection of the safety equipment

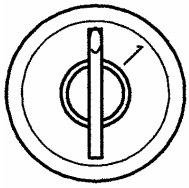
DANGER **Before starting any crane work, make sure that the entire safety equipment of the crane is checked for proper working order.**

6.8.1 Automatic safe load indicator (AML)

- Check the spring-loaded cable drums on the boom for proper working order.
- Check the length transmitter cables for damage.
- Check the AML indicator unit for proper working order (for further details, please refer to part G2 Superstructure, description of the automatic safe load indicator AML).

6.8.2 AML override (item B2-2, pos. 9)

DANGER **The key-actuated push-button may be used exclusively in case of a malfunction of the system, in order to stop operation without delay; by no means, however, to work with the crane in overload condition. Overriding the system during normal crane operation can cause serious damage and tremendous risk to persons and equipment.**



The instruments of the indicator unit and the visual-acoustic warning signal are also operative after overriding has been effected.

Attention **The AML serves only as an emergency switch for a possible overload condition of the crane and to prevent any resulting cases of damage, i.e. accidents.**

6.8.3 Hoist limit switch

The hoist limit switch serves as a shut-off device to prevent the bottom block from knocking against the boom head. The shut-off function must be checked before each crane operation by the working movement "bottom block UP". The bottom block can be lowered as the control lever is actuated to "bottom block DOWN".

Remark: **The expression "hoist limit" is a crane-specific term which refers to a state which occurs when the bottom block touches the boom head.**
If this condition is not prevented, the lifting rope may break, causing the load to be dropped.
The "hoist limit" state may occur when the load is lifted up to the boom head, by lowering the boom via the boom elevation or by extending the telescopic elements while the length of the winch rope wound off is not sufficient.

6.8.4 Key-actuated tip switch "Overriding hoist limit switch / set-up program"

Overriding the hoist limit switch for **controlled further raising** of the bottom block is possible via the key-actuated tip switch **43 "Overriding hoist limit switch"**.
- To override the hoist limit switch, turn the key-actuated tip switch **to the right**.

DANGER **This override function may only be actuated by authorized staff in cases of emergency, and must be returned to normal position immediately afterwards. If this instruction is not observed, this may result in material damage and/or damage to persons.**

6.8.4.1 Key-actuated tip switch "Overriding in set-up program"

- To override the AML in the set-up program, e.g. extending the telescope, turn key-actuated switch (item B2-2, pos. 9) **to the right**.

DANGER **Overriding the system via the key-actuated push-buttons** (item. B2-2, pos. 9) **and 43 during normal operation involves an enormous risk of damage and incalculable danger for persons and material.**

6.8.5 Rope limit switch

The rope limit switch which is mounted to the rope winch disconnects the winch drum rotation during the working movement "bottom block down", when the rope is unwound. This may occur, e.g. in case the maximum number of rope falls is used and with the telescopes extended. At least three safety rope windings must remain on the rope drum. The rope can be wound up again by actuation of the control lever "bottom block UP".

6.9 Over-overriding cutout device for auxiliary winch**)

DANGER **When the bottom block has been removed, the winch rope may be wound up only until its end reaches the hoist winch. If the winch rope is wound over the hoist winch without a load being fastened, the setting of the dead-windings-on-the-rope detecting switch is changed. The cutout device will not function correctly. Once winding it up to the end has happened, readjust the detecting switch position.**

The over-overriding cutout device prevents the wire rope from being damaged or improperly wound which would be caused by lowering the hook block excessively and extra wraps of wire rope required on the winch drum cannot be maintained. When the wire rope left on the drum is reduced to 3 wraps, the over-unwinding cutout function is activated and the operation toward the critical side (lowering of the drum) automatically stops.

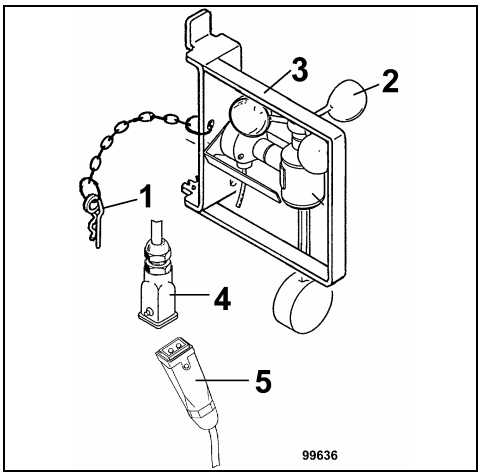
**) Optional equipment

6.10 Anemometer

DANGER **If the admissible wind speed value specified in the load charts has been exceeded, a warning lamp goes on in the AML display. In this case, the boom must be retracted or deposited, and crane operation must be stopped immediately.**

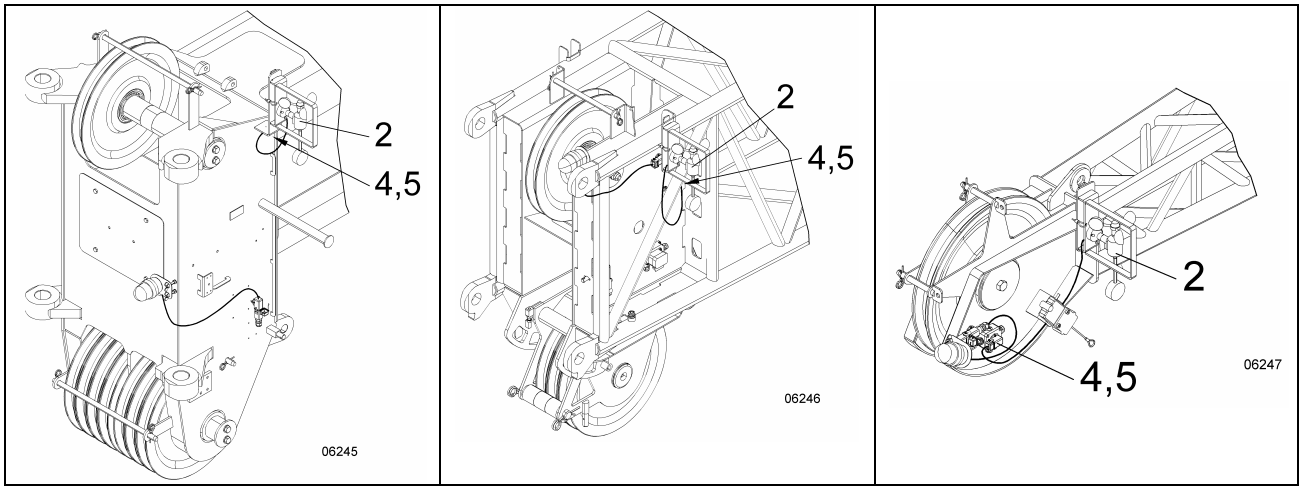
Attention **During traveling operation, the anemometer must be decommissioned or removed (Removal of the anemometer, refer to item 6.10.1).**

6.10.1 Removal of the anemometer



- Remove the plug (5) from the plugbox (4).
- Remove the spring clip (1).
- Remove the anemometer (2) with its retaining device (3).

To mount the anemometer, reverse the above procedure.



Memo:

7 Crane operation with a load fixed to the boom

After the crane operator has read the preceding chapters and familiarized himself with the control elements, the safety instructions and the warning devices, he may start to perform crane work with the superstructure.

The crane operator must especially observe all the instructions for the various working conditions described below and the "Notes concerning the load charts".

- **Before commencing each crane operation, the operating safety of the machine must be checked.**
- **The safety instructions according to part B.0 must be adhered to.**

In the load charts, the ranges indicating the strength of the components and the stability have been identified by *separating lines*.
The ratings indicated ***above the separating line*** are based on the **strength of the components** (danger of breaking in case of overload);
and the ratings ***below that line*** are based on the **stability** (danger of crane tipping in case of overload).

7.1 Crane operation with the machine stabilized by outriggers

The following actions and measures are required for crane operation "stabilized by outriggers".

- Check the ground condition.
- Block the suspension and align the vehicle stabilized by outriggers in horizontal position, according to the instructions (watch spirit levels). The wheels must be clear of the ground.
- Make sure that the applicable load chart and the appropriate values are entered into the ASLI if the outrigger beams are extended to half their supporting base.
- The weight of the load to be lifted must have been determined.
- The bottom block and the arrangement of rope falls must be dimensioned sufficiently.
- The admissible values specified in the load charts must be complied with precisely.
- The weights of the bottom block, the load securing ropes, the crossbeams etc. must be deducted from the lifting capacities.
- The selected load chart must exactly correspond with the desired work condition.
- The wind speed must not exceed the values specified in the Notes referring to the load charts.
- The load surface exposed to the wind must not exceed the values specified in the Notes referring to the load charts.
- The maximum admissible load must not be exceeded.
- The crane movements (speeds) must be selected so that work is effected without jerking, i.e. as smoothly as possible.
- Diagonal pulling is not admissible.
- Lifting the load and actuating the boom elevation with the load fixed to the boom is only admissible within the range of the values specified in the load charts.
- During crane work, the instruments, warning, indicator and pilot lamps and the ASLI indicator unit must always be monitored.
- All crane work is to be performed with the minimum working radius possible.
- It must be checked whether the jib is correctly mounted and whether the ASLI program is set to the rig arrangement required in the case in question.

cont.: **7.1 Crane operation with the machine stabilized by outriggers**

DANGER **Excessively fast initiation of lifting, slewing, braking and actuation of the boom elevation may cause the load to oscillate. The greater the load, or the greater the boom length, the more carefully the motion in question must be initiated.**

! Perform all crane work with due care and attention. !

7.2 Crane operation "free on wheels"

Not admissible (observe the notes referring to the load charts)!

7.3 Driving with a load

Not admissible (observe the notes referring to the load charts)!

7.4 Moving the crane in full rig arrangement on construction sites

For the conditions for driving the crane in full rig arrangement on construction sites, refer to item 7.4.1 and 7.4.2, Notes and Tables.

7.4.1 Instructions for moving the crane in full rig arrangement on construction sites

Refer to the Notes referring to the load charts and the information provided under item 7.4.2.

7.4.2 Front and rear axle loads for moving the crane in full rig arrangement on construction sites.

3rd axle lifted, axle load data referred to the center of the 1st and 2nd axle or the center of the 4th and 5th axle

			Counterweight											
			0t		12t		23,5t		35t		47t		71t	
Length of main boom (m)	**Length of fly jib** (m)	**Boom angle** (°)	Axle load(t)											
			1st & 2nd.	**4th & 5th.**	**1st & 2nd**	**4th & 5th**	**1st & 2nd.**	**4th & 5th**	**1st & 2nd.**	**4th & 5th**	**1st & 2nd**	**4th & 5th**	**1st & 2nd**	**4th & 5th**
13,3	**without**	30			20	52	28	55	36	59				
		42			23	49	31	52	40	55	49	58	65	65
		60	19	41	27	45	36	48	44	51	53	54		
	5.4 / 13.2 laterally in transport position	30			19	55	27	58						
		47			23	50	31	53	40	57	48	60	66	66
		60	18	43	27	46	36	49	44	52	53	55		
	5.4 mounted to boom head	47			22	50	31	53	39	57	48	60	66	66
		60	18	43	26	46	35	49	44	52	52	55		
	13,2 mounted to boom head	50			22	51	31	54	39	57	48	60	66	66
		60	17	44	26	47	35	50	43	53	52	56		
	19,2 mounted to boom head	54			23	50	31	54	40	57	49	60	66	66
		60	16	45	25	48	34	51	42	54	51	57		
	25,2 mounted to boom head	57	15	47	23	51	32	54	40	57	49	60	66	66
	31,2 mounted to boom head	60			23	51	32	54	40	57	49	60	67	67
	37,2 mounted to boom head	63			24	51	32	54	41	57	49	60	67	67

inadmissible ranges

cont'd.: **7.4.2 Front and rear axle loads for moving the crane in full rig arrangement on construction sites**

Note:
Boom over-rear and superstructure lock pin inserted, swing brake engaged; solid, resistant, level and horizontal ground, suspension locked, specified tire pressure, max. 1.4 km/h at creeping speed, if possible, with the outrigger beams extended and the outrigger floats as close as possible above the ground.
With the 3rd axle lowered (12 t), the front / rear axle loads are reduced by approx. 6t / 5t.

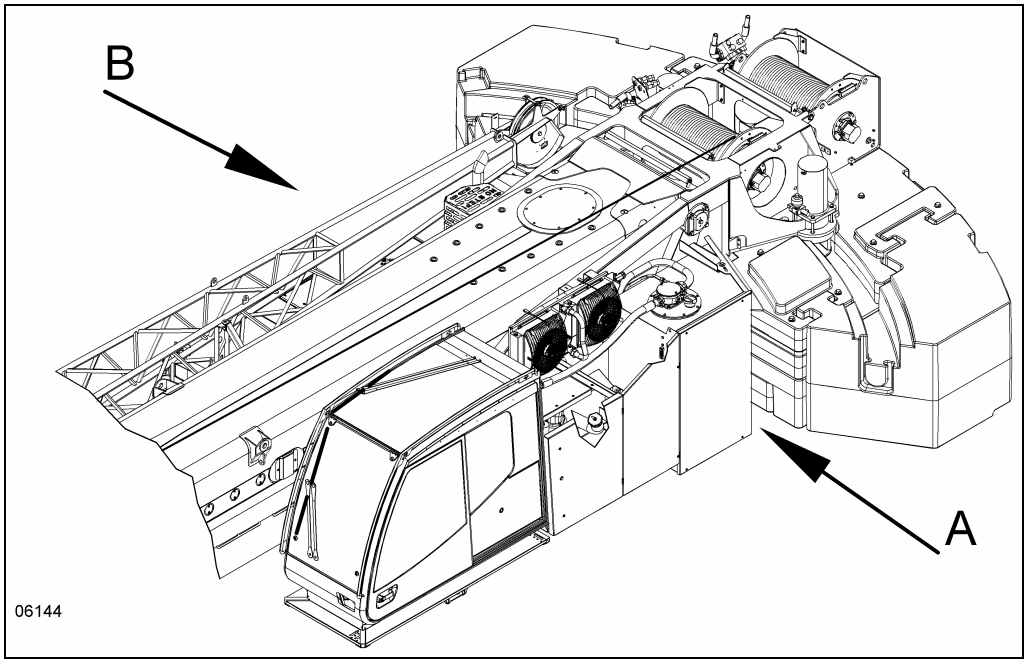
8 Emergency control functions and elements

In case of failure or malfunctions of various control and operating elements, or in case of malfunctions of the electrical equipment, the functions which failed might be effected, e.g. via emergency controls. However, these emergency control elements may only be used to complete the current crane movement and to reset the crane to its former rig arrangement. Afterwards, the reason for the damage must be determined immediately and the damage must be eliminated. For the position of the solenoid valves, refer to the following diagrams.

DANGER **Emergency control elements must never be used instead of the controls for normal operation. Any damage to the control and operating elements must be eliminated immediately.**
If the superstructure is moved via the emergency controls, no unauthorized persons are allowed in the area of movement.
The operator must be able to see the area of movement. Otherwise, another person must be designated to act as signal person.

Attention **Make sure that emergency control devices with rubber caps are never actuated with sharp-edged or pointed objects! Should the rubber caps be damaged, this may result in failure of the valves.**

NOTE **Emergency control “Telescoping”, refer to part B2-6, item 6.4.3.**
Optional equipment "Superstructure emergency control", refer to chapter B2-11.



8.1.1 Actuation of the emergency tip switches

- Start the engine.
- Set the engine to idling speed.
- ● The vehicle is supported by outriggers.

8.1.1.1 Counterweights up / down

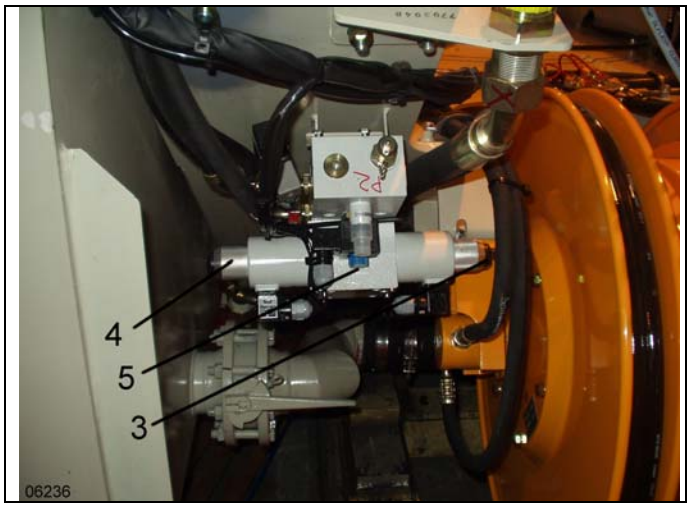
3 counterweight up,
4 counterweight down,

while

5 activating the counterweight

simultaneously.

A



8.1.1.2 Slewing the superstructure

Release superstructure lock, refer to B2-2, item 2.9.

6 Release swing brake

while

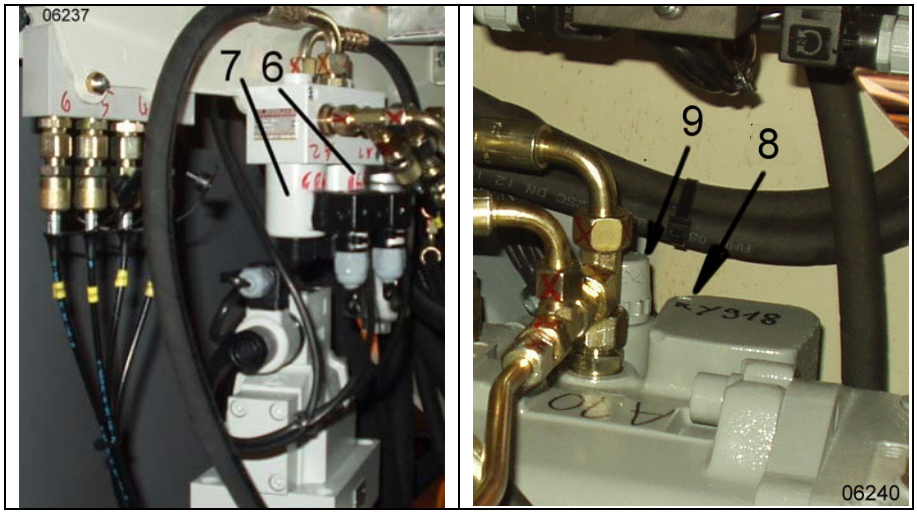
8 slewing to the right
or
9 slewing to the left

and

7 actuating arm rest override feature

simultaneously.

B



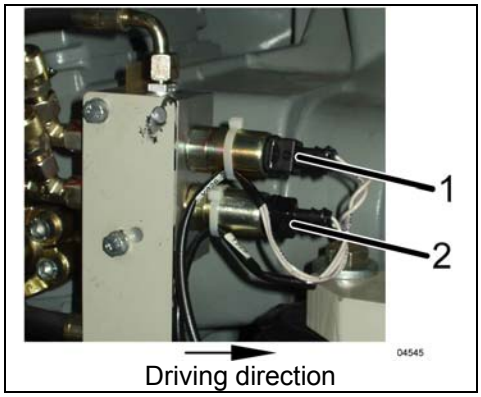
8.1.1.3 Hydraulic pumps for crane control

When the pump control fails, the hydraulic pumps can be connected via the emergency control. Now, crane motions are possible.

NOTE **Before actuating the control valves 1 and 2, make sure to remove the connectors and – once actuation is terminated – reposition them.**

1 hydraulic pump 1
2 hydraulic pump 2

B



9 Operation in winter

Depending on the climatic conditions of the area where the crane is to be used, the weather conditions may be more or less extreme during the winter months. Thus, the instructions mentioned below must definitely be observed to ensure trouble-free and safe operation in winter.

DANGER **Particular care is required when climbing up or using steps, ladders and platforms in damp weather and snow.**

- Access steps and platforms must be cleaned to remove dirt, oil, grease and smeary substances.

! Risk of slipping !

- Loose snow, frozen layers of snow and ice may form a dangerous coating on the boom surfaces, counterweights and platforms of the superstructure.

! Risk of accidents !

- Snow and ice must be removed from the chassis and the superstructure before work is started.
- Snow or lumps of ice which are blown down or which fall down during crane operation may endanger other persons.

! Risk of accidents !

DANGER **In case of extremely low freezing temperatures, do not touch metal surfaces with your bare hands - danger of freezing to metal surfaces!**

NOTE **The recommended oil sorts acc. to part "C2 Service and maintenance – superstructure" apply for the following assemblies.**

9.1 Engine

9.1.1 Engine oil

In order to ensure a sufficient lubrication in case the vehicle is to be started at low ambient temperatures, the viscosity of the engine oil must be selected according to the ambient temperatures prevailing at the time when the engine is started.
The specifications of the engine manufacturer supplied in a separate brochure must be adhered to.

9.1.2 Coolant

Attention **The engine must be filled with anti-corrosion - anti-freeze agent all the year round.**

The engine must be checked for a sufficient portion of coolant or anti-freeze agent in time, before the temperature drops below zero.
The specifications of the engine manufacturer supplied in a separate brochure must be adhered to.

9.1.3 Diesel fuel

To avoid operating malfunctions, the winter diesel fuel available on the market during the cold season must be used. If only summer-type diesel fuel is available, or if the winter-type diesel fuel is used at very low ambient temperatures, a certain amount of petroleum, the quantity of which depends on the ambient temperatures, must be added to the fuel in order to avoid segregation of paraffin.
Refer to Operating Manual of engine manufacturer which is supplied with the vehicle!

The approximate values for the amounts of additive are indicated in the operating manual of the engine manufacturer.
There is a simple method to check the diesel fuel for its suitability at the prevailing low temperatures:

- Fill diesel fuel in a flask and expose it to the ambient temperatures. If flakes (paraffin) develop in the fuel, it is only suited for operation at higher temperatures.

9.1.4 Starting the engine at low ambient temperatures

For the steps to be taken and for further details, please refer to the operating manual of the engine manufacturer.

9.2 Warming up the hydraulic oil or changing the oil type

At low ambient temperatures, the hydraulic oils recommended in part "C2" Inspection, Service and Maintenance - Superstructure must be used.

If the oils to be used at the appropriate ambient temperatures approach the limits (values of max. 10°C below the minimum temperature limit are admissible), the hydraulic oil can be warmed up without requiring a change of the oil type.

The hydraulic oil can be warmed up approximately to service temperature in a very short time by "retracting the boom elevation cylinder" (to its mechanical stop) or by repeated extending or retracting the telescopes.

The admissible service temperature is approx. 70-80°C.

Attention **Avoid relatively high engine speeds while the hydraulic oil is still cold. Allow the oil to warm up at least until it reaches the lower service temperature level.**

If the hydraulic system is filled e.g. with hydraulic oil HLP 68 or HLP 46, the oil type must be replaced by the specified pressure fluids at low ambient temperatures.

9.3 Batteries

Well-charged batteries are a prerequisite for cold-starting the engine.

At ambient temperatures lower than -30°C, when the machine has been standing in the open air for an extended period of time without being operated (e.g. at night), the batteries must be heated or removed from the vehicle and stored in a warm room.

In winter, the current consumption should be kept as low as possible.

Check the acid density and the acid level as described in part "C2 Service and Maintenance - Superstructure".

Discharged batteries freeze at temperatures starting from only -10°C.

The instructions of the battery manufacturer must be observed.

9.4 Adjustable air vents

The adjustable air vents (refer to sect. B2-2, items 5; 22 and 30) serve to direct the heated or fresh air flow.

9.5 Windshield washing system

During the winter months, a certain amount of anti-freeze agent for windshield washing systems, the quantity of which depends on the temperature, must be added to the water of the windshield washing system.

The washer water is made frost-proof by adding washer additives (cleaning agent and anti-freeze agent for windshield washing systems). Observe the manufacturer's instructions for use.

11 Attachments, optional equipment and accessories

The optional equipment of the vehicle is listed and explained in this chapter. Subitem 11.1 presents an overview of the optional equipment which has been described and explained in other sections.

11.1 Optional equipment mentioned in other sections

11.1.1 Assignment of functions to the left crane control lever in case of operation with a 2nd winch (auxiliary hoisting gear)

Refer to item: B2-6.2.1.2

11.1.2 Connecting - disconnecting the auxiliary hoisting gear (2nd hoist winch)

Refer to item: B2-6.2.1

11.1.3 Over-overriding cutout device for auxiliary winch

Refer to item: B2-6.9

11.2 Positioning the double ladder for mounting the jibs, and for access to the crane superstructure

NOTE **A double ladder is supplied with the vehicle for assembly and maintenance work on the jib, or - provided the jib is folded to the boom - on the superstructure assemblies. The ladder is located below the driver's cab.**

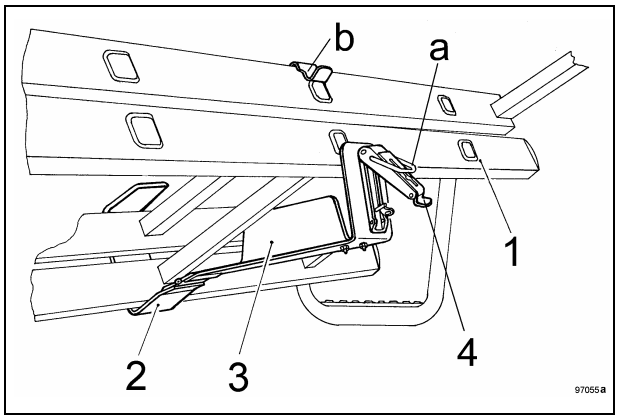
DANGER **The ladder may only positioned on solid, level ground. The safety instructions provided for the use of ladders and access steps must be observed; otherwise, there is a RISK OF ACCIDENTS.**

11.2.1 Fastening and locking the ladder:

- Slip the ladder (1) into the rear part of the angular supports (2).

NOTE **The struts (3) on the movable end of the supports must be in full contact with a rung of the ladder, to prevent the ladder from slipping sideways.**

- Attach eyelets of turnbuckle (a) in the locating cramps (b), fold turnbuckles (4) down and secure them using the catch lever.
- Fasten one of the two catch levers with the padlock supplied with the machine.

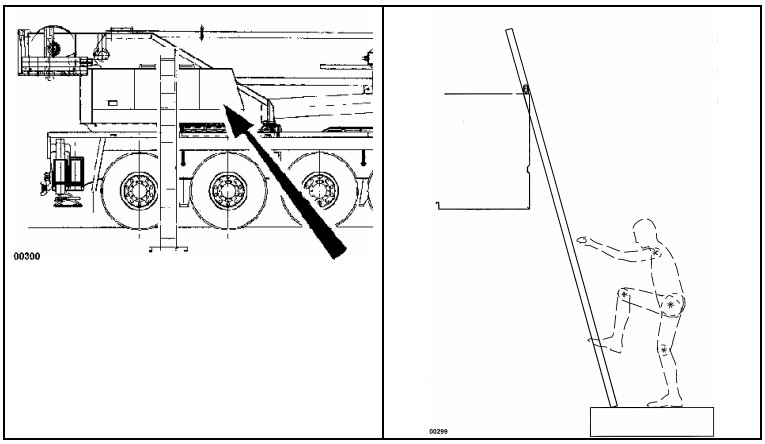


DANGER **Check the ladder at regular intervals for proper fastening and tight fit. Loss of the ladder during travelling operation may result in serious accidents.**

11.2.2 Positioning the ladder

- Remove the ladder from its supports below the driver's cab.
- Unfold ladder completely and rest it against the superstructure in an appropriate position (example: refer to illustration to the right).

To remove and stow the ladder, reverse the above procedure.



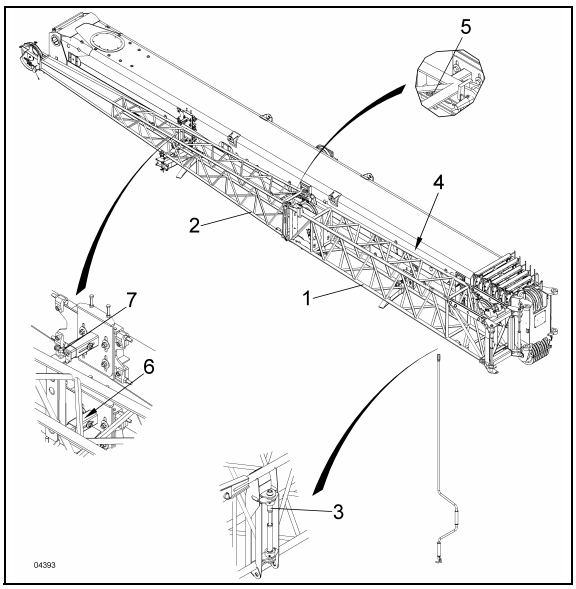
11.3 Mounting the jib (boom extension)

11.3.1 Mounting the jib (base section and top jib) to the boom

Prerequisite:

- The vehicle is supported by outriggers.
- The gearbox is in neutral position, the parking brake engaged, the engine is stalled.
- The boom has been stowed in its rest.
- Swing brake engaged.

- Lift jib (base section (1) and top jib (2) **secured to it by means of pins**) to the boom using an appropriate load fixing device.
- Adjust the jib. The bore-holes on the boom must coincide with the threaded pins of the spindle (3).
- Insert the crank in the threaded pin of the spindle (3) and turn the pin until the pin sections are completely inserted in the bore-holes on the boom.

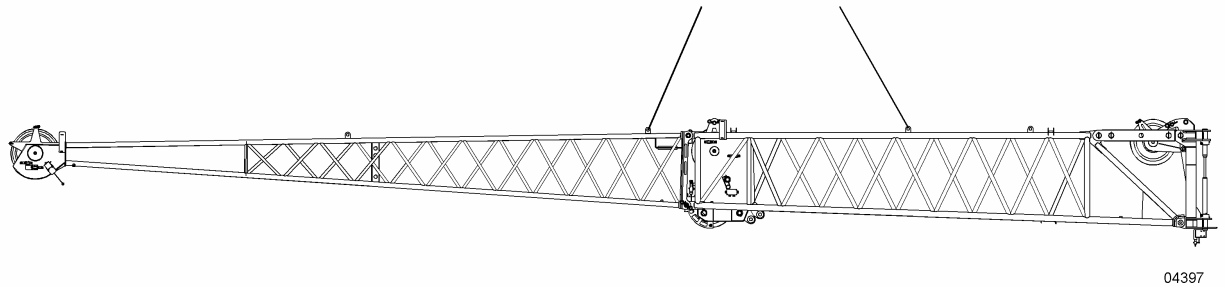


DANGER **The colored mark (F) on the spindle must be completely visible.**

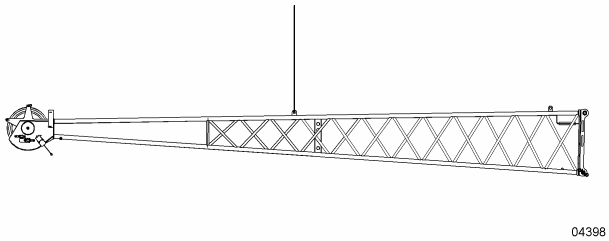
- Remove the crank from the threaded pin.
- Fasten the base section (1) using pin (4) and lock it by means of spring clips.
- Fasten the top jib (2) using the pins (5), (6) and (7), and lock it by means of spring clips.

The pin fastening is also shown under item 11.4.6, Fig. 1.

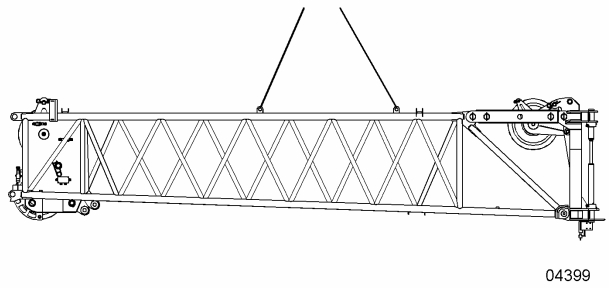
For disassembly, proceed analogously by reversing the above sequence of operations.



Points of attachment on base section and top jib (Weight: ca. 1400 kg)



Point of attachment on top jib (Weight: ca. 400 kg)



Points of attachment on base section (Weight: ca. 1000 kg)

11.4 Jib

The jib consists of a base section and various lattice-type extension elements. The jib can be adjusted to 3 angular positions.

DANGER **If working from an elevated position is absolutely necessary, use a platform or the double ladder supplied with the crane to prevent falling and to ensure safety.**

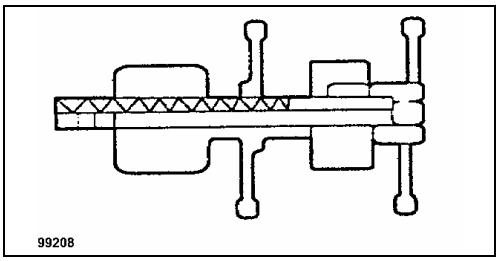
DANGER **For safety reasons, before starting crane operation with the jib (base section, or base section with top jib) folded to the basic boom, all pin connections, securing devices and fasteners on the jib and the basic boom must be checked.**
When crane work is performed with the jib folded to the boom in transport position, or during work over the main boom with the jib mounted to the boom head, the lifting capacities indicated in the load charts are reduced by the values indicated in the notes referring to the load charts.

DANGER **Take the necessary precautions to ensure that no one enters the area over which the jib will swing. Anyone standing in this area could be injured. Also check the neighboring area for any structure or other obstruction that may present a problem when moving the jib.**

DANGER **Whenever performing work on the jib, use the double ladder supplied with the crane.**

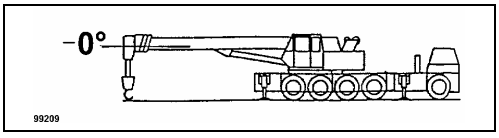
DANGER **Picking up loads which are resting on the ground by raising the boom via the boom elevation may result in overload to the jib, the winch rope or the crane overturning.**
There is a RISK OF OVERTURNING!
This movement "boom elevation - up" is not stopped by the overload safety device.

The following work must be performed and the following instructions must be observed before mounting is commenced:



- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.

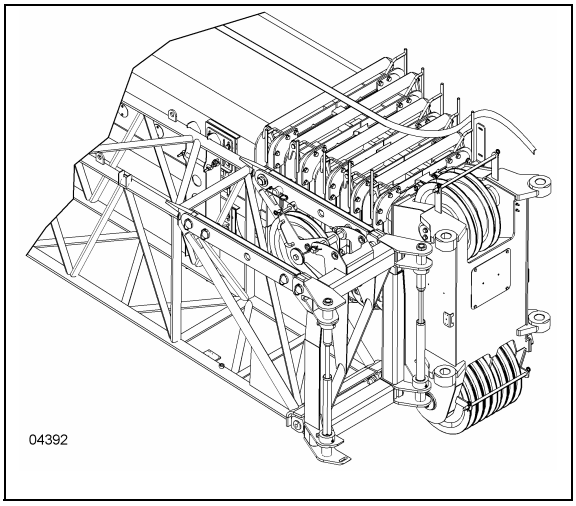
- The superstructure is slewed to the rear, the boom is lowered to 0° via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.



- While mounting and removing the jib, make sure that there are no obstacles in the area of movement.
- The crane must not be moved during assembly of the jib.
- **The appropriate rig arrangement of the jib must have been keyed-in in the AML (refer to load charts).**

11.4.1 Preparation for mounting the jib to the boom head

- Slightly lower the boom via the boom elevation (0° position).
- Place the bottom block on the ground.
- Disconnect the rope socket from the bottom block or from the boom head by releasing the pins.
- Remove the winch rope from the rope socket.
- Pull the winch rope out of the releasing weight of the hoist limit switch.
- Remove the winch rope falls from the bottom block and the rope sheaves on the boom head.
- Wind up the winch rope. Make sure that the winch rope is not dragged on the ground.
- Rest the winch rope on an appropriate surface as shown in the illustration.



NOTE **In case of crane work via the main winch over the boom head and the auxiliary hoisting gear via the jib, the bottom block need not be removed.**

11.4.2 Mounting the base section to the boom head

The steps described under item 11.14.1 have been accomplished.

- Fasten a lifting strap (1) or a similar device to the top end of the jib (base section) and in an appropriate location on the superstructure.

Releasing the top jib:

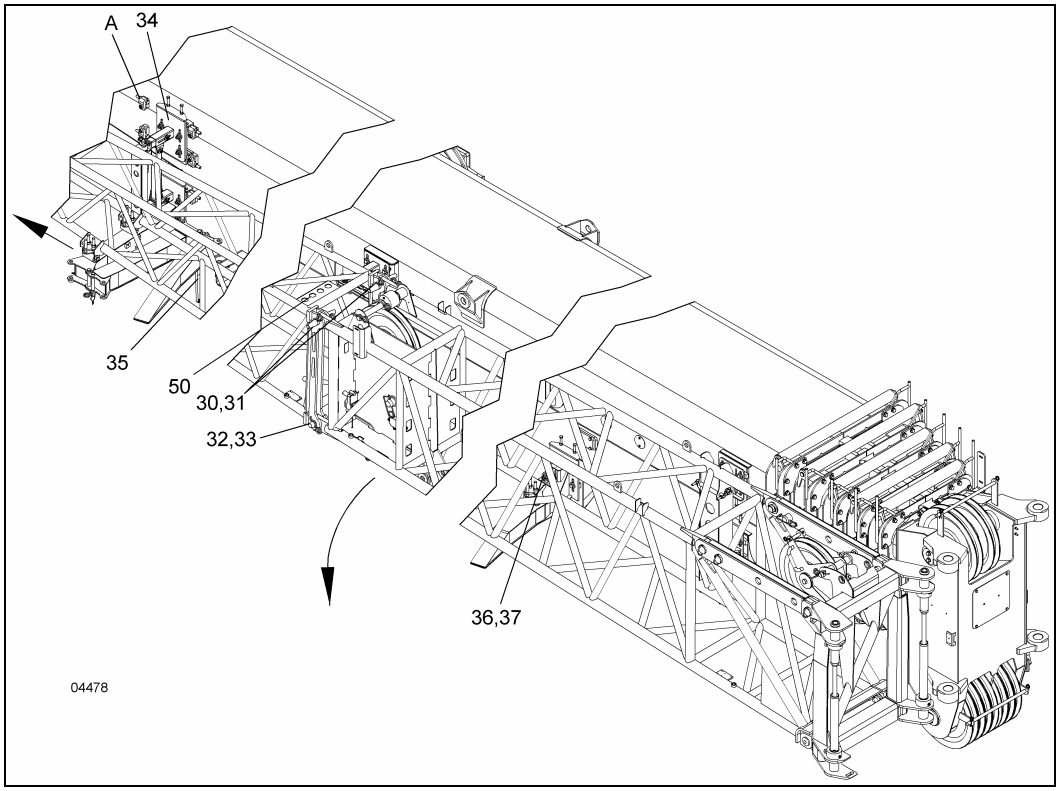
- Remove the upper spring clip and pins (30 and 31).
- Remove the lower spring clip and pins (32 and 33).

DANGER **The securing pins of the top jib must be inserted and remain locked.**

NOTE **Insert pins in supports (50) and lock them using the spring clips.**

- Shift the top jib in the direction of the arrow using a ratchet (35) until the bracket (34) touches the stop (A).

Now the base section is disconnected from the top jib and can be mounted to the boom head.



- Remove the spring clip and securing pin (36 and 37).
- Swing jib (base section) in the direction of the arrow to its stop.

cont'd.: **11.4.2 Mounting the base section to the boom head**

- The locating bore-holes of the jib (base section) (8) must coincide with the bore-holes of the boom head (7).

Fasten jib (base section) (8) to boom head (7).

- To this effect, turn the threaded pin of the spindle (9) using the crank (10) until the top and the bottom pin sections are completely inserted in the bore-holes of the bearing brackets.

DANGER **The colored mark (F) on the spindle must be completely visible.**

- Remove the crank from the spindle.

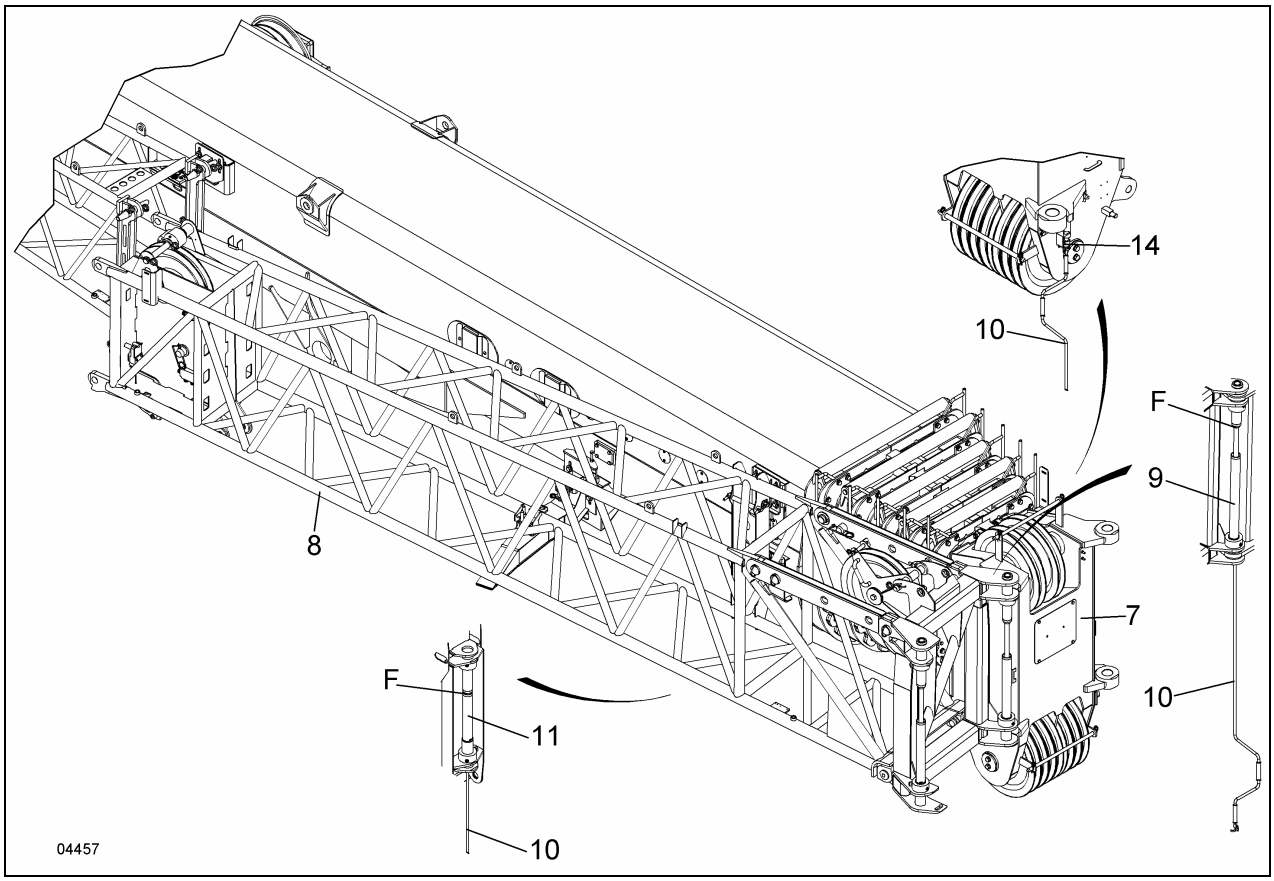
Detaching the jib (base section) from the boom:

- To this effect, turn the threaded pin of the spindle (11) using the crank (10) until the top and the bottom pin sections are completely moved out of the bore-holes of the bearing brackets.

NOTE **The colored mark (F) on the spindle must not be visible. The spindle pins must touch.**

DANGER **Before pivoting, make sure that the two pin sections of the spindle (11) are inserted in the bearing brackets.**

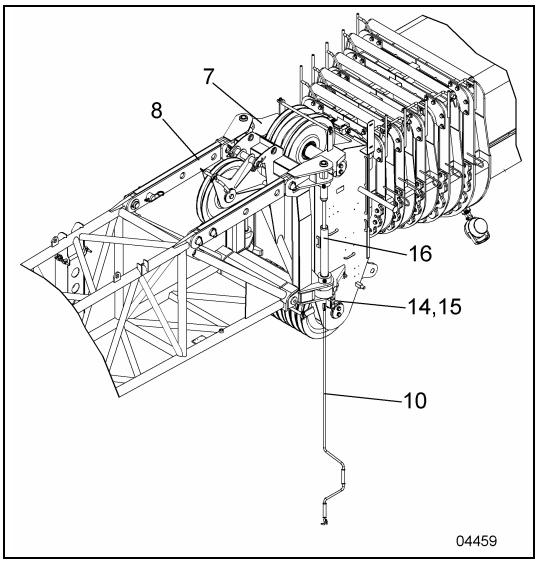
- Release locking mechanism (14) by means of the crank (10).



cont'd.: **11.4.2 Mounting the base section to the boom head**

- Release the lifting strap from the superstructure.
- Swing the jib (base section) forward using the lifting strap, until the stopper (14) is engaged in the bore-hole (15). The locating bore-holes of the jib (base section) (8) coincide with the bore-holes of the boom head (7).

- Turn the threaded pin of the spindle (16) inside using the crank (10) until the top and the bottom pin sections are completely inserted in the bore-holes of the bearing brackets.

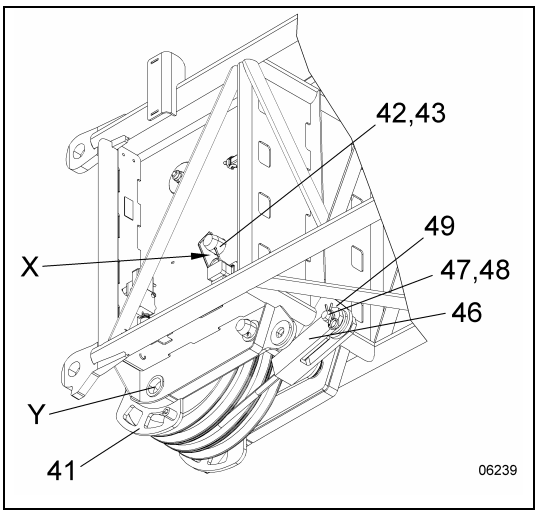


NOTE **If the upper pin section cannot be inserted in the bore-hole, proceed as described under item 11.4.2.1.**

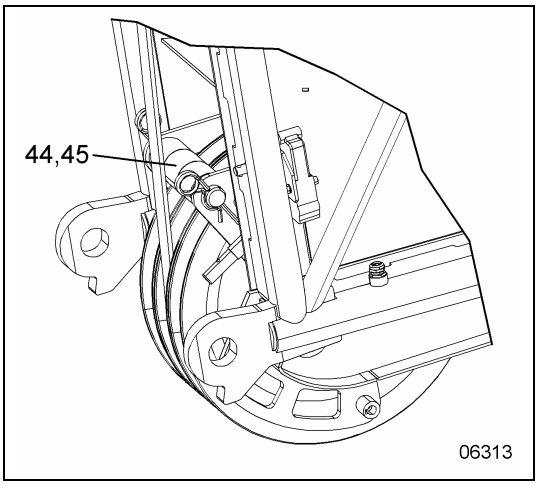
DANGER **The colored mark (F) on the spindle must be completely visible.**

- Remove lock pin (69) from the rope sheave (boom head).

- Fasten the rope socket (46) to the winch rope.
- Fasten the rope socket (46) to the bracket (49) (central clip on fixed point) by means of the spring clip and pin (47 and 48).
- Wind up the winch rope carefully (putting it under tension).
- Remove spring clip and pin (42 and 43) from the bore-hole (X).
- Unwind the winch rope carefully.
- Remove the rope locking sheave and the spring clip (44 and 45).
- Fold rope sheave carrier (41) down to its stop.
- Pin-fasten rope sheave carrier (41) by inserting and locking it in its position (Y) by means of the pin and the spring clip (42 and 43).
- Release winch rope; attach bottom block as described.



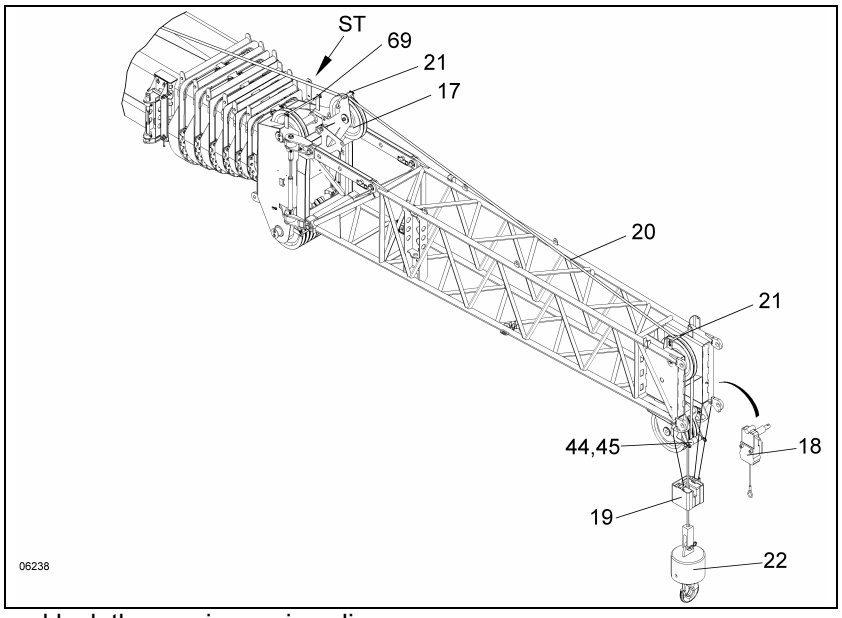
DANGER **Remove the pin and spring clip (42 and 43) from their position (X) and - after swinging the rope sheave to position (Y) - insert and lock them (spring clip). The pin in position (Z) must remain inserted and locked with the split pin. Otherwise, the rope sheave may fall to the ground - risk of injury.**
Before folding up in transport position, make sure the rope locking sheave and the spring clips (44 and 45) must be removed. Risk of damaging the winch rope.



NOTE **In working position, the rope sheave carrier (41) must be folded down and secured.**
In transport position, the rope sheave carrier (41) must be folded up and secured.

cont'd.: **11.4.2 Mounting the base section to the boom head**

- Fold up the rope sheave (17) on the bearing bracket of the jib (base section) by hand; lock it with pins and secure it using a spring clip.
- Release spring clip, remove rope sheave (21).
- Fasten the hoist limit switch (18).
- Fasten the releasing weight (19) to the hoist limit switch (18).
- Changing the offset angle of the base section as described under item 11.4.3.
- Pull the winch rope (20) - as shown in the figure - over the folded-up rope sheave and the sheaves of the jib (base section) and pass it through the releasing weight (19) of the hoist limit switch.

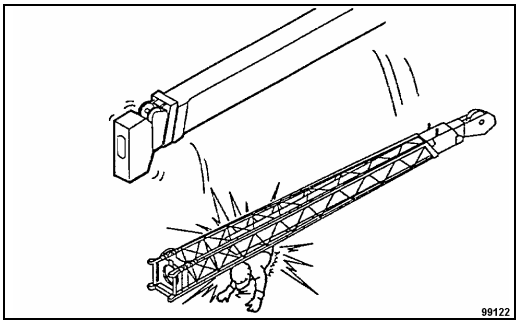


- Insert the pins (21) securing the rope and lock them using spring clips.
- Mount the rope securing sheave and the spring clip (44 and 45).
- Attach the bottom block (22) to the winch rope (20) using the rope socket.
- Insert the connectors **(St)** into the plugboxes on the boom head and the jib (base section).

Thus, the electrical connection of the AML for the hoist limit switch on the jib (base section) is established.

DANGER **Before performing any crane work with the jib (base section) mounted, it is essential to verify whether the pin sections are inserted properly in the bore-holes of the bearing brackets, and locked.**

DANGER **If the jib is not correctly secured by pins, it might get loose and fall to the ground. Always make sure that the lock, stowing and pivot pins are in position before starting any operation. Without these pins in position, the jib may fall off when an operation is started.**

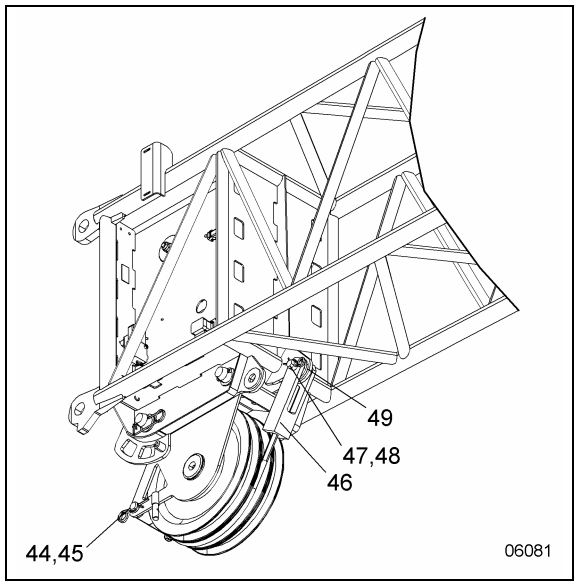


11.4.2.1 Turning the threaded pin into the left upper bearing bracket

NOTE **Should it not be possible to turn the upper left-hand pin section into the bore-hole of the adapter (bore-holes are not aligned), proceed as follows.**

- The rope sheave (17) has been folded up in its working position, as described above.
- The rope sheave carrier (41) has been set to its working position, as described above.

- Remove the rope locking sheave and the spring clip (44 and 45); place the winch rope on the central rope pulley as shown in the illustration. Mount the rope securing sheave and the spring clip (44 and 45).
- Fasten the rope socket (46) to the winch rope.
- Fasten the rope socket (46) to the bracket (49) (central clip on fixed point) by means of the spring clip and pin (47 and 48).
- Wind up the winch rope carefully (putting it under tension) until the direct rope control raises the head of the jib.
- Lift the jib until the top threaded pin can be turned in easily. Now the bore-holes of the adapter section and of the bearing bracket must be aligned, the top pin section must be turned in **until the colored mark (F)** (on the inner fine spindle) is **visible completely**.
- Unwind the winch rope carefully.
- Release winch rope; attach bottom block as described.



11.4.3 Changing the base section's offset angle

Attention **While changing the offset angle, as described under item 11.4.3, neither the top jib nor any intermediate sections must be mounted.**

The following work must be performed and the following instructions observed before the offset angle is changed:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- No obstacle is allowed to be within the motion area while the jib offset angle is being changed.
- The crane must not be moved while the offset angle of the jib is being changed.
- The jib has been mounted as described under item 11.4.2.

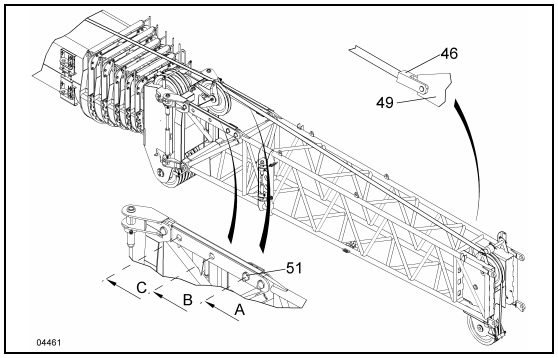
DANGER With the anti-two block override key tip switch (43) set to ON, the anti-two block (overwind cutout) function is disabled. **Operate carefully and only without a load.**

DANGER **Persons are not allowed to stay in the slewing range of the jib.**

Attention **When changing the jib's offset angle, always raise the basic boom mast enough to make sure that the head of the jib does not touch the ground. Check that all pins and plugs are locked and that the cable connectors for the hoist limit switch are correctly connected. Winding up the winch rope while actuating the boom elevation "up" is not admissible.**

- **The data of the jib rig arrangement in question must be entered into the AML.**

- Remove the bottom block from the winch rope.
- Mount the winch rope with rope socket (46) to the fixed point (central clip of fixed point) (49) of the jib as described under item 11.4.2.1, lock it with the pin and secure it.
- Set the anti-two block override key push-button **(43)** to ON and hold it in this position during actuation.
- Set the winch rope under slight tension (the jib is lifted slightly in this process).
- Continue to wind up the winch rope slowly and carefully - the jib is being lifted - until both the offset pins (51) are discharged.
- Remove the spring clip and pull out the offset pin (51) on the left and right.
- Insert the left-hand and right-hand offset pins (51) into the boreholes for the desired offset position (A, B or C) and lock them using the spring clips.



- Wind off the winch rope carefully and slowly - the jib is being lowered - ; simultaneously the jib will reach the desired offset position.
- Mount bottom block, hoist limit switch and releasing weight.
- Set the crane to working position.

11.4.3.1 Changing the angular position

To change the angle position, proceed on principle as described under item 11.4.3.

11.4.4 Resetting the base section's offset angle

DANGER **With the anti-two block override key tip switch (43) set to ON, the anti-two block (overwind cutout) function is disabled. Operate carefully and only without a load.**

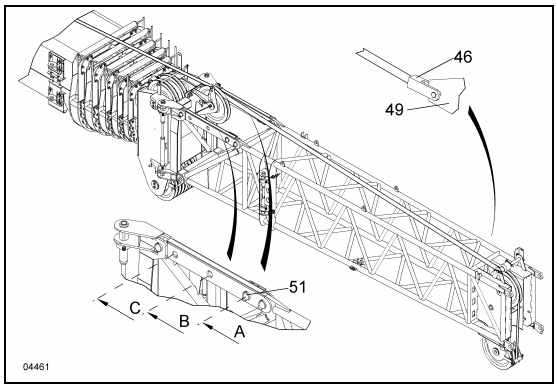
Attention **While resetting the offset angle, as described under item 11.4.4, neither the top jib nor any intermediate sections must be mounted.**

NOTE **The telescopic boom must be retracted completely to its stop.**

Prerequisites for resetting the jib offset angle:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- No obstacle is allowed to be within the motion area while the jib offset angle is being changed.
- The crane must not be moved while the offset angle of the jib is being reset.
- The jib has been mounted as described under item 11.4.2.

- Make sure that a sufficient length of winch rope is available to pass the winch rope over the head of the jib and back to the fixed point (49) of the jib.



- Lower the telescopic boom via the elevating mechanism until the head of the jib is placed just above the ground.
- Set the anti-two block override key push-button to ON and hold it in this position.
- If the bottom block is still fixed, remove the parts of line of the winch rope from the bottom block and the hoist limit switch weight.
- Place the winch rope (unless already placed there) in the sheave (1) of the boom elevation head and secure it to the fixed point (49) of the jib (see item 11.4.2.1) by means of the rope socket (46).
- Insert rope securing pin incl. rollers and lock it using spring clips.
- Wind up slack winch rope slowly until it is slightly tensioned.
- Continue to wind up the winch rope. The jib is raised, thus reducing the angle between the jib and the telescopic boom.
- While winding up the winch rope, the telescopic boom can be lowered via the elevating mechanism, so that the head of the jib remains just above the ground, as close as possible.

cont'd.: **11.4.4 Resetting the offset angle**

Attention **Do not continue to lower the boom when the jib is in its uppermost position. This would result in damage to the base section due to the reduced rope length.**

- Continue to wind up the winch rope until the jib has reached its initial position. Do not wind up the rope more than necessary.
- Remove the spring clip and pull out both offset pins (51).
- Insert both offset pins (51) on the left and right into the bore-holes for the initial position, and lock them using spring clips.
- Wind off the winch rope carefully until the jib has reached the desired initial position.

• When the jib has reached its desired offset position, discharge the winch rope and release the rope socket from the fixed point on the jib.

11.4.5 Removing the base section from the boom head

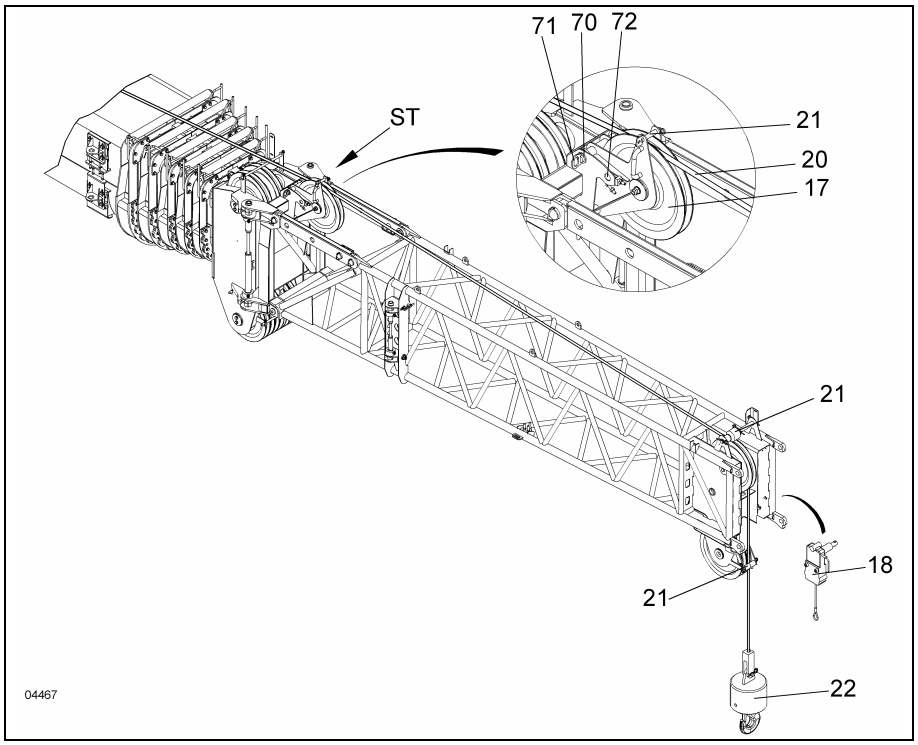
The following work must be performed and the following instructions must be observed before mounting is commenced:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is raised to 0° - 1° via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- While removing the jib (base section), make sure that there are no obstacles in the area of movement.
- The crane must not be moved during removal of the jib (base section).
- The jib (base section) has been mounted as described under item 11.4.3, and is returned to its initial position as described under item 11.4.4.

DANGER **With the anti-two block override key tip switch (43) set to ON, the anti-two block (overwind cutout) function is disabled**. **Operate carefully and only without a load.**

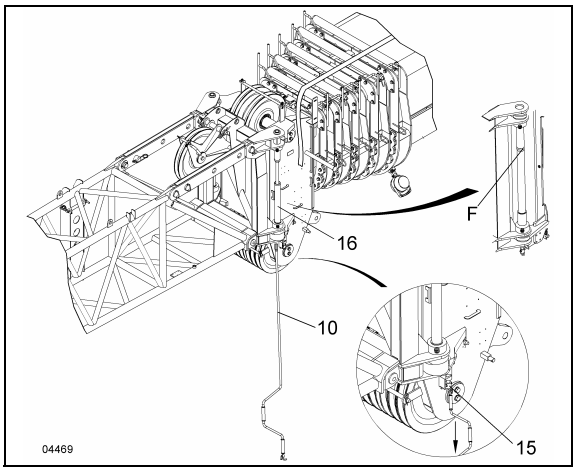
- Set the key tip switch (**43**) “hoist limit switch override” for anti-two block function to ON and hold it in this position.
- Deposit the bottom block (22) on the ground and remove the winch rope (20) together with the rope socket.
- Remove the rope securing pin (21).
- Remove pin (21) of the rope sheave (17) for the rope securing mechanism.
- Carefully retract the winch rope (20) up to the head of the main boom, and place it laterally on the head of the main boom. Make sure that the winch rope does not fall to the ground.

- Release the spring clip, remove the pin (70) of the rope sheave (17) from the borehole (71) and fold the sheave down in the bearing bracket. Pin-fasten and secure the rope sheave carrier in transport position (72).
- Remove and stow the hoist limit switch (18) and the releasing weight.
- Release the connectors **(St)** from the plugboxes on the boom head and the jib.
- Insert the pins (21) securing the rope in the jib (base section) head and lock them using spring clips.



cont'd.: **11.4.5 Removing the base section from the boom head**

- Fasten a lifting strap to the head of the jib (base section). The jib must be prevented from swinging.
- Use the end of the handle (10) to pull the stopper (15) out of its lock position.
- Turn the threaded pin of the spindle (16) to the outside using the crank (10) until the top and the bottom pin sections are completely turned out of the bore-holes of the bearing brackets.



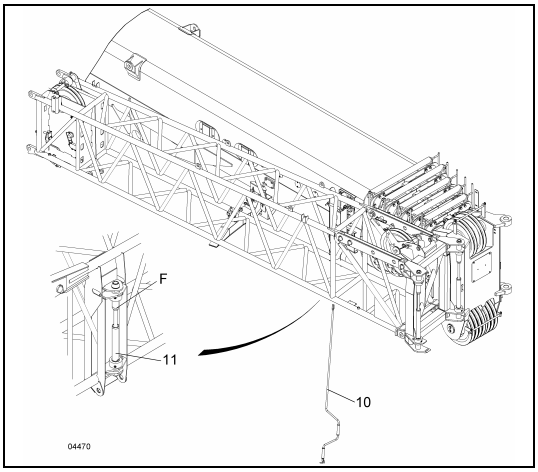
DANGER **The colored mark (F) on the spindle must not be visible. The spindle pins must touch.**

NOTE **If the upper locking pin is hard to remove or even cannot be removed from the bracket on the telescopic boom at all, the jib (base section) must be raised as described under item 11.4.2.1.**

- Swing the jib (base section) via the lifting strap until it touches the stop at the boom. (The bore-holes of the spindle (11) are aligned with the bore-holes on the boom):

Securing the jib (base section) to the boom:

- To this effect, turn the threaded pin of the spindle (11) to the inside using the crank (10) until the top and the bottom pin sections are completely inserted in the bore-holes of the bearing brackets.
- Remove the crank from the spindle.

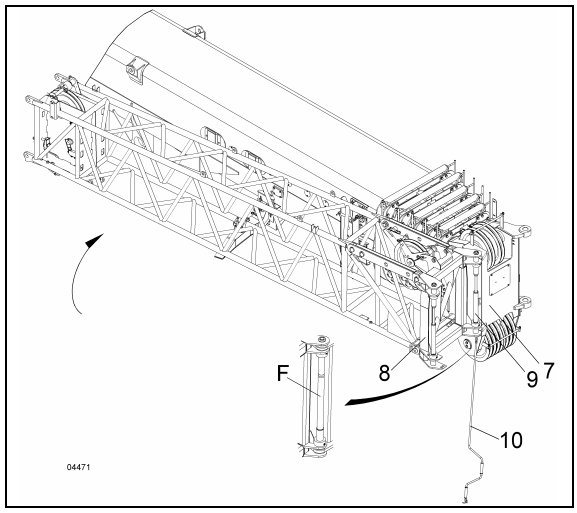


NOTE **The colored mark (F) on the spindle must be completely visible.**

cont'd.: **11.4.5 Removing the base section from the boom head**

Release jib (base section) (8) from the boom head (7):

- Turn the threaded pin of the spindle (9) using the crank (10) until the top and the bottom pin sections are completely moved out of the bore-holes of the bearing brackets.



DANGER **The colored mark (F) on the spindle must not be visible.**

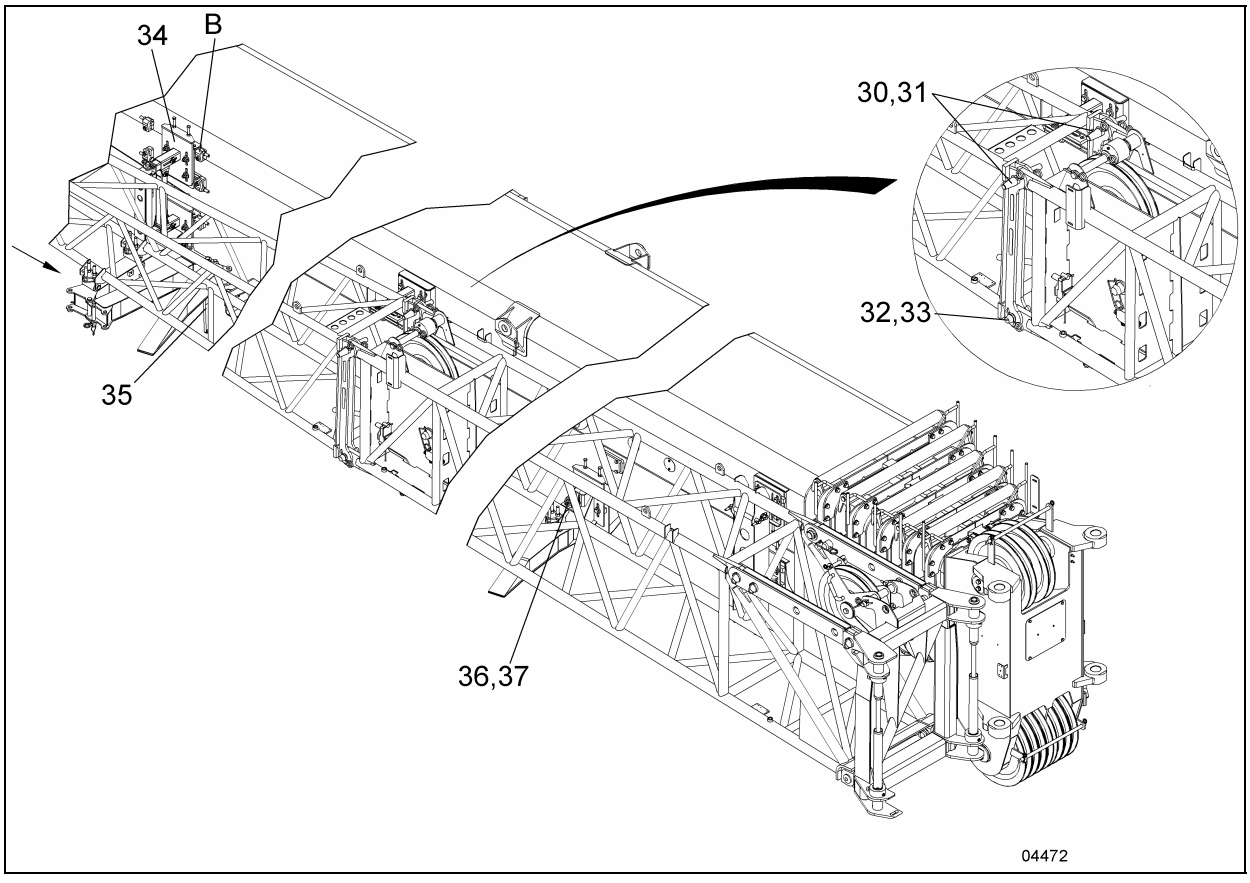
- Remove the crank (10) from the spindle (9).

- Swing jib (base section) in the direction of the arrow to its stop on the ramp.
- Fasten the jib (base section) by means of pin and spring clip (36 and 37) to the base section and secure it.

Fasten the top jib to the base section by means of pins:

- Shift the top jib in the direction of the arrow using a ratchet (35) until the bracket (34) touches the stop (B).

Now the top jib rests against the base section.



cont'd.: **11.4.5 Removing the base section from the boom head**

Fasten the top jib to the base section by means of pins:

- Mount the pin and the upper spring clip (30 and 31).
- Mount the pin and the lower spring clip (32 and 33).

DANGER **In driving condition, the base section and the top jib must be connected by pins, and secured.**

- Return the crane to horizontal working position.

11.4.6 Mounting the top jib and the base section to the boom head

Prerequisite:

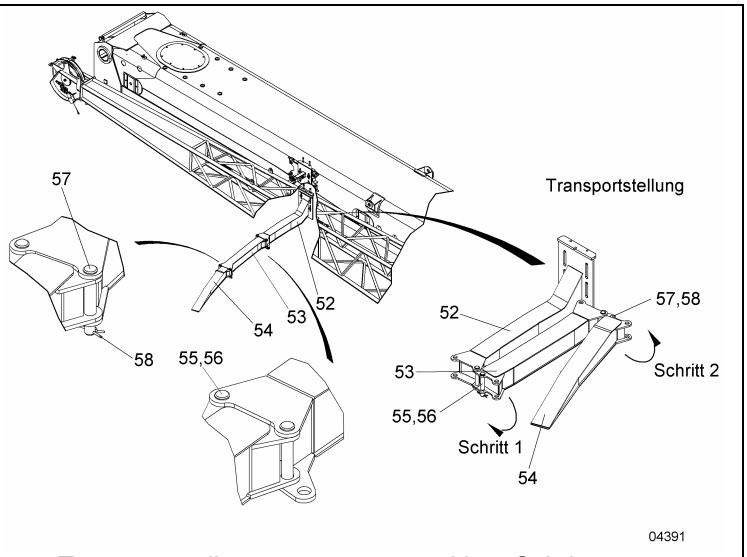
- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- While mounting the jib, make sure that there are no obstacles in the area of movement.
- The crane must not be moved during assembly.
- The steps described under item 11.14.1 have been accomplished.
- The base section and the top jib are interconnected by pins, and mounted on the boom.

Folding out the ramp;

If the base section and the top jib are mounted together, the ramp must be folded out as described below.

- Remove spring clip (55) from the pin (56). Remove the pin.
- Fold ramp section (53) to section (52).
- Insert pin (56), lock them using the spring clip (55).
- Remove spring clip (57) from the pin (58). Remove the pin.
- Fold ramp section (54) to section (53).
- Insert pin (57), lock them using the spring clip (58).

For folding the ramp inwards, proceed analogously by reversing the above sequence of operations.



Transportstellung = transport position; Schritt = step

- Fasten a lifting strap (1) or a similar device to the top end of the jib (base section) and in an appropriate location on the superstructure.

cont'd.: **11.4.6 Mounting the top jib and the base section to the boom head**

- Remove the spring clip and securing pin (36 and 37).
- Remove the spring clip and securing pin (40 and 41).
- Remove the upper and lower spring clip and pin (38 and 39).

Release the rope from the superstructure. Swing jib (base section and top jib) in the direction of the arrow to its stop.
To mount the jib to the boom head, proceed analogously as described under item 11.4.2.

Exception: If the upper pin section cannot be inserted in the bore-hole, proceed as described under item 11.4.6.1.

To disassemble the jib, proceed analogously as described under item 11.4.5. All lock pins which have been removed for assembly must be repositioned and secured by means of spring clips.
Fold ramp to the inside.

For changing the jib offset angle, refer to item 11.4.6.2.

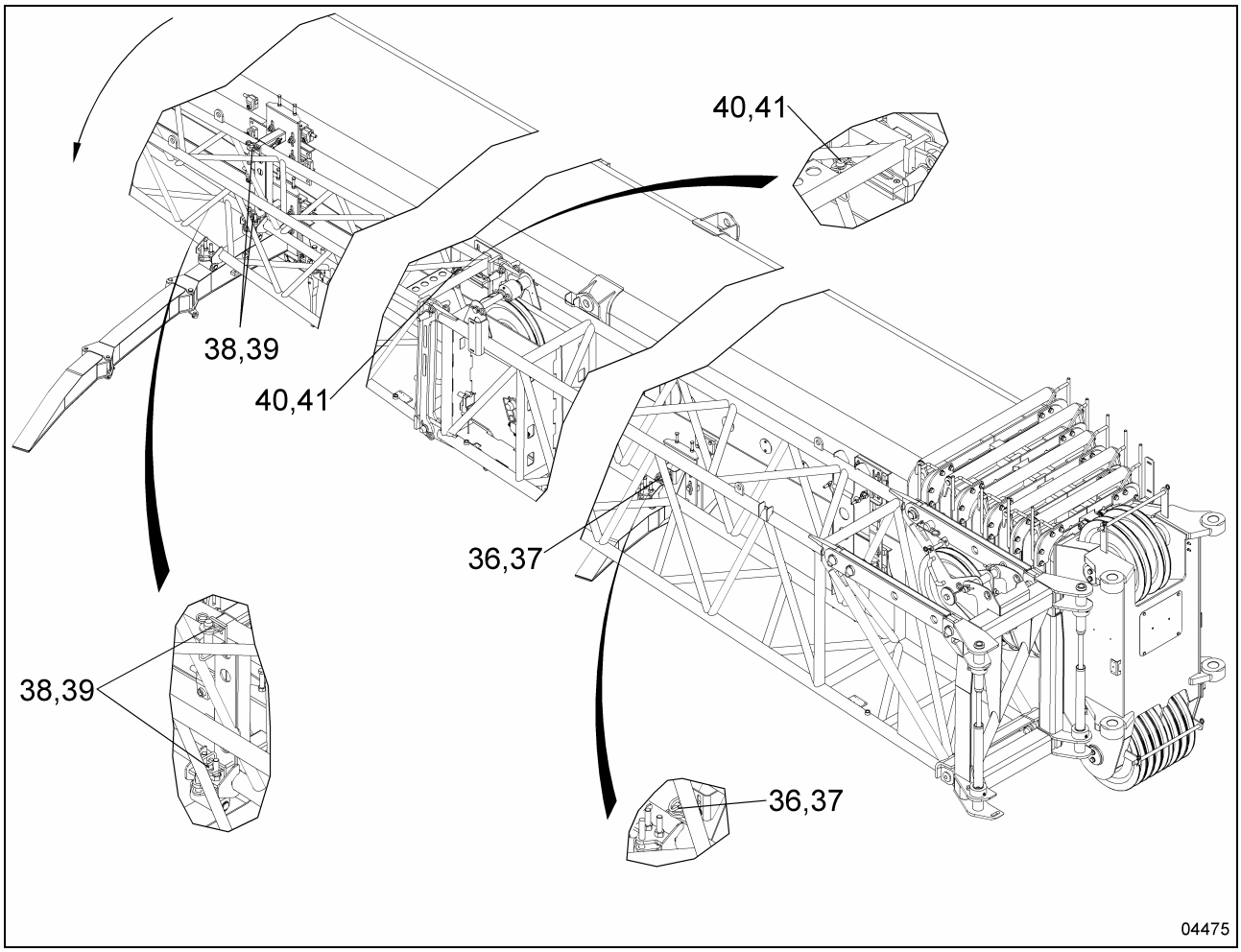


Fig. 1

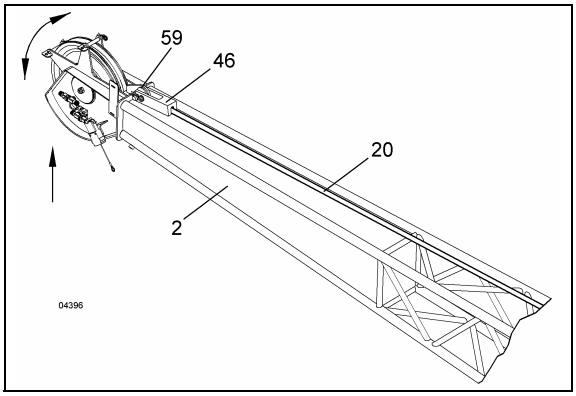
11.4.6.1 Turning the threaded pin into the left upper bearing bracket

NOTE **Should it not be possible to turn the upper left-hand pin section into the bore-hole of the adapter (bore-holes are not aligned), proceed as follows.**

● The rope sheave (17) has been folded up in its working position, as described above.

- Fasten winch rope (20) to the fixed point (59) of the top jib (2) by means of the rope socket (46).

  Wind up the winch rope carefully (putting it under tension) until the direct rope control raises the head of the jib.
- Lift the jib until the top threaded pin can be turned in easily. Now the bore-holes of the adapter section and of the bearing bracket must be aligned, the top pin section must be turned in **until the colored mark (F)** (on the inner fine spindle) is **visible completely**.
- Carefully unwind the winch rope, and remove it.



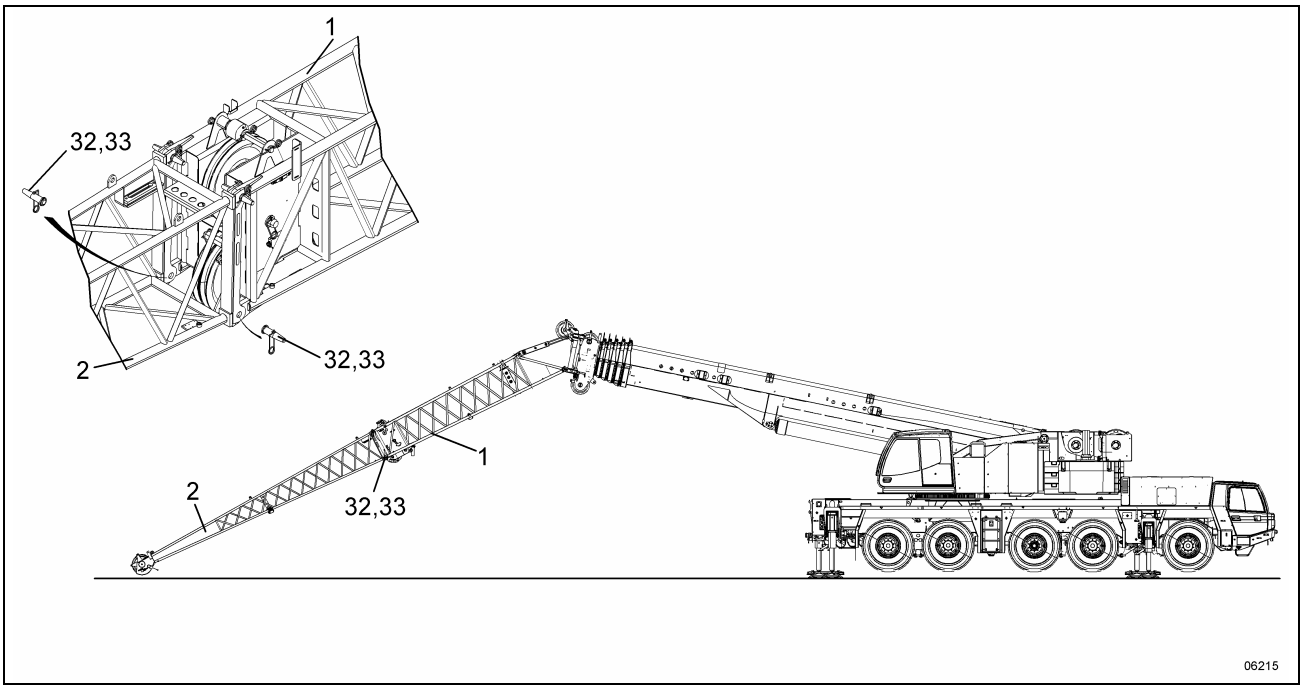
11.4.6.2 Changing the jib offset angle

To change the jib offset angle, proceed analogously as described under item 11.4.3 and 11.4.4.

Attention **When changing the jib offset angle, or when changing the angle position, the jib (base section and top jib) must be lifted/lowered as described under item 11.4.6.1.**

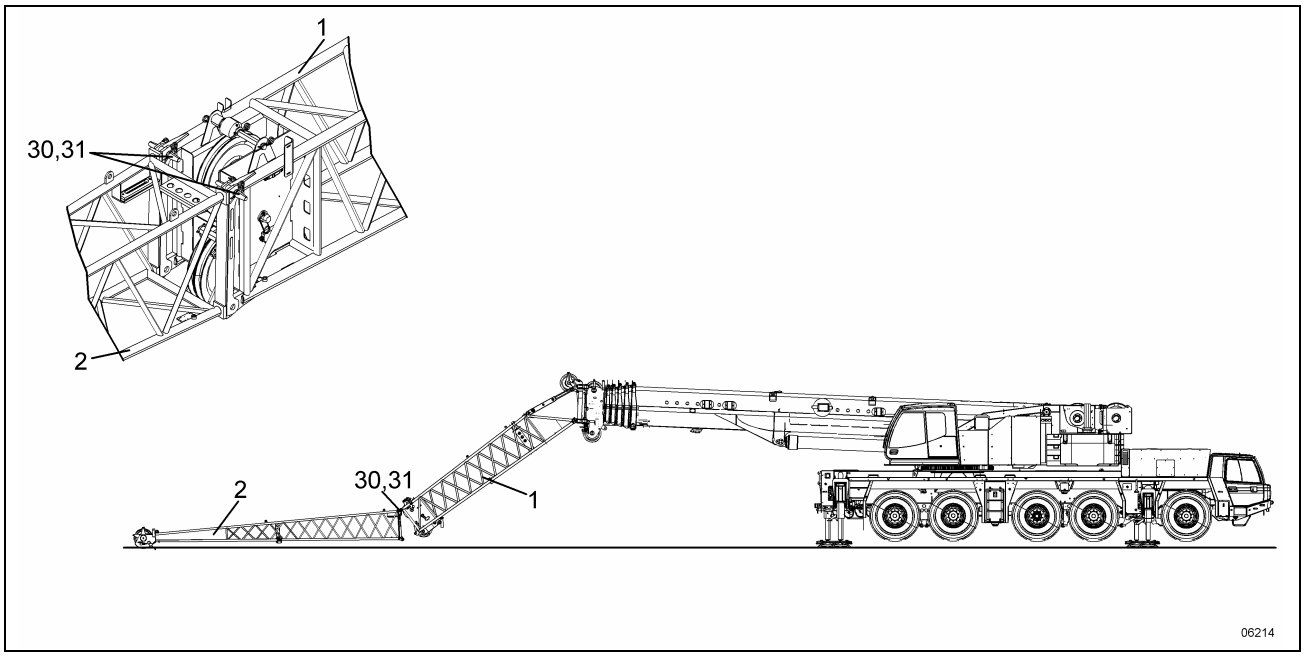
11.4.6.3 Removal of the top jib from the base section

Should one or several intermediate sections be mounted, the top jib (2) must be removed from the base section (1) as described below:



- Change the jib offset angle to 40° as described under item 11.4.8.
- Actuate the boom's basic mast carefully "down". The top jib must not touch the ground.
- Remove the lower spring clips and pins (32 and 33).

cont'd.: **11.4.6.3 Removal of the top jib from the base section**



- Lower the boom basic mast carefully via the boom elevation until the top jib rests on the ground, as shown in the drawing.
- Remove the upper spring clips and pins (30 and 31).

Now, the top jib is released from the base section.
If necessary, mount the winch rope, the hoist limit switch and the bottom block as described under item 14.4.2.

11.4.7 Mounting one / several intermediate section and the top jib to the jib

Prerequisite:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- While mounting the intermediate sections and the top jib to the jib, make sure that there are no obstacles in the area of movement.
- The crane must not be moved during assembly.
- The base section is mounted and set to an offset angle of 40° as described under item 11.4.1 to 11.4.3, or the top jib and the base section is mounted to the boom head as described under item 11.4.6.
- If a top jib is mounted, it must be detached from the base section as described under item 11.4.6.3.
- Telescopic boom raised to 2.7° via the boom elevation.
- The top jib (2) and the number of intermediate sections required for crane work (61) (shown under item 11.4.7 Fig. 1: 4 intermediate sections) are aligned with the jib as shown in Fig. 1. The distance X0 from the center of rotation to the 1st intermediate section must not be lower than = 16.3 m. If this dimension is exceeded, compensation is possible by extending the tele section(s) and by raising the boom via the boom elevation.

  Remove hoist limit switch weight.
- Attach hoist limit switch to the stowing pin in the box of the boom head.
- Lower the jib by actuation of the boom elevation.

cont'd.: **11.4.7 Mounting one / several intermediate section and the top jib to the jib**

- Disconnect the electrical plug-and-socket connectors of the hoist limit switch from the jib.
- Remove the pins of the rope securing device from the head of the jib.
- ● The intermediate section(s) (61) and top jib (2) have been placed in front of the jib as shown in Fig. 1.
- Connect the base section (1), the intermediate sections (61) and the top jib (2) by fastening and locking the upper pin fastening assembly (63, 64).

NOTE **Always insert the pins from the inside to the outside, and lock them.**

- Raise the boom until the lower bore-holes of the base section (1) and the intermediate section (61) are aligned. Connect the base section (1) to the intermediate section (61). To this effect, insert and lock the pins (65, 66).

NOTE **Always insert the pins from the inside to the outside, and lock them.**

- Continue to raise boom via the boom elevation. Fasten and lock further intermediate sections and the top jib as described above.
- Insert the connector in the plugboxes.
- The electrical connection of the AML for the hoist limit switch on the top jib is prepared.
- Move the jib into the offset position required for crane work. Refer to item 11.4.8.
- Unwind the winch rope, route it over the intermediate section(s), the top jib and the rope sheave, fasten the chain of the hoist limit switch weight on the hoist limit switch of the top jib.
- Insert the two pins securing the rope to the head of the top jib, and lock them.
- Mount the bottom block.
- Align the vehicle using the outriggers (refer to part B1-6, item 6.2.3).
- Enter the data into the AML according to the desired boom status (refer to load chart).

NOTE **The dimension X is applicable for the use of 4 intermediate sections. Dimension X1 = 6.0 m; dimension X = 40.3 m.**

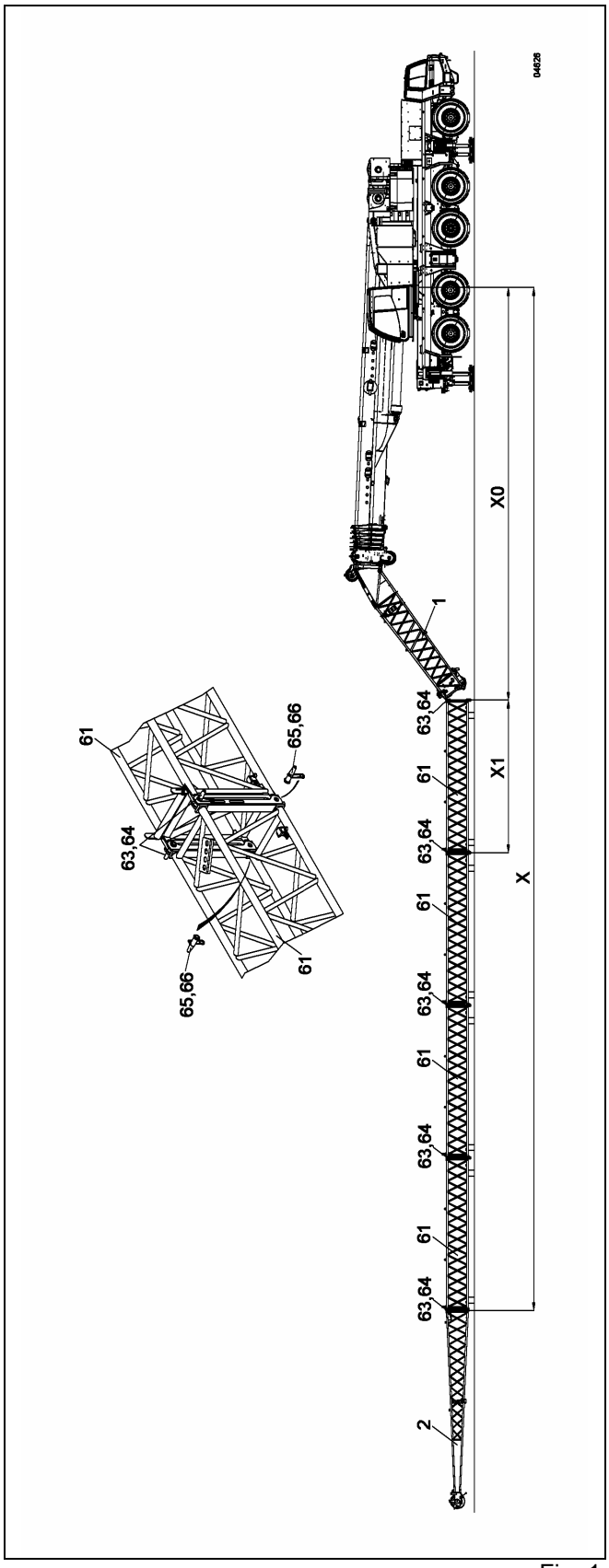


Fig. 1

11.4.8 Changing the offset position with the top jib and intermediate section(s) mounted

Prerequisite:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- No obstacle is allowed to be within the area of motion while the offset angle is being changed.
- The crane must not be moved while the offset angle is changed.
- The jib has been mounted as described under item 11.4.7.

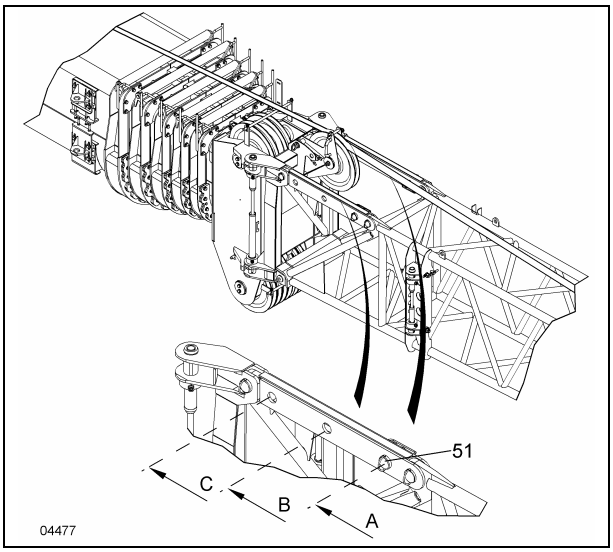
NOTE **To change the offset angle with an intermediate section and the top jib mounted, proceed as described under item 11.4.6.1.**

If several intermediate sections are mounted, proceed as follows:

Lower the boom carefully until the jib rests on the ground and pins (51) are set free.

NOTE **To achieve the desired offset position, lower the vehicle via the rear outriggers, if necessary, extend tele section 1 up to 50% and fasten it with pins.**

- Remove both pins (51) on the left and right and insert them into the desired position A, B or C, and lock them.
- Remove the ladder.
- Raise the basic mast carefully until the desired offset angle is reached.



NOTE **During the angle adjusting process from A to B or C, the head of the lattice-type fly jib drags over the ground until the desired angle position is reached. While the angle is being changed from the C position to B or A, the head of the top jib rests on the ground.**

- Lift the winch rope onto the roper sheave; insert and secure the rope lock pins.
- Attach the releasing weight of the hoist limit switch.
- If necessary, mount the bottom block.

To reset the jib offset angle, proceed analogously by reversing the above sequence of operations.

11.4.9 Disassembly of intermediate section and top jib

DANGER **The intermediate sections and/or the top jib to be removed must be prevented from falling by means of guying ropes or by means of supports.**

Prerequisite:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear, the boom is lowered via the boom elevation, the tele sections are completely retracted. The mechanical swing lock is engaged.
- While removing the intermediate section(s) and the top jib from the jib, make sure that there are no obstacles in the area of movement.
- The crane must not be moved during disassembly.
- The jib has been mounted as described under item 11.4.7, and is returned to its initial position as described under item 11.4.8.
- For removal, proceed analogously by reversing the sequence of mounting operations described under item 11.4.7.

If work is to be performed now using the base section, proceed as follows:

- Fasten the releasing weight to the hoist limit switch.
- Fold down rope sheave (41) in working position, pin-fasten and lock it.
- Pull the winch rope over the folded-up rope sheave and the sheaves of the jib, pass it through the releasing weight of the hoist limit switch and attach the weight to the switch.
- Insert the pins securing the rope to the rope sheaves and lock them using spring clips.
- Fasten the winch rope in the rope socket as specified, secure the rope socket to the bottom block with pins and lock it.
- Insert the connectors into the plugbox on the boom head and the jib. Thus, the electrical connection of the AML for the hoist limit switch on the jib is established.

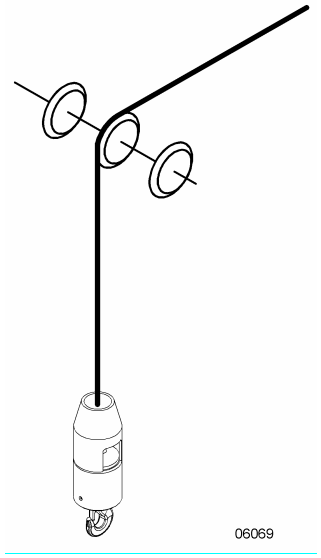
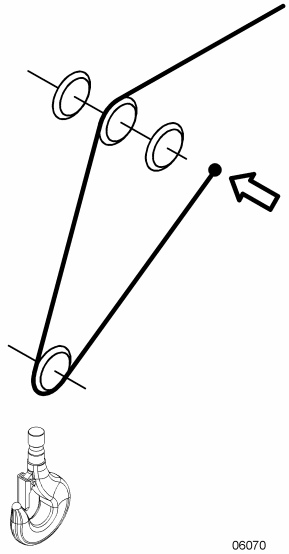
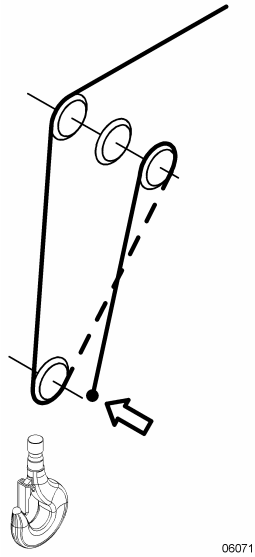
- Disassembly of the base section as described under item 11.4.5.

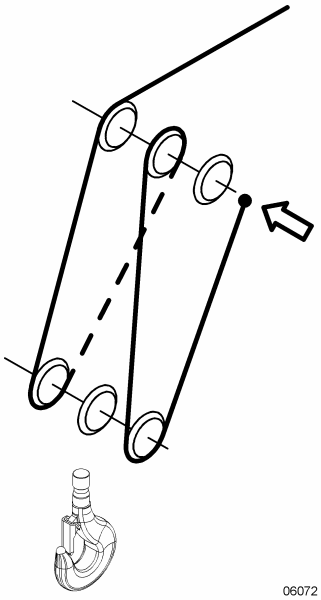
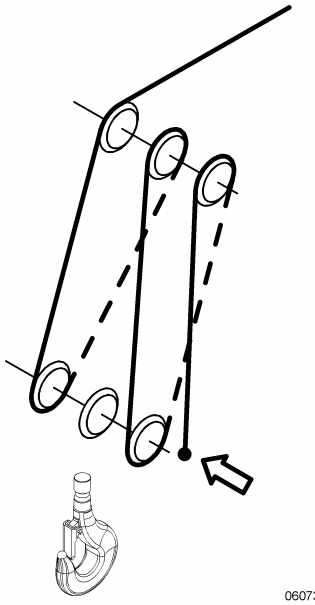
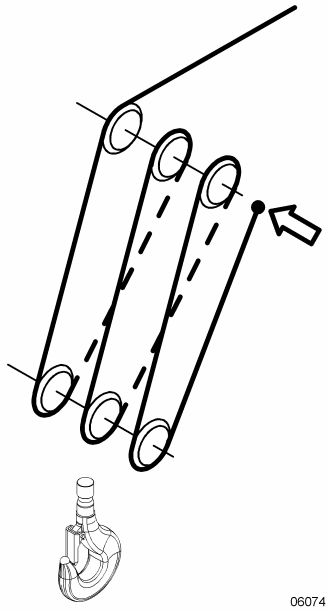
11.4.10 Examples for rope reeving

Depending on the required load to be lifted, the required bottom block and the number of rope falls required for the case in question are indicated in the "Notes referring to the load chart".

The appropriate number of winch rope falls required must be arranged as follows:

NOTE **The rope should be arranged in the bottom block - especially if few rope falls are used - so that the bottom block is suspended vertically, as far as possible (refer to example with four rope falls).**

Bottom block, 1 pulley	**Bottom block, 1 pulley**	**Bottom block, 1 pulley**
arrangement with **1** rope fall	arrangement with **2** rope falls	arrangement with **3** rope falls
 06069	 06070	 06071

Bottom block, 3 pulleys	**Bottom block, 3 pulleys**	**Bottom block, 3 pulleys**
arrangement with **4** rope falls	arrangement with **5** rope falls	arrangement with **6** rope falls
 06072	 06073	 06074

11.5 Heavy-lift sheave

11.5.1 Information regarding operation

Prerequisite:

- The crane is supported by outriggers as specified.
- All tele sections are retracted completely.
- The superstructure is slewed to the rear. The mechanical swing lock is engaged.
- The crane must not be moved during assembly.
- The single top has been mounted.

- For the hoisting load, the boom angle and the working radius, refer to the load chart;
- maximum hook height 10 m,
- make sure the ropes move freely.

NOTE **Operation with the heavy-lift sheave requires particular caution. Outside the specified working ranges, contact with the ropes cannot be ruled out.**

11.5.2 Mounting the heavy-lift sheave up to a hoisting capacity of 140t

- Release bolts (18), remove washers (17) and sleeves (13). Stow sleeves (13) so as to prevent them from being lost.
- Mount sheave carriers (15)(16) as shown, using the washers (17) and bolts (18).
- Remove spring clip (20) and cotter pin (19).

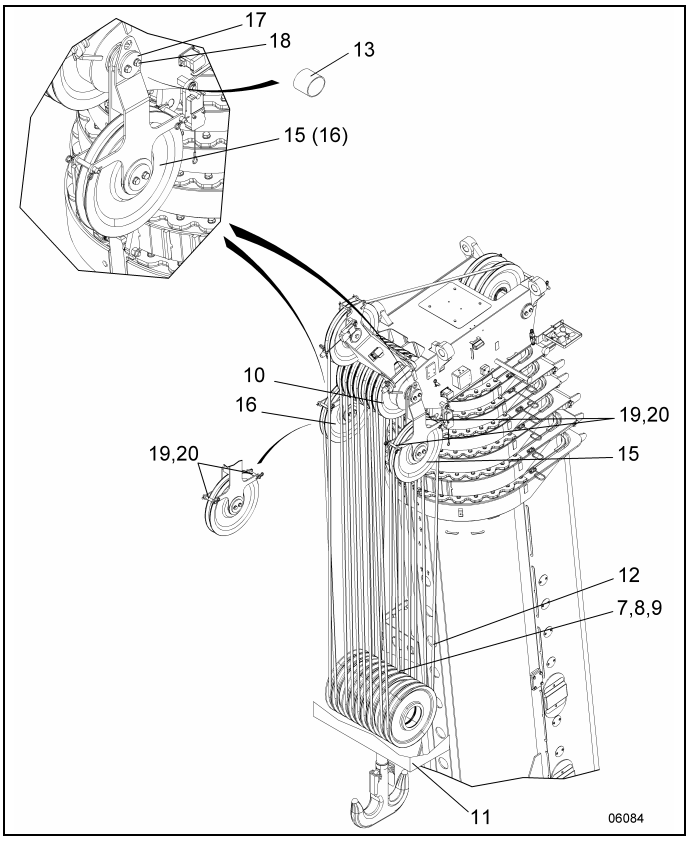
- Reeve the rope (12) as shown between the bottom block (11), the sheave carrier (15, 16) and the top block (10).

- Fasten the rope (12) and the rope socket (7) to the bottom block (11) using the pin (9). Lock pin (9) using the spring clip (8).

- Secure rope (12) using the cotter pins (19) and the spring clips (20).

For disassembly, reverse assembly procedure.

For rope reeving, refer to item 11.5.2.1.

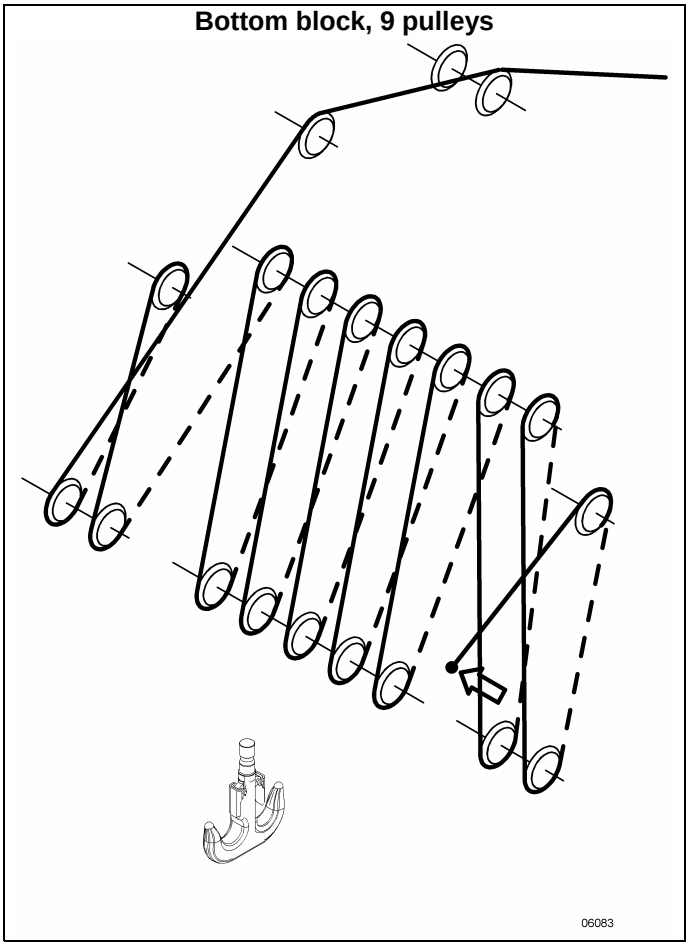


Attention **For the maximum admissible hoisting load, refer to the load charts. The bottom block must comprise 9 pulleys for the corresponding lifting capacity which is admissible for the application in question.**

11.5.2.1 Rope reeving

- Fasten the winch rope falls in the sheaves as shown in the illustration.

Bottom block, 9 pulleys

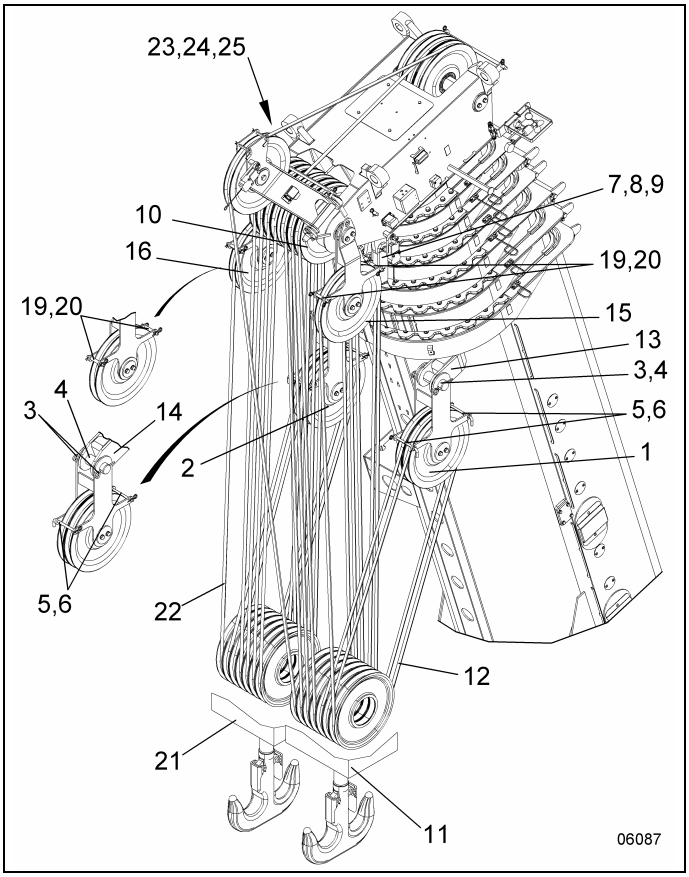


11.5.3 Mounting the heavy-lift sheave as of a hoisting capacity of 140t

- Sheave carriers (15; 16) as described under item 11.5.2.
- Fasten the sheave carrier (1) to the support (13) using the pins (4). Lock pins (4) using the spring clips (3).
- Fasten the sheave carrier (2) to the support (14) using the pins (4). Lock pins (4) using the spring clips (3).
- Reeve the ropes (12; 22) as shown between the bottom blocks (11; 21), the sheave carriers (1; 2; 15; 16) and the top block (10).
- Fasten the ropes (12; 22) and the rope sockets (7; 23) as shown using the pin (9; 25). Lock pin (9; 25) using the spring clip (8; 24).
- Secure ropes (12; 22) using the cotter pins (5; 19) and the spring clips (6; 20).

For disassembly, reverse assembly procedure.

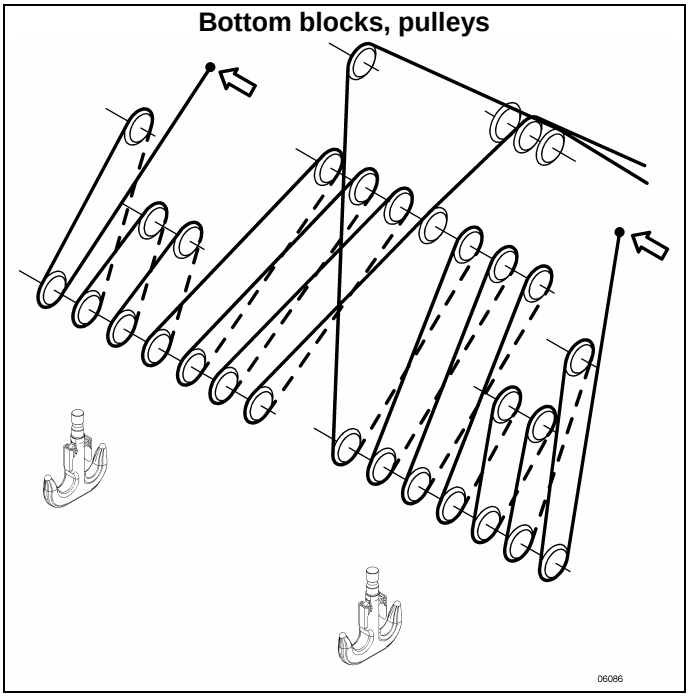
For rope reeving, refer to item 11.5.3.1.



Attention **For the maximum admissible hoisting load, refer to the load charts. The bottom blocks must comprise 7 pulleys for the corresponding lifting capacity which is admissible for the application in question.**

11.5.3.1 Rope reeving

- Fasten the winch rope falls in the sheaves as shown in the illustration.



11.6 Single top

The single top is always used with a single rope fall, and is protected by the AML program for the telescopic boom, with the appropriate counterweight mounted to the machine and with the prevailing extension width.
The total load to be lifted, consisting of the load handling devices and the bottom blocks on the single top and the telescopic boom head, and the load to be lifted at the single top, must not exceed the maximum lifting capacity of the telescopic boom according to the load charts for the crane's prevailing rig arrangement.

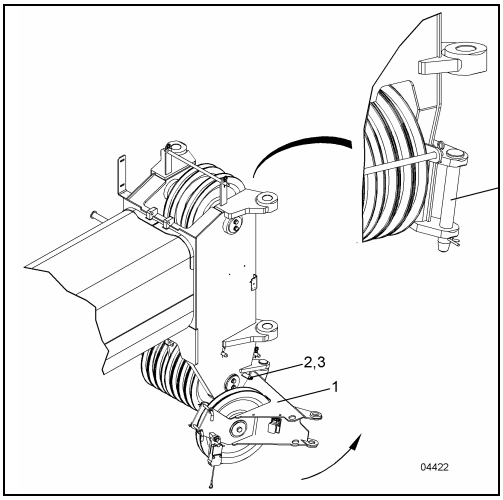
DANGER **The appropriate load chart of the telescopic boom as required by the actual crane configuration, taking account of the counterweight, and the number of parts of line ”1” must be entered into the automatic safe load indicator.**
Picking up loads which are resting on the ground by raising the boom via the boom elevation may lead to overload of the single top or the winch rope, or result in the crane overturning; thus, this procedure is prohibited.
This movement "boom elevation - up" is not stopped by the overload safety device.

Attention **The load and radius data appearing in the AML deviate slightly from the actual values, as the AML does not take account of the geometric circumstances of the single top.**

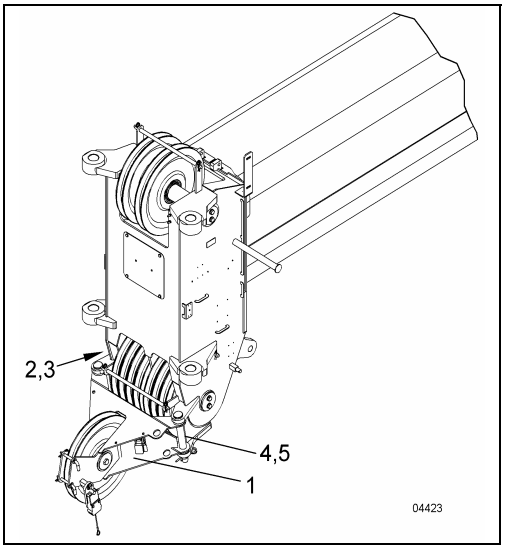
DANGER **When working with two winch ropes, make sure that the winch rope is guided via the rope sheaves as shown under item 11.6.3. Otherwise, there is a risk that the winch rope might cross and chafe.**

11.6.1 Mounting the single top to the boom head

- Remove the spring clip and pin (item 4, 5).
- Release the transport securing device, remove spring clip of lock pin (item 2, 3), remove lock pin.
- Swing the single top (item 1) to its stop.

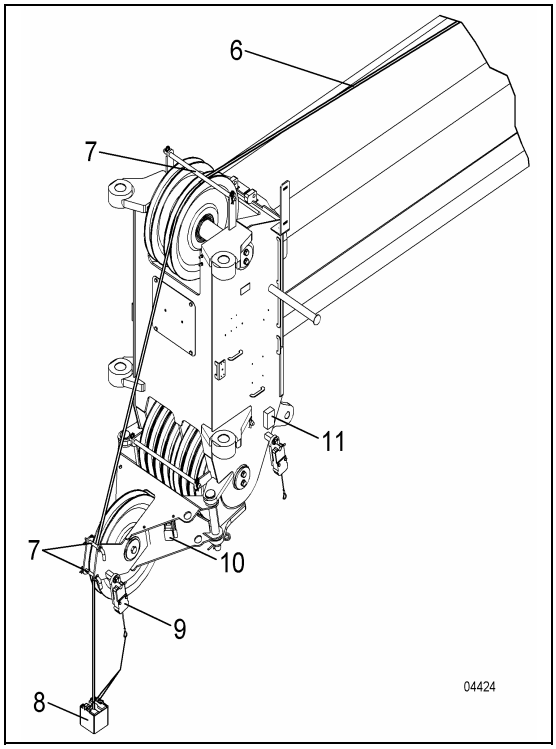


- Mount transport securing device, (item 2, 3) again to prevent it from getting lost.
- Fasten the single top (item 1) to the boom head by inserting the pin (item 4).
- Lock pin (item 4) by means of the spring clips (item 5).



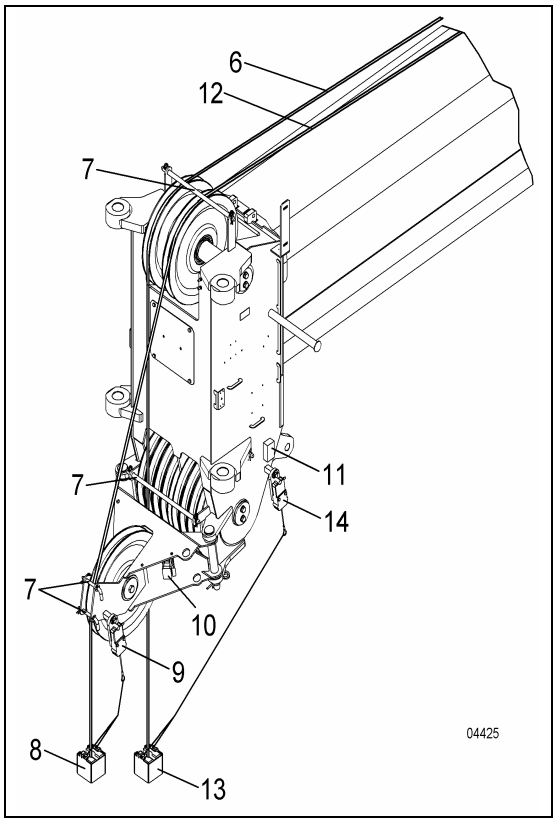
11.6.2 Rope reeving during operation with the main winch

- Place the winch rope (item 6) of the 1st hoist winch over the single top and lock it using the securing yokes (item 7).
- Pass winch rope of the 1st hoist winch through the releasing weight (item 8) and secure the hoist limit switch (item 9).
- Remove the electrical plug-and-socket connector from the blind socket (item 10) and insert it into the socket (11). Insert the blind plug into the blind socket (item 10) for storage.
- Once the work has been terminated, reset the single top to its initial state.



11.6.3 Rope fall arrangement for operation with the main and auxiliary winch

- Place the winch rope (item 6) of the 1st hoist winch over the boom head and lock it using the securing yokes (item 7).
- Pass winch rope of the 1st hoist winch through the releasing weight (item 13) and secure the hoist limit switch (item 14).
- Place the winch rope (item 12) of the 2nd hoist winch over the single top and lock it using the securing yokes (item 7).
- Pass winch rope of the 2nd hoist winch through the releasing weight (item 8) and secure the hoist limit switch (item 9).
- Remove the electrical plug-and-socket connector from the blind socket (item 10) and insert it into the socket (11). Insert the blind plug into the blind socket (item 10) for storage.
- Once the work has been terminated, reset the single top to its initial state.



11.6.4 Operation with 2 hooks

DANGER **A double ladder must be positioned at the superstructure to enable placing the rope of the 2nd winch. The double ladder is located below the driver's cab and secured by means of supports. (Refer to part B, item 11.9).**

Provided that the crane is equipped with two hoisting gears, the use of the jib or of the single top offers the possibility to locate loads accurately which are positioned accordingly, or to turn loads.
Prerequisite: The jib or the single top is mounted correctly to the telescopic boom head as described, and the crane is stabilized by outriggers as specified.

DANGER **On principle, loads must be lifted or lowered by means of the component featuring the least load bearing capacity. Thus, the load must always be lifted clear or lowered completely by means of this component.**
The overload safety device must be set to the correct AML which corresponds to the configuration of the jib, and to the counterweight and the supporting base.

The lifting capacities at the jib which are admissible in this case correspond to the maximum lifting capacities indicated in the appropriate load charts for the jib. The total load incl. hook block and all the load securing equipment must not exceed the lifting capacities specified for the rig arrangement of the crane.

DANGER **The number of rope falls attached to the boom head must never be smaller than the number of rope falls attached to the jib. On principle, it must be at least identical with or greater than the number of rope falls fixed to the jib. If this regulation is not observed, this may cause failure of the hoisting gear or of the hoisting rope of the telescopic boom head.**

On principle, each load may only be lifted completely clear of the ground with the hook which is at the greatest horizontal distance from the center of rotation.

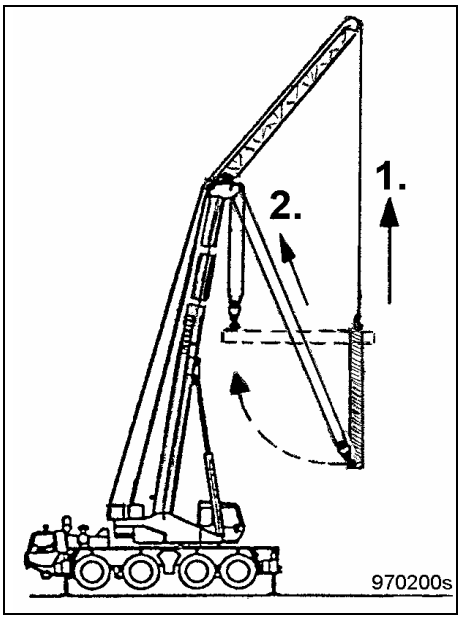
DANGER **When the hook block at the telescopic boom head is put under load condition while a load is being lifted, incorrect load values will appear on the automatic safe load indicator.**

DANGER **When working with main and auxiliary winch, the winch rope of the main winch must always be guided over the boom head, and the winch rope of the auxiliary winch must be guided over the jib (single top, heavy-lift fly jib, etc.). Otherwise, there is a risk that the winch ropes might cross and chafe.**

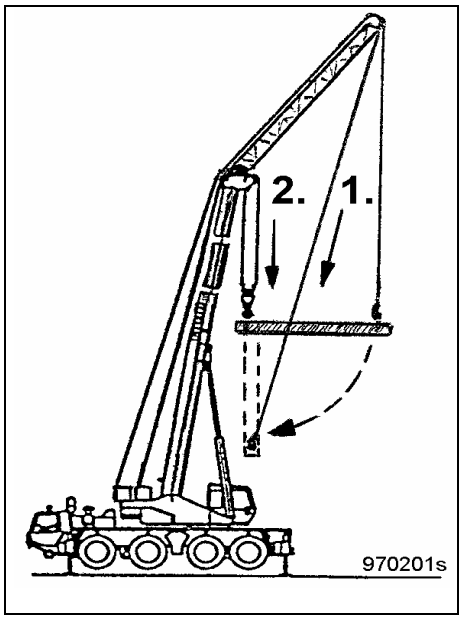
cont'd.: **11.6.4 Operation with 2 hooks**

When a load is suspended on both hook blocks, the telescopic boom must on no account be lowered via the derricking gear.

All crane work must be performed with the required care.

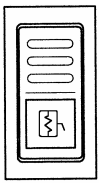


1. **Use the 2nd winch to lift the load clear of the ground**
2. **Use the main winch to hoist the load**



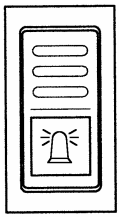
1. **Use the second winch to lower the load**
2. **Use the main winch to deposit the load**

11.7 Heating of working mirror

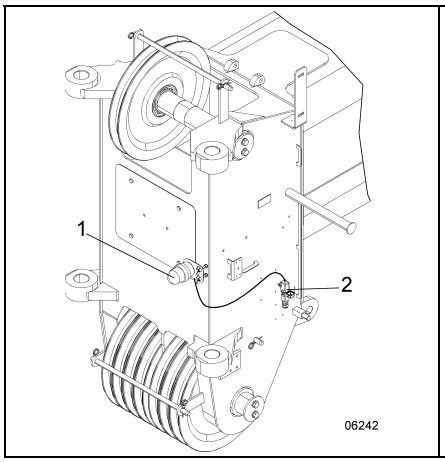


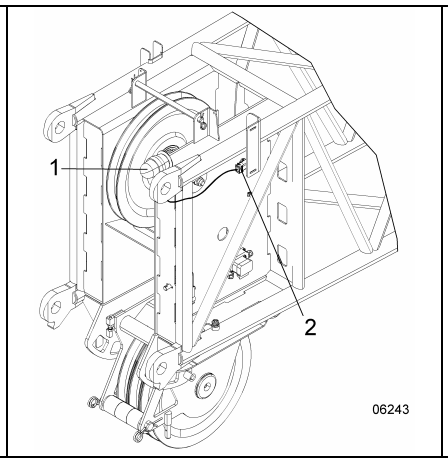
- Actuate the rocker switch **46** "working mirror heating"; the green function lamp in the switch goes on to indicate the heating process.

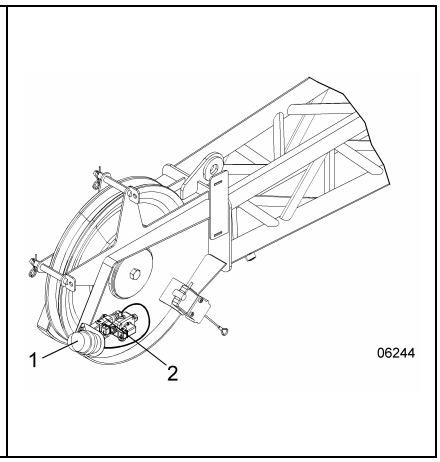
11.8 Aircraft warning lamp on the boom



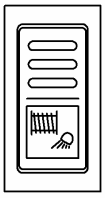
- Actuate the rocker switch **45** "aircraft warning lamp"; the aircraft warning lamp on the boom is switched on; the green function lamp in the switch goes on to indicate that the lamp is switched on.
- Secure aircraft warning lamp (1) to its support, connect it to the power supply (2).







11.9 Working floodlight on the hoist winch

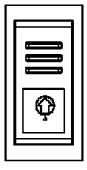


- Actuate the rocker switch **48** "working floodlight, hoist winch" down to switch the lights ON/OFF.

11.10 Working floodlight - electrical adjustment

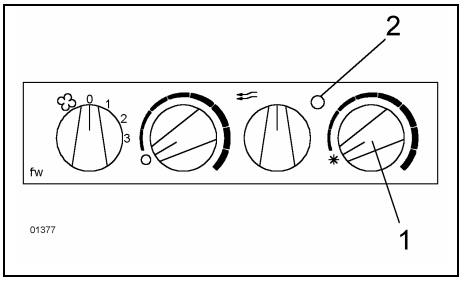
- Actuate the rocker tip switch **50** "working floodlight". The working floodlight on the boom is adjusted.

11.11 Hook height indication, auxiliary hoist winch



- Actuate the rocker tip switch **24** “Hook height indication, auxiliary hoist winch” . The current height of the bottom block is displayed.

11.12 Air conditioning system



- Actuate the rotary switch (1) to switch on the air conditioner. During air conditioner operation, the pilot lamp (2) is lit.

For further details on operation, care and maintenance of the air conditioner, refer to the documents of the manufacturer of this unit in Part G2 Superstructure.

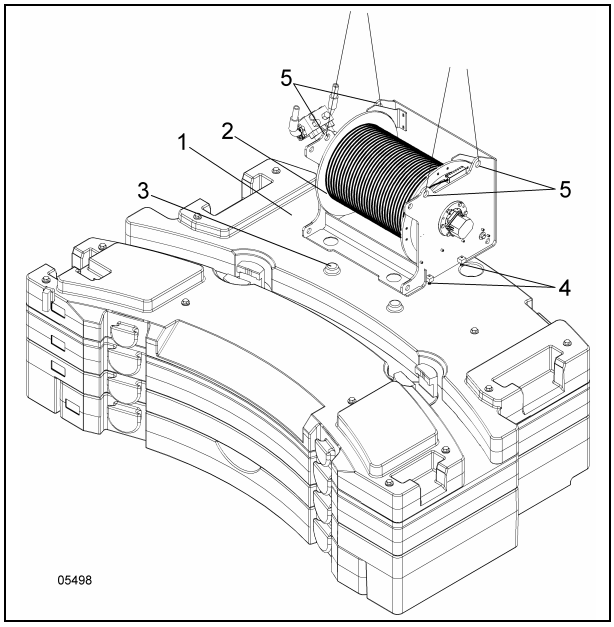
11.13 Mounting/removal of the auxiliary winch

Assembly:

- The vehicle is supported correctly by outriggers.
- The counterweight variant 47t or 71t has been picked up, as described above, and stowed in the counterweight rest.

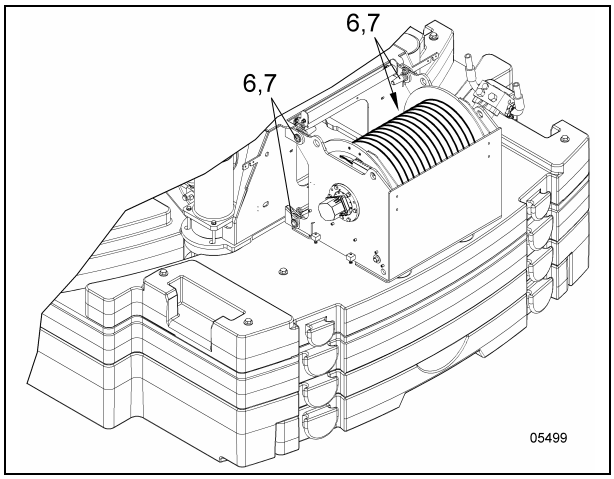
- Pick up auxiliary winch (2) via the 4 points for attachment (5) using appropriate securing devices (weight approx. 1400 kg).
- Place auxiliary winch (2) on the counterweight (1) so that the locating bore-holes of the auxiliary winch are located in the centering pins (3) of the counterweight (1).

The setscrews (4) have been set by the factory and must not be adjusted! In case of problems, please contact the TADANO-FAUN After-Sales Service.



- Pick up counterweight as described.

- Fasten the auxiliary winch. To this effect, insert pins (6) and lock them using the spring clips (7).
- Connect the electrical (10) and hydraulic (8) connectors and the line of the centralized lubrication system (9).
- Detach and place the winch rope.



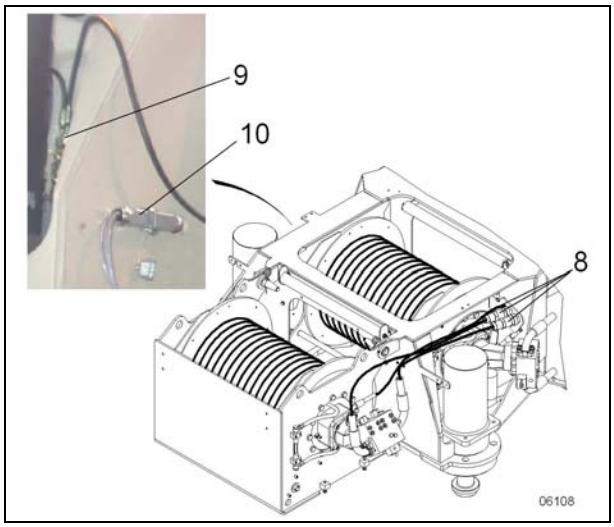
For removal of the auxiliary winch, proceed analogously by reversing the above sequence of operations.

In this context, the following must be observed:

- The winch rope of the auxiliary winch is wound up and fixed to the auxiliary winch.

DANGER **The instructions under item B2-6.9 "Over-unwinding cutout device" must be complied with.**

- When releasing the connections of the hydraulic and the centralized lubrication system, absorb any leaking oil or grease and remove it.



11.14 Switch "Emergency OFF, superstructure engine”

Engine stop

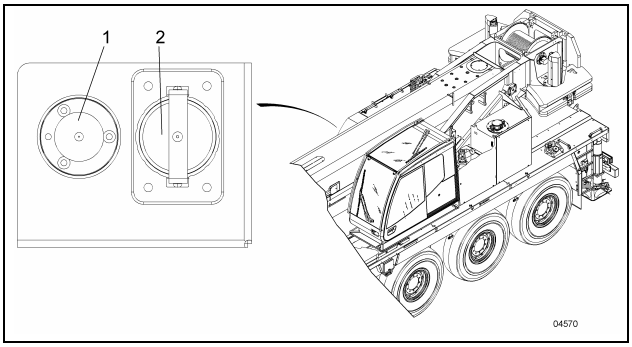
The switch is installed in the lid of the superstructure, in driving direction, on the right side of the vehicle.
To stop the running engine in the superstructure in cases of emergency, press the push-button.
If it is intended to restart the engine, press the push-button once more; now it will return to its initial position..

11.15 Starting the engine with current supplied from an external power source

If the vehicle's batteries are discharged or if their capacity is insufficient, the engine can be started with power supplied from an external source.

Such an external power source are the batteries of another vehicle with 24 V system, or the batteries of the superstructure or the chassis of the vehicle in question.

However, this requires that the vehicle supplying power is equipped with a plugbox for starting via an external power source.



The plugbox for starting via an external power source (2) of the vehicle to be supplied with power is installed on the right side of the vehicle, on the battery box, below the cover.

The batteries of the vehicle supplying power should have the same or a higher capacity (Ampere) than those of the vehicle to be supplied with power.

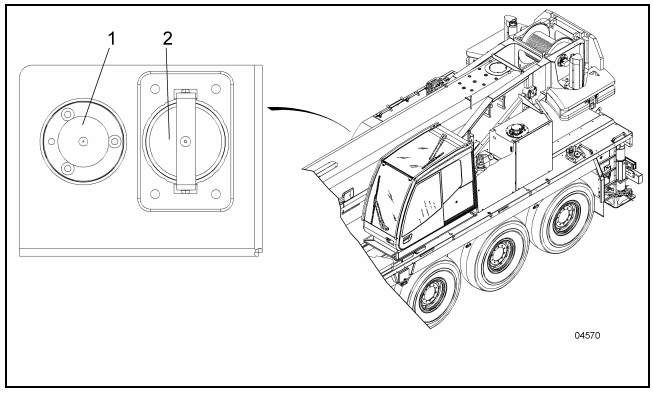
To avoid damage to the generator, make sure that the following sequence of operations is observed:

Vehicle to be supplied with power	Vehicle supplying power
1. The ignition is switched off.	The ignition is switched off
2. The battery main switch is turned off	The battery main switch is turned off
3. Connect jumper cables to plugbox	Connect jumper cables to plugbox
	4. Switch battery main switch on.
	5. Switching the ignition on
	6. Start the engine and make it run at half-load.
7. Switch the ignition on. (Do **not switch on** the battery main switch).	
8. Starting the engine	
9. Switch battery main switch on.	
	10. Shut off the engine, switch the ignition off. Switch battery main switch off.
11. Disconnect the jumper cables	Disconnect the jumper cables

Attention Make sure that the engine is never running without connection to the battery (either to the vehicle's own battery or to the battery of another vehicle) (destruction of the rectifier diodes in the three-phase generator).

NOTE **Current can also be supplied via the plugbox for starting the vehicle by means of an external power source, i.e. another vehicle can be started.**

11.16 Battery charging plugbox



The battery charge condition is checked by measurement of the acid density.

If the acid density is below 1.21 kg/l - referred to a temperature of 20°C and the specified acid level - the battery must be charged.

The battery may only be charged with direct current (DC).

To charge the batteries, connect the charging plugbox (1) to the battery charger directly via a cable; it is not necessary to remove the batteries.

The plugbox for starting via an external power source (1) is installed on the right side of the vehicle, on the battery box underneath the cover.

For further details, refer to the brochures of the battery manufacturer.

Attention **The charging plugbox (1) must not be used to start the vehicle via an external power source with the charging unit connected. It is only used for charging the battery.**

11.17 Hourmeter, hoist winch

A separate hourmeter (part B2-2.1, item 13 **)** has been installed to monitor the operating hours of hoist winch 1. The hourmeter operates as soon as the hoisting winch is put into operation.

11.18 Hourmeter, auxiliary hoist winch

A separate hourmeter (part B2-2.1, item 15 **)** has been installed to monitor the operating hours of hoist winch 2. The hourmeter operates as soon as the hoisting winch is put into operation.

11.19 Emergency control of superstructure / emergency drainage device

DANGER **On principle, the superstructure emergency mode is only admissible to reset the crane from a working position to its former rig arrangement in case of malfunction of the power supply.**

To supply the superstructure hydraulic system in case of failure of the engine in the superstructure, the hydraulic pump or the superstructure electrical system, the oil supply can be ensured by means of hose pipes equipped with quick-locking coupling devices via a hydraulic motor which is driven from the hydraulic system in the chassis.
Due to the different sizes of the quick-locking coupling devices, these cannot be confused on connection.

Attention **In the case of specific crane work which may require quick utilisation of the emergency control feature, oil supply to the emergency control system must be ensured before such work begins. At the same time, all possible procedures for resetting the superstructure to its former rig arrangement must be checked for proper function.**
When slewing the superstructure, pay attention to any connected hydraulic hoses.

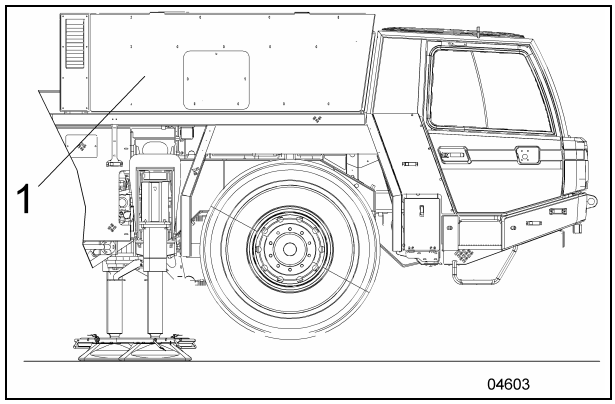
DANGER **Only hoisting gear 1 can be reset to its former rig arrangement via the emergency control.**
Persons may only be transported by means of hoisting gear 1.

11.19.1 Establishing the oil supply between the chassis and the superstructure

In the chassis:

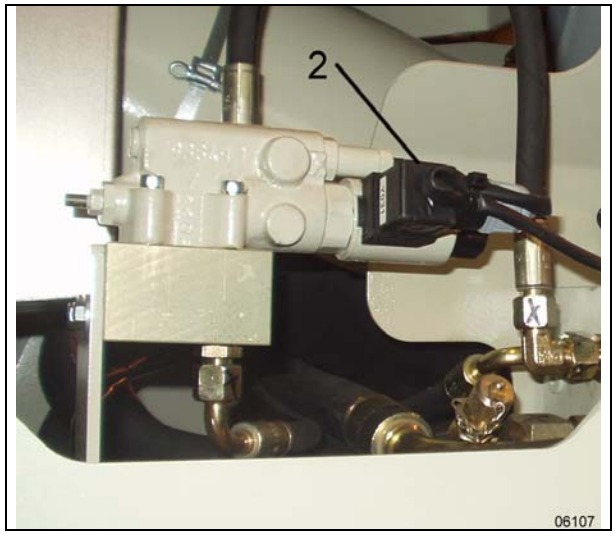
- Stabilize the vehicle by outriggers.
- Shut off the engine in the chassis.

- Open the cover (1) of the radiator housing.



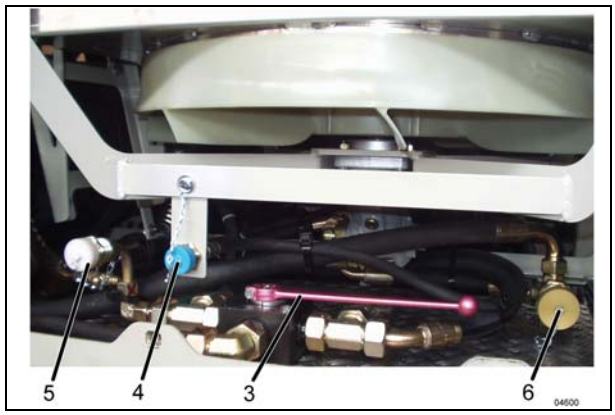
- During normal driving operation, the plug (2) of the engine cooling system is inserted in its electronically controlled initial position at the valve block, i.e. “independent of the engine speed”, and must be switched to its “emergency position” (governed by the engine speed**)**.

- Remove plug (2) for the oil supply of the superstructure emergency control from the valve block.



cont'd.: **11.19.1 Establishing the oil supply between the chassis and the superstructure**

- Move 3/2-way change-over lever (3) for oil supply to the superstructure emergency control feature from its initial position to the left into emergency position.
- Remove the caps from the quick-locking coupling devices (4, 5 and 6).
- Screw-fasten the hose pipes to the quick-locking coupling devices (4, 5 and 6) by turning them to their stops.



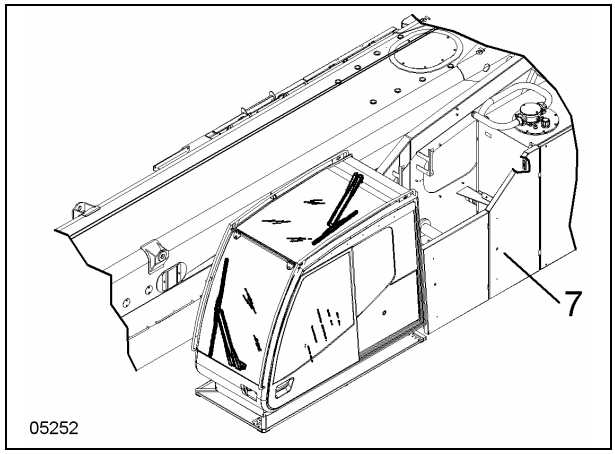
Attention **The change-over cock and the plug "engine cooling system" are used for change-over in the emergency position, and must be returned or inserted to their initial position once work is finished.**

In the superstructure:

Establishing the connection of the hydraulic hoses between the chassis and the superstructure

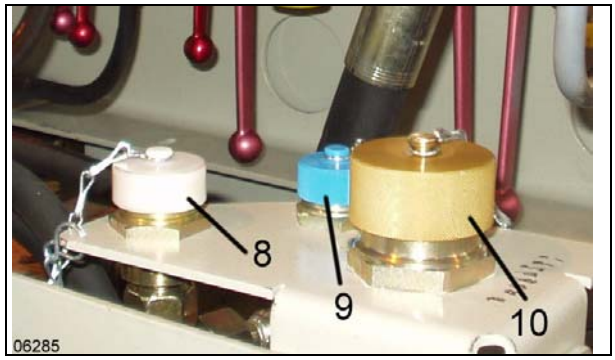
Prerequisite:
The three hose pipes in the **chassis** are safely connected to the quick-locking coupling devices.

- Open the cover (7)



- Remove the caps from the quick-locking coupling devices (8, 9 and 10).

- Screw-fasten the hose pipes to the three quick-locking coupling devices (8, 9 and 10) by turning them to their stop.



Attention **All hose pipes must be screw-fastened safely to the quick-locking coupling devices, as otherwise the hydraulic system may be damaged.**

11.19.2 Resetting the superstructure to its former rig arrangement

DANGER **During superstructure emergency operation, any risks of overload or overturning to which the crane might be exposed must be taken into account. Make sure that always motions tending to reduce the load moment (lowering the load or raising the boom) are performed, if possible. Retracting the telescopic boom is not possible.**
While resetting the crane to its former rig arrangement, actuate the control levers gently.

NOTE **In emergency mode, as long as the superstructure power supply is available, the information on the AML display remains visible and should be used to assess the risk.**

DANGER **If there is a failure of the electrical power supply of the superstructure, the AML information is no longer available. The prevailing risk must be judged on the basis of other information.**
Even if the electrical power supply is still available in superstructure emergency mode, a dangerous motion (increasing the load moment) will not be stopped by the automatic safe load indicator.

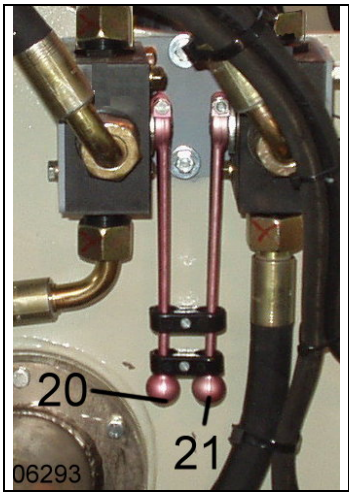
Prerequisite:
The hose connections between the chassis and the superstructure have been established.

In the chassis:

- Start the engine in the chassis and set the speed to ≤ 1000 r.p.m.
- Set the change-over cock (in the chassis) and the plug of the engine cooling system (in the chassis) to its emergency working position (refer to item 11.19.1).

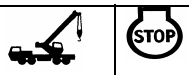
In the superstructure:

All control cocks are in their initial position. No crane movements are possible.



cont'd.: **11.19.2 Resetting the superstructure to its former rig arrangement**

Functions of the control cocks:

Control cock:		**Function:**
11		Actuation of the pressure supply (oil supply). ON / OFF.
12		Hoist winch, winding up the rope.
13		Hoist winch, unwinding the rope.
14		Raise boom via the boom elevation.
15		Actuate boom elevation "down".
16		Release swing brake.
17		Slewing superstructure to the right.
18		Slewing superstructure to the left.
19		Release rope winch brake.
20/21		Enable "Slewing superstructure to the left/right"

NOTE **To slew the superstructure to the right/left, observe the following sequence of operations:**
- Actuate control cock 16 to release the swing brake,
- actuate the control cocks 20/21 to enable slewing of superstructure to the right/left,
- actuate control cocks 17 or 18 to slew the superstructure to the right or left

To return the superstructure to its former rig arrangement, proceed as follows:
- Switch on the pressure (oil supply) by actuation of the control cock (11).
- Perform the desired crane function by actuation of the appropriate control cock (12 - 21).

In the case of extended pauses between the emergency actuations, move control cock (11) to its initial position.

Attention **Once emergency operation is finished, the levers of all control cocks must be returned to their initial position, and removed.**

11.19.3 Putting the vehicle in its initial condition

After resetting the vehicle to its former rig arrangement, perform the following steps:
- Move the control cock and the plug to their initial position.
- Disconnect and remove the hoses.
- Close the connectors of the quick-locking coupling devices by means of caps.
- Close lids and covers.

Memo:

12 Instrument panel

12.1 Monitoring superstructure, chassis, and outrigger operation from the superstructure, ASLI control unit

12.1.1 Indicator, pilot and warning lamps

Item

3 (rt) Central warning indicator CGC

12.1.2 Instruments

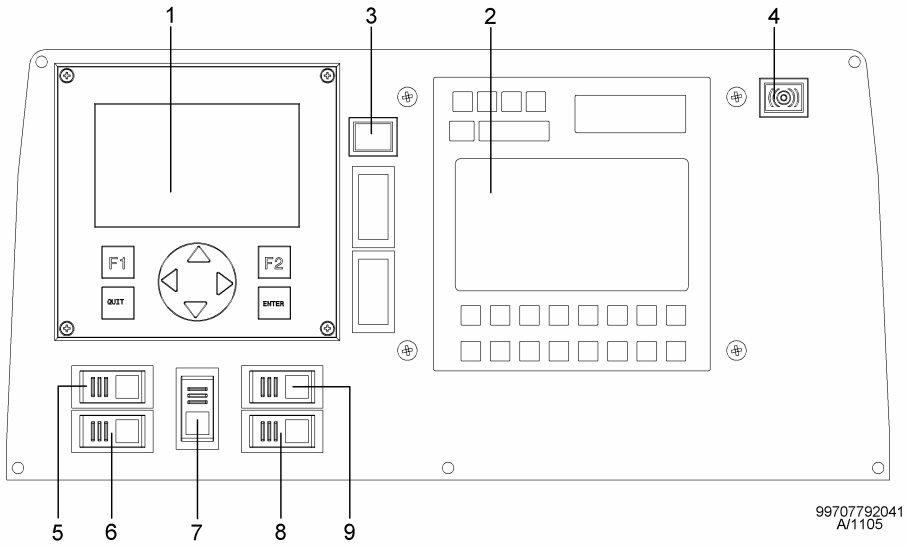
12.1.3 Other components

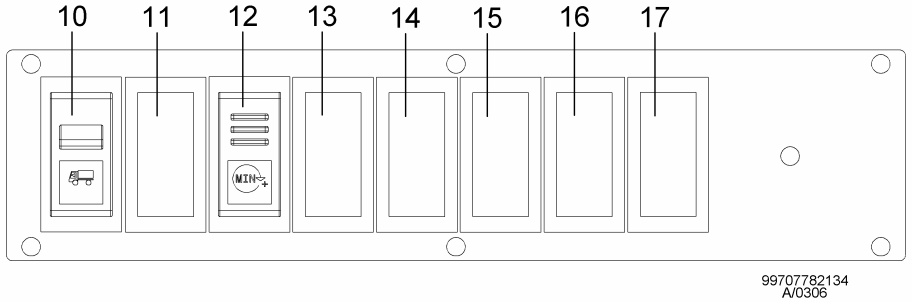
Item

1 CMV indicator and control unit
2 AML indicator and control unit
4 AML Warning buzzer

12.1.4 Switches, rocker switches (WS), rocker tip switches (WT)

5 WT - Extending/retracting outriggers, VL
6 WT - Extending/retracting outriggers, HL
7 WS Outrigger preselection
8 WT - Extending/retracting outriggers, HR
9 WT - Extending/retracting outriggers, VR
10 WS*) Ignition chassis ON
11 free
12 WT - Engine speed regulation, chassis
13 - 17 free





Pilot lamps =	(gn) green
Indicator lamps =	(ge) yellow
	(or) orange
	(bl) blue
Warning lamps =	(rt) red

UW = Chassis
WS = Rocker switch
WS*) = Rocker switch with function lighting
WT = Rocker tip switch
VL = front, left-hand VR = front, right-hand
HL = rear, left-hand HR = rear, right-hand
CGC = Control and Service System
AML = Automatic Safe Load Indicator
CMV = Cockpit-Multi-Vision

12.2 Operation of the superstructure

12.2.1 Indicator, pilot and warning lamps

Item
20 free
28 (rt) Counterweight not "up"
30 (gn) Counterweight locked
33 (gn) Counterweight down
34 (ge) Counterweight unlocked

12.2.2 Instruments

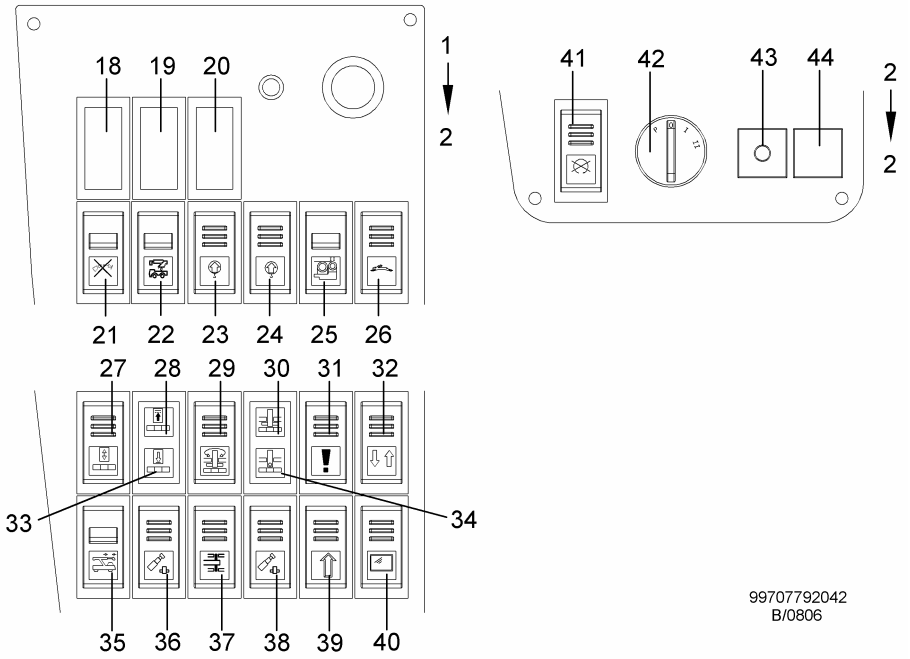
12.2.3 Other components

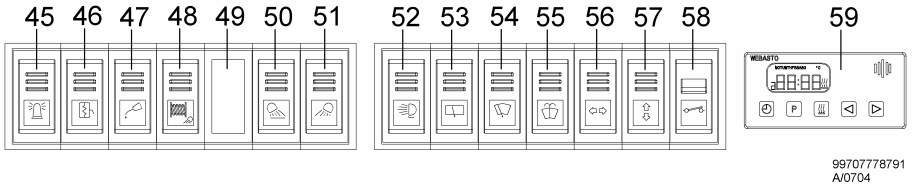
42 DS Ignition starter switch
43 Key-actuated switch, HES override feature
59 Timer, supplementary heater unit

12.2.4 Switches, rocker switches (WS), rocker tip switches (WT)

Item
18 free
19 free
21 WS*) Override function slow-stop
22 WS Removal the boom**)
23 WST Indicator / Reset - hook height, hoist winch
24 WS Indicator - hook height, auxiliary hoisting winch**)
25 WS *) Auxiliary hoisting gear engaged**)
26 WS Fast speed, tele section(s)
27 WT counterweight "up-down"

Item
29 WT counterweight locked - unlocked
31 WS Counterweight override feature / crane control
32 WS Hoist winch rotation indicator
35 WS*) Emergency control - tele
36 WT Emergency control, tele section(s); tele section(s) locked/unlocked
37 WT Emergency control, tele section(s); cylinder locked/unlocked
38 WS Lock override feature/tele control
39 WT Lift-adjuster
40 WT Monitor - Tele
41 WT-Engine stalling device
44 free
45 WS*) Aircraft warning lamp**)
46 WS *) Mirror heating on boom**)
47 WS*) central lubrication system
48 WS Working floodlight, hoist winch **)
49 free
50 WT Working floodlight - electrical adjustment**)
51 WS Working floodlight on basic boom
52 WS Instrument illumination/working floodlight on the crane cabin
53 WS Wiper, skylight
54 WS Windscreen wiper
55 WT Washer
56 WT Windscreen adjustment
57 WT Seat adjustment
58 WS*) Battery main switch





Pilot lamps =	(gn) green
Indicator lamps =	(ge) yellow
	(or) orange
	(bl) blue
Warning lamps =	(rt) red

WS	= Rocker switch
WS*)	= Rocker switch with function lighting
WT	= Rocker tip switch
WST	= Rocker switch button
DS	= Rotary switch

**) Optional equipment

Part C

Service and Maintenance

1 General information

Regular care, careful servicing and maintenance will ensure that your machine is ready to work perfectly through a long lifetime.

All the operations required have been described in the following part "C" and must be effected at the intervals specified in the maintenance schedules for the chassis and the superstructure.

Service and maintenance work may only be performed by qualified, well-trained and authorized specialist staff.

These instructions do not include any particular work on the engine and the gearbox requiring special knowledge. For further details, please refer to the Operating Manuals of the manufacturers of the assemblies in question.
The machine must be cleaned thoroughly at least every 3 months; at the same time, all defective parts of the paint must be derusted and re-painted. When the vehicle is out of operation for an extended period of time, all metallic parts must be greased to protect them against corrosion. Corrosion protection must be ensured especially as regards the piston rods of the working cylinders.

1.1 Before starting service and maintenance work

Absolute cleanliness and reasonable planning are prerequisites to all work.

- Maintenance work may only be performed while the engine is at a standstill.
- Protect the machine against rolling away.
- Use only non-fibrous cloth for all work to be carried out, in particular at the hydraulic system.
- Check oil levels only while the machine is standing in horizontal position.

NOTE **During oil level inspections, the safety prescriptions according to § 6 "Regulation for the prevention of accidents to drive assemblies" must be observed. (Please observe any specific regulations of the country where the machine is to be used which might differ from those mentioned above.)**

- Oil changes should only be effected when the systems and assemblies have their service temperature.

DANGER **Danger of scalding in case of uncontrolled seepage of hot lubricant or hydraulic oil.**

DANGER **Systems, such as: hydraulic system, piping, radiator, compressed air tanks, expansion vessels, pressure accumulators etc., must be depressurized before they are opened.**

- In case of a visible loss of oil, check the oil level of the assembly in question at shorter intervals; determine the reason and eliminate it. Check the hose clamps possibly installed for tight fit at regular intervals; if necessary, re-tighten them.
- Disconnect the batteries before performing work at the electrical equipment during which tools etc. might get into contact with the electrical equipment. First disconnect the negative, then the positive terminal (when reconnecting, start with the positive terminal, subsequently connect the negative terminal).
- Before greasing, clean the lubricators; then lubricate according to the maintenance schedule.
- Grease all joints, all movable and rotating parts which are not equipped with grease nipples using an oil can, according to the maintenance schedule.

(cont'd.) **1.1 Before starting service and maintenance work**

- Eliminate any leakage in the piping systems immediately.
- When mounting covers, plugscrews etc., pay attention to good condition and perfect fit of the seals, if necessary, replace sealing element.
- All filter elements and/or filter cartridges must be replaced at the specified intervals, unless cleaning is expressly admitted.
- If the oil or grease type is to be changed for technical or operational reasons, make sure that only the recommended qualities and viscosities are selected.
- Only use clean oils and lubricants stored in closed vessels.
- For filling and transferring oil, use only clean vessels; the use of a fine-meshed strainer is recommended.
- Use only clean tools when handling lubricants.
- Before re-using fastening and securing elements, e.g. screws and bolts, nuts, spring washers, discs etc., check and, if necessary, replace them. Do not re-use lock nuts.
- Before disassembly, mark all cables and lines to be disconnected to prevent them from being mixed up on reassembly once repair has been completed. Check for proper working order. Check compressed air, hydraulic oil and coolant lines for leakage.

1.2 Welding and straightening work

Welding work, thermal treatment and straightening work on “supporting components” are absolutely prohibited (refer to part E-1, item 1).
As high-tensile steels are used, there is a risk that the material properties might be lost due to inexpert welding work, thermal treatment or straightening work.

1.3 Inspection of screw couplings

Check all connecting and securing bolts, including those of the assemblies, and all hose clamps for tight fit at regular 3-month intervals; if necessary, re-tighten them.
When checking for tight fit, adhere to the specified tightening torques.

The corresponding standard for tightening torques "FN 10009" is available from the Tadano-Faun After-Sales Service.

1.4 Checking the hydraulic system and its screw couplings for leakage

Leaking hydraulic screw couplings - if they have come loose - may only be retightened when the system is depressurized. If safely fastened screw couplings are leaking, the screw coupling in question must be replaced. Damaged pipes must not be repaired but replaced by new ones.

1.4.1 Admissible period of use of hydraulic hoses

Hydraulic hoses and hose pipes must be checked at regular weekly intervals and replaced immediately if damage - e.g. abrasions, cuts, fissures, deformations are detected or if they move out of their fittings, so that damp spots are visible.
The utilization period of hose pipes should not exceed 6 years as from the date of commissioning (refer to DIN 20 066 and ZH 1/74) (please observe any specific regulations of the country where the machine is to be used which might differ from those mentioned above).

1.5 Cleaning

In order to avoid damage to the electrical equipment, the brake pipes and the paint, the machine should be cleaned during the first three months using cold water only. Water temperatures in excess of 70°C should be avoided; aggressive and inflammable cleaning substances should not be used.
Spray nozzles should not be closer to the vehicle than 30 cm. Do not use "Power Jet" nozzles.
When the machine is cleaned using a high-pressure cleaning unit (steam jet unit), make sure that the steam jet is neither directed immediately on rubber or electrical components, nor on joints and the length compensation of propeller shafts and breathers.
Maximum pressure of cleaning units = 80 bar. Preferably, fan nozzles should be used.

1.6 After having finished service and maintenance work

After having finished these operations, re-install the protective equipment properly. Check the machine for proper operation.

Attention **When disposing of oil, grease, detergents or components containing oil, e.g. filters, observe the provisions for pollution control. Used oil must be disposed of according to the applicable requirements.**

Besides, please observe the instructions specified in item B0-2.17.3 of the part Safety Instructions.

1.7 Configuration of electronic components

In the case of replacement of the engine, gearbox and ABV electronics (control system) and on replacing the engine and the gearbox, the control parameters must be configured anew. Such work may only be performed by well-trained specialists.
For further information, please contact the TADANO FAUN After-Sales Service.

Memo:

Part C1

Service and Maintenance

Chassis

2 Maintenance intervals

The maintenance intervals depend on the vehicle's operating conditions; the next maintenance will be due after:

- a certain number of operating hours,
- a certain number of kilometers traveled, or
- a defined period of time.

NOTE **The value which is reached first shall be decisive.**

The kilometers travelled are indicated in the driver's cab on the "modular tachograph" (see item B1-2.1 and B1-4.6.7), and the number of operating hours on the hourmeter in the instrument panel (see item B1-4.6.2.9 and B1-11).

Maintenance work which must be performed earlier than the regular maintenance works, or in a different fashion, is indicated in the maintenance schedule in the column "Initial maintenance after", e.g. commissioning of the machine or replacement of components.
After these maintenance works have been effected, the column **„Regular maintenance every 125 / 250 / 500 / 1000 / 2000 / operating hours"** shall apply.

Maintenance work which must be performed daily or before commissioning the vehicle has been marked by an "**X**" in the maintenance schedule in the column "**Daily, before start-up"**.

The number of operating hours expiry of which calls for the specified maintenance work to be performed repeatedly have been marked by an **"X"** in the columns **"Regular maintenance every 125 / 250 / 500 / 1000 / 2000 / operating hours"**.

e.g. "every 500 operating hours" i.e. after 500, 1000, 1500 etc. operating hours have been reached,
"every 2000 operating hours" i.e. after 2000, 4000, 6000 etc. operating hours have been reached.

NOTE **The maintenance intervals apply for machines which are subject to normal operating and environmental conditions. If the machines are used in particular applications, the maintenance intervals must be adapted to the prevailing operating conditions.**

NOTE **Whenever maintenance work is performed, it is obvious that also maintenance work required to be done at shorter intervals which coincides with this date must be performed as well.**

NOTE **If the test and maintenance schedules call for tests on several identical parts (e.g. axles, propeller shafts, suspension cylinders etc.), only one item is positioned in terms of example.**

Memo:

2.1 Maintenance schedule

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Hydraulic piping										
Check hydraulic hoses / hose lines for damage.	**1.4.1**								Once per week	
Replace hydraulic hoses.	**1.4.1**								every 6 years	
Engine										
Inspection for leakage.	**3**		**X**							Daily, simultaneously with each oil level inspection and each oil change.
Check hose clamps of the coolant hoses for tight fit and tightness.	**3**				**X**					
Oil level inspection.	**3.1**		**X**							
Oil change, oil filter replacement.	**3.2**						600 operating hours		Once per year	Every 40,000 km traveled, every 600 operating hours, at least, however, once per year.
Inspection of tight fit of the hose clamps of the charge air hoses.	**3.3**				**X**					
Drain condensed water.	**3.4.1**						**X**		Once per year	If necessary, earlier.
Fuel tank; check ventilation filter	**3.4.2**						**X**		Once per year	If necessary, earlier.
Fuel filter; drain condensed water.	**3.4.3.1**				**X**					If necessary, more often.
Fuel filter, replace filter cartridge.	**3.4.3.2**						**X**		Once per year	Every 100,000 km traveled. If necessary, more frequently, depending on the fuel quality.
Replacement of coolant.	**3.5**							**X**	every 2 years	
Inspection of coolant level.	**3.5.1**		**X**							
Cleaning the cooler.	**3.6**					**X**				If necessary, earlier.

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Air cleaner										
Monitoring the air cleaner	**3.7**		**X**							During operation via the "air cleaner" indicator in the CGC.
Check air cleaner housing for damage and cracks.	**3.7**									Simultaneously with each maintenance of the air cleaner.
Replacement of air cleaner cartridge.	**3.7.1** **3.7.2**							**X**	Every 2 years	And when the indicator "air cleaner" in the CGC goes on.
Clean air cleaner housing.	**3.7.1**									Simultaneously with each maintenance of the air cleaner. If necessary, earlier, depending on dust collected.
Check air intake pipes and hoses.	**3.7.3**				**X**					
Servicing switch "Air cleaner monitoring" - check for proper working order	**3.7.4**						**X**		Once per year.	and if the indicator lamp in the CGC does not go on in spite of contamination of the air cleaner.
Cleaning the louvred grill, coarse filter.	**3.7.5**									Simultaneously with each maintenance of the air cleaner. If necessary, earlier, depending on dust collected.
Gearbox										
Inspection for leakage.	**4.1**		**X**							Daily, simultaneously with each oil level inspection and each oil change.
Oil level inspection.	**4.1**					**X**				
First oil change.	**4.2**	3,000 operating hours; at least after 3 years								
Subsequent oil changes.	**4.2**									For oil types and oil change intervals, refer to the ZF Chart of approved Lubricants in Part G1, Chassis.

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Transfer box										
Check electrical switches for proper working order	**5**				**X**					Simultaneously with each oil level inspection; at the latest with each oil change.
Inspection of control cylinders for on-road/off-road gear for leakage	**5**				**X**					Simultaneously with each oil level inspection; at the latest with each oil change.
Check delivery lines for leakage and chafe marks.	**5**				**X**					Simultaneously with each oil level inspection; at the latest with each oil change.
Check breather; if necessary, clean.	**5.1.1/9**				**X**					Simultaneously with each oil level inspection; at the latest with each oil change.
Inspection for leakage.	**5.1.1**		**X**							Daily, simultaneously with each oil level inspection and each oil change.
Oil level inspection / check visually.	**5.1** **5.1.1**				**X**				Every 3 months	
Oil change.	**5.2**	1,000 to 1,500 km							Once per year	At regular intervals of 10,000 km traveled.
Clean oil cooler.	**5.3**					**X**				If necessary, earlier.
Axles										
Oil level inspection.	**6.1**								Once per month	
Oil change.	**6.2**	100 operating hours					**X**		Once per year	Every 10,000 kilometers traveled, at least, however, once per year.
Grease stub axle bearings (supplied via central lubrication).	**6.4**						**X**		Once per year.	Every 10000 kilometers traveled, at least, however, once per year.
Replacement of grease filling in the wheel hubs of the non-driven axles.	**6.4.1**	1000 operating hours							Every 2 years	Every 50,000 km traveled.

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Inspection for leakage.	**6.5**		**X**				**X**			Daily, simultaneously with each oil level inspection and each oil change.
Visual inspection and check of control functions.	**6.5**						**X**			Simultaneously with each oil level inspection and each oil change
Inspection of axial play**.**	**6.6**							**X**		In a specialist workshop.
Inspection of wheel bearing backlash.	**6.6**	100 operating hours							Once per year	
Check screws and bolts on axles, drop arms, thrust rods, etc. for tight fit; if necessary, re-tighten.	**6.7**	50 operating hours, then after reaching 100 op. hrs.				**X**			Once per year	
Preservation of axle and planetary gearings.	**6.8**									When the vehicle is inoperative for an extended period of time.
Check flange screws of propeller shafts for tight fit, if necessary, re-tighten.	**6.9** **7.3**	50 operating hours, then after reaching 100 op. hrs.				**X**			Once per year.	
Propeller shafts										
Inspection of backlash.	**7.1**	50 operating hours, then after reaching 100 op. hrs.				**X**			Once per year	
Inspection for noise.	**7.2**		**X**							During operation.
Eddy-current brake[**)]										
Check backlash between stator and rotors.	**8**						**X**		Once per year.	
Check air gap.	**8**						**X**		Once per year.	

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Checking the propeller shaft flange screws for tight fit.	**8**	50 operating hours, then after reaching 100 op. hrs.				**X**			Once per year	
Check tightening torque of screws and bolts.	**8**						**X**		Once per year.	
Check shaft packing rings on axle.	**8**						**X**		Once per year.	
Check insulating sleeves, cabling, fasteners and supports for good condition.	**8**						**X**		Once per year.	
Check terminals/pole units and pole shoes for corrosion.	**8**						**X**		Once per year.	
Check cable lugs and ground connection for proper fastening and tight fit.	**8**						**X**		Once per year.	
Check contacts in relay box for good condition.	**8**						**X**		Once per year.	
Check the cable connections and connecting clamps in the relay box for tight fit.	**8**						**X**		Once per year.	
Check control levers for good condition. Check pilot lamp for proper function.	**8**		**X**							During traveling operation.

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Breathers										
Check, clean and - if necessary, replace breathers at the gearbox, transfer box, axles, fuel tank (chassis and superstructure), hydraulic tank (chassis and superstructure), swing drive and eddy current brake**).	**9**				**X**					and simultaneously with every oil change.
Check and, if necessary, clean breather / vent holes on the brake cylinders.	**9**				**X**					If necessary, earlier.
Check, clean and – if necessary – replace silencers / breathers on the brake valves.	**9**				**X**					If necessary, earlier.
Hydraulic system										
Check hydraulic system for leakage.	**10** **C2-3.6**		**X**							
Oil level inspection.	**10.1**		**X**							
Replace filter cartridges.	**10.2**	125 operating hours					**X**		Once per year	simultaneously with each hydraulic oil change and if the symbol indicating contamination of the filter is lit.
Replacement of the ventilation filter.	**9/10.2.1**							**X**		If necessary, earlier, if contaminated.
Oil change.	**10.3**							**X**	Every 2 years	Take and analyse an oil sample at regular intervals.
Check working pressure of the hydraulic system of the chassis; if necessary, have it re-adjusted by specialists.	**10.5.3** **10.6.4** **10.7.3**	125 operating hours					**X**			

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Hydraulic system of steering assembly										
Hydraulic oil change.	**10.5.1**									Simultaneously with each hydraulic oil change.
Inspection of miter gear of steering system for leakage.	**10.5.2**		**X**							
Checking the steering gear and the steering system for leakage.	**10.5.4**		**X**							
Hydraulic system of suspension										
Hydraulic oil change.	**10.6.1**									Simultaneously with each hydraulic oil change.
Check for proper working order and leakage	**10.6.2**		**X**							
Check the preload pressure of the hydraulic accumulators.	**10.6.3**	50 operating hours, then once more after 4 months					**X**		Once per year	And, if necessary, more frequently during the winter months.
Hydraulic system of outriggers										
Hydraulic oil change.	**10.7.1**									Simultaneously with each hydraulic oil change.
Checking the hydraulic system of outriggers / the hydraulic cylinders for leakage.	**10.7.4**		**X**							Before each outrigger operation.
Brake system										
Check compressed air system for leakage.	**11.1**		**X**							
Actuate drainage valves of air tanks**.**	**11.1**			**X**					Every 2 weeks	

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial mainten-ance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Cleaning drainage valves of air tanks.	**11.1**						**X**		Once per year	
Functional check of air drier.	**11.2.1**			**X**						
Replacement of air drier cartridge.	**11.2.1** **11.2.2**								Every 2 years	If necessary, earlier.
Pressure governor - check for proper working order and visual inspection of its internal components.	**11.3**						**X**			Inspection according to the legal regulations of the country where the machine is to be registered.
Inspection and cleaning of the diaphragm cylinders.	**11.4.3**						**X**			And whenever the spreading device is checked. Inspection according to the legal regulations of the country where the machine is to be registered.
Checking wheel brakes for proper working order and wear.	**11.5**						**X**			Inspection according to the legal regulations of the country where the machine is to be registered.
Inspection of brake lining thickness.	**11.5.1**				**X**					
Inspection of air gap**.**	**11.5.2**				**X**					
Wheel brakes - Maintenance	**11.6**						**X**			
Inspection for wear of the spreading device; greasing of movable components	**11.6.1**							**X**	Every 2 years	Inspection according to the legal regulations of the country where the machine is to be registered.

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Checking the pressure setting of the pressure reducing valves.	**11.7**						**X**			Simultaneously with each inspection of the brake system, and after replacement of a valve. Inspection according to the legal regulations of the country where the machine is to be registered.
Correct functioning of the ABV system**)	**11.8**		**X**							When starting driving operation, and/or while driving: check the pilot lamps for proper working order.
Check mechanical components of ABV**) system.	**11.8**				**X**					
Check the entire ABV**) system.	**11.8**						**X**			In a specialist workshop.
Checking function and setting of engine brake and exhaust flaps.	**11.9 11.9.1**			**X**						Observe specifications of engine manufacturer.
Inspection of the compressed air system.	**11.10**						**X**			Inspection according to the legal regulations of the country where the machine is to be registered.
Electrical equipment										
Batteries, grease terminals.	**12.1**									As required.
Check the batteries.	**12.1**			**X**					Once per month.	
Check the three-phase generator.	**12.2**						**X**			Pay attention to correct Vee belt tension.
Check the starter.	**12.3**						**X**			Refer to the instructions of the engine manufacturer.
Check lamps and indicator lamps for proper function.	**12.4**		**X**							

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Clean lamp glasses and check them for damage.	**12.4**		**X**							If necessary, earlier in case of contamination.
Wheels and tires										
Check rims for good condition and tires for wear.	**13**			**X**						Immediately in case of damage (accident).
Check wheels for parallelism.	**13**			**X**			**X**			In a specialist workshop.
Check toe-in (0° ± 0.5)	**13**						**X**			In a specialist workshop.
Check wheel nuts for tight fit.	**13.2**	50 km, then after reaching a mileage of 100 km and 200 km.				**X**				Subsequently, after 500, 1000 and every 5000 km or after 50, 100 and every 500 operating hours.
Check tire inflating pressure.	**13.4**			**X**						
Interchanging wheels in case of tire wear.	**13.6**								Every 5,000 to 10,000 km	Depending on wear pattern.
Outriggers										
Cleaning and lubrication of sliding surfaces of outrigger beams.	**14**				**X**				Once per month	And after every crane cleaning operation using the high-pressure steam jet blower.
Clean and grease support (Ball) of outrigger floats.	**14**				**X**				Once per month	And after every crane cleaning operation using the high-pressure steam jet blower.
Outrigger floats - inspection and, if necessary, adjustment of the slide pieces and slideway liners	**14.2**						**X**			
Inspection and, if necessary, readjustment of chains for extension and retracting.	**14.3**					**X**			Twice per year.	
Grease chain for extension and retracting.	**14.3**					**X**			Twice per year.	
Check hoses and cables**.**	**14.3.1**					**X**			Twice per year.	

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Driver's cab										
Lubricate joints, pins, hinges and all movable components.	**15**			**X**					Every two weeks	And after every crane cleaning operation using the high-pressure steam jet blower.
Treat door locks (closing cylinders), door seals.	**15**						**X**		Once per year	
Grease support[**)] of the double ladder.	**15**					**X**				If necessary, more often.
Warm water heating unit: lubricate shaft bearings, articulations of levers and all movable parts.	**15.1**					**X**			Twice per year.	
Warm water heating unit. Clean heat exchanger.	**15.1**							**X**	every 3 years	Simultaneously with a replacement of the coolant in the engine.
Warm water heating unit. Heat exchanger: Clean air fins. Blower fan: Clean electric motor and fan wheel.	**15.1.2**					**X**			Twice per year.	
Warm water heating unit. Inspection and/or replacement of the air cleaner.	**15.1.3**				**X**				Every 15,000 km or every 3 months.	
Clean wiper-blade elements.	**15.2**				**X**				Once per month	If necessary, more frequently.
Replace the wiper-blade elements.	**15.2**						**X**		Once per year	Or if damaged.
Checking the fluid level and replenishing fluid in tank of washing system.	**15.2**				**X**				Once per month	If necessary, more frequently.

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Air conditioning system**). Clean evaporator, heat exchanger and blower fan.	**15.3.3 15.3.4**					**X**				If necessary, more often.
Air conditioning system**). Replace air cleaner.	**15.3.6**				**X**				Every 15,000 km or every 3 months.	
Air conditioning system**). Replace drier of air conditioning compressor.	**15.3.9**							**X**		If necessary, more often.
Air conditioning system**). Replenish compressor oil filling.	**15.3.10**									Whenever performing work on the air conditioner.
Miscellaneous; other points of lubrication, service and maintenance										
Other points of lubrication										
Oil/grease joints and pins, hinges and other movable components.	**16.1**			**X**					Every two weeks	And after every crane cleaning operation using the high-pressure steam jet blower.
Supplementary heater unit **)										
Replace strainer in the fuel pipe.	**16.2**						**X**		Once per year	
Trailer coupling device) Rockinger**										
Greasing the trailer coupling device.	**16.3.1**					**X**				And after each vehicle cleaning operation using a high-pressure steam jet unit.
Checking the trailer coupling device.	**16.3.1**						**X**			
Check compressed air coupling heads.	**16.3.3**					**X**				And simultaneously with each inspection of the brake system.

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C1", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Trailer coupling device) Ringfeder**										
Greasing the trailer coupling device.	**16.3.2**					**X**				And after each vehicle cleaning operation using a high-pressure steam jet unit.
Checking the trailer coupling device.	**16.3.2**						**X**			
Clean and grease coupling bolt**.**	**16.3.2**					**X**				And after each vehicle cleaning operation using a high-pressure steam jet unit. If necessary, earlier, depending on dust collected.
Check compressed air coupling heads.	**16.3.3**					**X**				And simultaneously with each inspection of the brake system.
Sliding coupling										
Checking the sliding coupling	**16.4**						**X**			
Steering										
Grease bearing points on guide levers (supplied via central lubrication).	**16.5**						**X**			
Suspension										
Grease suspension cylinders (top and bottom; supplied via central lubrication).	**16.6**				**X**					
Check bellows.	**16.6**			**X**						If necessary, more frequently.
Central lubrication system										
Check fluid level in supply tank; if necessary, replenish.	**16.7**									As required.
Check pipes and screw couplings for damage.	**16.7**			**X**						

Memo:

3 Engine

DANGER **Maintenance work may only be performed while the engine is at a standstill.**

The following general inspection, servicing and maintenance operations at the engine, such as:

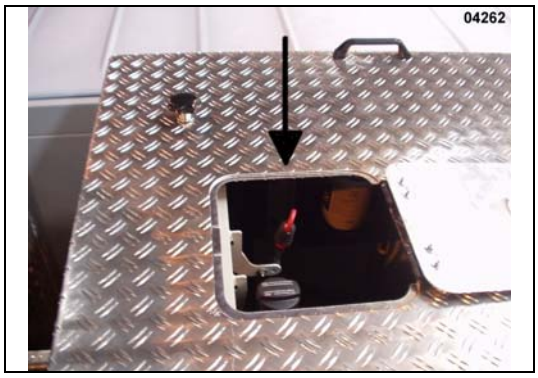
- engine oil level inspection,
- Engine oil change,
- Replacement of lubricating oil filter,
- Replacement of fuel filter cartridges,
- Cleaning of fuel prefilter cartridges,
- Inspection of Vee belt for good condition,
- Checking the tappet clearance,
- Performing troubleshooting, etc.

have been described in the Operating Manual of the engine manufacturer which has been supplied with the machine.

- Check engine for leakage at regular intervals.

3.1 Oil level inspection

NOTE **The oil level is checked and oil is added through the servicing port in the engine cover.**



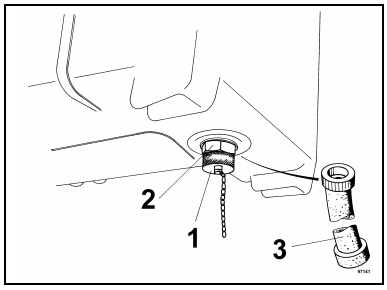
For oil level inspection and oil filling, refer to the specifications of the engine manufacturer.

While the engine is at a standstill, the oil level of the engine can be monitored by a symbol.
(Refer to part “B1-3”, item “FAUN Cockpit Graphic Control System“).

3.2 Oil change / oil filter replacement

Attention **Oil change and oil filter replacement every 40,000 km traveled, every 600 operating hours; at least, however, once per year.**
However, these intervals apply only in conjunction with oils according to DB approval 228.5.
The specifications of consumables of the engine manufacturer must be complied with.

NOTE **To facilitate collection of the used oil during engine oil changes, the oil drain plug installed as standard equipment can be removed during the first oil change, and replaced by a drain valve provided with the tool kit.**
To this effect, first drain the used oil, then mount the drain valve specified above including the packing ring instead of the oil drain plug.



During subsequent oil changes, only the cap (1) of the drain valve (2) needs to be removed and replaced by the oil drain hose (3) which is also supplied with the tool kit. As the hose is fastened, the drain valve opens and the oil can be drained through the hose into the collect vessel provided to this effect.
After these operations have been finished, remove the drain hose, clean the thread using a clean piece of cloth and retighten the cap screw.

! Used oil and filters must be disposed of in an environmentally responsible fashion !

3.3 Inspection of hose clamps of the charge air hoses.

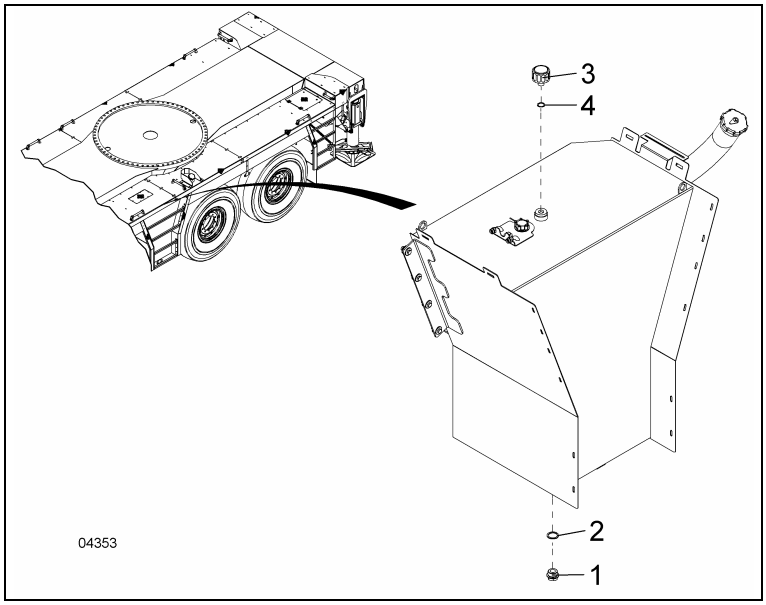
Attention **The hose clamps of the charge air hoses are equipped with cup springs on the threaded housing. When re-tightening the hose clamps, make sure that the maximum tightening torque of 10.2 Nm is not exceeded.**

- The hose clamps of the engine charge air hoses must be checked for tight fit according to the maintenance schedule.

3.4 Fuel tank

3.4.1 Draining condensation water

Under extreme weather conditions, condensation may form in the fuel tank.
Operate the vehicle until the tank is emptied to reserve; unscrew the drain plug (1) from the tank bottom and drain condensed water into an appropriate vessel. The drain port must be left open until clean fuel flows out.
Before retightening the drain plug, clean the sealing surface using a lint-free cloth. Check and clean sealing element (2); if necessary, replace.



3.4.2 Ventilation filter

- Check ventilation filter (3) for damage / contamination; clean, if necessary, replace (refer also item C1-9).
- When replacing the ventilation filter, check and clean sealing element (4); if necessary, replace it.

3.4.3 Fuel strainer

3.4.3.1 Draining condensation water

- Open the drain valve (1) and allow the collected condensation water to drain into an appropriate vessel.

NOTE **Before the cold season begins, the condensate must be drained. If necessary, repeat this step several times.**

3.4.3.2 Replacement of fuel filter

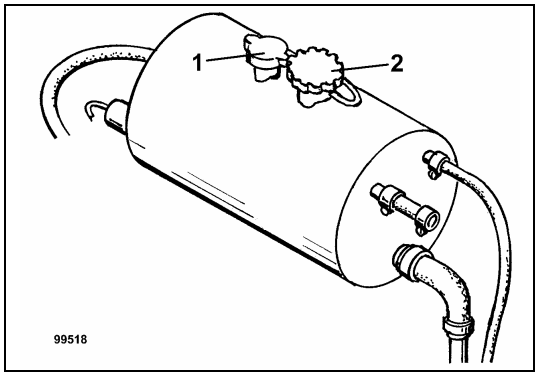
- Drain the entire filter contents as described under item C1-3.4.3.1.
- Disconnect the filter (4) from the filter top (5) together with the filter base (2).
- Disconnect the filter base from the filter; clean the filter base (e.g. using diesel fuel).
- Clean the sealing surfaces.
- Grease new sealing elements with diesel fuel and insert them into the gaskets (3).
- Screw-fasten filter base (2) by hand to new filter cartridge, and screw-fasten filter cartridge (4) to filter top (5).
- Tighten all components securely.
- Bleed system, as described in part B item B1-4.5.3.

3.5 Coolant

3.5.1 Check coolant

DANGER **Open cover of filler socket carefully and only at a coolant temperature below 90°C.**

The cooling system is filled correctly if the coolant reaches the rim of the filler socket (pos. 2) on the overflow tank.
If necessary, add or replace the anti-freeze agent approved by the engine manufacturer.
Check the anti-freeze protection using a test instrument. The components must be frost-proof down to -37°C all the year round.
The valve cover (pos. 1) has been closed with a lead seal in the factory.
When the coolant is replaced or the cooling system has to be refilled after repair, the whole cooling system must be bled.

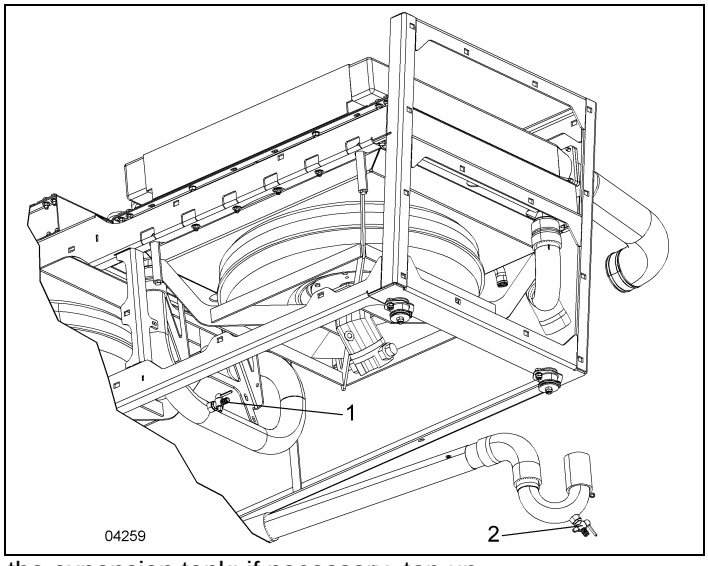


NOTE **In case of possible leakage at the radiator hose couplings, do not only retighten or replace the hose clamps, but check also the pressure relief valve in the valve cover for proper working order. A defective valve may cause excess pressure in the coolant circuit and consequently leakage.**

3.5.2 Drainage of coolant

NOTE **Before the coolant is renewed, the vehicle's warm water heating must be open.**

Two drain cocks are installed in the cooling system.
The coolant contained in the two radiators can be drained via the drain cock (1).
The entire contents of the cooling system can be drained via the drain cock (2).



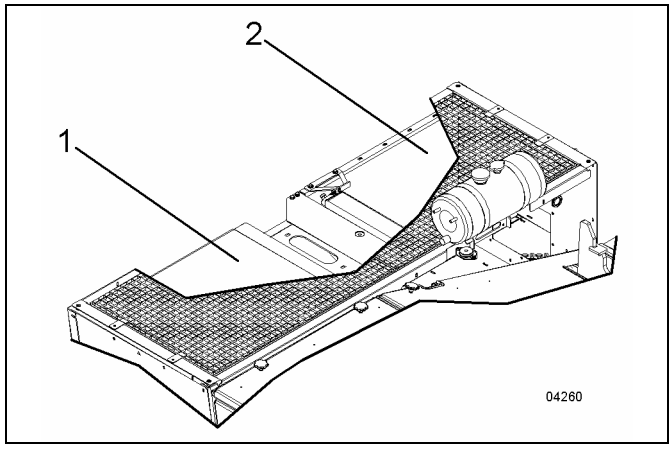
- Open the drain cocks (1 and 2) and the cover of the filler socket on the expansion tank. Drain the coolant in appropriate vessels.
- Close the drain cocks and pour in coolant mix via the filler socket of the overflow tank.
- Start the engine, make it run at varying speed levels for approx. 1 minute; thus, the cooling system is deaerated.
- Stop the engine and check the coolant level in the expansion tank; if necessary, top up.

! Coolant must be disposed of in an environmentally responsible fashion !

NOTE **For instructions how to drain the entire coolant from the engine, refer to the engine manufacturer's operating manual supplied with the machine.**

3.6 Cleaning the radiator

Clean the cooler fins of the intercooler/water cooler (1) and of the water cooler (2) at regular intervals, according to the maintenance schedule, by blowing-out with compressed air or using a painter's brush.



3.7 Air cleaner

DANGER **The air cleaner may only be serviced while the engine is not running. Switch battery main switch off.**

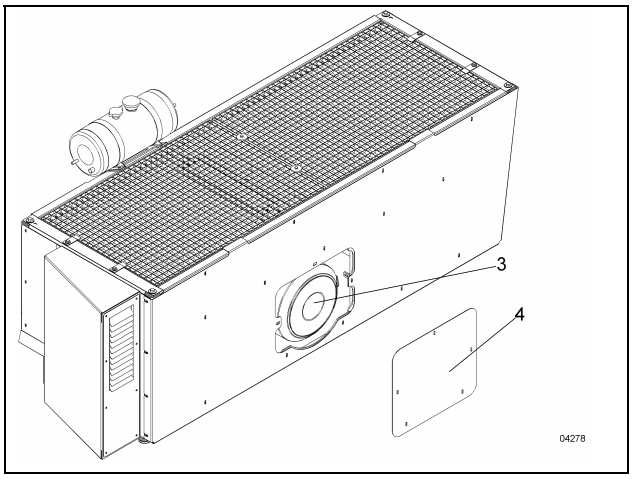
Attention **Do not start the engine while the air cleaner element is not installed.**

NOTE **In addition to the normal replacement intervals, the air cleaner cartridge needs only be serviced if the icon "air cleaner" in the FAUN Control and Service System goes on while the engine is running (refer to part "B", item 3.1 and 4.6.2.10). However, the air cleaner housing may have to be cleaned at shorter intervals as an intermediate measure, depending on the operating conditions and on the dust collected.**

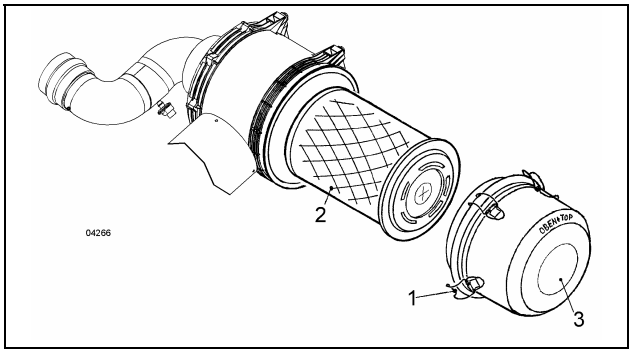
Attention **The air cleaner housing must be checked for damage and cracks whenever the air cleaner is serviced.**

3.7.1 Removal / installation of the air cleaner cartridge

- Unscrew cover (4).



- Remove the cover (3) from the air cleaner housing.
- Pull the air cleaner cartridge (2) carefully and completely out of the air cleaner housing turning it slightly.
- Clean air cleaner housing and sealing surfaces of air cleaner housing and cover carefully using a lint-free damp cloth.



Attention **Do not blow-clean using compressed air!**
Make sure that no dust can enter the engine's air intake system while the air cleaner housing is being cleaned!

- Insert new or cleaned air cleaner cartridge carefully into the housing, the open end first (for cleaning the air cleaner cartridge in cases of emergency, see item C1-3.7.2) and check it for correct fit.
- Mount the cover (3). Pay attention to correct assembly. The mark „TOP – OBEN“ must be turned by approx. 5° counter-clockwise.
- Screw-fasten cover (4).

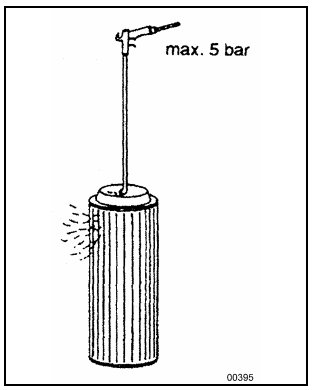
! Air cleaner cartridges must be disposed of in an environmentally responsible fashion !

3.7.2 Cleaning the air cleaner cartridge

Attention **If no new air cleaner element is available, the cartridge can be cleaned in <u>cases of emergency</u>.**
The air cleaner cartridge must NEVER be <u>washed</u>, <u>brushed</u> or <u>knocked</u> against a hard surface to remove the dirt. Blowing-out is only admissible in cases of emergency, making sure that no dust gets to the inside of the filter cartridge.

Attention **Cleaning an element in case of an emergency does not affect the usual replacement intervals.**

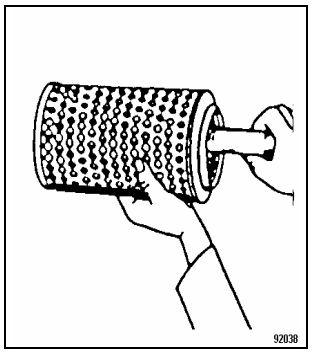
- To this effect, a tube with a 90° bent end section should be placed on the compressed-air gun. It must be long enough to reach down to the bottom of the cartridge. Clean air cleaner cartridge carefully by blowing from the inside to the outside using dry compressed air (max. 5 bar), by moving the tube in the air cleaner cartridge up and down repeatedly, until no more dust is raised.



Attention **The tip of the tube must not get too close to the filter paper.**

Attention **Before reinstalling the cleaned air cleaner cartridge, check it carefully for damage to the paper bellows and to the seals.**

- After every cleaning operation, check every pleat of the paper bellows using an inspection lamp (flashlight) and check it for damage (cracks and holes). To ensure that minor defects are also detected, this check should not be performed in direct sunlight, but e.g. in a dark room.
- Any damage is shown by bright light.
- Check rubber filter seal for crushing and damage.



Attention **A damaged air cleaner cartridge must be replaced.**

3.7.3 Check air intake pipes and hoses.

- Check all hose connections between the air cleaner and the engine and the charge air hoses for tight fit. Use screw-type hose clamps only.

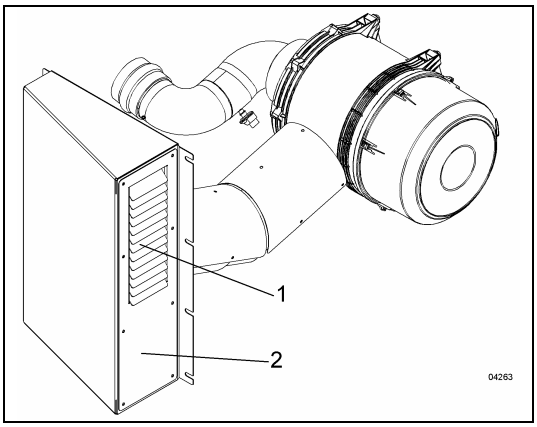
- Check hoses and pipes for porosity and cracks.

3.7.4 Monitoring of air cleaner - check for proper working order

- Once the engine is running, reduce air cleaner intake opening (1) **gradually** by covering it (e.g. using cardboard or sheet metal), until the air cleaner icon lights up.

Attention **Once the air cleaner icon is lit, the intake opening must not be reduced further. Risk of damage!**

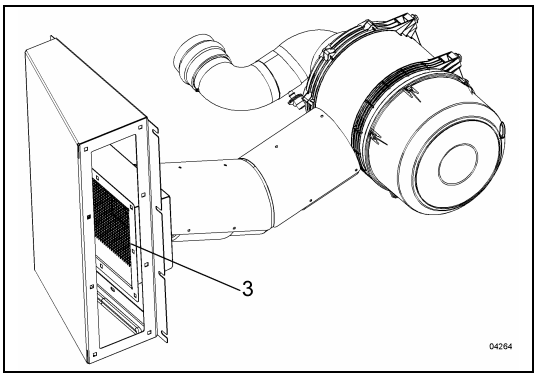
NOTE **The air intake duct, the air cleaner housing and the filter cartridge are located on the radiator housing on the right side of the vehicle.**



3.7.5 Cleaning the fin-type grill, coarse filter

- Clean fin-type grill (Fig., item 3.7.4, pos. 1).
- Unscrew plate (Fig., item 3.7.4, pos. 2) from the air intake case.
- Clean the coarse filter (3) and the air intake case.

- Screw-fasten plate (Fig., item 3.7.4, pos. 2).



3.8 Exhaust system

The exhaust system, which simultaneously functions as spark arrester, consists of special steel. It does not require any particular service or maintenance.

4 Gearbox

4.1 Oil level inspection

Attention **An insufficient oil level in the gearbox will cause damage to the gearbox.**

! R I S K O F A C C I D E N T S !

Attention **For oil level inspection, the intarder must not be actuated immediately before parking the vehicle. Thus, it is ensured that the correct oil quantity is accumulated in the gearbox.**

- Check gearbox for leakage at regular intervals.

Prerequisite:

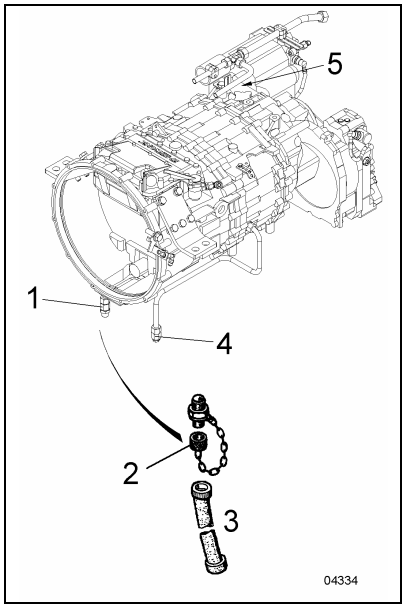
- The oil level inspection must be performed while the transmission oil has cooled down (<40°C).
- The vehicle is parked on a plane surface (horizontally).
- The handbrake (parking brake) is engaged.
- The gearbox is set to neutral „N".
- The engine has been stopped.
- The vehicle has been protected against rolling away by means of wheel chocks.

NOTE **Check the gearbox for leakage during each inspection. Locate and eliminate any leakage immediately. Replenish any possible amounts of oil which may have been lost.**
In case of leakage at the gearbox, also check the breather installed on the upper side of the gearbox for correct function.

For information on the oil level inspection, refer to the enclosed documents of the gearbox manufacturer (gearbox and intarder) (Part G1, chassis).

Attention **Other than specified in the gearbox manufacturer's documents, proceed as follows to change the oil and to replenish new oil:**

- Open the oil filler plug (5).
- Open the oil level inspection tube (4).
- Allow any oil existing in the tube to drain in an appropriate vessel.
- Pour in oil (5) until it escapes at the oil level inspection tube (4) (drain in an appropriate vessel).
- Clean the sealing surfaces.
- Screw-fasten the oil filler plug (5) with a new packing ring (observe specified tightening torque).
- Close the oil level inspection tube (4).



4.2 Oil change / oil filter replacement

Attention **The oil may only be stored in and transferred from clean containers. If this rule is not observed, the gearbox might be contaminated and even damaged.**
Make sure that containers or filling devices which have been used for anti-freeze or engine coolant fluids are not used for transmission oil.

DANGER **There is a risk of scalding when the oil is hot.**

Touching hot gearbox components may cause burns.

Attention **For the oil change, the intarder must not be actuated immediately before parking the vehicle. Thus, it is ensured that the correct quantity for oil change is accumulated in the gearbox.**

For information regarding oil types, oil changes, replacement of oil filters, pouring in oil and oil level inspection, please refer to the enclosed operating instructions and the gearbox manufacturer's list of approved lubricants (Part G1, chassis).

NOTE **Dirt particles:**

Whenever changing the oil, check the drained oil for traces of dirt. Any deposits of sludge or soft mud collected in the oil sump must be eliminated.

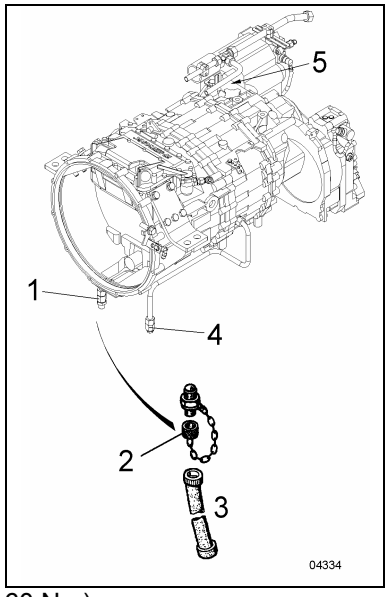
Metal particles:

If the oil contains metal particles, this indicates that a damage to the gearbox has occurred. If such particles are found in the oil sump, the gearbox must be disassembled and checked carefully to determine the reason. If metal contamination is detected, the gearbox must be disassembled and cleaned completely.

Attention **Other than stipulated in the documents of the gearbox manufacturer, proceed as described under item 4.2.1 or 4.2.2 to change the oil and to pour in oil.**

4.2.1 Oil change

NOTE **To facilitate collection of the used oil during engine oil changes, a drain hose (3) can be screw-fastened.**

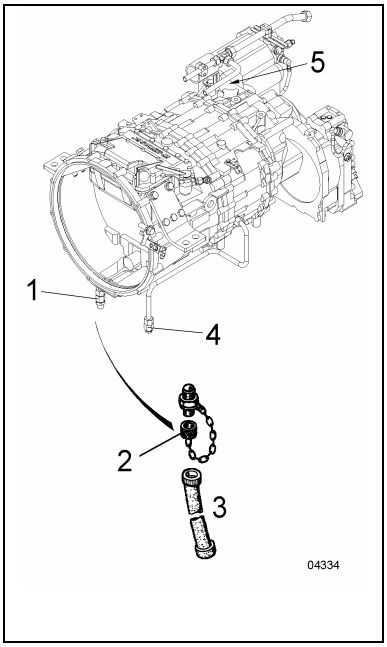


- Remove the cap (2) from the drain valve (1).
- Screw-fasten the drain hose (3). As the hose is fastened, the drain valve (1) opens and the oil can be drained through the drain hose (3) into the collect vessel provided to this effect.
- After the entire oil has been drained, remove the drain hose (3), clean the thread using a clean piece of cloth and retighten the cap screw.
- Open the oil filler plug (5).
- Open the oil level inspection tube (4).
- Pour in oil (5) until it escapes at the oil level inspection tube (4) (drain in an appropriate vessel).
- Clean the sealing surfaces.
- Screw-fasten the oil filler plug (5) with a new packing ring (tightening torque 60 Nm).
- Close the oil level inspection tube (4).
- Start the engine and perform a test run (2 to 5 km).

Attention **During and after the test run and until after the next oil level measurement, the intarder must not be actuated.**

- Park the vehicle and secure it as described under item 4.1.
- Open the oil level inspection tube (4).
- Allow any oil existing in the tube to drain in an appropriate vessel.
- Drain excess oil in an appropriate vessel or add oil as described above, until it escapes through the oil level inspection tube (4).
- Close oil level inspection tube (4) and – if necessary - the oil filler plug (5).

4.2.2 Pouring in oil after repairs



- The gearbox (as described under item 4.2.1) and the intarder (as described in the ZF documents, part G1) have been drained completely.
- The oil drain plugs and the drain valve are closed.
- Open the oil filler plug (5).
- Pour in oil (5) (for the oil sort and quantity, refer to the gearbox manufacturer's documents).
- Clean the sealing surface.
- Screw-fasten the oil filler plug (5) with a new packing ring (tightening torque 60 Nm).
- Start the engine and perform a test run (2 to 5 km).

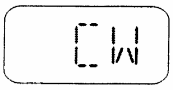
Attention **When beginning the test run, actuate the intarder ONCE BRIEFLY (max. level), then return it to position 0. Subsequently, the intarder must not be actuated until after the next oil level inspection.**

- Park the vehicle and secure it as described under item 4.1.
- Open the oil level inspection tube (4).
- Allow any oil existing in the tube to drain in an appropriate vessel.
- Drain excess oil in an appropriate vessel or add oil as described above, until it escapes through the oil level inspection tube (4).
- Close oil level inspection tube (4) and – if necessary - the oil filler plug (5).

! Used oil and oil filters must be disposed of in an environmentally responsible fashion !

4.4 Clutch and clutch actuating assembly

The gearbox is adapted to the engine via a standard dry clutch.
The clutch and the clutch actuating assembly do not require any maintenance.
In case of wear of the clutch and if replacement of the clutch linings is imminent, a corresponding message appears in the display of the instrument panel.



>> **CW** << = Clutch wear indication.
(Clutch wear)
The vehicle must be taken to a specialist workshop before long to have the clutch replaced.

5 Transfer box

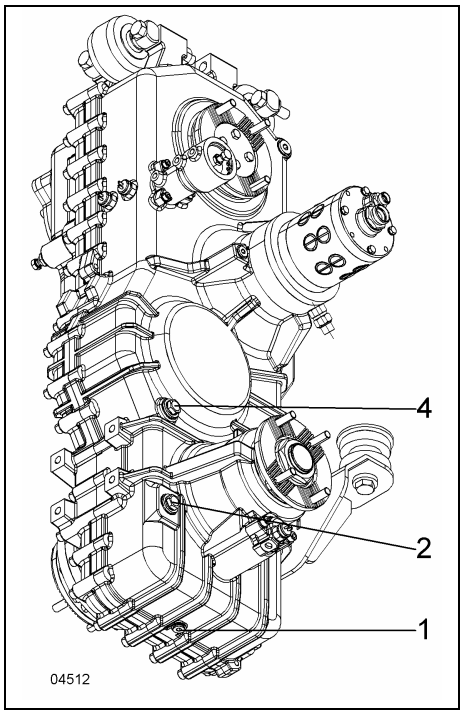
5.1 Oil level inspection

Attention **An insufficient oil level results in insufficient lubrication and reduces the service life; an excessive oil level results in overheating of the transfer box.**

Prerequisites for oil level inspection:

The oil level should be checked after a driving operation, after the oil has settled.

- The vehicle is parked on a horizontal surface.
- The handbrake (parking brake) is engaged.
- The gearbox is set to neutral „N“.
- The transfer box is set to on-road travel.
- The vehicle is supported by outriggers.
- The engine has been stopped.
- The wheels are blocked using wheel chocks.
- For oil level correction, the cover plate of the servicing port in the chassis frame must be unscrewed.



- Remove the oil filler and inspection plugs (2).

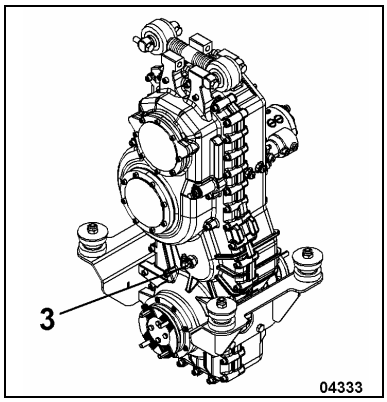
The oil level must reach the lower edge of the bore-hole.

If necessary, add oil through the oil filler and inspection plug (2).

To this effect, proceed as described under item 5.2 "Oil change".

- Fasten oil filler and inspection plug (2) safely after having fitted a new seal.

5.1.1 Visual check during each oil level inspection



- Check housings and shafts for leakage
- Check gearbox suspension for stability
- Check breather (3) for contamination, if necessary, clean it (refer to item C1-9).
- Check condition of compressed air lines and function of gearshift system.
- Check electrical cables and cable connections.

5.2 Oil change

NOTE **Perform oil change when the transfer box has reached its service temperature. The vehicle must be supported by outriggers, until the wheels are clear of the ground.**

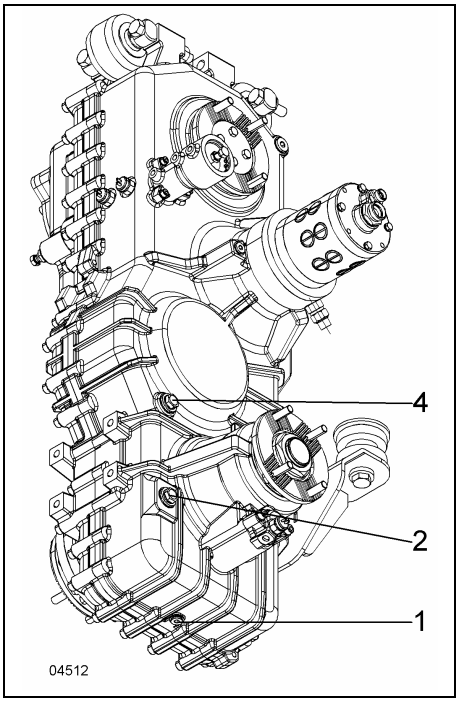
Attention **During an oil change, the oil in the transfer box, the oil cooler and the hydraulic lines must be drained on principle.**

(cont'd.) **5.2 Oil change**

Prerequisites for oil change:

- The vehicle is parked on a horizontal surface.
- The handbrake (parking brake) is engaged.
- The gearbox is set to neutral „N“.
- The transfer box is set to on-road travel.
- The vehicle is supported by outriggers.
- The engine has been stopped.
- For oil change, the cover plate of the servicing port in the chassis frame must be unscrewed.

- Unscrew breather (item 5.1.1, pos. 3).
- Remove the oil filler plug (4).
- Unscrew the drain plug (1) and drain the used oil into an appropriate tank.
- If oil is no longer leaving through the drain plug (1), disconnect the hydraulic line from the oil cooler (item 5.3, pos. 5); the residual oil will leave through the drain plug (1) due to bleeding. Drain the used oil in an appropriate vessel.



! Used oil must be disposed of in an environmentally responsible fashion !

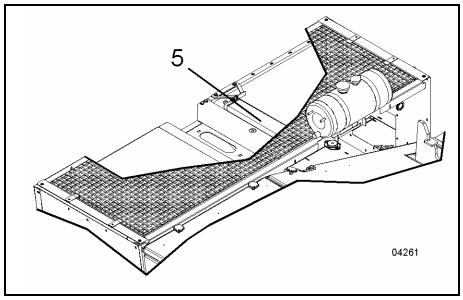
- After the used oil has been drained completely, retighten drain plug (1) safely with new packing rings and reconnect hydraulic line to the oil cooler (item 5.3, pos. 5).
- Pour in new oil via the oil filler plug (4). For the correct oil quantity, refer to item C1-24.
- After pouring in the required quantity of oil, install the oil filler plug (4) using a new seal.
- Clean breather (item 5.1.1, pos. 3) and re-tighten it (refer to item C1-9).
- Start the engine and set gearbox to "D". (Select high gear in manual mode.)

DANGER **Caution – wheels are turning.**

- Increase the engine speed to approx. 1,200 r.p.m. and make the engine run for one minute; thus, the hose lines are filled with oil.
- Set the engine to idle and change the gearbox to “N”.
- Shut off the engine.
- Switch the transfer box to on-road speed.
- Check oil level on oil filler and inspection plug (2); if necessary, correct it.
- The transfer box is filled correctly if the oil level reaches the oil filler and inspection plug (2) after overflowing.
- If necessary, check the oil level and repeat the steps described above.

5.3 Cleaning the radiator

Clean the cooler fins of the oil cooler (5) at regular intervals, according to the maintenance schedule, by blowing-out with compressed air or using a painter's brush.



6 Axles

DANGER **For all maintenance operations on the axles, the vehicle must be aligned in horizontal position. If the vehicle is standing on wheels (without outriggers), e.g. during oil level inspections or oil changes to the axle drive assemblies, it must be protected against rolling away by means of wheel chocks; the parking brake must be engaged and the engine must be shut off.**

NOTE **Draining the oil only in warm condition.**

DANGER **There is a risk of scalding when the oil is hot.**

6.1 Checking the oil level in the axle drive assemblies of the steering driven axles and the planetary gears

NOTE **For oil level inspection and filling of the planetary gears, the oil drain port (2) (item C1-6.2.1 and C 1-6.2.2) must be in its lowest position. To this effect, lock the axle suspension; support the vehicle by outriggers and place it in horizontal position. Turn the wheels so that the oil drain port is placed in its lowest position.**

- Protect the vehicle against rolling away.
- Remove the plugscrews (1) (item C1-6.2.1 and C1-6.2.2) of the oil level inspection and filler ports.
  The oil level must reach the rim (bottom edge) of the inspection and filler ports.
- If necessary, add oil via the inspection and filler ports port until overflow occurs.
- Check the sealing elements for damage, clean and, if necessary, replace them.
- Insert the plugscrews with the sealing elements, and tighten them.
- Check the breather (3) (item C1-6.2.1 and C1-6.2.2), clean and - if necessary - replace it (see also item C1-9). Clean, check and, if necessary, replace the sealing element.

6.2 Oil change in the axle drive assemblies and planetary gears

6.2.1 Drive 10x6**)

Drain the oil:

- Remove the plugscrews (1) and (4) from the inspection and filler ports as well as from the filler ports.
- Remove the plugscrews (2) from the drain ports.
- Drain the oil completely in a suitable vessel.
- Check the sealing elements for damage, clean and, if necessary, replace them. Clean plugscrews.
- Insert the plugscrews (2) with the sealing elements, and tighten them.

Pour in oil:

2nd and 4th axles:
- Pour in oil via the filler ports (4) until the oil leaves through the oil level inspection and filler ports (1).

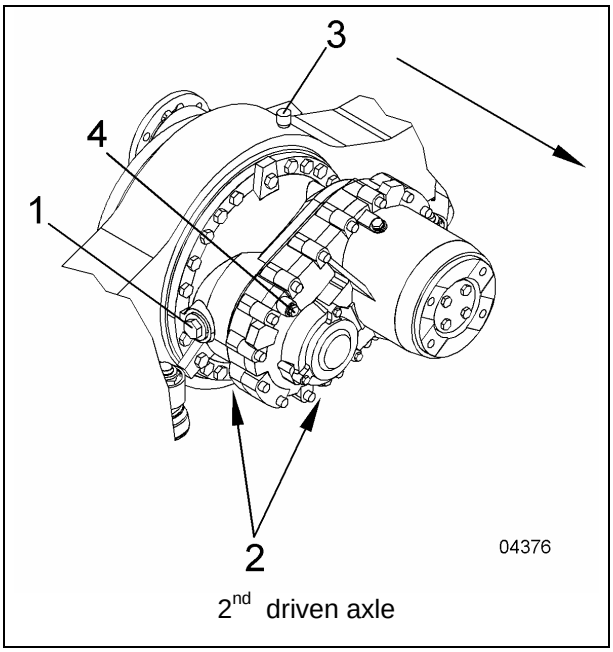
5th axle:
- Add oil via the oil level inspection and filler port (1) until overflow occurs.

- Wait a few minutes; then add oil, if necessary, until the oil level remains constant.
  The oil level must reach the rim (bottom edge) of the inspection and filler ports (1).
- Check the sealing elements for damage, clean and, if necessary, replace them. Clean plugscrews.
- Insert plugscrews (1) or (1) and (4) incl. the sealing elements, and tighten them.
- Check and clean the breather (3), if necessary, replace it (refer to item C1-9). Clean, check and, if necessary, replace the sealing element.

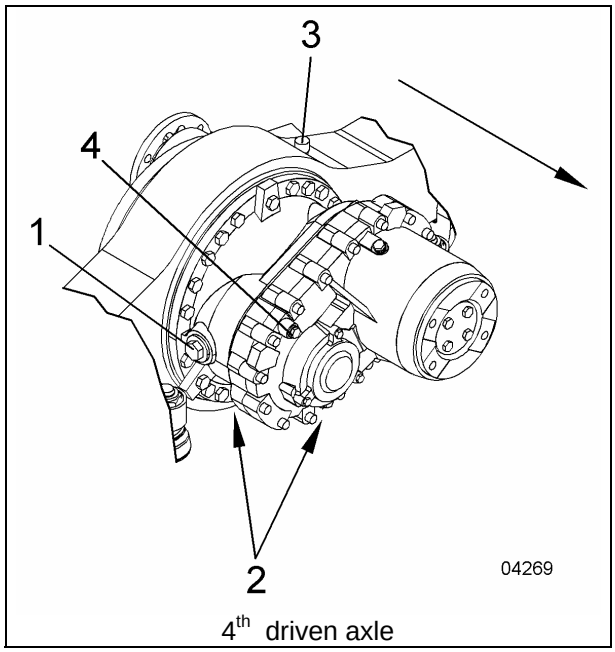
! Used oil must be disposed of in an environmentally responsible fashion !

**) Optional equipment

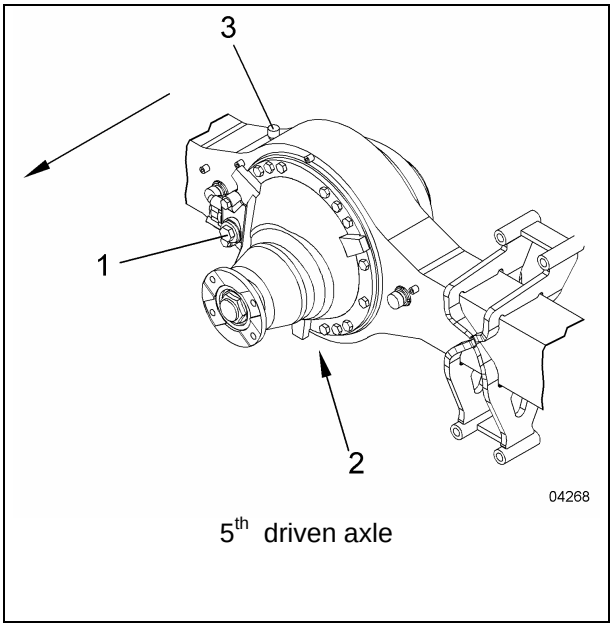
(cont'd.) **6.2.1 Drive 10x6**



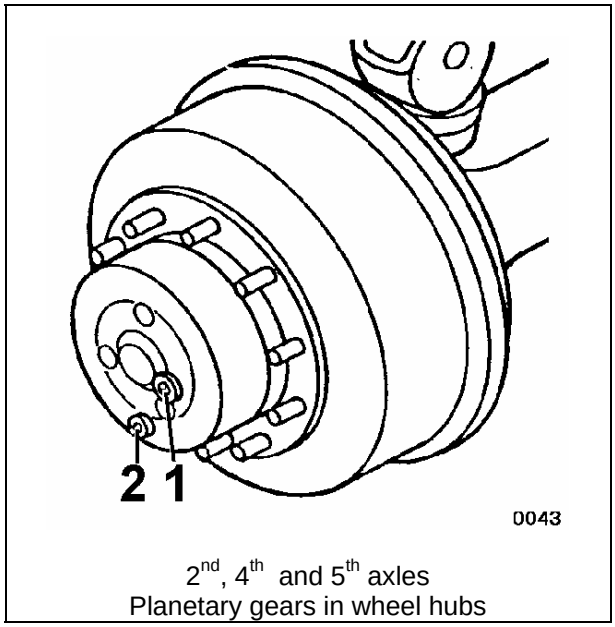
2nd driven axle



4th driven axle



5th driven axle



2nd, 4th and 5th axles
Planetary gears in wheel hubs

Item 1 Oil level and inspection port; Item 2 Oil drain port; Item 3 Breather; Item 4 Filler ports.

⟶ = Driving direction

6.2.2 Drive 10 x 8

Drain the oil:

- Remove the plugscrews (1) and (4) from the inspection and filler ports as well as from the filler ports.
- Remove the plugscrews (2) from the drain ports.
- Drain the oil completely in a suitable vessel.
- Check the sealing elements for damage, clean and, if necessary, replace them. Clean plugscrews.
- Insert the plugscrews (2) with the sealing elements, and tighten them.

Pour in oil:

2^{nd} and 4^{th} axles:

- Pour in oil via the filler ports (4) until the oil leaves through the oil level inspection and filler ports (1).

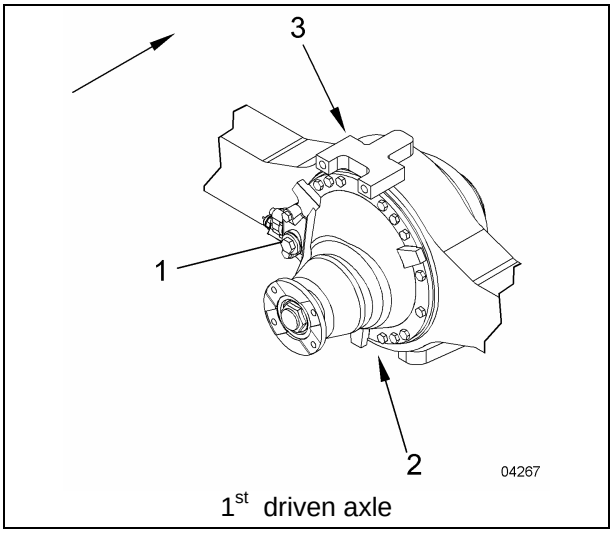
5^{th} axle:

- Add oil via the oil level inspection and filler port (1) until overflow occurs.

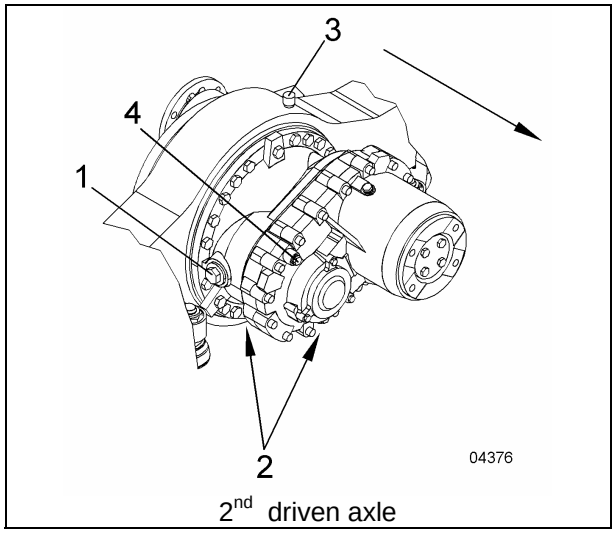
- Wait a few minutes; then add oil, if necessary, until the oil level remains constant.
  The oil level must reach the rim (bottom edge) of the inspection and filler ports (1).
- Check the sealing elements for damage, clean and, if necessary, replace them. Clean plugscrews.
- Insert plugscrews (1) or (1) and (4) incl. the sealing elements, and tighten them.
- Check and clean the breather (3), if necessary, replace it (refer to item C1-9). Clean, check and, if necessary, replace the sealing element.

! Used oil must be disposed of in an environmentally responsible fashion !

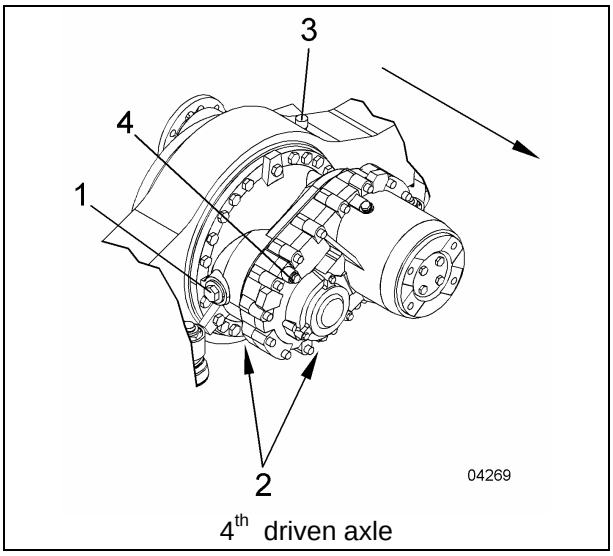
(cont'd.) **6.2.2 Drive 10x8**



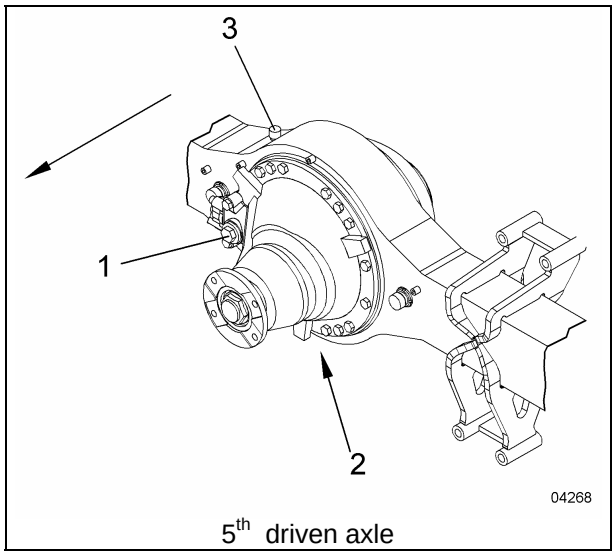
1st driven axle



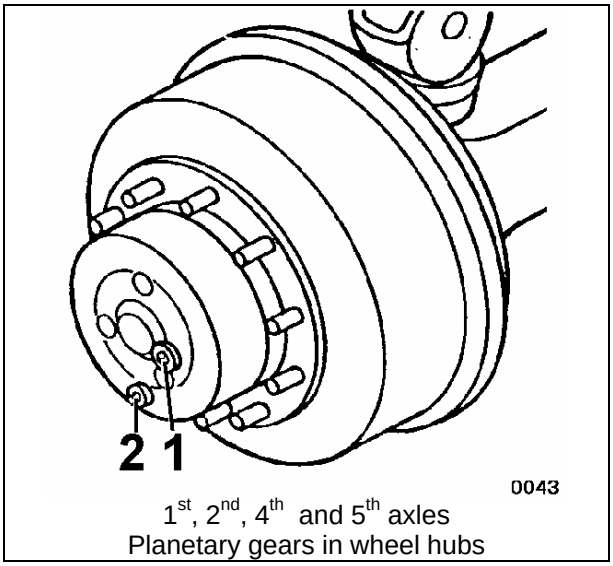
2nd driven axle



4th driven axle



5th driven axle



1st, 2nd, 4th and 5th axles
Planetary gears in wheel hubs

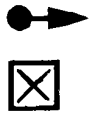
Item 1 Oil level and inspection port; Item 2 Oil drain port; Item 3 Breather; Item 4 Filler ports.

→ = Driving direction

6.4 Greasing the axles

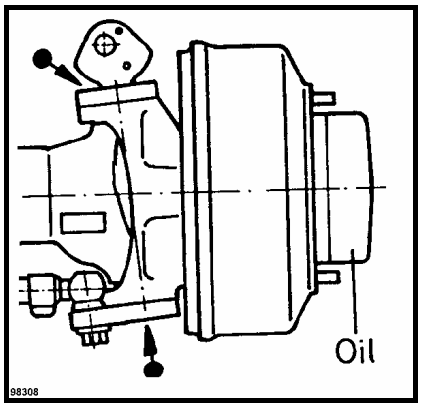
Attention **Greasing by means of high-pressure grease guns must be effected carefully and slowly. Otherwise the grease - in particular at relatively low temperatures - cannot flow fast enough through the grease grooves of the bushings and through the bearings. This might result in such a high back-pressure that the dust caps at the axle kingpins are pressed through.**

- Grease stub axle bearings at regular intervals according to the maintenance schedule (unless they are supplied via a centralized lubrication system).
- Check bearings of the joints, etc. for wear and good condition.
- Grease the articulated heads of the drop arms and guide levers (steering linkage), (provided that they are equipped with lubricators) (unless they are supplied via a centralized lubrication system).



Lubricators

Grease filling in the wheel hubs



Driven planetary axles

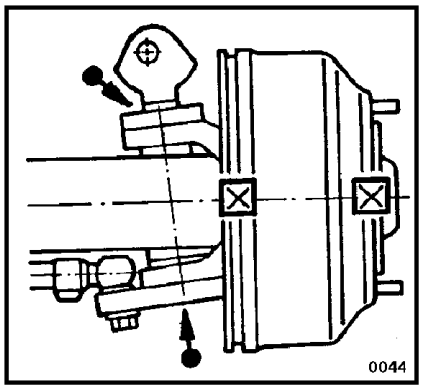
NOTE **The twin propeller shafts in the driven axles are maintenance-free.**

6.4.1 Replacement of grease filling in the wheel hubs of the non-driven axles

In case of the 10 x 6**) drive configuration, the wheel hubs of the 1st and 3rd axles are filled with grease.

In case of the 10 x 8 drive configuration, the wheel hubs of the 3rd axle are filled with grease.

These grease fillings must be replaced at regular intervals according to the maintenance schedule.



Non-driven axles

6.5 Check for leakage / visual inspection / inspection of the control function

- Check the axle drive assemblies and the planetary gears in the wheel hubs for leakage at regular intervals according to the maintenance schedule.
- Check the control functions of the differential locks and the 2nd axle connection function (in case of 10 x 8 drive) at regular intervals by actuating the rocker tip switch in the instrument panel while the ignition is switched on, according to the maintenance schedule.

**) Optional equipment

6.6 Checking the axial play of the steering axle bearings and the planetary bearings; check the wheel bearing backlash.

NOTE THESE OPERATIONS REQUIRE SPECIAL KNOWLEDGE AND SHOULD ONLY BE PERFORMED IN A SPECIALIZED SERVICE STATION.

- Check the axial play and the bearings of the planetary gears at regular intervals according to the maintenance schedule.
- Check the wheel bearing backlash at regular intervals, according to the maintenance schedule; if necessary, re-adjust.
- Check the locking condition of the wheel bearing adjusting nuts.

6.7 Checking screws and bolts on axles for tight fit; check axle fastening, drop arms, thrust rod fastening, etc.

- Check nuts on track rods and steering rods for tight fit.
- Check securing bolts of steering and track rods and, if necessary, re-tighten them (observe specified tightening torques).
- Re-tighten thrust rod fasteners of axle suspension systems (observe specified tightening torque).
- Screws locked by means of Loctite must not be re-tightened.

6.8 Preservation of axle and planetary gears

- In order to maintain the operating safety of the vehicle, corrosion is not admissible on supporting components.
- In order to avoid damage due to corrosion when the vehicle is not operated for an extended period of time, move the vehicle over a distance of approx. 100 m while the axles are cold, to supply cold oil to all parts of the axle drive assemblies. The axles must be protected against penetration of water.

6.9 Checking the propeller shaft flange screws for tight fit

- Check screws and nuts of the propeller shaft drive flanges for tight fit and, if necessary, re-tighten at regular intervals, according to the maintenance schedule.

Memo:

7 Propeller shafts

DANGER **Wherever there is a potential danger to persons and material, the crane operating company has to provide for appropriate safety precautions. Only specialized staff are allowed to install or replace propeller shafts at the vehicle.**

7.1 Inspection of backlash

- Check backlash of the gudgeon assemblies and the splined shaft connections at regular intervals.

Attention **If a noticeable backlash is detected, replace the propeller shaft (repair).**

7.2 Noise test

- Perform a noise test at regular intervals. If the noise is different from that noise known from normal operation, look for the reason and repair any possible deficiency.
- Check the balancing plates or the counter-balancing pieces.

7.3 Checking the flange couplings

- Check the flange couplings for tight fit.

Max. tightening torque of screws and bolts for a thread size of M14 x 1,5 = 190 ± 10 Nm.

Memo:

8 Eddy-current brake **)

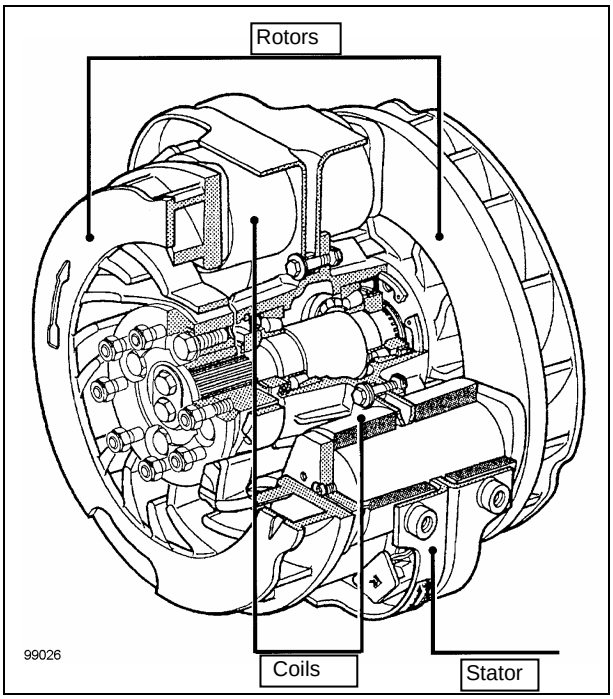
NOTE **The eddy-current brake must be checked completely by an authorized specialist workshop at least once per year. The regular maintenance operations and tests described in the maintenance schedule should also be performed in a specialist workshop.**

DANGER **These checks must be performed in a specialist workshop.**

8.1 Service

NOTE **The breather extension must be free of contamination. Clean if necessary:**
- Remove contamination using appropriate means.
- Remove breather extension and clean it by blowing it out using compressed air.
Breather extension, refer to Fig., item C1-9.

Regular servicing of the retarder is indispensable to ensure its reliable operation.



Washing

- The retarder must be washed at least twice per year to eliminate grease and dirt.
- The cleaning may only be effected when the machine has cooled down and when the electrical equipment is switched off.
- Clean rotors of the retarder at regular intervals on the outside using a steam jet unit, to remove grease and dirt and to ensure heat dissipation.

Attention **Do not use detergents or solvents.**

- To avoid damaging the insulation of the electrical cables, do not direct the steam jet immediately onto the electrical cables and connections.
- The stator and the electrical connections may only be washed with very low pressure
- For drying, compressed air should be preferably used.
- Inspection of the mechanical and electrical components at regular intervals in a specialist workshop.

Attention **Under aggravated operating conditions, (e.g. during operation on construction sites), the cleaning intervals can be reduced to once per week in case of severe dust accumulation.**

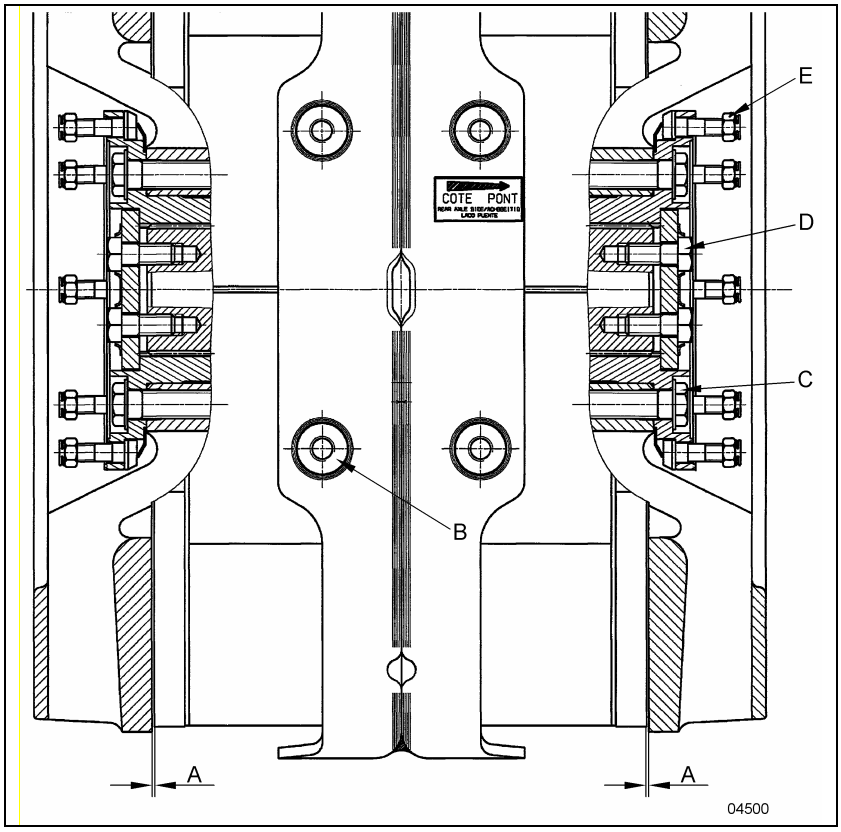
Check the mechanical and electrical components according to the maintenance schedule.

**) Optional equipment

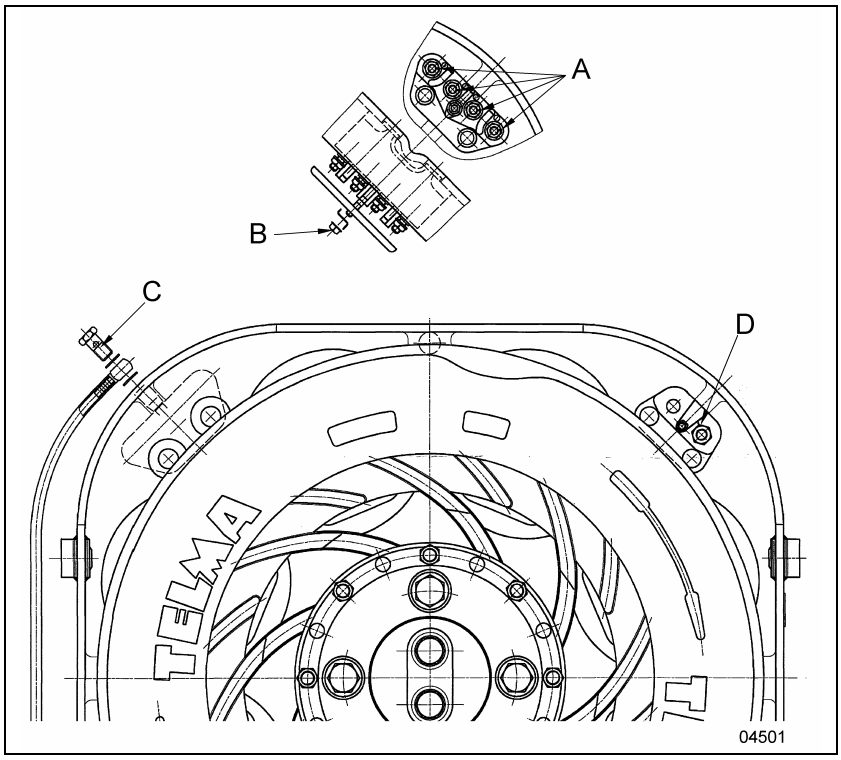
8.1.1 Test and setting values

Air gap
A = 1,35 – 1,5 mm

Tightening Torque:
B = 90 Nm ± 18 Nm
C = 250 Nm ± 50 Nm
D = 60 Nm ± 12 Nm
E = 60 Nm ± 12 Nm



Tightening Torque:
A = 5 Nm ± 1 Nm
B = 4 Nm ± 0,8 Nm
C = 6 Nm ± 1,2 Nm
D = 12 Nm ± 2,4 Nm



9 Breather

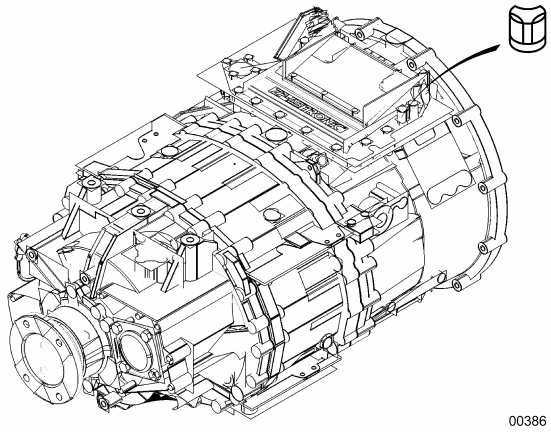
A faulty breather may result in leakage at the gearbox, transfer box or a drive axle.
Engine malfunctions may also be due to a faulty ventilation filter of the fuel tank (chassis and superstructure).
Malfunctions of the hydraulic system can be due to a faulty ventilation filter of the hydraulic oil tank (chassis and superstructure).
Malfunctions of the eddy-current brake**) may be due to a faulty breather.
Malfunctions of the superstructure swing mechanism may be due to a faulty breather.
However, other malfunctions in the brake and compressed air systems - valves which deaerate insufficiently, wheel brakes which are sliding or releasing slowly - may be due to a contaminated breather or a clogged breather hole.

The brake valves have been provided with a combined silencer / venting device. The wheel brake cylinders are equipped with vent/breather holes.

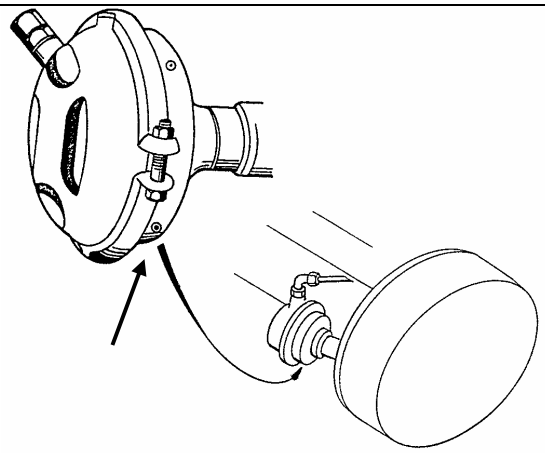
- Check breathers for proper condition.
- Clean contaminated breathers on the outside.
- Vent/breather holes on the wheel brake cylinders must be free from contamination.
- The breather cap must be easy to turn (not in the case of venting devices on the brake valves).
- Check breathers for tight fit.
- Replace breathers if they have been loosened or lost, or if they are faulty.
- If it is suspected that the oil - especially the oil of the axles, of gearbox and transfer box - contains water, make sure that an oil change is performed.
- During painting work, cover the breathers well. Once painting work is finished, it is essential to remove the cover.
- When spray-cleaning the assemblies, make sure that the breathers are not directly exposed to the jet of water. Penetrating water may cause damage.
- If it is suspected that the hydraulic oil (chassis and superstructure) contains water, make sure that the hydraulic oil is examined, and - if necessary - clean and change the oil.
- If water is suspected of having entered the fuel tank (chassis and superstructure), drain the water from the fuel tank, as described. If necessary, drain condensed water from the fuel strainer as described, and if necessary, replace the fuel filter as described.

**) Optional equipment

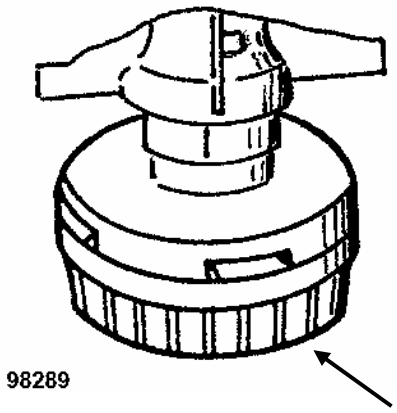
(cont'd.) **9 Breather**



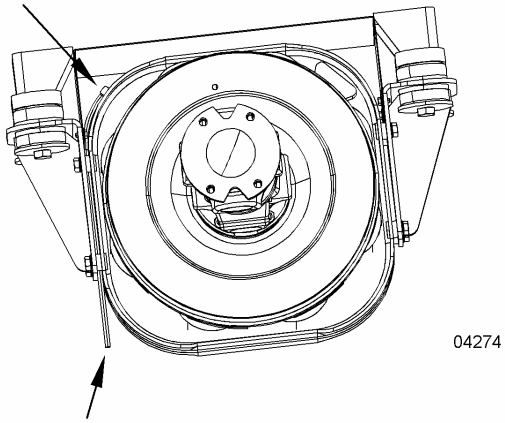
Breather installed on the gearbox



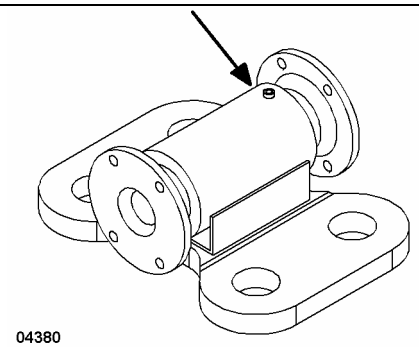
Breather, brake cylinder



Breather, brake valves



Breather at the eddy-current brake **)



Breather, intermediate bearing of propeller shafts (only in case of 10x8 version)

For an illustration and the mounting location of the breathers on the axles, refer to item C1-6.
For an illustration and indication of the mounting location of the breather to the transfer box, refer to item C1-5.1.1.
For an illustration and the mounting location of the breather on the fuel tank, refer to item C1-3.4.2 (chassis) and item C2-2.4.2.1 (superstructure).
For an illustration and the mounting location of the breather on the hydraulic oil tank, refer to item C1-10.2.1 (chassis) and item C2-3.2.1 (superstructure).
For an illustration and the mounting location of the breather on the swing drive, refer to item C2-4.2.2 (superstructure).

10 Hydraulic system

DANGER **Work on the hydraulic system may only be performed while the engine is at a standstill.**

- Check hydraulic system for leakage at regular intervals.

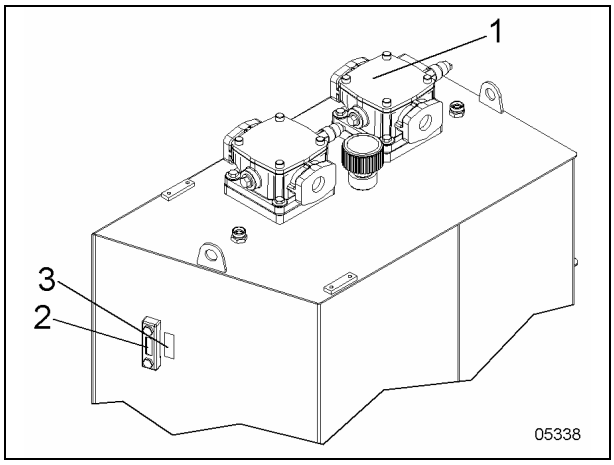
• Checking and retightening the screw couplings of the hydraulic assemblies and pipes, see item C2-3.6.

10.1 Check the hydraulic oil level.

NOTE **The steering, the outriggers and the suspension are supplied from a common hydraulic oil tank.**

- Check hydraulic oil level when the engine is at a standstill, while the outriggers are retracted.
- The hydraulic oil level is indicated at the sight glass (2).
- The hydraulic oil level depends on the hydraulic oil temperature; refer to plate (3).
- Oil is poured in via the port of the filter cap (1).

- Unscrew the filter cap (1) and pour in hydraulic oil through the port.
- Clean, check and, if necessary, replace the seal in the cap.
- Reposition and fasten the filter cap (1).



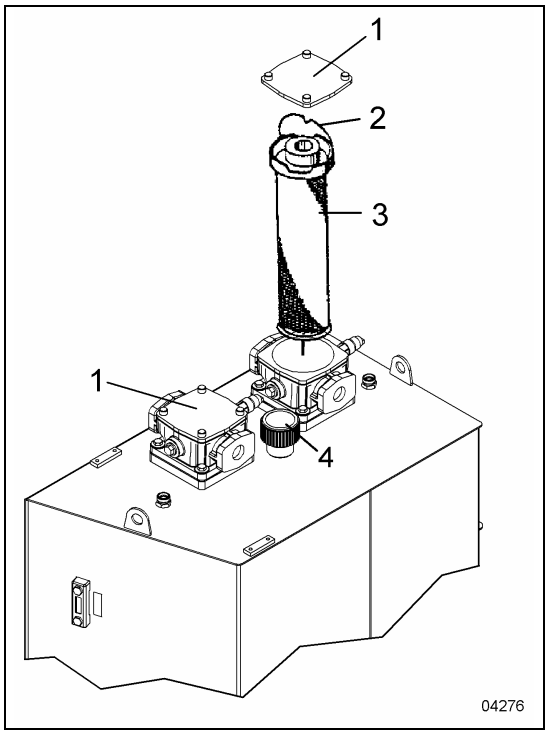
Attention **Make sure that only new hydraulic oil is poured in from clean vessels.**

10.2 Replacement of filter cartridges

DANGER **Replace the filter cartridges only while the engine is at a standstill.**

NOTE **The individual components installed in the valves, pumps and hydraulic motors have deliberately narrow tolerances. Even very small impurities penetrating the hydraulic system may cause malfunctions.**
The two filter cartridges must be replaced during each hydraulic oil change, if the icon „Contamination of the hydraulic oil filter“ (see item B1-3.1, FAUN Cockpit-Grafik-Control System, and B1-4.6.3.1) goes on, and according to the intervals stipulated in the maintenance schedule.
Do not clean filter cartridges.

- Unscrew the two filter covers (1).
- Fold the clips (2) of the filter cartridges (3) up. Turn the filter cartridge to the left by 90° and unlock it.
- Remove the filter cartridges (3); allow the residual oil to drip.
- Insert new filter cartridges carefully into the housing. Lock them by a 90° rotation and fold down the clip (2).
- Clean, check and, if necessary, replace the seals in the caps.
- Clean the seals of the filter covers (1) and the sealing surfaces using a non-fibrous cloth.
- Make sure that the packing rings fit correctly.
- Re-fasten the filter covers (1).



10.2.1 Replacement of the ventilation filter

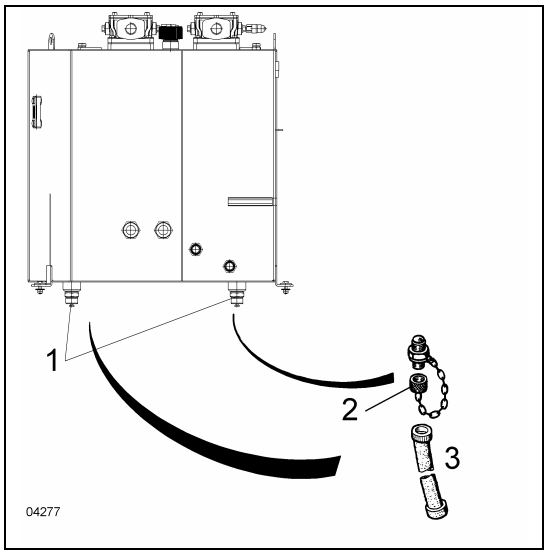
- If the ventilation filter is contaminated or clogged, unscrew the ventilation filter (4) and replace it by a new one (refer also to item C1-9). Clean, check and, if necessary, replace the sealing element.

10.3 Oil change in the hydraulic system

DANGER **Perform hydraulic oil change only while the engine is not running.**

- The outriggers are retracted.

- Remove the caps (2) from the drain valves (1).
- Screw-fasten the drain hoses (3). As the hose is fastened, the drain valves (1) open and the hydraulic oil can be drained through the drain hoses into the collect vessel provided to this effect.
- After these operations have been finished, remove the drain hoses, clean the thread using a clean piece of cloth and retighten the cap screws.
- Replace the filter cartridges as described under item C1-10.2.
- Pour in new hydraulic oil as described under item C1-10.1.



NOTE **It is recommended to have the oil analysed by the supplier before carrying out a scheduled hydraulic oil change, or at regular intervals, to see whether a hydraulic oil change is necessary. The purity degree must comply with ISO 4406 grade 18/16/13. Only clean hydraulic oil must be poured in during the oil changes. Depending on the degree of contamination and the thermal load the hydraulic oil is subject to, shorter oil change intervals than those specified in the maintenance schedule may be required.**

! Filters and used oil must be disposed of in an environmentally responsible fashion. !

10.4 Changing the oil type

The hydraulic system can be converted to biodegradable hydraulic oils according to VDMA 24568.

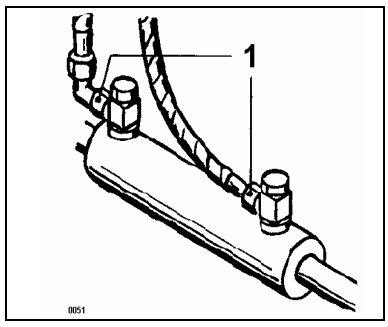
Attention **When changing over the hydraulic system from hydraulic oils based on mineral oil to biodegradable hydraulic oils, compliance with the directives of VDMA 24569 must be ensured.**
(Use the recommended oil types.)

10.5 Hydraulic system of steering assembly

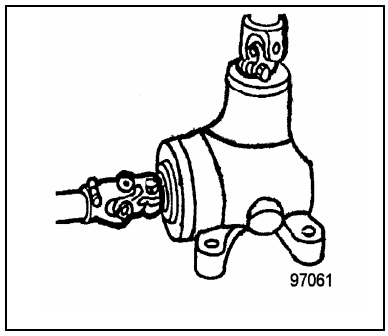
10.5.1 Hydraulic oil change

NOTE **After having filled the hydraulic oil tank with new hydraulic oil, perform maintenance work individually on each steering cylinder.**

- Start the engine, support the machine by outriggers.
- Release the screw couplings (1) of the steering cylinder in question.
- Turn the steering wheel alternately and slowly against the stops on the left and right.
- Drain approx. 1 l of used oil per cylinder via the screw coupling, until a solid stream of hydraulic oil flows out free of bubbles.
- Close the cylinder screw couplings; check the hydraulic oil level in the hydraulic oil tank and, if necessary, add hydraulic oil.



10.5.2 Miter gear of steering system



The miter gear of the steering system has been provided with a life-time lubrication in the factory (oil filling). Thus, it normally does not require any service or maintenance. Should nevertheless any leakage be detected, the vehicle must be taken to a specialized workshop where the reason for the leakage is eliminated - i.e. if necessary, the miter gear of the steering system may have to be replaced.

- Check the miter gear for leakage at regular intervals, according to the maintenance schedule.

10.5.3 Pressure check

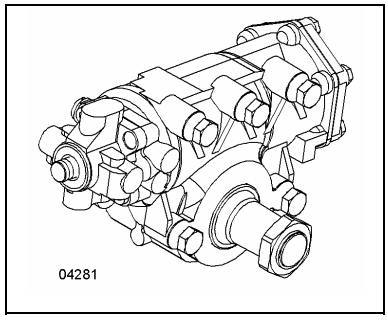
NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

In case of an operating malfunction in the steering system, the set-point pressure can be checked by screw-fastening a hydraulic pressure gauge to the measuring sockets (**M1**), (**M2**), (**M4**) and (**M5**).

To ensure precise measurement results, increase the engine speed to idle, turn the steering wheel to its left or right stops, and keep it in this position.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30°C to 40°C.**

10.5.4 Check steering gear / steering system for leakage



The steering gear has been provided with a life-time lubrication in the factory (oil filling). Thus, it normally does not require any service or maintenance. Should nevertheless any leakage be detected, the vehicle must be taken to a specialized workshop where the reason for the leakage is eliminated - i.e. if necessary, the steering gear may have to be replaced.

- Check the steering gear for leakage at regular intervals, according to the maintenance schedule.

- Check the steering system for leakage at regular intervals, according to the maintenance schedule.

10.6 Hydraulic system of suspension

10.6.1 Hydraulic oil change

By lowering the chassis before each hydraulic oil change, an essential part of the hydraulic oil flows from the suspension cylinders and hydraulic accumulators into the hydraulic oil tank. After a hydraulic oil change, the suspension system is filled automatically with new hydraulic oil via the level control system.

DANGER **When lowering the vehicle, and when the axle suspension is locked, make sure that nobody stays under or on the vehicle.**

10.6.2 Checking the suspension system for proper working order and leakage

- Check the valves, sleeves and connectors for leakage.
- Check system for proper operation and correct pressure.
- Check hydraulic hoses at regular intervals visually for fissures and damage.

Checking the hydraulic accumulators, refer to item 10.6.3.

10.6.3 Checking the hydraulic accumulators

DANGER **Before working on the suspension system, lower the vehicle completely.**

The pre-load pressure of the hydraulic accumulators must be set and checked especially during the winter months and after every installation or repair work.
The inspection intervals specified in the maintenance schedule must absolutely be observed.

☞ The first inspection must be performed already after 50 operating hours. ☜

Check the pressure of each individual hydraulic accumulator separately while the engine is not running. The oil-bearing end of the accumulators must have been drained previously via the measuring screw couplings on the accumulators (refer to part "B1", item 4.7.3.2).

THIS CHECK MUST BE PERFORMED IN A SPECIALIST WORKSHOP.

- Check the pre-load pressure by measuring using a filling and test equipment, and correct it, if necessary.

DANGER **Make sure to use only nitrogen for filling or for pressure correction. Never use oxygen or air.**

E x p l o s i o n h a z a r d !

- After the pressure test has been effected, actuate the push-button switch "level control" to restore the vehicle's suspension to working order. (For further details, refer to part B1, item 4.7.3.1).

Attention **The axle suspension must not be locked while the level control is actuated.**

10.6.4 Pressure check, axle load of 3rd axle

NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

In case of an operating malfunction in the suspension system of the 3rd axle, the set-point pressure can be checked by screw-fastening a hydraulic pressure gauge to the measuring connectors (**M6**).

For a precise measurement, set the engine to idle and set suspension to level position.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30°C to 40°C.**

Measuring connector M3 for leveling and inclination adjustment, see item 10.7.3.

10.7 Hydraulic system of outriggers

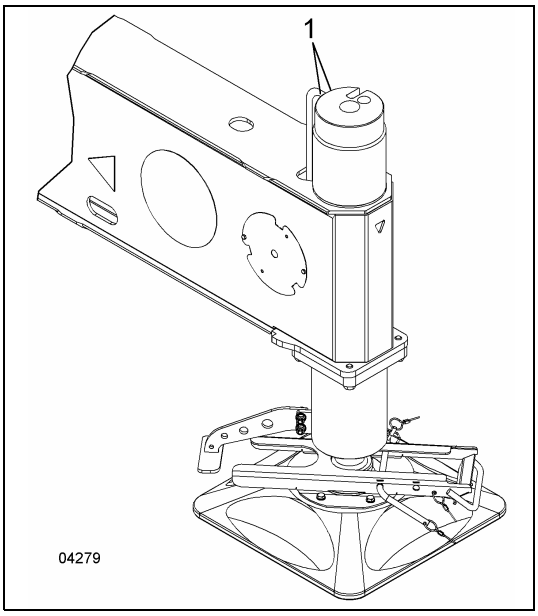
10.7.1 Hydraulic oil change

After having changed the hydraulic oil in the hydraulic oil tank (with the outrigger and extension cylinders retracted), no hydraulic oil change is required in the outriggers. The cylinders are automatically supplied with new hydraulic oil.

- When replacing a cylinder or after repair work, extend the appropriate outrigger cylinder while the engine is running at idling speed, so that new hydraulic oil is pressed into the cylinders.

- Release screw coupling (1) on the cylinder ring end gradually by a few rotations and actuate the outrigger cylinder actuation for the outrigger cylinder concerned repeatedly, until a solid stream of hydraulic oil flows out.

Thus, the cylinder is deaerated.



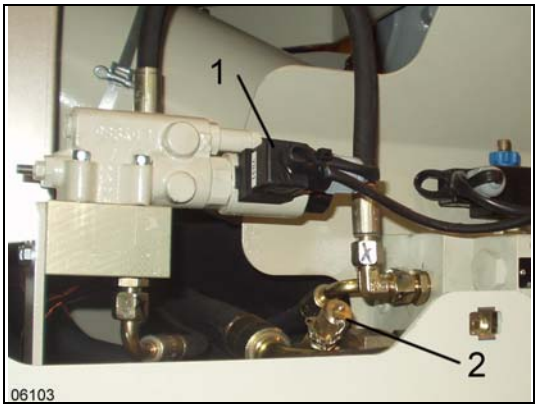
10.7.2 Maintenance instructions for hydraulic cylinders

- Before commissioning, make sure that the hydraulic cylinders are bled.
- Bleeding may only be finished when no more bubbles appear.
- Bleeding must be repeated whenever hydraulic components or pipelines have been assembled or disassembled.

10.7.3 Pressure check

NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

The pressures of the level control and the inclination adjustment (suspension), the outrigger cylinders, outrigger beams and the fan drive are checked via the measuring connector **M 3 (2)**.
The measuring connector **M 3 (2)** is located on the right-hand side of the vehicle, in the fan box, behind the driver's cab.



Pressure check of suspension and outriggers:
- Connect a hydraulic pressure gauge to the measuring connector **M 3 (2)**.
- Actuate the desired hydraulic circuit to its mechanical stop while the engine is running at idling speed.

Pressure check of the fan drive:
- Connect a hydraulic pressure gauge to the measuring connector **M 3 (2)**.
- at an engine speed of 1000 rpm, fan I: 530 rpm, fan II: 470 rpm; connector (1) remains inserted.

- at an engine speed of 1800 rpm, fan I: 2100 rpm, fan II: 1870 rpm; connector (1) is removed.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30 to +40°C.**

10.7.4 Checking the hydraulic system of outriggers / cylinders for leakage

- Check the hydraulic system of the outriggers and the cylinders for leakage at regular intervals according to the maintenance schedule.

10.8 Test connectors and measured values

NOTE **Pressure setting after bleeding the system at a hydraulic oil temperature of +30°C to +40°C and at the engine speeds which are specified for the various working movements.**

After the pressure setting, the pressure measurements must be repeated 3 times. None of the measured values may exceed the tolerance range.

The level clearance must be measured 1 x.

Fan drive	Set-point	Tolerance	Measuring connector	Engine speed
Pressure capping, fan pump (primary protection); ED valve de-energized (connector removed) Pressure-limiting valve (DBV) in ED valve screwed-in to its stop; Setting on pump controller of fan pump	300 bar	± 5 bar	M3	1800 min^{-1}
Fan speed when engine is hot; Valve (ED valve) de-energized (connector removed) Fan I: 2100 rpm Fan II: 1870 rpm Setting on DBV in ED valve	250 bar	± 5 bar	M3	1800 min^{-1}
Fan speed when engine is cold; ED valve supplied with 24V; Fan I: 530 rpm Fan II: 470 rpm Setting on pump controller of fan pump	30 bar	± 5 bar	M3	1000 min^{-1}

Level and inclination position	Set-point	Tolerance	Measuring connector	Engine speed
Level control and inclination adjustment	270 bar	+10 bar	M3	at idle
Lift axles 1 - 5	270 bar	+10 bar	M3	at idle
Lift 3rd axle	270 bar	+10 bar	M3	at idle
Axle load of 3rd axle at driving level: 12000 kg **Procedure:** **1.** Raise vehicle to level position, wait for 5 seconds, then read the pressure **2.** Set pressure limiting valve **V5** (new setting only visible after the level button has been touched again and after a waiting time of approx. 5 seconds) **3.** Repeat step **2.** until the set-point has been reached	107 bar	± 2 bar	M6	at idle

Outriggers	Set-point	Tolerance	Measuring connector	Engine speed
Extending outrigger beams	80 bar	+5 bar	M3	at idle
Retracting outrigger beams	270 bar	+10 bar	M3	at idle
Extending the outrigger cylinders	270 bar	+10 bar	M3	at idle
Retracting the outrigger cylinders	270 bar	+10 bar	M3	at idle

Hydraulic suspension	Set-point	Tolerance
Nitrogen preload pressure, axles 1+2, 3	75 bar	± 2 bar
Nitrogen preload pressure, axles 4+5	65 bar	± 2 bar

cont'd.: **10.8 Test connectors and measured values**

Steering (hydr. steering limitation) front axles				
Procedure: **Vehicle on rotary table;** **1.** Set the steering to its maximum angle (steering lock) **2.** Place a washer (thickness 8 mm) at the steering stop bolt of axle 1 and steer wheel against steering stop bolt **3.** Adjust hydraulic steering limitation – first circuit I, then circuit II (this sequence must be adhered to, as the circuits interact!) **4.** Place a washer (thickness 15mm) at the steering stop bolt of axle 1 and steer wheel against steering stop bolt **5.** Read max. pressure and note it down; *not adjustable* **6.** Actuate steering without a washer placed at the steering stop bolt, until the wheel touches the steering stop bolt **7.** Read and note down pressure; it must not exceed the setting of the hydr. steering limitation				
Servocom	Set-point	Tolerance	Measuring connector	Engine speed
Circuit I Hydr. steering limitation with washer, steering actuated to the left	90 bar	+5 bar	M1	at idle
Circuit I Hydr. steering limitation with washer, steering actuated to the right	90 bar	+5 bar	M1	at idle
Circuit II Hydr. steering limitation with washer, steering actuated to the left	60 bar	+5 bar	M2	at idle
Circuit II Hydr. steering limitation with washer, steering actuated to the right	60 bar	+5 bar	M2	at idle
Circuit I max.; *check using a 15 mm washer; steering actuated to the left and right; not adjustable*	150 bar	+15 bar	M1	at idle
Circuit II max.; *check using a 15 mm washer; steering actuated to the left and right; not adjustable*	150 bar	+15 bar	M2	at idle
Circuit I Hydr. steering limitation without washer, steering actuated to the left	max. 90 bar	---	M1	at idle
Circuit I Hydr. steering limitation without washer, steering actuated to the right	max. 90 bar	---	M1	at idle
Circuit II Hydr. steering limitation without washer, steering actuated to the left	max. 60 bar	---	M2	at idle
Circuit II Hydr. steering limitation without washer, steering actuated to the right	max. 60 bar	---	M2	at idle

Steering, rear axles	Set-point	Tolerance	Measuring connector	Engine speed
Steering, axle 4	160 bar	+5 bar	M4	at idle
Steering, axle 5	160 bar	+5 bar	M5	at idle

Level clearance **Axle center - bottom edge of chassis frame**	Set-point	Tolerance
Normal level, front	305 mm	± 5mm
Normal level, rear	370 mm	± 5mm
Upper level, front	370 mm	± 5mm
Upper level, rear	435 mm	± 5mm

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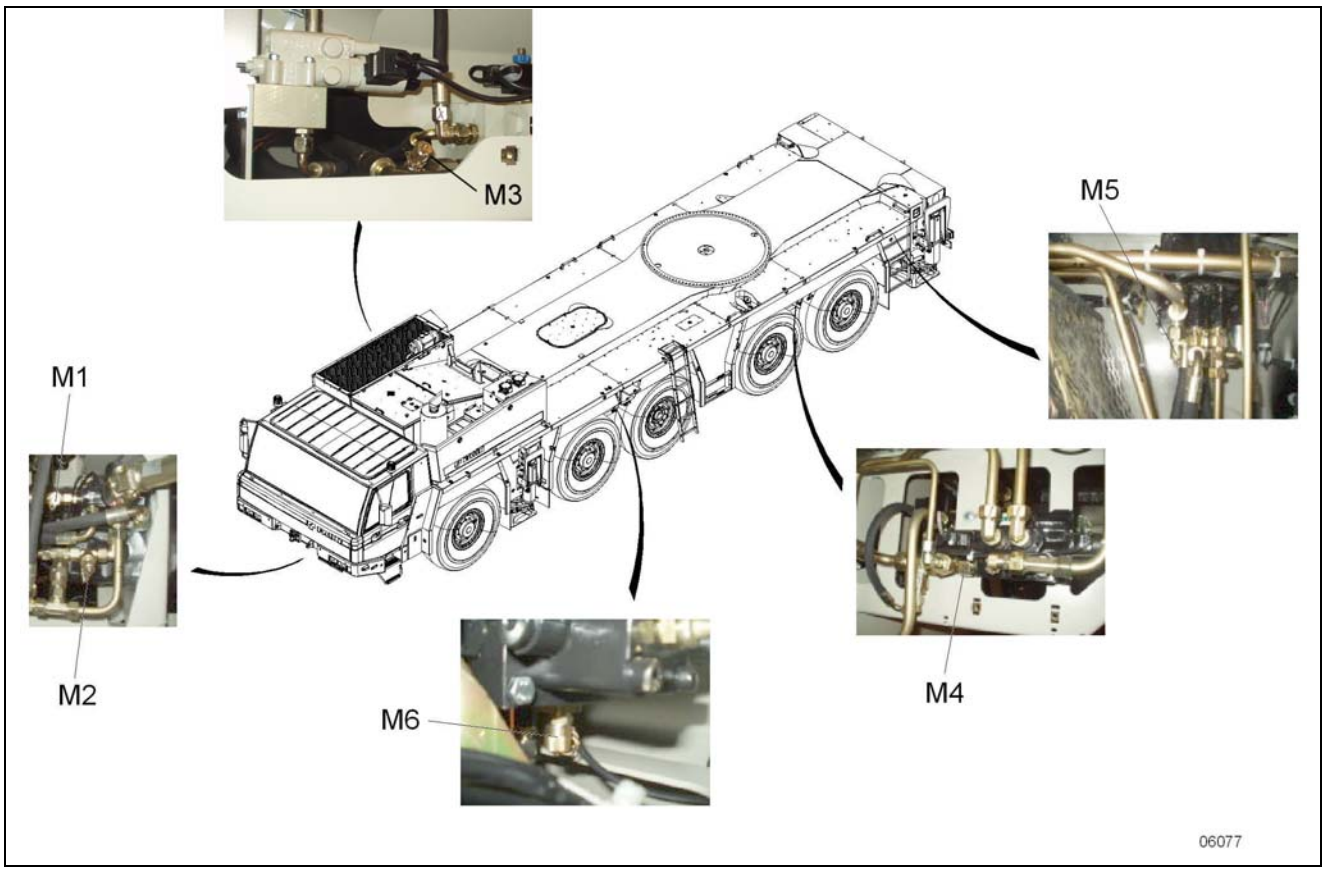
10.9 Location of the hydraulic measuring connectors

Measuring connectors are provided in easily accessible locations to enable the functional inspection of the hydraulic system of the vehicle.
The locations of the measuring connectors on the vehicle are shown in the following illustration.

Designation and function of the measuring connectors:

M 1 = Measuring connector, steering, circuit I.
M 2 = Measuring connector, steering, circuit II.
M 3 = Measuring connector, hydraulic pressure, fan drive and outriggers.
M 4 = Measuring connector, steering, 4th rear axle
M 5 = Measuring connector, steering, 5th rear axle
M 6 = Measuring connector, axle load of 3rd axle



10 Hydraulic system

DANGER **Work on the hydraulic system may only be performed while the engine is at a standstill.**

- Check hydraulic system for leakage at regular intervals.

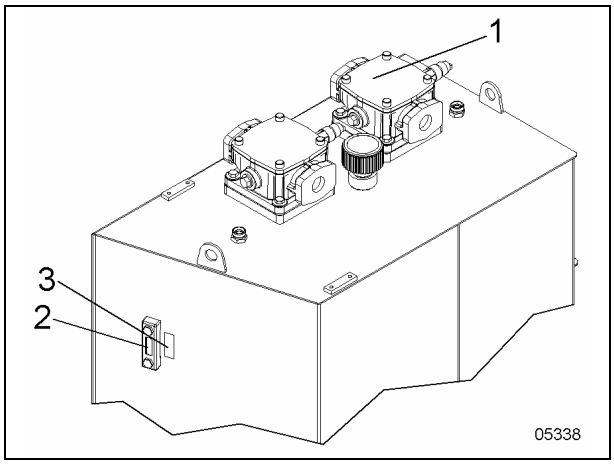
• Checking and retightening the screw couplings of the hydraulic assemblies and pipes, see item C2-3.6.

10.1 Check the hydraulic oil level.

NOTE **The steering, the outriggers and the suspension are supplied from a common hydraulic oil tank.**

- Check hydraulic oil level when the engine is at a standstill, while the outriggers are retracted.
- The hydraulic oil level is indicated at the sight glass (2).
- The hydraulic oil level depends on the hydraulic oil temperature; refer to plate (3).
- Oil is poured in via the port of the filter cap (1).

- Unscrew the filter cap (1) and pour in hydraulic oil through the port.
- Clean, check and, if necessary, replace the seal in the cap.
- Reposition and fasten the filter cap (1).



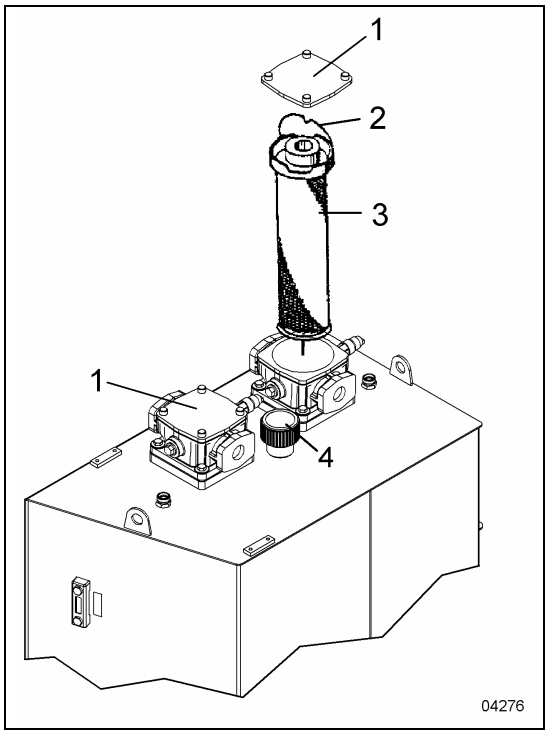
Attention **Make sure that only new hydraulic oil is poured in from clean vessels.**

10.2 Replacement of filter cartridges

DANGER **Replace the filter cartridges only while the engine is at a standstill.**

NOTE **The individual components installed in the valves, pumps and hydraulic motors have deliberately narrow tolerances. Even very small impurities penetrating the hydraulic system may cause malfunctions.**
The two filter cartridges must be replaced during each hydraulic oil change, if the icon „Contamination of the hydraulic oil filter“ (see item B1-3.1, FAUN Cockpit-Grafik-Control System, and B1-4.6.3.1) goes on, and according to the intervals stipulated in the maintenance schedule.
Do not clean filter cartridges.

- Unscrew the two filter covers (1).
- Fold the clips (2) of the filter cartridges (3) up. Turn the filter cartridge to the left by 90° and unlock it.
- Remove the filter cartridges (3); allow the residual oil to drip.
- Insert new filter cartridges carefully into the housing. Lock them by a 90° rotation and fold down the clip (2).
- Clean, check and, if necessary, replace the seals in the caps.
- Clean the seals of the filter covers (1) and the sealing surfaces using a non-fibrous cloth.
- Make sure that the packing rings fit correctly.
- Re-fasten the filter covers (1).



10.2.1 Replacement of the ventilation filter

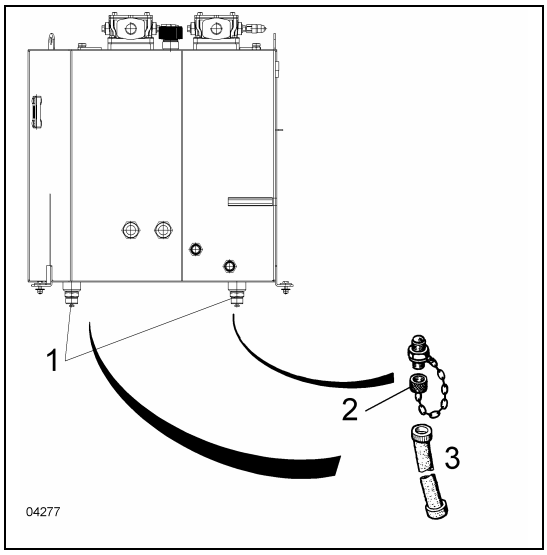
- If the ventilation filter is contaminated or clogged, unscrew the ventilation filter (4) and replace it by a new one (refer also to item C1-9). Clean, check and, if necessary, replace the sealing element.

10.3 Oil change in the hydraulic system

DANGER **Perform hydraulic oil change only while the engine is not running.**

- The outriggers are retracted.

- Remove the caps (2) from the drain valves (1).
- Screw-fasten the drain hoses (3). As the hose is fastened, the drain valves (1) open and the hydraulic oil can be drained through the drain hoses into the collect vessel provided to this effect.
- After these operations have been finished, remove the drain hoses, clean the thread using a clean piece of cloth and retighten the cap screws.
- Replace the filter cartridges as described under item C1-10.2.
- Pour in new hydraulic oil as described under item C1-10.1.



NOTE **It is recommended to have the oil analysed by the supplier before carrying out a scheduled hydraulic oil change, or at regular intervals, to see whether a hydraulic oil change is necessary. The purity degree must comply with ISO 4406 grade 18/16/13. Only clean hydraulic oil must be poured in during the oil changes. Depending on the degree of contamination and the thermal load the hydraulic oil is subject to, shorter oil change intervals than those specified in the maintenance schedule may be required.**

! Filters and used oil must be disposed of in an environmentally responsible fashion. !

10.4 Changing the oil type

The hydraulic system can be converted to biodegradable hydraulic oils according to VDMA 24568.

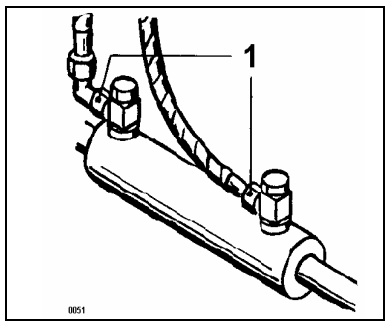
Attention **When changing over the hydraulic system from hydraulic oils based on mineral oil to biodegradable hydraulic oils, compliance with the directives of VDMA 24569 must be ensured.**
(Use the recommended oil types.)

10.5 Hydraulic system of steering assembly

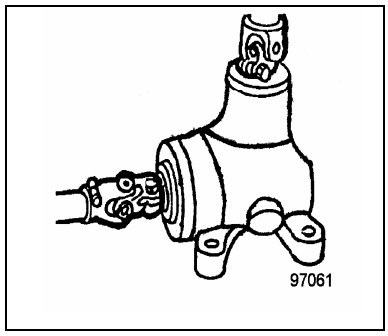
10.5.1 Hydraulic oil change

NOTE **After having filled the hydraulic oil tank with new hydraulic oil, perform maintenance work individually on each steering cylinder.**

- Start the engine, support the machine by outriggers.
- Release the screw couplings (1) of the steering cylinder in question.
- Turn the steering wheel alternately and slowly against the stops on the left and right.
- Drain approx. 1 l of used oil per cylinder via the screw coupling, until a solid stream of hydraulic oil flows out free of bubbles.
- Close the cylinder screw couplings; check the hydraulic oil level in the hydraulic oil tank and, if necessary, add hydraulic oil.



10.5.2 Miter gear of steering system



The miter gear of the steering system has been provided with a life-time lubrication in the factory (oil filling). Thus, it normally does not require any service or maintenance. Should nevertheless any leakage be detected, the vehicle must be taken to a specialized workshop where the reason for the leakage is eliminated - i.e. if necessary, the miter gear of the steering system may have to be replaced.

- Check the miter gear for leakage at regular intervals, according to the maintenance schedule.

10.5.3 Pressure check

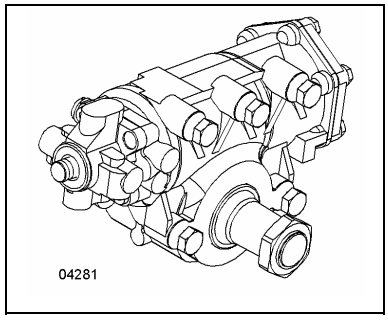
NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

In case of an operating malfunction in the steering system, the set-point pressure can be checked by screw-fastening a hydraulic pressure gauge to the measuring sockets (**M1**), (**M2**), (**M4**) and (**M5**).

To ensure precise measurement results, increase the engine speed to idle, turn the steering wheel to its left or right stops, and keep it in this position.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30°C to 40°C.**

10.5.4 Check steering gear / steering system for leakage



The steering gear has been provided with a life-time lubrication in the factory (oil filling). Thus, it normally does not require any service or maintenance. Should nevertheless any leakage be detected, the vehicle must be taken to a specialized workshop where the reason for the leakage is eliminated - i.e. if necessary, the steering gear may have to be replaced.

- Check the steering gear for leakage at regular intervals, according to the maintenance schedule.

- Check the steering system for leakage at regular intervals, according to the maintenance schedule.

10.6 Hydraulic system of suspension

10.6.1 Hydraulic oil change

By lowering the chassis before each hydraulic oil change, an essential part of the hydraulic oil flows from the suspension cylinders and hydraulic accumulators into the hydraulic oil tank. After a hydraulic oil change, the suspension system is filled automatically with new hydraulic oil via the level control system.

DANGER **When lowering the vehicle, and when the axle suspension is locked, make sure that nobody stays under or on the vehicle.**

10.6.2 Checking the suspension system for proper working order and leakage

- Check the valves, sleeves and connectors for leakage.
- Check system for proper operation and correct pressure.
- Check hydraulic hoses at regular intervals visually for fissures and damage.

Checking the hydraulic accumulators, refer to item 10.6.3.

10.6.3 Checking the hydraulic accumulators

DANGER **Before working on the suspension system, lower the vehicle completely.**

The pre-load pressure of the hydraulic accumulators must be set and checked especially during the winter months and after every installation or repair work.
The inspection intervals specified in the maintenance schedule must absolutely be observed.

☞ The first inspection must be performed already after 50 operating hours. ☜

Check the pressure of each individual hydraulic accumulator separately while the engine is not running. The oil-bearing end of the accumulators must have been drained previously via the measuring screw couplings on the accumulators (refer to part "B1", item 4.7.3.2).

THIS CHECK MUST BE PERFORMED IN A SPECIALIST WORKSHOP.

- Check the pre-load pressure by measuring using a filling and test equipment, and correct it, if necessary.

DANGER **Make sure to use only nitrogen for filling or for pressure correction. Never use oxygen or air.**

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- After the pressure test has been effected, actuate the push-button switch "level control" to restore the vehicle's suspension to working order. (For further details, refer to part B1, item 4.7.3.1).

Attention **The axle suspension must not be locked while the level control is actuated.**

10.6.4 Pressure check, axle load of 3rd axle

NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

In case of an operating malfunction in the suspension system of the 3rd axle, the set-point pressure can be checked by screw-fastening a hydraulic pressure gauge to the measuring connectors (**M6**).

For a precise measurement, set the engine to idle and set suspension to level position.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30°C to 40°C.**

Measuring connector M3 for leveling and inclination adjustment, see item 10.7.3.

10.7 Hydraulic system of outriggers

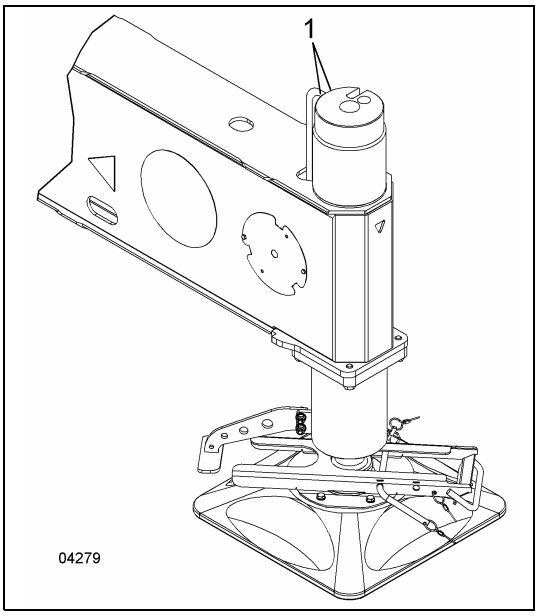
10.7.1 Hydraulic oil change

After having changed the hydraulic oil in the hydraulic oil tank (with the outrigger and extension cylinders retracted), no hydraulic oil change is required in the outriggers. The cylinders are automatically supplied with new hydraulic oil.

- When replacing a cylinder or after repair work, extend the appropriate outrigger cylinder while the engine is running at idling speed, so that new hydraulic oil is pressed into the cylinders.

- Release screw coupling (1) on the cylinder ring end gradually by a few rotations and actuate the outrigger cylinder actuation for the outrigger cylinder concerned repeatedly, until a solid stream of hydraulic oil flows out.

Thus, the cylinder is deaerated.



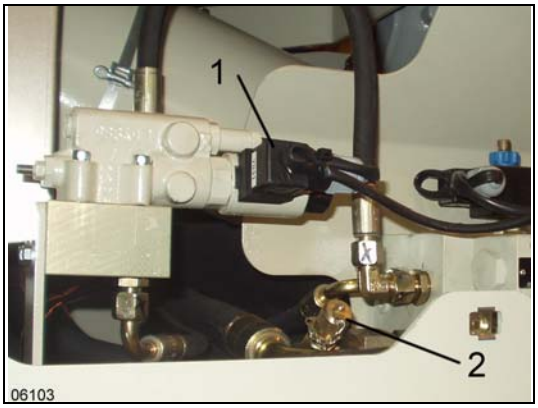
10.7.2 Maintenance instructions for hydraulic cylinders

- Before commissioning, make sure that the hydraulic cylinders are bled.
- Bleeding may only be finished when no more bubbles appear.
- Bleeding must be repeated whenever hydraulic components or pipelines have been assembled or disassembled.

10.7.3 Pressure check

NOTE **The test connectors (measuring connectors "M") and the measured values of the entire hydraulic system of the chassis are listed up under item 10.9.**

The pressures of the level control and the inclination adjustment (suspension), the outrigger cylinders, outrigger beams and the fan drive are checked via the measuring connector **M 3 (2)**.
The measuring connector **M 3 (2)** is located on the right-hand side of the vehicle, in the fan box, behind the driver's cab.



Pressure check of suspension and outriggers:
- Connect a hydraulic pressure gauge to the measuring connector **M 3 (2)**.
- Actuate the desired hydraulic circuit to its mechanical stop while the engine is running at idling speed.

Pressure check of the fan drive:
- Connect a hydraulic pressure gauge to the measuring connector **M 3 (2)**.
- at an engine speed of 1000 rpm, fan I: 530 rpm, fan II: 470 rpm; connector (1) remains inserted.

- at an engine speed of 1800 rpm, fan I: 2100 rpm, fan II: 1870 rpm; connector (1) is removed.

NOTE **The specified values are only reached when the system is deaerated. The hydraulic oil temperature should be in the range from approx. +30 to +40°C.**

10.7.4 Checking the hydraulic system of outriggers / cylinders for leakage

- Check the hydraulic system of the outriggers and the cylinders for leakage at regular intervals according to the maintenance schedule.

10.8 Test connectors and measured values

NOTE **Pressure setting after bleeding the system at a hydraulic oil temperature of +30°C to +40°C and at the engine speeds which are specified for the various working movements.**

After the pressure setting, the pressure measurements must be repeated 3 times. None of the measured values may exceed the tolerance range.

The level clearance must be measured 1 x.

Fan drive	Set-point	Tolerance	Measuring connector	Engine speed
Pressure capping, fan pump (primary protection); ED valve de-energized (connector removed) Front axle steering actuated to its stop; Setting on pump controller of fan pump	300 bar	± 5 bar	M3	1800 min^{-1}
Fan speed when engine is hot; Valve (ED valve) de-energized (connector removed) front axle steering set free; Fan I: 2100 rpm Fan II: 1870 rpm Setting on DBV in ED valve	250 bar	± 5 bar	M3	1800 min^{-1}
Fan speed when engine is cold; ED valve supplied with 24V; Fan I: 530 rpm Fan II: 470 rpm Setting on pump controller of fan pump	30 bar	± 5 bar	M3	1000 min^{-1}

Level and inclination position	Set-point	Tolerance	Measuring connector	Engine speed
Level control and inclination adjustment	270 bar	+10 bar	M3	at idle
Lift axles 1 - 5	270 bar	+10 bar	M3	at idle
Lift 3rd axle	270 bar	+10 bar	M3	at idle
Axle load of 3rd axle at driving level: 12000 kg **Procedure:** **1.** Raise vehicle to level position, wait for 5 seconds, then read the pressure **2.** Set pressure limiting valve **V5** (new setting only visible after the level button has been touched again and after a waiting time of approx. 5 seconds) **3.** Repeat step **2.** until the set-point has been reached	107 bar	± 2 bar	M6	at idle

Outriggers	Set-point	Tolerance	Measuring connector	Engine speed
Extending outrigger beams	80 bar	+5 bar	M3	at idle
Retracting outrigger beams	270 bar	+10 bar	M3	at idle
Extending the outrigger cylinders	270 bar	+10 bar	M3	at idle
Retracting the outrigger cylinders	270 bar	+10 bar	M3	at idle

Hydraulic suspension	Set-point	Tolerance
Nitrogen preload pressure, axles 1+2, 3	75 bar	± 2 bar
Nitrogen preload pressure, axles 4+5	65 bar	± 2 bar

cont'd.: **10.8 Test connectors and measured values**

Steering (hydr. steering limitation) front axles				
Procedure: **Vehicle on rotary table;** **1.** Set the steering to its maximum angle (steering lock) **2.** Place a washer (thickness 8 mm) at the steering stop bolt of axle 1 and steer wheel against steering stop bolt **3.** Adjust hydraulic steering limitation – first circuit I, then circuit II (this sequence must be adhered to, as the circuits interact!) **4.** Place a washer (thickness 15mm) at the steering stop bolt of axle 1 and steer wheel against steering stop bolt **5.** Read max. pressure and note it down; *not adjustable* **6.** Actuate steering without a washer placed at the steering stop bolt, until the wheel touches the steering stop bolt **7.** Read and note down pressure; it must not exceed the setting of the hydr. steering limitation				
Servocom	Set-point	Tolerance	Measuring connector	Engine speed
Circuit I Hydr. steering limitation with washer, steering actuated to the left	90 bar	+5 bar	M1	at idle
Circuit I Hydr. steering limitation with washer, steering actuated to the right	90 bar	+5 bar	M1	at idle
Circuit II Hydr. steering limitation with washer, steering actuated to the left	60 bar	+5 bar	M2	at idle
Circuit II Hydr. steering limitation with washer, steering actuated to the right	60 bar	+5 bar	M2	at idle
Circuit I max.; *check using a 15 mm washer; steering actuated to the left and right; not adjustable*	150 bar	+15 bar	M1	at idle
Circuit II max.; *check using a 15 mm washer; steering actuated to the left and right; not adjustable*	150 bar	+15 bar	M2	at idle
Circuit I Hydr. steering limitation without washer, steering actuated to the left	max. 90 bar	---	M1	at idle
Circuit I Hydr. steering limitation without washer, steering actuated to the right	max. 90 bar	---	M1	at idle
Circuit II Hydr. steering limitation without washer, steering actuated to the left	max. 60 bar	---	M2	at idle
Circuit II Hydr. steering limitation without washer, steering actuated to the right	max. 60 bar	---	M2	at idle

Steering, rear axles	Set-point	Tolerance	Measuring connector	Engine speed
Steering, axle 4	160 bar	+5 bar	M4	at idle
Steering, axle 5	160 bar	+5 bar	M5	at idle

Level clearance **Axle center - bottom edge of chassis frame**	Set-point	Tolerance
Normal level, front	305 mm	± 5mm
Normal level, rear	370 mm	± 5mm
Upper level, front	370 mm	± 5mm
Upper level, rear	435 mm	± 5mm

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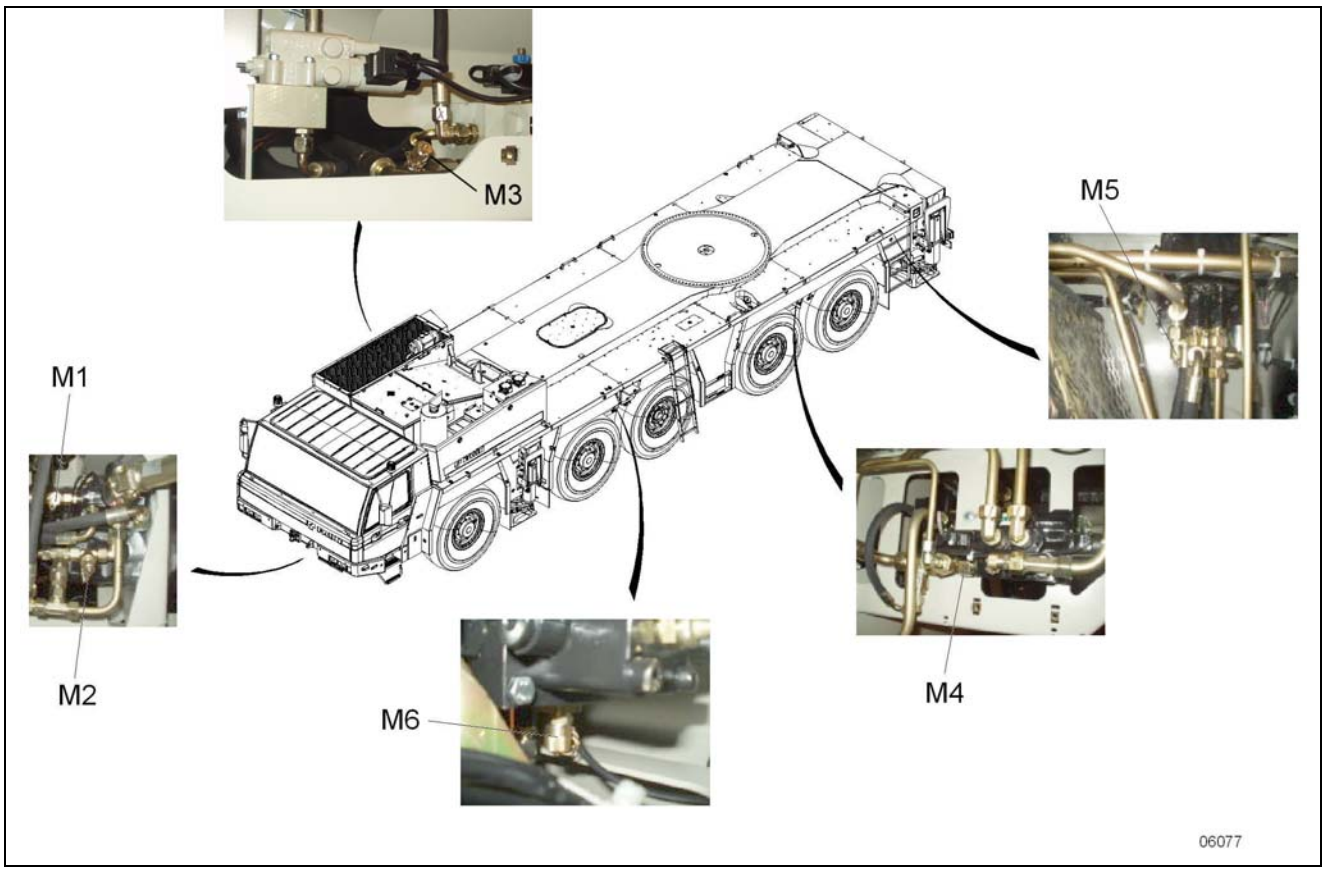
10.9 Location of the hydraulic measuring connectors

Measuring connectors are provided in easily accessible locations to enable the functional inspection of the hydraulic system of the vehicle.
The locations of the measuring connectors on the vehicle are shown in the following illustration.

Designation and function of the measuring connectors:

M 1 = Measuring connector, steering, circuit I.
M 2 = Measuring connector, steering, circuit II.
M 3 = Measuring connector, hydraulic pressure, fan drive and outriggers.
M 4 = Measuring connector, steering, 4th rear axle
M 5 = Measuring connector, steering, 5th rear axle
M 6 = Measuring connector, axle load of 3rd axle



11 Brakes

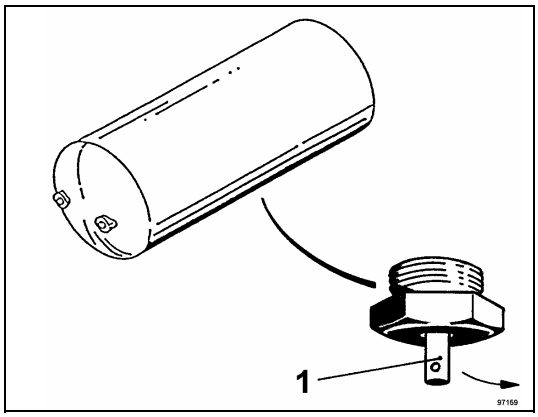
DANGER **Prior to all types of work on the brake system, protect the vehicle against rolling by means of wheel chocks.**

11.1 Drainage valves in the compressed air tanks

- Pull or push the actuator bolt (toggle valve 1) to check carefully whether condensed water is blown off.

Make sure that no condensed water is blown off.

- If condensed water is found to be blown off, check the air drier (filter element) for proper working order, and the compressed air system for leakage.



NOTE **A leaky compressed air system affects the operating time of the air compressor and the efficiency of the air drier. Check compressed air system for leakage at regular intervals. Locate and eliminate any leakage immediately.**

11.2 Air drier

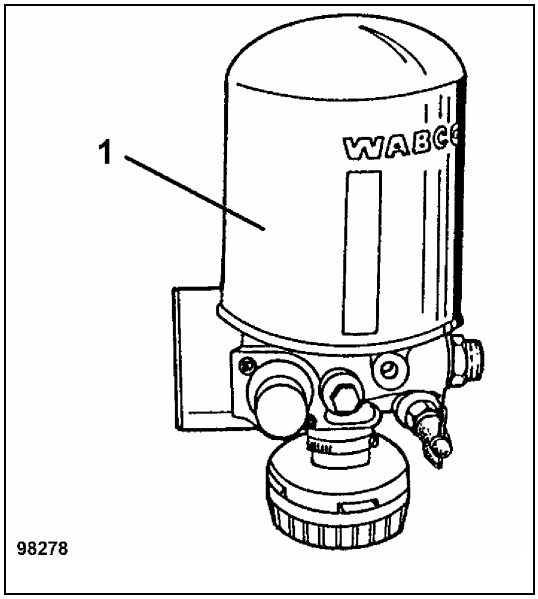
11.2.1 Functional check

- Actuate the drainage valves as described under item C1-11.1.

- If no condensed water is blown off, the desiccant cartridge of the air drier may only be replaced when condensed water escapes several times successively during the regular inspections of the air tank valves as specified in the maintenance schedule.

11.2.2 Replacement of the desiccant cartridge

- The desiccant cartridge may only be replaced during the pressure governor's switch-off phase.
- Unscrew the desiccant cartridge (1).
- Fasten the new cartridge.
- Check the packing ring and tighten the cartridge with approx. 15 Nm.



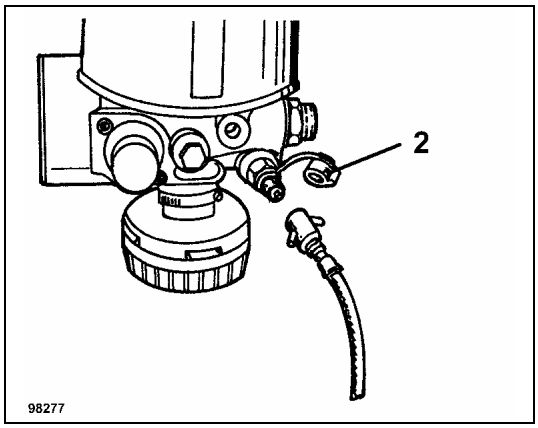
NOTE **Replace desiccant cartridge every 2 years.**
During the rest of the time, it must be monitored as described under items C1-11.1 and C1-11.2.2.

11.3 Pressure governor with tire inflation socket (integrated in air drier)

11.3.1 Inflating tires via the tire inflation socket on the pressure governor

NOTE **To avoid damage to the air compressor, it may only be used to fill the tires mounted to the vehicle with compressed air. Work, such as painting by means of a spray gun, is prohibited.**

- Start the engine.
- Remove the valve cap (2).
- Fasten the tire inflating hose to the valve.
- Inflate tires up to the specified pressure (for tire pressure, refer to section A, item 2.7.3).



DANGER **Check tire pressure at regular intervals.**

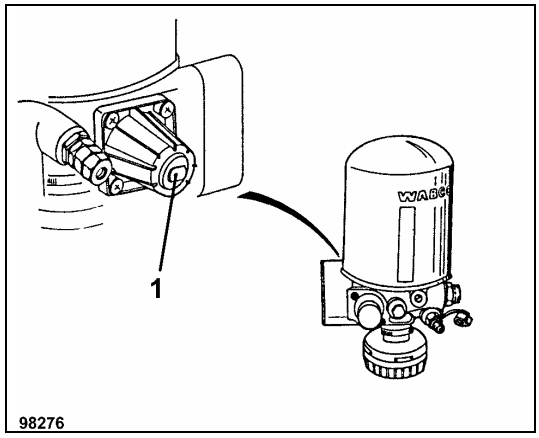
11.3.2 Setting the shut-off pressure of the pressure governor

DANGER **In order not to prejudice the traffic and operating safety of the vehicle, make sure that the adjustment and maintenance operations on the entire brake system (also in the wheel brake system), as specified below, are only performed by well-trained specialist staff in an authorized specialist workshop (brake repair service).**

DANGER **Prior to all types of work on the brake system, protect the vehicle against rolling by means of wheel chocks.**

The pressure governor must be checked visually and for proper function as required by the legal provisions of the country in question (in FRG: according to § 29 StVZO - Federal Motor Vehicle Safety Standards). When deficiencies are detected, the unit must be removed from the machine and examined internally, or be replaced by another unit.
After an extended period of operation, there may be a deviation from the specified switch-off pressure.

- When the engine is running, turn the setscrew (1) until the specified switch-off pressure has been reached.



11.4 Brake cylinder

DANGER **In order not to prejudice the traffic and operating safety of the vehicle, make sure that adjustment and maintenance work at the entire brake system (also in the wheel brake system) is only performed by well-trained specialist staff in an authorized specialist workshop (brake repair service).**

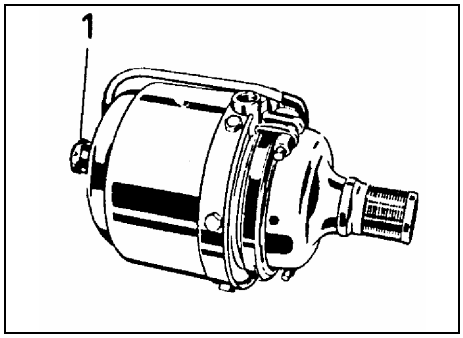
DANGER **Prior to all types of work on the brake system, protect the vehicle against rolling by means of wheel chocks.**

11.4.1 Releasing the air accumulator section of the air accumulator diaphragm cylinders

The combined air accumulator diaphragm cylinder is equipped with a mechanical releasing device for the air accumulator section. In case of a complete pressure failure (e.g. major leakage in the air accumulator section), the piston, due to the spring load, is in braking position.

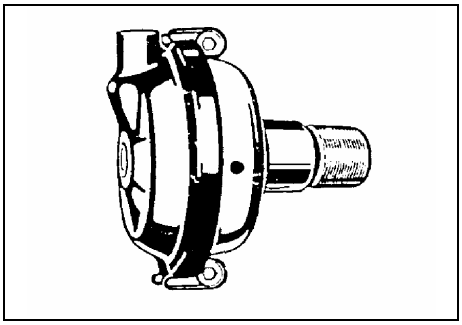
- Turn the releasing bolts (1) out of the threaded sleeves of the air accumulator brake cylinders, until the brakes are released.

11.4.2 Establishing the braking function of the air accumulator section



- Ventilate the air accumulator section (min. 6 bar).
- Screw-in the releasing bolts and tighten them safely (tightening torque approx. 45 Nm).
- Check braking function; if necessary, re-adjust.

11.4.3 Cleaning the diaphragm brake cylinders



Even if the diaphragm cylinders operate perfectly (response pressure does not exceed 0.5 bar, no leakage etc.), they must be cleaned at regular intervals.

- Remove, disassemble and clean the cylinders.
- Replace the wear parts.

In the scope of an examination of the interior parts of the spreading wedge brake actuation which is due at intervals of two years, the brake cylinders (diaphragm and tristop cylinders) must also be checked for leakage and proper working order.

Attention **After mounting the brake cylinders, check that the breather hole is directed downwards and that the other bore-holes are closed with rubber plugs.**
After mounting, the brake cylinders must not touch any vehicle components. For inspection, it may be necessary to move the suspension in and out, and to actuate the steering to its stops on the left and right.
Brake hoses must not chafe or be kinked.

11.5 Inspection of the wheel brakes

NOTE **The wheel brakes are adjusted automatically, depending on the wear of the brake linings. Manual readjustment is not required.**
However, it is necessary to check them at regular intervals.

11.5.1 Inspection of brake lining thickness

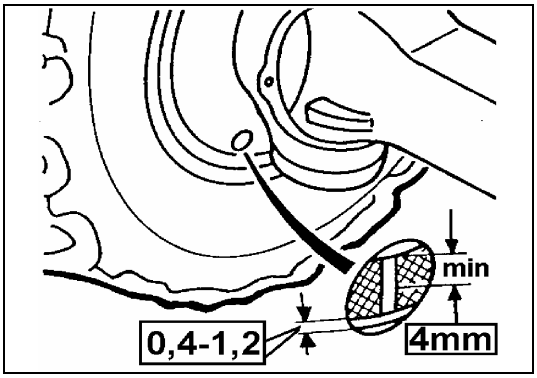
- To check the brake lining thickness visually, remove the rubber plugscrew from the inspection holes of the cover plates.
- The brake linings have to be replaced if the wear marking provided has been reached, or if their thickness has decreased to the minimum value of 4 mm.

Attention **When brake linings are to be replaced, make sure to renew all linings of one axle.**

It is essential that only original **TADANO FAUN spare parts** are used.

11.5.2 Inspection of air gap

- Check the air gap between the brake drum and the brake lining using a feeler gauge.
- During the inspection, make sure that both brake shoes are applied evenly to the brake drum. For that purpose, actuate the service brake.



The air gap for each brake shoe must be 0.4 to 1.2 mm.
The max. air gap must not exceed 1.2 mm.

- If the air gap needs to be readjusted, actuate the brake several times in quick succession while traveling at low speed.

After approx. 30 braking operations, the air gap must have been reduced. If the air gap is not reduced, check the spreading mechanism for proper operation.

NOTE **The air gap of the brake can only be readjusted while the wheels are turning.**

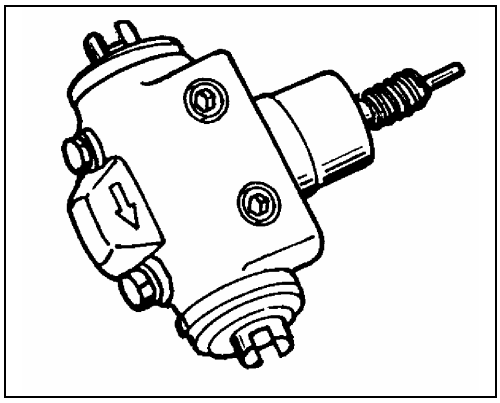
Attention **If only one brake shoe touches the brake drum, the vehicle must be taken to a repair workshop without delay.**

11.6 Wheel brakes - Maintenance

Perform the regular maintenance work according to the maintenance schedule.

- Check all components for damage or wear.
- Replace defective components; renew contaminated or hardened grease.
- After assembly, make sure that the brake is re-adjusted.

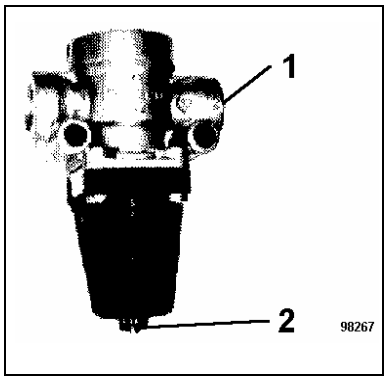
11.6.1 Spreading device - Maintenance



- Disassemble spreading device at regular intervals, according to the maintenance schedule, and check for wear; if necessary, repair it using the repair kits specified in the spare parts list.
- Visual inspection of internal components: specified at intervals of two years.
- All movable parts must be greased previously with Shell Grease 16, or Thermatex EP1.

11.7 Check pressure limiting valve

A pressure limiting valve is installed in brake circuit I (BBA I) of the brake system to limit the rear axle pressure (item 15 in the brake system).



- Whenever the brake and compressed air system is examined, or on replacing valves, the setting value of the pressure limiting valve must be checked.
- When the valve is replaced, the pressure must be set to the specified value.

For setting and measured values, refer to item 11.11.

- The correct setting value can be obtained on valve (1) by turning the setscrew (2).

11.8 Automatic anti-lock system (ABV) - Maintenance**)

The indicator lamps in the instrument panel enable checking of the function during driving operation.

- Check sensors for correct fit, electrical cables for correct installation, damage, kinks and chafing.
- Check electrical plug-and-socket connectors.
- Have the ABV system (electronic system) checked by a specialist workshop.

NOTE **Various components of the ABV system are used for ABV control as well as for gearbox control. The components are also installed if the vehicle is not equipped with an ABV system.**

DANGER **Faulty components may lead to gearbox malfunctions.**

**) Optional equipment

11.9 Engine brake

For a functional check of the engine brake, the brake-air pressure in the brake system must be at least 8 bar.

11.9.1 Functional test of the engine brake

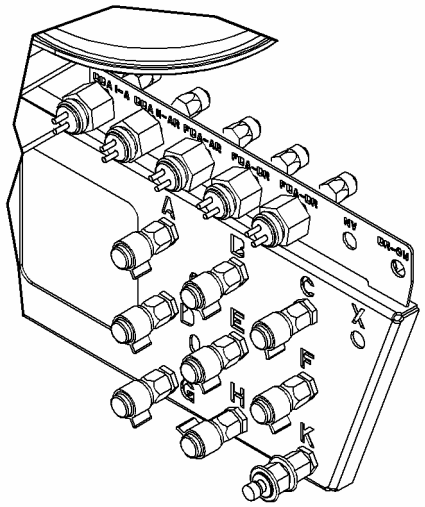
For precise instructions regarding the checks for proper function, good condition and setting of the engine brake, please refer to the brochure of the engine manufacturer.

11.10 Test connectors for inspection of the compressed air brake system

The brake system must be checked according to the testing instructions by the brake service workshop as required by the legal provisions of the country in question (in FRG: "special brake inspection service" pursuant to § 29 StVZO). To this effect, a portable tester is required.

Test panel, connectors A - X behind the 5th axle on the right.

NOTE **After the inspection has been completed, make sure that the test connectors are closed by means of the appropriate protective caps.**



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Item	Scope of test and inspection work
A	Supply line connecting the air compressor to the four-circuit protection valve (feed line)
B	Brake-air pressure, service brake circuit I (BBA I).
C	Brake-air pressure, service brake circuit II (BBA II).
D	Brake-air pressure, auxiliary and parking brake (HBA/FBA).
E	Brake-air pressure, auxiliary equipment (NVA).
F	Control line pressure, service brake circuit I (BBA I) (3rd, 4th and 5th axles) upstream the pressure limiting valve (non-reduced).
G	Brake cylinder pressure, air accumulator cylinder, 2nd axle.
H	Brake cylinder pressure, air accumulator cylinder, 4th and 5th axles.

NOTE **The air accumulator cylinders can be filled by means of the filler socket installed in the test panel as described under item B1-5.10.4.**

Test connectors on 2nd axle on the left and right, brake pressure, circuit II.
Test connectors on 3rd and 5th axles on the left and right, brake pressure, circuit I.
Test connector below the air drier, switch-off and switch-on pressure of the pressure governor.
Test connector between the 1st and 2nd axles on the right of the 20 l tank for secondary equipment, brake-air pressure.

Test and setting values of the brake and compressed air system, refer to item 11.11.

11.11 Test and setting values

When replacing valves and pressure switches and in the scope of the regular inspection operations - pursuant to the specific regulations of the country where the machine is to be registered - the following pressure settings must be checked or re-set.

11.11.1 Brakes

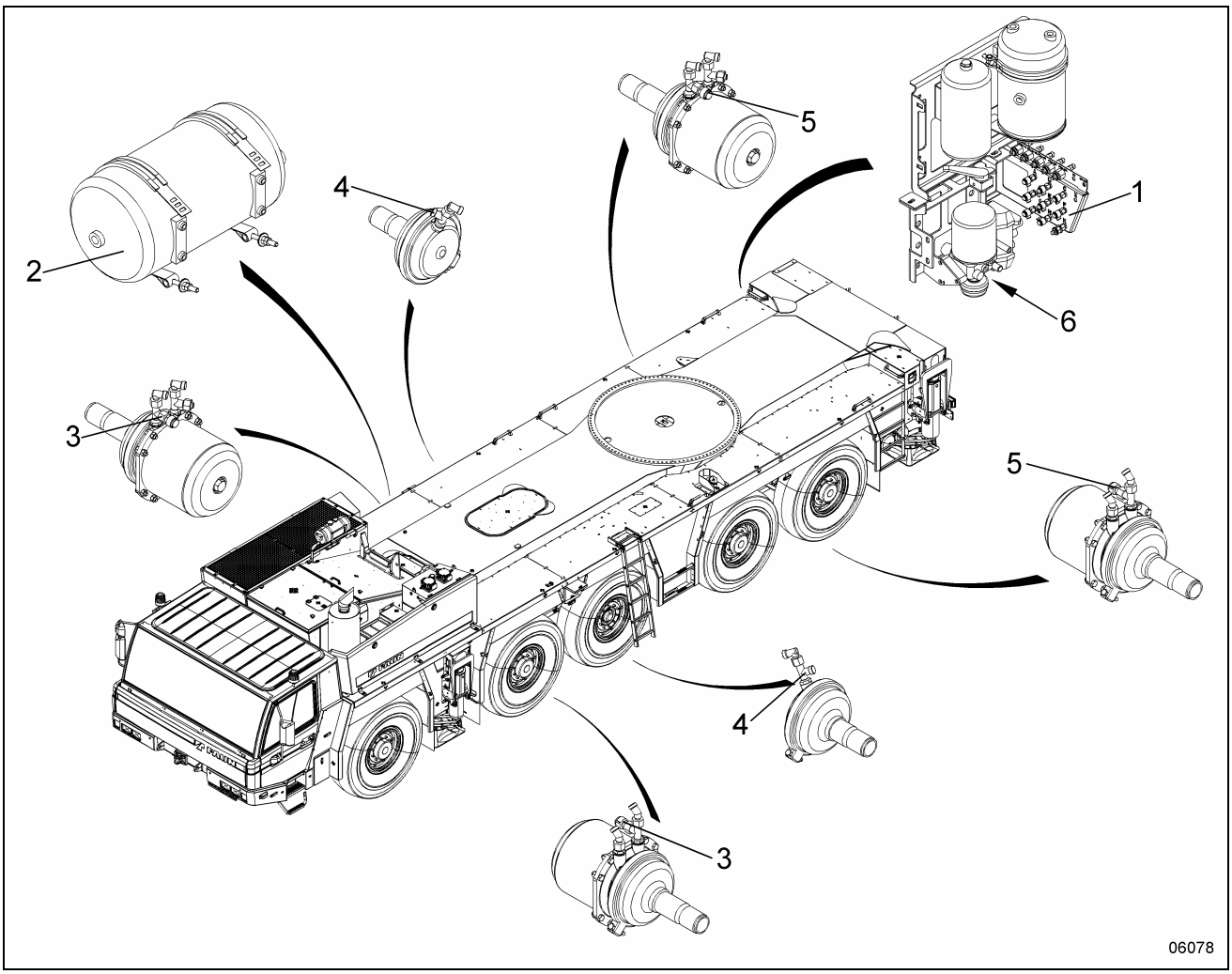
Valve / pressure switch	Inspection	Measuring connector	Measured value
Pressure governor			
Switch-off pressure:	Fill empty brake system until switch-off pressure is reached.	Test connector on air drier.	**11.7 -12.3 bar**
Switch-on pressure:	Reduce pressure in brake system until it is replenished.	Test connector on air drier.	**10.0 -11.0 bar**
Pressure limitation			
Service pressure:	1st and 2nd circuits	Test panel connectors B and C	**9.8 -10.2 bar**
	3rd and 4th circuits	D and E	**8.1 -8.5 bar**
Pressure switch			
***Operating pressure*:**	Fill empty brake system. The warning lamp "service and parking brake" and the warning lamp "parking brake" in the instrument panel must go out.	Test panel, connectors B, C, D, G and H	**5,5 ± 0.5 bar**
Pressure limiting valve			
Setting value:	Actuate service brake (depress brake pedal completely).	Test panel: Connector F	**≥ 8.0 bar**
		Test connectors on the brake cylinders of axles 3, 4 and 5	**7.0 -7.2 bar**

10.12 Location of the measuring and test connectors

Measuring connectors are provided in easily accessible locations of the vehicle to enable the functional inspection of the brake and compressed air system.
The locations of the measuring connectors on the vehicle are shown in the following illustration.

Designations and functions of the measuring and test connectors:

1 = Test panel, connectors A - X behind the 5th axle on the right (assignment, see item C1-11.10).
2 = Test connector, auxiliary equipment 20l compressed air tank between 1st and 2nd axles on the right.
3 = Test connector, brake cylinders of 2nd axle, right-hand and left-hand.
4 = Test connector, brake cylinders of 3rd axle, right-hand and left-hand.
5 = Test connector, brake cylinders of 5th axle, right-hand and left-hand.
6 = Test connector below the air drier, switch-off and switch-on pressure of the pressure governor.



12 Electrical equipment

Attention **When work is effected at the electrical equipment of the chassis, the current circuit must be interrupted by disconnecting the negative terminal "-" cable from the batteries (marked with a minus sign [-] on the battery).**
Never disconnect the batteries while the engine is running. This might destroy electronic components.

12.1 Batteries

DANGER **When checking the acid level, do not smoke; do not use open flames!**
Due to chemical reactions, batteries emit highly explosive hydrogen gas!
Spilled battery acid must not touch the skin, the clothes or the vehicle's paint. Battery acid may cause injuries. Wear protective glasses!
If acid has got on your skin or in your eyes, wash these areas immediately with ample quantities of tap water and, if necessary, consult a doctor!

Attention **Used batteries must be disposed of according to the regulations.**

The batteries are located behind the lateral cover in the battery box on the vehicle's platform, on the left, behind the driver's cab. If the vehicle operates under normal conditions, the batteries require only little maintenance.
A well-charged battery helps improve the starting process and has a longer service life.

- The acid level must be checked at regular intervals (visual inspection). The acid level must be approx. 10 to 15 mm above the top edge of the cells.
- Only top up distilled or demineralized water. After replenishing, wait approx. 30 minutes, then check the acid.
- The acid density in the individual cells must be measured using an acidimeter.

NOTE **Discharge batteries freeze at -10°C.**

12.1.1 Specific gravity and charge condition of the battery at an acid temperature of +20°C

Specific gravity		Volts per cell	Charge condition of battery
Normal	Tropics	at test instrument	
1.28	1.23	2.4	charged
1.20	1.12	2.0	semi-discharged; re-charge
1.12	1.08	1.75	discharged - recharge immediately

NOTE **When the vehicle is to be used under tropical climate conditions, it is essential to take the fluctuations of the acid density into consideration. During the charging process, the acid temperature must be monitored continuously.**

- During the cold season, a good charging condition must be permanently ensured. If the vehicle is standing for an extended period of time, the batteries must be re-charged.
- The charging current must not exceed 1/10 of the battery capacity.
- The connecting terminals must be greased with acid-free and acid-resistant grease (e.g. Vaseline).
- Due to the danger of short circuits, parts conducting current, such as tools, etc., must not be placed on the batteries.
- If the battery charging pilot lamp does not go out at increased engine speed, this indicates that the batteries are not charged. Find out the reason immediately (e.g. governor or alternator).

12.1.2 Installation of new batteries

- When **installing** new batteries, **first** connect **the positive cable (+)**, and then the negative cable (-).
- For **removal**, **reverse sequence** of installation operations.

12.1.3 Starting the engine by means of jumper cables

Should the engine fail to start due to an uncharged battery, the engine can be started with energy supplied by the batteries of another vehicle, by means of a jumper cable. However, only jumper cables provided specifically to this effect with a sufficient cable cross section may be used for this starting process.
The two vehicles must be equipped with 24V systems. The total capacity (Ah) of the starter batteries must not be essentially lower.
To avoid any current conduction between the vehicles, these must not be in connection in any way.
The batteries must be connected to the vehicle's electrical systems as specified.
The jumper cables must be connected by the following sequence of operations:

- Start the engine of the vehicle supplying power and make it run at medium speed level.
- Connect one end of the positive cable (+) to the positive terminal (+) of the discharged battery. Connect the other end of the cable to the positive terminal (+) of the battery of the vehicle supplying power. The plus (+) and minus (-) signs are marked on the battery.
- Connect one end of the negative cable (-) to the negative terminal (-) of the discharged battery. The other end of the cable must be connected to the negative terminal (-) of the battery of the vehicle supplying power. The plus (+) and minus (-) signs are marked on the battery.
- Now start the engine of the vehicle to be started by an external power source, as described under item B1-4, 4.5.
- After starting the engine, disconnect the jumper cables again.

DANGER **Do not touch the metallic parts of the cable clamps and make sure that the positive cable (+) does not touch any metallic part of the vehicle's body.**

12.2 Three-phase generator

The service life of the three-phase generator depends considerably on the bearings. Thus, make sure that the Vee belts have always the proper tension (refer to Operating Manual of the engine manufacturer).

- The generator should be checked in a specialist workshop at regular intervals. In case of operation in very dusty ambient conditions or at high ambient temperatures, the inspection should take place correspondingly earlier.
- Operate the generator only when the batteries are connected.
- When connecting the batteries, pay attention to correct polarity, as incorrect connection might destroy the diodes in the generator.
- Make sure that the batteries are disconnected and that the engine is not running when assembly work is performed which involves live components (precaution)!
- Tipping against the mass in order to find out whether voltage is "on" is not admissible.
- Pre-excitation of the generator is effected from the batteries via the battery charging pilot lamp. To ensure correct excitation, a defective battery charging pilot lamp must be replaced immediately.

12.3 Starter

Refer to the instructions of the engine manufacturer.

12.4 Lamps and lights

Defective lamps, indicator and warning lights must be replaced immediately. Make sure to use lamps having the same wattage.

12.4.1 Mounting location, voltage/wattage and designation of the lamps and lights in the chassis

Mounting location	DIN	Design	Power
Main headlights	72601	H 4	24V 75/70W
Parking light	72601	R19/5	24V 5W
Front flasher lamps	72601	P25-1	24V 21W
Rear flasher lamps	72601	P21W	24V 21W
Stop lights	72601	P21W	24V 21W
Rear fog light	72601	P21W	24V 21W
Reversing light	72601	P21W	24V 21W
Fog lights	72601	YC	24V 70W
Rear lamps	72601	R10W	24V 10W
Lateral lights, rear	72601	R10W	24V 10W
Cab roof, bordering lights	72601	R19/10	24V 10W
Driver's cab, ceiling lamp	72601	K	24V 10W
Instrument panel - switch lighting	72601	W5/1.2	24V 1.2W
Instrument panel - indicator lamps	72601	W5/1.2	24V 1.2W
Rotary beacon	72601	H1	24V 70W
Tachometer lighting	72601	W10/3	24V 3W
Lighting of revolution counter	72601	W10/3	24V 3W
Rear light	72601	R5W	24V 5W
Working floodlight on the outriggers	72601	H3	24V 70W

Memo:

12.5 Fuse / relay arrangement

The fuse box is installed in the driver's cab, on the right side of the instrument panel.

DANGER **Before replacing any defective fuses, turn the ignition off. Replace defective fuses only by fuses having the same power rating. Do never use a jumper wire or a similar device.**

Fuse arrangement		
F001 = CMV Chassis- Superstructure	F020 = ABV**)	F039 = free
F002 = Node D001 Node D002	F021 = ABV-Trailer**)	F040 = Generator G+ Tachometer
F003 = Node D003 Node D004	F022 = Gearbox set to „neutral“	F041 = ADM electronics
F004 = Node D005 Node D006	F023 = Immobilizer**)	F042 = Diagnostic connector
F005 = Node D007 Node D008	F024 = Gearbox	F043 = Gearbox Starter interlock
F006 = Node D016 Node D015 Node D017	F025 = Bordering lights Rear lights License plate lamps Parking light, LH	F044 = ABV
F007 = Direction indicators	F026 = Instrument illumination Bordering lights Rear lights License plate lamps Parking light, RH	F045 = ABV
F008 = Wiper, washer Electric horn Super-tone horn**)	F027 = Additional bordering light Lateral light, crane	F046 = ABV-Trailer**)
F009 = Stop lights Air drier	F028 = Dimmed light, left-hand Relay, fog-light**)	F047 = Immobilizer**) Tachograph
F010 = Reversing light Centralized lubrication system	F029 = Dimmed light, right-hand	F048 = Tachograph Radio Voltage reduction device 24/12 V
F011 = Indicator lamps Relays Tachometer	F030 = High-beam light, left-hand	F049 = Supplementary heater unit **)
F012 = Heater fan Supplementary heater unit **)	F031 = High-beam light, right-hand Indicator lamp, high-beam light	F050 = Supplementary heater unit **) Fan (relay) **)
F013 = MR electronics ADM electronics	F032 = Air conditioning**)	F051 = Battery main switch
F014 = free	F033 = Trailer plugbox**) Plugbox (24V)	F052 = Steering computer
F015 = Diagnostic connector	F034 = Hazard warning flasher lamp	F053 = Emergency switch, front axle steering
F016 = Trailer plugbox**)	F035 = Rotary beacon	F054 = Steering computer
F017 = Intarder	F036 = Fog lights**) Rear fog light Cab light Headlamp flasher	F055 = Hand-operated intarder switch Eddy-current brake**) Radiomodem**)
F018 = Mirror heating system Adjustment of rearview mirrors Refrigerator box **) (24V)	F037 = free	F056 = Working floodlight
F019 = free	F038 = Intarder	99707782081/V/0106

ABV = Automatic anti-lock system MR / ADM = Electronic system, engine CMV = Colour display

**) Optional equipment

(cont'd.): **12.5 Fuse / relay arrangement**

The relay panels are installed in the driver's cab, on the right side of the instrument panel.

A 131a	A130a
K 726 Ignition, chassis ON	K 036 CMV supply

Relay arrangement		
K 024**) = Eddy-current brake	K 041 = Door contact switch	V 626 = Diode group
K 023**) = Eddy-current brake	K 008 = Rear fog light	V 632 = Emergency control
K 409 = Axle oscillation	K 006 = Fog lights	V 504 = Steering
K 025**) = Eddy-current brake	K 013 = Battery main switch	V 503 = Steering
K 026**) = Eddy-current brake	K 004 = Generator D+	V 502 = Steering
K 027**) = Eddy-current brake shut-off feature	K 002 = Wiper interval	V 501 = Steering
K 720 = Engine stop (stalling device)	K 042 = Brake light	K 652**) = Diagnosis
K 719 = Engine stop (stalling device)	K 047 = Service brake	K 653**) = Diagnosis
K 061 = Central warning, chassis	K 007 = High-beam light / headlamp flashers	K 533 = Malfunction, steering; 4th axle
K 030 = Working speed	K 040 = Holding circuit, NES	K 532 = Malfunction, steering; 5th axle
K 731**) = Lighting from superstructure	V 004 = CMV supply	K 531 = Power supply, steering computer, 5th axle
K 730**) = Lighting from superstructure	K 015**) = Eddy-current brake	K 521 = Buzzer
V 711 = Ignition, chassis	V 506**) = Group of diodes	K 511 = Speed limitation, 4th axle
K 101**) = ABV shut-off feature	K 316 = Engine brake	K 514**) = Front axle steering, left-hand
K 1W**)	K 067 = Working floodlight, right side	K 515**) = Front axle steering, right-hand
K 033 **) = Supplementary heater unit	K 066 = Working floodlight, left side	K 065**) = Automatic fan connection
K 725 = Engine speed regulation "+"	K 313 = Gearbox neutral	K 039**) = Air conditioning condenser
K 724 = Engine speed regulation "-"	K 311 = Gearbox, starter interlock	K 038**) = Air conditioner coupling
K 010 = Direction / hazard warning flasher transmitter	K 312 = Reversing light	K 037**) = Air conditioning system
V 003 = Buzzer	R 501 = Resistor, steering system	

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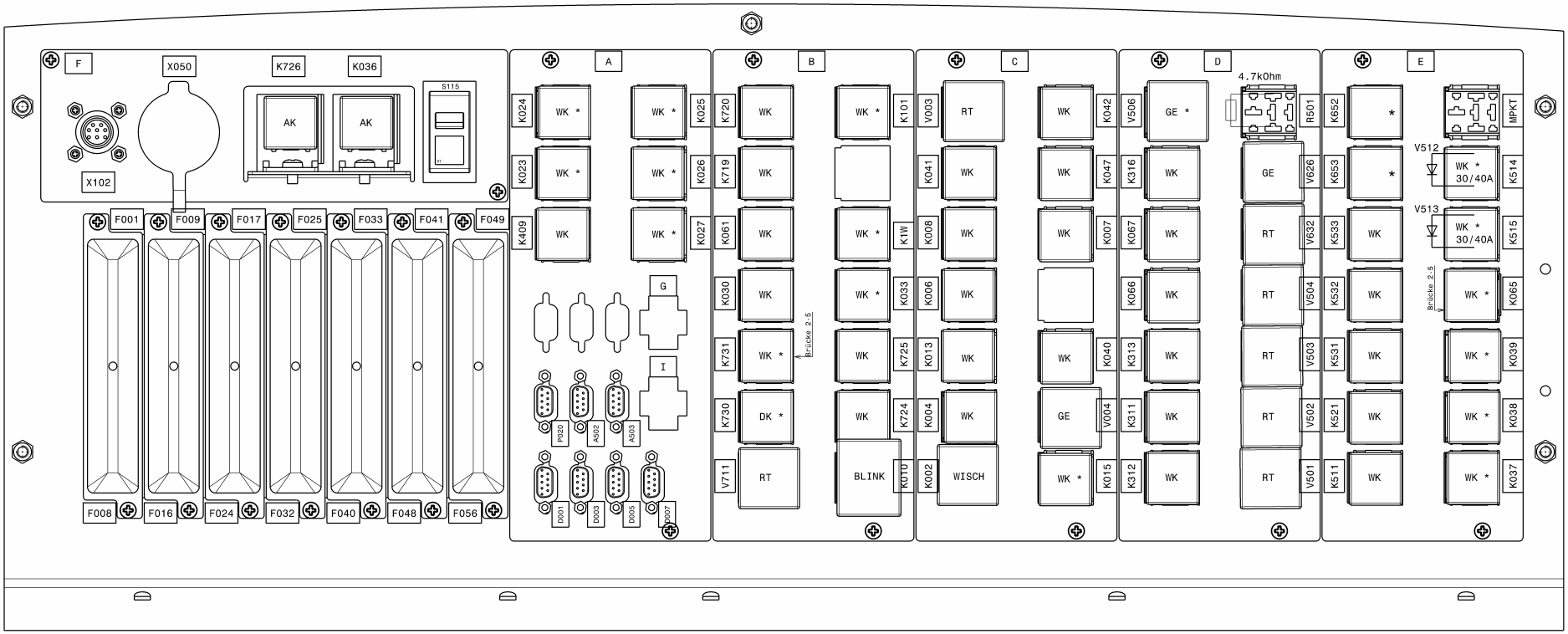
K = Relays, V = Diodes, R = Resistor; UW = Chassis, OW = Superstructure, VA = Front axle, VL = front, left-hand, VR = front, right-hand,
ABV = Automatic anti-lock system; CMV = Display, NES = Rear foglight.

**) Optional equipment

(cont'd.): **12.5 Fuse / relay arrangement**



Belegung der Sicherungsdosen

	F001	10A
	F002	10A
	F003	10A
	F004	10A
	F005	10A
	F006	10A
	F007	7.5A
	F008	10A

	F009	10A
	F010	10A
	F011	5A
	F012	15A
	F013	10A
-	F014	-
	F015	10A
	F016	7.5A

	F017	10A
	F018	10A
-	F019	-
	F020	5A
*	F021	5A
	F022	7.5A
*	F023	5A
	F024	10A

	F025	7.5A
	F026	7.5A
	F027	7.5A
	F028	10A
	F029	10A
	F030	10A
	F031	10A
*	F032	20A

	F033	10A
	F034	10A
	F035	15A
	F036	10A
-	F037	-
	F038	7.5A
-	F039	-
	F040	7.5A

	F041	10A
	F042	10A
	F043	10A
	F044	10A
	F045	10A
*	F046	25A
	F047	5A
	F048	15A

*	F049	20A
*	F050	5A
	F051	10A
	F052	10A
	F053	15A
	F054	10A
	F055	10A
	F056	15A

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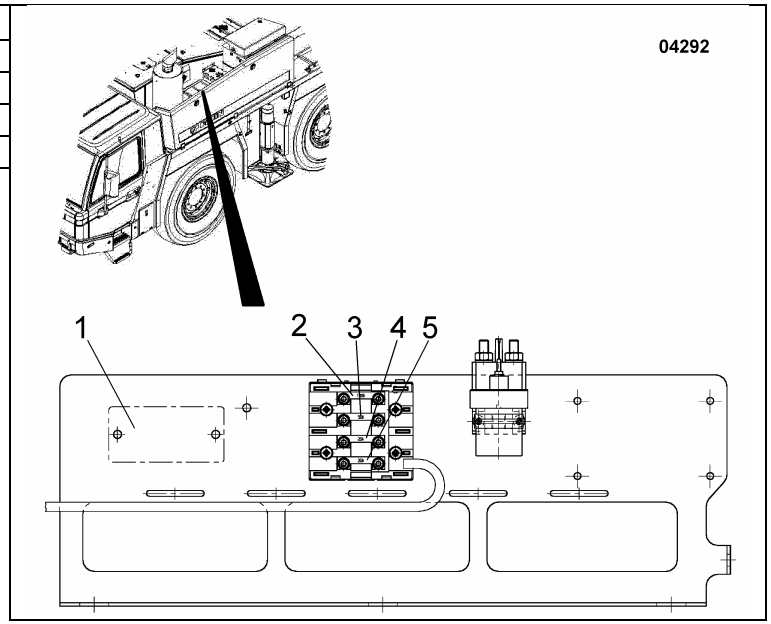
* = Sonderausrüstung

Belegung der Sicherungsdosen = Fuse arrangement; Sonderausrüstung = optional equipment

12.5.2 Fuses in battery box

1 = Eddy-current brake**)*)	**250 A**
2 = F 061 Fuse, charging plugbox**)	**25 A**
3 = F 058 Fuse, chassis frame	**25 A**
4 = F 059 Fuse, superstructure	**25 A**
5 = F 060 Fuse, driver's cabin	**50 A**



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**) Optional equipment

12 Electrical equipment

Attention **When work is effected at the electrical equipment of the chassis, the current circuit must be interrupted by disconnecting the negative terminal "-" cable from the batteries (marked with a minus sign [-] on the battery).**
Never disconnect the batteries while the engine is running. This might destroy electronic components.

12.1 Batteries

DANGER **When checking the acid level, do not smoke; do not use open flames!**
Due to chemical reactions, batteries emit highly explosive hydrogen gas!
Spilled battery acid must not touch the skin, the clothes or the vehicle's paint. Battery acid may cause injuries. Wear protective glasses!
If acid has got on your skin or in your eyes, wash these areas immediately with ample quantities of tap water and, if necessary, consult a doctor!

Attention **Used batteries must be disposed of according to the regulations.**

The batteries are located behind the lateral cover in the battery box on the vehicle's platform, on the left, behind the driver's cab. If the vehicle operates under normal conditions, the batteries require only little maintenance.
A well-charged battery helps improve the starting process and has a longer service life.

- The acid level must be checked at regular intervals (visual inspection). The acid level must be approx. 10 to 15 mm above the top edge of the cells.
- Only top up distilled or demineralized water. After replenishing, wait approx. 30 minutes, then check the acid.
- The acid density in the individual cells must be measured using an acidimeter.

NOTE **Discharge batteries freeze at -10°C.**

12.1.1 Specific gravity and charge condition of the battery at an acid temperature of +20°C

Specific gravity		Volts per cell	Charge condition of battery
Normal	Tropics	at test instrument	
1.28	1.23	2.4	charged
1.20	1.12	2.0	semi-discharged; re-charge
1.12	1.08	1.75	discharged - recharge immediately

NOTE **When the vehicle is to be used under tropical climate conditions, it is essential to take the fluctuations of the acid density into consideration. During the charging process, the acid temperature must be monitored continuously.**

- During the cold season, a good charging condition must be permanently ensured. If the vehicle is standing for an extended period of time, the batteries must be re-charged.
- The charging current must not exceed 1/10 of the battery capacity.
- The connecting terminals must be greased with acid-free and acid-resistant grease (e.g. Vaseline).
- Due to the danger of short circuits, parts conducting current, such as tools, etc., must not be placed on the batteries.
- If the battery charging pilot lamp does not go out at increased engine speed, this indicates that the batteries are not charged. Find out the reason immediately (e.g. governor or alternator).

12.1.2 Installation of new batteries

- When **installing** new batteries, **first** connect **the positive cable (+)**, and then the negative cable (-).
- For **removal**, **reverse sequence** of installation operations.

12.1.3 Starting the engine by means of jumper cables

Should the engine fail to start due to an uncharged battery, the engine can be started with energy supplied by the batteries of another vehicle, by means of a jumper cable. However, only jumper cables provided specifically to this effect with a sufficient cable cross section may be used for this starting process.
The two vehicles must be equipped with 24V systems. The total capacity (Ah) of the starter batteries must not be essentially lower.
To avoid any current conduction between the vehicles, these must not be in connection in any way.
The batteries must be connected to the vehicle's electrical systems as specified.
The jumper cables must be connected by the following sequence of operations:

- Start the engine of the vehicle supplying power and make it run at medium speed level.
- Connect one end of the positive cable (+) to the positive terminal (+) of the discharged battery. Connect the other end of the cable to the positive terminal (+) of the battery of the vehicle supplying power. The plus (+) and minus (-) signs are marked on the battery.
- Connect one end of the negative cable (-) to the negative terminal (-) of the discharged battery. The other end of the cable must be connected to the negative terminal (-) of the battery of the vehicle supplying power. The plus (+) and minus (-) signs are marked on the battery.
- Now start the engine of the vehicle to be started by an external power source, as described under item B1-4, 4.5.
- After starting the engine, disconnect the jumper cables again.

DANGER **Do not touch the metallic parts of the cable clamps and make sure that the positive cable (+) does not touch any metallic part of the vehicle's body.**

12.2 Three-phase generator

The service life of the three-phase generator depends considerably on the bearings. Thus, make sure that the Vee belts have always the proper tension (refer to Operating Manual of the engine manufacturer).

- The generator should be checked in a specialist workshop at regular intervals. In case of operation in very dusty ambient conditions or at high ambient temperatures, the inspection should take place correspondingly earlier.
- Operate the generator only when the batteries are connected.
- When connecting the batteries, pay attention to correct polarity, as incorrect connection might destroy the diodes in the generator.
- Make sure that the batteries are disconnected and that the engine is not running when assembly work is performed which involves live components (precaution)!
- Tipping against the mass in order to find out whether voltage is "on" is not admissible.
- Pre-excitation of the generator is effected from the batteries via the battery charging pilot lamp. To ensure correct excitation, a defective battery charging pilot lamp must be replaced immediately.

12.3 Starter

Refer to the instructions of the engine manufacturer.

12.4 Lamps and lights

Defective lamps, indicator and warning lights must be replaced immediately. Make sure to use lamps having the same wattage.

12.4.1 Mounting location, voltage/wattage and designation of the lamps and lights in the chassis

Mounting location	DIN	Design	Power
Main headlights	72601	H 4	24V 75/70W
Parking light	72601	R19/5	24V 5W
Front flasher lamps	72601	P25-1	24V 21W
Rear flasher lamps	72601	P21W	24V 21W
Stop lights	72601	P21W	24V 21W
Rear fog light	72601	P21W	24V 21W
Reversing light	72601	P21W	24V 21W
Fog lights	72601	YC	24V 70W
Rear lamps	72601	R10W	24V 10W
Lateral lights, rear	72601	R10W	24V 10W
Cab roof, bordering lights	72601	R19/10	24V 10W
Driver's cab, ceiling lamp	72601	K	24V 10W
Instrument panel - switch lighting	72601	W5/1.2	24V 1.2W
Instrument panel - indicator lamps	72601	W5/1.2	24V 1.2W
Rotary beacon	72601	H1	24V 70W
Tachometer lighting	72601	W10/3	24V 3W
Lighting of revolution counter	72601	W10/3	24V 3W
Rear light	72601	R5W	24V 5W
Working floodlight on the outriggers	72601	H3	24V 70W

Memo:

12.5 Fuse / relay arrangement

The fuse box is installed in the driver's cab, on the right side of the instrument panel.

DANGER **Before replacing any defective fuses, turn the ignition off. Replace defective fuses only by fuses having the same power rating. Do never use a jumper wire or a similar device.**

Fuse arrangement		
F001 = CMV Chassis- Superstructure	F020 = ABV**)	F039 = free
F002 = Node D001 Node D002	F021 = ABV-Trailer**)	F040 = Generator G+ Tachometer
F003 = Node D003 Node D004	F022 = Gearbox set to „neutral“	F041 = ADM electronics
F004 = Node D005 Node D006	F023 = Immobilizer**)	F042 = Diagnostic connector
F005 = Node D007 Node D008	F024 = Gearbox	F043 = Gearbox Starter interlock
F006 = Node D016 Node D015 Node D017	F025 = Bordering lights Rear lights License plate lamps Parking light, LH	F044 = ABV
F007 = Direction indicators	F026 = Instrument illumination Bordering lights Rear lights License plate lamps Parking light, RH	F045 = ABV
F008 = Wiper, washer Electric horn Super-tone horn**)	F027 = Additional bordering light Lateral light, crane	F046 = ABV-Trailer**)
F009 = Stop lights Air drier	F028 = Dimmed light, left-hand Relay, fog-light**)	F047 = Immobilizer**) Tachograph
F010 = Centralized lubrication system	F029 = Dimmed light, right-hand	F048 = Radio Voltage reduction device 24/12 V
F011 = Indicator lamps Relays Tachometer	F030 = High-beam light, left-hand	F049 = Supplementary heater unit **)
F012 = Heater fan Supplementary heater unit **)	F031 = High-beam light, right-hand Indicator lamp, high-beam light	F050 = Supplementary heater unit **) Fan (relay) **)
F013 = MR electronics ADM electronics	F032 = Air conditioning**)	F051 = Battery main switch
F014 = free	F033 = Trailer plugbox**) Plugbox (24V)	F052 = Steering computer
F015 = Diagnostic connector	F034 = Hazard warning flasher lamp	F053 = Emergency switch, front axle steering
F016 = Trailer plugbox**)	F035 = Rotary beacon	F054 = Steering computer
F017 = Intarder	F036 = Fog lights**) Rear fog light Cab light Headlamp flasher	F055 = Hand-operated intarder switch Eddy-current brake**) Radiomodem**)
F018 = Mirror heating system Adjustment of rearview mirrors Refrigerator box **) (24V)	F037 = free	F056 = Working floodlight
F019 = Reversing light**)	F038 = Intarder	99707782081/X/0306

ABV = Automatic anti-lock system MR / ADM = Electronic system, engine CMV = Colour display

**) Optional equipment

(cont'd.): **12.5 Fuse / relay arrangement**

The relay panels are installed in the driver's cab, on the right side of the instrument panel.

A 131a	A130a
K 726 Ignition, chassis ON	K 036 CMV supply

Relay arrangement		
K 024**) = Eddy-current brake	K 041 = Door contact switch	V 626 = Diode group
K 023**) = Eddy-current brake	K 008 = Rear fog light	V 632 = Emergency control
K 409 = Axle oscillation	K 006 = Fog lights	V 504 = Steering
K 025**) = Eddy-current brake	K 013 = Battery main switch	V 503 = Steering
K 026**) = Eddy-current brake	K 004 = Generator D+	V 502 = Steering
K 027**) = Eddy-current brake shut-off feature	K 002 = Wiper interval	V 501 = Steering
K 720 = Engine stop (stalling device)	K 042 = Brake light	K 652**) = Diagnosis
K 719 = Engine stop (stalling device)	K 047 = Service brake	K 653**) = Diagnosis
K 061 = Central warning, chassis	K 007 = High-beam light / headlamp flashers	K 533 = Malfunction, steering; 4th axle
K 030 = Working speed	K068**) = Reversing light	K 532 = Malfunction, steering; 5th axle
K 731**) = Lighting from superstructure	K 040 = Holding circuit, NES	K 531 = Power supply, steering computer, 5th axle
K 730**) = Lighting from superstructure	V 004 = CMV supply	K 521 = Buzzer
V 711 = Ignition, chassis	K 015**) = Eddy-current brake	K 511 = Speed limitation, 4th axle
K 101**) = ABV shut-off feature	V 506**) = Group of diodes	K 514**) = Front axle steering, left-hand
V010**) = Reversing light	K 316 = Engine brake	K 515**) = Front axle steering, right-hand
K 1W**)	K 067 = Working floodlight, right side	K 065**) = Automatic fan connection
K 033 **) = Supplementary heater unit	K 066 = Working floodlight, left side	K 039**) = Air conditioning condenser
K 725 = Engine speed regulation "+"	K 313 = Gearbox neutral	K 038**) = Air conditioner coupling
K 724 = Engine speed regulation "-"	K 311 = Gearbox, starter interlock	K 037**) = Air conditioning system
K 010 = Direction / hazard warning flasher transmitter	K 312 = Reversing light	
V 003 = Buzzer	R 501 = Resistor, steering system	

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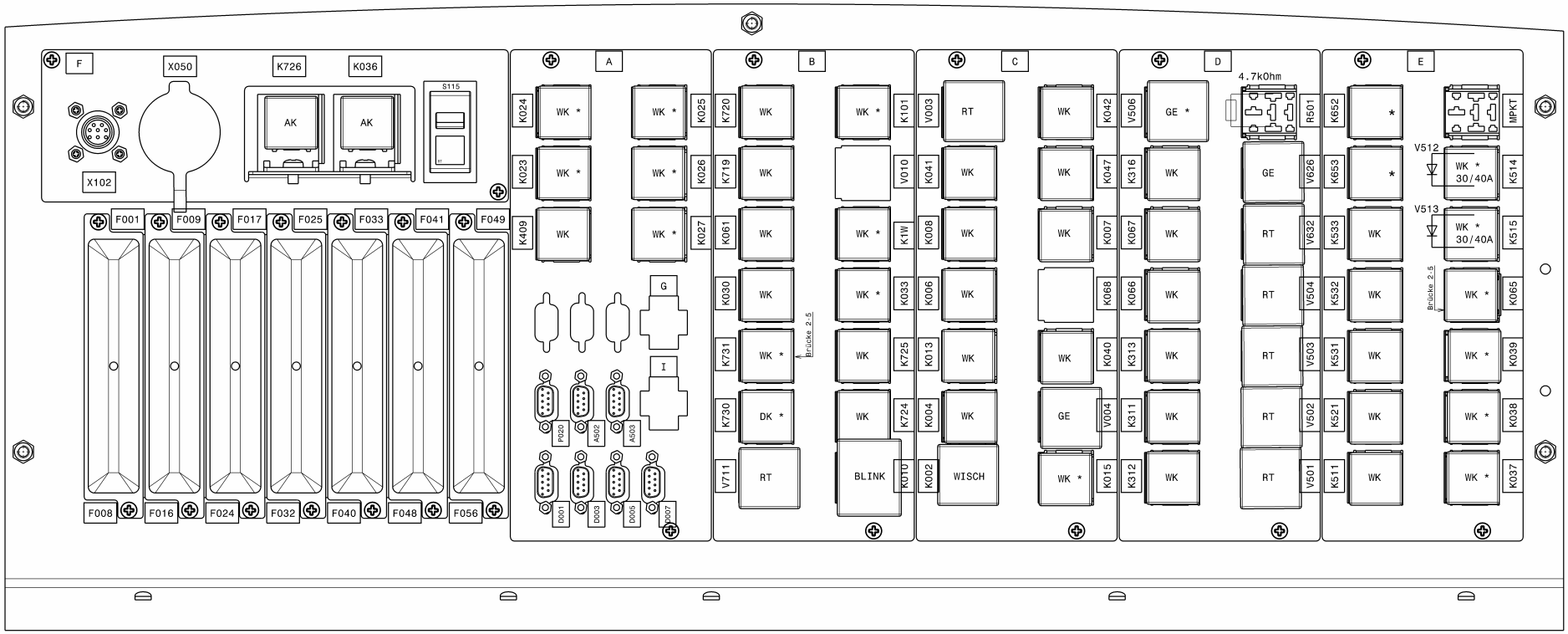
K = Relays, V = Diodes, R = Resistor; UW = Chassis, OW = Superstructure, VA = Front axle, VL = front, left-hand, VR = front, right-hand,
ABV = Automatic anti-lock system; CMV = Display, NES = Rear foglight.

**) Optional equipment

(cont'd.): **12.5 Fuse / relay arrangement**



V010,K068: Option Rückfahrscheinw. a. Außenspiegeln f. nachträglichen Einbau!

Belegung der Sicherungsdosen

	F001	10A		F009	10A		F017	10A		F025	7.5A		F033	10A		F041	10A	*	F049	20A
	F002	10A		F010	10A		F018	10A		F026	7.5A		F034	10A		F042	10A	*	F050	5A
	F003	10A		F011	5A	*	F019	10A		F027	7.5A		F035	15A		F043	10A		F051	10A
	F004	10A		F012	15A		F020	5A		F028	10A		F036	10A		F044	10A		F052	10A
	F005	10A		F013	10A	*	F021	5A		F029	10A	-	F037	-		F045	10A		F053	15A
	F006	10A	-	F014	-		F022	7.5A		F030	10A		F038	7.5A	*	F046	25A		F054	10A
	F007	7.5A		F015	10A	*	F023	5A		F031	10A	-	F039	-		F047	5A		F055	10A
	F008	10A		F016	7.5A		F024	10A	*	F032	20A		F040	7.5A		F048	15A		F056	15A

* = Sonderausrüstung

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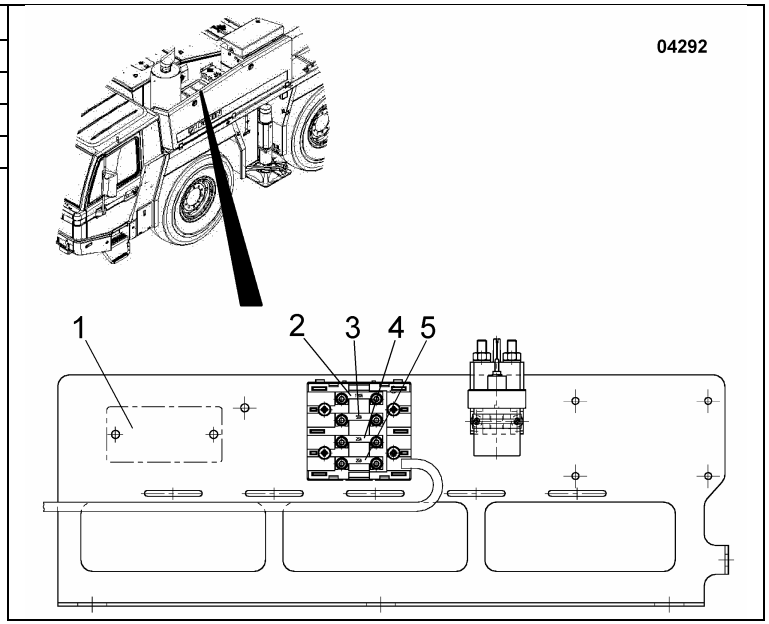
Belegung der Sicherungsdosen = Fuse arrangement; Sonderausrüstung = optional equipment

12.5.2 Fuses in battery box

1 = Eddy-current brake**)*)	**250 A**
2 = F 061 Fuse, charging plugbox**)	**25 A**
3 = F 058 Fuse, chassis frame	**25 A**
4 = F 059 Fuse, superstructure	**25 A**
5 = F 060 Fuse, driver's cabin	**50 A**



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**) Optional equipment

13 Wheels and tires

DANGER **The wheel is an important safety component at the vehicle and must be checked at regular intervals** with regard to:

- lateral or vertical movement of the rim,
- wear and deterioration of the tires,
- tire pressure,
- toe-in,
- parallelism of the wheels (immediately in case of a deficiency), racks in the rim and the wheel nave,
- traces of corrosion,
- damaged wheel bolts or wheel nuts,
- deformation of rims,
- tight fit of wheel nuts etc.

NOTE **Refer also to chapter B0, item 1.1 „Important instructions regarding the load ratings of tires depending on the maximum travelling speeds and the stress to which the rims are subject“.**

13.1 Measures to be taken to avoid accidents caused by the wheels

- Check the wheels for good condition and wear.
- When the vehicle operates under heavy load, it might be necessary to reduce the intervals specified in the maintenance schedule.
- Do not repair or weld damaged wheels, misshapen and broken rims and bolt boreholes.
- Re-paint rim to prevent the development of corrosion and tension cracks.
- The surface protection of the rim must be checked and, if necessary, renewed at certain intervals and when a tire is mounted.
- Whenever tires are mounted, clean the rims to remove corrosion, dirt and rubber residues and provide the rims with a new protective paint.

DANGER **In order to avoid severe accidents, make sure that only parts of the same make, the same system and the same size are combined. Pay attention to the marked identification figures.**

13.2 Checking the wheel nuts on the disc wheel for tight fit

- Wheel nuts of recently mounted wheels must be checked for tight fit repeatedly, according to the maintenance schedule, until all nuts remain evenly tightened.
- Re-tighten wheel nuts vigorously, without applying force.

NOTE **Make sure to tighten the wheel nuts in crosswise order. Use a torque wrench.**
Do not damage the threads of the wheel bolts.

DANGER **In order to prevent the wheels from getting loose due to subsiding and abrasion of the painted contact surfaces, which would result in ovalization of the rim holes or in breaking of the wheel bolts, make sure that the wheel nuts are checked for tight fit at regular intervals.**

13.3 Tightening torque of wheel nuts (with thrust plate)

Wheel nuts M22x1.5, blackened with phosphorus = 650 Nm.

13.4 Tire pressure

Check the tire pressure at regular intervals, according to the maintenance schedule. It is possible to inflate tires via the tire inflation socket on the pressure governor (for further details, refer to item C1-11.3.1). The tire inflating pressures are specified in part "A", item 2.7.3.

13.5 Replacement of a disc wheel

DANGER **Two persons should perform mounting and moving the wheels (weight of wheel and tire approx. 300 kg). Risk of accidents !**

- Park the vehicle.
- Actuate the parking brake.
- Gearbox set to „Neutral“.
- Shut off the engine.
- Prevent the vehicle from rolling away by placing wheel chocks under the wheels.
- After a case of damage, which might cause an accident hazard when removing the wheel, check the tire, rim and hub.
- Release wheel nuts by approx. 2 turns.
- Jack-up the axle - e.g. by supporting the chassis by outriggers - until the tire has some ground clearance.
- Unscrew the wheel nuts, remove the wheel from the hub and put it down, without laying it on the ground.
- Clean wheel hub, bolts, nuts and contact surfaces of wheel; check them for wear and deficiencies.
- Replace defective components. **Use only genuine TADANO-FAUN spare parts**!

NOTE **To facilitate mounting, the wheel can be lifted to the level of the wheel hub by means of appropriate equipment, e.g. a forklift truck.**

- Check new wheel for proper working order, then position it on the hub.
- Do not damage the threads of the wheel bolts.
- Screw-on the wheel nuts so that they are uniformly applied; then tighten them to the specified torque using a torque wrench.
- If necessary, check tire inflating pressure.
- Set vehicle in driving condition. If necessary, perform leveling as described under item B1-4.7.2.
- Check wheel nuts for tight fit at regular intervals according to the maintenance schedule.

13.6 Interchanging wheels in view of tire wear

To ensure a uniform wear pattern on all tires, it is recommended to interchange the wheels of the vehicle. This exchange is due as soon as an irregular wear pattern is visible. In this context, intervals ranging from 5,000 to 10,000 km have proved to be useful.

The wheels should be interchanged cross-wise, i.e. to the other side of the vehicle, and the locations should be selected so that tires with a uniform wear pattern are mounted in locations showing an irregular wear pattern.

These measures enhance the driving comfort and the service life of the tires.

14 Outriggers

The sliding surfaces of the outrigger beams and the support of the outrigger float in the outrigger cylinder must be cleaned and lubricated with multi-purpose grease at regular intervals. To this effect, remove the cover (10).

14.2 Inspection and, if necessary, adjustment of the slide pieces and slideway liners

The backlash of the outriggers is adjusted by means of two slide pieces and five slideway liners.
Support outriggers according to item B1-6.

14.2.1 Outrigger beams (B)

The outrigger beams B are adjusted via the four slideway liners (1) and (2).

- The outriggers are extended completely; the engine in the chassis has been stopped, the parking brake is engaged.
- Check dimension (S1); if the backlash exceeds 3 mm, it must be readjusted.
- Release lock nuts; readjust slideway liners (2) until the backlash (S1) is lower than 3 mm. Re-tighten the lock nuts.
- Remove the covers from the opposite side of the vehicle.
- Retract the outriggers completely.
- Release the lock nuts, readjust the slideway liners (1) until the outrigger beam is extended and retracted speedily, without getting seized.

14.2.2 Outrigger beam (C)

- The outrigger beam (B) has been adjusted.

The outrigger beam (C) is adjusted via one slideway liner (3) and two slide pieces (4).
- The outriggers are extended completely; the engine in the chassis has been stopped, the parking brake is engaged.
- Check dimension (S2); if the backlash exceeds 3 mm, it must be readjusted.
- Release securing bolts; readjust slide pieces (4) until the backlash (S2) is lower than 3 mm. Re-tighten the securing bolts.

NOTE **If necessary, extract the outrigger cylinders, thus raising the outrigger beam until the backlash (S2) is lower than 3 mm.**

- Remove covers from the opposite side of the vehicle, unless this has already been effected.
- Retract the outriggers completely.
- Release the lock nut, readjust the slideway liner (3) until the outrigger beam is extended and retracted speedily, without getting seized.

Perform the work described under item 14.2.1 and 14.2.2 for all outrigger beams.

Functional check: The outrigger beams must be extended and retracted speedily, without being seized. Otherwise, the backlash must be increased.
- Mount covers again.
- Retract and secure outriggers as described under item B1-6. Move outrigger flats into on-road driving condition, and pin-fasten them.

14.3 Inspection and, if necessary, readjustment of chains for extension and retracting

The outriggers are moved synchronously via the chains for extension and retracting.

- Remove the covers from the opposite side of the vehicle. Remove the covers (10 to 12).
- Extend all outrigger beams completely (refer to part B1-6).
- Stop the engine in the chassis, engage the parking brake.

14.3.1 Visual inspection

- The chains for extension and retracting, including the hose lines and cables, must run correctly; they must not be damaged, kinked or show areas of chafing.

Attention **Make sure that the extension chain does not rest on or rub along the outrigger beams (B) or (C).**

14.3.2 Re-tensioning

Measure the setting dimension (D) and (E). The difference must not exceed 10 mm (dimension (D) must be measured from the edge of the outrigger box (A) to the stops (13)).

1. Dimension (E) less than dimension (D) = the extension chain must be tensioned.

   The readjustment must be performed on the cup spring package (8), after having loosened the cup spring package (9).

Cup spring package (9):

- Release the locknut (7).
- To release the cup spring package (9), release the tightening nut (5) by approx. three turns (this corresponds to approx. 6 mm).
- Hold tightening nut (5) and lock it using locknut (7).

Cup spring package (8):

- Release the locknut (7).
- Tighten the tightening nut (6) until dimension (F) amounts to 31.5 $\pm$ 0.5 mm.
- Hold tightening nut (6) and lock it using locknut (7).

2. Dimension (E) greater than dimension (D) = the retraction chain must be tensioned.

   The readjustment must be performed on the cup spring package (9), after having loosened the cup spring package (8).

Cup spring package (8):

- Release the locknut (7).
- To release the cup spring package (8), release the tightening nut (6) by approx. three turns (this corresponds to approx. 6 mm).

Cup spring package (9):

- Release the locknut (7).
- Tighten the tightening nut (5) by approx. three turns (corresponds to approx. 6 mm).
- Hold tightening nut (5) and lock it using locknut (7).

Cup spring package (8):

- Check dimension (F), it must amount to 31.5 $\pm$ 0.5 mm; readjust, if necessary.
- Hold tightening nut (6) and lock it using locknut (7).

cont'd.: **14.3.2 Re-tensioning**

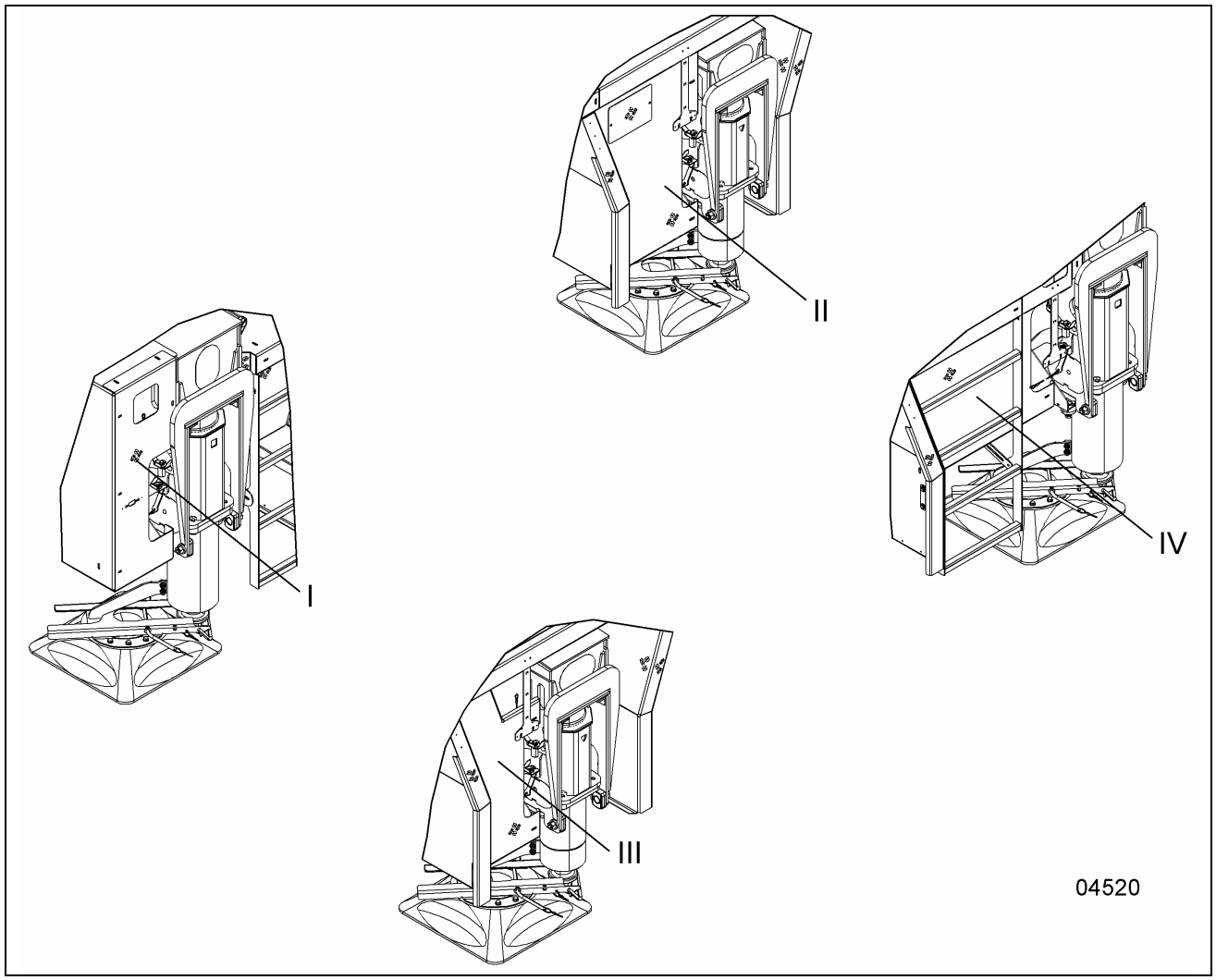
Attention **Make sure that the chains are not twisted or damaged while the tightening nuts (5) and (6) are being locked!**

After re-adjustment, the outrigger beams must be extended and retracted for checking.
Check the setting dimension (D), (E) and (F in case of cup spring package 8) and, if necessary, correct.

- Mount covers again.
- Retract and secure outriggers as described under item B1-6. Move outrigger flats into on-road driving condition, and pin-fasten them.

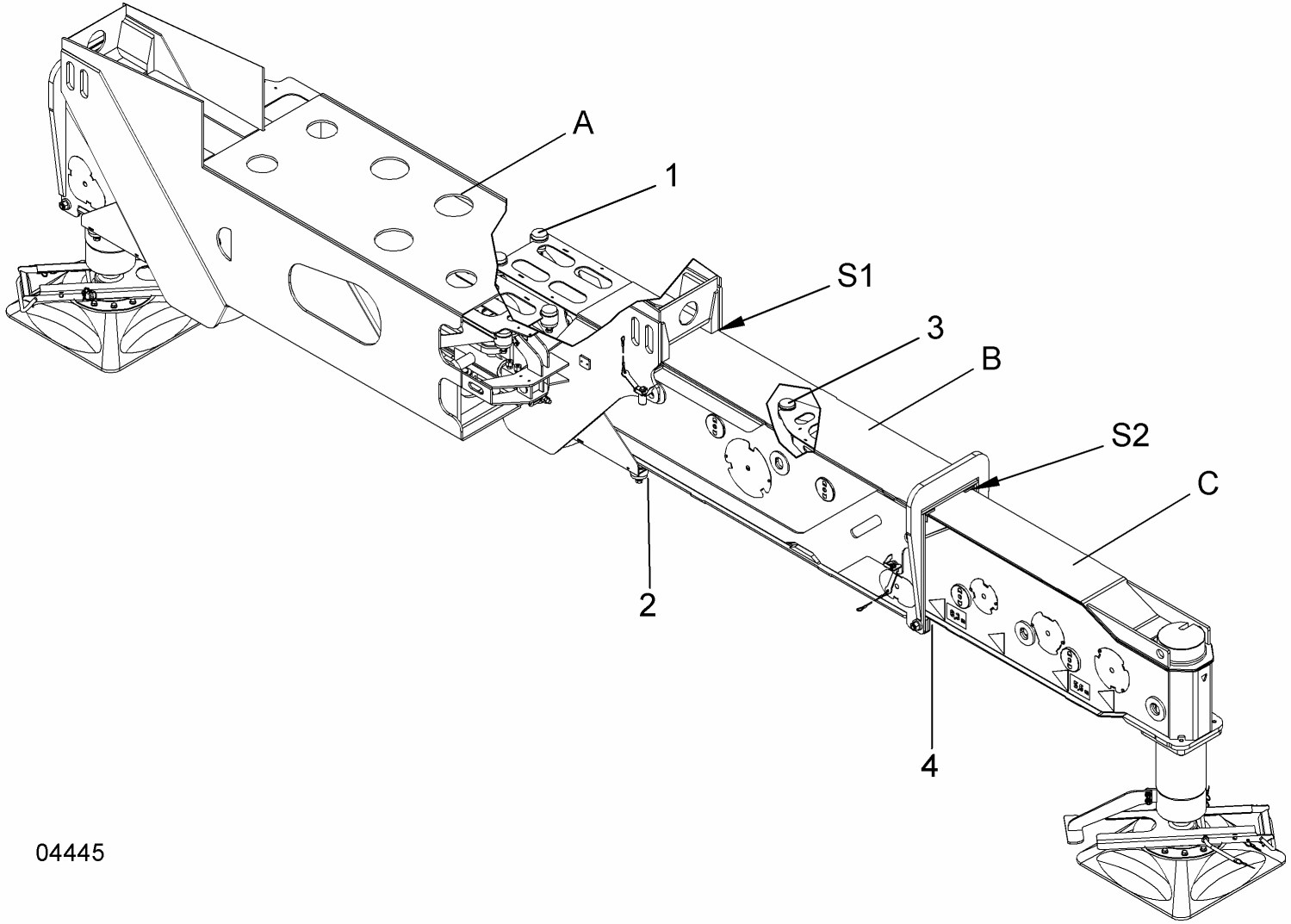
Covers to be removed for service and maintenance work:

I = Cover, rear right-hand
II = Cover, front right-hand
III = Cover, front left-hand
IV = Cover, rear left-hand



Memo:

cont'd.: **14** **Outriggers**



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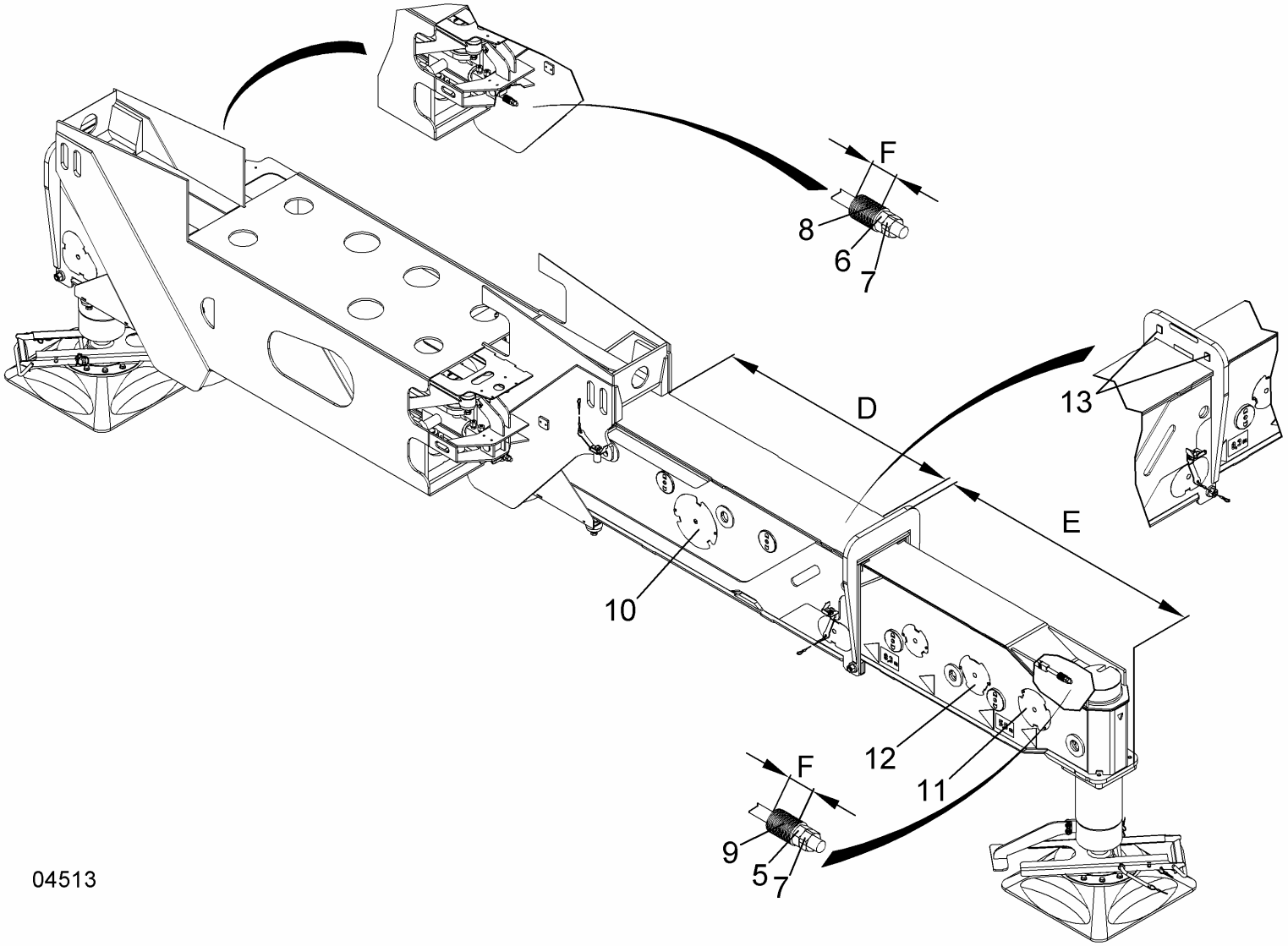
cont'd.: **14** **Outriggers**



15 Driver's cab

Grease joints and pins and all movable components with lubricating oil. Make sure that these parts run freely and are easy to operate.

These components are, e.g.:

- Joints of the folding access steps on the left and right;
- Hinges of the cover lid below the driver's cab,
- Hinges of the engine servicing lid.

The mechanical components of the door locks also require regular care. The closing cylinders should be treated with a graphited agent, preferably before the cold season begins.
It is better to treat door seals and other rubber components with acid-free grease or French talc before the cold season begins.

15.1 Warm water heating

15.1.1 Heat exchanger

After having removed the rear panel, lifted off the cover with air distributor and released the hose connections, the heat exchanger can be pulled upwards and out. It is advisable to rinse it thoroughly on the water end at all main servicing intervals (approx. 3 - 5 years) to ensure that chalk and iron deposits are removed.
The air fins should be blown out at regular intervals of 500 service hours using compressed air in the direction opposite to the air supply. This can be performed while the heat exchanger remains mounted. However, the air cleaner and the blower fan must be removed previously.

15.1.2 Blower fan

The blower fan slide-in module can be pulled out to the back after the rear panel has been removed. To reach an optimum service life, the electric motor and the fan wheel must be blown out gently with compressed air at regular intervals of 500 service hours. (Contamination reduces the electric motor's service life and, due to imbalances on the fan wheel, may result to vibrations and consequently to development of noise).

Attention **Make sure that the position of any balancing clips on the impeller is not changed!**

15.1.3 Air cleaner

The air cleaner can be replaced through the fresh air port when the flap is set to "fresh air". It must be checked for contamination at regular intervals. A servicing interval of approx. 3 months or 15,000 km travelled is recommended for filter replacement.
The servicing intervals depend on the local operating conditions and may be subject to fluctuations.
A severely contaminated air cleaner may result in insufficient demisting of the windows.

15.2 Wiper-blade elements / washing system

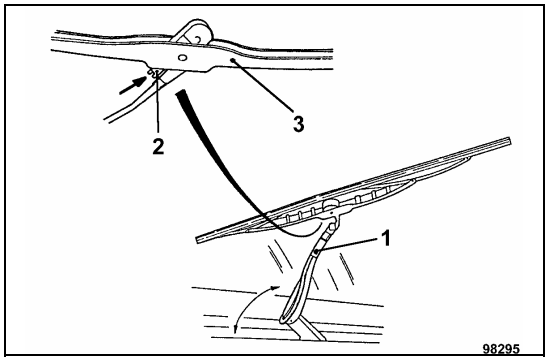
15.2.1 Replacement of the wiper-blade elements

The wiper-blade elements must be cleaned at regular intervals to work properly.
For safety reasons (good visibility), it is recommended to replace the wiper-blade elements immediately if their cleaning effect decreases. The wiper-blade elements should be replaced at least once per year.

Replacement of wiper-blade elements:

- Lift wiper arm (1), push down the spring (2) and slip wiper-blade element (3) towards the wiper arm.
- Remove wiper-blade element and reverse the above procedure to mount new wiper-blade element.

The wiper-blade element is correctly mounted when it is locked in its support.



15.2.2 Windshield washing system

The supply tank of the windshield washing system is located below the front lid of the driver's cab, on the right (refer to part B1-2, item 2.3.3).

15.3 Air conditioner **)

DANGER **All sorts of repair, replenishing or overhaul work on the air conditioner system may only be performed in an authorized workshop by well-trained staff.**
Work on the air conditioner requires specific extraction and filling stations, recovery stations, electronic leak detectors and special tools which are only available in specialist workshops. Correct disposal of fluids is also only ensured in a specialized workshop.

In the scope of the maintenance operations which are to be performed at least twice per year by the vehicle's operator, all movable parts, such as shaft bearings and articulations of levers, must be lubricated sufficiently with a commercially available grease, and actuated.

15.3.1 Functional check of air conditioner

The air conditioner should be put into operation for approx. 10 minutes at regular intervals, also in winter, to keep it in proper working order.

15.3.1.1 Inspection for correct fluid level and leakage

- Start the engine of the vehicle.
- Switch on the air conditioner (for further details, refer to part B1-4.4.5 and B1-10.5).
- When the system is perfectly tight, the white ball will float in the inspection glass of the fluid tank, thus indicating the correct fluid level. (Refer to item 15.3.9).
- If air inclusions appear in the inspection glass, the system is leaky. It must be checked or repaired in a specialist workshop. (Electronic leakage detector)
- If traces of corrosion or precipitation appear in the inspection glass, or if the refrigerant is turbid, the fluid tank and the drier must be replaced in a special workshop.

**) Optional equipment

15.3.2 Condenser

The condenser is installed below the driver's cab.
- Clean condenser at regular intervals to remove dust, insects, etc. (blowing out or washing down).

15.3.3 Evaporator

The evaporator is installed centrally in the driver's cab.
- Check discharge of condensed water.
- The evaporator fins must be blown out using compressed air together with the heat exchanger fins, with the air jet directed contrary to the air-supply side. To this effect, the evaporator and the heat exchanger can remain in their installation position. However, the blower fan and the air cleaner must be removed previously.

15.3.4 Heat exchanger

- It is advisable to rinse it thoroughly on the water end at all main servicing intervals to ensure that chalk and iron deposits are removed.

For cleaning of heat exchanger fins, refer to item 15.3.3 "Evaporator".

15.3.5 Blower fan

- To reach an optimum service life, the electric motor and the fan wheel must be blown out gently with compressed air at regular intervals of 500 service hours.

Attention **Make sure that the position of any balancing clips on the impeller is not changed!**

15.3.6 Air cleaner

- The air cleaner can be replaced through the fresh air port when the flap is set to "fresh air". It must be checked for contamination at regular intervals. A severely contaminated air cleaner may result in insufficient demisting of the windows.

15.3.7 Hoses and hose clamps

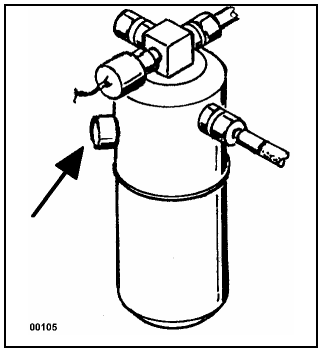
- Check hoses for leakage, areas of abrasion and cracks.
- Hose clamps: Check hose couplings for tight fit.

15.3.8 Checking the Vee belt of the air conditioning compressor

- Check Vee belt for good condition, cracks, fouling and wear.
- Check the Vee belt tension.

Refer to operating manual of the engine manufacturer.

15.3.9 Drier of air conditioning compressor



The collector drier is installed centrally on the front end, below the driver's cab. There is an inspection glass in the collector drier.
Two beads are located in the inspection glass.

1.: For fluid level indication; colour: white. (Refer to item 15.3.1.1)

2.: For moisture indication; colour: blue: dry.

Colour: pink: damp.

If the 2nd bead indicates "pink", this means that the collector drier must be replaced by a specialist workshop.
However, the drier of the air conditioning compressor should be replaced at intervals of max. 2 years.

15.3.10 Oil level inspection of air conditioning compressor

The oil level in the compressor can only be checked after a repair, or every time before the air conditioning system is filled with new refrigerant. No refrigerant may be present in the circulation or the oil level inspection.
On principle, the oil volume extracted from the refrigerating circulation plus an additional quantity of 10 cm^3 must be poured into the circuit on re-filling. If parts have been replaced during repair, then the quantities specified for the replaced component must be added additionally (adhere to the current information by the various manufacturers).

15.4 Supplementary heater unit **)

For instructions on operation, service and maintenance of the heater unit, please refer to the documents of the unit's manufacturer. Make sure that the manufacturer's instructions are observed.

15.5 Engine pre-heating unit**)

For instructions on operation, service and maintenance of the heater unit, please refer to the documents of the unit's manufacturer. Make sure that the manufacturer's instructions are observed.

15.6 Control and Service System

DANGER **Repair work may only be performed by qualified specialist staff. To replace parts or components, use only parts listed in the Spare Parts List. Unauthorized opening or inappropriate repair work may result in severe injuries or death, and considerable property damage.**

15.6.1 Monitor

The monitor of the Control and Service System should be cleaned at regular intervals, depending on dust accumulated, using a lint-free cloth.

The unit has been designed for a temperature range from **–40°C to +85°C**.
The monitor has been designed for a temperature range from **–20°C to +70°C**.

**) Optional equipment

16 Miscellaneous; other points of lubrication, servicing and maintenance

16.1 Other points of lubrication

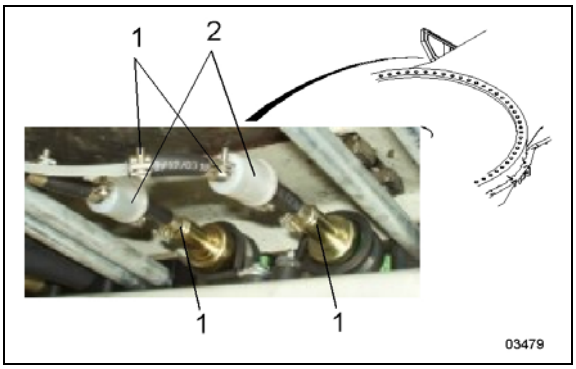
Grease joints and pins and other movable components with lubricating oil or lubricant. Make sure that these parts move unrestrictedly and are easy to operate.

These components are, e.g.:
- Threads of the star-shaped handles which serve to lock the lateral coverings;
- Hinges of the lateral coverings;
- Hinges of the engine servicing lid;
- Hinges and pin securing devices of the tool kit **)

16.2 Replacement of filter in the fuel pipe of the supplementary heater unit**)

The supplementary heating is supplied with fuel from the fuel tank of the chassis.

It is recommended to replace the fuel filter once per year to ensure trouble-free heater operation.
- Loosen the hose clamps (1), remove the fuel filter (2), install a new filter and tighten the hose clamps safely.



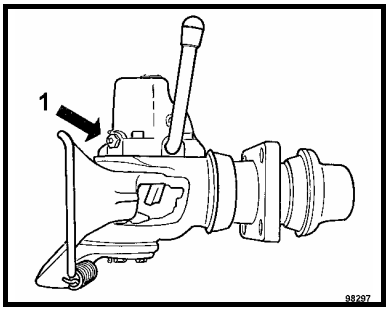
**) Optional equipment

16.3 Trailer coupling device **)

16.3.1 Rockinger

16.3.1.1 Service

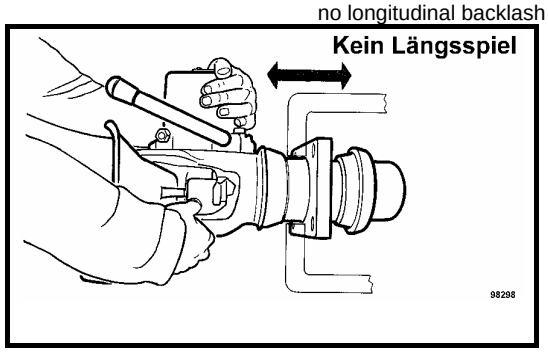
The trailer coupling device must be lubricated with multi-purpose grease via the lubricator (1).



NOTE **The coupling device may only be greased in open condition (coupling bolt on top) to prevent the automatic unit from being supplied with excessive grease.**
Subsequently, the automatic unit must be actuated several times.

16.3.1.2 Inspection and adjustment

The trailer coupling device must be checked at regular intervals, for safety reasons.

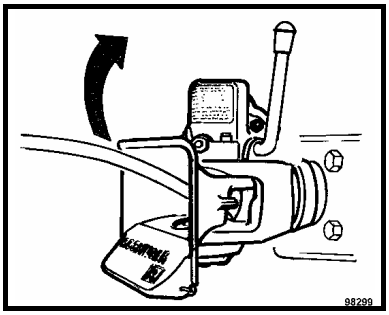


16.3.1.3 Inspection of the longitudinal bearing backlash.

- Move the coupling head (not the coupling jaw funnel) with both hands in longitudinal direction.

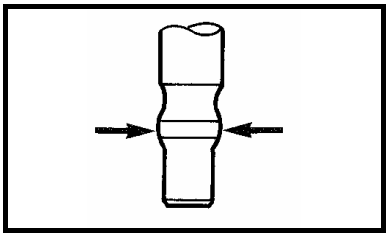
Make sure that **no longitudinal backlash** is noticeable.

16.3.1.4 Inspection of the vertical bearing backlash.



- Open the coupling (hand-actuated lever in 1st locking position).
- Insert a bent tire lever so that the top side of the lever touches the coupling jaw, and its underside rests against the coupling body (not of the lower bushing).
- Push the rod upwards while watching the movement of the coupling device. If the backlash due to wear exceeds 1 mm, the coupling device must be removed on all accounts, and the bearing must be checked.

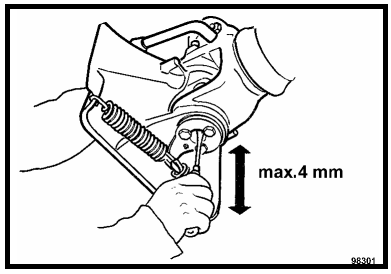
16.3.1.5 Inspection of the coupling bolt for wear.



- The wear of the coupling bolt must be determined by measuring it with a sliding caliper.
- The diameter of the ball-shaped part must not fall below 36.5 mm. Otherwise, the coupling bolt must be replaced.

**) Optional equipment

16.3.1.6 Inspection of the vertical backlash.



- The maximum vertical backlash must not exceed 4 mm.

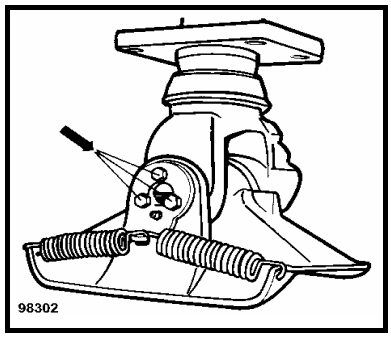
16.3.1.7 Inspection of the lower bushing for wear.

- The admissible inside diameter of the lower bushing in the coupling jaw must not exceed 31.2 mm.

16.3.1.8 Pre-load of the rubber springs.

The axial torque of the coupling, when new, is at least 100 Nm.
- Turning the coupling head by hand must require considerable effort.

16.3.1.9 Adjustment of the coupling jaw.



To enable coupling, the coupling jaw (coupling bolt on top) must be locked automatically in its central position. Failing this, the central position must be corrected as follows:

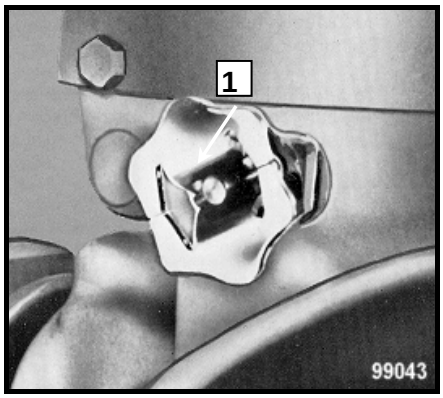
- Open the coupling (hand-actuated lever in 1st lock).
- Loosen the screws at the bottom part.
- Push the coupling jaw to the right/left, until the release lever is engaged.
- Tighten the screws (tightening torque: 49 Nm).
- To engage, press the hand lever into the 2nd lock position.

16.3.1.10 Inspection

- Close the coupling device (hand lever down).
- Push the coupling jaw slightly to the left or right.
- Open the coupling (hand-actuated lever in 2nd lock).
- Release the coupling jaw: The release lever must lock the coupling jaw again in its central position.

16.3.2 Ringfeder

16.3.2.1 Greasing



- Grease the entire coupling head on the knob locking device at regular intervals, according to the maintenance schedule, via the lubricator (1).

To minimise wear on the coupling bolt and the towing eyelet, clean and grease these parts at regular intervals.

The pull rod bearing does not require any maintenance.
The castle nut below the protective cap has a tightening torque of 400 to 500 Nm.

16.3.3 Coupling heads

The pneumatic coupling heads must be free of leakage in coupled and in uncoupled condition (no sound of air escaping). The sealing surfaces must be kept clean and free of damage. In uncoupled condition, the covers must be folded over the sealing surfaces.

16.4 Sliding coupling

Check the sliding coupling according to the maintenance schedule.

16.5 Steering

Grease the bearing points of the guide levers according to the maintenance schedule.

NOTE **The guide levers are supplied with grease via the centralized lubrication system.**

16.6 Suspension

Grease the suspension cylinders at the top and bottom according to the maintenance schedule.

NOTE **The suspension cylinders are supplied with grease via the centralized lubrication system.**

- Check bellows for correct fit and condition (no cracks, holes etc.). Fasten bellows correctly. If damage is detected, do not repair, but replace them.

16.7 Centralized lubrication system

For instructions on operation, service and maintenance along with the data regarding lubricants and the lubricating points, please refer to the information supplied by the unit's manufacturer (see Part G1, Chassis).
Make sure that the manufacturer's instructions are observed.

16.8 Supplementary heater unit **)

For instructions on operation, service and maintenance of the heater unit, please refer to the documents of the unit's manufacturer.
Make sure that the manufacturer's instructions are observed.

16.9 Rear area surveillance**)

16.9.1 Video camera

The video camera does not require any maintenance.
The plate of the video camera should be cleaned at regular intervals depending on the degree of contamination, using a soft, damp cloth. Dry polishing should be avoided to protect the plate against scratches. The video camera is resistant against cleaning by means of a high pressure or steam jet unit.

If a failure of malfunction is detected during operation, the external circuit (fuse, power supply, cabling, monitor etc.) must be checked first on principle. If the failure or the malfunction cannot be eliminated, please contact our TADANO FAUN After-Sales Service.

**) Optional equipment

24 Summary of oil types and filling capacities

(Recommended oil types)

NOTE **The filling capacities specified below are approximate values. For precise measuring results, the oil level inspection plugs, the oil dipsticks or inspection glasses are always decisive. Only those qualities may be used which are listed in the chart of approved consumables of the assembly manufacturer, or which are indicated on the nameplate of the assemblies.**

Maintenance point	Oil type / Filling type	Filling capacity
Engine	Engine oils according to the DC consumables specification. **Initial filling with SAE 15W-40**	Refer to DC Operating Manual
Coolants / anti-freeze agents	Coolants according to the DC Operating Manual Anti-freeze agents according to the DC fuel specifications	approx. 90 l
Fuel tank	Diesel fuel EN 590	approx. 530 l
Gearbox	For oil types and oil change intervals, refer to the ZF Chart of approved Lubricants in Part G1, Chassis. **Initial filling with ECOFLUID 75W-80**	See ZF Operating Manual in Part G1 Chassis.
Transfer box	Hypoid gear oil SAE 90 according to MIL-I-2105 B, API-GL5	Transfer box approx. 5.5 l Transfer box with supply lines and oil cooler approx. 9.5 l

(cont'd.) **24** **Summary of oil types and filling capacities**
(Recommended oil types)

NOTE **The filling capacities specified below are approximate values. For precise measuring results, the oil level inspection plugs, the oil dipsticks or inspection glasses are always decisive. Only those qualities may be used which are listed in the chart of approved consumables of the assembly manufacturer, or which are indicated on the nameplate of the assemblies.**

Maintenance point	Oil type / Filling type	Filling capacity
Axles	Hypoid gear oil SAE 90 according to MIL-L- 2105 B / API-GL 5 Hypoid gear oil with multigrade properties according to MIL-L- 2105 C / D / API-GL 5 SAE 90 or multigrade oils at normal outside temperatures SAE 75 W -90, SAE 75 W -85 at outside temperatures below -10°C SAE 140 or multigrade oils at over +30°C	
Drive 10x6):**		
Planetary gears 2nd axle		approx. 1.3 l each
Axle drive assembly 2nd axle		
Drive 10x8:		
Planetary gears 1st axle		approx. 1.3 l each
Axle drive assembly 1st axle		approx. 19.0 l
Planetary gears 2nd axle		approx. 1.3 l each
Axle drive assembly 2nd axle		approx. 21.0 l
Planetary gears 4th axle		approx. 1.3 l each
Axle drive assembly 4th axle		approx. 22.0 l
Planetary gears 5th axle		approx. 1.3 l each
Axle drive assembly 5th axle		approx. 19.0 l

	Ambient temperature	Mineral oils according to DIN 51524-2	Biodegradable oils according to VDMA 24568	
Hydraulic system				approx. 290 l
	over +30° C	HVLP 68	HEES 68	
Oil tank for **steering, outriggers, suspension**	from + 5° C to +25° C	HLP 46	HEES 46	approx. 200 l
	below + 5° C to - 15° C	HLP 32	HEES 32	
	from - 15° C to - 25° C	HLP 22	HEES 22	
	below - 25° C	HLP 10		
	Initial filling with HLP 46			

Air conditioning system)** **Refrigerator oil and refrigerant.**	Refrigerator oil: ND-Öl 8 Refrigerant : R134a	210 cm^3 1.65 kg

**) Optional equipment

25 Summary of lubricating grease types (recommended grease types)

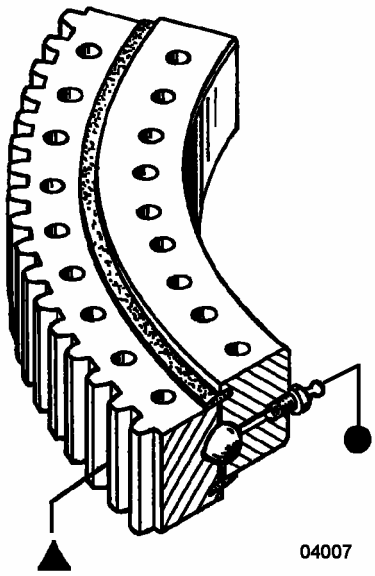
Maintenance point	Grease type	Filling capacity
Grease filling in wheel bearings For drive 10 x 6:**) **1st and 3rd axles** For drive 10 x 8 **3rd axle**	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20	as required
Outriggers Extension and retracting chain Sliding surfaces Outrigger floats	Klübersynth MZ 4-17 Spray Preservation lubricant, specification BB (DIN 51513) or bituminous cogwheel spray for ring gears Lubricating paste containing MoS_{2-}, Cu or Al-Makroflon HSII	as required
Centralized lubrication system Grease tank	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20	as required
Batteries	Terminal grease	as required
Spreading device	Renoplex EP2, manufacturer: Fuchs	approx. 25 g per box
Door locks	Graphite powder	as required
Other points of lubrication	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20	as required

**) Optional equipment

Memo:

26 Chart of approved consumables and lubricants

Recommended greases and lubricants for greasing points equipped with lubricators, sliding surfaces and ball bearing slewing devices, as well as ringgear and slewing gear pinion.



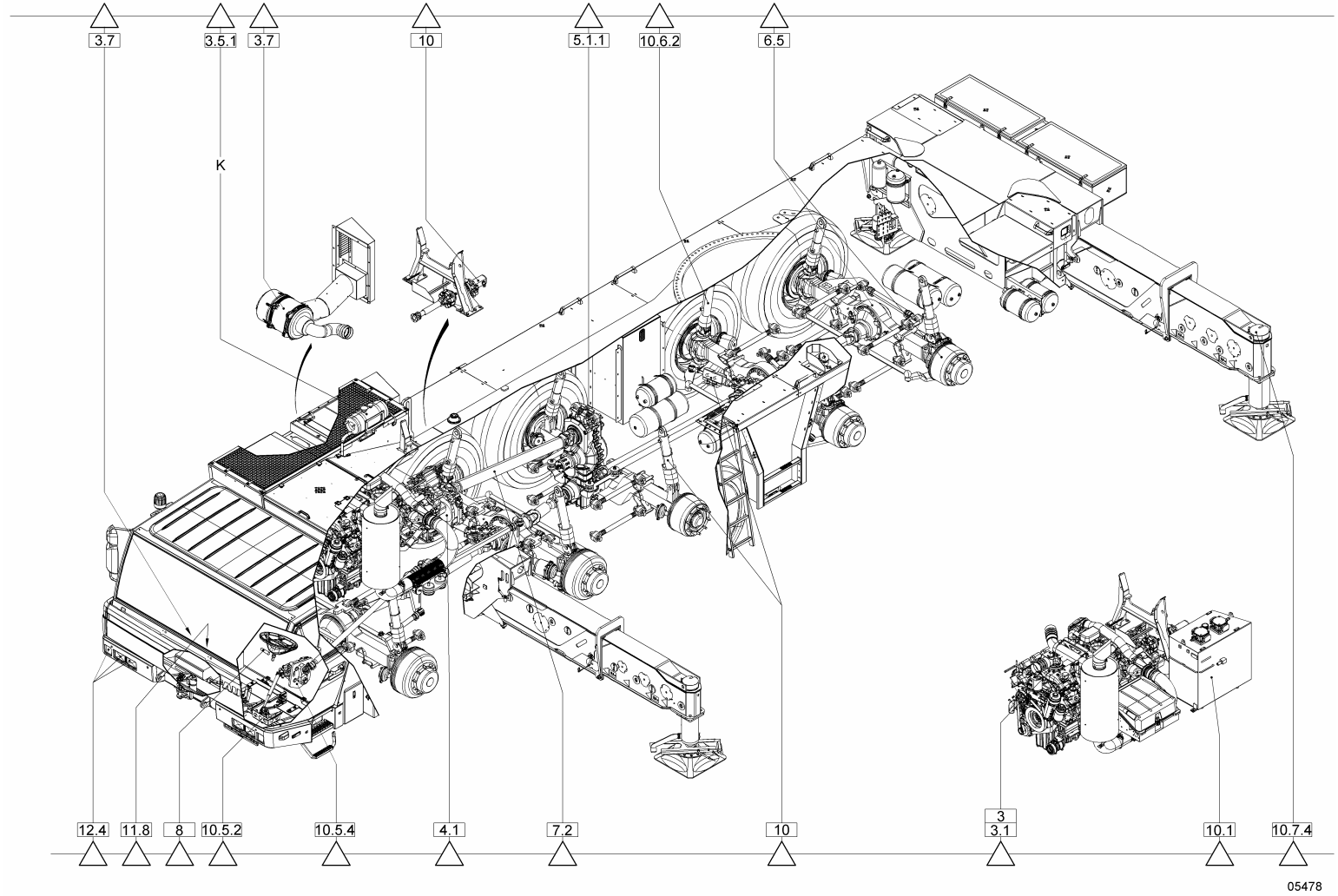
Symbols used in the lubricating schedule	Symbols used in the Table	
□	●	First-class lubricating grease, lithium-saponified, penetration grade 2
■	▲	Special lubricant, adhesive, hydrophobic with sufficient temperature characteristics

ANTAR	●	Rolexa 2	248 K to 403 K
	▲	Engrenage 3	263 K to 393 K
ARAL	●	Aralub HL 2	243 K to 393 K
	▲	Aralub LFZ 1	253 K to 403 K
BP	●	BP Energrease LS 2	243 K to 393 K
	▲	BP Energol WRL	243 K to 353 K
Castrol	●	Castrol Spheerol AP 2	253 K to 393 K
	▲	Castrol Grippa 33 S	253 K to 353 K
Chevron	●	Chevron Dura-Lith Grease 2	248 K to 398 K
	▲	Chevron Pinion Grease MS	273 K to 398 K
Esso	●	BEACON 2	243 K to 403 K
	▲	SURETT Fluid 4 K	253 K to 333 K

Gulf	●	GULF CROWN Grease No. 2	243 K to 393 K
	▲	GULF LUBCOTE No. 2	253 K to 333 K
Mobil	●	MOBILUX 2	243 K to 403 K
	▲	MOBILTAC 81	243 K to 393 K
SHELL	●	Alvania Fett R 2	243 K to 403 K
	▲	Cardium Fluid C	255 K to 333 K
TEXACO DEA	●	Glissando FL 20	253 K to 393 K
	▲	Crater 2 X Fluid	253 K to 393 K
VALVOLINE	●	VALVOLINE LB-2	253 K to 393 K
	▲	VALVOLINE Dipper Stick	253 K to 493 K
Fritz Manke Technische Artikel Fichtestr. 72 40233 Düsseldorf			
	▲	Voler Compound 2000 E	243 K to 343 K

Memo:

27 Inspection scheme (before start-up, daily)



Check before start-up

[ ] = Refer to Part C1), item …

△ = Inspection

K = Coolant

Check before start-up

Illustration of version 10 x 8

Memo:

28 Inspection and cleaning scheme

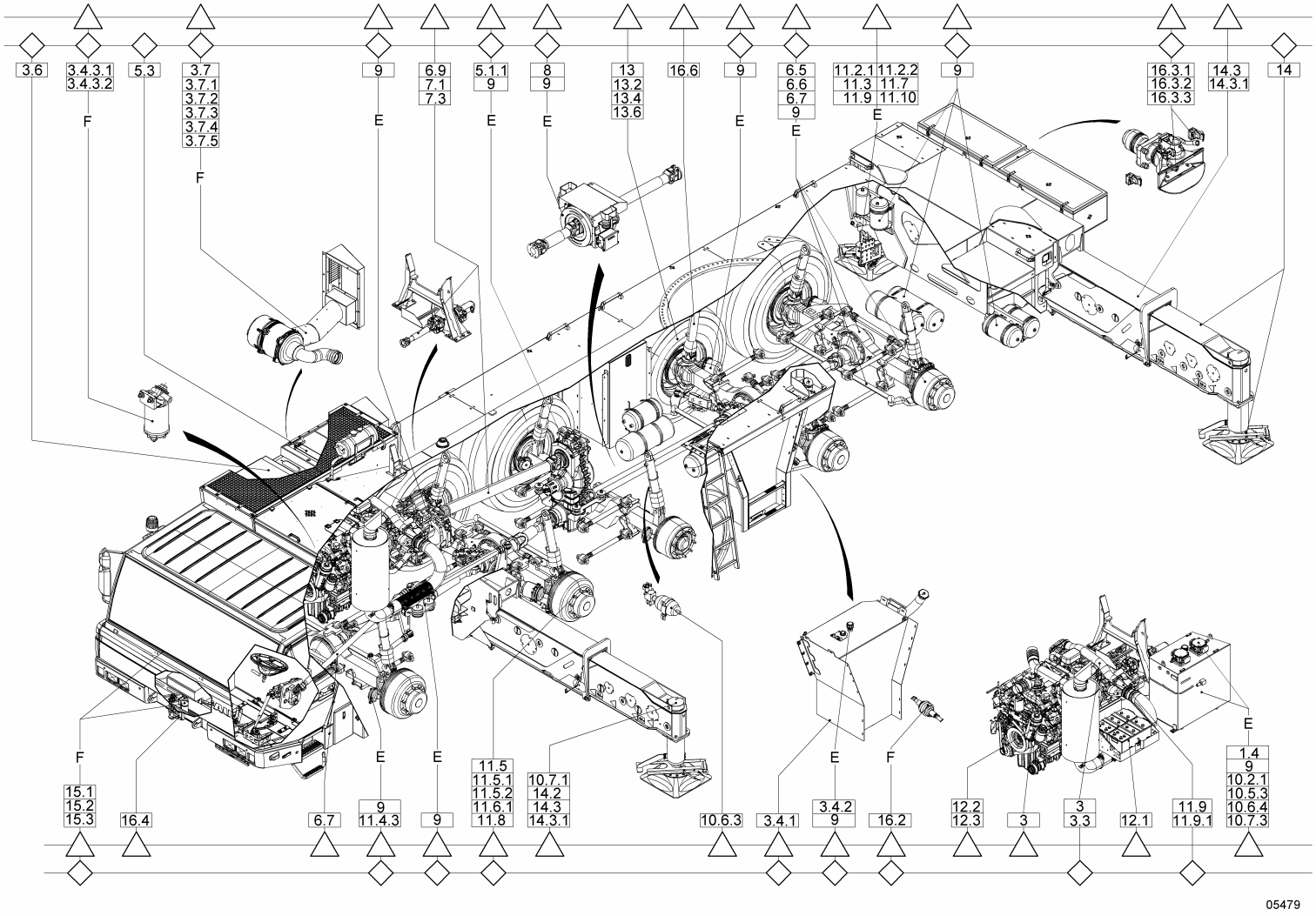


Illustration of version 10 x 8

Inspection, refer to maintenance schedule
Cleaning, replacement, refer to maintenance schedule

[ ] = Refer to Part C1), item .....

F = Cleaning and/or replacement of filters, refer to maintenance schedule

E = Breathers

△ = Inspection

◇ = Cleaning

Inspection, refer to maintenance schedule
Cleaning, replacement, refer to maintenance schedule

Memo:

29 Oil/coolant level inspection and change scheme

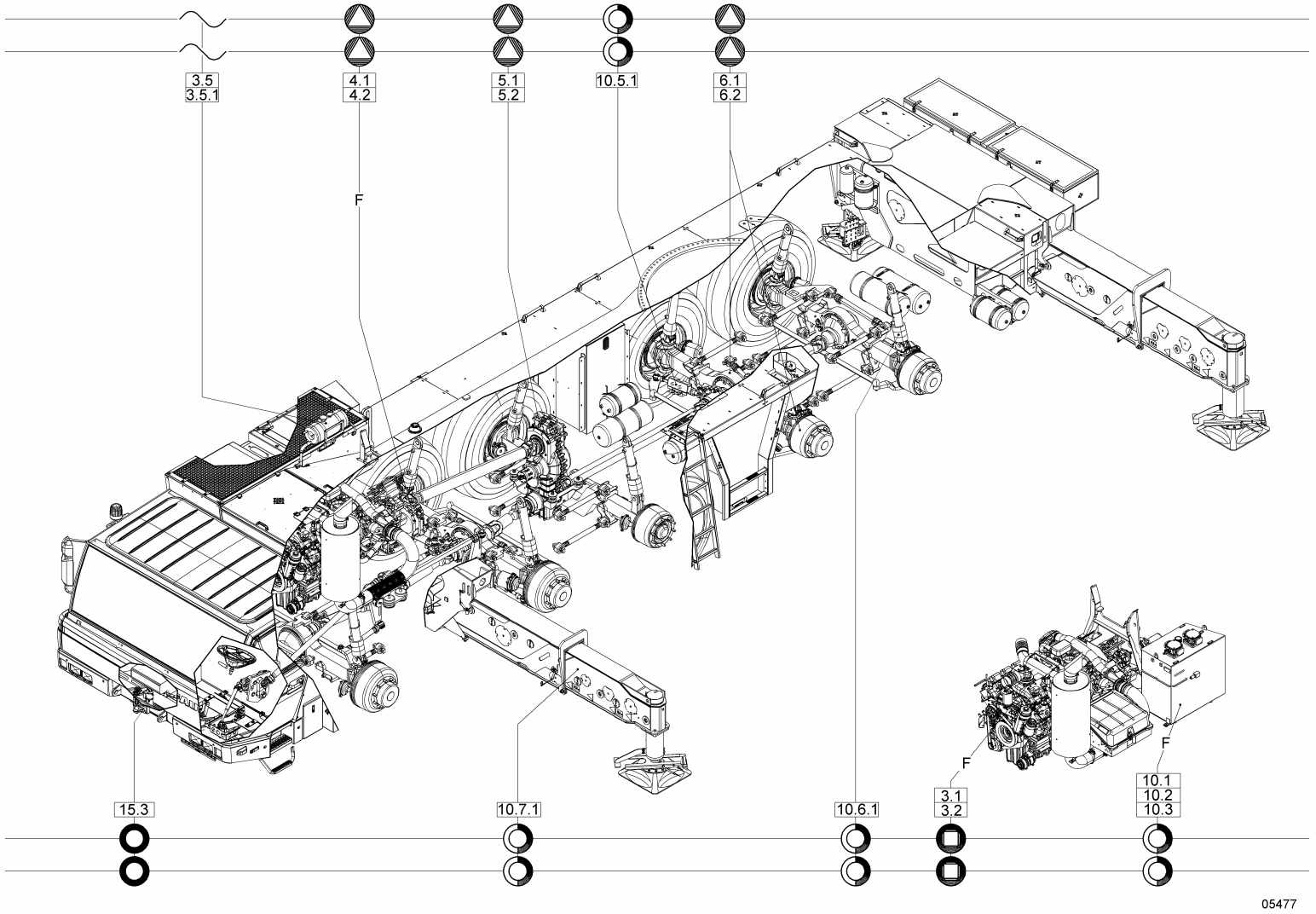


Illustration of version 10 x 8

Oil change, refer to maintenance schedule
Oil level inspection, refer to maintenance schedule

[ ] = Refer to Part C1), item ...

F = Filter change, refer to maintenance schedule

Engine oil*)

Hypoid gear oil *)

Hydraulic oil *)

Refrigerator oil and refrigerant*)

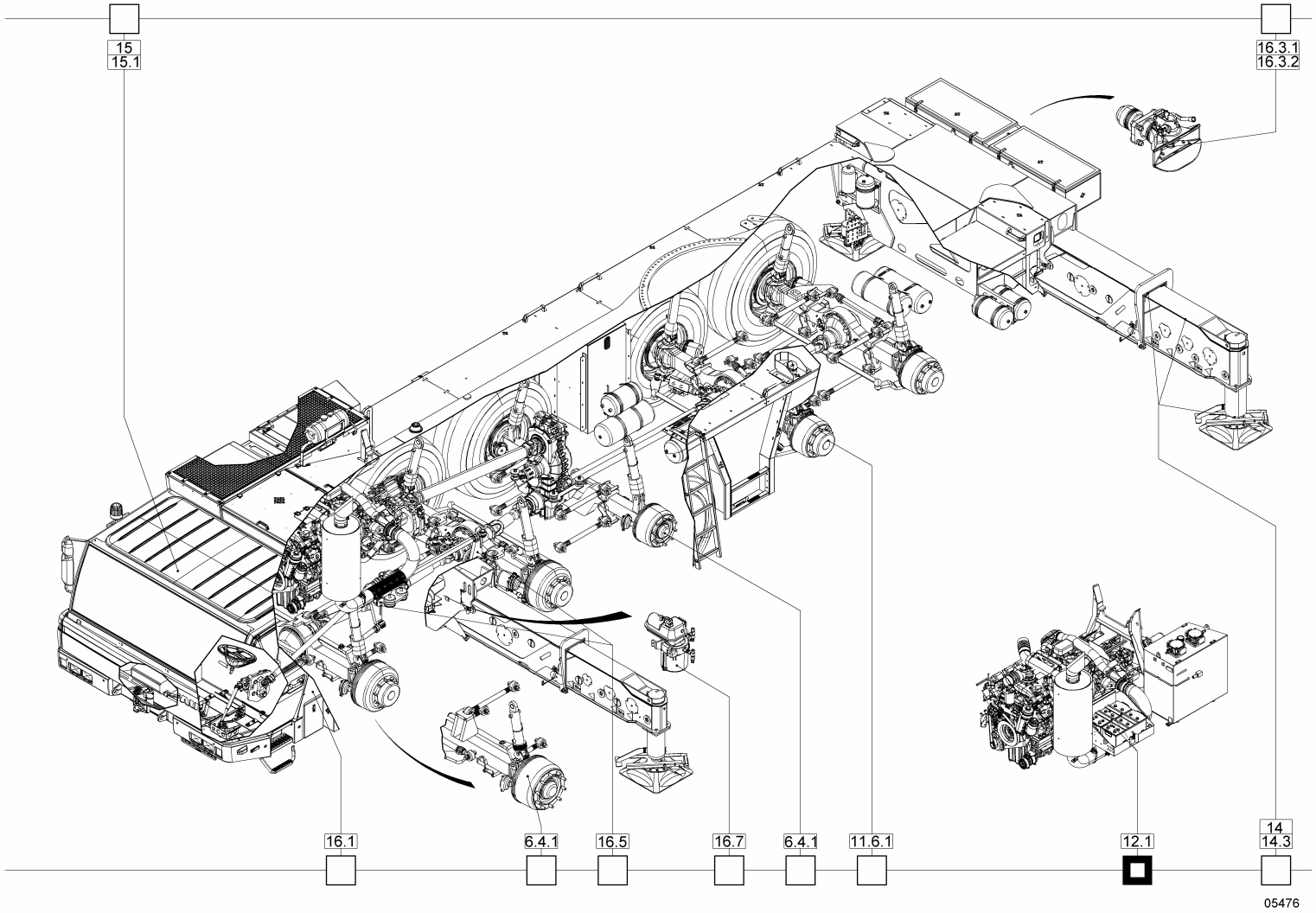
~ Corrosion-protective anti-freeze agent/coolant

***) Use the recommended oil types**

Oil change, refer to maintenance schedule
Oil level inspection, refer to maintenance schedule

Memo:

30 Lubricating scheme



Lubrication, refer to maintenance schedule

= Refer to Part C1) Item …

Universal grease)**

Special grease*)

*) **Use recommended grease types**

Clean lubricators before greasing. Grease all the other parts using an oil can.

Lubrication, refer to maintenance schedule

Memo:

Part C2

Service and Maintenance

Superstructure

1 Maintenance intervals

The maintenance intervals depend on the vehicle's operating conditions; the next maintenance will be due after:

- a certain number of operating hours,
- a defined period of time.

NOTE **The value which is reached first shall be decisive.**

The operating hours are indicated on the hourmeter in the crane cabin. Refer to item B2-2 "superstructure cab".

Maintenance work which must be performed earlier than the regular maintenance works, or in a different fashion, is indicated in the maintenance schedule in the column "Initial maintenance after", e.g. commissioning of the machine or replacement of components.
After these maintenance works have been effected, the column **„Regular maintenance every 125 / 250 / 500 / 1000 / 2000 / operating hours"** shall apply.

Maintenance work which must be performed daily or before commissioning the vehicle has been marked by an "**X**" in the maintenance schedule in the column "**Daily, before start-up"**.

The number of operating hours expiry of which calls for the specified maintenance work to be performed repeatedly have been marked by an **"X"** in the columns **"Regular maintenance every 125 / 250 / 500 / 1000 / 2000 / operating hours"**.

e.g. "every 500 operating hours" i.e. after 500, 1000, 1500 etc. operating hours have been reached,
"every 2000 operating hours" i.e. after 2000, 4000, 6000 etc. operating hours have been reached.

NOTE **The maintenance intervals apply for machines which are subject to normal operating and environmental conditions. If the machines are used in particular applications, the maintenance intervals must be adapted to the prevailing operating conditions.**

NOTE **Whenever maintenance work is performed, it is obvious that also maintenance work required to be done at shorter intervals which coincides with this date must be performed as well.**

NOTE **In the maintenance plans, items C2-18 to C2-21, the maintenance works are structured by assemblies.**
The maintenance works are shown, as an example, only for one part of an assembly; if a part occurs more than just once, the maintenance works must be performed on all such parts (e.g. batteries etc.).

Memo:

1.2 Maintenance schedule

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial mainten-ance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Hydraulic piping										
Check hydraulic hoses / hose lines for damage.	**C1-1.4.1**								Once per week	
Replace hydraulic hoses.	**C1-1.4.1**								every 6 years	
Engine										
Inspection for leakage.	**2**		**X**							
Oil level inspection.	**2.1**		**X**							
Oil change, oil filter replacement.	**2.2**						900 operating hours		Once per year	
Inspection of tight fit of the hose clamps of the charge air hoses.	**2.3**				**X**					
Fuel tank; drain condensed water.	**2.4.1**						**X**		Once per year	If necessary, earlier.
Fuel tank; clean fuel strainer in the filler socket**.**	**2.4.2**					**X**				If necessary, earlier.
Fuel tank; check ventilation filter	**2.4.2.1**						**X**		Once per year	If necessary, earlier.
Fuel strainer; drain condensed water.	**2.4.3.1**				**X**					If necessary, more often.
Fuel strainer, replace filter cartridge.	**2.4.3.2**						**X**		Once per year	If necessary, more frequently, depending on the fuel quality.
Check hose clamps of the coolant hoses for tight fit and tightness.	**2.5.1**				**X**					
Inspection of coolant level.	**2.5.1**		**X**							
Replacement of coolant.	**2.5.2**							**X**	every 2 years	

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Cleaning the cooler.	**2.6**					**X**				If necessary, earlier.
Air cleaner										
Clean air cleaner housing.	**2.7**						**X**			Simultaneously with each maintenance of the air cleaner. If necessary, earlier, depending on dust collected.
Check air cleaner housing for damage and cracks.	**2.7**									Simultaneously with each maintenance of the air cleaner.
Replacement of air cleaner cartridge.	**2.7.1**						**X**			And when the indicator "air cleaner" in the CGC goes on.
Check air intake pipes and hoses.	**2.7.3**				**X**					
Check electrical vacuum switch on the air cleaner housing.	**2.7.4**									If the indicator “air cleaner” in the CGC does not go on in spite of contamination of the air cleaner.
Monitoring the air cleaner	**2.7.4**		**X**							During operation via the "air cleaner" indicator in the CGC.
Servicing switch "Air cleaner monitoring" - check for proper working order	**2.7.4.1**						**X**			
Exhaust system										
Silencer spark arrester**)	**2.8**				**X**					Empty and clean 2 or 3 times per year.
Hydraulic system										
Check hydraulic system for leakage.	**3/3.6**		**X**							
Oil level inspection.	**3.1**		**X**							

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Replace the filter cartridges.	**3.2**	125 operating hours					**X**		Once per year	Simultaneously with each hydraulic oil change and if the servicing indicator in the CGC is lit.
Replacement of the ventilation filter.	**3.2.1**							**X**		If necessary, earlier, if contaminated.
Clean filling strainer	**3.2.1.1**									As required.
Replace sinter filters (if installed; refer to hydraulic piping diagrams).	**3.2.2**									If an operating malfunction occurs.
Oil change.	**3.3**							**X**	Every 2 years	Take and analyse an oil sample at regular intervals.
Replacement of filter insert of pressure filter.	**3.5**							**X**		
Oil cooler / supplementary oil cooler; clean cooler fins.	**3.7**			**X**						
Oil cooler/supplementary oil cooler; check fan and thermostatic valve for proper working order.	**3.7**			**X**						
Check working pressure of the hydraulic system of the superstructure; if necessary, have it re-adjusted by specialists.	**3.9** **3.10**	125 operating hours					**X**			
Swing mechanism										
Check gearbox visually.	**4**								Every 3 years	Inside and outside
Inspection for leakage.	**4.1**		**X**							
Check oil level in gearbox.	**4.1**		**X**							While gearbox is at a standstill.

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Change oil in gearbox.	**4.2**	200 operating hours, then after reaching 1000 op. hrs.						**X**	Once per year.	Analyze an oil sample simultaneously with every oil change.
Checking the swing brake for proper working order and leakage	**4.2.3**		**X**						Once per year	
Check tooth face backlash on swing motor gearbox drive shaft	**4.4**								Once per year	
Grease ring gear and pinion of swing mechanism.	**4.5**			**X**						If necessary, at shorter intervals, depending on slewing frequency.
Grease ball bearing slewing device of race system (supplied via central lubrication).	**4.6**			**X**						If necessary, at shorter intervals, depending on slewing frequency.
Grease the lock pin.	**4.7**			**X**						
Check mechanical superstructure lock and proximity switch for proper working order.	**4.8**		**X**							
Check connecting bolts of ring gear, securing bolts of hydraulic motor and gearbox flange screws for tight fit.	**4.10**	100 to 125 operating hours				**X**				Comply with tightening torque.
Check tipping backlash of slewing device.	**4.11**									As required.
Hoisting gear and auxiliary hoisting gear**										

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Check gearbox visually.	**5**								Every 3 years	Inside and outside
Inspection for leakage.	**5.1**		**X**							
Oil level inspection.	**5.1/5.3**		**X**							
Oil change.	**5.2/5.4**	200 operating hours, then after reaching 1000 op. hrs.						**X**	Once per year.	Analyze an oil sample simultaneously with every oil change.
Check tooth face backlash.	**5.5**						**X**		Once per year.	
Grease drum bearings (supplied via central lubrication).	**5.6**					**X**			Twice per year.	And after each cleaning operation using a steam jet unit.
Hoisting gear brake - check disc package and free wheeling.	**5.8**						**X**		Once per year.	
Check hoist limit switch for proper function.	**5.9**		**X**							During operation.
Check rope limit switch for proper function.	**5.10**					**X**				and simultaneously with each rope replacement.
Winch rope										
Visual inspection.	**6.1**		**X**						Once per week.	Before and after each operation.
Cleaning.	**6.2**									If seriously soiled.
Lubrication and servicing of the rope.	**6.2**				**X**					If necessary, earlier, and after each cleaning operation.
Check rope drum for wear.	**6.4**					**X**				And before placing a new winch rope.
Electrical equipment										

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial mainten-ance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Check the batteries.	**7.1**			**X**					Once per month.	
Batteries, grease terminals.	**7.1**									As required.
Check the three-phase generator.	**7.2**						**X**			Pay attention to correct Vee belt tension.
Check the starter.	**7.3**						**X**			Refer to the instructions of the engine manufacturer.
Check lamps and indicator lamps for proper function.	**7.4**		**X**							
Clean lamp glasses and check them for damage.	**7.4**		**X**							If necessary, earlier in case of contamination.
Check the automatic safe load indicator for proper working order.	**7.5**		**X**							
Check automatic safe load indicator.	**7.6**					**X**				
Crane cab										
Lubricate/oil joints, pins, hinges and all movable components.	**8**			**X**					Every two weeks	And after every crane cleaning operation using the high-pressure steam jet blower.
Treat door locks (closing cylinders).	**8**						**X**		Once per year	
Air conditioning system**) Perform inspection.	**8.1**						**X**		Once per year.	At the beginning of a cooling period. In a specialist workshop.
Clean wiper-blade elements.	**8.2.1**				**X**				Once per month	If necessary, more frequently.
Replace the wiper-blade elements.	**8.2.1**						**X**		Once per year	Or if damaged.
Checking the fluid level and replenishing fluid in tank of washing system.	**8.2.2**				**X**				Once per month	If necessary, more frequently.

**) Optional equipment

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Replace fuel filter of auxiliary heating.	**8.3.1**						**X**		Once per year.	Before heating operation begins.
Check/Cleaning recirculated air filter.	**8.6**									As required, i.e. when air flow in recirculation mode decreases.
Other points of lubrication, service and maintenance										
Telescopic boom										
Oil, grease **slide pieces, slideway linings, slide bars, crossheads and guide rollers.**	**9.1**			**X**						
Grease slideway linings of boom on top.	**9.1.1**								Once per week	
Grease slideway linings of boom at the bottom.	**9.1.1**								Once per week	
Grease boom laterally and at the bottom.	**9.1.1**								Once per month	Every 100 operating hours
Grease telescope cylinder locks.	**9.1.1**								Once per month	Every 100 operating hours
Grease boom locks.	**9.1.1**								Once per week	
Grease basic boom bearing (supplied via central lubrication).	**9.1**				**X**					
Boom elevation cylinder										
Grease cylinder bearing (supplied via central lubrication).	**9.2**				**X**					If necessary, earlier.
Bottom block										
Grease the hook cross-beam.	**9.3**				**X**					
Counterweight										

Assemblies / Maintenance work and inspections	Refer to Part "C2", item	Initial maintenance after	Daily; before start-up	Regular maintenance every					Minimum intervals	Remark
				125	250	500	1000	2000		
				operating hours						
Check counterweight cylinders for leakage.	**9.4**		**X**							
Check locking cylinders for leakage.	**9.4**		**X**							
Jib[**)]										
Grease and lubricate rope pulley support, bearings and bolt securing mechanisms.	**9.5**				**X**					
Centralized lubrication system										
Check fluid level in supply tank; if necessary, replenish.	**9.6**									As required.
Check pipes and screw couplings for damage.	**9.6**			**X**						
Other points of lubrication										
Lubricate joints, pins, hinges and all movable components.	**9.7**			**X**					Every two weeks.	And after every crane cleaning operation using the high-pressure steam jet blower.

[**)] Optional equipment

Memo:

Memo:

2 Engine

DANGER **A double ladder must be positioned at the superstructure to enable maintenance work to be performed on the engine (with the fly jib mounted and folded to the boom). The double ladder is located below the driver's cab and secured by means of supports (see part B2, item 11.2).**

DANGER **Maintenance work may only be performed while the engine is at a standstill.**

The following general inspection, servicing and maintenance operations at the engine, such as:

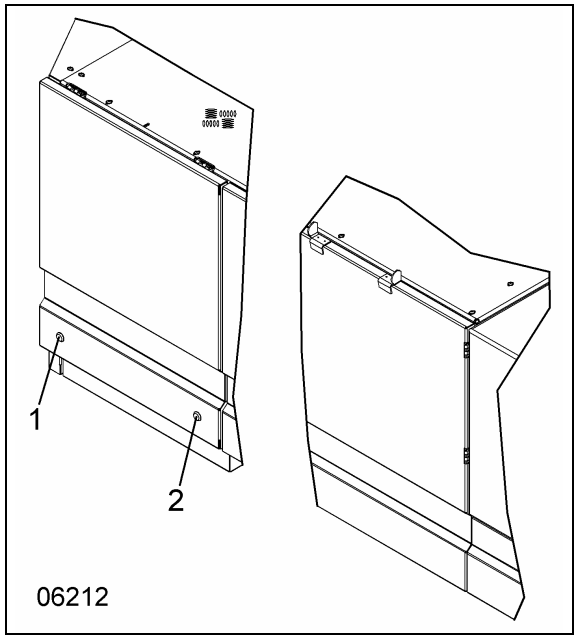
- Engine oil level inspection,
- Engine oil change,
- Replacement of lubricating oil filter,
- Replacement of fuel filter cartridges,
- Cleaning of fuel prefilter cartridges,
- Inspection of Vee belt for good condition,
- Checking the tappet clearance
- Performing troubleshooting, etc.,

have been described in the Operating Manual of the engine manufacturer which has been supplied with the machine.

- Check engine for leakage at regular intervals.

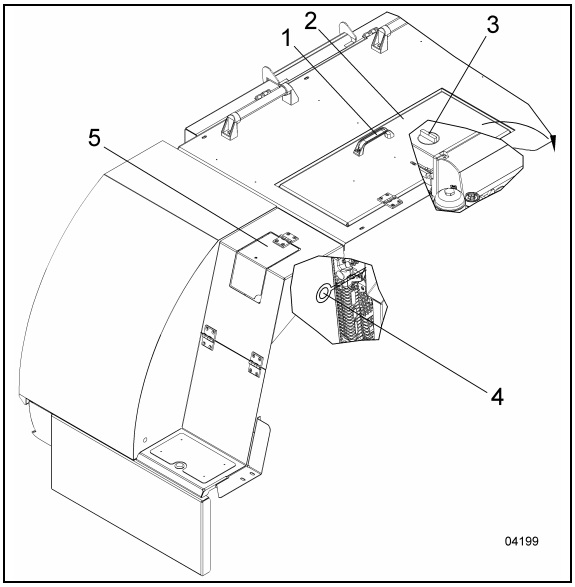
Unlock lateral servicing lids.

The lateral servicing lids can be opened after releasing the locks (1), (2).



2.1 Oil level inspection

NOTE **The oil level is checked and oil is added through the servicing port (2) in the engine cover.**



- Open servicing lid (2) at the handle (1).
Pour in oil via the oil filler port (3).

- Open servicing lid (5).
The oil level is measured by means of the oil dipstick (4).

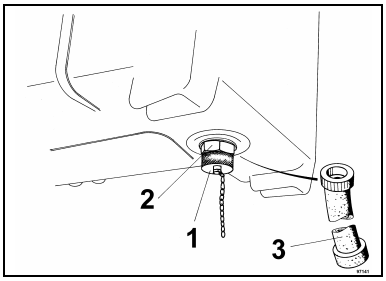
For oil level inspection and oil filling, refer to the specifications of the engine manufacturer.

While the engine is at a standstill, the oil level of the engine can be monitored by a symbol (refer to item B2-3).

2.2 Oil change / oil filter replacement

Attention **Oil change and oil filter replacement every <u>900</u> operating hours; at least, however, <u>once per year</u>.**
However, these intervals apply only in conjunction with oils according to DB approval 228.5.
The specifications of consumables of the engine manufacturer must be complied with.

NOTE **To facilitate collection of the used oil during engine oil changes, the oil drain plug installed as standard equipment can be removed during the first oil change, and replaced by a drain valve provided with the tool kit.**
To this effect, first drain the used oil, then mount the drain valve with packing ring instead of the oil drain plug.



During subsequent oil changes, only the cap (1) of the drain valve (2) need be removed and replaced by the oil drain hose (3) which is supplied with the took kit. As the hose is fastened, the drain valve opens and the oil can be drained through the hose into the collect vessel provided to this effect.
After these operations have been finished, remove the drain hose, clean the thread using a clean piece of cloth and retighten the cap screw.

! Used oil and filters must be disposed of in an environmentally responsible fashion !

2.3 Inspection of hose clamps of the charge air hoses

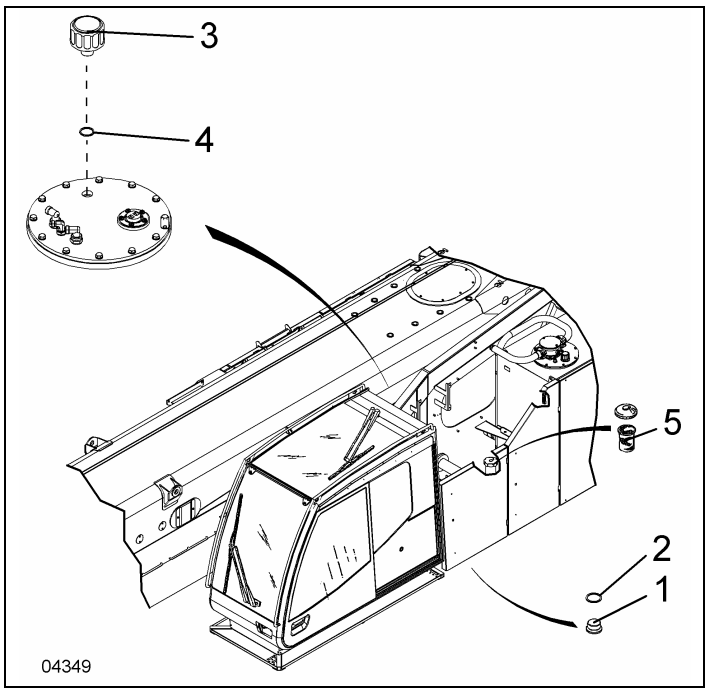
Attention **The hose clamps of the charge air hoses are equipped with cup springs on the threaded housing. When re-tightening the hose clamps, make sure that the maximum tightening torque of 10.2 Nm is not exceeded.**

- The hose clamps of the engine charge air hoses must be checked for tight fit according to the maintenance schedule.

2.4 Fuel tank

2.4.1 Draining condensation water

Under extreme weather conditions, condensation may form in the fuel tank.
Operate the vehicle until the tank is emptied to reserve; unscrew the drain plug (1) from the tank bottom and drain condensed water into an appropriate vessel. The drain port must be left open until clean fuel flows out.
Before retightening the drain plug, clean the sealing surface using a lint-free cloth.
- Check and clean sealing element (2); if necessary, replace.
- Insert plugscrew (1) together with the sealing element (2) and tighten it.



2.4.2 Clean fuel strainer**) in the filler socket

The filler socket for fuel is located on the left side, behind the superstructure cabin.
- Open the cover, remove the fuel strainer (5) and clean it in a clean vessel using a cleaning agent or diesel fuel; check and if necessary, replace it.
- Subsequently, blow the fuel strainer (5) out using compressed air.
- Reposition the fuel strainer (5) and mount cover.

2.4.2.1 Ventilation filter

- Check the aeration filter (3) for damage and contamination; clean and, if necessary, replace it (refer to item C1-9).
- When replacing the ventilation filter, check and clean sealing element (4); if necessary, replace it.

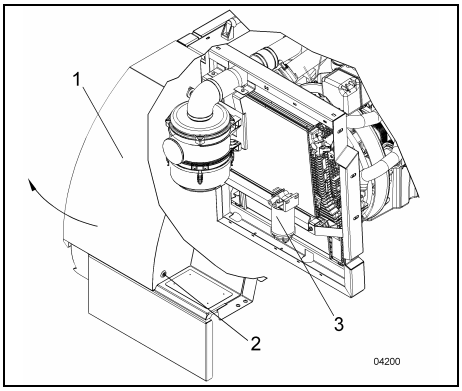
**) Optional equipment

2.4.3 Fuel strainer

NOTE **The fuel strainer is located below the air cleaner fairing.**

- Open servicing lid (1) after having released the lock (2).

The fuel strainer (3) is accessible for maintenance purposes.



2.4.3.1 Draining condensation water

- Open the drain valve (1) and allow the collected condensation water to drain into an appropriate vessel.

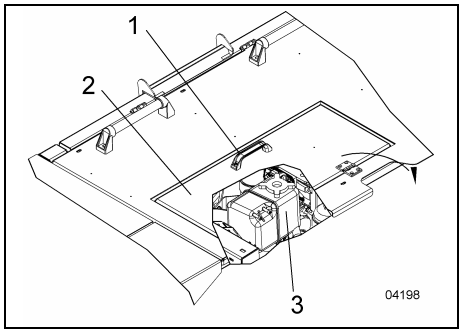
NOTE **Before the cold season begins, the condensate must be drained. If necessary, repeat this step several times.**

2.4.3.2 Replacement of fuel strainer

- Drain the entire filter contents as described under item 2.4.3.1.
- Disconnect the filter (4) from the filter top (5) together with the filter base (2).
- Disconnect the filter base from the filter; clean the filter base (e.g. using diesel fuel).
- Clean the sealing surfaces.
- Grease new sealing elements with diesel fuel and insert them into the gaskets (3).
- Screw-fasten filter base (2) by hand to new filter cartridge, and screw-fasten filter cartridge (4) to filter top (5).
- Tighten all components securely.
- Bleed system, as described in part B2, item 4.5.3.

2.5 Coolant

NOTE **The expansion tank is located below the servicing lid (2).**

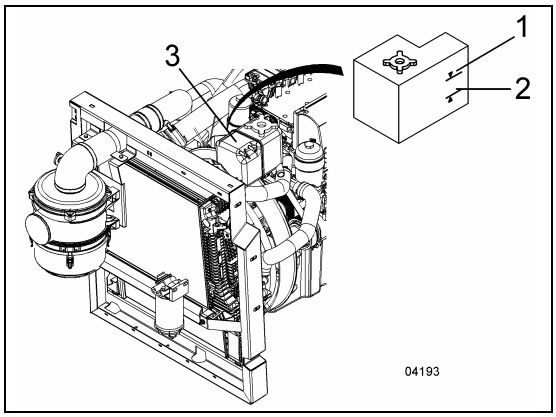


- Open servicing lid (2) at the handle (1).
The expansion tank (3) is accessible for maintenance purposes.

2.5.1 Check coolant level

DANGER **Open cover of filler socket carefully and only at a coolant temperature below 90°C.**

The cooling system is filled correctly if the coolant level is between the "Max. (1) and Min." (2) marks on the expansion tank (3).



If necessary, add or replace the anti-freeze agent approved by the engine manufacturer.
Check the anti-freeze protection using a test instrument. The components must be frost-proof down to -37°C all the year round.

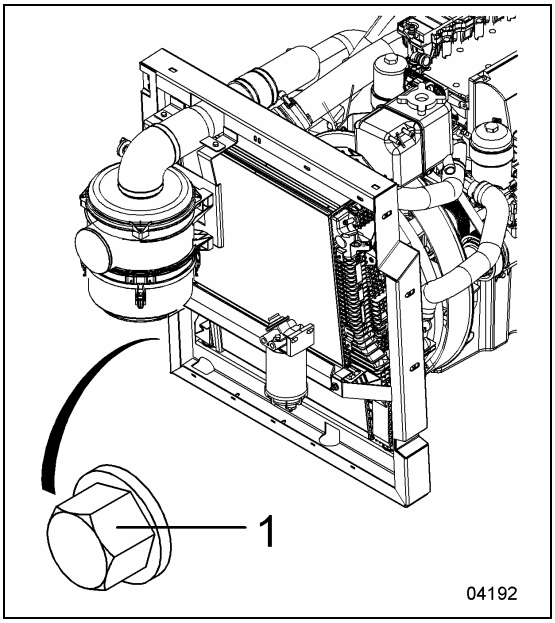
When the coolant is replaced or the cooling system has to be refilled after repair, the whole cooling system must be bled.

NOTE **In case of possible leakage at the radiator hose couplings, do not only retighten or replace the hose clamps, but check also the pressure relief valve in the valve cover for proper working order. A defective valve may cause excess pressure in the coolant circuit and consequently leakage.**

2.5.2 Drainage of coolant

NOTE **Before the coolant is replaced, the vehicle's warm water heating must be open.**

The drain plug is located at the bottom of the radiator. It is located in the lowest position of the cooling system.
- Open the drain plug (1) and the cover of the overflow tank; drain coolant into a suitable container.
- Fasten the drain plug and pour in coolant mix via the overflow tank.
- Start the engine, make it run at various speed levels for approx. 1 minute.
- Stop the engine and check the coolant level in the overflow tank; if necessary, top up.



! Coolant must be disposed of in an environmentally responsible fashion !

NOTE **For instructions how to drain the entire coolant from the engine, refer to the engine manufacturer's operating manual.**

2.6 Cleaning the radiator

Depending on the dust collected, the cooler fins of the charge air and water cooler must be cleaned by flushing with compressed air or using a paint brush.

2.7 Air cleaner

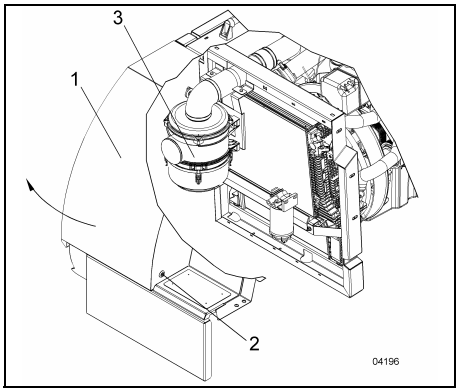
DANGER **The air cleaner may only be serviced while the engine is not running. Switch battery main switch off.**

Attention **Do not start the engine while the air cleaner cartridge is not installed.**

NOTE **In addition to the normal replacement intervals, the air cleaner cartridge needs only be serviced if the icon "air cleaner" in the FAUN Control and Service System goes on while the engine is running (refer to part "B2", item 3.1 and 4.6.2.5). However, the air cleaner housing may have to be cleaned at shorter intervals as an intermediate measure, depending on the operating conditions and on the dust collected.**

Attention **The air cleaner housing must be checked for damage and cracks whenever the air cleaner is serviced.**

NOTE **The air cleaner (3) is located below the air cleaner fairing.**



- Open servicing lid (1) after having released the lock (2).

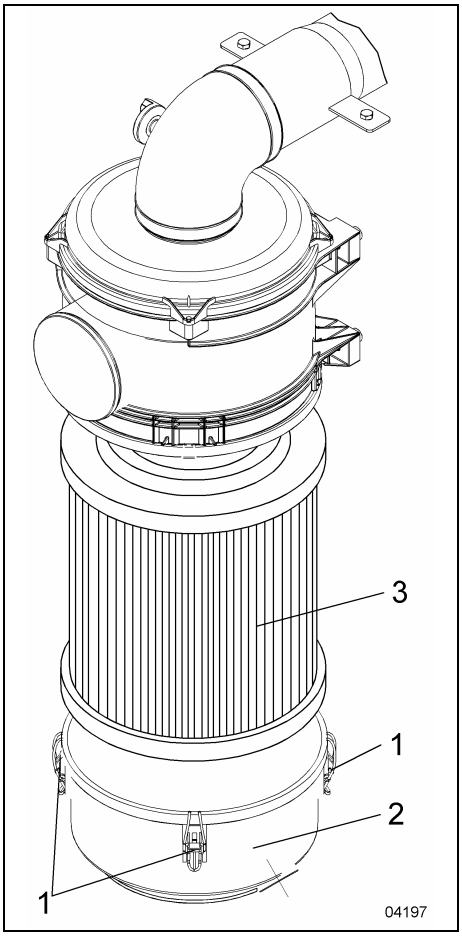
The air cleaner (3) is accessible for maintenance purposes.

2.7.1 Removal / installation of the air cleaner cartridge

- Open the retaining clips (1) of the cover.
- Remove the cover (2) from the air cleaner housing.
- Pull the air cleaner (3) out of the air cleaner housing.
- Clean the air cleaner housing and the sealing surfaces of the air cleaner housing, as well as the cover carefully using a lint-free piece of cloth.
- Insert new air cleaner cartridge carefully into the air cleaner housing. Make sure that the sealing surfaces are in perfect condition.
- Mount the cover. To this effect, place the cover onto the air cleaner housing and fasten it by means of the retaining clips (1).

- During assembly, perfect fit of the air cleaner cartridge and the air cleaner housing cover must be ensured.

Attention **Do not blow-clean using compressed air!**
Make sure that no dust can enter the engine's air intake system while the air cleaner housing is being cleaned!



2.7.2 Checking the air cleaner cartridge

Check new air cleaner cartridge before installation.

Attention **On no account may an air cleaner cartridge be used which shows visible damage - dents, deteriorated filter surface etc.**
Replace damaged air cleaner cartridges immediately.

2.7.2.1 Maintenance instructions

Air cleaner servicing requires absolute precision and reliability. Inappropriate air cleaner servicing may damage the engine.

Do NOT perform maintenance depending on the result of the visual inspection of the air cleaner cartridge. If an air cleaner cartridge is functioning properly, it must look dirty.

Never clean an air cleaner cartridge by
- knocking,
- washing,
- blowing,
- or other cleaning procedures.

2.7.2.2 Disposal

! Air cleaner cartridges must be disposed of in an environmentally responsible fashion !

2.7.3 Check air intake pipes and hoses.

- Check all hose connections between the air cleaner and the engine and the charge air hoses for tight fit. Use screw-type hose clamps only.

- Check hoses and pipes for porosity and cracks.

2.7.4 Inspection of electric vacuum switch on the clean air end of the air cleaner housing

If the pilot lamp "air cleaner" does not go on despite the air cleaner being contaminated, the electric vacuum switch must be checked for proper working order. The pilot lamp may also be defective.

2.7.4.1 Monitoring of air cleaner - check for proper working order

- Engine running, reduce air cleaner intake opening **gradually** by covering it (e.g. using cardboard or sheet metal), until the air cleaner icon goes on.

Attention **Once the air cleaner icon is lit, the intake opening must not be reduced further.**
Risk of damage!

2.8 Exhaust system

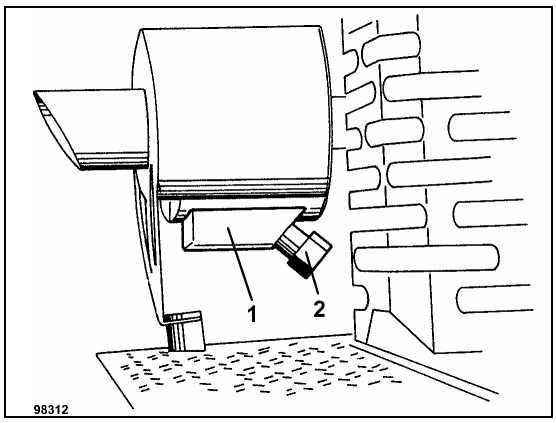
The exhaust system consists of special steel. It does not require any particular service or maintenance.

2.8.1 Servicing the silencer spark arrester**)

Cleaning the soot collector

To remove the soot particles collected in the soot collector (1), remove the cap (2).

To ensure that the spark arrester is always in proper working order, the soot recipient must be emptied at regular intervals.



**) Optional equipment

Memo:

3 Hydraulic system

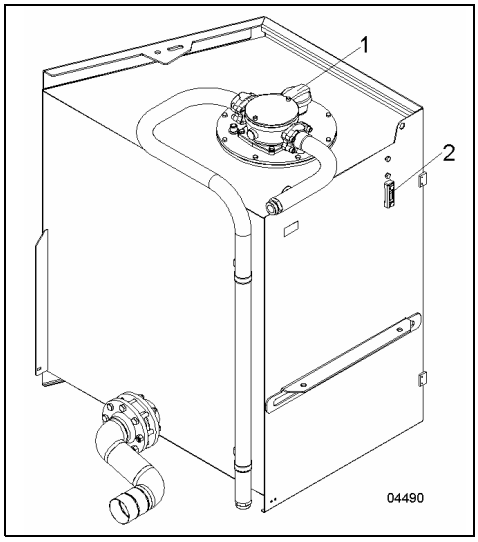
DANGER **Work on the hydraulic system may only be performed while the engine is at a standstill.**

- Check hydraulic system for leakage at regular intervals.

•Checking and retightening the screw couplings of the hydraulic assemblies and pipes, see item C2-3.6.

Attention **The shut-off cocks may only be closed in case of repair work (e.g. at the hydraulic pumps).**

3.1 Check the hydraulic oil level.



- Check the hydraulic oil level while the engine is at a standstill and while the telescope cylinders and the boom elevation cylinder are retracted.
- The hydraulic oil level is indicated at the sight glass (2).
- The hydraulic oil level should be in the center of the inspection glass (2.
- Oil is poured in via the port of the ventilation filter (1)

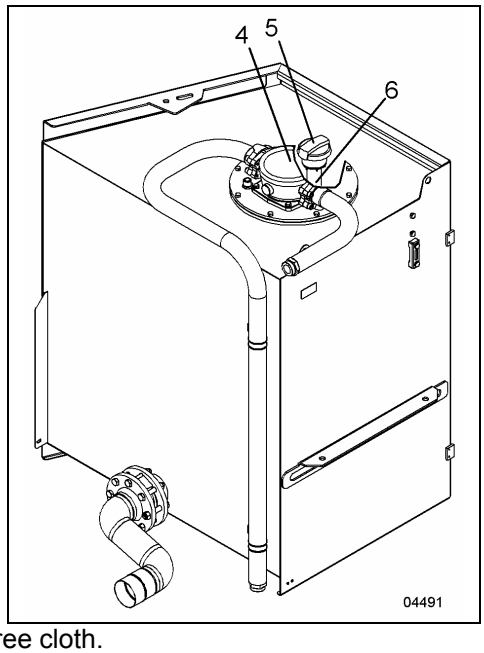
- Unscrew the ventilation filter (1) and pour in hydraulic oil through the port.
- Reposition and fasten the ventilation filter (1).

Attention **Make sure that only new hydraulic oil is poured in from clean vessels.**

3.2 Replacement of filter cartridges

DANGER **Replace the filter cartridges only while the engine is at a standstill.**

NOTE **The individual components installed in the valves, pumps and hydraulic motors have deliberately narrow tolerances. Even very small impurities penetrating the hydraulic system may cause malfunctions.**
The filter cartridge must be replaced simultaneously with every oil change to the hydraulic system, if the icon "Contamination of hydraulic oil filter" (see item B2-3.1, Control and Service System, and item B2-4.6.3.1) or the warning lamp 3 "Central warning" goes on, and according to the maintenance schedule.
Do not clean the filter cartridge.



● The tele and boom elevation cylinders are retracted.

- Release the securing bolts and remove the filter cover (4).
- Remove the filter insert; allow the residual oil to drip.
- Clean, check and, if necessary, replace the seal in the cap.
- Insert new filter cartridge carefully into the housing.
- Clean the filter cover seal (4) and the sealing surfaces using a lint-free cloth.
- Make sure that the sealing element fits correctly.
- Position the filter cover (4) and re-tighten the securing bolts.

3.2.1 Replacement of the ventilation filter

- If the ventilation filter is contaminated or clogged, open the ventilation filter (5) and replace the filter element by a new one (refer also to item C1-9).

3.2.1.1 Clean filling strainer

- If the filling strainer is contaminated or clogged, open the ventilation filter (5) and clean the filling strainer (6).

3.2.2 Replacement of sinter filters

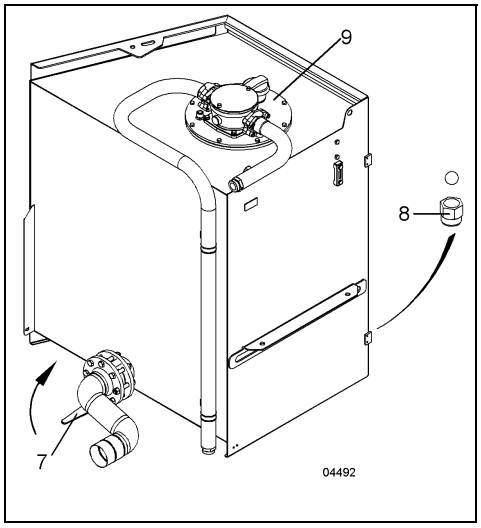
Depending on the design of the hydraulic system, sinter filters are installed in the valves and control blocks. The installation position of the filter in question is specified in the appropriate hydraulic piping diagram.

NOTE **Whenever an operating malfunction occurs in a function circuit (loss of power etc.), replace the sinter filters before taking other action.**

! Filters must be disposed of in an environmentally responsible fashion !

3.3 Oil change in the hydraulic system

DANGER **Perform hydraulic oil change only while the engine is not running.**



- The tele and boom elevation cylinders are retracted.
  Close the stop cock (7) in the suction pipe.
- Remove the cap from the drain plug (8).
- Release drain plug (8) - **do not unscrew it** - until hydraulic oil is leaving. Drain the hydraulic oil completely into a suitable container.
- Close the drain plug. Reposition the cap.
- Replace the filter cartridge as described under item 3.2.
- Eliminate any impurities after having removed the cover (9).
- Rinse the tank using diesel, petroleum etc.
- Make sure that no impurities remain in the tank. Eliminate rinsing liquid completely.
- Clean sealing surfaces, clean sealing element, check and - if necessary - replace it.
- Re-mount the cover (9). Tighten securing bolts safely.
- Pour in new hydraulic oil as described under item 3.1.
- Open the stop cock (7) in the suction pipe.

Attention **Before starting the engine, check whether the stop cock in the suction pipe of the hydraulic oil tank is opened (lever parallel with reference to the piping).**

NOTE **It is recommended to have the oil analysed by the oil supplier before carrying out a scheduled hydraulic oil change, or at regular intervals, to see whether a hydraulic oil change is necessary. The purity degree must comply with ISO 4406 grade 18/16/13. Only clean hydraulic oil must be poured in during the oil changes. Depending on the degree of contamination and the thermal load the hydraulic oil is subject to, shorter oil change intervals than those specified in the maintenance schedule may be required.**

! Filters and used oil must be disposed of in an environmentally responsible fashion. !

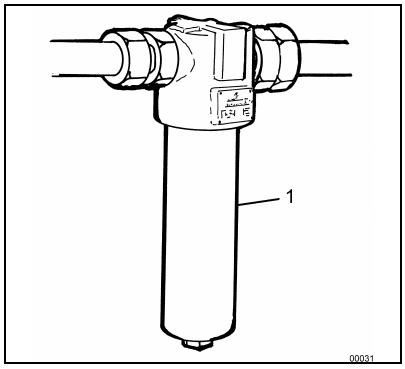
3.4 Changing the oil type

The hydraulic system can be converted to biodegradable hydraulic oils according to VDMA 24568.

Attention **When changing over the hydraulic system from hydraulic oils based on mineral oil to biodegradable hydraulic oils, compliance with the directives of VDMA 24569 must be ensured.**
(Use the recommended oil types.)

3.5 Replacement of filter insert of pressure filter

- Unscrew the filter housing (1) and replace the filter cartridge.
- Clean sealing surfaces before assembly using a lint-free cloth.



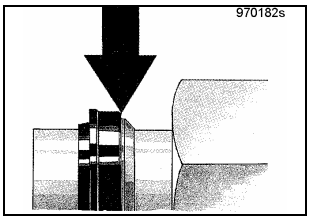
3.6 Checking and retightening the screw couplings of the hydraulic assemblies and pipes

- Check piping systems for leakage according to the maintenance schedule.
- In case of leakage of the adjustable screw couplings and assemblies, proceed as follows: first release the cap nuts on the piping systems or hose pipes, then tighten the adjustable screw couplings in the assemblies safely, finally fasten the cap nuts of the piping systems and hose pipes again.
- Perfectly sealing condition is only ensured if the above sequence of operations is observed and complied with.
- In case of leakage at the cap nuts of the piping systems, check cap nuts for tight fit; if necessary, replace the screw coupling.

3.6.1 Check screw couplings on the piping systems

Release the cap nut and check whether the gap between the packing ring and the retaining ring is closed.

If necessary, replace the screw coupling.



3.7 Oil cooler / supplementary oil cooler**)

- Clean cooler fins with compressed air, depending on dust accumulated.
- Check fan and thermostatic valve for proper working order.

**) Optional equipment

3.8 Maintenance instructions for hydraulic cylinders

- Before commissioning, make sure that the hydraulic cylinders are bled.
- Bleeding may only be finished when no more bubbles appear.
- Bleeding must be repeated whenever hydraulic components or pipelines have been assembled or disassembled.
- When machines are operating outdoors, bleed the hydraulic cylinders at regular intervals.

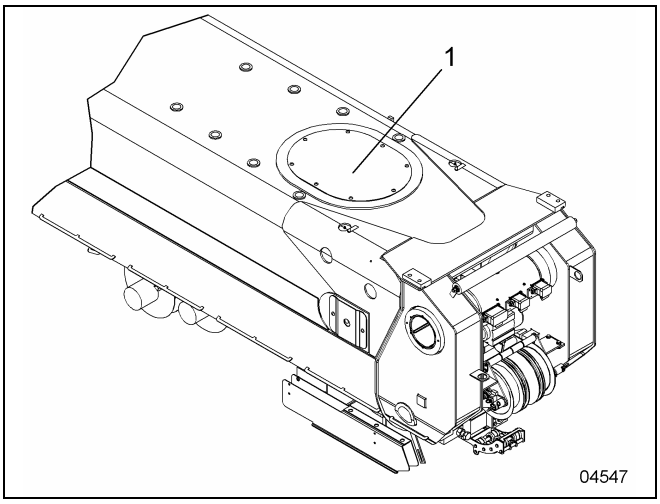
3.8.1 Bleeding the boom tele locking mechanism

The boom tele locking mechanism only require bleeding after:

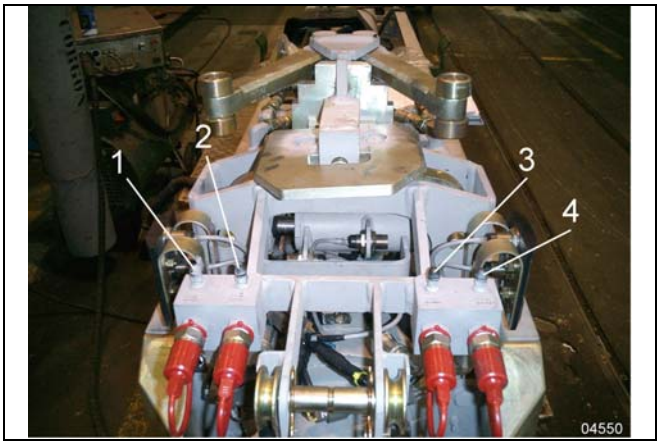
- repair or replacement of hydraulic components, or after hydraulic lines or screw couplings have been opened or replaced,
- malfunctions of boom tele lock due to air entered into this part of the hydraulic system.

Prerequisite:

- The vehicle has been stopped, the gearbox is set to neutral, the engine in the chassis is at a standstill, the parking brake has been engaged.
- The boom is directed over-front and stowed in its rest, all tele sections are retracted.



- Remove the cover (1).
- Start the engine in the superstructure – as described -; have it run at increased speed level.
- Put the tele section emergency control into operation as described under item B2-6.4.3.1.



- Release vent screws (1-4) from the locking unit.
- Actuate the switches of the various locking functions, as described under item B2-6.4.3.1, until a solid stream of oil leaves at the vent screws.

Attention **Any spilled oil must be absorbed immediately.**

- Close vent screws again.
- Check function. If necessary, bleeding must be repeated.
- Stop the superstructure.
- Reset the emergency control to its former state.

- Mount the cover.
- Check the hydraulic oil level, as described under item C2-3.1. If necessary, add hydraulic oil.

Functions of vent screws (in driving direction):

1 = cylinder – pin locked.
2 = cylinder – pin unlocked.
3 = boom – pin locked.
4 = boom – pin unlocked.

3.9 Speeds of the working hydraulics of the superstructure

The table indicates the specified speed set-point of the working hydraulics in sec./min., at max. engine speed, for testing purposes.

NOTE **Precise measurements are only possible after the system has been rinsed and bled. The hydraulic oil temperature should be approx. + 30 to + 40°C and the engine speed should be 2300 rpm. Setting tolerances: Pressure and time values +5%, engine speeds -5%.**

Speeds			Set-point	Engine
Boom elevation	"up"	Normal	95 sec.	Max.
	"up"	High speed	50 sec.	Max.
	"down"	Function speedily, smoothly		
Telescope	extending	High speed	approx. 430 sec.	Max.
	retracting	High speed	approx. 400 sec.	Max.
Winch (only for hoisting!)		Normal	42 rpm	Max.
		High speed	64 rpm	Max.
Auxiliary winch (only for hoisting!)		Normal	42 rpm	Max.
Swing mechanism			51 s/rot	Max.

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3.10 Pressure check in the hydraulic system of the superstructure

In the case of an operating malfunction of the hydraulic system of the superstructure, the set-point pressures of the various pressure ranges can be checked at max. engine speed, by unscrewing the pipes from the measuring connectors on the valves and control blocks, which are marked with "M" in the figure, and by fastening hydraulic pressure gauges to these connectors.

NOTE **Precise measurements are only possible after the system has been rinsed and bled. The hydraulic oil temperature should be approx. + 30 to + 40°C and the engine speed should be 2300 rpm. Setting tolerances: Pressure and time values +5%, engine speeds -5%.**

For pressure values for the hydraulic system of the superstructure, refer to item C2-3.10.1.

I **For pressure setting, refer to the separate documentation. These documents are available via the TADANO-FAUN After-Sales Service.**

II **During pressure setting, the connector of the proportional valve for "boom elevation UP" / "winch UP" must be removed.**

III **When setting the pressure, disconnect and shut off the hose for the hoisting gear brake.**

3.10.1 Set-point pressures in the hydraulic system of the superstructure

Pressure ranges		Set-point	Measuring connector	Engine
Control oil supply max. (fixed setting)		40 bar	M4	Max.
Control pressure, telescope locking mechanism		**I** 75 bar	M9	Max.
Triple control block, tele section 1 / boom elevation / option primary		**II** 365 bar	M3	Max.
Tele section, secondary	retracting	**I** 240 bar	M12	Max
Tele section, secondary	extending	**I** 175 bar	M12	Max
Tele section, pressure reduction	extending	**I** 145 bar	M12	Max
Boom elevation, secondary	“down”	30 bar	M12	Max
Boom elevation, secondary	“up”	345 bar	M12	Max
Triple control block, tele section 2 / winch / auxiliary winch primary		**II** 350 bar	M6	Max.
Winch, secondary	“down”	**III** 110 bar	M11	Max
Auxiliary winch, secondary	“down”	**III** 100 bar	M11	Max
Control block counterweight	“up”	210 bar	M5	Max.
Counterweight, secondary	“down”	100 bar	M5	at idle
Swing mechanism, supply pressure (without applying pressure)		25 bar	M7	Max
Swing mechanism left- / right-hand, pressure capping		340 bar	M13/M14	Max

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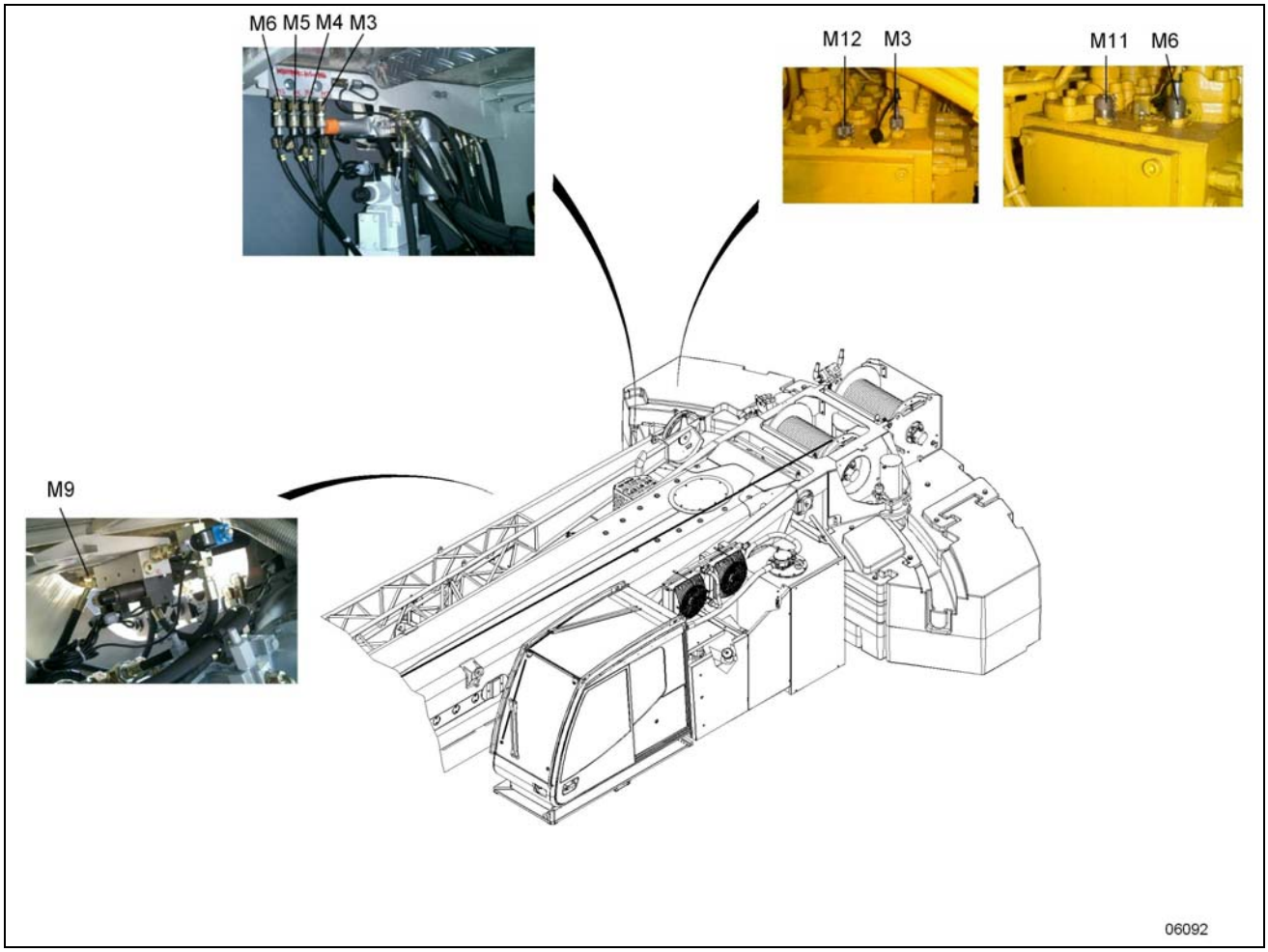
3.12 Measuring connectors



NOTE **The measuring connectors are marked with an "M" in the hydraulic piping diagram for the superstructure.**

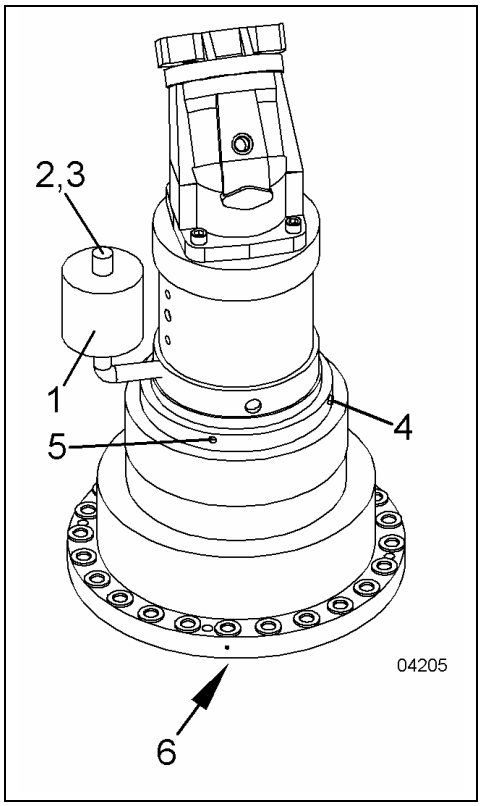
4 Swing mechanism

DANGER **Perform works on the swing mechanism only when it is at a standstill and not subject to load.**
Before commencing the works, take precautions to prevent unintended start-up.
Before starting the vehicle after maintenance or repair works, make sure that there is no person within the danger zone.
To enhance safety, the swing mechanism should be checked visually (inside and outside) at intervals of three years.

4.1 Check for correct oil level and leakage

- **Check the swing mechanism for leakage at regular intervals, according to the maintenance schedule.**
- **Defective seals may affect the service life of the swing mechanism considerably.**
- **Loss of oil or an insufficient oil level in the gearbox may result in damage.**

- Check oil level at regular intervals according to the maintenance schedule, while the gearbox is not moving and after the oil has cooled down.
- After removal of the inspection plug (4), the oil level in the gearbox must reach the inspection port or the inspection glass (5); if necessary, add an appropriate amount of oil via the expansion tank (1) using a funnel or a hose. To this effect, remove the ventilation filter (2) and the plugscrew (3).
- Check oil level once more, if necessary, replenish.



Attention **Different oil types – even if from the same manufacturer – must not be mixed! Moreover, mineral and synthetic oil must not be mixed!**

4.2 Oil change

- Perform the oil change at regular intervals according to the maintenance plan when the system has its service temperature.

DANGER **Risk of scalding.**

- Drain oil into an appropriate vessel through the drain port by removing the oil drain plug (6).
- Clean, check and, if necessary, replace the seal. Close drain port again.
- Pour in new oil via the expansion tank (1) after removing the ventilation filter (2) and the plugscrew (3), until the oil escapes through the inspection port (4) or until the oil level is visible in the center of the inspection glass (5). Immediately after start-up, check the oil level once more and, if necessary, add oil.
- Clean sealing surfaces, clean sealing elements, check and - if necessary - replace them.
- Close inspection and filler ports again.

NOTE **Check oil for foreign matter whenever an oil change is performed.**
Drain oil when it has its service temperature. Caution - risk of scalding!
If e.g. coarse impurities are detected, they may be due to excessive stress or improper operation. Determine the cause and eliminate it. Dismantle the hoisting gear, check it for damage. If necessary, have a general overhaul be performed by the manufacturer.
Check oil for possible blackening and foreign matter, if necessary, reduce oil change intervals.

4.2.1 Inspection of the swing mechanism

DANGER **Before or after any extended continuous operation, and in case the maximum load is reached frequently, the screws and bolts located within the power flow must be checked for tight fit.**

- Check all screw couplings for tight fit.
- Check swing mechanism for abnormal sounds.

4.2.2 Ventilation filter

- Check the aeration filter (item 4.2, pos. 2) for damage and contamination; clean and, if necessary, replace it (refer also to item C1-9).

4.2.3 Inspection of the swing brake

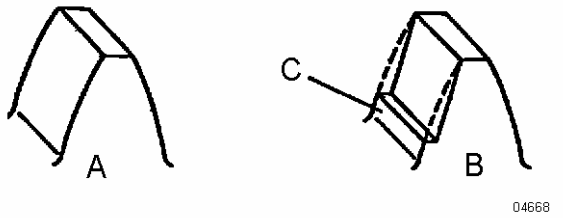
Check for proper working order and leakage during operation. Once per year, the internal parts should be checked for wear.
Please do not hesitate to contact your TADANO FAUN After-Sales Service in case of queries or problems. They will be pleased to perform for you all the servicing, maintenance and repair work required.

4.4 Check tooth face backlash on swing motor gearbox drive shaft

The swing motor and the brake should be removed and the splined shaft connections on the drive end checked at regular intervals.

No excessive tooth face backlash is admissible.

After the running-in period, the tooth faces show a smooth, bright surface in case of normal wear. If there are other phenomena, such as scrub marks, seizing, pits, flaking, blistering, cracks and plastic deformations, the gear wheels must be replaced.



A = gearing in proper working order, B = gearing damaged, C = step

Please do not hesitate to contact your TADANO FAUN After-Sales Service in case of queries or problems. They will be pleased to perform for you all the servicing, maintenance and repair work required.

4.5 Swing mechanism - greasing ring gear and pinion

The lubrication intervals depend on the slewing frequency. The special lubricant is applied to the gearing using a paint-brush or a spray gun. It must be ensured that no blank areas are left on the tooth faces.

NOTE **After each cleaning operation of the machine - especially after using a steam-jet unit - check the lubrication of the ring gear and pinion of the swing mechanism. The ring gear and the pinion must always be supplied with lubricant.**

4.6 Greasing the ball bearing slewing ring

NOTE **The ball-bearing slewing device is supplied with grease via the centralized lubrication system.**

- Shorter lubricating intervals may be required in tropical areas, at a high relative humidity, under ambient conditions entailing lots of dust or dirt, and in the case of significant temperature fluctuations.
- Before the crane is put out of operation for an extended time, and before it is restored to operating condition, re-greasing is essential.
- Caution when cleaning the crane - make sure that no water enters into the raceways.
- Once cleaning is finished, lubricate the crane thoroughly.
- The grease filling is to prevent friction, to seal and to protect the assembly against corrosion.
- Sufficiently ample amounts of grease must be used, so that a grease bead forms around the whole circumference of the bearing grooves.
- To achieve uniform grease distribution, support the crane by outriggers and slew the superstructure while re-greasing.

DANGER **CAUTION during slewing operation ! Nobody is allowed to stay on the chassis ! For slewing, it is essential that the crane is supported by outriggers!**

4.7 Greasing the swing lock pin

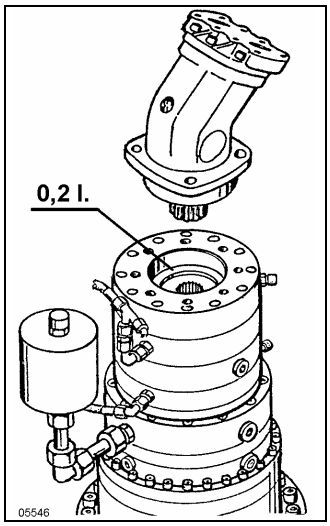
- The lock pin of the superstructure locking system must always be easy to operate.
- Grease the pin at regular intervals.

4.8 Check mechanical superstructure lock and proximity switch for proper working order.

The superstructure is locked by means of the lock pin. Checking is possible via a proximity switch provided in the chassis. The functions of the lock assembly and the proximity switch should be checked before each crane operation.
For locking the superstructure, refer to part B2, item 2.9.
If the icon "swing mechanism locked" does not go on in the Control and Service System after actuation, this may be due to the following reasons:

- The icon is faulty.
- The lock has not been engaged.
- The proximity sensor in the chassis is faulty.

4.9 Lubrication of the swing mechanism multi-disc compartment



To ensure corrosion-protection inside the multi-disc compartment and to obtain a constant friction value, 0.2 l of hydraulic oil must be poured in before assembling the motor.
The multi-disc compartment does not require an oil change.

However, it must be ensured that the same type and quantity of oil are poured in after repair or after replacement of the disc package, before the motor is assembled.

4.10 Checking the ring gear connecting bolts, the securing bolts of the hydraulic motor and the gearbox flange bolts for tight fit

- Check screws of rotary coupling, of hydraulic motor and gearbox flange bolts for tight fit according to the maintenance schedule; if necessary, re-tighten.

Attention **It is essential to use a torque wrench for checking or re-tightening the screws and bolts.**

Tightening torques of
- ring gear connecting bolts M 30 = 1805 $\pm$ 95 Nm,
- hydraulic motor securing bolts M 12 = 89 Nm $\pm$ 5 Nm,
- gearbox flange bolts M 20 = 546 Nm $\pm$ 14 Nm.

4.11 Checking the slewing device for wear

During the many years of operation, the wear of the raceway system, and consequently the tipping backlash of the slewing device increase.

The maximum admissible increase of the bearing backlash, measured below the raceway, is 2.9 mm. The specified value is not an absolute value, but indicates the increase of the backlash, referred to the bearing backlash of the component when new.

DANGER **If an inadmissible increase of the tipping backlash or advanced wear is suspected, please contact the TADANO-FAUN After-Sales Service.**

5 Hoisting gear and auxiliary hoisting gear**)

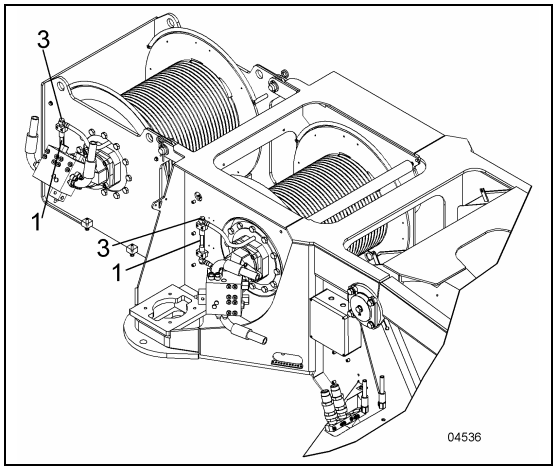
DANGER **A double ladder must be placed on the superstructure for maintenance work to be performed on the main or auxiliary winch. The double ladder is located below the driver's cab and secured by means of supports (see part B2, item 11.2).**

DANGER **Perform works on the hoisting gear or on the auxiliary hoisting gear**) only when the vehicle is at a standstill and in no-load condition.**
Before commencing the works, take precautions to prevent unintended start-up.
Before starting the vehicle after maintenance or repair works, make sure that there is no person within the danger zone.
To enhance safety, the hoisting gear and the auxiliary hoisting gear should be checked visually (inside and outside) at intervals of three years.

5.1 Check for correct oil level and leakage

- **Check the hoisting gear for leakage at regular intervals, according to the maintenance schedule.**
- **Defective seals may affect the service life of the hoisting gear considerably.**
- **Loss of oil or an insufficient oil level in the gearbox may result in damage.**

- Check oil level at regular intervals according to the maintenance schedule, while the gearbox is not moving and after the oil has cooled down.
- The oil level must be between the two marks “minimum” and “maximum” at the inspection glass (1). If necessary, add an appropriate quantity of oil via the filler plug (3) using a funnel or a hose.
- Check oil level once more, if necessary, replenish.
- Clean sealing surfaces, clean sealing elements, check and - if necessary - replace them.
- Close filler ports again.



Attention **Different oil types – even if from the same manufacturer – must not be mixed! Moreover, mineral and synthetic oil must not be mixed!**

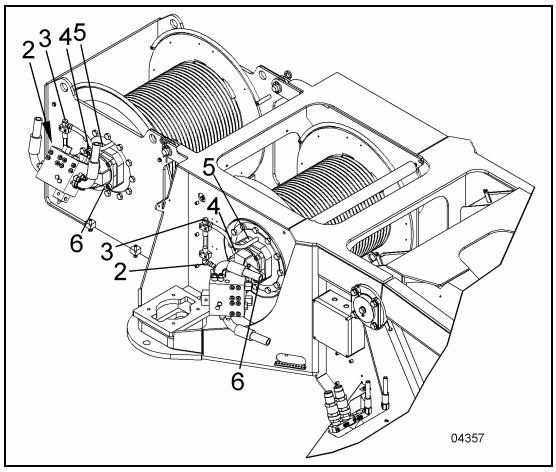
**) Optional equipment

5.2 Oil change

- Perform the oil change at regular intervals according to the maintenance plan when the system has its service temperature.

DANGER **Risk of scalding.**

- Unscrew filler plug (3) and drain plug (2).
- Drain oil in an appropriate vessel.
- Clean the sealing surfaces.
- Clean the seals of the drain plug (2), check and – if necessary – replace them, then re-tighten the drain plug (2).
- Pour in new oil through the filler plug (3) by means of a funnel or a hose, until the oil level on the inspection glass is between the min. and max. marks.
- Clean the sealing surfaces, clean the seal of the filler plug (3), check and – if necessary – replace it, then re-tighten the plug.
- Check oil level once more, if necessary, replenish.



NOTE **Check oil for foreign matter whenever an oil change is performed.**
Drain oil when it has its service temperature. Caution - risk of scalding!
If e.g. coarse impurities are detected, they may be due to excessive stress or improper operation. Determine the cause and eliminate it. Dismantle the hoisting gear, check it for damage. If necessary, have a general overhaul be performed by the manufacturer.
Check oil for possible blackening and foreign matter, if necessary, reduce oil change intervals.

5.3 Oil level inspection in motor coupling of hoisting gear motor

The oil level must be checked at regular intervals according to the maintenance schedule.
- Open the oil level inspection plug (4) at the overflow port. The oil level must reach the lower edge of the overflow port. If necessary, add oil (use the recommended oil types) via the filler opening (5).

5.4 Oil change to motor coupling of hoisting gear motor

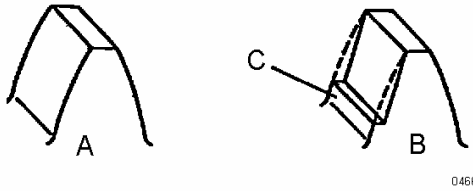
The oil change must be performed at regular intervals according to the maintenance schedule.
- Drain oil via the drain plug (6).
- Check oil for impurities. If coarse abrasion or flat spots are detected on the tooth faces, the splined shaft connection must be checked.
- Pour in new oil via the oil filler port (5), until the oil flows out of the inspection port.

5.5 Check tooth face backlash on hoisting gear motor gearbox drive shaft

The hoisting gear motor and the brake should be removed and the splined shaft connections on the drive end checked at regular intervals.

No excessive tooth face backlash is admissible.

After the running-in period, the tooth faces show a smooth, bright surface in case of normal wear. If there are other phenomena, such as scrub marks, seizing, pits, flaking, blistering, cracks and plastic deformations, the toothed wheels must be replaced.



A = gearing in proper working order, B = gearing damaged, C = step

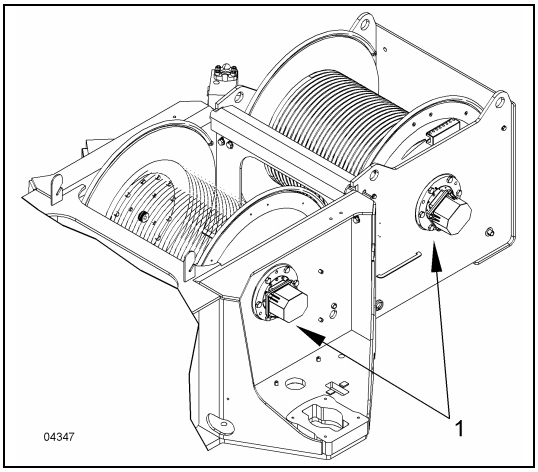
Please do not hesitate to contact your TADANO FAUN After-Sales Service in case of queries or problems. They will be pleased to perform for you all the servicing, maintenance and repair work required.

5.6 Greasing of hoisting gear drum bearing bush

NOTE **The bearing bush is supplied with grease via the centralized lubrication system.**

- Grease the bearing bush on the bearing end via lubricators (1) according to the maintenance schedule.

Make sure to apply only just as much grease until it flows out uniformly at the bearing bush.
(Use recommended grease type).



5.7 Preservation of the hoisting gear drive

If the machine is to be decommissioned for an extended time, preservation of the hoisting gear is recommended.
- Drain the used oil and pour in half the quantity of preservative oil.
- Actuate the hoisting gear for approx. 5 to 10 minutes, winding and unwinding the rope without load, using a high number of rope falls.

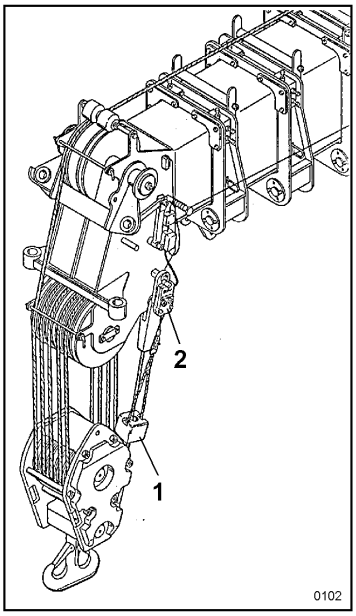
- On re-commissioning the machine, drain the preservative oil and pour in the specified oil type.

Only such types of preservative oil may be used as emulsify with the lubricating oil, according to the oil manufacturer's specifications (use the recommended oil types).

5.8 Inspection of hoisting gear brake

The hoisting gear brake should be checked for wear once per year.
The hydraulic multi-disc brake of the hoisting gear is subject to a certain wear. For inspection, unscrew the hoisting gear flange together with the engine. In case of wear, the complete set of brake discs must be replaced.
At the same time, the free wheeling of the hoisting gear brake must be checked.
To this effect, proceed as follows:
To check the free wheeling, pick up a load which amounts to 125 % of the max. rope pull force via the boom elevation using the short boom, and suspend it just above the ground. The distance which is now existing between the lifted load and the ground must not change within 15 minutes.
However, it must be taken into consideration that the angle included by the boom elevation cylinder does not change due to temperature influences. If the load moves down, the free wheeling must be replaced.

5.9 Check hoist limit switch for proper function.



The hoist limit switch prevents the bottom block from hitting against the rope sheaves.

- Raise the bottom block carefully, until the releasing weight (1) is lifted and the spring-loaded limit switch (2) is set free.

Now, the crane movements "hoisting gear up", "extending telescopes" and "boom elevation down" must be switched off.

- Lower the bottom block until the releasing weight is suspended freely; now all crane movements are possible again.

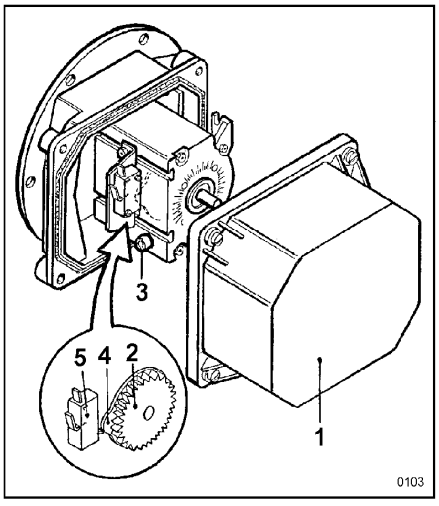
5.10 Checking the hoist limit switch on the hoisting gear

The rope limit switch is set so that at least **three** safety rope windings remain on the drum.
- Extend the telescopes and wind off the rope until at least **three** rope windings remain on the drum.

Now, the hoisting gear must shut off.

NOTE **Before winding up the rope, check the rope drum and the rope grooves for wear. While spooling up, check the rope and, if necessary, grease it.**

5.10.1 Setting the rope limit switch



- Wind up at least 3 rope windings on the drum.
- Unscrew the cover (1).
- Turn the gearbox cam disc (2) via the setscrew (3) until the cam (4) actuates the micro switch (5). (Clicking sound in the switch).

The gearbox cam disc does not require any maintenance.

6 Winch rope

NOTE **The winch rope servicing and maintenance operations specified under item 6 must also be performed for the winch rope of the 2nd hoisting gear.**

DANGER **A double ladder must be positioned at the superstructure to enable placing the winch rope of the 2nd hoisting gear. The double ladder is located below the driver's cab and secured by means of supports. (Refer to part B1, item 11.2).**

6.1 Inspection

- The winch rope must be checked visually before and after each application.
- When the winch ropes are evaluated and inspected at regular intervals, the legal regulations (in FRG: according to DIN 15020, page 2, and VBG 9a) must be observed scrupulously.
- Winch ropes must be discarded if one of the following deficiencies occur: breakage of a winch rope, breakage of a strand, stepping up, bruising, traces of corrosion, wear, reduction of the winch rope diameter, lasting deformation, etc. (For further details, refer to part "E, Crane Testing Instructions", item 3, "Inspection of winch ropes").
- The winch ropes must be checked along their whole length, even at the fastening devices.

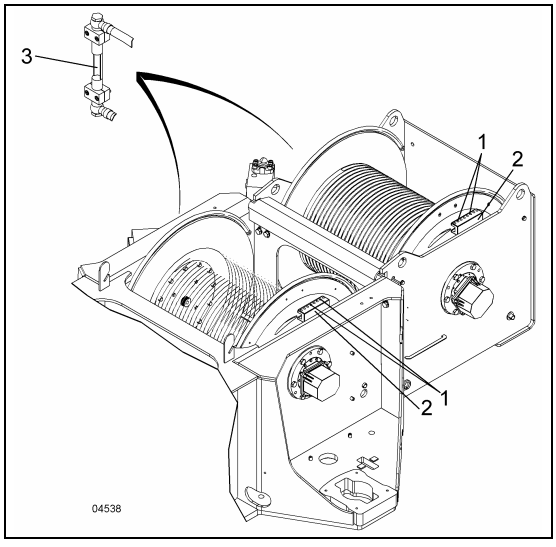
6.2 Cleaning and lubrication of the winch rope

- To prolong the service life of the winch ropes, wash severely soiled winch ropes down with clear water at regular intervals, and grease them after drying. To protect the winch ropes against humidity and corrosion, grease them at regular intervals using an adhesive grease.
- It is not sufficient to grease the winch rope only on the outside. The lubricant must penetrate into the winch rope.

Attention **To increase the winch rope's service life, keep it tidy; do not drag it over the ground.**

6.3 Removal (replacement) of the winch rope

- Place the bottom block on the ground.
- Detach the winch rope socket from its bolt fastening devices and remove it.
- Remove the winch rope from the hoist limit switch weight and detach the winch rope falls from the bottom block and the guide pulleys.
- Wind off the winch rope until the winch rope limit switch shuts off.
- Loosen the residual winch rope windings.
- Release the winch rope end by loosening the threaded (2) pins (1),
- remove the winch rope.



6.4 Inspection of winch rope drum

- Before placing a new winch rope of the same type (refer to crane inspection booklet), check the winch rope drum.
- Clean the drum thoroughly, removing dirt, old paint and foreign matter.
- Check the winch rope drum grooves for wear.
- If necessary, check the oil level via the inspection port (3).

6.5 Placing a new winch rope

NOTE **The service life of a winch rope depends essentially on the way how it is handled on positioning. For replacement, make sure that only metallic winch ropes of the same type and strength and the same diameter are used.**

- If possible, place a reel stand below the boom head when performing this work.
- The technical data of winch ropes are specified in the crane inspection booklet.
  (The corresponding pages are available via the TADANO-FAUN After-Sales Service.)

- Route the winch rope end over the boom head and pull it through to the winch rope drum.
- Pass the winch rope end through the bore-hole of the clamping piece, tighten the threaded pins (1).
- Wind up approx. 6 winch rope windings; wind off the winch rope until the winch rope limit switch shuts off as soon as 3 windings are reached; if necessary, re-adjust the switch.
- Wind up the winch rope slowly on the winch drum. (Place winch rope under a certain pretension.)
- Tap the winch rope into its proper position using only a hammer of brass or lead.

- The winch rope is only wound up properly on the drum when the correct turn directions are selected.
- When winding up the winch rope, make sure that it is under tight tension (if necessary, grease the winch rope).

- Route the winch rope through the weight in the hoist limit switch, reeve the various winch rope falls in the bottom block and fasten the winch rope to the winch rope socket.

Attention **Initially, the new winch rope may only be moved under moderate load and the load must be increased gradually to its maximum rating, so that the winch rope is allowed to run in, to settle and to lengthen.**

6.6 Care to the winch rope

- Regular care to the winch rope helps ensure safety during crane operation and is essential for enhancing the winch rope's service life considerably.
- Metallic winch ropes must be re-greased at regular intervals, depending on the operating conditions, this is especially important in the bending areas at the drum and the pulleys. The agents used for re-greasing must be compatible with the original winch rope lubrication.
- Under identical test conditions, well-greased winch ropes provide four times the fatigue strength under reversed bending stress than non-greased winch ropes.
- Metallic winch ropes which are subject to severe dirt accumulation should be cleaned at regular intervals, best using a brush and washing with clear water.
- If the lower winch rope layers on the drum are nearly not used or not used at all, they must be unwound from time to time and re-positioned under pre-load. A winch rope will operate with optimum economic efficiency if its entire length is always used. Therefore, it is recommended to use a winch rope length suitable for the work to be performed if crane operation will take an extended period of time.
- The winch rope must be checked visually at regular intervals, especially during the first time after placing. Moreover, it must be checked visually after extraordinary stress, in case of supposed, but not visible damage or if there are first signs of damage at the winch rope.
- If the same hoisting movement is executed frequently, the winch rope may be dislocated longitudinally from time to time.

7 Electrical equipment

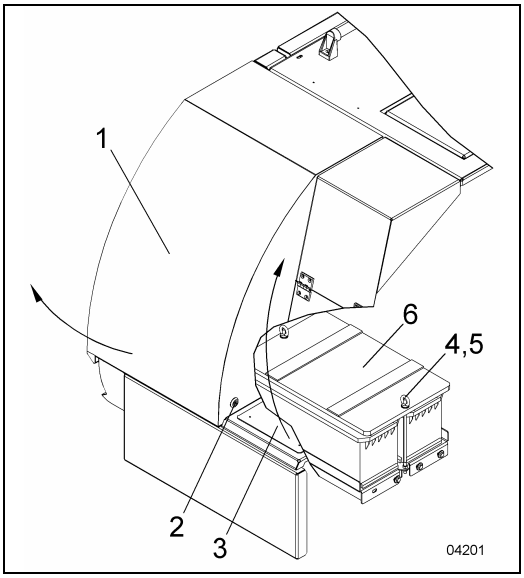
Attention **When work is effected at the electrical equipment, or during welding work on the superstructure, the current circuit must be interrupted by disconnecting the negative terminal "-" cable from the batteries (marked with a minus sign [-] on the battery).**
Never disconnect the batteries while the engine is running. This might destroy electronic components.

7.1 Batteries

DANGER **When checking the acid level, do not smoke; do not use open flames!**
Due to chemical reactions, batteries emit highly explosive hydrogen gas!
Spilled battery acid must not touch the skin, the clothes or the vehicle's paint. Battery acid may cause injuries. Wear protective glasses!
If acid has got on your skin or in your eyes, wash these areas immediately with ample quantities of tap water and, if necessary, consult a doctor!

Attention **Used batteries must be disposed of in an environmentally responsible fashion.**

The batteries are installed on the right side of the superstructure (viewed in driving direction), on the front end, below the cover.
For battery maintenance, open the servicing lid (1) by unlocking the square-head bolt (2) and remove the battery cover (6) by dismantling the ring nut (4) and the washer (5).
If the vehicle operates under normal conditions, the batteries require only little maintenance.
A well-charged battery helps improve the starting process and has a longer service life.



- The acid level must be checked at regular intervals (visual inspection). The acid level must be approx. 10 to 15 mm above the top edge of the cells.
- Only top up distilled or demineralized water. After replenishing, wait approx. 30 minutes, then check the acid.
- The acid density in the individual cells must be measured using an acidimeter.

Discharge batteries freeze at -10°C.

7.1.1 Specific gravity and charge condition of the battery at an acid temperature of +20°C

Specific gravity		Volts per cell	Charge condition of battery
Normal	Tropics	at test instrument	
1,28	1,23	2,4	charged
1,20	1,12	2,0	semi-discharged; re-charge
1,12	1,08	1,75	discharged - recharge immediately

NOTE **When the vehicle is to be used under tropical climate conditions, it is essential to take the fluctuations of the acid density into consideration. During the charging process, the acid temperature must be monitored continuously.**

- During the cold season, a good charging condition must be permanently ensured. If the vehicle is standing for an extended period of time, the batteries must be re-charged.
- The charging current must not exceed 1/10 of the battery capacity.
- The connecting terminals must be greased with acid-free and acid-resistant grease (e.g.Vaseline).
- Due to the danger of short circuits, parts conducting current, such as tools, etc., must not be placed on the batteries.
- If the battery charging pilot lamp does not go out at increased engine speed, this indicates that the batteries are not charged. Find out the reason immediately (governor or alternator).

7.1.2 Installation of new batteries

- When **installing** new batteries, **first** connect **the positive cable (+)**, and then the negative cable (-).
- For **removal**, **reverse sequence** of installation operations.

7.2 Three-phase generator

The service life of the three-phase generator depends considerably on the bearings. Thus, make sure that the Vee belts have always the proper tension (refer to Operating Manual of the engine manufacturer).

- The generator should be checked in a specialist workshop at regular intervals. In case of operation in very dusty ambient conditions or at high ambient temperatures, the inspection should take place correspondingly earlier.
- Operate the generator only when the governor and the batteries are connected.
- When connecting the batteries, pay attention to correct polarity, as incorrect connection might destroy the diodes in the generator.
- Make sure that the batteries are disconnected and that the engine is not running when assembly work is performed which involves live components (precaution)!
- Tipping against the mass in order to find out whether voltage is "on" is not admissible.
- Pre-excitation of the generator is effected from the batteries via the battery charging pilot lamp. To ensure correct excitation, a defective battery charging pilot lamp must be replaced immediately.

7.3 Starter

Refer to the instructions of the engine manufacturer

7.4 Lamps and lights

Defective lamps, indicator and warning lights must be replaced immediately. Make sure to use lamps having the same wattage.

7.4.1 Mounting location, voltage/wattage and designation of the lamps and lights in the superstructure

Mounting location	DIN	Design	Voltage/ Wattage
Working floodlights (cabin, boom)	72601	YC	24V 70W
Working floodlights**) (boom)		G 6,35	24V 250W
Flashing beacon	72601	H1	24V 70W
Instrument panel (switches)	72601	W5/1.2	24V 1.2W
Cab light	72601	K	24V 10W
Lateral lights on the boom head	72601	H	24V 2W

7.5 Load moment limiter (ASLI - Automatic Safe Load Indicator) (AML)

The automatic safe load indicator consists to a major part of electronic components of modular design which must be serviced exclusively by qualified service staff.

Every time before the crane operator puts the machine into operation, he must make sure that:
- the ASLI is not restricted in its functionality by external destruction;
- the hoist limit switch, its weight and chain are correctly mounted,
- the electric cable connections are inserted;
- the cables are correctly wound up and tensioned in the electric cable drum, and properly routed in the cable drum;
- the cables are neither damaged nor any strands are broken.

7.6 Inspection of the ASLI at regular intervals according to the legal regulations

- The systems must be checked with calibrated weights according to the legal regulations.
- If an essential difference compared to the original setting is detected, re-adjustment must be effected by a specialist.

Tampering with the electronic system of the ASLI by unauthorized persons is prohibited.

**) Optional equipment

Memo:

7.7 Fuse / relay arrangement

The fuse box is located at the rear of the crane cabin.

DANGER **Before replacing any defective fuses, turn the ignition off. Replace defective fuses only by fuses having the same power rating. Do never use a jumper wire or a similar device.**

Fuse arrangement		
F801 = Wiper / washer	F820 = Armrest / solenoid valve, control pressure/dead man's switch**)	F839 = Crane control
F802 = Seat / windscreen	F821 = AML display / central electrical system	F840 = Air conditioning system**)
F803 = Mirror heating / centralized lubrication system	F822 = Crane control / high speed / swing range limitation	F841 = Supplementary heater unit
F804 = ADM / CGC / warning buzzer, motor	F823 = Heating blower fan / timer heater unit	F842 = Supplementary heater unit
F805 = ADM / MR	F824 = Crane control / override AML	F843 = Battery main switch
F806 = free	F825 = free	F844 = Radio 12 V / connector 12 V
F807 = Engine diagnosis	F826 = Instrument illumination / working floodlight, crane cabin	F845 = Auxiliary hoisting gear
F808 = Electric horn	F827 = Working floodlight on boom, electrically adjustable (25 A)	F846 = Length transmitter / angle transmitter / anemometer
F809 = Crane control, hoist winches	F828 = free	F847 = AML Valve /SCK /buzzer (Equipment according to the country where the machine is to be registered)
F810 = Crane control, swing brake / high speed	F829 = Working floodlight, hoisting gear	F848 = LCD – Monitor
F811 = Crane control	F830 = Aircraft warning lamp	F849 = free
F812 = Precontrol, left-hand and right-hand	F831 = Cab light / fan	F850 = Hoist limit switch
F813 = AML / DA / DWG	F832 = free	F851 = free
F814 = Hoisting gear angular momentum encoder	F833 = ADM	F852 = AML - ZE
F815 = AML override feature	F834 = Engine diagnosis	F853 = AML - ZE
F816 = Telescope control	F835 = Generator	F854 = Removing the boom**)
F817 = Telescope control – length transmitter	F836 = Oil cooler (2nd Oil cooler 30 A)	F855 = Direction indicators - Brake pressure - Chassis
F818 = AML / Crane control - emergency mode	F837 = Plugbox, inspection lamp	F856 = Ignition in chassis ON
F819 = Counterweight	F838 = Swing brake / Crane control - emergency mode	

MR / ADM = Electronic system, engine;	CGC = Control and Service System
AML = Load moment limiter;	ZE = Central electrical system;
F = Fuse;	MV = Solenoid valve;
DA = Pressure sensor	DWG = Swing angle transmitter

**) Optional equipment

cont'd.: **7.7 Fuse / relay arrangement**

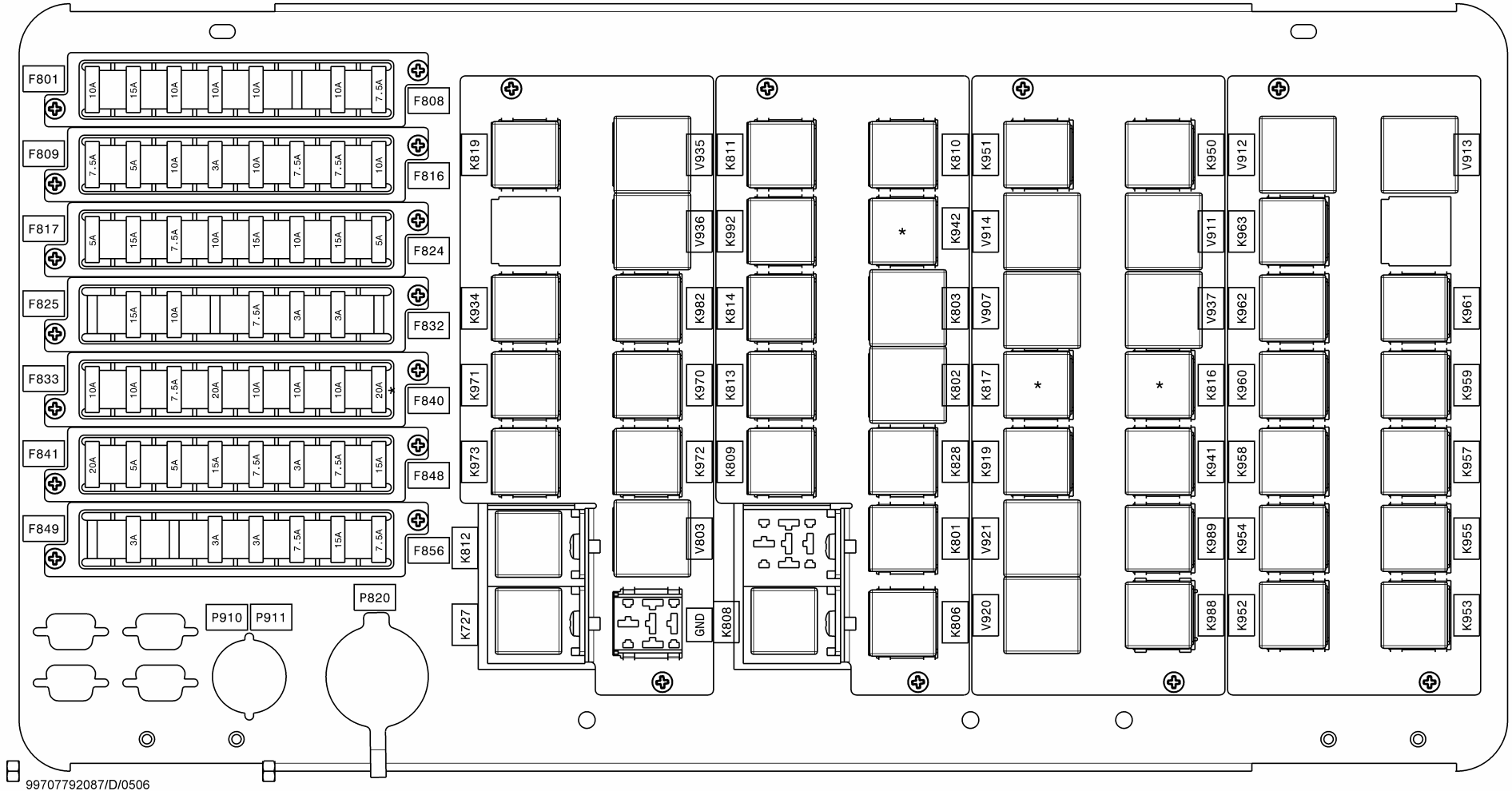
The relay panels are located at the rear of the crane cabin.

Relay arrangement		
K 819 = Emergency OFF	K 810 = Heating / Instrument illumination	K 941 = Crane control ON
K 934 = Armrest	K 942 = Electric horn - AML override activated	K 989 = Counterweight up
K 971 = Tele control, emergency mode	K 803 = Wiper interval action	K 988 = Counterweight down
K 973 = Tele control, emergency mode	K 802 = Wiper interval action	V 912 = Crane control, emergency mode
K 812 = CGC supply	K 828 = Swing brake	K 963 = Hydraulic pump I
K 727 = CGC supply	K 801 = Radiator control	K 962 = Crane control, emergency mode, 2nd hoisting gear UP
V 935 = Tele control, emergency mode	K 806 = Battery main switch, delayed	K 960 = Crane control, emergency mode, slewing to the right
V 936 = Tele control, emergency mode	K 951 = Crane control, emergency mode, swing brake	K 958 = Emergency mode, retract telescope
K 982 = Crane control, emergency mode	V 914 = Crane control, emergency mode, swing brake	K 954 = Crane control, emergency mode, boom elevation up
K 970 = Tele control, emergency mode	V 907 = AML override actuated	K 952 = Crane control, emergency mode, hoisting gear down
K 972 = Tele control, emergency mode	K 817 = Generator D+**)	V 913 = Crane control, emergency mode
V 803 = CGC supply	K 919 = AML shut-off feature	K 961 = Crane control, emergency mode, 2nd hoisting gear down
K 811 = Heater unit, vehicle fan	V 921 = Counterweight	K 959 = Crane control, emergency mode, slewing to the left
K 992 = LCD - Monitor	V 920 = Counterweight	K 957 = Crane control, emergency mode, extend tele section
K 814 = Electric horn	K 950 = Crane control, emergency mode	K 955 = Crane control, emergency mode, boom elevation down
K 813 = 15+ ADM/MR	V 911 = Crane control, emergency mode	K 953 = Crane control, emergency mode, hoisting gear up
K 809 = Generator D+	V 937 = Crane control, emergency mode	
K 808 = Working floodlight	K 816 = Air conditioning system**)	

ADM / MR = Electronic system, engine;	CGC = Control and Service System;
AML = Load moment limiter;	K = Relay
MPKT = Ground point	V = Diode

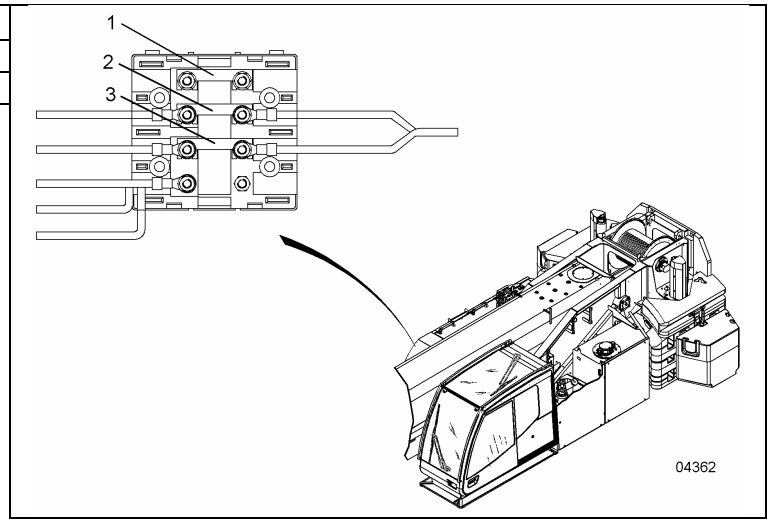
**) Optional equipment

7.7 Fuse / relay arrangement (cond't)



7.7.1 Fuses in battery box

1 = F 863 Fuse, charging plugbox**)	**25 A**
2 = F 862 Fuse, battery +	**25 A**
3 = F 861 Fuse, battery +, battery main switch	**50 A**



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**) Optional equipment

Memo

Memo

8 Crane cab

Grease joints and pins and all movable components with lubricating oil. Make sure that these parts are running freely and are easy to operate.

These components are, e.g.:

- Hinges of the covers and servicing lids.

The mechanical components of the door lock also require regular care. The closing cylinder should be treated with a graphited agent, preferably before the cold season begins.
Door seals and other rubber components should be treated with acid-free grease or French talc optimally before the cold season begins.

For further information concerning the crane cabin, refer to the documents of the machine manufacturer in part G2, superstructure.

8.1 Air conditioning system**)

The air conditioning system for the crane cabin is **MAINTENANCE-FREE**. It must only be taken to a special workshop in case of malfunctions.

Attention **All sorts of repair, replenishing or overhaul work on the air conditioning system may only be performed in an authorized workshop by well-trained staff.**
Work on the air conditioning system requires specific extraction and filling stations, recovery stations, electronic leak detectors and special tools which are only available in specialist workshops. Correct disposal of fluids is also only ensured in a specialized workshop.

Oil level inspection of air conditioning compressor:

The oil level in the compressor can only be checked after a repair, or every time before the air conditioning system is filled with new refrigerant. No refrigerant must be present in the circuit at the time the oil level inspection is performed.
On principle, the oil volume extracted from the refrigerating circuit plus an additional quantity of 10 cm^3 must be poured into the circuit on re-filling. If parts have been replaced during repair, then the quantities specified for the replaced component must be added additionally (adhere to the current information by the various manufacturers).

8.1.1 Functional check of air conditioning system

The air conditioning system should be put into operation for approx. 10 minutes at regular intervals, also in winter, to keep it in proper working order.

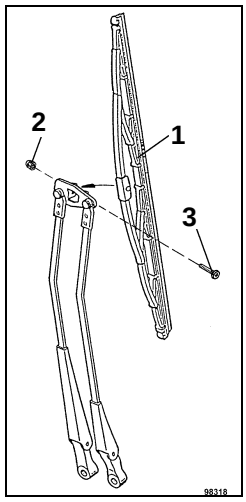
The system should be checked in a specialist workshop once per year at the beginning of the cooling period.

For further details on operation, care and maintenance of the air conditioner, refer to the documents of the manufacturer of this unit in Part G2, Superstructure.

**) Optional equipment

8.2 Wiper-blade elements / washing system

8.2.1 Replacement of the wiper-blade elements



The wiper-blade elements must be cleaned at regular intervals to work properly.
For safety reasons (good visibility), it is recommended to replace the wiper-blade elements immediately if their cleaning efficiency decreases. The wiper-blade elements should be replaced at least once per year.

Replacement of wiper-blade elements:

- Lift wiper arm (1), remove the nut (2) and the securing bolt (3) and remove the wiper blade.
- To mount the new wiper blade, reverse disassembly procedure.

8.2.2 Windshield washing system

The tank of the windshield washing system is accessible after opening of the windshield.

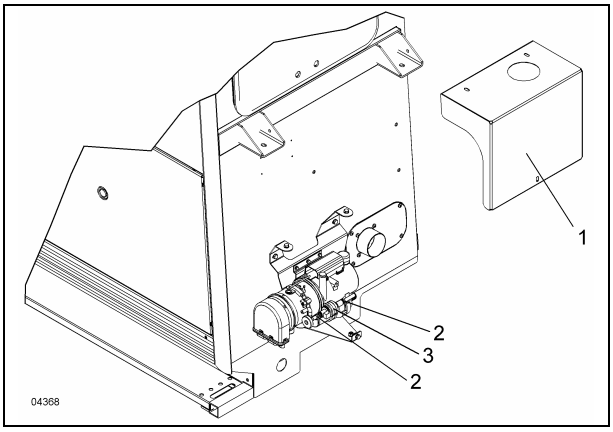
8.3 Supplementary heater unit

For instructions on operation, service and maintenance of the heater unit, please refer to the documents of the unit's manufacturer.
Make sure that the manufacturer's instructions are observed.

8.3.1 Replacement of the fuel filter

The supplementary heating is supplied with fuel from the vehicle's fuel tank.
It is necessary to replace the fuel filter (3) of the supplementary heater unit at regular intervals according to the maintenance schedule to ensure trouble-free heater operation.

- Remove the cover (1).
- Loosen the hose clamps (2), remove the fuel filter (3), install a new filter and tighten the hose clamps safely.



8.5 FAUN Cockpit Graphic Control System

DANGER **Repair work may only be performed by qualified specialist staff. To replace parts or components, use only parts listed in the Spare Parts List. Unauthorized opening or inappropriate repair work may result in severe injuries or death and considerable property damage.**

8.5.1 Monitor

The monitor of the FAUN Cockpit Graphic Control System should be cleaned at regular intervals, depending on dust accumulated, using a lint-free cloth.

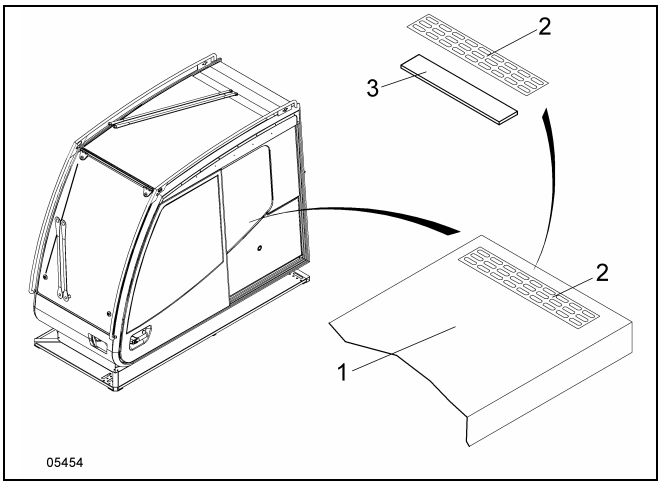
The unit has been designed for a temperature range from **–40°C to +85°C**.
The monitor has been designed for a temperature range from **–20°C to +70°C**.

8.6 Cleaning the recirculated air filter

The recirculated air filter (3) for the fan and the air conditioning is located between the protective grille (2) in the floor assembly (1) behind the seat.
If the recirculated air filter (3) is visibly clogged by relatively big particles, it must be cleaned.
The cleaning intervals required depend greatly on the crane's application.
The clogged filter element can be washed in water and re-installed after drying.
Before installing the filter element, check it for damage.

Attention **In case of visible damage, the filter element must be replaced.**

- Lift off the protective grille (2) and remove the filter element (3).
- Install the filter element, once cleaned and dried, by reversing the above sequence of operations analogously.



Memo:

9 Other points of lubrication, servicing and maintenance

9.1 Telescopic boom

- Grease or lubricate **slide pieces, slideway liners, slide bars, crossheads and guide rollers** etc. at regular intervals, according to the maintenance schedule (use recommended grease types).
- Grease **basic boom bearing** via the lubrication ports on the basic boom at regular intervals according to the maintenance plan.

NOTE **The basic boom bearing is supplied with grease via the centralized lubrication system.**

NOTE **Whenever the crane has been cleaned - especially using a steam jet cleaning unit - check the lubrication of the slide surfaces, slideway liners, guide elements etc. of the telescopic elements and, if necessary, renew the grease applied. These components must always be provided with a sufficient grease filling.**

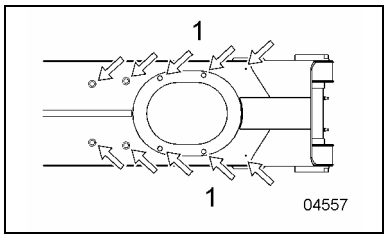
9.1.1 Grease tele sections / locking mechanisms

DANGER **During service and maintenance work on the telescopic boom, the boom must be directed forward in driving direction, and max. 2 tele sections may be extended simultaneously.**
During telescoping operations, or during boom elevation (up / down), persons are not allowed to stay in the work range.

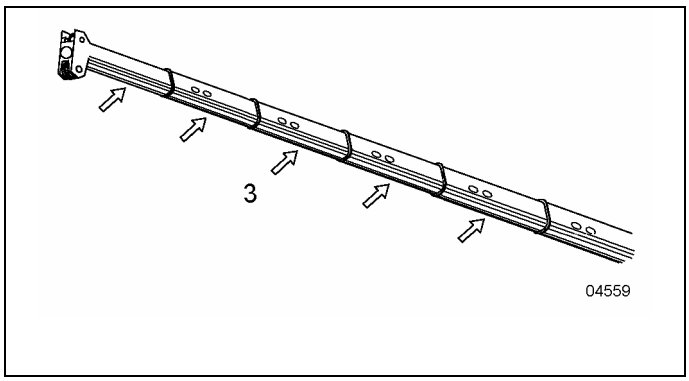
NOTE **To grease the telescopes, select the boom state "maintenance" – as described in the AML operation manual.**

Attention **If telescoping is required to get access to the points of lubrication, raise the boom to ≥ 20° using the boom elevation. For lubrication as such, the boom must be returned to its horizontal position.**

● The boom has been retracted and lowered completely.
- Remove the plugscrews.
- Grease the slideway linings – on the upper side of the boom – via the points of lubrication (1) as described in the maintenance schedule.
- Mount plugscrews again.

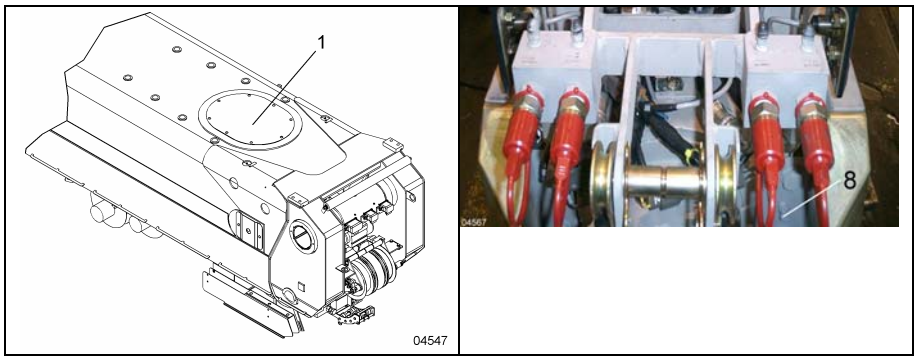


- Raise boom ≥ 20° via the boom elevation, extend max. 2 tele sections until the lubricating surfaces for the boom – on the sides and the underside of the boom - (3) are completely accessible. Lower the boom via the elevating mechanism and align it horizontally.
- Grease the sliding surfaces – on the sides and the underside of the boom – according to the maintenance schedule.
- Repeat the process until all silding surfaces have been greased.

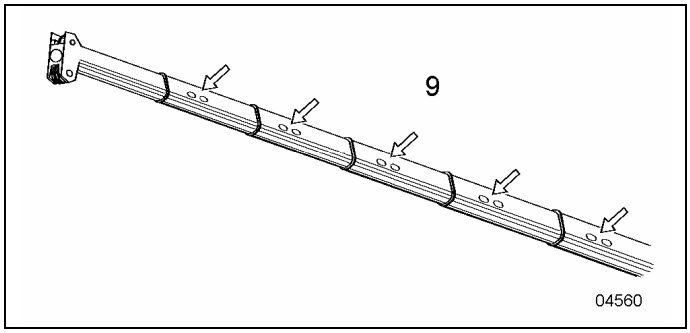


cont'd.: **9.1.1 Grease tele sections / locking mechanisms**

- Remove the cover (1).
- Grease the lubricators – lock cylinder – (8) according to the maintenance schedule.
- Mount the cover (1).

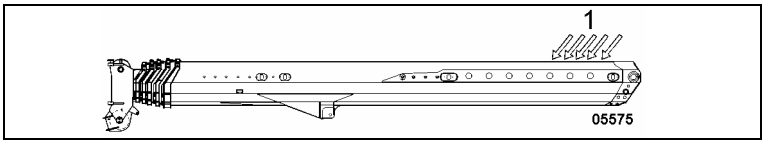


- Raise boom ≥ 20° via the boom elevation, extend max. 2 tele sections until the points of lubrication for the boom (9) are accessible. Lower the boom via the elevating mechanism and align it horizontally.
- Grease the lubricators – lock cylinder – according to the maintenance schedule.
- Repeat the process until all lubricators have been greased.

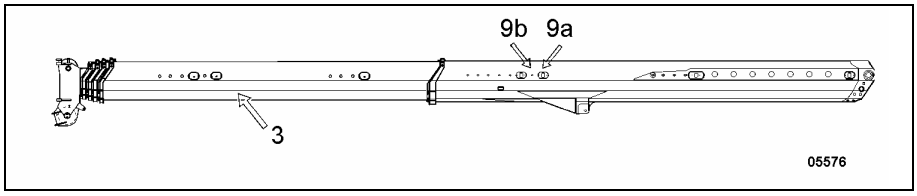


Telescope position / points of lubrication:

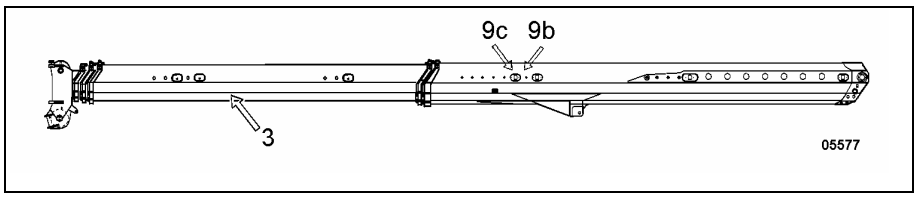
The tele sections are retracted completely.
The points of lubrication (1) can be greased.



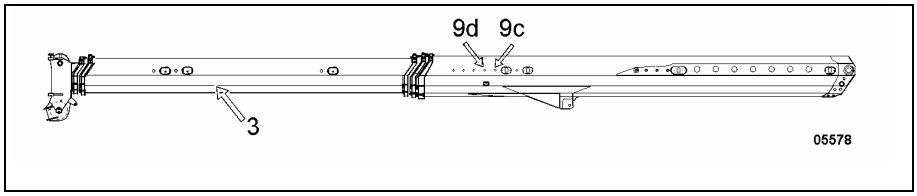
Tele section 1 is extended 100%.
The points of lubrication (3) and (9a) for tele section 1 and (9b) for tele section 2 can be greased.



Tele section 2 is extended 100%.
The points of lubrication (3) and (9b) for tele section 2 and (9c) for tele section 3 can be greased.

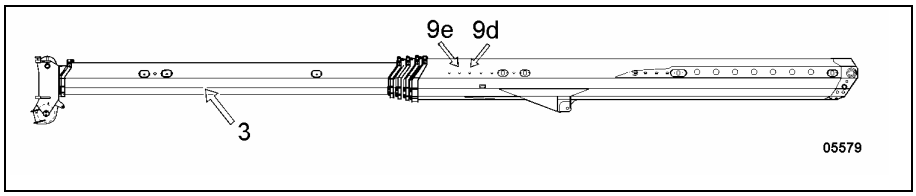


Tele section 3 is extended 100%.
The points of lubrication (3) and (9c) for tele section 3 and (9d) for tele section 4 can be greased.

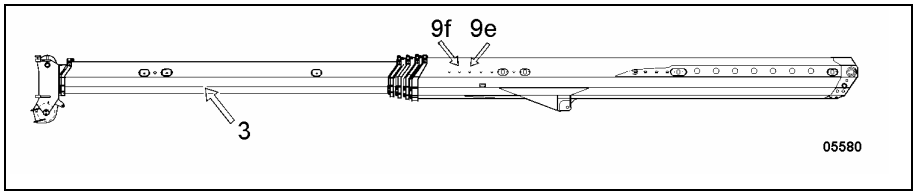


cont'd.: **9.1.1 Grease tele sections / locking mechanisms**

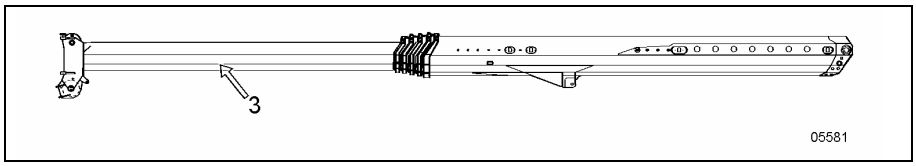
Tele section 4 is extended 100%.
The points of lubrication (3) and (9d) for tele section 4 and (9e) for tele section 5 can be greased.



Tele section 5 is extended 100%.
The points of lubrication (3) and (9e) for tele section 5 and (9f) for tele section 6 can be greased.



Tele section 6 is extended 100%.
The points of lubrication (3) for tele section 6 can be greased.



9.2 Boom elevation cylinder

NOTE **The boom elevation cylinder is supplied with grease via the centralized lubrication system.**

9.3 Bottom block

- The load hook cross-beam and the load hook bearings must be greased via the lubricators at regular intervals, according to the maintenance schedule. The lubricating intervals depend on the number of service operating; under extreme operating conditions, lubrication may have to be effected earlier than specified in the maintenance schedule.

DANGER **Welding on any components of the bottom block is not admissible.**

9.4 Counterweight

- Check counterweight cylinders for leakage according to the maintenance schedule. Check the cylinders for correct fastening.

- Check locking cylinders for leakage according to the maintenance schedule. Check the locking mechanism for proper working order and the cylinders for correct fastening.

9.5 Boom extension**)

- Grease the bearings, the bushings and the pin securing mechanisms.
- Grease the pin securing mechanisms which serve to mount the adapter to the boom head.

9.6 Centralized lubrication system

For instructions on operation, service and maintenance and data regarding the lubricating points, please refer to the documents of the unit's manufacturer (see Part G2 Superstructure).
Make sure that the manufacturer's instructions are observed.

**) Optional equipment

9.7 Other points of lubrication

Grease joints, pins and all movable components, such as:
hinges of the engine servicing lid, hinges of the servicing lid for the air cleaner and the batteries, hinges of the working floodlight adjusting device etc. by means of lubricating oil. Make sure that these parts move unrestrictedly and are easy to operate.

15 Summary of oil types and filling capacities

(Recommended oil types)

NOTE **The filling capacities specified below are approximate values. For precise measuring results, the oil level inspection plugs, the oil dipsticks or inspection glasses are always decisive. Only those qualities may be used which are listed in the chart of approved consumables of the assembly manufacturer, or which are indicated on the nameplate of the assemblies.**

Maintenance point	Oil type			Filling capacity
Engine	Engine oils according to the DC consumables specification. **Initial filling with SAE 15W-40**			Refer to DC Operating Manual
Coolants / anti-freeze agents	Coolants according to the DC Operating Manual Anti-freeze agents according to the DC fuel specifications			approx. 25 l
Fuel tank	Diesel fuel EN 590			approx. 250 l
Hydraulic system	Ambient temperature	Mineral oils according to DIN 51524-2	Biodegradable oils according to VDMA 24568	approx. 1.050 l
	over +30° C	HVLP 68	HEES 68	
Oil tank	from + 5° C to +25° C	HLP 46	HEES 46	approx. 920 l
	below + 5° C to - 15° C	HLP 32	HEES 32	
	from - 15° C to - 25° C	HLP 22	HEES 22	
	below - 25° C	HLP 10		
	Initial filling with HLP 46			
Gearbox of swing mechanism	Hypoid gear oil SAE 90-GL5 Viscosity grade according to ISO-VG 220, DIN 51519 **Initial filling with ARAL DEGOL BMB 220**			approx. 6.2 l
Multi-disc compartment	ATF II D			0.2 l
Hoisting gear gearbox	Hypoid gear oil SAE 90 according to GL5 Viscosity grade according to ISO-VG 220, DIN 51519 **Initial filling with ARAL DEGOL BMB 220**			approx. 3.8 l
Motor coupling	ATF II D			as required
Air conditioning system[**] **Refrigerator oil and refrigerant**	Refrigerator oil: ND-Öl 8 Refrigerant : R134a			210 cm^3 1.65 kg

[**] Optional equipment

Memo:

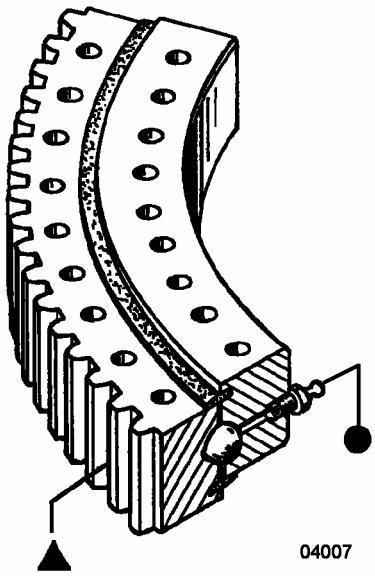
16 Summary of lubricating grease types (recommended grease types)

Maintenance point	Grease type		Filling capacity
Ring gear pinion and **gearing** of the **ball bearing slewing device**	Preservation lubricant, specification BB (DIN 51513) or bituminous cogwheel spray for ring gears		as required
Swing Locking pins **Lubricators** on **bottom blocks, Guide rollers on telescopic boom**	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20		as required
Winch rope	Corrosion-protective oil or anti-corrosion agent, lubricating grease or lubricating adhesive or cogwheel spray Lubricating properties ensured from -20°C to +120°C Dropping point 200°C DIN 51801; consistency grade 2 DIN 51818		as required
Tele section slide pieces, slideway liners	Long-term lubricant: We recommend: FAUN-LUB		as required
Slide bars, slide jaws Guide elements	from -40°C to +125°C NLGI grade no. 1 Penetration 310/340 Dropping point +180°C	from -30°C to +150°C NLGI grade no. 2 Penetration 265/295 Dropping point +185°C	
Telescopic boom **Locking mechanism for boom elevation cylinder and boom**	Lithium-saponified lubricating grease, dropping point over 170°C penetration grade 2 (according to DIN 51804 or ASTM-D 217) down to - 20°C Lubricating grease KPL 2N (DIN 51502/825) (-20° C to +140° C) down to - 40°C Lubricating grease KTPL 2M (DIN 51502/825) (-40° C to +120° C)		as required
Centralized lubrication system Grease tank	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20		as required
Batteries	Terminal grease		as required
Door locks	Graphite powder		as required
Other points of lubrication	Lubricating grease, lithium-saponified, according to DIN 51825-KP2K-20		as required

Memo:

17 Chart of approved consumables and lubricants

Recommended greases and lubricants for greasing points equipped with lubricators, sliding surfaces and ball bearing slewing devices, as well as ringgear and slewing gear pinion.



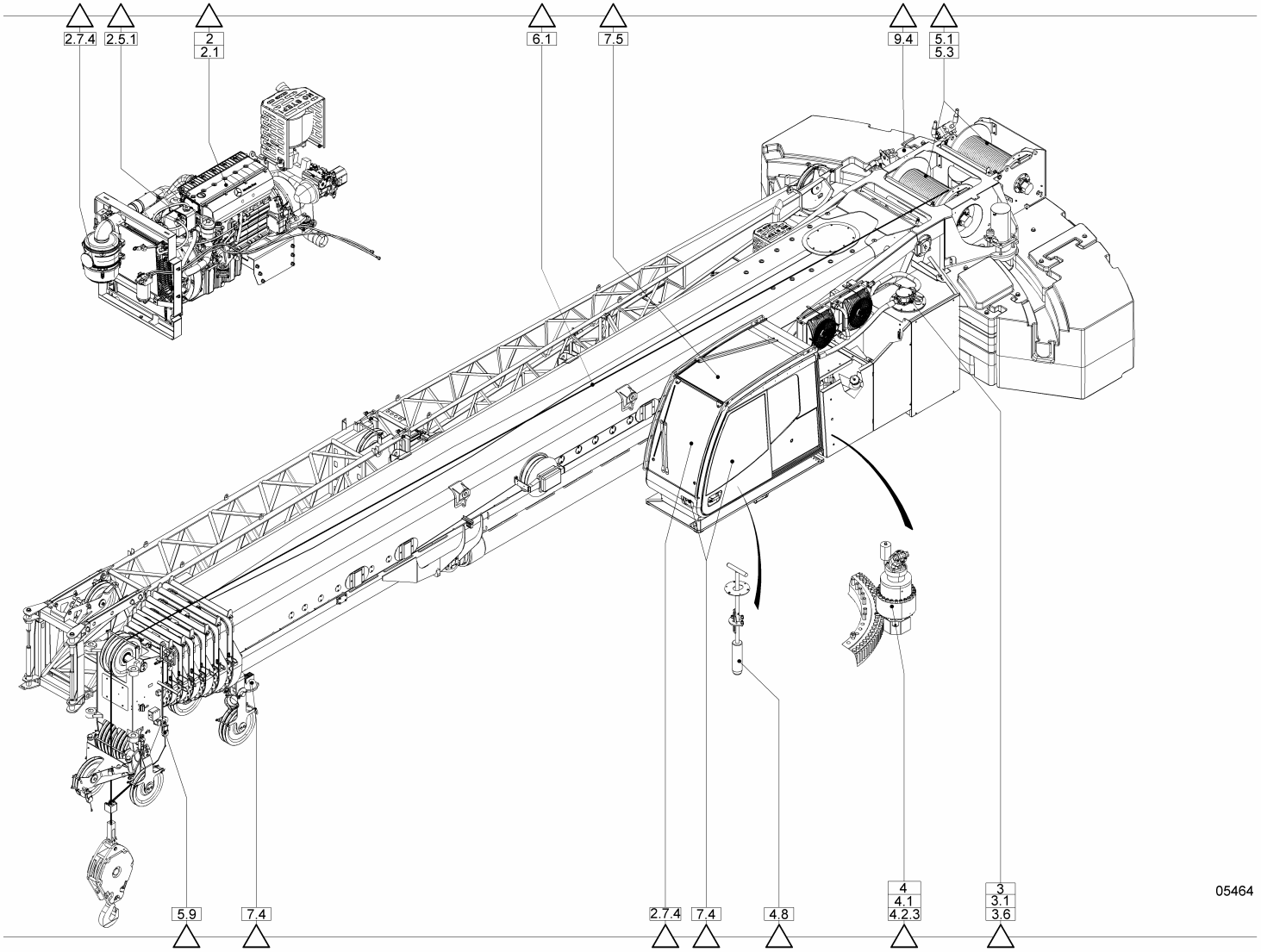
Symbols used in the lubricating schedule	Symbols used in the Table	
□	●	First-class lubricating grease, lithium-saponified, penetration grade 2
▣	▲	Special lubricant, adhesive, hydrophobic with sufficient temperature characteristics

ANTAR	●	Rolexa 2	248 K to 403 K
	▲	Engrenage 3	263 K to 393 K
ARAL	●	Aralub HL 2	243 K to 393 K
	▲	Aralub LFZ 1	253 K to 403 K
BP	●	BP Energrease LS 2	243 K to 393 K
	▲	BP Energol WRL	243 K to 353 K
Castrol	●	Castrol Spheerol AP 2	253 K to 393 K
	▲	Castrol Grippa 33 S	253 K to 353 K
Chevron	●	Chevron Dura-Lith Grease 2	248 K to 398 K
	▲	Chevron Pinion Grease MS	273 K to 398 K
Esso	●	BEACON 2	243 K to 403 K
	▲	SURETT Fluid 4 K	253 K to 333 K

Gulf	●	GULF CROWN Grease No. 2	243 K to 393 K
	▲	GULF LUBCOTE No. 2	253 K to 333 K
Mobil	●	MOBILUX 2	243 K to 403 K
	▲	MOBILTAC 81	243 K to 393 K
SHELL	●	Alvania Fett R 2	243 K to 403 K
	▲	Cardium Fluid C	255 K to 333 K
TEXACO DEA	●	Glissando FL 20	253 K to 393 K
	▲	Crater 2 X Fluid	253 K to 393 K
VALVOLINE	●	VALVOLINE LB-2	253 K to 393 K
	▲	VALVOLINE Dipper Stick	253 K to 493 K
Fritz Manke Technische Artikel Fichtestr. 72 40233 Düsseldorf			
	▲	Voler Compound 2000 E	243 K to 343 K

Memo:

18 Inspection scheme (before start-up, daily)



Check before start- up

= Refer to Part C2), item …

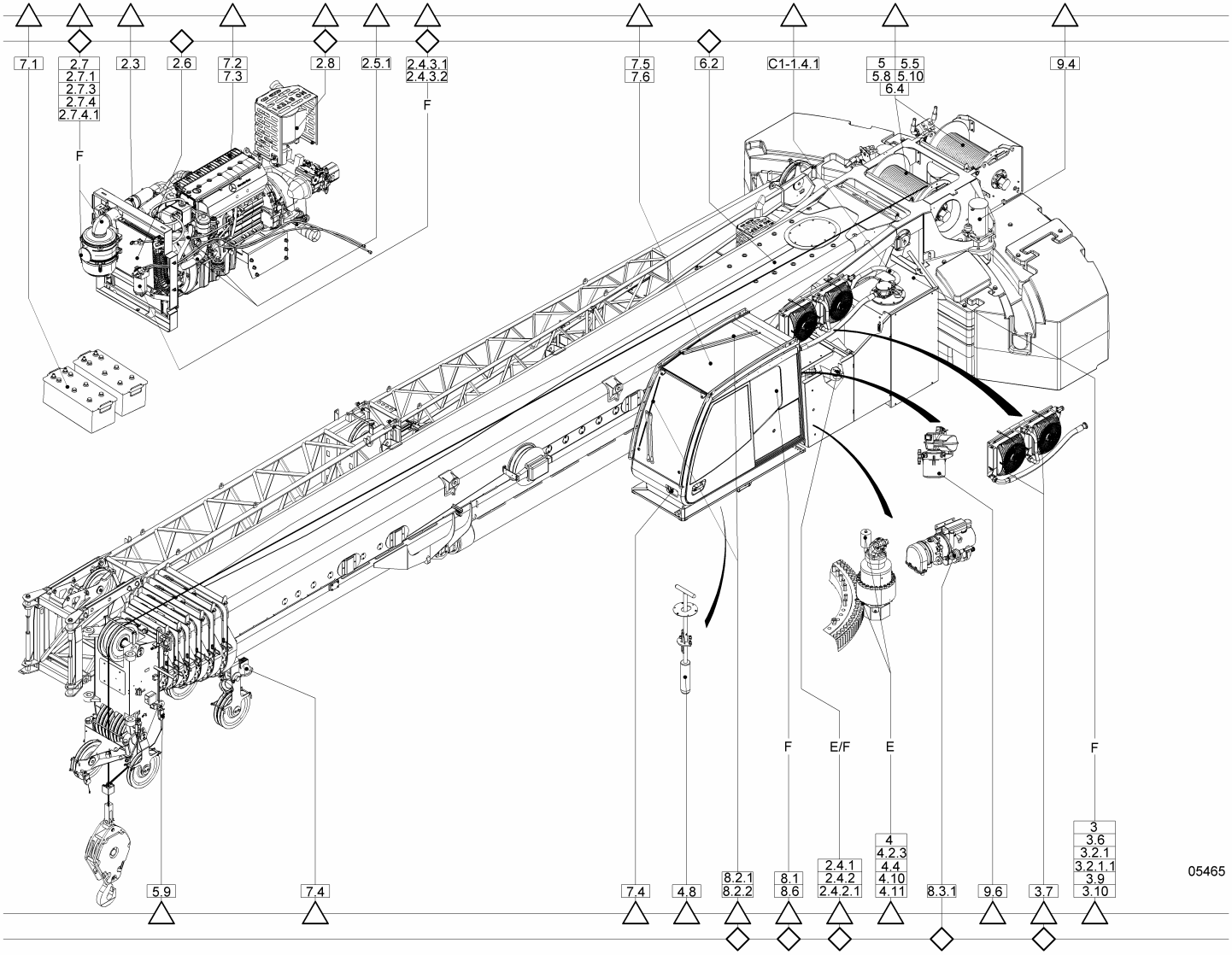
= Inspection

K = Coolant

Check before start-up

Memo:

19 Inspection and cleaning scheme



Inspection, refer to maintenance schedule
Cleaning, replacement, refer to maintenance schedule

= Refer to Part C2) Item …

F = Cleaning and/or replacement of filters, refer to maintenance schedule

E = Breathers

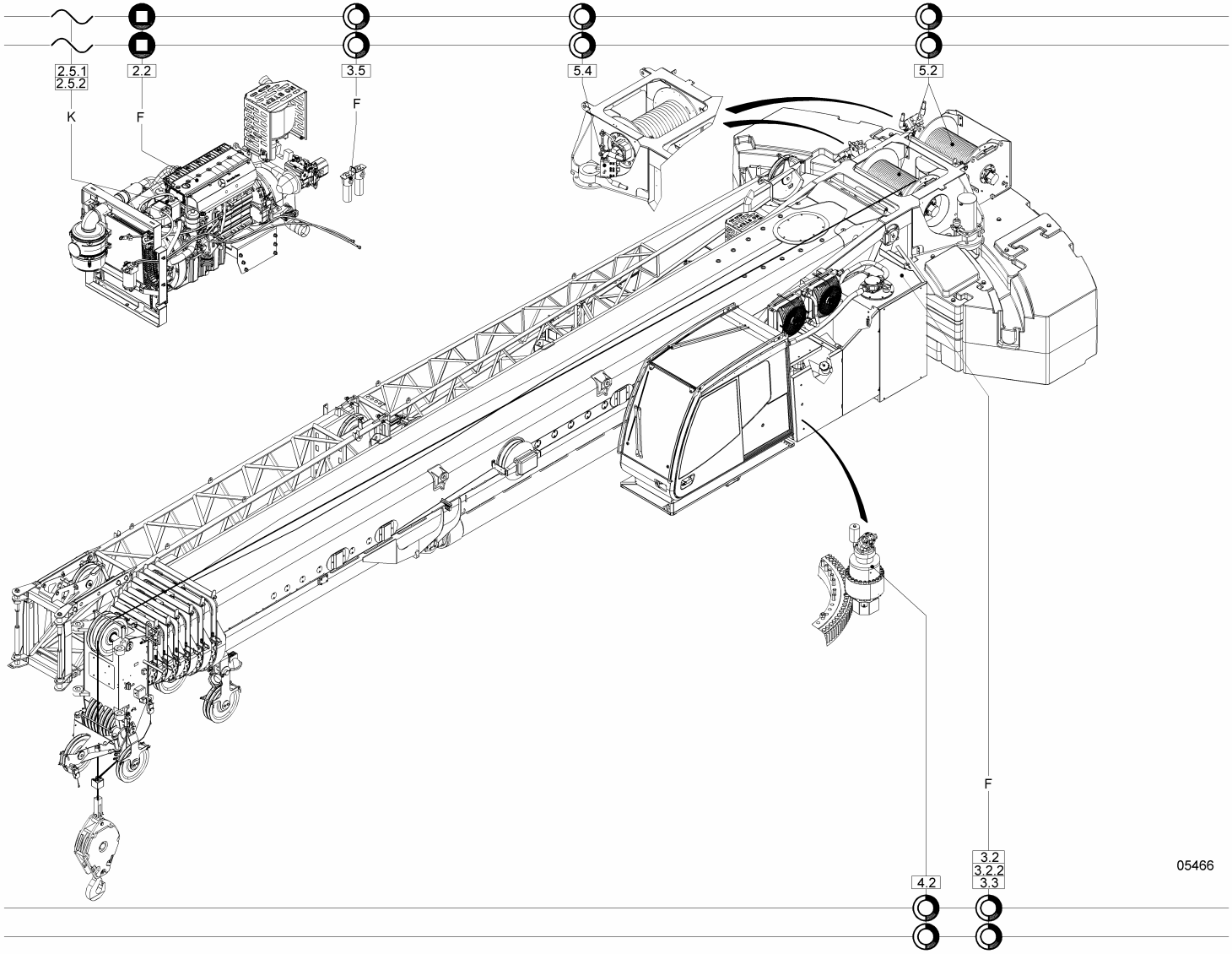
= Inspection

= Cleaning

Inspection, refer to maintenance schedule
Cleaning, replacement, refer to maintenance schedule

Memo:

20 Oil/coolant level inspection and change scheme



Oil change, refer to maintenance schedule
Oil level inspection, refer to maintenance schedule

= Refer to Part C2) Item …

F = Filter change, refer to maintenance schedule

Engine oil*)

Hydraulic oil *)

Refrigerator oil and refrigerant*)

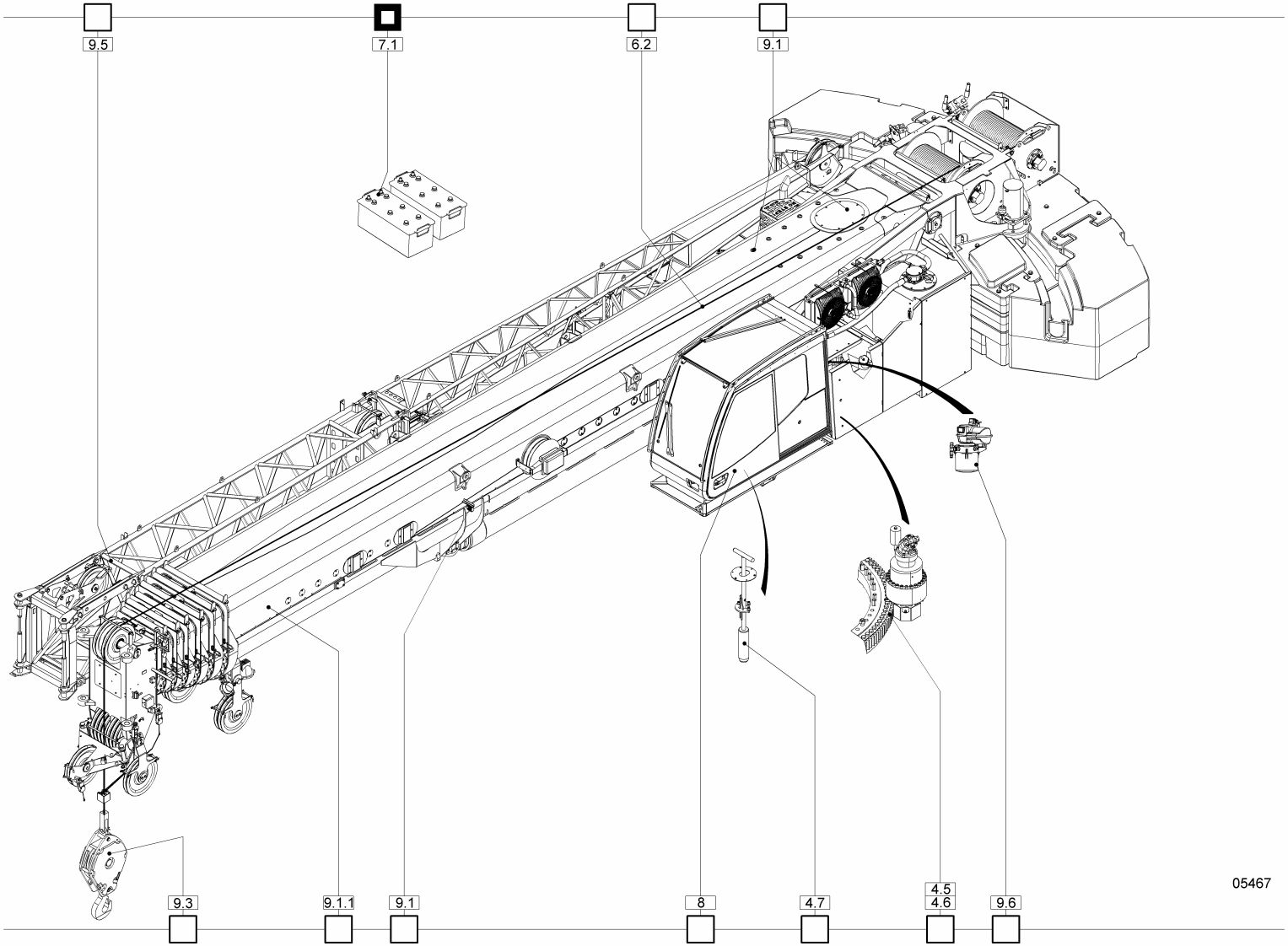
Corrosion-protective anti-freeze agent, coolant

***) Use the recommended oil types**

Oil change, refer to maintenance schedule
Oil level inspection, refer to maintenance schedule

Memo:

21 Lubricating scheme



Lubrication, refer to maintenance schedule

= Refer to Part C2) Item …

Universal grease)**

Special grease*)

*) **Use recommended grease types**

Clean lubricators before greasing. Grease all the other parts using an oil can.

Lubrication, refer to maintenance schedule

Memo:

Part D

Circuit and piping diagrams

0 Diagrams

	$	Shield to ground via cable fitting
	(i)	Insulate cable ends
	A001	Radio
	A002	Voltage reduction device 24 V/12 V
*	A003	Control unit
*	A005	Control unit, centralized lubrication system
*	A010	Flame-start control system
	A010	Flame-type preheating system
	A013	MR Engine control system Electronic system
	A014	ADM Adaptation module Vehicle engine control
	A030	Electrical tachograph MTCO
*	A031	Refrigerator box
	A101	Electronic module ABV
*	A106	Radio modem
	A303	Gearbox electronics
	A304	Intarder electronics
	A502	Steering computer I
	A502	Steering electronics I
	A503	Steering computer II
	A503	Steering electronics II
	A801	Radio
	A802	Voltage reduction device 24V / 12 V
	A803	Control unit
	A804	MR Engine control system Electronic system
	A805	ADM Adaptation module Vehicle engine control
*	A807	Electrical thermostat control
	A810	Voltage reduction device 12 V/6 V
	A901	AML display
	A902	ASLI angle transmitter, boom
	A903	ASLI length transmitter, boom
	A905	Pressure sensor, piston end "ACTUAL VALUE"
	A906	Pressure sensor, rod end "COMPENSATION"
	A907	Pressure sensor, hydraulic system pressure
	A908	Length transmitter, telescope cylinder
	A917	Remote control transmitter, left-hand a extending/retracting the telescopes b slewing left-hand/right-hand c direction extending telescope d direction retracting telescope e direction slewing left-hand f direction slewing right-hand
	A917	Remote control transmitter, left-hand g high speed h swing brake
	A917	Remote control transmitter, left-hand, i electric horn
	A917	Remote control transmitter, left-hand, j hoisting gear 2
	A917	Remote control transmitter, left-hand k deadman sensor l deadman sensor
	A918	Remote control transmitter, right-hand a hoisting gear - up/down b boom elevation - up/down c direction hoisting gear - down d direction hoisting gear - up e direction boom elevation - up
		f direction boom elevation - down h hoisting gear 2
	A918	Remote control transmitter, right-hand g fast speed
	A918	Remote control transmitter, right-hand, i electric horn
	A918	Remote control transmitter, right-hand, j hoisting gear 1
	A918	Remote control transmitter, right-hand k deadman sensor l deadman sensor
	A921	AML central unit
	A922	Swing angle transmitter, swing mechanism
*	A923	Control electronics deadman sensor, left-hand
*	A924	Control electronics, deadman sensor, right-hand
	A926	Control unit, monitor
	A927	Monitor, telescope control
*	A934	Manual control unit, counterweight / removal of boom
	B001	Electric horn
*	B002	Supertone horn
	B003	Buzzer, reversing signal
*	B005	Temperature sensor; room thermostat
	B006	Inductive pickup, tachograph
	B007	Loudspeaker, left-hand
	B008	Loudspeaker, right-hand
	B009	Buzzer, engine malfunction/steering
	B011	Fuel level transmitter
*	B012	Timer, heater unit
	B018	Pressure sensor unit, brake circuits I + II
	B101	Inductive pickup ABV 2A left-hand L2
	B102	Inductive pickup ABV 2A right-hand L1
	B107	Inductive pickup ABV 5A left-hand A1
	B108	Inductive pickup ABV 5A right-hand A2
	B306	Buzzer, warning, gearbox
	B402	Pressure sensor, axle load front axle
	B403	Pressure sensor, axle load rear axle
	B501	Steering sensor, 1st axle (left-hand)
	B502	Steering sensor, 2nd axle (left-hand)
	B505	Steering sensor, 4th axle (left-hand)
	B506	Steering sensor, 5th axle (left-hand)
*	B601	Pressure sensor, outriggers, front left-hand
*	B602	Pressure sensor, outriggers, front right-hand
*	B603	Pressure sensor, outriggers, rear left-hand
*	B604	Pressure sensor, outriggers, rear right-hand
*	B605	Length transmitter, outriggers, front left-hand
*	B606	Length transmitter, outriggers, front right-hand
*	B607	Length transmitter, outriggers, rear left-hand
*	B608	Length transmitter, outriggers, rear right-hand
*	B703	Air pressure transmitter, supply, superstructure
	B801	Electric horn
	B802	Fuel level transmitter
*	B802	Fuel level transmitter, bio diesel
	B806	Buzzer, engine malfunction
	B807	Loudspeaker, left-hand
	B808	Loudspeaker, right-hand
	B809	Timer, heating
	B902	AML buzzer
	B904	Rotation transmitter, hoisting gear 1
*	B905	Buzzer, ASLI shut-off feature
*	B908	Rotation transmitter, hoisting gear 2
	B909	Anemometer
*	B909	Connector, anemometer
	B909	Connector, anemometer
	B911	Rotation pulse transmitter, hoisting gear 1
*	B912	Rotation pulse transmitter, hoisting gear 2
*	B913	Buzzer, swing mechanism active
	B916	Displacement sensor, cylinder counterweight left
	B917	Displacement sensor, cylinder counterweight right
	D001	CAN distribution module
	D002	CAN distribution module
	D003	CAN distribution module
	D004	CAN distribution module
	D005	CAN distribution module
	D005	CAN distribution module CPU
	D006	CAN distribution module
	D007	CAN distribution module
	D008	CAN distribution module
	D015	CAN distribution module, outriggers right-hand
	D016	CAN distribution module, electr. Spirit level
	D017	CAN distribution module, outriggers left-hand
*	D700	Transmitter for outriggers
	E001	Dimmed light, left-hand
	E002	High-beam light, left-hand
	E003	High-beam light, left-hand
	E004	Fog light, left-hand
	E005	Bordering light on roof, left-hand
	E006	Bordering light, front, left-hand (Parking light)
*	E007	Bordering light, lateral, left-hand (France)
	E008	Side marker lamp, left-hand
*	E009	Bordering light, rear, left-hand (France)
	E010	Rear light, left-hand
	E011	License plate lamp
	E012	Direction indicator, front, left-hand
	E013	Direction indicator, lateral, left-hand
	E014	Direction indicator, rear, left-hand
	E015	Stop light, left-hand
	E016	Rear fog light, left-hand
	E017	Reversing light
	E018	Cab light, left-hand
*	E019	Rotary beacon, left-hand
	E021	Dimmed light, right-hand
	E022	High-beam light, right-hand
	E023	High-beam light, right-hand
	E024	Fog light, right-hand
	E025	Bordering light on roof, right-hand
	E026	Bordering light, front, right-hand (Parking light)
*	E027	Bordering light, lateral, right-hand (France)
	E028	side marker lamp, right-hand
*	E029	Bordering light, rear, right-hand (France)
	E030	Rear light, left-hand
*	E031	License plate lamp
	E032	Direction indicator, front, right-hand
	E033	Direction indicator, lateral, right-hand
	E034	Direction indicator, rear, right-hand
	E035	Stop light, right-hand
	E036	Rear fog light, right-hand
	E037	Reversing light
	E038	Cab light, right-hand
*	E039	Rotary beacon, right-hand
*	E042	Bordering light, front, left-hand (France)
*	E043	Bordering light, front, right-hand (France)
*	E044	Heater unit M1 Motor, blower fan M2 Motor, pump E Heater plug B3 Temperature limiter B1 Flame monitor B2 Temperature sensor
*	E048	Marker lamp (France)
*	E049	Marker lamp (France)
	E053	Side marker lamp, left-hand
	E054	Side marker lamp, right-hand
	E055	Side marker lamp, left-hand
	E056	Side marker lamp, right-hand
	E057	Side marker lamp, left-hand
	E058	Side marker lamp, right-hand
	E059	Side marker lamp, left-hand
	E060	Side marker lamp, right-hand
	E061	Side marker lamp, left-hand
	E062	Side marker lamp, right-hand
	E079	Side marker lamp, left-hand
	E080	Side marker lamp, right-hand
	E091	Working floodlight, outriggers front left-hand
	E092	Working floodlight, outriggers front right-hand
	E093	Working floodlight, outriggers rear left-hand
	E094	Working floodlight, outriggers rear right-hand
	E097	Side marker lamp, left-hand
	E098	Side marker lamp, right-hand
	E701	Rotary beacon rear, left-hand
*	E704	Rotary beacon, rear, right-hand
	E705	Lateral light, front right, on boom
	E706	Lateral light, front left, on boom
	E707	Clearance lamp rear, left-hand, on the counterweight
	E708	Clearance lamp rear, right-hand, on the counterweight
	E801	Heater unit
	E802	Working floodlight on the crane cabin
	E803	Working floodlight on the crane cabin
	E804	Working floodlight 70W basic boom
*	E804	Working floodlight 250 W basic boom, adjustable via motor
	E805	Cab light
*	E808	Working floodlight 70W basic boom
*	E808	Working floodlight 250 W basic boom, adjustable via motor
*	E810	Working floodlight on rope winch
*	E811	Aircraft warning lamp
*	E811	Connector, aircraft warning lamp
*	E812	Condenser blower with pressure switch
*	E813	Air conditioning compressor
*	E901	SCK alarm, visual/acoustic
	F001	Fuse
	F002	Fuse
	F003	Fuse
	F004	Fuse
	F005	Fuse
	F006	Fuse
	F007	Fuse
	F008	Fuse

	F009	Fuse
	F010	Fuse
	F011	Fuse
	F012	Fuse
	F013	Fuse
*	F014	Fuse
	F015	Fuse
	F016	Fuse
	F017	Fuse
	F018	Fuse
*	F019	Fuse
	F020	Fuse
*	F021	Fuse
	F022	Fuse
*	F023	Fuse
	F024	Fuse
	F025	Fuse
	F026	Fuse
	F027	Fuse
	F028	Fuse
	F029	Fuse
	F030	Fuse
	F031	Fuse
*	F032	Fuse
	F033	Fuse
	F034	Fuse
	F035	Fuse
	F036	Fuse
*	F037	Fuse
	F038	Fuse
	F038	Fuse
*	F039	Fuse
	F040	Fuse
	F041	Fuse
	F042	Fuse
	F043	Fuse
	F044	Fuse
	F045	Fuse
*	F046	Fuse
	F047	Fuse
	F048	Fuse
*	F049	Fuse
*	F050	Fuse
	F051	Fuse
	F052	Fuse
	F053	Fuse
	F054	Fuse
	F055	Fuse
	F056	Fuse
	F058	Fuse
	F059	Fuse
	F060	Fuse
	F061	Fuse
*	F062	Fuse
	F801	Fuse
	F802	Fuse
	F803	Fuse
	F804	Fuse
	F805	Fuse
	F806	Fuse
	F807	Fuse
	F808	Fuse
	F809	Fuse
	F810	Fuse
	F811	Fuse

	F812	Fuse
	F813	Fuse
	F814	Fuse
	F815	Fuse
	F816	Fuse
	F817	Fuse
	F818	Fuse
	F819	Fuse
	F820	Fuse
	F821	Fuse
	F822	Fuse
	F823	Fuse
	F823	Fuse
	F824	Fuse
	F825	Fuse
	F826	Fuse
	F827	Fuse
*	F827	Fuse
*	F828	Fuse
	F829	Fuse
	F830	Fuse
	F831	Fuse
	F832	Fuse
	F833	Fuse
	F834	Fuse
	F835	Fuse
	F836	Fuse
	F837	Fuse
	F838	Fuse
	F839	Fuse
*	F840	Fuse
	F841	Fuse
	F842	Fuse
	F843	Fuse
	F844	Fuse
	F845	Fuse
	F846	Fuse
	F847	Fuse
	F848	Fuse
*	F849	Fuse
	F850	Fuse
	F851	Fuse
	F852	Fuse
	F853	Fuse
	F854	Fuse
	F855	Fuse
	F856	Fuse
*	F860	Fuse
	F861	Fuse
	F862	Fuse
	F863	Fuse
	G001	Battery
	G002	Battery
	G003	Generator
	G801	Battery
	G802	Battery
	G803	Generator
	H005	Indicator lamp, engine malfunction
	H011	Direction indicator I pilot lamp
*	H012	Direction indicator II pilot lamp
	H014	Service brake indicator lamp
	H015	Parking brake indicator lamp
	H034	Indicator lamp, central warning, chassis
	H307	Indicator lamp, gearbox malfunction
	H510	Indicator lamp, steering malfunction

*	H702	Direction indicator pilot lamp
*	H703	Indicator lamp, service brake, superstructure
	H810	Indicator lamp, central warning, CGC
	H850	Indicator, tele/cyl. Pin securing mechanism
		T1 = LED display; telescope pin fastening; tele section detection
		T2 = LED display; telescope pin fastening; tele section detection
		T3 = LED display; telescope pin fastening; tele section detection
		T4 = LED display; telescope pin fastening; tele section detection
		T5 = LED display; telescope pin fastening; tele section detection
		T6 = LED display; telescope pin fastening; tele section detection
		B on = LED display; cylinder pin fastening B off = LED display; cylinder pin fastening
		C on = LED display; cylinder pin fastening C off = LED display; cylinder pin fastening
	H902	Indicator lamp, swing brake released
	H905	Indicator lamp, counterweight not “up”
	H906	Indicator lamp, counterweight “down”
	H907	Indicator lamp, counterweight locked
	H908	Indicator lamp, counterweight unlocked
	K002	Relay, intermittent wiper operation
	K003	Electr. Battery main switch
	K004	Relay, generator D+
	K005	Relay, electric horn
*	K006	Relay, fog-light
	K006	Relay, fog-light
	K007	Relay, high-beam light / headlamp flashers
	K008	Relay, rear fog light
	K010	Direction / hazard warning flasher transmitter
	K013	Relay, battery main switch
	K013	Relay, battery main switch, time-delayed
*	K015	Relay, eddy-current brake
*	K016	Relay box
*	K023	Relay, eddy-current brake
*	K024	Relay, eddy-current brake
*	K025	Relay, eddy-current brake
*	K026	Relay, eddy-current brake
	K027	Relay, eddy-current brake (shut-off)
	K030	Relay, working speed
*	K033	Relay, heater unit 58
	K036	Relay, CGC supply
*	K037	Relay, air conditioner
*	K038	Relay, clutch, air conditioner
*	K039	Relay, condenser, air conditioner
	K040	Relay, holding circuit NES
	K041	Relay, door contact switch
	K042	Relay, stop light, superstructure
	K046	Relay, parking brake
	K047	Relay, service brake
	K061	Relay, central warning, chassis
	K063	Relay, engine malfunction
*	K065	Relay, automatic connection of fan
	K066	Relay, working floodlight, left-hand
	K067	Relay, Working floodlight, right-hand
*	K101	Relay, ABV shut-off feature
	K311	Relay, gearbox starter interlock
	K312	Relay, reversing light
	K313	Relay “Gearbox, neutral”
	K316	Relay “Engine brake”

	K409	Relay, axle oscillation
	K511	Relay, speed limitation of 4th axle
*	K514	Relay, front axle steering, left-hand
*	K515	Relay, front axle steering, right-hand
	K521	Relay, buzzer
	K531	Relay, supply of 5th axle
	K532	Relay, free of faults, 5th axle
	K533	Relay, faults, 4th axle
	K617	Relay, outriggers retracted
	K652	Relay, emergency actuation,outrigger beam front, left-hand
	K653	Relay, emergency actuation, outrigger beam front, right-hand
*	K709	Direction indicator transmitter
	K719	Relay, engine stalling device
	K720	Relay, engine stalling device
	K724	Relay, engine speed regulation “-“ „-„
	K725	Relay, engine speed regulation “-“ „+“
	K726	Relay, ignition, chassis ON
	K727	Relay, CGC supply
*	K730	Relay, Light from the superstructure
*	K731	Relay, Light from the superstructure
*	K735	Relay, chassis control system engaged
	K801	Relay, radiator control
	K802	Wiper interval action relay
	K803	Wiper interval action relay
	K805	Electric battery main switch
	K806	Relay, battery main switch, time-delayed
	K806	Timing relay, battery main switch
	K808	Relay, working floodlight
	K809	Relay, generator D+
	K810	Relay, heating, instrument illumination
	K811	Relay, heating / driving fan
	K812	Relay, CGC supply
	K813	Relay 15+ ADM/MR
	K814	Relay, electric horn
*	K816	Relay, air conditioner
*	K817	Relay, generator D+
	K819	Relay, EMERGENCY OFF
	K828	Relay, swing brake
	K851	Relay, tele pin securing mechanism T1
	K852	Relay, tele pin securing mechanism T2
	K853	Relay, tele pin securing mechanism T3
	K854	Relay, tele pin securing mechanism T4
	K855	Relay, tele pin securing mechanism T5
	K856	Relay, cylinder pin securing mechanism C engaged
	K857	Relay, cylinder pin securing mechanism C released
	K858	Relay, cylinder pin securing mechanism B engaged
	K859	Relay, cylinder pin securing mechanism B released
	K919	Relay, AML shut-off feature
	K921	Relay, counterweight “down”
	K922	Relay, counterweight “down”
	K923	Relay, counterweight not “up”
	K924	Relay, counterweight not “up”
	K925	Relay, counterweight locked
	K926	Relay, counterweight locked
	K927	Relay, counterweight unlocked
	K928	Relay, counterweight unlocked
	K929	Relay, counterweight rest
	K930	Relay, counterweight not “up”
	K931	Relay, counterweight not “up”
	K932	Relay, counterweight locked
	K934	Relay, armrest

	K935	Relay, counterweight „up“
	K941	Relay, crane control ON
*	K942	Relay, electric horn ASLI override actuated
	K950	Relay, crane control, emergency mode
	K951	Relay, crane control, emergency mode, swing brake
	K952	Relay, crane control, emergency mode “hoist winch – down”
	K952	Relay, crane control, emergency mode “hoist winch 1 – down”
	K953	Relay, crane control, emergency mode “hoist winch – up”
	K953	Relay, crane control, emergency mode “hoist winch 1 – up”
	K954	Relay, crane control, emergency mode, boom elevation up
	K954	Relay, crane control, emergency mode, boom elevation up
	K955	Relay, crane control, emergency mode, boom elevation down
	K955	Relay, crane control, emergency mode, boom elevation down
	K957	Relay, crane control, emergency mode, extending telescopes
	K957	Relay, extending telescopes
	K958	Relay, crane control, emergency mode, retracting telescopes
	K958	Relay, crane control, emergency mode, retracting telescopes
	K959	Relay, crane control, emergency mode, slewing left-hand
	K959	Relay, crane control Relay, swing mechanism left-hand
	K960	Relay, crane control, emergency mode, slewing right-hand
	K960	Relay, crane control, emergency mode, swing mechanism, right-hand
	K961	Relay, crane control, emergency mode “hoist winch 2 – down”
	K962	Relay, crane control, emergency mode “hoist winch 2 – up”
	K963	Relay, pump I
	K970	Relay, telescope control, emergency mode
	K971	Relay, telescope control, emergency mode
	K972	Relay, telescope control, emergency mode
	K973	Relay, telescope control, emergency mode
	K982	Relay, tele/cyl. Pin securing mechanism
	K988	Relay, counterweight down
	K989	Relay, counterweight up
	K992	Relay, electronic control LCD screen
*	L001	Eddy-current brake
	M001	Starter
	M002	Heater fan (Thermostatic switch only in case of air conditioner!) Collector drier with pressure switch Magnetic clutch Condenser fan
	M003	Wiper motor
	M005	Washer motor
*	M501	Servomotor, front axle steering

	M801	Starter
	M802	Radiator motor I
	M803	Motor, windscreen wiper
	M804	Wiper motor, skylight
	M805	Windshield washer motor
*	M806	Fan
	M807	Fan/ventilation/heating/air conditioning
*	M808	Servomotor, working floodlight
*	M809	Refrigerator motor II
	M810	Motor, seat adjustment
	M811	Motor Windscreen adjustment
	M812	Pump, central lubrication
	P001	Fuel level indicator
	P004	Engine temperature indicator
	P005	Speed indicator with hourmeter
	P006	Tachograph
	P020	CMV Cockpit-Multi-Vision
	P020	CMV Cockpit-Multi-Vision
	P310	Display for gearbox
	P501	Steering control device
	P802	Engine hourmeter
	P810	CGC Cockpit Graphic Control System
	P820	Diagnostic connector
	P821	Diagnostic connector
*	P902	Hourmeter, hoisting gear 1
*	P903	Hourmeter, hoisting gear 2
	P910	AML display, diagnostic / program connector
	P911	AML, diagnostic / program connector
	R001	Rearview mirror, left-hand, heated, adjustable
	R002	Rearview mirror, right-hand, heated, adjustable
	R003	Rearview mirror, right-hand, heated
	R004	Air drier
*	R005	Rearview mirror, right-hand, heated
*	R006	Rearview mirror, right-hand, heated
*	R007	Heater plug
	R010	Foot-actuated accelerator transmitter
	R013	Resistor 120 Ω
	R021	Resistor 120 Ω
	R031	Resistor 2.2 Ω
	R100	Resistor ABV
	R101	Resistor ABV
	R102	Resistor ABV
	R103	Resistor ABV
	R104	Resistor ABV
	R105	Resistor ABV
	R106	Resistor ABV
	R107	Resistor ABV
	R301	Resistor 2.2 Ω
	R501	Resistor, steering system
*	R702	Hand-actuated accelerator transmitter, engine speed, chassis
	R802	Foot-actuated accelerator transmitter
*	R804	Mirror, heated
	R806	Resistor, engine temperature gauge
	R807	Resistor, tank level indication
	R910	Resistor HES, main boom
	R911	Resistor blind plug, HES
*	R912	Resistor HES, fly jib
	R912	Resistor, hoist limit switch, fly jib
*	R913	Resistor blind plug, HES
	R913	Resistor 1, winch operation
*	R914	Resistor, hoist limit switch, top jib

*	R915	Resistor HES, heavy-lift fly jib
*	R916	Resistor blind plug, HES
*	R917	Resistor HES single top
	R917	Resistor HES, single top
*	R918	Resistor Blind plug HES
	R918	Resistor blind plug, HES
	S002	Ignition starter switch
	S004	Rocker switch with indicator lamp, mirror heating
	S005	Switch, heating / air conditioner
	S006	Light switch
	S007	Steering column switch Intermittent wiper action Washer
	S008	Steering column switch High-beam / dimmed light horn
	S009	Steering column switch, direction indicators
*	S010	Rocker switch, super-tone horn
	S011	Rocker switch, fog light
	S012	Hazard warning flasher switch, hazard warning flashers with indicator lamp
	S013	Key-actuated change-over switch, chassis – superstructure
	S013	Key-actuated switch, superstructure – chassis
	S014	Rocker tip switch, rear fog light
	S015	Rocker switch with indicator lamp, rotary beacon
	S016	Rocker tip switch, on-road / off-road gear
	S021	Rocker switch, battery main switch
	S022	Rocker tip switch, axle drive mechanism
	S026	Rotary switch, mirror adjusting switch
*	S029	Rocker switch, eddy-current brake
	S030	Rocker switch, working speed
	S031	Rocker switch, reversing signal
	S032	Rocker switch, engine speed regulation
	S037	Switch, coolant level
	S038	Switch, air cleaner
	S039	Switch, steering pump
	S040	Switch, steering emergency pump
	S041	Switch, stop light
	S042	Switch, parking brake brake-air pressure
	S043	Switch, parking brake
	S044	Switch, parking brake
	S045	Switch, off-road gear
	S046	Switch, 2nd axle drive
	S047	Switch, inter-axle differential, on 1st axle
	S048	Switch, inter-axle differential, on 2nd axle
	S049	Switch, inter-axle differential, on 4th axle
	S050	Switch, inter-axle differential, on 5th axle
	S052	Switch, reserve, circuit I
	S053	Switch, reserve, circuit II
*	S054	Switch, stop light
	S056	Switch, on-road gear
	S057	Switch, rear inter-axle
	S058	Switch, hydraulic filter
	S059	Switch, hydraulic filter
	S063	Door contact switch, left-hand
	S064	Door contact switch, right-hand
	S074	Switch, inter-axle differential, transfer box
*	S075	Mushroom-head emergency OFF pushbutton, left-hand
*	S076	Mushroom-head emergency OFF pushbutton, right-hand

	S077	Switch, hydraulic oil level
*	S100	Rocker tip switch – switching ABV ON / OFF
	S112	Rocker tip switch, menu guidance
	S113	Rocker tip switch, selection
	S114	Rocker tip switch, service
	S115	Rocker switch, emergency actuation of CAN on
*	S301	Gear selector, gearbox
	S302	Gear selector, gearbox
	S319	Switch, gearbox in neutral position
	S320	Step switch, intarder (with eddy-current brake)
	S321	Rocker switch, shut-off of intarder
	S401	Rocker switch, axle lock
	S402	Rocker tip switch “Levelling”
	S403	Rocker tip switch, inclination adjustment, front left-hand
	S404	Rocker tip switch, inclination adjustment, rear left-hand
	S405	Rocker tip switch, inclination adjustment, front right-hand
	S406	Rocker tip switch, inclination adjustment, rear right-hand
	S409	Proximity switch, boom rest, crane position “over-front”
	S411	Proximity switch on lock pin, crane directed to the rear
	S412	Switch, front axle, left-hand, axle locking assembly
	S413	Switch, front axle, right-hand, axle locking assembly
	S414	Switch, rear axle, left-hand, axle locking assembly
	S415	Switch, rear axle, right-hand, axle locking assembly
	S418	Rocker tip switch, axle oscillation (not active in case of operation from superstructure !)
	S419	Switch, 3rd axle connected, left-hand
	S420	Switch, 3rd axle connected, right-hand
	S422	Rocker switch, axle load
	S426	Proximity switch, 3rd axle, top left-hand
	S427	Proximity switch, 3rd axle, top right-hand
	S428	Rocker tip switch, 3rd axle, raise – lower
	S437	Magnetic switch, normal level, front, left-hand
	S438	Magnetic switch, normal level, rear, left-hand
	S439	Magnetic switch, normal level, front, right-hand
	S440	Magnetic switch, normal level, rear, right-hand
	S457	Magnetic switch, increased normal level, front, left-hand
	S458	Magnetic switch, increased normal level, rear, left-hand
	S459	Magnetic switch, increased normal level, front, right-hand
	S460	Magnetic switch, increased normal level, rear, right-hand
	S461	Rocker tip switch, raise – lower level of all axles
*	S501	Rocker switch, unlock rear axle
*	S503	Control switch, rear axle steering
	S506	Switch on slipring, crane directed to the rear
*	S510	Rocker switch, rear axles locked (4th / 5th)
	S521	Rocker switch, on-road – construction site
	S532	Relay, free of faults, 5th axle
	S601	Rocker switch, preselection of outriggers
	S602	Rocker tip switch, extending/retracting front, right-hand
	S603	Rocker tip switch, extending/retracting rear, right-hand
	S604	Rocker tip switch, extending/retracting rear, left-hand
	S605	Rocker tip switch, extending/retracting front, left-

		hand
	S701	Rocker switch with indicator lamp chassis control system engaged
*	S704	Rocker switch, direction indicators
*	S707	Rocker switch with indicator lamp, parking brake
	S708	Rocker tip switch, engine speed chassis
*	S722	Switch, service brake, superstructure
	S801	Rocker switch, windscreen wipers
	S802	Rocker switch, wiper skylight
	S803	Rocker tip switch, washer
	S804	Rocker switch Instrument illumination Working floodlight
*	S807	Rocker switch with indicator lamp, aircraft warning lamp
	S808	Rocker switch with indicator lamp, battery main switch
	S809	Rocker switch with indicator lamp, centralized lubrication
	S810	Ignition starter switch, chassis – superstructure
*	S814	Rocker switch, working floodlight on rope winch
	S815	Rotary switch, heating blower fan
*	S817	Rocker switch with indicator lamp, mirror heating
	S818	Rocker switch, working floodlight on basic boom
*	S819	Rocker tip switch, variable working floodlight, basic boom
	S823	Mushroom-head emergency off push-button
*	S824	Mushroom-head emergency off push-button
*	S825	Air conditioning switch with temperature control
*	S826	Rotary switch, air conditioner
	S827	Rocker tip switch, seat adjustment
	S828	Rocker tip switch Windscreen adjustment
	S829	Rocker tip switch, engine stalling device
	S830	Switch, air cleaner
	S831	Switch, hydraulic oil filter
	S832	Temperature switch, radiator control 50°C
	S836	Switch, hydraulic oil temperature 85°C
*	S840	Thermo probe NTC
	S851	Rocker switch, high speed, telescope
	S854	Rocker switch, lift adjuster
*	S859	Rocker switch, removal the boom
*	S862	Rocker tip switch, pin fastening boom elevation cylinder
	S865	Pressure switch, counterweight 250 bar
	S866	Pressure switch, counterweight left 230 bar
	S867	Pressure switch, counterweight right 230 bar
	S903	Key-actuated push-button, hoist limit switch
	S904	Key-actuated push-button, ASLI
	S909	Rocker tip switch, telescope emergency mode, locking/unlocking the tele section(s)
	S910	Rocker tip switch, telescope emergency mode, locking/unlocking the tele section(s)
	S911	Rocker switch, telescope emergency control
	S913	Rocker tip switch, counterweight “up/down”
	S914	Rocker tip switch, lock / unlock counterweight
	S924	Rocker tip switch, override of crane control/counterweight
	S925	Rocker switch with indicator lamp, telescope emergency mode
*	S932	Rocker switch with indicator lamp, hoist winch 2 “engaged”
*	S933	Key-actuated switch “change-over of load chart”
	S938	Limit switch, hoisting gear 1 „down“
*	S939	Limit switch, hoisting gear 2 „down“

	S940	Armrest switch
	S941	Proximity switch, counterweight down, right-hand
	S942	Proximity switch, counterweight down, left-hand
	S943	Proximity switch “TOP”, counterweight cylinder not on top right
	S944	Proximity switch “TOP”, counterweight cylinder not on top left
	S945	Proximity switch, counterweight locked, left-hand
	S946	Proximity switch, counterweight locked, right-hand
	S947	Proximity switch, counterweight unlocked, left-hand
	S948	Proximity switch, counterweight unlocked, right-hand
	S951	Proximity switch cylinder lock mechanism C engaged
	S952	Proximity switch cylinder lock mechanism C released
	S957	Proximity switch cylinder lock mechanism B, left-hand, engaged
	S958	Proximity switch cylinder lock mechanism B, left-hand, released
	S959	Proximity switch cylinder lock mechanism B, right-hand, engaged
	S960	Proximity switch cylinder lock mechanism B, right-hand, released
	S961	Pressure switch, swing brake released
	S962	Hoist limit switch, main boom
*	S963	Hoist limit switch, fly jib
	S963	Hoist limit switch, fly jib
	S964	Proximity switch T1 Tele pin locking mechanism, detection of tele section
	S965	Proximity switch T2 Tele pin locking mechanism, detection of tele section
	S966	Proximity switch T3 Tele pin locking mechanism, detection of tele section
	S967	Proximity switch T4 Tele pin locking mechanism, detection of tele section
	S968	Proximity switch T5 Tele pin locking mechanism, detection of tele section
	S969	Proximity switch T6 Tele pin locking mechanism, detection of tele section
	S972	Proximity switch “CENTER”, counterweight not on top right
	S973	Proximity switch “CENTER”, counterweight not on top left
*	S977	Pressure switch, swing lockout
*	S978	Proximity switch – operation with dolly
*	S979	Hoist limit switch top jib
	S979	Hoist limit switch, top jib
*	S981	Hoist limit switch, single top
	S981	Hoist limit switch, single top
*	S985	Hoist limit switch, heavy-lift fly jib
	S990	Rocker switch, rope winch rotation transmitter
	S993	Rocker tip switch, monitor
	S994	Rocker switch with indicator lamp, lockout of swing range limitation
	S996	Rocker switch, indication of hook height, hoisting gear 1
	S997	Rocker switch, indication of hook height, hoisting gear 2

	V003	Diode group, buzzer
	V004	Diode group, CGC supply
	V005	Diode group “+” CGC
	V501	Diode group, steering
	V502	Diode group, steering
	V503	Diode group, steering
	V504	Diode group, steering
	V506	Diode group
	V512	Rectifier diode
	V513	Rectifier diode
	V626	Diode group
	V632	Diode group, emergency mode (CAN)
	V701	Diode group, CGC supply
	V711	Diode group, ignition, chassis
	V802	Diode group, CGC supply
	V803	Diode group, CGC supply
	V808	Diode
	V905	Diode group, counterweight
	V907	Diode group, ASLI override feature activated
	V911	Diode group, crane control; emergency mode
	V912	Diode group, crane control; emergency mode
	V913	Diode group, crane control; emergency mode
	V914	Diode group, crane control; emergency mode, swing brake
	V920	Diode group, counterweight
	V921	Diode group, counterweight
	V935	Diode group, tele/cyl. Pin securing mechanism
	V936	Diode group, tele/cyl. Pin securing mechanism
	V937	Diode group, crane control; emergency mode
	W001	Antenna
	W701	Slipring (chassis/superstructure)
	W801	Antenna
	W901	Cable drum, length angle transmitter, slip ring
	W901	Cable drum, length angle transmitter
	W905	Cable drum
	W906	Cable drum
	X	Remove connection in case of optional equipment
*	X…	12 V plugbox
	X001	Plugbox 24V
*	X002	Battery charging plugbox
*	X003	Plugbox for starting the engine with current supplied from an external source
*	X004	Trailer plugbox N
*	X005	Trailer plugbox S
	X021	Diagnostic connector
	X050	Diagnostic connector
	X098	Plugbox 12V
*	X101	Trailer plugbox, ABV
	X102	Diagnostic connector, ABS
	X301	Plug, vehicle electric system I
	X801	Plugbox 24V/10A inspection lamp
*	X802	Battery charging plugbox
*	X803	Plugbox for starting the engine with current supplied from an external source
	X837	Plugbox 12V/10A
	X901	Plug-and-socket connectors, fly jib
	X902	Blind plug, main boom
*	X903	Plug on fly jib to main boom
	X903	Plug on fly jib to main boom
*	X904	Plug on fly jib to hoist limit switch
	X904	Plug on fly jib to hoist limit switch
*	X908	Plug on top jib, rear
	X908	Plug on top jib, rear
*	X909	Plug on top jib, front
	X909	Plug on top jib, front

*	X910	Plug on top jib to hoist limit switch
	X910	Plug on top jib to hoist limit switch
*	X911	Plug on single top to main boom
	X911	Plug on single top to main boom
*	X913	Plug on heavy-lift jib to main boom
	Y002	Pneumatic solenoid valve, transfer box, off-road gear
	Y006	Solenoid valve PN, 2nd axle drive
	Y007	Solenoid valve PN, inter-wheel differential
	Y008	Solenoid valve PN, rear axle, longitudinal
*	Y011	Solenoid valve PN, parking brake
*	Y013	Solenoid valve, flame-type preheating system
	Y014	Pneumatic solenoid valve, transfer box, on-road gear
*	Y016	Fuel pump
	Y019	Solenoid valve PN, transfer box differential lock
	Y031	Solenoid valve, cooler control
*	Y101	Solenoid valve ABV 2A left-hand L2
*	Y102	Solenoid valve ABV 2A right-hand L1
*	Y107	Solenoid valve ABV 5A left-hand A1
*	Y108	Solenoid valve ABV 5A right-hand A2
	Y307	Pneum. Solenoid valve, engine brake
	Y311	Pneum. Solenoid valve, engine brake
	Y401	Solenoid valve, inclination adjustment front left, down
	Y402	Solenoid valve, inclination adjustment front left, up
	Y403	Solenoid valve, inclination adjustment rear left, down
	Y404	Solenoid valve, inclination adjustment rear left, up
	Y405	Solenoid valve, inclination adjustment front right, down
	Y406	Solenoid valve, inclination adjustment front right, up
	Y407	Solenoid valve, inclination adjustment rear right, down
	Y408	Solenoid valve, inclination adjustment rear right, up
	Y411	Solenoid valve PN, axle lock
	Y412	Solenoid valve, axle oscillation
	Y419	Solenoid valve, axle oscillation, right-hand
	Y420	Solenoid valve, axle oscillation, left-hand
	Y438	Solenoid valve, lift all axles
	Y440	Solenoid valve, annular space, all axles (all axles lifted)
	Y442	Solenoid valve, lower 3rd axle, left-hand
	Y443	Solenoid valve, lower 3rd axle, right-hand
	Y444	Solenoid valve, keep 3rd axle lifted
	Y445	Solenoid valve, lower 3rd axle
	Y446	Solenoid valve, lift 3rd axle, left-hand
	Y447	Solenoid valve, lift 3rd axle, right-hand
	Y448	Solenoid valve, lock transverse coupling
	Y449	Solenoid valve, limitation of axle load, 3rd axle

	Y513	Check valve, 4th axle (left-hand)
	Y514	Check valve, 4th axle (left-hand)
	Y515	Solenoid valve, 4th axle; actuation of steering, left-hand
	Y516	Solenoid valve, 4th axle; actuation of steering, right-hand
	Y518	Check valve, 4th axle (right-hand)
	Y519	Check valve, 4th axle (right-hand)
	Y523	Coupling, front axle steering
	Y535	Check valve, 5th axle (right-hand)
	Y536	Check valve, 5th axle (right-hand)
	Y537	Check valve, 5th axle (left-hand)
	Y538	Check valve, 5th axle (left-hand)
	Y539	Solenoid valve, 5th axle; actuation of steering, left-hand
	Y540	Solenoid valve, 5th axle, actuation of steering, right-hand
	Y541	Solenoid valve, steering stabilization, 5th axle
	Y542	Solenoid valve, engine running (D+)
	Y602	Solenoid valve, extending outrigger beam, rear right-hand
	Y603	Solenoid valve, retracting outrigger beam, rear right-hand
	Y604	Solenoid valve, extending outrigger cylinder, rear right-hand
	Y605	Solenoid valve, retracting outrigger cylinder, rear right-hand
	Y606	Solenoid valve, extending outrigger beam, rear left-hand
	Y607	Solenoid valve, extending outrigger beam, rear left-hand
	Y608	Solenoid valve, extending outrigger cylinder, rear left-hand
	Y609	Solenoid valve, retracting outrigger cylinder, rear left-hand
	Y610	Solenoid valve, extending outrigger cylinder, front left-hand
	Y611	Solenoid valve, retracting outrigger cylinder, front left-hand
	Y612	Solenoid valve, extending outrigger beam, front left-hand
	Y613	Solenoid valve, retracting outrigger beam, front left-hand
	Y614	Solenoid valve, extending outrigger cylinder, front right-hand
	Y615	Solenoid valve, retracting outrigger cylinder, front right-hand
	Y616	Solenoid valve, extending outrigger beam, front right-hand
	Y617	Solenoid valve, retracting outrigger beam, front right-hand
	Y618	Solenoid valve, depressurized circulation
	Y619	Solenoid valve, pressure limitation, extending outrigger beams
	Y801	Fuel pump
	Y901	Solenoid valve, crane control, control pressure
	Y902	Solenoid valve, boom elevation, down
	Y903	Solenoid valve, hoisting gear 1, down
	Y904	Solenoid valve, hoisting gear 1, up
	Y905	Solenoid valve, extending tele.
	Y906	Solenoid valve, hoisting gear 2, down
	Y907	Solenoid valve, hoisting gear 2, up
	Y908	Solenoid valve, retracting tele.
	Y909	Solenoid valve, boom elevation, up
	Y910	Solenoid valve, swing brake released
	Y914	Solenoid valve, high speed
	Y915	Solenoid valve, differential mode, tele.
	Y918	Solenoid valve, swing mechanism, left-hand
	Y919	Solenoid valve, swing mechanism, left-hand
	Y925	Solenoid valve, pump I
	Y926	Solenoid valve, pump II
	Y927	Solenoid valve, counterweight
	Y931	Solenoid valve, counterweight down
	Y932	Solenoid valve, counterweight up
	Y933	Solenoid valve, locking counterweight
	Y934	Solenoid valve, unlocking counterweight
	Y938	Solenoid valve, counterweight down/up
	Y939	Solenoid valve, counterweight down/up
	Y941	Solenoid valve, ASLI
	Y943	Solenoid valve, pressure reduction, telescope emergency control
	Y947	Solenoid valve, sprag clutch, swing mechanism
	Y969	Solenoid valve, locking pressure
	Y971	Solenoid valve; contol oil, locking mechanism
	Y972	Solenoid valve, soft change-over, locking tele cylinder
	Y973	Solenoid valve, lock, keeping locking state
	Y974	Solenoid valve, locking cylinder
	Y975	Solenoid valve, unlocking cylinder
	Y976	Solenoid valve, locking cylinder
	Y977	Solenoid valve, unlocking cylinder
	Y980	Solenoid valve, POWER-SHIFT
	Y982	Solenoid valve, retracting tele.
*	Y984	Solenoid valve, locking boom pin fastening, right-hand
*	Y985	Solenoid valve, unlocking boom pin fastening, right-hand
*	Y986	Solenoid valve, locking boom pin fastening, left-hand
*	Y987	Solenoid valve, unlocking boom pin fastening, left-hand
*	Y988	Solenoid valve, pin fastening of boom elevation cylinder
*	Y989	Solenoid valve, pin fastening of boom elevation cylinder

1 oder 2 Arbeitsscheinwerfer am Grundausleger = 1 or 2 working floodlights (70W) on basic boom

2 Arbeitsscheinwerfer motorisch verstellbar am Grundausleger = 2 working floodlights on basic boom, adjustable via motor

Key for diagrams

Deutsch	English
$ = Äußerer Schirm über Kabelverschraubung an Masse	$ = external shield to ground via cable fitting
(Option)	(Optional equipment)
ab	"down"
Abschalt. Tempomat	Shut-off Cruise control
Abschirmung	Shield
Abstützung	Outriggers
Abstützzyl. ausfahren	Extend outrigger cylinder
Abstützzyl. einfahren	Retract the outrigger cylinder
Abtriebsdrehzahl	Output speed
ABV-Signal	ABV signal
Achsblockierung	Axle locking assembly
Achse	Axle
Achse 3 heben	Lift 3rd axle
Achse 3 senken	Lower 3rd axle
Achsen anheben	Lift axles
Achspendelung	Axle oscillation
an Lüftermotor Lenkung	to fan motor, steering
Anschl. Kuppl.	Connection coupling
Anschluss Beifahrersitz	Connector, passenger seat
Anschluss Fahrersitz	Connector, driver’s seat
Anschluss Funk	Connection, radio
Anschluss Gasheizung	Connector, gas heating
Anschluss Heizung	Connection, heating
Anschluss Kamera s/w HR	Connector, monochrome camera, rear right-hand
Anschluss Konstantdrossel	Connection, constant throttle valve
Anschluss Lenksäule	Connector, steering column
Anschluss Radio Japan	Connector, radio, Japan
Anzeige Display	Display
Anzeigeleuchten von Anschlußseite dargestellt	Indicator lights shown from the connection site
auf	“up”
aus	off
Ausg.	Output
Ausleger	Boom
Auslegerspitze	Boom tip
äußerer Schirm über Kabelverschraubung an Masse	External shield to ground via cable fitting
BBA – Betriebsbremsanlage	Service brake system
Bedien.	Operation
Beifahrersitz	Passenger seat
Beleucht. Display	Lighting of display
Blindstecker	Blind plug
Bordnetz Kl. …	Vehicle’s electrical network, terminal …
Bremslicht	Brake light
CAN Masse	CAN ground
CGC Versorgung	CGC supply
Diagnose	Diagnosis
Diff.-laengs	Inter-axle differential lock
Diff.-quer	Inter-wheel differential lock
Display	Display
Drehen links	Slewing to the left
Drehen rechts	Slewing to the right
Drehwerk	Swing mechanism
Drehwinkel	Swing angle
Ein	on
entr. - entriegeln	Unlocked - unlocking
EURO-Steuerung	EURO control
Fahrersitz	Driver's seat
Fahrschalt.	Gear selector switch
Fahrtrichtung	Driving direction
FAUN-Steuerung	FAUN control system
FBA - Federspeicherbremsanlage	Air accumulator brake system
Federung	Suspension
Federungszylinder	Suspension cylinder
Folientastatur CGC	Membrane keypad CGC
Funktion	Function
Fussbremse	Footbrake
Gangschalter	Gear selector
Gebläse	Fan
Gegengewicht	Counterweight
Geländegang	Off-road gear
Getriebe	Gearbox
Hauptschalter	Main switch
Hauptstbl.	Main control block
heben	Raising / lifting
Hilfshubwerk	Auxiliary hoisting gear
hinten links absenken	lowering, rear, left-hand
hinten links anheben	raising, rear, left-hand
hinten rechts absenken	lowering, rear, right-hand
hinten rechts anheben	raising, rear, right-hand
Hinterachslenkung	rear axle steering
HL	rear, left-hand
Hochschaltsperre	upshifting lock
HR	rear, right-hand
Hubwerk	Hoisting gear
Hubw. ab	Hoisting gear “down”
Hubw. auf	Hoisting gear “up”
Hydraulikanlage	Hydraulic system
Hypl - Hydraulikplan	Hydraulic piping diagram
Hypl Lüfterantrieb	Hydraulic piping diagram, fan drive
Hypl. Drehwerk	Hydraulic piping diagram, swing mechanism
Hypl. Gegengewicht	Hydraulic piping diagram, counterweight
Hypl. Hubwinde	Hydraulic piping diagram, hoist winch
Hypl. Telezylinder	Hydraulic piping diagram, telescopic cylinders, tele cylinders
Hypl. Wippzylinder	Hydraulic piping diagram, boom elevation cylinder
Hyplan Lenkung	Hydraulic piping diagram, steering
Hyplan Motor	Hydraulic piping diagram, engine
Hyplan Pumpen-ENB	Hydraulic piping diagram, pump assembly
Intarder	Intarder
Intarder-Anzeige	Intarder indication
K.-Leitung	K line
Klima	Air conditioner
Kondensator-Gebläse	Condenser fan
Kreis I/II	Circuit I/II
Lastsignal	Load signal
Lecköl	Leakage oil
Leerlaufschalter	Idle switch
links	Left-hand
L-Leitung SDDL	L line SDDL
LS-Signal - Lastschaltsignal	Load-sensing signal
Lüfterantrieb	Fan drive
Lüfterpumpe	Fan pump
Lüftersteuerung	Fan control
Luftfederung	Air suspension
Magnetkupplung	Magnetic clutch

Magnetventil	Solenoid valve
Masse	Ground
Masse Deckenleuchte usw. li. / re	Ground, ceiling lamp etc., left-hand / right-hand
Masse FH/Inst.T.	Ground, driver's cab/instrument panel
Masse Scheinwerfer usw. li. / re	Ground, headlamp etc., left-hand / right-hand
Masseleitungen braun	Ground cables: brown
minus	Minus
Motor	Engine
Motor Start	Engine start
Motor Stopp	Engine stop (stalling device)
Motorbremse	Engine brake
Nicht angegebene Leitungsfarben: weiß	Cable colours unless otherwise specified: white
Nicht angegebene Leitungsquerschn.:	Cable cross sections, unless otherwise specified:
Niveauregulierung	Leveling
Notlenkpumpe	Steering emergency pump
NV - Nebenverbraucher	Auxiliary equipment
NVA - Nebenverbraucheranlage	Auxiliary equipment
Ölbeh. (Ölbehälter)	Oil tank
OW - Oberwagen	Superstructure
PTO1 Anforderung	PTO1 request
PTO1 Rückmeldung	PTO1 feedback signal
rechts	Right-hand
Relais PTO1	Relay, PTO1
Res. - Reserve	Reserve
Rücklicht	Rear light
Rundumleuchte	Rotary beacon
Sammeltrockner mit Druckschalter	Collector drier with pressure switch
Schalter OW ein	Switch, superstructure, ON
Schalter UW ein	Switch, chassis, ON
senken	Lowering
Sicherung	Fuse
siehe BGR	Refer to module
Sign. 1./2./3./N/R-Gang	Signals, 1st, 2nd, 3rd/N/rev. gear
Sonderausrüstung	Optional equipment
Sonderausrüstung Kundenwunsch	Optional equipment at customer’s request
Speicherladeventil	Accumulator load valve
Spitzenausleger	Fly jib
SPK - Br. (Spreizkeilbremse)	Spreading wedge brake
Stbl. - Steuerblock	Control block
Steuerblock Ventilgruppe	Control block valve group
Stecker nur bei Option „England“ gesteckt	Pin only pluged in case of opional equipment „England“
Straßenfahrt	On-road travel
Straßengang	On-road gear
Stromrelais Runduml.	Power relay, rotary beacon
Stufe (Heizung: - / Teleskopieren: _)	Stage / section
Stützträger hi.li. ausfahren	Extending rear outrigger beams, left-hand
Stützträger hi.li. einfahren	Retracting rear outrigger beams, left-hand
Stützträger hi.re. ausfahren	Extending rear outrigger beams, right-hand
Stützträger hi.re. einfahren	Retracting rear outrigger beams, right-hand
Stützträger vo.li. ausfahren	Extending front outrigger beams, left-hand
Stützträger vo.li. einfahren	Retracting front outrigger beams, left-hand
Stützträger vo.re. ausfahren	Extending front outrigger beams, right-hand
Stützträger vo.re. einfahren	Retracting front outrigger beams, right-hand
Stützzylinder hi.li. ausfahren	Extending rear outrigger cylinders, left-hand
Stützzylinder hi.li. einfahren	Retracting rear outrigger cylinders, left-hand
Stützzylinder hi.re. ausfahren	Extending rear outrigger cylinders, right-hand
Stützzylinder hi.re. einfahren	Retracting rear outrigger cylinders, right-hand
Stützzylinder vo.li. ausfahren	Extending front outrigger cylinders, left-hand
Stützzylinder vo.li. einfahren	Retracting front outrigger cylinders, left-hand
Stützzylinder vo.re. ausfahren	Extending front outrigger cylinders, right-hand
Stützzylinder vo.re. einfahren	Retracting front outrigger cylinders, right-hand
Tachgraph	Tachograph
Teleskopausleger	Telescopic boom
Tele aus	Extending tele section
Tele ein	Retracting tele section
Thermoschalter	Thermostatic switch
Trennstelle Hydraulikpläne	Interface, hydraulic piping diagrams
Türschalter	Door switch
Umluft	Recirculated air
Umrissleuchten	Clearance lamps
UW - Unterwagen	Chassis
Ventilgruppe	Valve group
Verteilergetriebe	Transfer box
Vierkreisschutzventil	Four-circuit protection valve
VL	Front, left-hand
vorne links absenken	Lower, front, left-hand
vorne links anheben	Raise, front, left-hand
vorne rechts absenken	Lower, front, right-hand
vorne rechts anheben	Raise, front, right-hand
VR	Front, right-hand
Warnsummer, Störlampe	Warning buzzer, malfunction indicator lamp
Widerstand	Resistor
Widerstand Kl. 1-2 entfällt bei Betrieb mit 2 Winden	Resistor, terminal 1 - 2, deleted in case of two-winch operation
Wippspitze	Luffing fly jib
Wippe ab	Boom elevation "down"
Wippe auf	Boom elevation “up”
Zusatzheizung	Supplementary heater unit
Zwischenstück	Intermediate section
Zylinder	Cylinder

Textblöcke - Text blocks

Re. Chapter D1-2, page 1/2

List of functionalities (not for materials planning)

Item	Designation	Qty.
01	Two-cylinder air compressor	1
02	Processing compressed air	1
04	Dual-circuit brake valve	1
05	Handbrake valve	1
07	Compressed air tank 5 l	1
08	Compressed air tank 20l	1
08.1	Compressed air tank 40l	5
08.2	Compressed air tank 10l	1
09	Drainage valve	7
10	Brake cylinder 20	8
11	Air accumulator cylinder 20/24	6
15	Pressure limiting valve	1
16	Relay valve	4
16.1	Overload protection valve	2
20	Pressure switch	5
24	Silencer	6
24.1	Silencer	1
28	Test socket	10
28.1	Test socket	6
30	Filler socket	1
31	Electr. control system	1
32	ABV solenoid valve	4
33	Rod-type sensor	4
34	Trailer control valve	1
35	Coupling head V (supply)	1
36	Coupling head B (brake)	1

TECHNICAL DATA OF BRAKE SYSTEM

Switch-off pressure 11.7 to 12.3 bar
Switch-on pressure 10.0 to 11.0 bar
Service pressure 9.8 to 10.2 bar - circuits 1 and 2
Service pressure 8.1 to 8.5 bar - circuits 3 and 4
Design pressure: 8.5 bar - 1st and 2nd axles
Pressure limitation of 3rd to 5th axles: 7.0 to 7.2 bar
Brake circuit 1 = 3rd to 5th axles.
Brake circuit 2 = 1st and 2nd axles.

The brake system has been equipped with polyamide tubes according to DIN 74324.

(KG) = Connector for clutch and gearbox
(NV) = Connector or auxiliary equipment

Re. Chapter D1-2, page 1/2

List of functionalities (not for materials planning)		
Item	Designation	Qty.
001	3/2 way valve	5
002	3/2 way valve	2
003	5/2 way valve	1
004	Compressed air tank 20l	1
005	Drainage valve	1
006	Unloading valve	1
007	4/2 way valve	1

Functions of valves according to designation of electr. connector	
Y002	Transfer box - off-road gear
Y006	Connection of 2nd axle
Y007	Inter-wheel differential lock in axles
Y008	Diff. transfer box
Y014	Transfer box - on-road gear
Y019	4th axle - inter-axle lock
Y307	Const. throttle valve
Y311	Engine brake
Y411	Axle lock / suspension
Connector for supply of auxiliary equipment, refer to module 16/00	

Re. Chapter D2-3, page 2/12

Overview of solenoid valves

Y091	Control pressure shut-off feature
Y902	Boom elevation "down"
Y903	Winch „down“
Y904	Winch “up”
Y905	Extend tele section
Y906	2nd winch “down”
Y907	2nd winch “up”
Y908	Retract tele section
Y909	Boom elevation “up”
Y910	Release swing brake
Y914	High speed
Y915	Differential mode, tele
Y918	Swing mechanism, left-hand
Y919	Swing mechanism, right-hand
Y925	Pump 1
Y926	Pump 2
Y927	Activation of counterweight
Y931	Counterweight down
Y932	Counterweight up
Y933	Lock counterweight
Y934	Unlock counterweight
Y941	ASLI shut-off feature
Y943	Pressure commutation, tele
Y974	Lock boom
Y975	Unlock boom
Y976	Lock tele cylinder
Y977	Unlock tele cylinder
Y980	Connect POWER-SHIFT function
Y9xx	Connect tele locking mechanism
Y9xx	Tank discharge, tele cylinder
Y9xx	

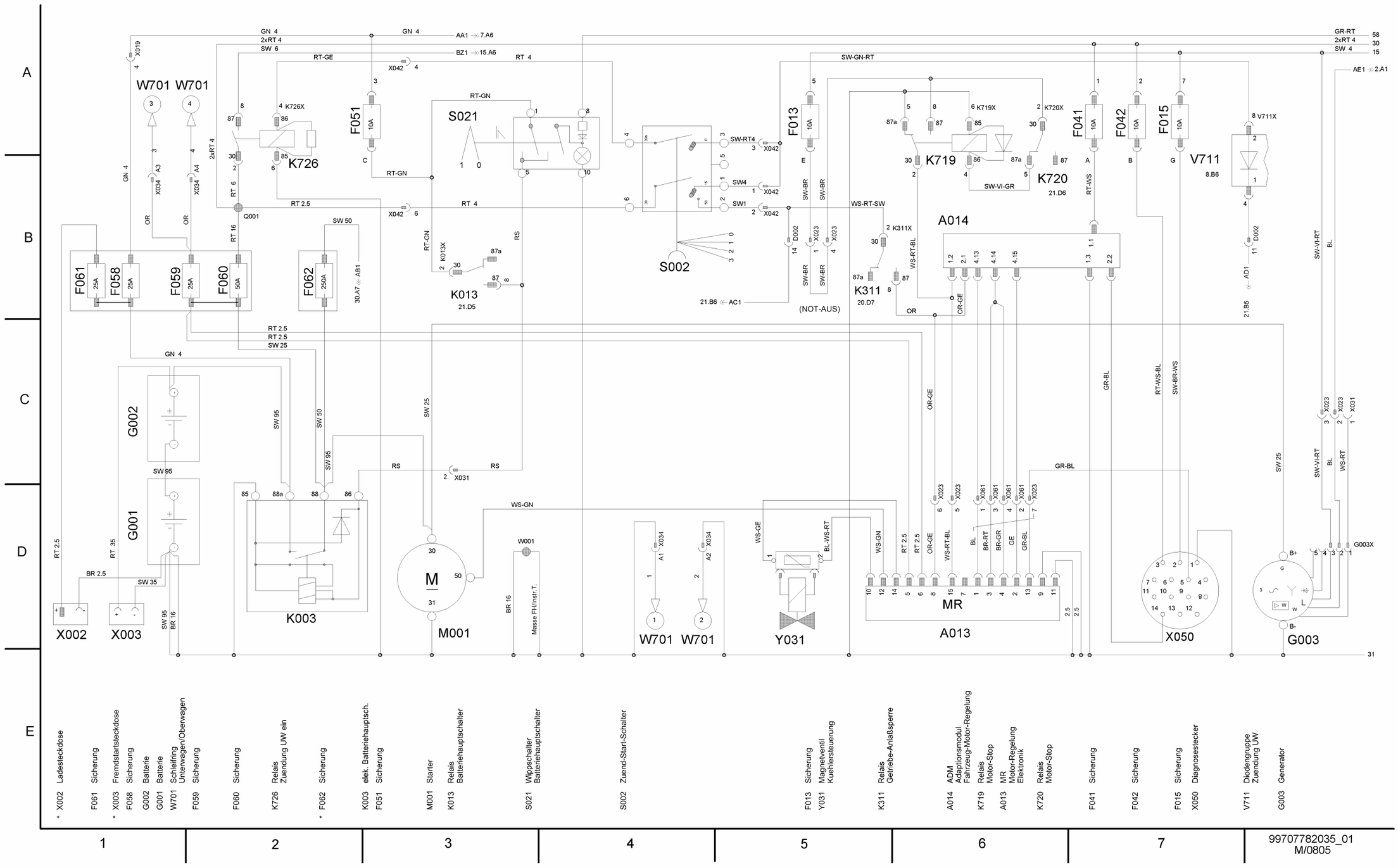
Part D1

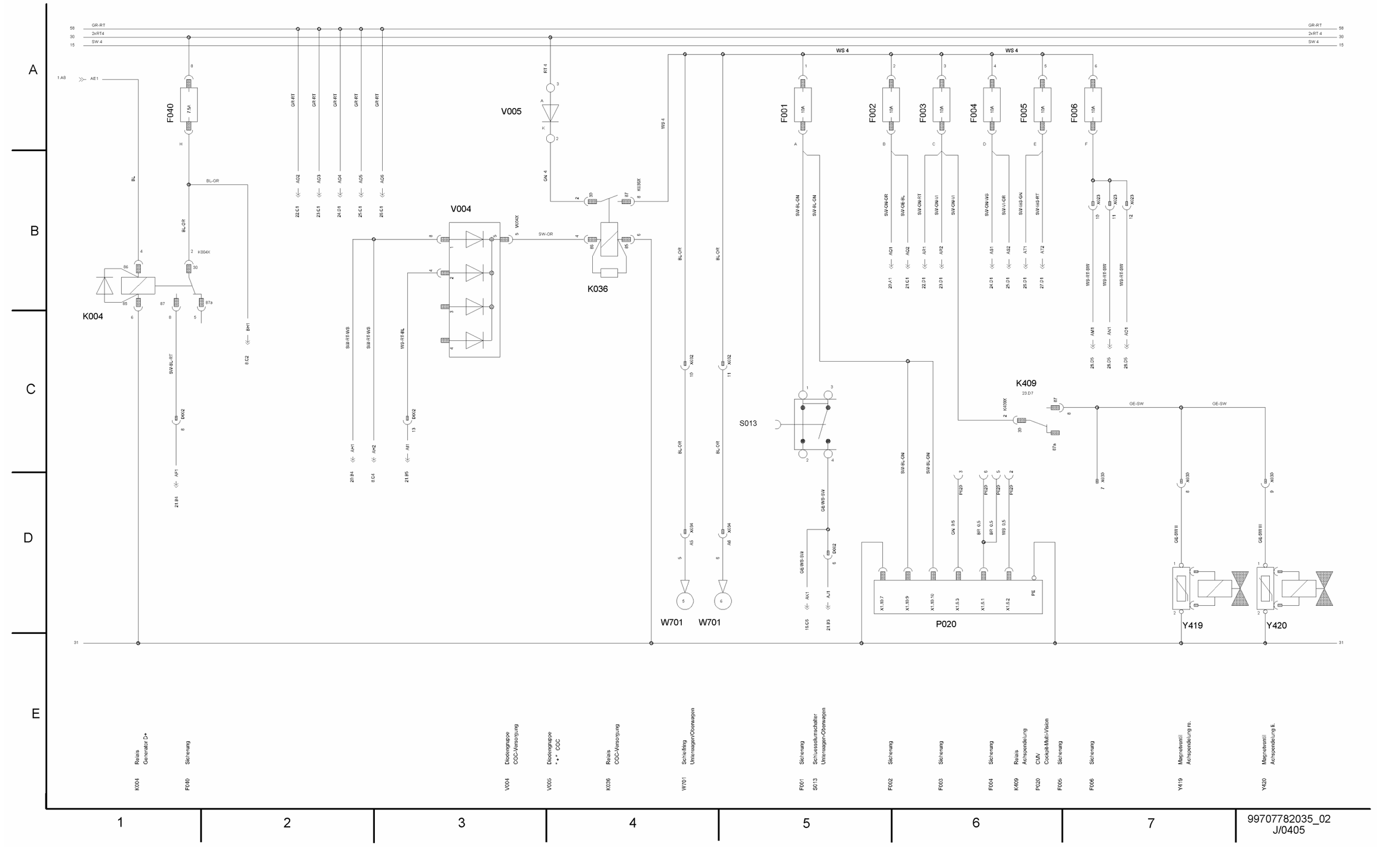
Circuit and piping diagrams

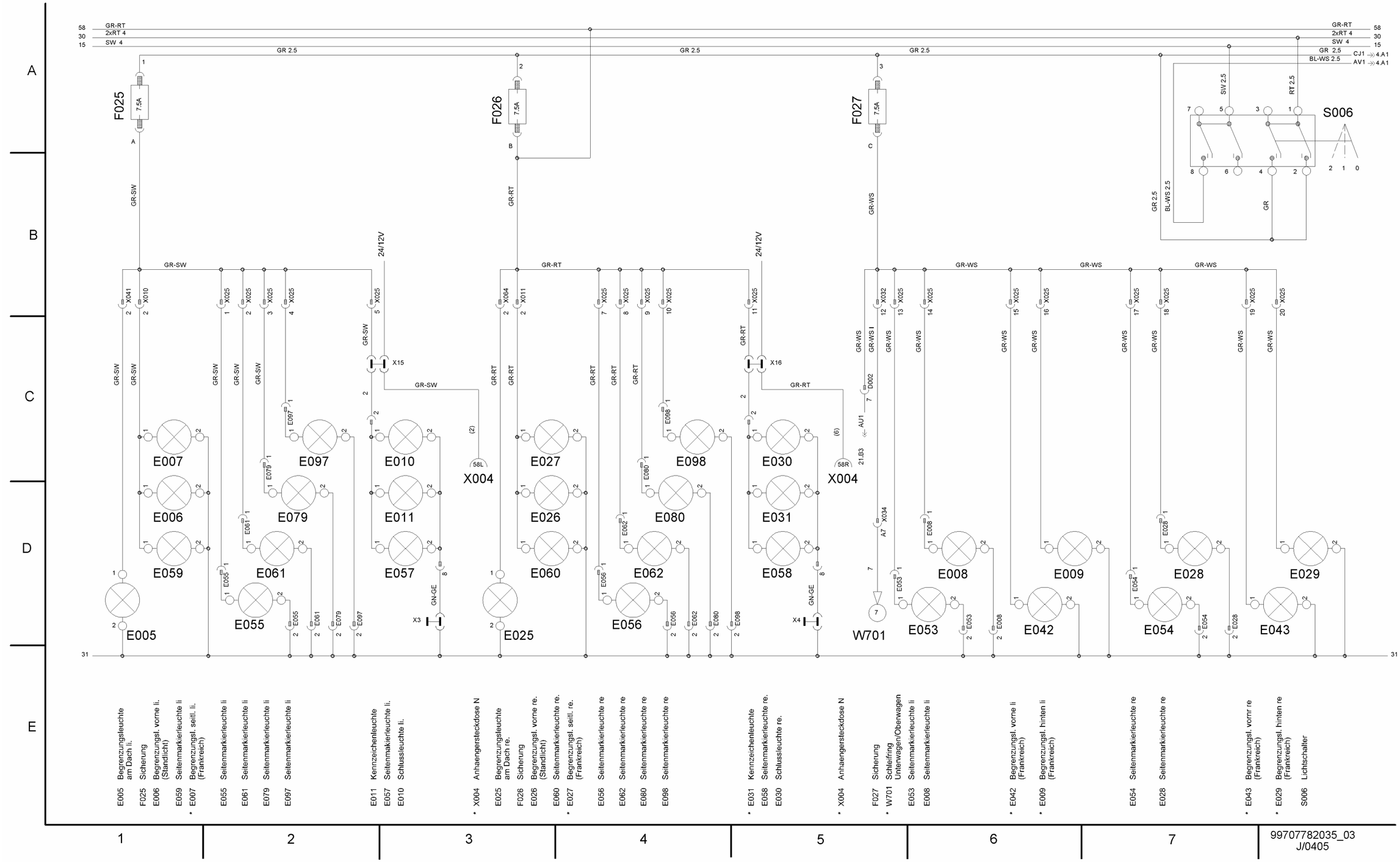
Chassis

1 Electric circuit diagrams

1.1 Chassis (99707782035)




A
B
C
D
E
1
2
3
4
5
6
7
99707782035_02
J/0405
GR-RT
2xRT4
SW 4
58
30
15
31
F040
7.5A
K004
K004X
V004
V005
V004X
K036
K036X
W701
F001
F002
F003
F004
F005
F006
10A
WS 4
S013
K409
K409X
P020
Y419
Y420
GE-SW
SW-BL-GN
SW-GN-NR
SW-GE-BL
SW-GN-RT
SW-GN-VI
SW-NT-NS
SW-VI-GR
SW-WS-GN
SW-WS-RT
WS-RT-SW
BL-OR
GN 4
RT 4
BL
BL-GR
SW-RT-WS
SW-RT-BL
SW-BL-RT
GE-WS-SW
GE-SW II
Relais Generator D+
Sicherung
Dioden-gruppe CCC-Versorgung
Dioden-gruppe "+" CCC
Relais CCC-Versorgung
Schleifring Unterwagen/Oberwagen
Sicherung
Schlüsselumschalter Unterwagen-Oberwagen
Sicherung
Sicherung
Sicherung
Relais Achspendelsperre
CMV Cockpit-Multi-Vision
Sicherung
Sicherung
Magnetventil Achspendelsperre re.
Magnetventil Achspendelsperre li.



E005	Begrenzungsleuchte am Dach li.
F025	Sicherung
E006	Begrenzungsl. vorne li. (Standlicht)
E059	Seitenmarkierleuchte li
* E007	Begrenzungsl. seitl. li. (Frankreich)
E055	Seitenmarkierleuchte li
E061	Seitenmarkierleuchte li
E079	Seitenmarkierleuchte li
E097	Seitenmarkierleuchte li
E011	Kennzeichenleuchte
E057	Seitenmakierleuchte li.
E010	Schlussleuchte li.
* X004	Anhaengersteckdose N
E025	Begrenzungsleuchte am Dach re.
F026	Sicherung
E026	Begrenzungsl. vorne re. (Standlicht)
E060	Seitenmarkierleuchte re.
* E027	Begrenzungsl. seitl. re. (Frankreich)
E056	Seitenmarkierleuchte re
E062	Seitenmarkierleuchte re
E080	Seitenmarkierleuchte re
E098	Seitenmarkierleuchte re
* E031	Kennzeichenleuchte
E058	Seitenmarkierleuchte re.
E030	Schlussleuchte re.
* X004	Anhaengersteckdose N
F027	Sicherung
* W701	Schleifring Unterwagen/Oberwagen
E053	Seitenmarkierleuchte li
E008	Seitenmarkierleuchte li
* E042	Begrenzungsl. vorne li (Frankreich)
* E009	Begrenzungsl. hinten li (Frankreich)
E054	Seitenmarkierleuchte re
E028	Seitenmarkierleuchte re
* E043	Begrenzungsl. vornr re (Frankreich)
* E029	Begrenzungsl. hinten re (Frankreich)
S006	Lichtschalter

1 2 3 4 5 6 7

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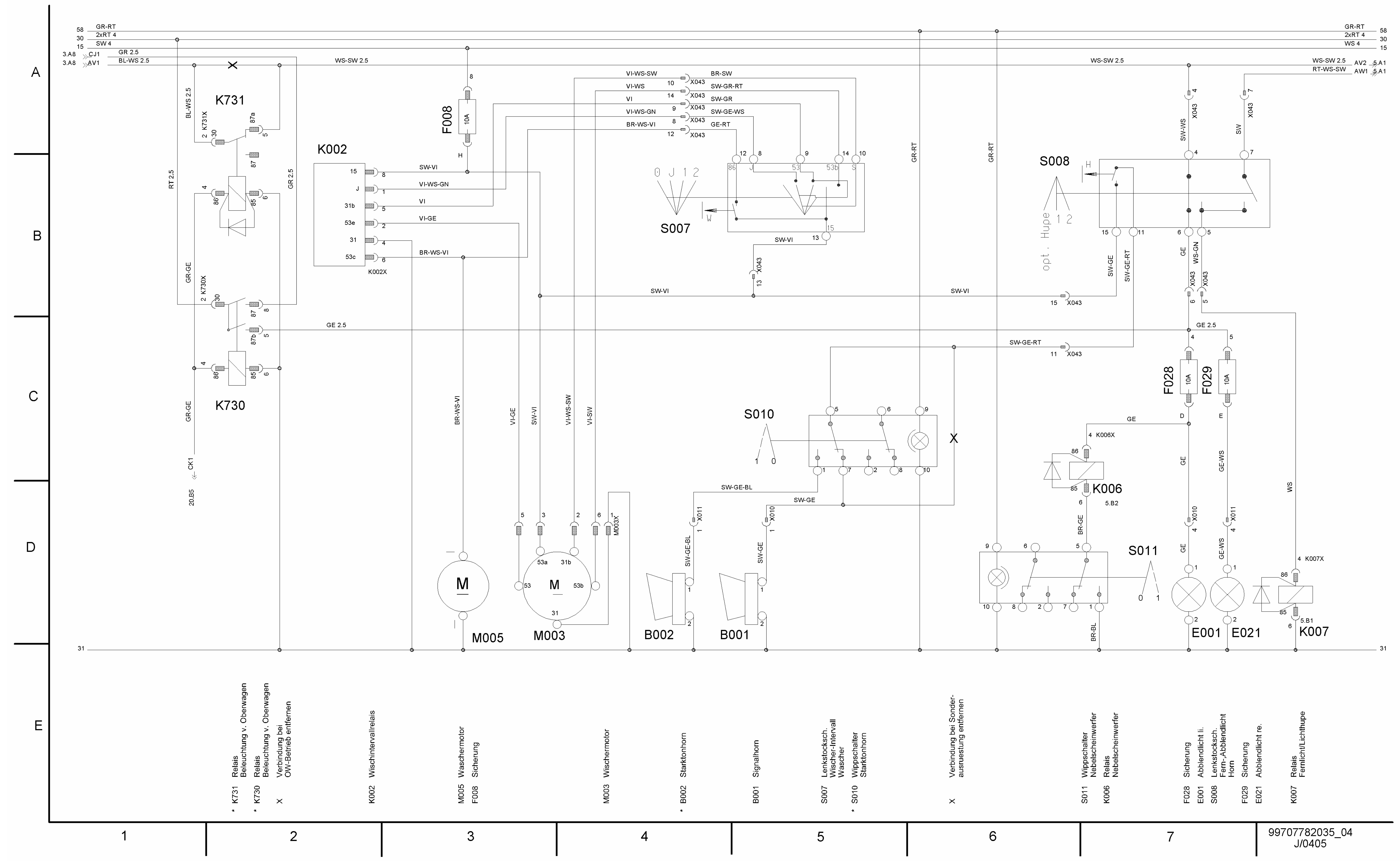
K731
K730
K002
F008
M005
M003
S007
S008
S010
S011
B002
B001
K006
F028
F029
E001
E021
K007
K731 Relais Beleuchtung v. Oberwagen
K730 Relais Beleuchtung v. Oberwagen
X Verbindung bei OW-Betrieb entfernen
K002 Wischintervallrelais
M005 Waschermotor
F008 Sicherung
M003 Wischermotor
B002 Starktonhorn
B001 Signalhorn
S007 Lenkstocksch. Wischer-Intervall Wascher
S010 Wippschalter Starktonhorn
X Verbindung bei Sonder-ausruestung entfernen
S011 Wippschalter Nebelscheinwerfer
K006 Relais Nebelscheinwerfer
F028 Sicherung
E001 Abblendlicht li.
S008 Lenkstocksch. Fern-Abblendlicht Horn
F029 Sicherung
E021 Abblendlicht re.
K007 Relais Fernlicht/Lichthupe
99707782035_04
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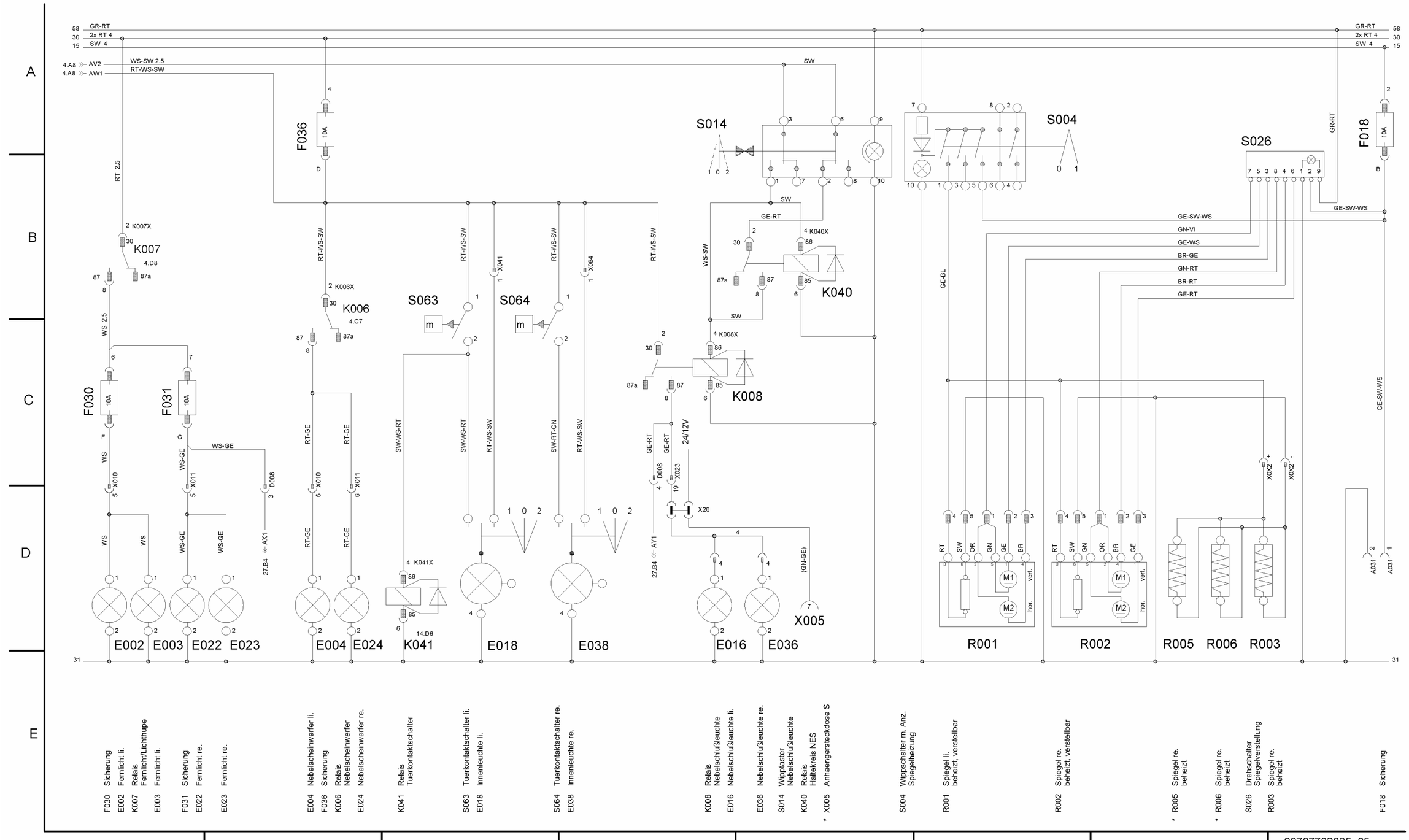
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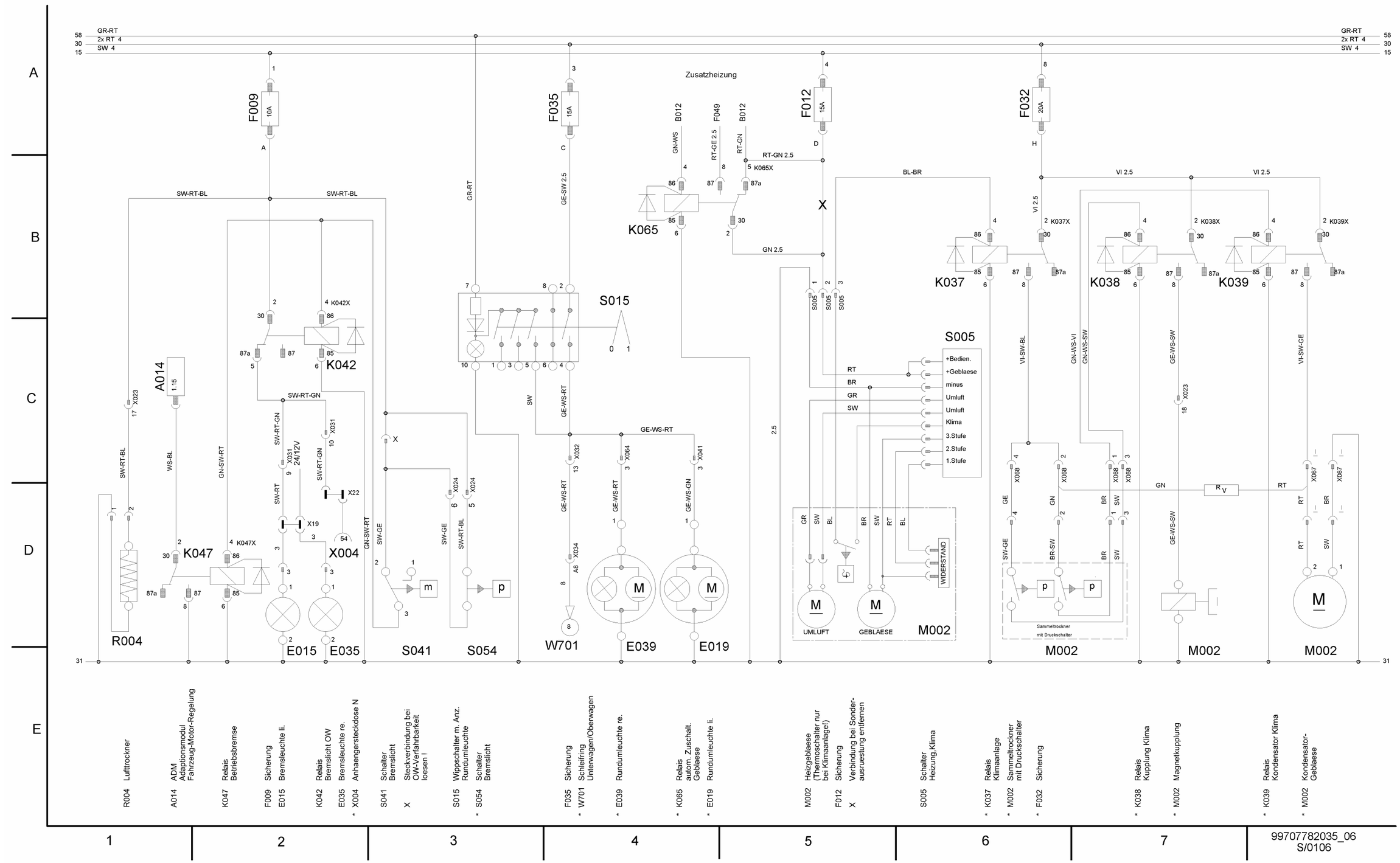
58 GR-RT
30 2x RT 4
15 SW 4
4.A8 AV2
4.A8 AW1
WS-SW 2.5
RT-WS-SW
RT 2.5
F036 10A
K007X
K007
4.D8
K006X
K006
4.C7
WS 2.5
F030 10A
F031 10A
WS
WS-GE
RT-GE
D008
X010
X011
27.B4 AX1
S063
S064
RT-WS-SW
SW-WS-RT
SW-RT-GN
X041
X064
K041X
K041
14.D6
E002 E003 E022 E023
E004 E024
E018
E038
S014
SW
GE-RT
WS-SW
K040X
K040
K008X
K008
24/12V
X023
X20
27.B4 AY1
(GN-GE)
X005
E016 E036
S004
GE-BL
S026
GE-SW-WS
GN-VI
GE-WS
BR-GE
GN-RT
BR-RT
GE-RT
F018 10A
X0X2 +
X0X2 -
A031 2
A031 1
RT
SW
OR
GN
GE
BR
M1
M2
vert.
hor.
R001
R002
R005
R006
R003
31
F030 Sicherung
E002 Fernlicht li.
K007 Relais Fernlicht/Lichthupe
E003 Fernlicht li.
F031 Sicherung
E022 Fernlicht re.
E023 Fernlicht re.
E004 Nebelscheinwerfer li.
F036 Sicherung
K006 Relais Nebelscheinwerfer
E024 Nebelscheinwerfer re.
K041 Relais Tuerkontaktschalter
S063 Tuerkontaktschalter li.
E018 Innenleuchte li.
S064 Tuerkontaktschalter re.
E038 Innenleuchte re.
K008 Relais NebelschluÃleuchte
E016 NebelschluÃleuchte li.
E036 NebelschluÃleuchte re.
S014 Wipptaster NebelschluÃleuchte
K040 Relais Haltekreis NES
* X005 Anhaengersteckdose S
S004 Wippschalter m. Anz. Spiegelheizung
R001 Spiegel li., beheizt, verstellbar
R002 Spiegel re., beheizt, verstellbar
* R005 Spiegel re. beheizt
* R006 Spiegel re. beheizt
S026 Drehschalter Spiegelverstellung
R003 Spiegel re. beheizt
F018 Sicherung
99707782035_05
K/0505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GR-RT
2x RT 4
SW 4
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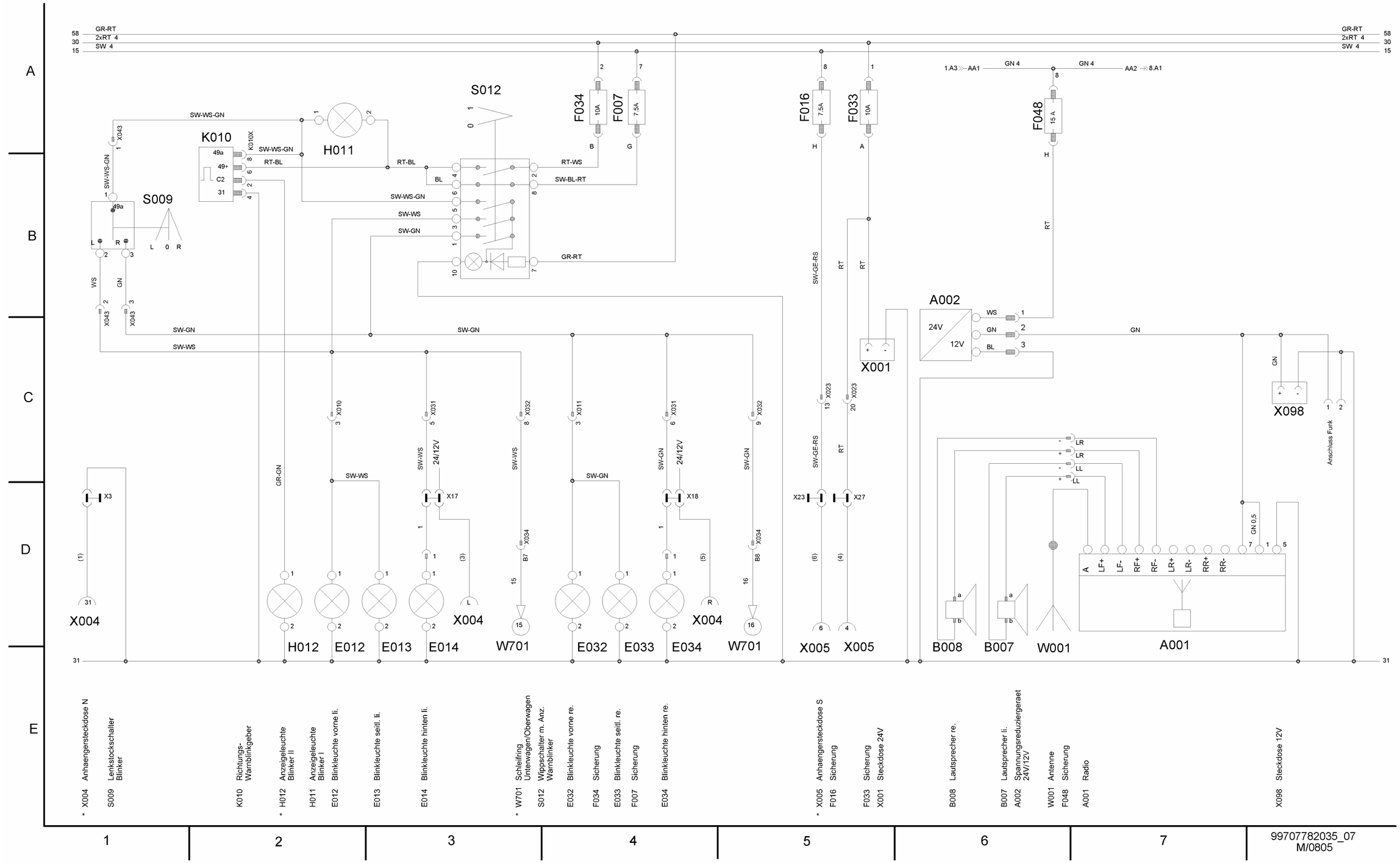
F009
10A
F035
15A
F012
15A
F032
20A
Zusatzheizung
B012
F049
B012
GN-WS
RT-GE 2.5
RT-GN
RT-GN 2.5
K065X
K065
GN 2.5
BL-BR
VI 2.5
K037X
K038X
K039X
K037
K038
K039
S015
S005
+Bedien.
+Geblaese
minus
Umluft
Umluft
Klima
3.Stufe
2.Stufe
1.Stufe
RT
BR
GR
SW
VI-SW-BL
GN-WS-VI
GN-WS-SW
GE-WS-SW
VI-SW-GE
A014
K042X
K042
SW-RT-GN
SW-RT-BL
WS-BL
GN-SW-RT
K047
K047X
X004
X019
X022
X031
24/12V
R004
E015
E035
S041
S054
W701
E039
E019
M002
UMLUFT
GEBLAESE
WIDERSTAND
Sammeltrockner
mit Druckschalter
GE-WS-RT
SW-GE
SW-RT-BL
GN-SW-RT
GE-WS-GN
X
m
p
M
R004 Lufttrockner
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
K047 Relais Betriebsbremse
F009 Sicherung
E015 Bremsleuchte li.
K042 Relais Bremslicht OW
E035 Bremsleuchte re.
* X004 Anhaengersteckdose N
S041 Schalter Bremslicht
X Steckverbindung bei OW-Verfahrbarkeit loesen !
S015 Wippschalter m. Anz. Rundumleuchte
* S054 Schalter Bremslicht
F035 Sicherung
* W701 Schleifring Unterwagen/Oberwagen
* E039 Rundumleuchte re.
* K065 Relais autom. Zuschalt. Gebläse
* E019 Rundumleuchte li.
M002 Heizgeblaese (Thermoschalter nur bei Klimaanlage!)
F012 Sicherung
X Verbindung bei Sonder-ausruestung entfernen
S005 Schalter Heizung,Klima
* K037 Relais Klimaanlage
* M002 Sammeltrockner mit Druckschalter
* F032 Sicherung
* K038 Relais Kupplung Klima
* M002 Magnetkupplung
* K039 Relais Kondensator Klima
* M002 Kondensator-Geblaese
99707782035_06
S/0106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F034
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F007
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F016
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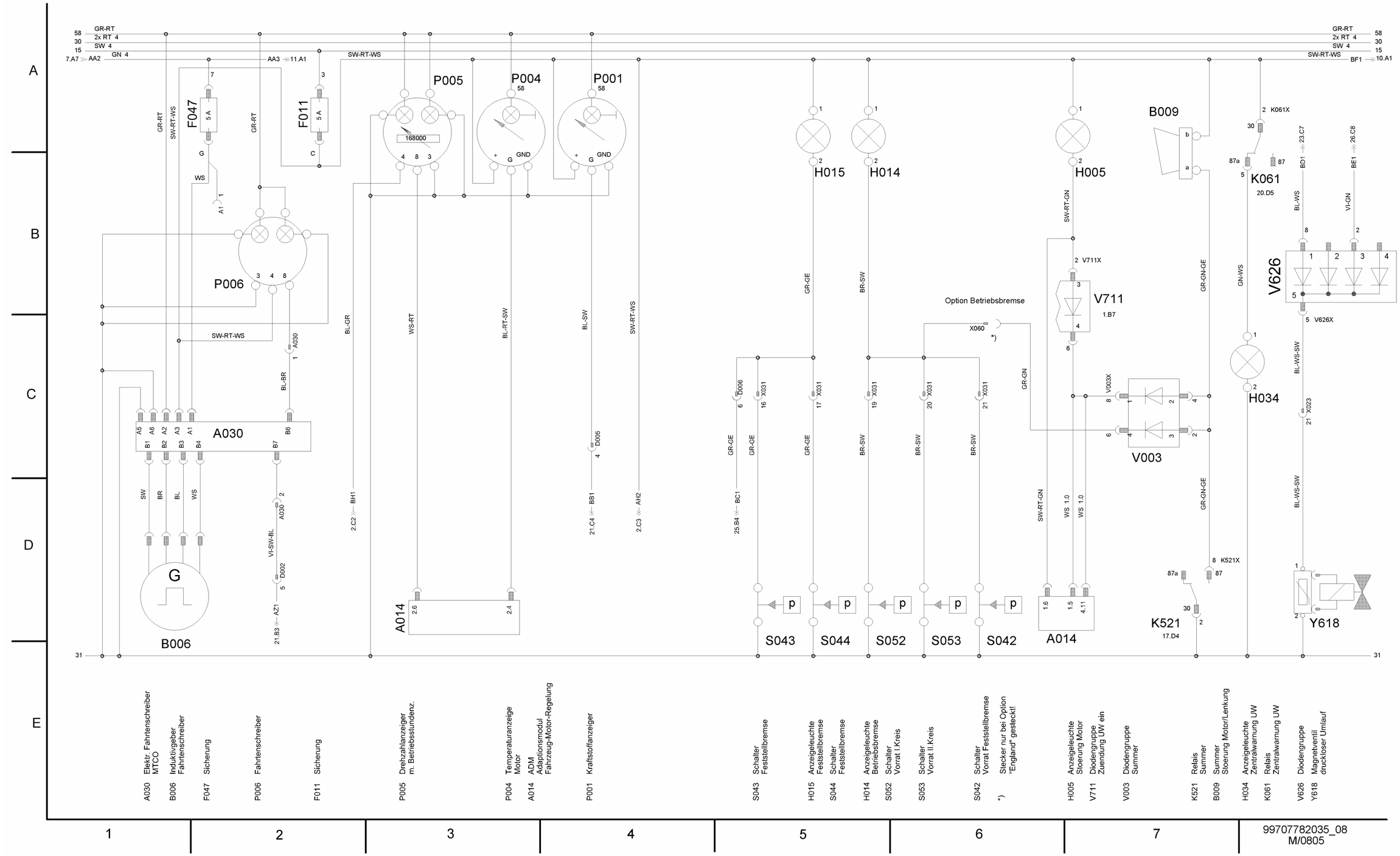
F033
10A
F048
15 A
1.A3 AA1
GN 4
AA2 8.A1
K010
K010X
49a
49+
C2
31
H011
S009
L 0 R
SW-WS-GN
RT-BL
RT-WS
SW-BL-RT
SW-WS
SW-GN
GR-RT
RT
SW-GE-RS
A002
24V
12V
WS
GN
BL
X001
X098
Anschluss Funk
GN 0,5
LR
LL
A
LF+
LF-
RF+
RF-
LR+
LR-
RR+
RR-
X004
X3
H012
E012
E013
E014
W701
E032
E033
E034
X005
X23
X27
B008
B007
W001
A001
31
* X004 Anhaengersteckdose N
S009 Lenkstockschalter Blinker
K010 Richtungs- Warnblinkgeber
* H012 Anzeigeleuchte Blinker li
H011 Anzeigeleuchte Blinker l
E012 Blinkleuchte vorne li.
E013 Blinkleuchte seitl. li.
E014 Blinkleuchte hinten li.
* W701 Schleifring Unterwagen/Oberwagen
S012 Wippschalter m. Anz. Warnblinker
E032 Blinkleuchte vorne re.
F034 Sicherung
E033 Blinkleuchte seitl. re.
F007 Sicherung
E034 Blinkleuchte hinten re.
* X005 Anhaengersteckdose S
F016 Sicherung
F033 Sicherung
X001 Steckdose 24V
B008 Lautsprecher re.
B007 Lautsprecher li.
A002 Spannungsreduziergeraet 24V/12V
W001 Antenne
F048 Sicherung
A001 Radio
X098 Steckdose 12V
99707782035_07
M/0805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GR-RT
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SW 4
GN 4
SW-RT-WS
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F011
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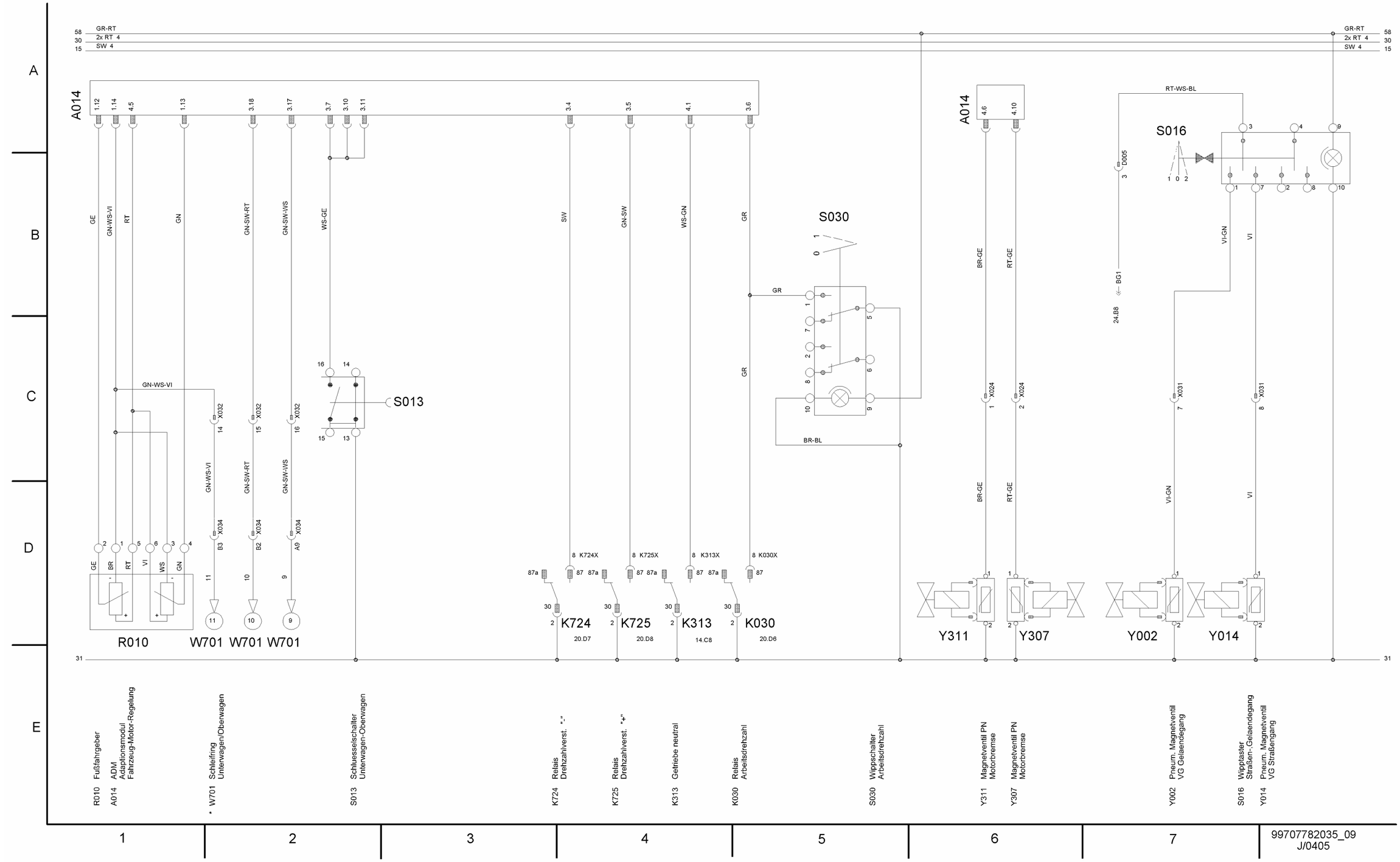
P005
P004
P001
168000
GND
P006
A030
B006
H015
H014
H005
B009
K061X
K061
20.D5
V711X
V711
1.B7
V003X
V003
H034
V626
V626X
K521X
K521
17.D4
Y618
Option Betriebsbremse
X060
*)
S043
S044
S052
S053
S042
A014
BL-GR
WS-RT
BL-RT-SW
BL-SW
GR-GE
BR-SW
GR-GN
GR-GN-GE
GN-WS
BL-WS
VI-GN
BL-WS-SW
SW-RT-GN
WS 1.0
VI-SW-BL
SW
BR
BL
WS
BC1
BB1
AH2
BH1
AZ1
A030 Elektr. Fahrtenschreiber MTCO
B006 Induktivgeber Fahrtenschreiber
F047 Sicherung
P006 Fahrtenschreiber
F011 Sicherung
P005 Drehzahlanzeiger m. Betriebsstundenz.
P004 Temperaturanzeige Motor
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
P001 Kraftstofanzeiger
S043 Schalter Feststellbremse
H015 Anzeigeleuchte Feststellbremse
S044 Schalter Feststellbremse
H014 Anzeigeleuchte Betriebsbremse
S052 Schalter Vorrat I.Kreis
S053 Schalter Vorrat II.Kreis
S042 Schalter Vorrat Feststellbremse
*) Stecker nur bei Option "England" gesteckt!
H005 Anzeigeleuchte Stoerung Motor
V711 Diodengruppe Zuendung UW ein
V003 Diodengruppe Summer
K521 Relais Summer
B009 Summer Stoerung Motor/Lenkung
H034 Anzeigeleuchte Zentralwarnung UW
K061 Relais Zentralwarnung UW
V626 Diodengruppe
Y618 Magnetventil druckloser Umlauf
99707782035_08
M/0805


A
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58 GR-RT
30 2x RT 4
15 SW 4
A014
1.12
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3.18
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3.7
3.10
3.11
3.4
3.5
4.1
3.6
GE
GN-WS-VI
RT
GN
GN-SW-RT
GN-SW-WS
WS-GE
SW
GN-SW
WS-GN
GR
S030
S013
S016
A014
4.6
4.10
BR-GE
RT-GE
RT-WS-BL
D005
BG1
24.B8
VI-GN
VI
X024
X031
X032
X034
GN-WS-VI
GN-SW-RT
GN-SW-WS
BR-BL
K724X
K725X
K313X
K030X
K724
K725
K313
K030
20.D7
20.D8
14.C8
20.D6
R010
W701
Y311
Y307
Y002
Y014
31
R010 Fußfahrgeber
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
* W701 Schleifring Unterwagen/Oberwagen
S013 Schluesselschalter Unterwagen-Oberwagen
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
K313 Gefriebe neutral
K030 Relais Arbeitsdrehzahl
S030 Wippschalter Arbeitsdrehzahl
Y311 Magnetventil PN Motorbremse
Y307 Magnetventil PN Motorbremse
Y002 Pneum. Magnetventil VG Geländegang
S016 Wipptaster Straßen-,Geländegang
Y014 Pneum. Magnetventil VG Straßengang
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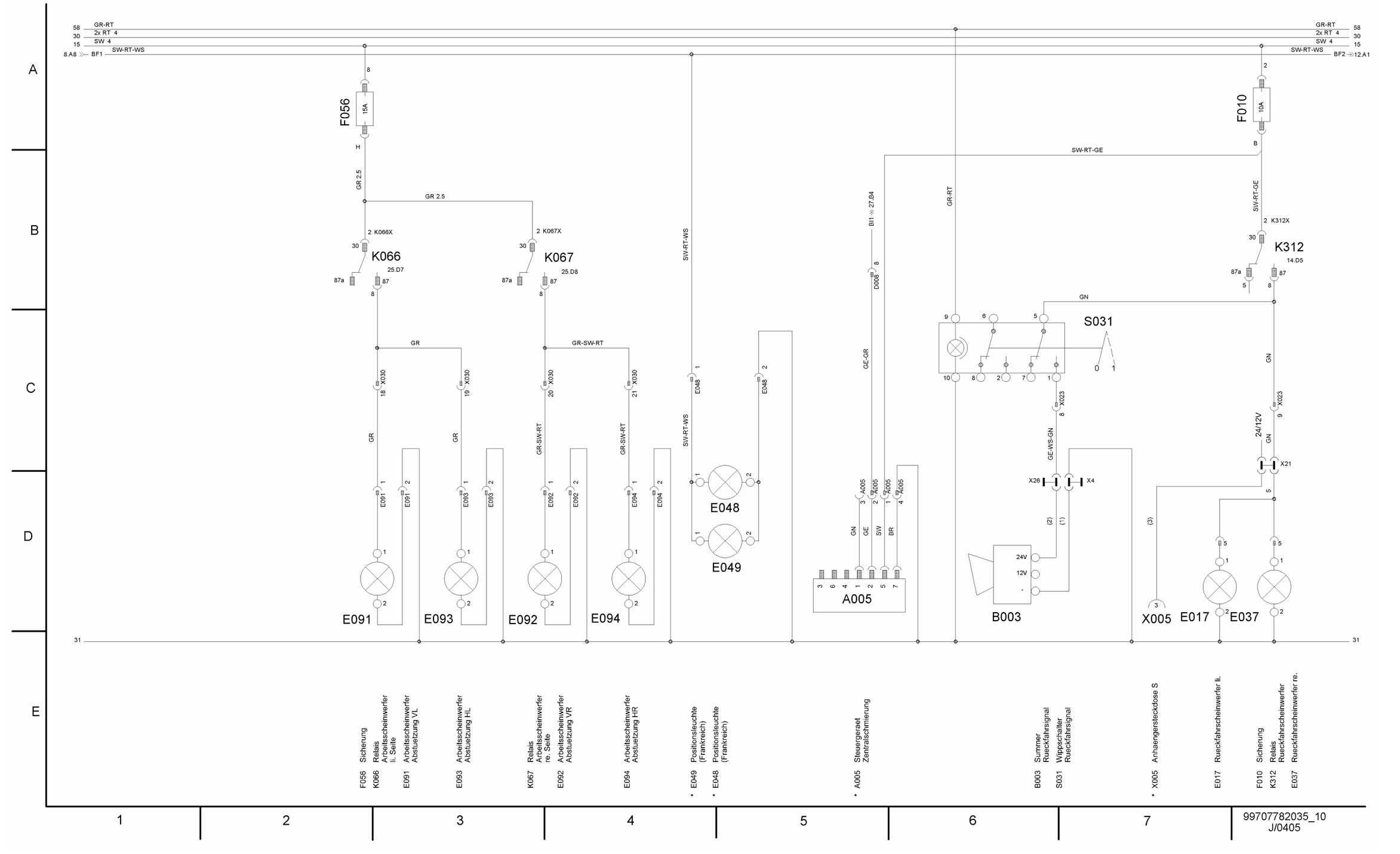
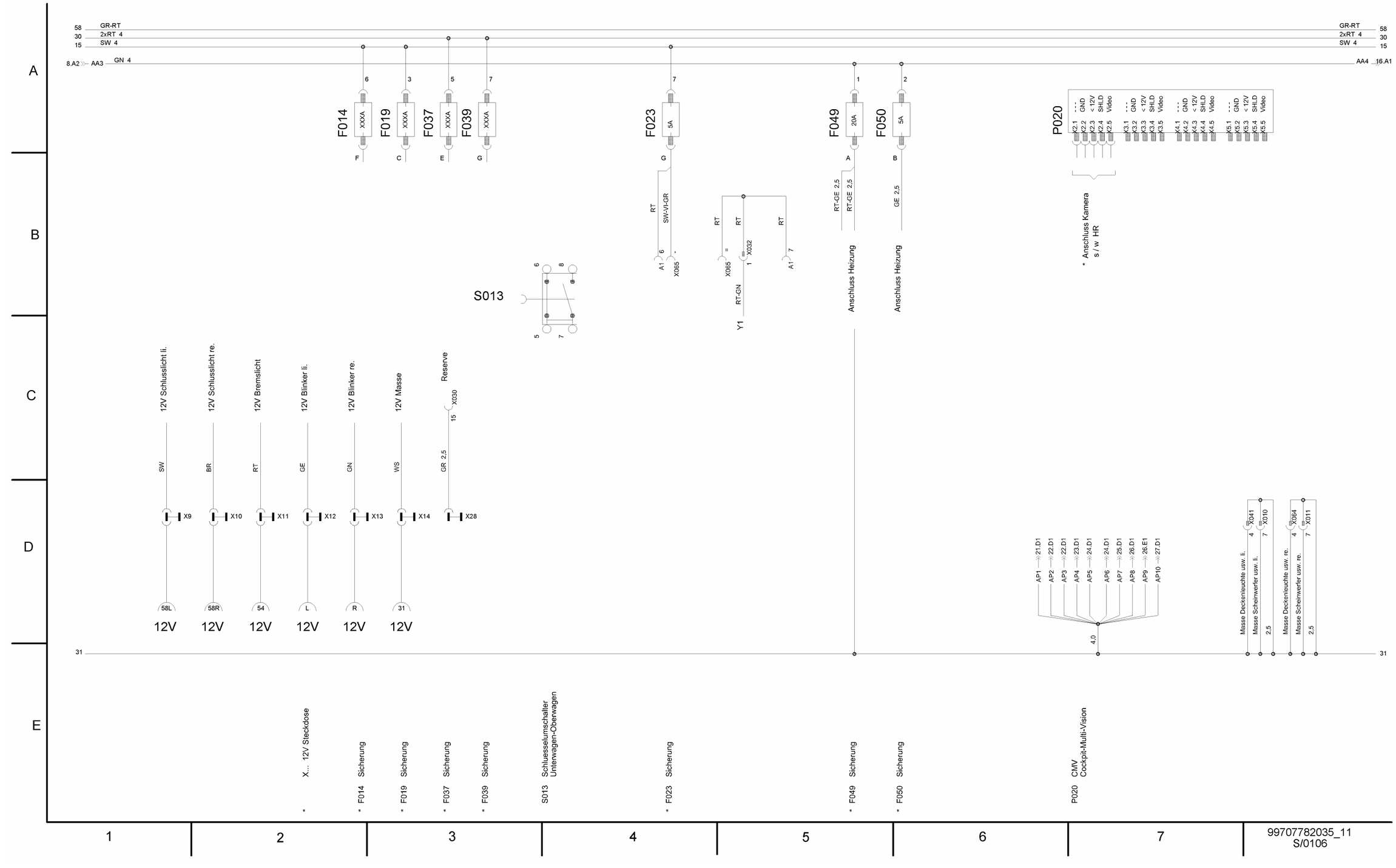


F056 Sicherung
K066 Relais Arbeitsscheinwerfer li. Seite
E091 Arbeitsscheinwerfer Abstuetzung VL
E093 Arbeitsscheinwerfer Abstuetzung HL
K067 Relais Arbeitsscheinwerfer re. Seite
E092 Arbeitsscheinwerfer Abstuetzung VR
E094 Arbeitsscheinwerfer Abstuetzung HR
* E049 Positionsleuchte (Frankreich)
* E048 Positionsleuchte (Frankreich)
* A005 Steuergeraet Zentralschmierung
B003 Summer Rueckfahrsignal
S031 Wippschalter Rueckfahrsignal
* X005 Anhaengersteckdose S
E017 Rueckfahrscheinwerfer li.
F010 Sicherung
K312 Relais Rueckfahrscheinwerfer
E037 Rueckfahrscheinwerfer re.


A
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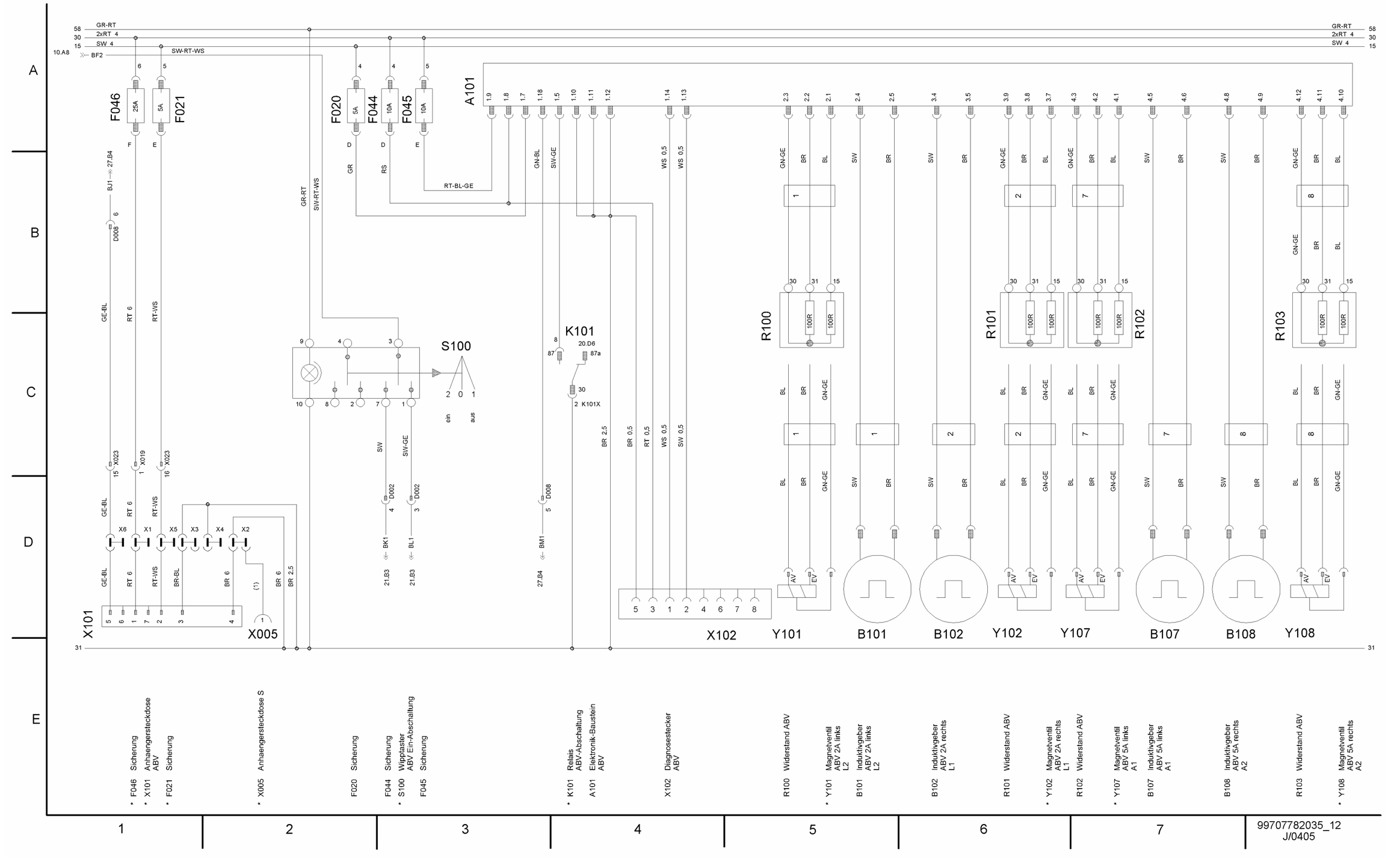
58 GR-RT
30 2xRT 4
15 SW 4
8.A2 AA3 GN 4
AA4 16.A1
F014 XXXA
F019 XXXA
F037 XXXA
F039 XXXA
F023 5A
F049 20A
F050 5A
P020
S013
Y1
RT-GE 2.5
GE 2.5
Anschluss Heizung
* Anschluss Kamera s / w HR
12V Schlusslicht li.
12V Schlusslicht re.
12V Bremslicht
12V Blinker li.
12V Blinker re.
12V Masse
Reserve
SW BR RT GE GN WS GR 2.5
X9 X10 X11 X12 X13 X14 X28
58L 58R 54 L R 31
12V
31
21.D1 22.D1 22.D1 23.D1 24.D1 24.D1 25.D1 26.D1 26.E1 27.D1
AP1 AP2 AP3 AP4 AP5 AP6 AP7 AP8 AP9 AP10
4.0
Masse Deckenleuchte usw. li.
Masse Scheinwerfer usw. li.
Masse Deckenleuchte usw. re.
Masse Scheinwerfer usw. re.
X041 X010 X064 X011
2.5
X... 12V Steckdose
F014 Sicherung
F019 Sicherung
F037 Sicherung
F039 Sicherung
S013 Schluesselumschalter Unterwagen-Oberwagen
F023 Sicherung
F049 Sicherung
F050 Sicherung
P020 CMV Cockpit-Multi-Vision
99707782035_11
S/0106

1.2 ABV (99707782035)



E

* F046 Sicherung
* X101 Anhaengersteckdose ABV
* F021 Sicherung

* X005 Anhaengersteckdose S

F020 Sicherung

F044 Sicherung
* S100 Wipptaster ABV Ein-Abschaltung
F045 Sicherung

* K101 Relais ABV-Abschaltung
A101 Elektronik-Baustein ABV

X102 Diagnosestecker ABV

R100 Widerstand ABV
* Y101 Magnetventil ABV 2A links L2
B101 Induktivgeber ABV 2A links L2

B102 Induktivgeber ABV 2A rechts L1

R101 Widerstand ABV
* Y102 Magnetventil ABV 2A rechts L1
R102 Widerstand ABV

* Y107 Magnetventil ABV 5A links A1
B107 Induktivgeber ABV 5A links A1

B108 Induktivgeber ABV 5A rechts A2

R103 Widerstand ABV
* Y108 Magnetventil ABV 5A rechts A2

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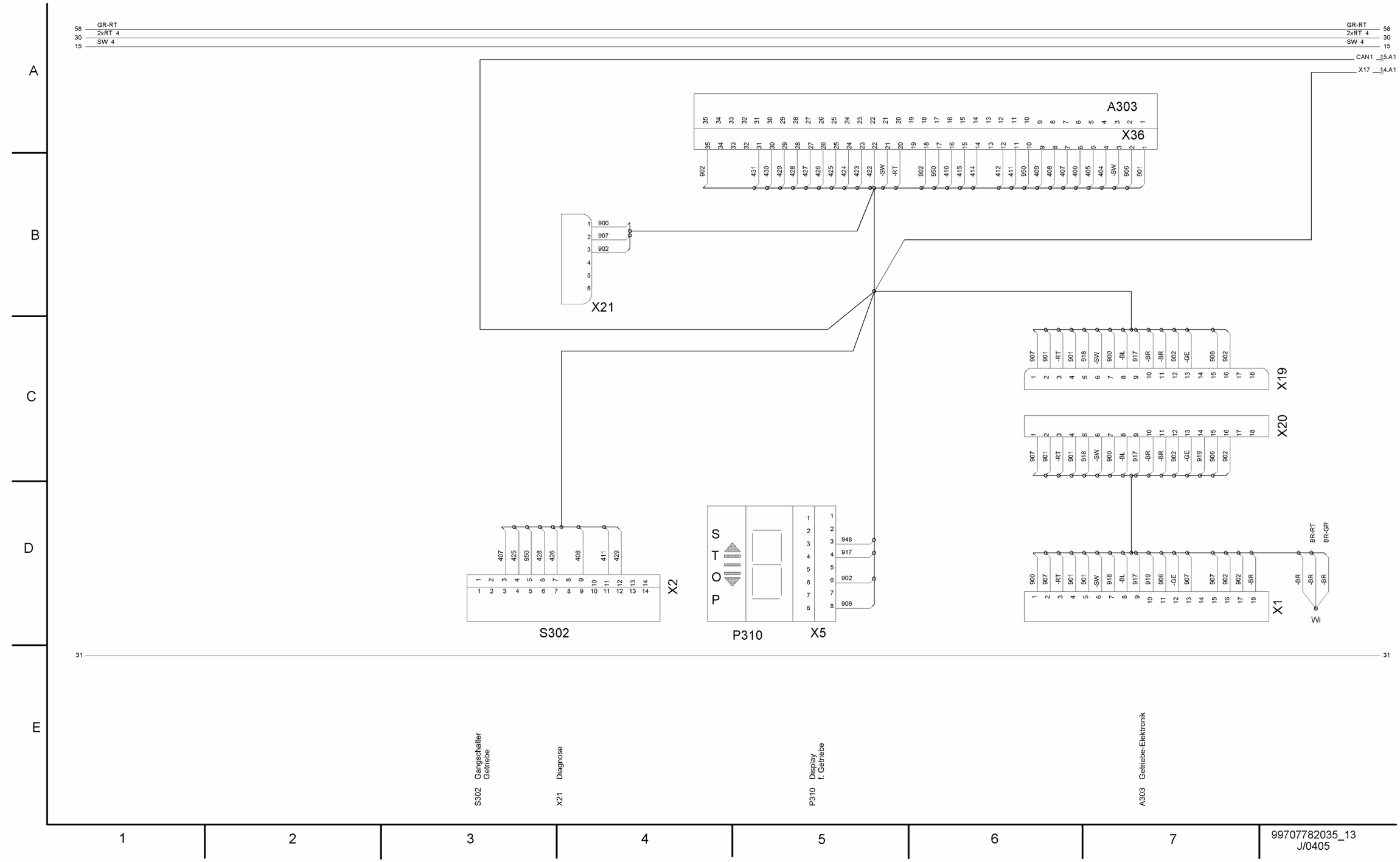
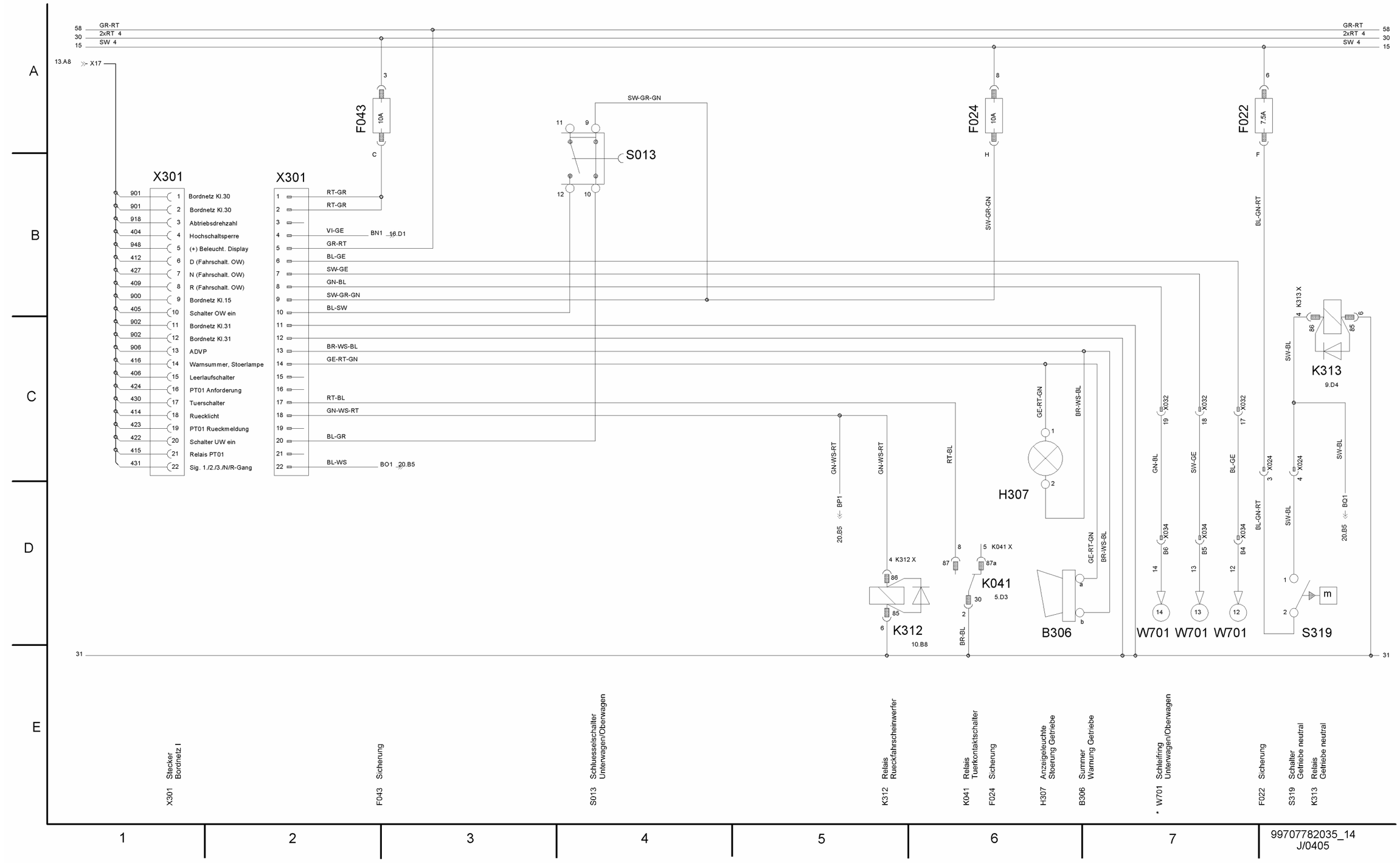
J/0405

1.3 Gearbox control (99707782035)

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7
58 GR-RT
30 2xRT 4
15 SW 4
13.A8 X17
F043 10A
F024 10A
F022 7.5A
SW-GR-GN
S013
X301
901 1 Bordnetz Kl.30
901 2 Bordnetz Kl.30
918 3 Abtriebsdrehzahl
404 4 Hochschaltsperre
948 5 (+) Beleucht. Display
412 6 D (Fahrschalt. OW)
427 7 N (Fahrschalt. OW)
409 8 R (Fahrschalt. OW)
900 9 Bordnetz Kl.15
405 10 Schalter OW ein
902 11 Bordnetz Kl.31
902 12 Bordnetz Kl.31
906 13 ADVP
416 14 Warnsummer, Stoerlampe
406 15 Leerlaufschalter
424 16 PT01 Anforderung
430 17 Tuerschalter
414 18 Ruecklicht
423 19 PT01 Rueckmeldung
422 20 Schalter UW ein
415 21 Relais PT01
431 22 Sig. 1./2./3./N/R-Gang
X301
1 RT-GR
2 RT-GR
3
4 VI-GE BN1 16.D1
5 GR-RT
6 BL-GE
7 SW-GE
8 GN-BL
9 SW-GR-GN
10 BL-SW
11
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13 BR-WS-BL
14 GE-RT-GN
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17 RT-BL
18 GN-WS-RT
19
20 BL-GR
21
22 BL-WS BO1 20.B5
GN-WS-RT BP1 20.B5
H307
K312 10.B8
K041 5.D3
B306
W701 W701 W701
S319
K313 9.D4
BL-GN-RT
31
X301 Stecker Bordnetz I
F043 Sicherung
S013 Schluesselschalter Unterwagen/Oberwagen
K312 Relais Rueckfahrscheinwerfer
K041 Relais Tuerkontaktschalter
F024 Sicherung
H307 Anzeigeleuchte Steuerung Getriebe
B306 Summer Warnung Getriebe
* W701 Schleifring Unterwagen/Oberwagen
F022 Sicherung
S319 Schalter Getriebe neutral
K313 Relais Getriebe neutral
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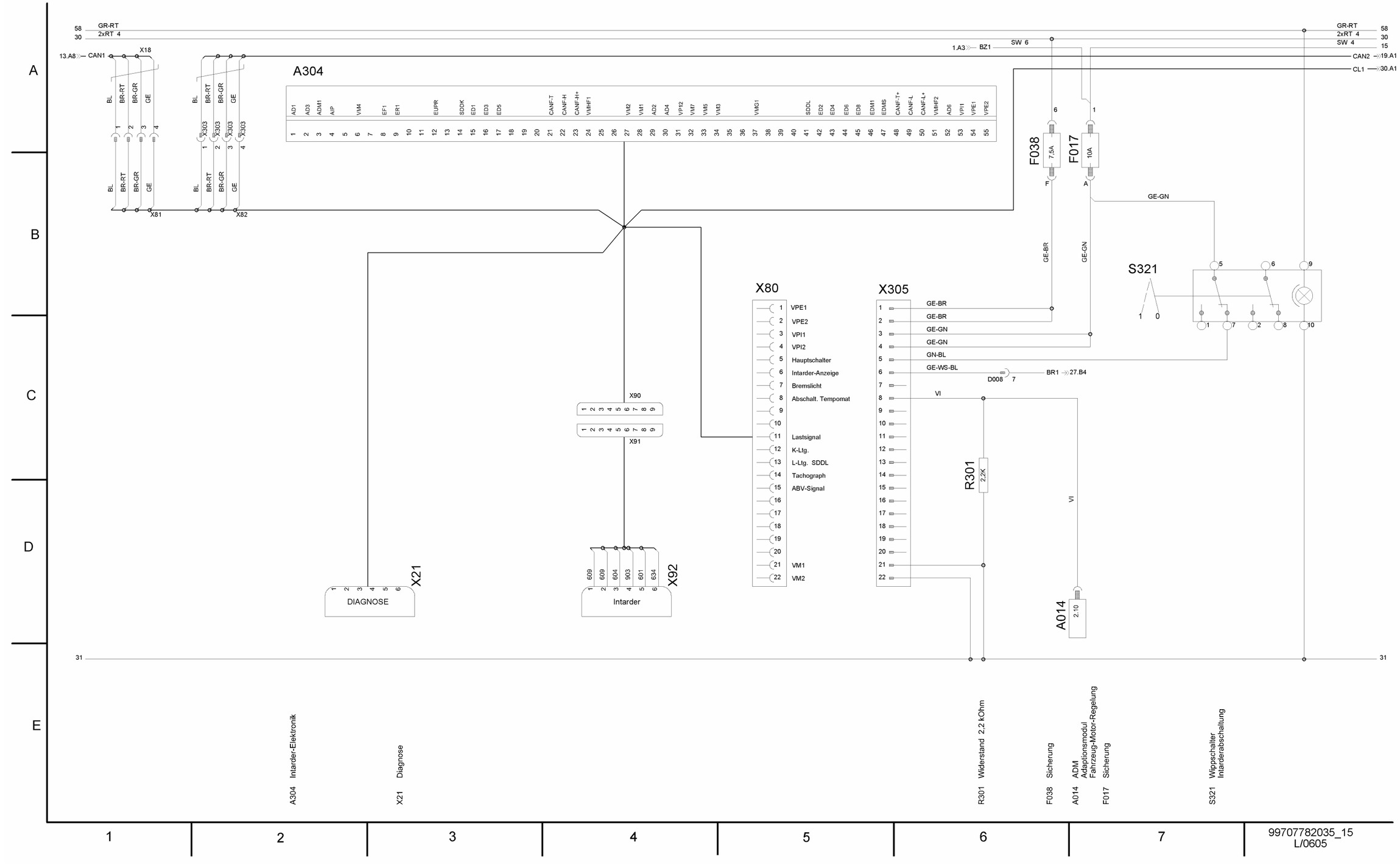
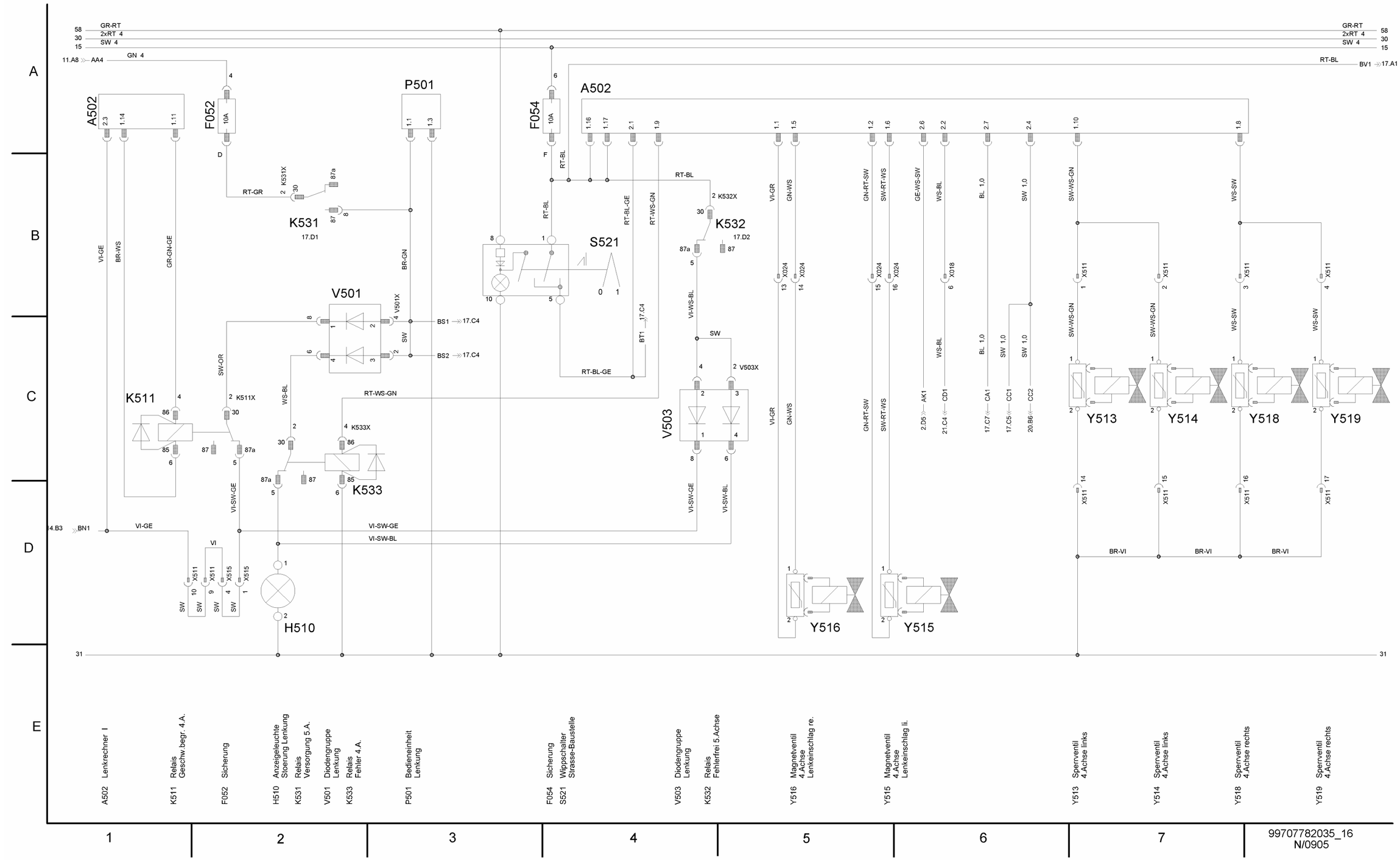
J/0405

1.4 Chassis (99707782035)





A502	Lenkrechner I	V501	Diodengruppe Lenkung	F054	Sicherung	Y516	Magnetventil 4.Achse Lenkeinschlag re.
K511	Relais Geschw. begr. 4.A.	K533	Relais Fehler 4.A.	S521	Wippschalter Strasse-Baustelle	Y515	Magnetventil 4.Achse Lenkeinschlag li.
F052	Sicherung	P501	Bedieneinheit Lenkung	V503	Diodengruppe Lenkung	Y513	Sperrventil 4.Achse links
H510	Anzeigeleuchte Stoerung Lenkung	F054	Sicherung	K532	Relais Fehlerfrei 5.Achse	Y514	Sperrventil 4.Achse links
K531	Relais Versorgung 5.A.	S521	Wippschalter Strasse-Baustelle	Y516	Magnetventil 4.Achse Lenkeinschlag re.	Y518	Sperrventil 4.Achse rechts
				Y515	Magnetventil 4.Achse Lenkeinschlag li.	Y519	Sperrventil 4.Achse rechts

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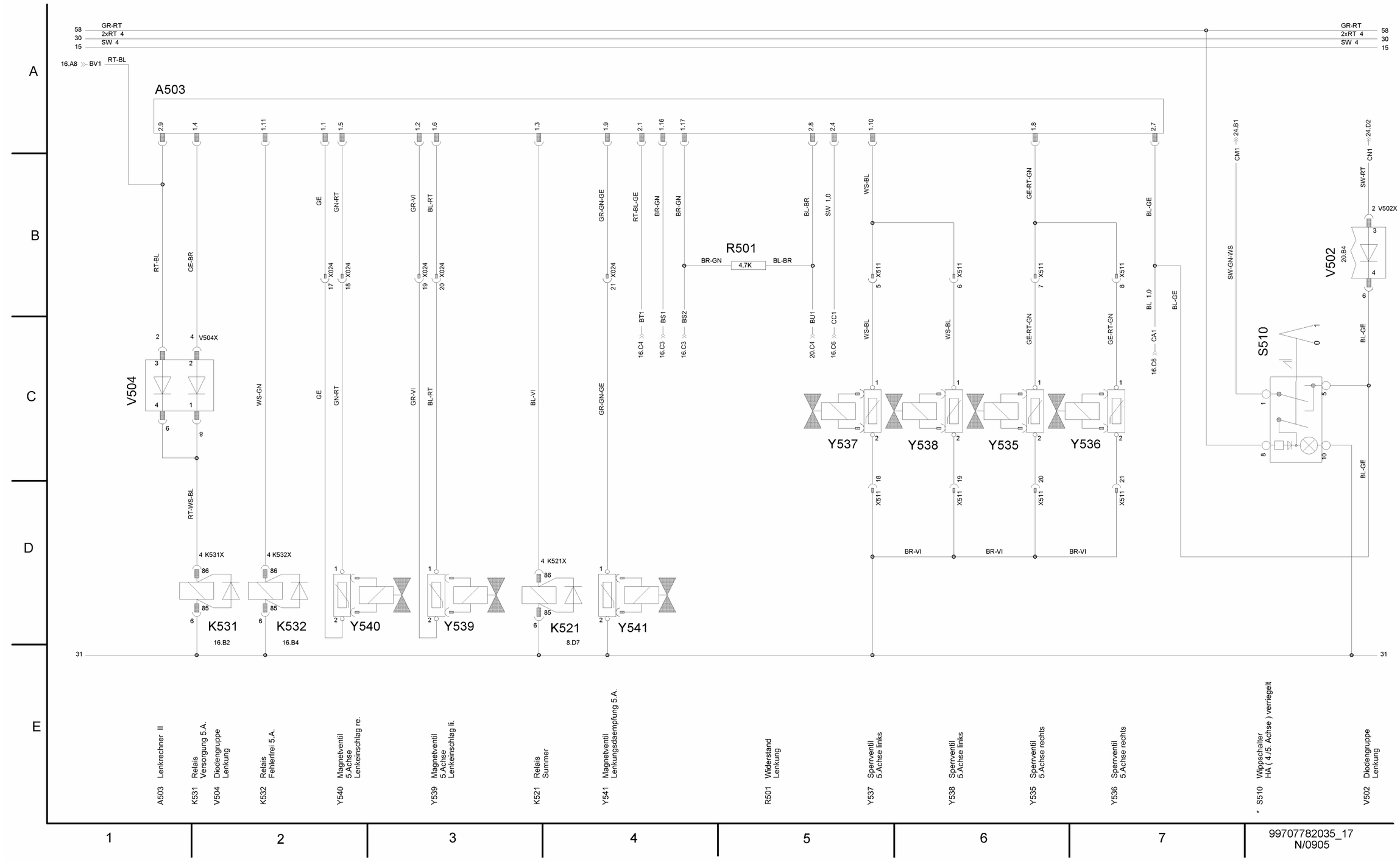
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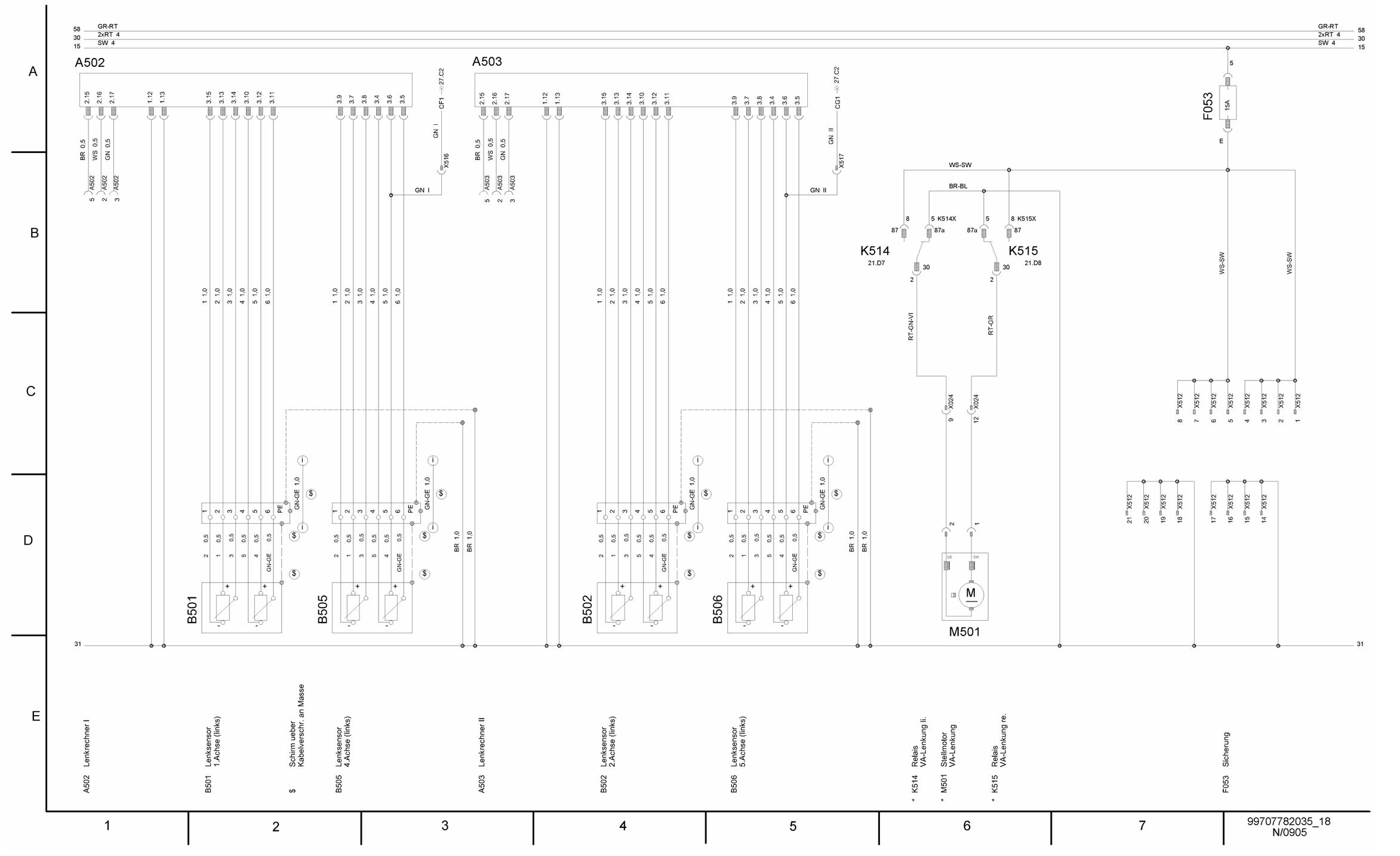
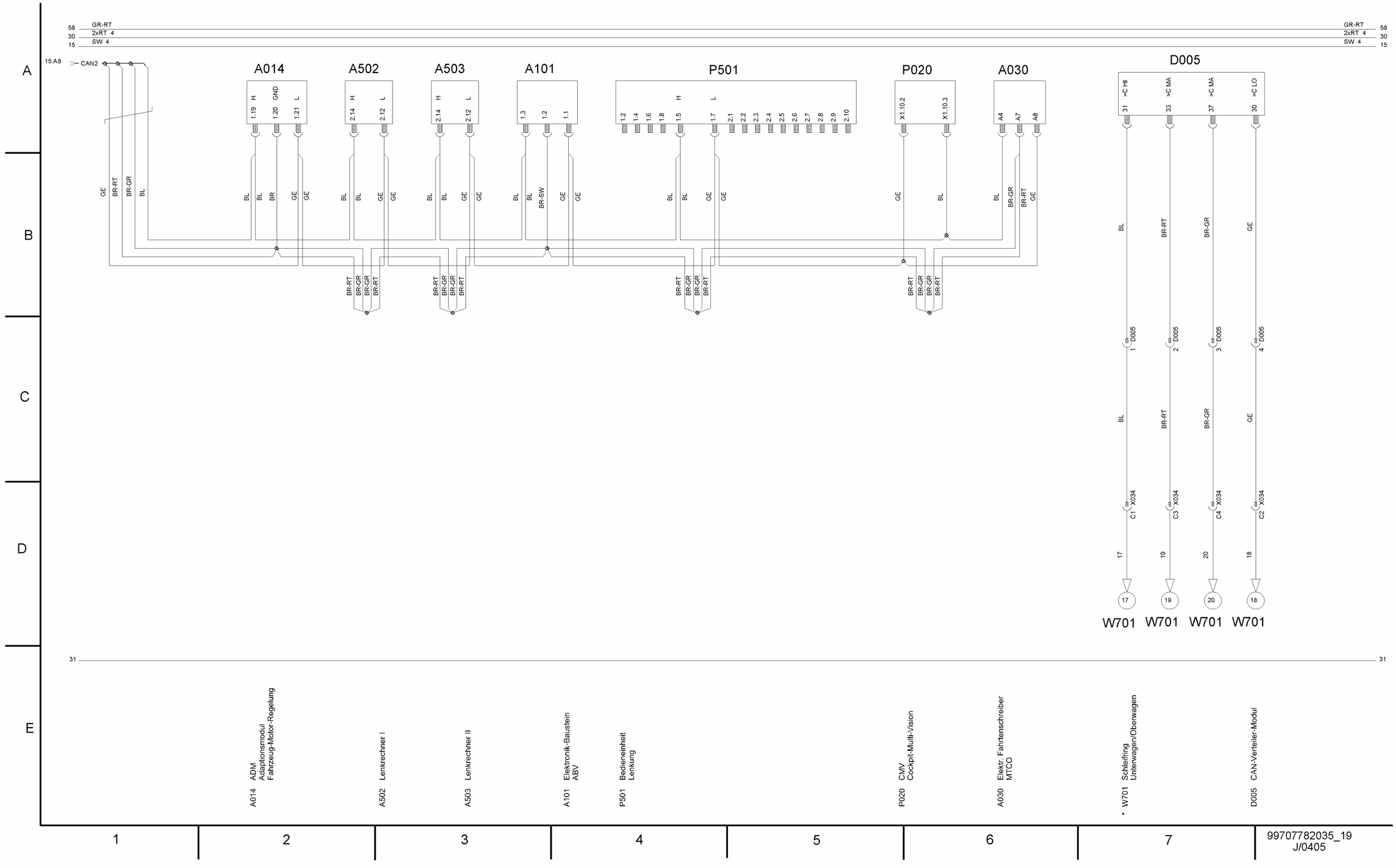
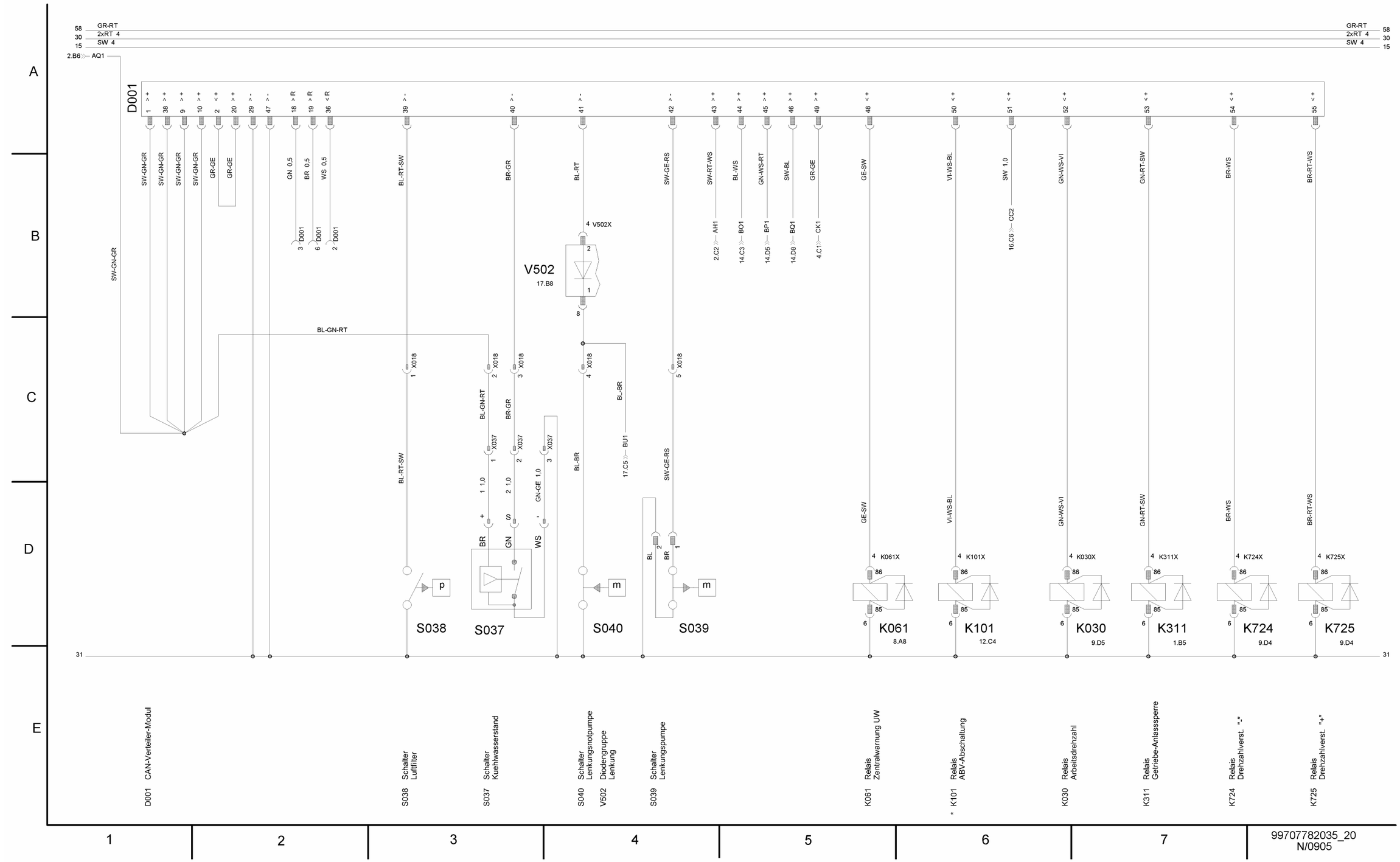
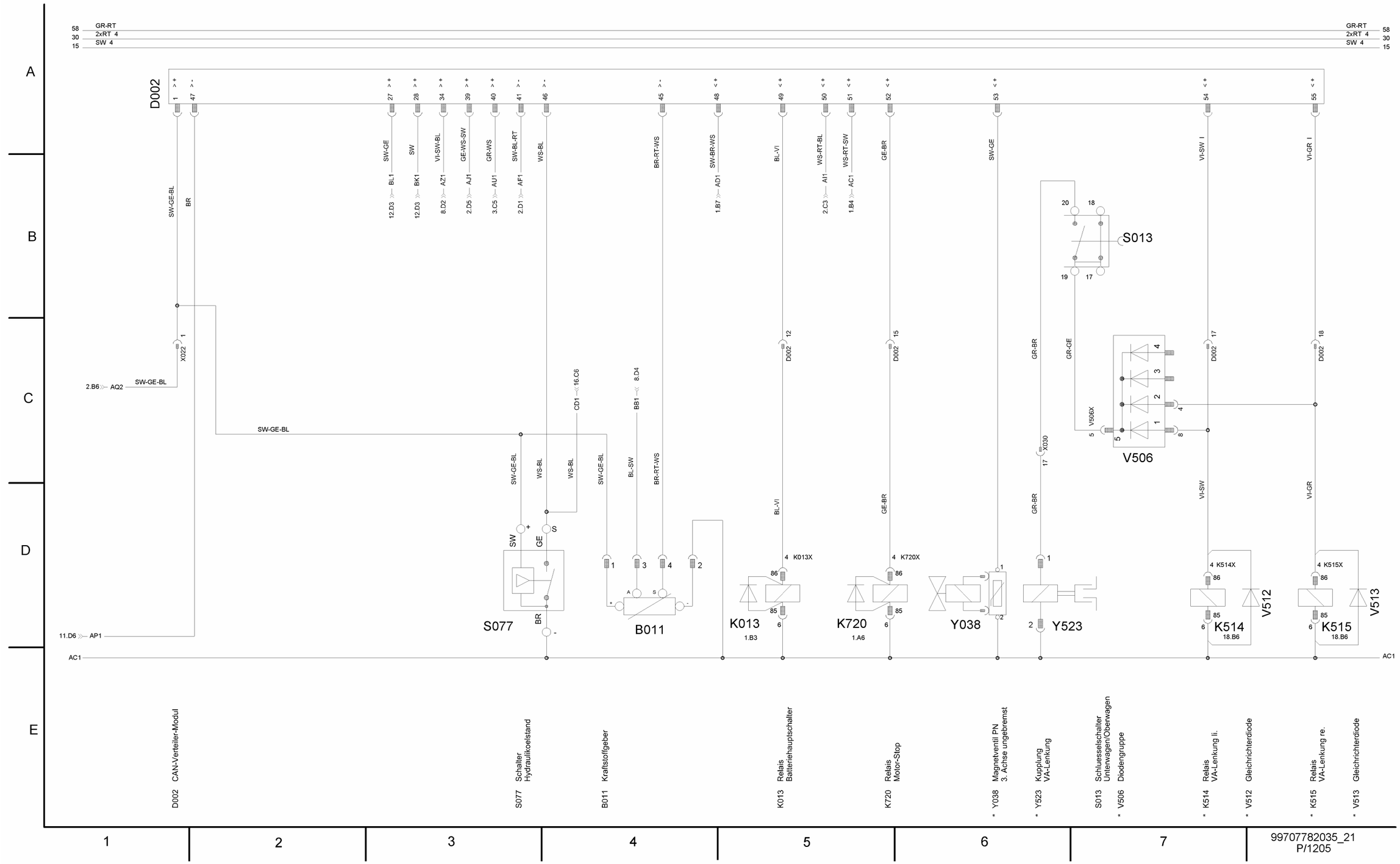
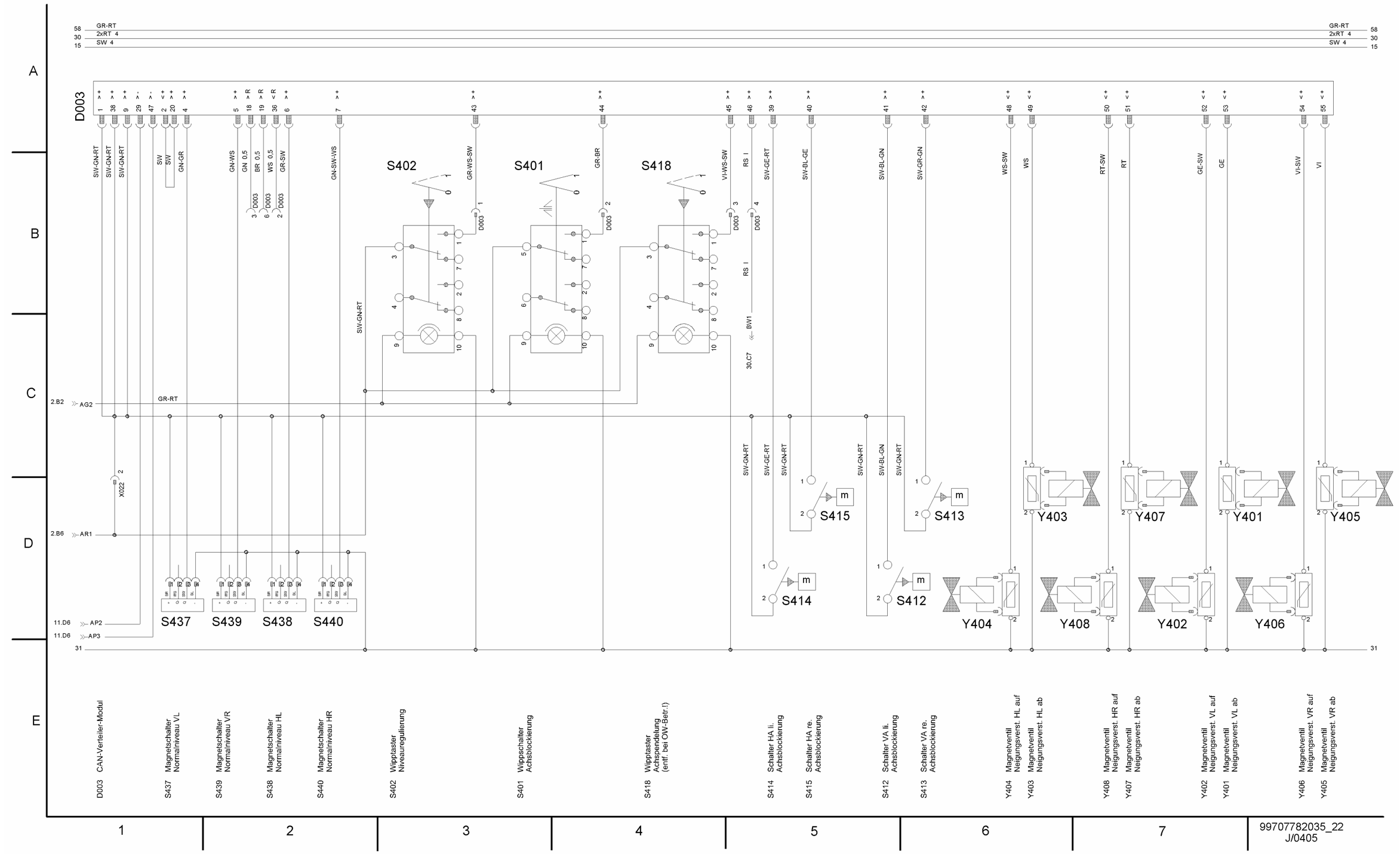
58 GR-RT
30 2xRT 4
15 SW 4
16.A8 BV1 RT-BL
A503
RT-BL
GE-BR
WS-GN
GE
GN-RT
GR-VI
BL-RT
BL-VI
GR-GN-GE
RT-BL-GE
BR-GN
R501
4,7K
BL-BR
SW 1,0
WS-BL
GE-RT-GN
BL-GE
BL 1,0
SW-GN-WS
SW-RT
V504
V504X
RT-WS-BL
K531
K531X
16.B2
K532
K532X
16.B4
Y540
Y539
K521
K521X
8.D7
Y541
Y537
Y538
Y535
Y536
X511
BR-VI
V502
V502X
20.B4
S510
CM1 24.B1
CN1 24.D2
16.C6 CA1
31
A503 Lenkrechner II
K531 Relais Versorgung 5.A.
V504 Diodengruppe Lenkung
K532 Relais Fehlerfrei 5.A.
Y540 Magnetventil 5.Achse Lenkeinschlag re.
Y539 Magnetventil 5.Achse Lenkeinschlag li.
K521 Relais Summer
Y541 Magnetventil Lenkungsdaempfung 5.A.
R501 Widerstand Lenkung
Y537 Sperrventil 5.Achse links
Y538 Sperrventil 5.Achse links
Y535 Sperrventil 5.Achse rechts
Y536 Sperrventil 5.Achse rechts
* S510 Wippschalter HA (4./5. Achse) verriegelt
V502 Diodengruppe Lenkung
99707782035_17
N/0905

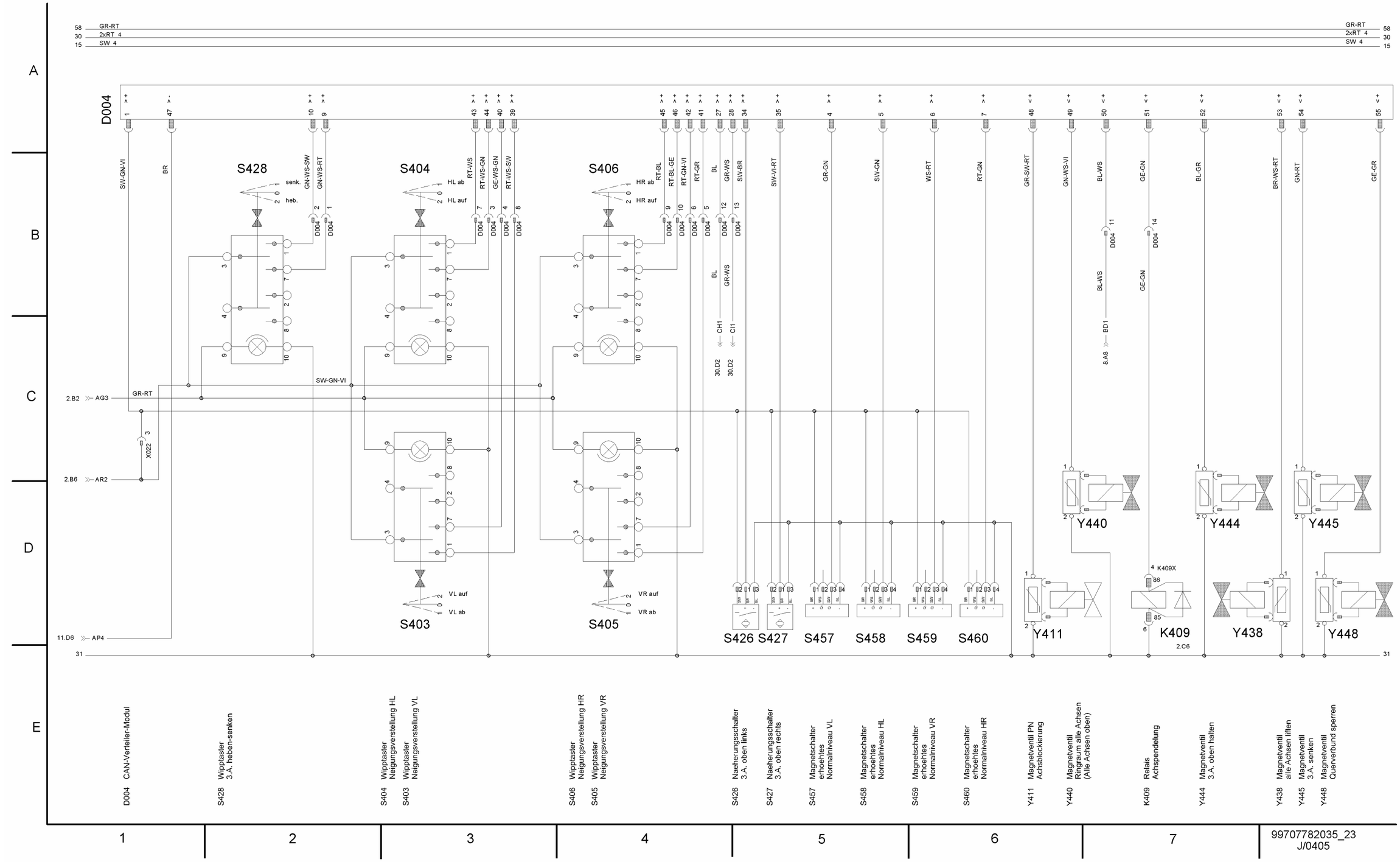

58 GR-RT
30 2xRT 4
15 SW 4
A502
A503
BR 0,5
WS 0,5
GN 0,5
GN I
GN II
CF1 ⇒27.C2
CG1 ⇒27.C2
X516
X517
B501
B505
B502
B506
GN-GE
GN-GE 1,0
BR 1,0
F053
15A
WS-SW
BR-BL
K514
21.D7
K515
21.D8
K514X
K515X
RT-GN-VI
RT-GR
X024
M501
X512
31
A502 Lenkrechner I
B501 Lenksensor 1.Achse (links)
$ Schirm ueber Kabelverschr. an Masse
B505 Lenksensor 4.Achse (links)
A503 Lenkrechner II
B502 Lenksensor 2.Achse (links)
B506 Lenksensor 5.Achse (links)
* K514 Relais VA-Lenkung li.
* M501 Stellmotor VA-Lenkung
* K515 Relais VA-Lenkung re.
F053 Sicherung
99707782035_18
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
15.A8 CAN2
A014
1.19 H
1.20 GND
1.21 L
A502
2.14 H
2.12 L
A503
2.14 H
2.12 L
A101
1.3
1.2
1.1
P501
1.2 1.4 1.6 1.8 1.5 H 1.7 L 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10
P020
X1.10.2
X1.10.3
A030
A4 A7 A8
D005
31 >C HI
33 >C MA
37 >C MA
30 >C LO
BL BR-RT BR-GR GE
1 D005
2 D005
3 D005
4 D005
C1 X034
C3 X034
C4 X034
C2 X034
17 19 20 18
W701
31
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
A502 Lenkrechner I
A503 Lenkrechner II
A101 Elektronik-Baustein ABV
P501 Bedieneinheit Lenkung
P020 CMV Cockpit-Multi-Vision
A030 Elektr. Fahrtenschreiber MTCO
* W701 Schleifring Unterwagen/Oberwagen
D005 CAN-Verteiler-Modul
1 2 3 4 5 6 7
99707782035_19
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
2.B6 AQ1
D001
SW-GN-GR
BL-GN-RT
BL-RT-SW
BR-GR
BL-RT
SW-GE-RS
SW-RT-WS
BL-WS
GN-WS-RT
SW-BL
GR-GE
GE-SW
VI-WS-BL
SW 1,0
GN-WS-VI
GN-RT-SW
BR-WS
BR-RT-WS
V502
17.B8
4 V502X
BL-BR
GN-GE 1,0
BR
GN
WS
BL
S038
S037
S040
S039
K061
8.A8
K101
12.C4
K030
9.D5
K311
1.B5
K724
9.D4
K725
9.D4
31
D001 CAN-Verteiler-Modul
S038 Schalter Luftfilter
S037 Schalter Kuehlwasserstand
S040 Schalter Lenkungsnotpumpe
V502 Diodengruppe Lenkung
S039 Schalter Lenkungspumpe
K061 Relais Zentralwarnung UW
K101 Relais ABV-Abschaltung
K030 Relais Arbeitsdrehzahl
K311 Relais Getriebe-Anlasssperre
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
99707782035_20
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
D002
SW-GE-BL
BR
SW-GE
SW
VI-SW-BL
GE-WS-SW
GR-WS
SW-BL-RT
WS-BL
BR-RT-WS
SW-BR-WS
BL-VI
WS-RT-BL
WS-RT-SW
GE-BR
SW-GE
GR-BR
GR-GE
VI-SW I
VI-GR I
X022
2.B6 AQ2
SW-GE-BL
S077
B011
K013
1.B3
K720
1.A6
Y038
Y523
S013
V506
X030
K514
18.B6
K515
18.B6
V512
V513
11.D6 AP1
AC1
D002 CAN-Verteiler-Modul
S077 Schalter Hydraulikoelstand
B011 Kraftstoffgeber
K013 Relais Batteriehauptschalter
K720 Relais Motor-Stop
Y038 Magnetventil PN 3. Achse ungebremst
Y523 Kupplung VA-Lenkung
S013 Schluesselschalter Unterwagen/Oberwagen
V506 Diodengruppe
K514 Relais VA-Lenkung li.
V512 Gleichrichterdiode
K515 Relais VA-Lenkung re.
V513 Gleichrichterdiode
99707782035_21
P/1205


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D003
S402
S401
S418
S437
S439
S438
S440
S414
S415
S412
S413
S403
S404
S407
S408
S401
S402
S405
S406
2.B2 AG2
2.B6 AR1
11.D6 AP2
11.D6 AP3
31
X022
GR-RT
SW-GN-RT
GN-WS
GN-SW-WS
GR-WS-SW
GR-BR
VI-WS-SW
RS I
SW-GE-RT
SW-BL-GE
SW-BL-GN
SW-GR-GN
WS-SW
WS
RT-SW
RT
GE-SW
GE
VI-SW
VI
BW1
30.C7
D003 CAN-Verteiler-Modul
S437 Magnetschalter Normalniveau VL
S439 Magnetschalter Normalniveau VR
S438 Magnetschalter Normalniveau HL
S440 Magnetschalter Normalniveau HR
S402 Wipptaster Niveauregulierung
S401 Wippschalter Achsblockierung
S418 Wipptaster Achspendelung (entf. bei OW-Betr.!)
S414 Schalter HA li. Achsblockierung
S415 Schalter HA re. Achsblockierung
S412 Schalter VA li. Achsblockierung
S413 Schalter VA re. Achsblockierung
Y404 Magnetventil Neigungsverst. HL auf
Y403 Magnetventil Neigungsverst. HL ab
Y408 Magnetventil Neigungsverst. HR auf
Y407 Magnetventil Neigungsverst. HR ab
Y402 Magnetventil Neigungsverst. VL auf
Y401 Magnetventil Neigungsverst. VL ab
Y406 Magnetventil Neigungsverst. VR auf
Y405 Magnetventil Neigungsverst. VR ab
1
2
3
4
5
6
7
99707782035_22
J/0405



D004 CAN-Verteiler-Modul

S428 Wipptaster 3.A. heben-senken

S404 Wipptaster Neigungsverstellung HL

S403 Wipptaster Neigungsverstellung VL

S406 Wipptaster Neigungsverstellung HR

S405 Wipptaster Neigungsverstellung VR

S426 Naeherungsschalter 3.A. oben links

S427 Naeherungsschalter 3.A. oben rechts

S457 Magnetschalter erhoehtes Normalniveau VL

S458 Magnetschalter erhoehtes Normalniveau HL

S459 Magnetschalter erhoehtes Normalniveau VR

S460 Magnetschalter erhoehtes Normalniveau HR

Y411 Magnetventil PN Achsblockierung

Y440 Magnetventil Ringraum alle Achsen (Alle Achsen oben)

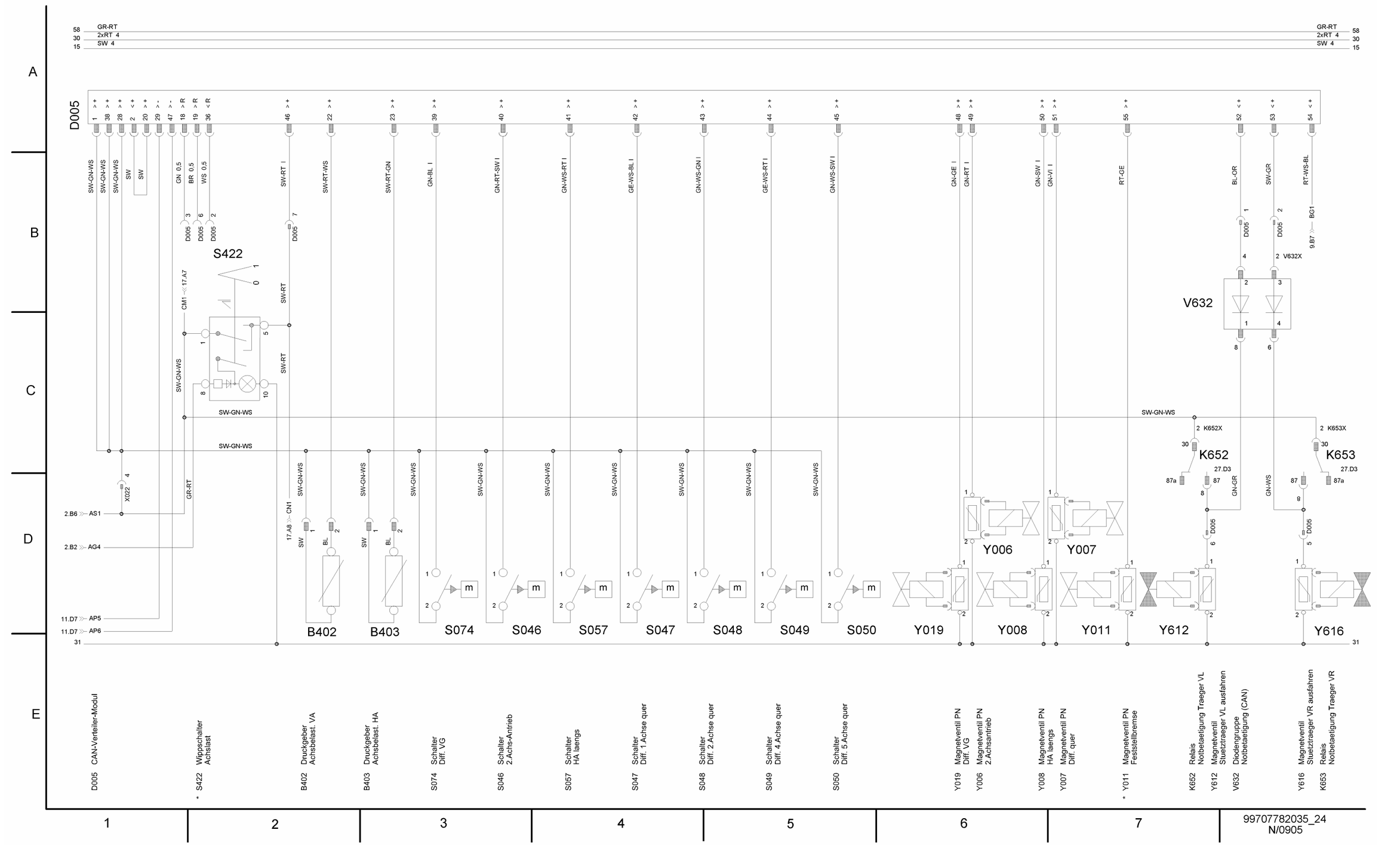
K409 Relais Achsspendelung

Y444 Magnetventil 3.A. oben halten

Y438 Magnetventil alle Achsen liften

Y445 Magnetventil 3.A. senken

Y448 Magnetventil Querverbund sperren


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D005
SW-GN-WS
SW-GN-WS
SW-GN-WS
SW
SW
GN 0,5
BR 0,5
WS 0,5
SW-RT I
SW-RT-WS
SW-RT-GN
GN-BL I
GN-RT-SW I
GN-WS-RT I
GE-WS-BL I
GN-WS-GN I
GE-WS-RT I
GN-WS-SW I
GN-GE I
GN-RT I
GN-SW I
GN-VI I
RT-GE
BL-OR
SW-GR
RT-WS-BL
S422
CM1 17.A7
SW-RT
SW-GN-WS
V632
V632X
BG1
9.B7
X022
2.B6 AS1
2.B2 AG4
11.D7 AP5
11.D7 AP6
31
GR-RT
17.A8 CN1
B402
B403
S074
S046
S057
S047
S048
S049
S050
Y019
Y006
Y008
Y007
Y011
Y612
Y616
K652X
K652
K653X
K653
27.D3
GN-GR
GN-WS
D005 CAN-Verteiler-Modul
* S422 Wippschalter Achslast
B402 Druckgeber Achsbelast. VA
B403 Druckgeber Achsbelast. HA
S074 Schalter Diff. VG
S046 Schalter 2.Achs-Antrieb
S057 Schalter HA laengs
S047 Schalter Diff. 1.Achse quer
S048 Schalter Diff. 2.Achse quer
S049 Schalter Diff. 4.Achse quer
S050 Schalter Diff. 5.Achse quer
Y019 Magnetventil PN Diff. VG
Y006 Magnetventil PN 2.Achsantrieb
Y008 Magnetventil PN HA laengs
Y007 Magnetventil PN Diff. quer
* Y011 Magnetventil PN Feststellbremse
K652 Relais Notbetaetigung Traeger VL
Y612 Magnetventil Stuetztraeger VL ausfahren
V632 Diodengruppe Notbetaetigung (CAN)
Y616 Magnetventil Stuetztraeger VR ausfahren
K653 Relais Notbetaetigung Traeger VR
1
2
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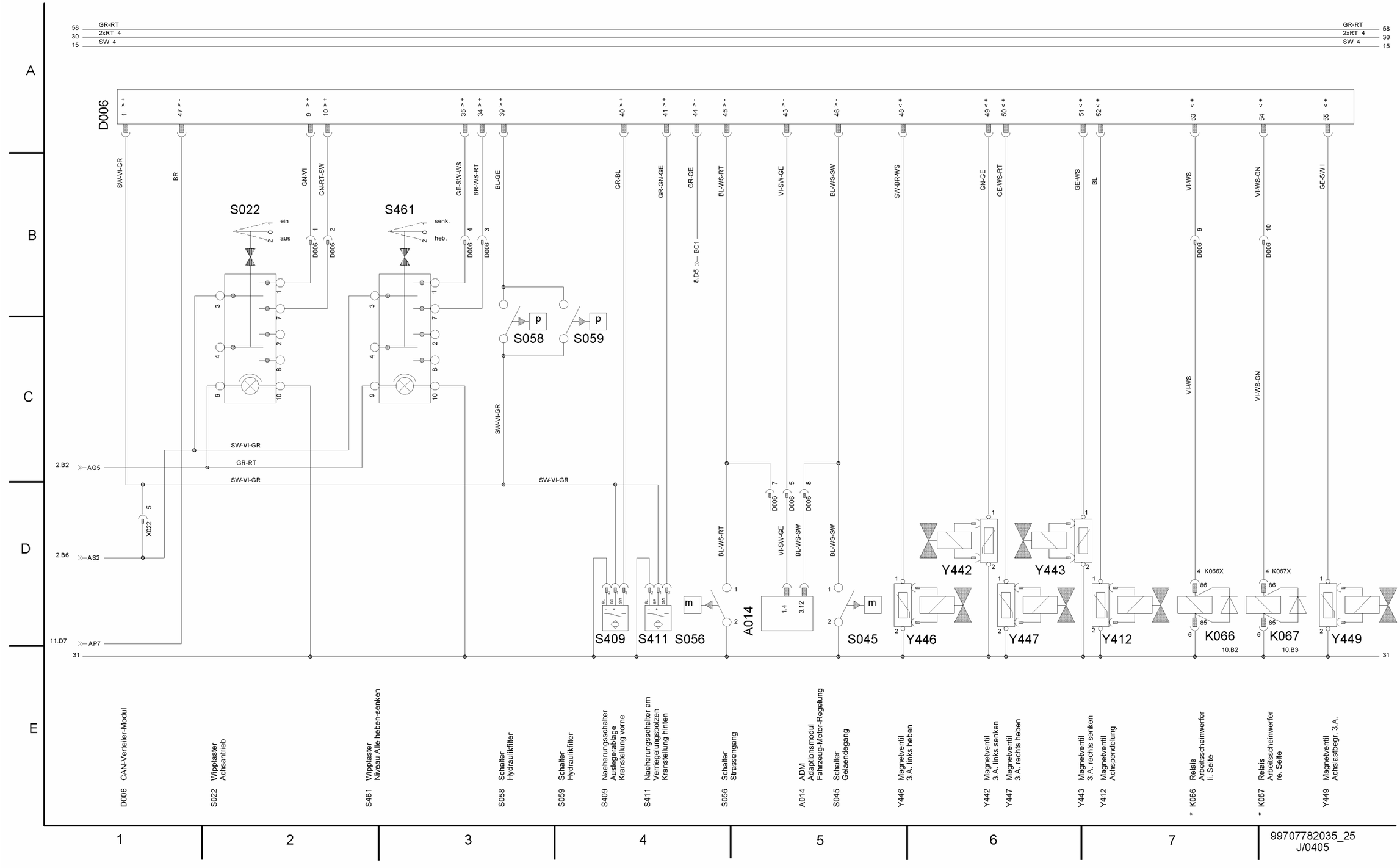
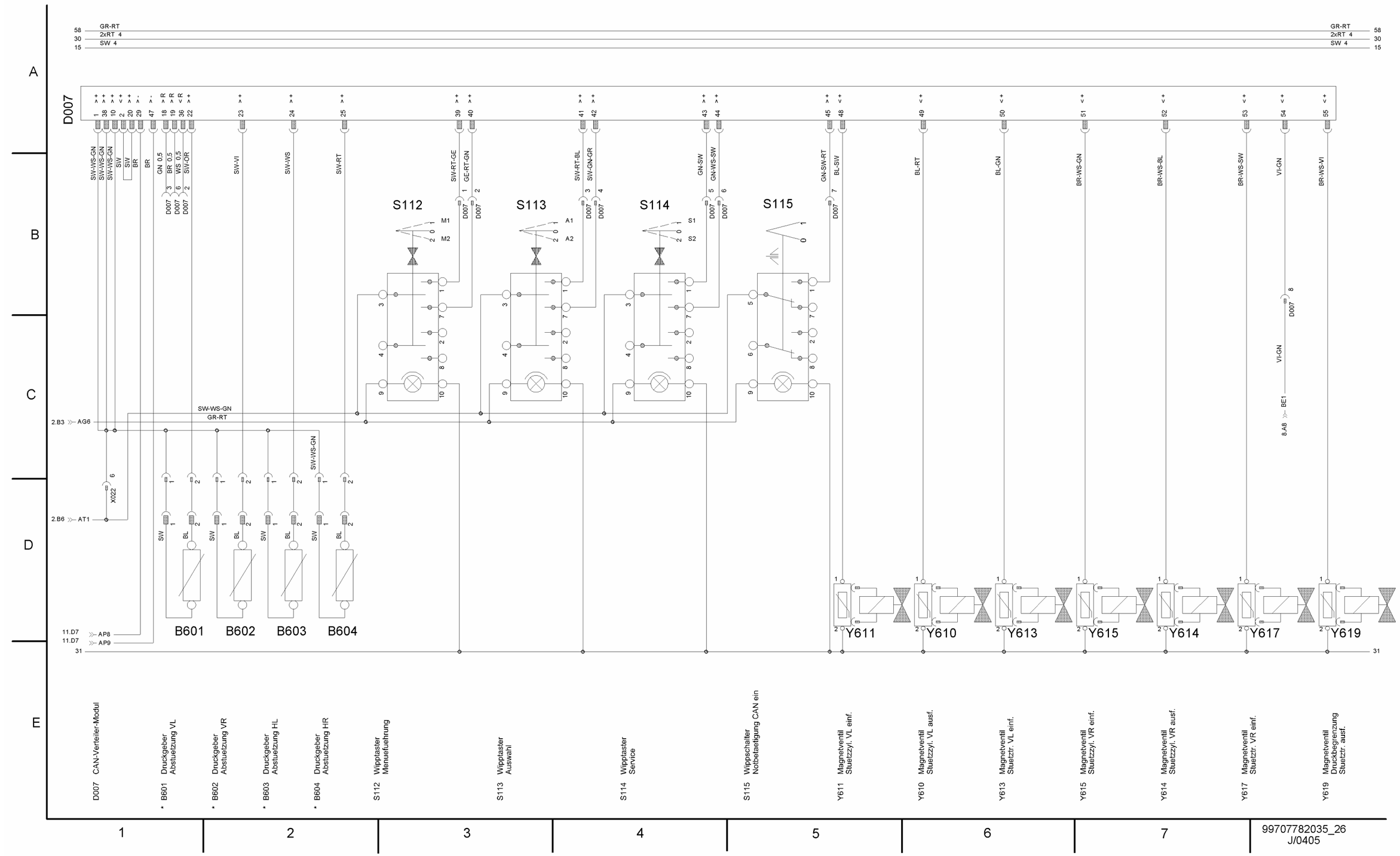
5
6
7
99707782035_24
N/0905

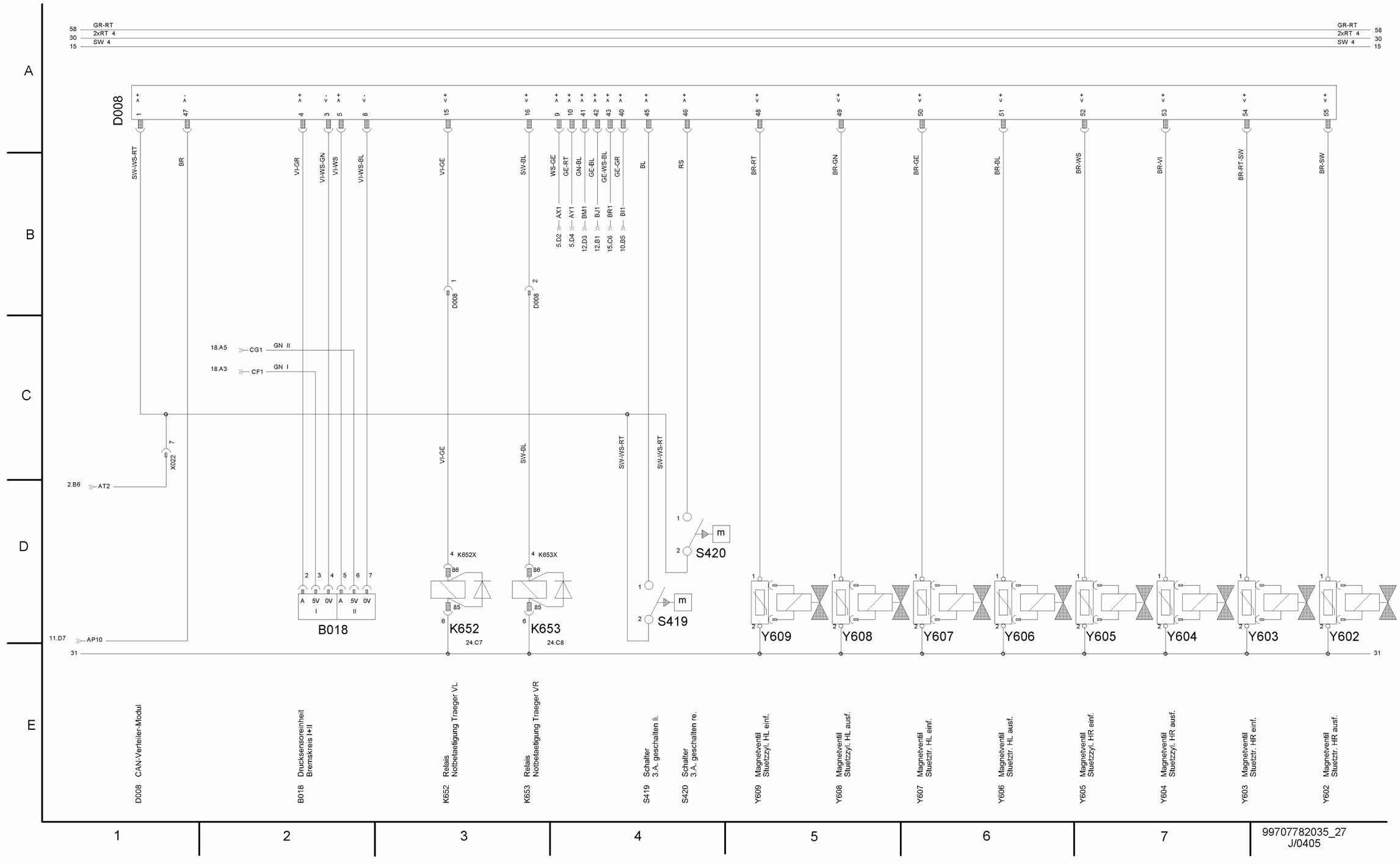


D006	CAN-Verteiler-Modul	
S022	Wipptaster Achsantrieb	
S461	Wipptaster Niveau Alle heben-senken	
S058	Schalter Hydraulikfilter	
S059	Schalter Hydraulikfilter	
S409	Naeherungsschalter Auslegerablage Kranstellung vorne	
S411	Naeherungsschalter am Verriegelungsbolzen Kranstellung hinten	
S056	Schalter Strassengang	
A014	ADM Adaptionsmodul Fahrzeug-Motor-Regelung	
S045	Schalter Gelaendegang	
Y446	Magnetventil 3.A. links heben	
Y442	Magnetventil 3.A. links senken	
Y447	Magnetventil 3.A. rechts heben	
Y443	Magnetventil 3.A. rechts senken	
Y412	Magnetventil Achspendelung	
K066 *	Relais Arbeitsscheinwerfer li. Seite	
K067 *	Relais Arbeitsscheinwerfer re. Seite	
Y449	Magnetventil Achslastbegr. 3.A.	

1 | 2 | 3 | 4 | 5 | 6 | 7

99707782035_25
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
D007
SW-WS-GN
SW-WS-GN
SW-WS-GN
SW
SW
BR
BR
GN 0,5
BR 0,5
WS 0,5
SW-OR
SW-VI
SW-WS
SW-RT
SW-RT-GE
GE-RT-GN
SW-RT-BL
SW-GN-GR
GN-SW
GN-WS-SW
GN-SW-RT
BL-SW
BL-RT
BL-GN
BR-WS-GN
BR-WS-BL
BR-WS-SW
VI-GN
BR-WS-VI
S112
S113
S114
S115
M1
M2
A1
A2
S1
S2
SW-WS-GN
GR-RT
2.B3 AG6
X022
2.B6 AT1
11.D7 AP8
11.D7 AP9
31
StW
BL
B601
B602
B603
B604
Y611
Y610
Y613
Y615
Y614
Y617
Y619
VI-GN
8.A8 BE1
D007 CAN-Verteiler-Modul
* B601 Druckgeber Abstuetzung VL
* B602 Druckgeber Abstuetzung VR
* B603 Druckgeber Abstuetzung HL
* B604 Druckgeber Abstuetzung HR
S112 Wipptaster Menuefuehrung
S113 Wipptaster Auswahl
S114 Wipptaster Service
S115 Wippschalter Notbetaetigung CAN ein
Y611 Magnetventil Stuetzzyl. VL einf.
Y610 Magnetventil Stuetzzyl. VL ausf.
Y613 Magnetventil Stuetztr. VL einf.
Y615 Magnetventil Stuetzzyl. VR einf.
Y614 Magnetventil Stuetzzyl. VR ausf.
Y617 Magnetventil Stuetztr. VR einf.
Y619 Magnetventil Druckbegrenzung Stuetztr. ausf.
1
2
3
4
5
6
7
99707782035_26
J/0405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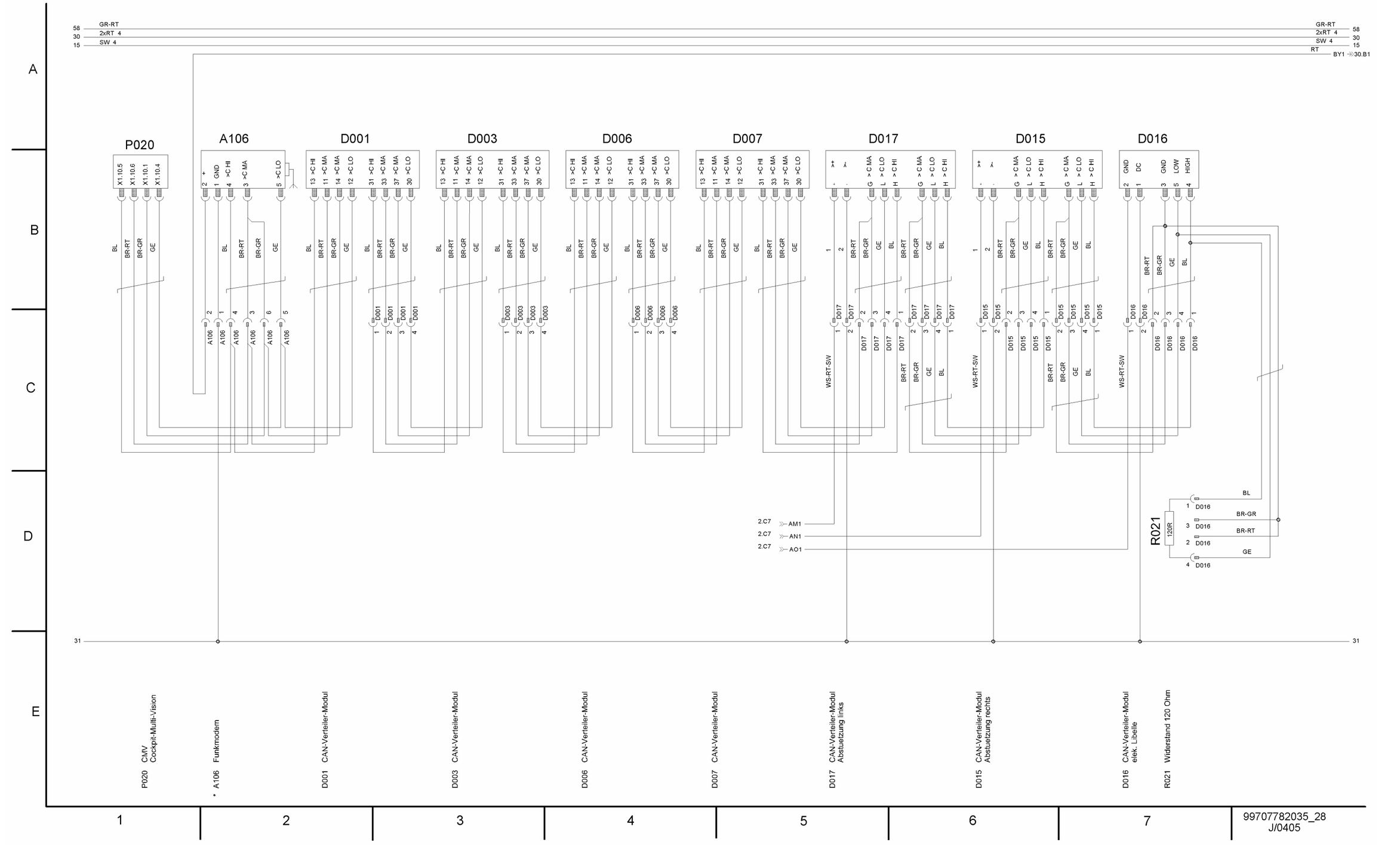
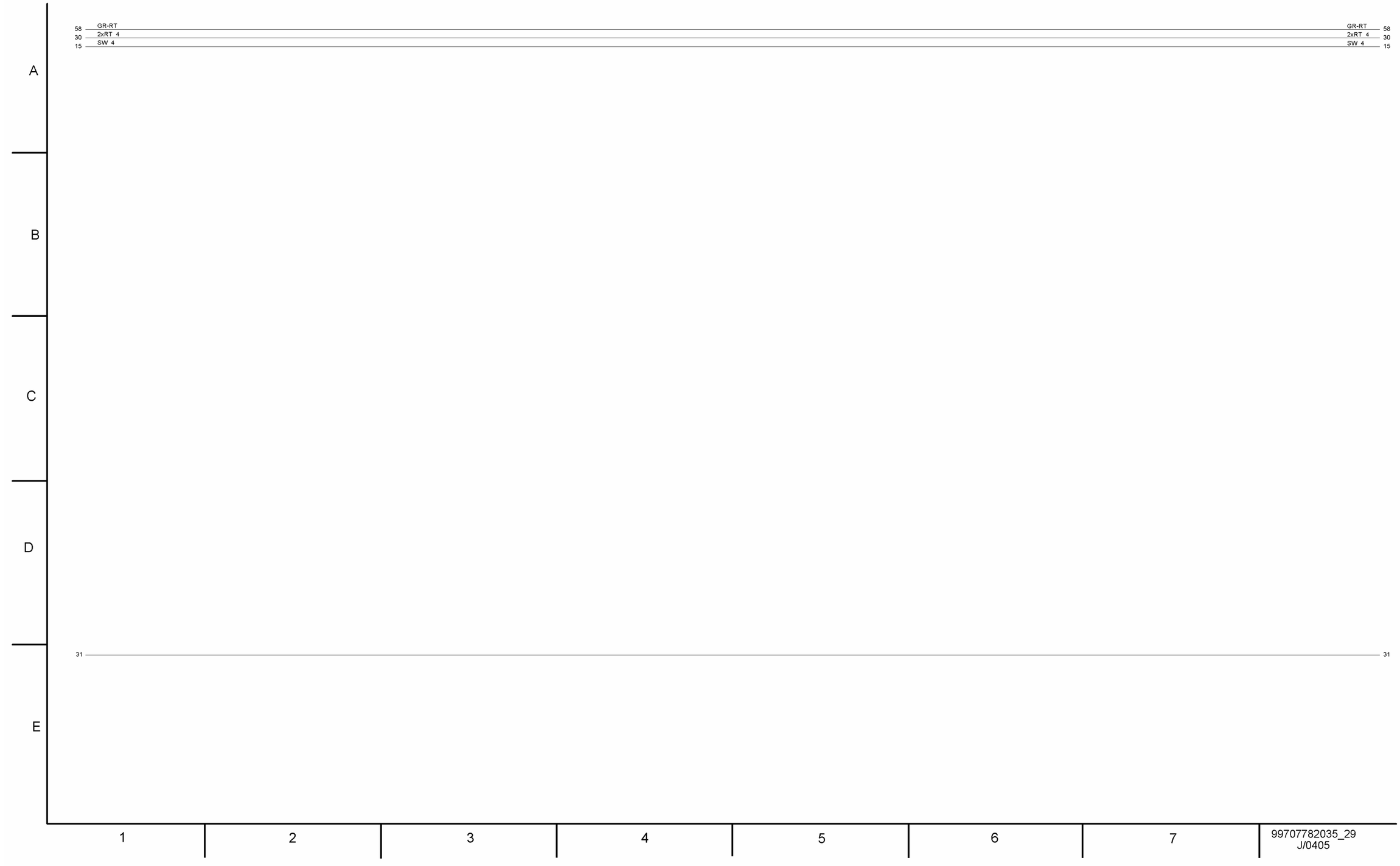
30 2xRT 4
15 SW 4
D008
SW-WS-RT
BR
VI-GR
VI-WS-GN
VI-WS
VI-WS-BL
VI-GE
SW-BL
WS-GE
GE-RT
GN-BL
GE-BL
GE-WS-BL
GE-GR
BL
RS
BR-RT
BR-GN
BR-GE
BR-BL
BR-WS
BR-VI
BR-RT-SW
BR-SW
AX1
AY1
BM1
BJ1
BR1
BI1
5.D2
5.D4
12.D3
12.B1
15.C6
10.B5
18.A5 CG1 GN II
18.A3 CF1 GN I
X022
2.B6 AT2
11.D7 AP10
31
B018
A 5V 0V A 5V 0V
I II
K652X
K653X
K652
24.C7
K653
24.C8
S419
S420
Y609
Y608
Y607
Y606
Y605
Y604
Y603
Y602
D008 CAN-Verteiler-Modul
B018 Drucksensoreinheit Bremskreis I+II
K652 Relais Notbetaetigung Traeger VL
K653 Relais Notbetaetigung Traeger VR
S419 Schalter 3.A. geschalten li.
S420 Schalter 3.A. geschalten re.
Y609 MagnetventII Stuetzzyl. HL einf.
Y608 MagnetventII Stuetzzyl. HL ausf.
Y607 MagnetventII Stuetztr. HL einf.
Y606 MagnetventII Stuetztr. HL ausf.
Y605 MagnetventII Stuetzzyl. HR einf.
Y604 MagnetventII Stuetzzyl. HR ausf.
Y603 MagnetventII Stuetztr. HR einf.
Y602 MagnetventII Stuetztr. HR ausf.
1 2 3 4 5 6 7
99707782035_27
J/0405

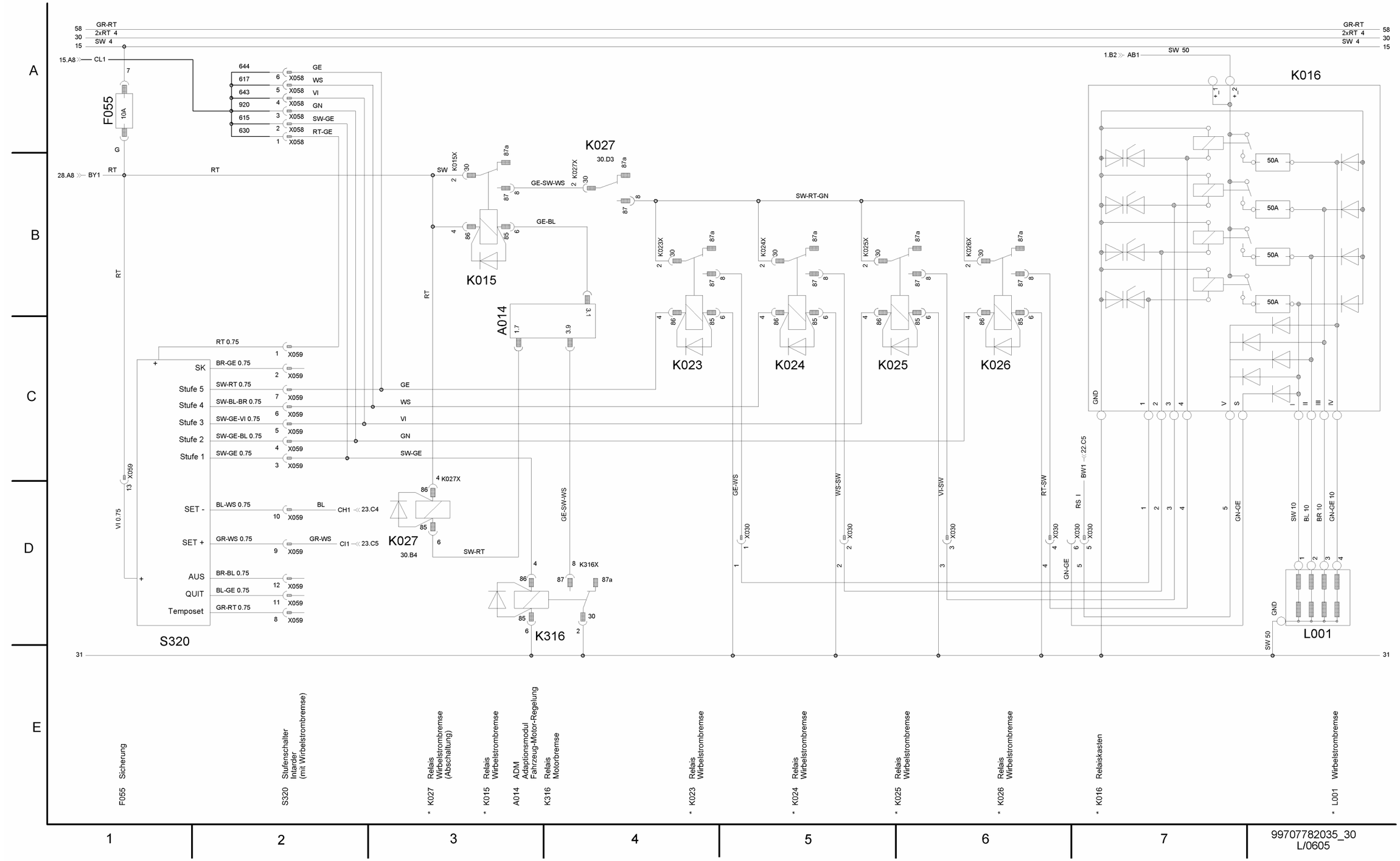
1.5 CAN connections (99707782035)



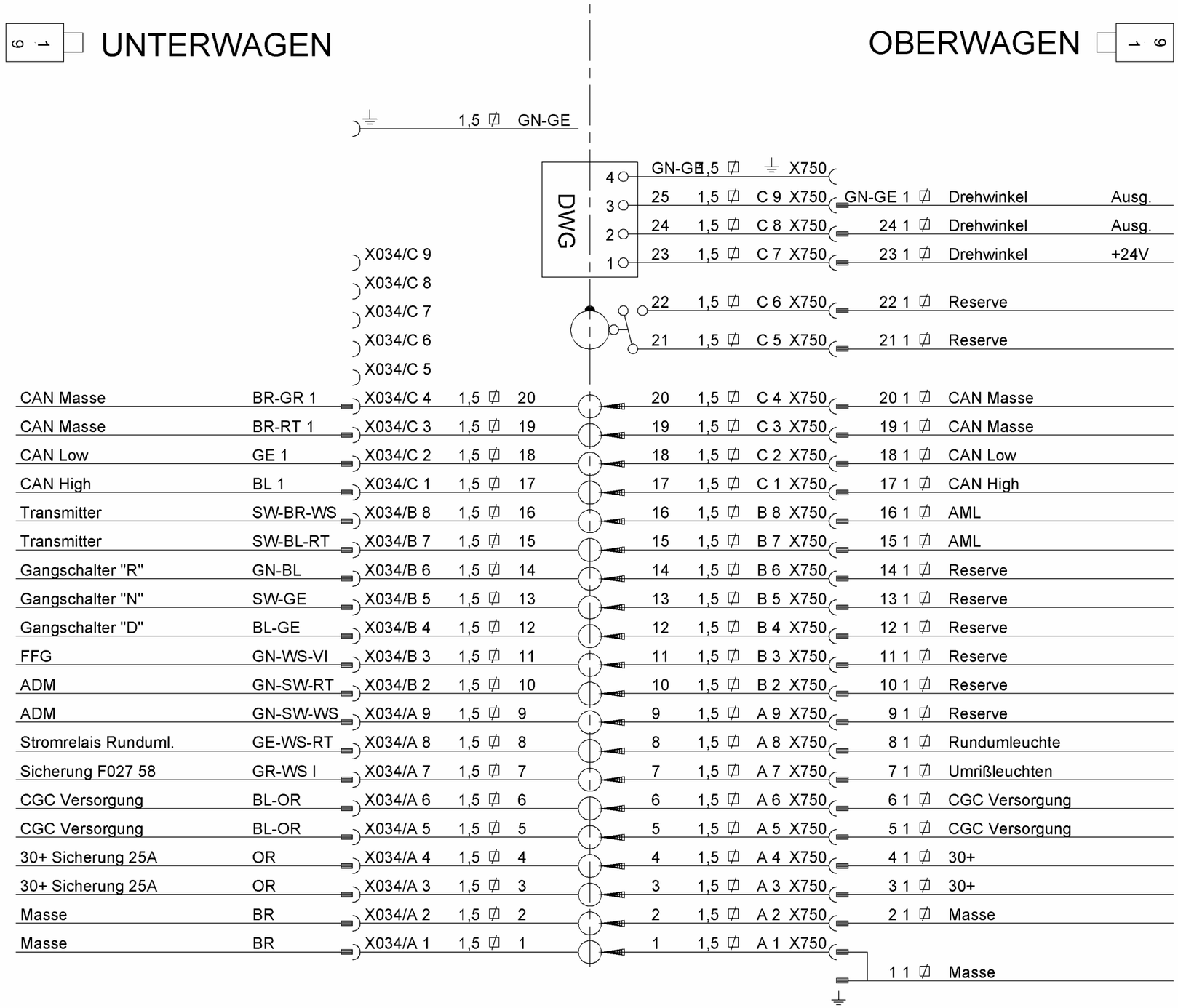
1.6 Chassis (99707782035)



1.7 Eddy-current brake (99707782035)



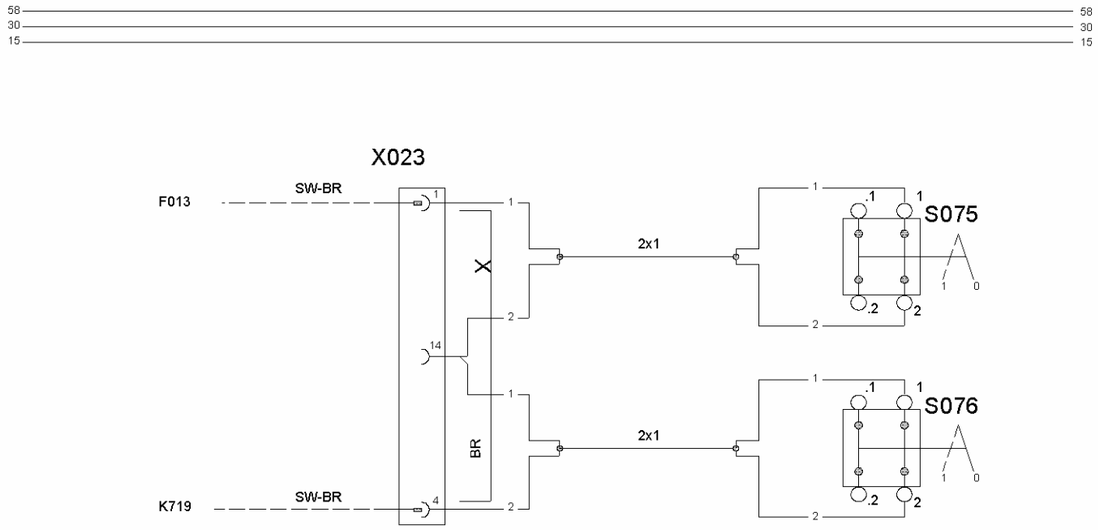
1.8 Connection diagram - Slipring (99707782068)



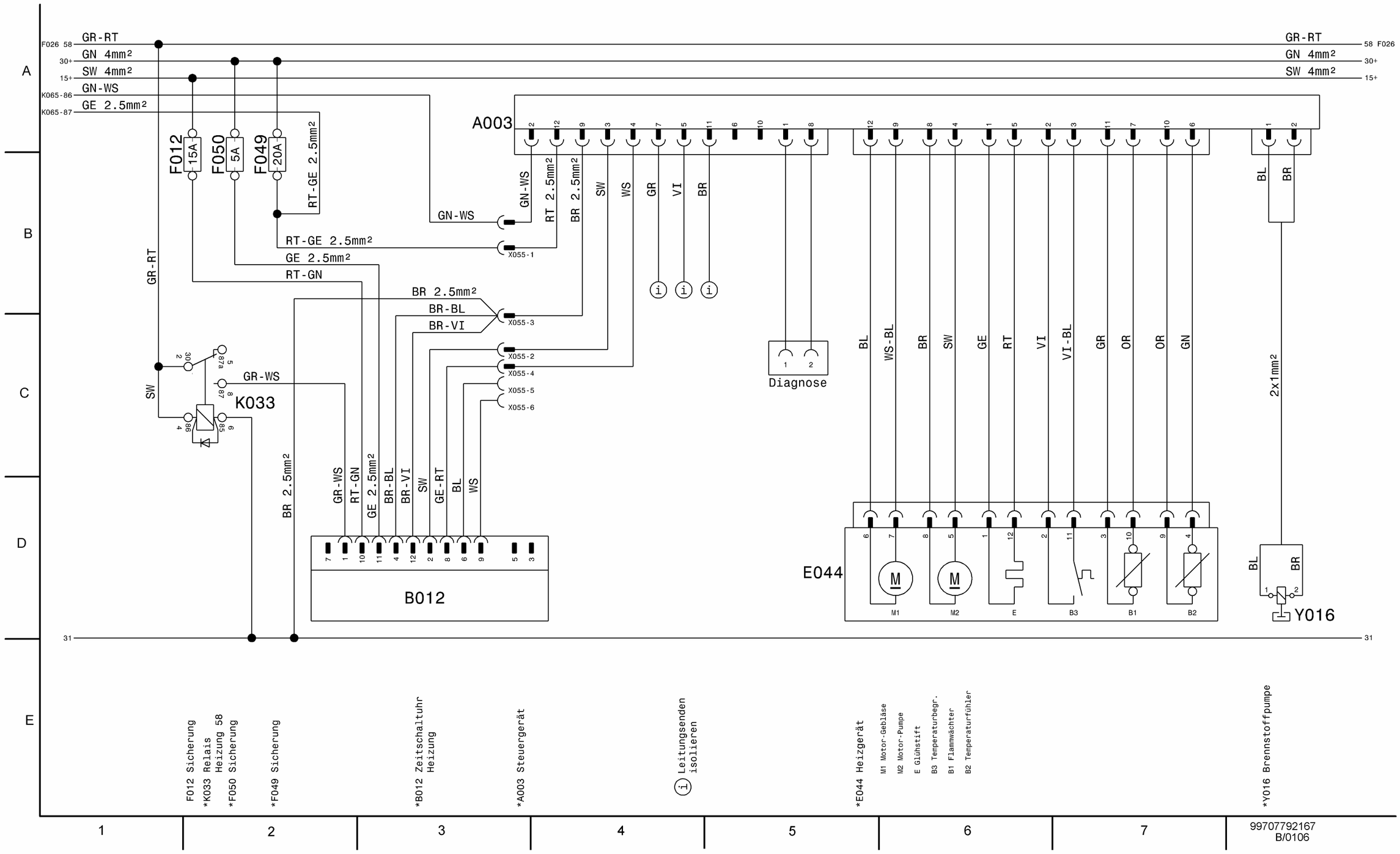
Leitungsfarben Cable colours Couleurs des cables			
BG	beige	beige	beige
BL	blau	blue	bleu
BR	braun	brown	brun
GE	gelb	yellow	jaune
GN	gruen	green	vert
GR	grau	grey	gris
OR	orange	orange	orange
RS	rosa	pink	rose
RT	rot	red	rouge
SW	schwarz	black	noir
TR	transp.	transp	transp.
VI	violett	violet	violet
WS	weiß	white	blanc

99707782068
B/0704

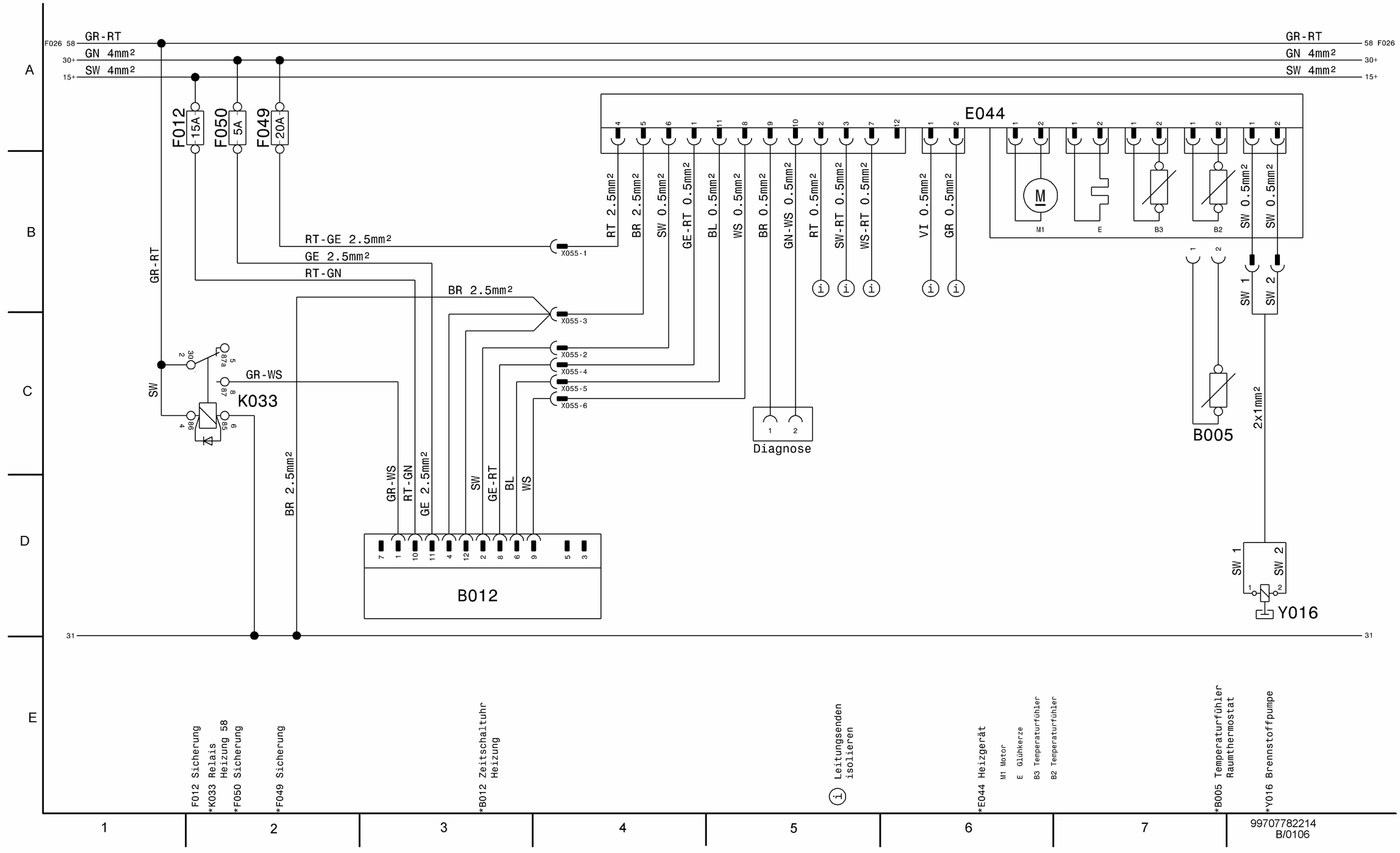
1.9 Emergency OFF - Engine STOP (stalling device) 99707782491



1.10 Heater unit Webasto Thermo 90S (99707792167)

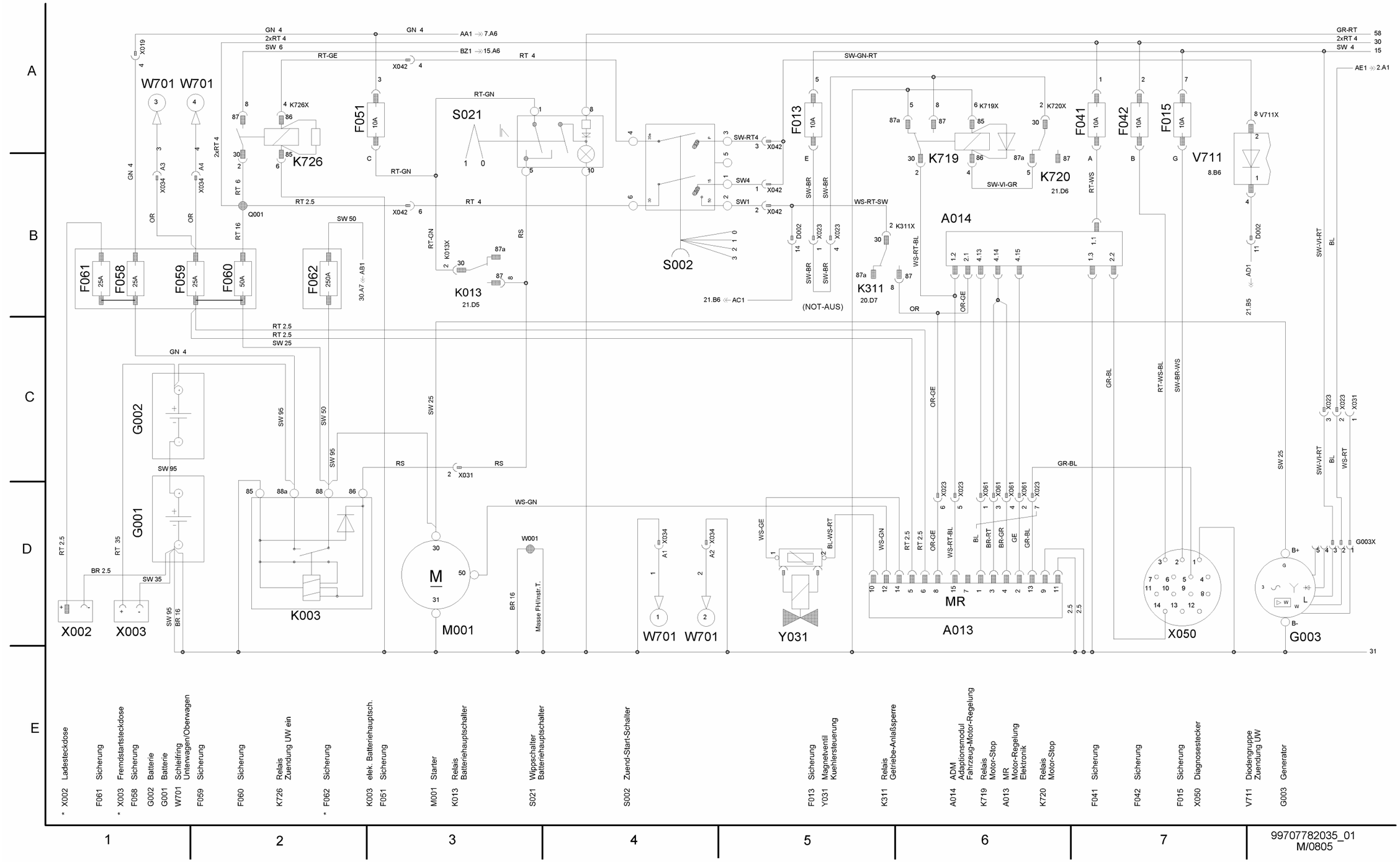


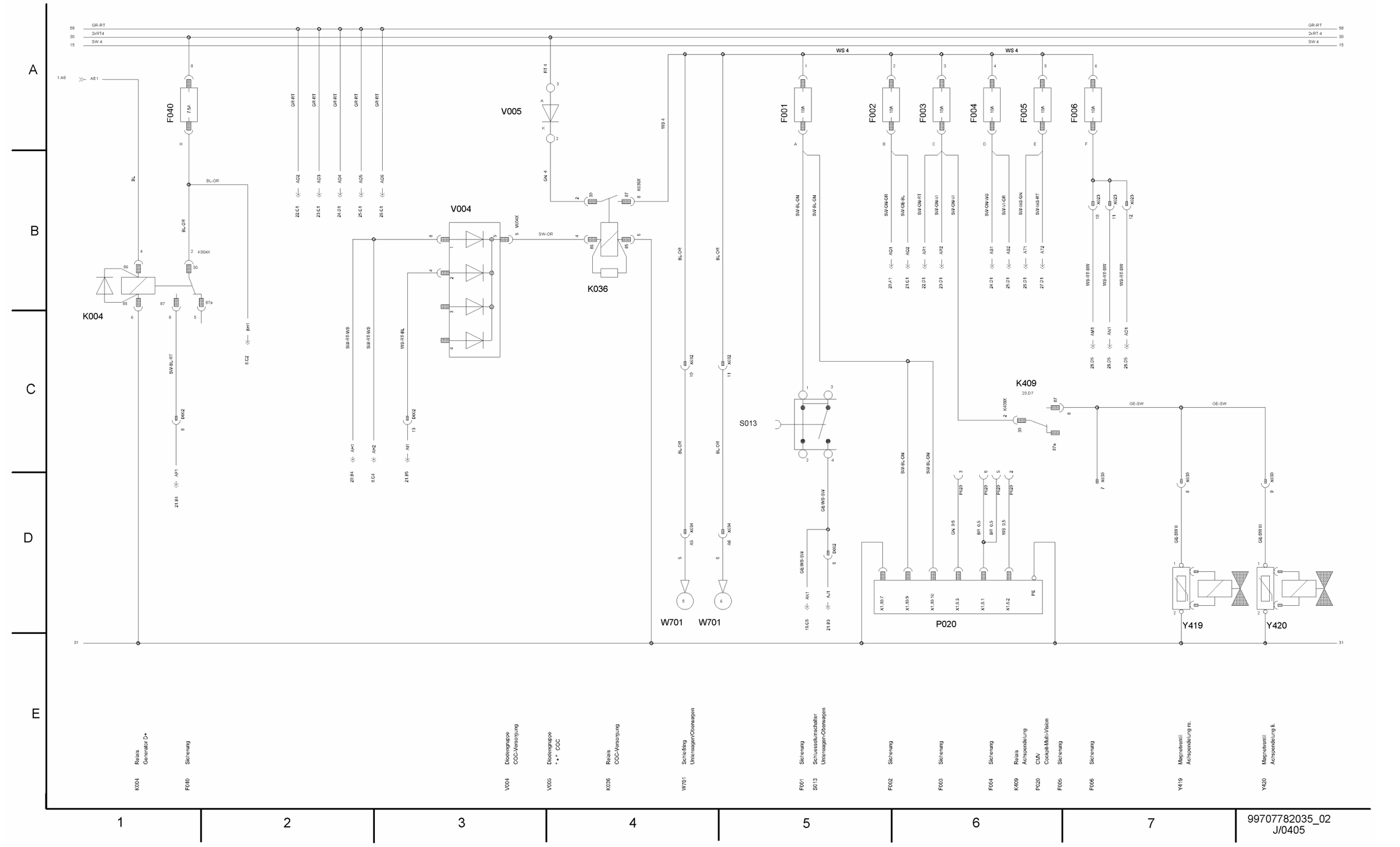
1.11 Heater unit Webasto Air Top 3500 (99707782214)

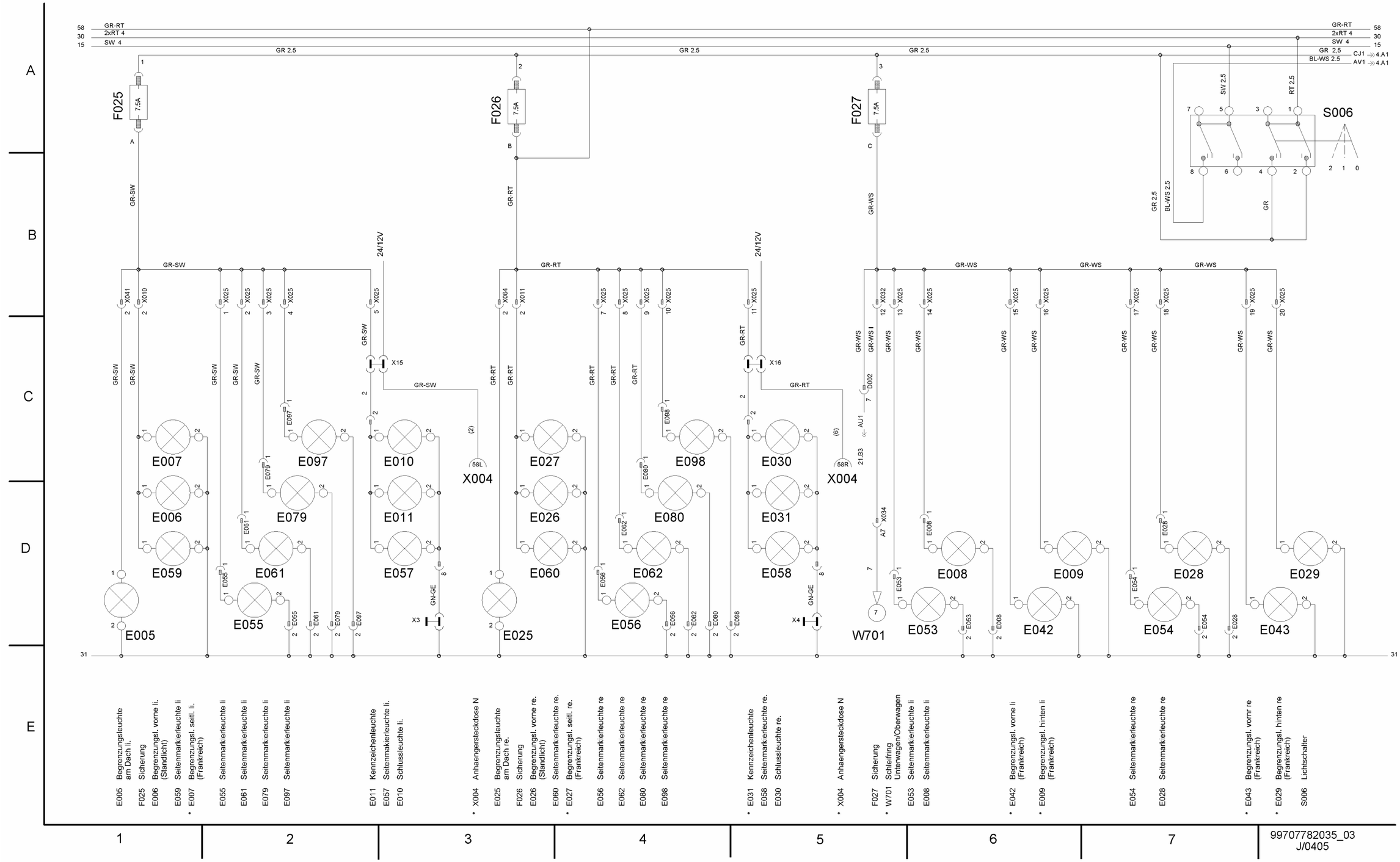


1 Electric circuit diagrams

1.1 Chassis (99707782035)



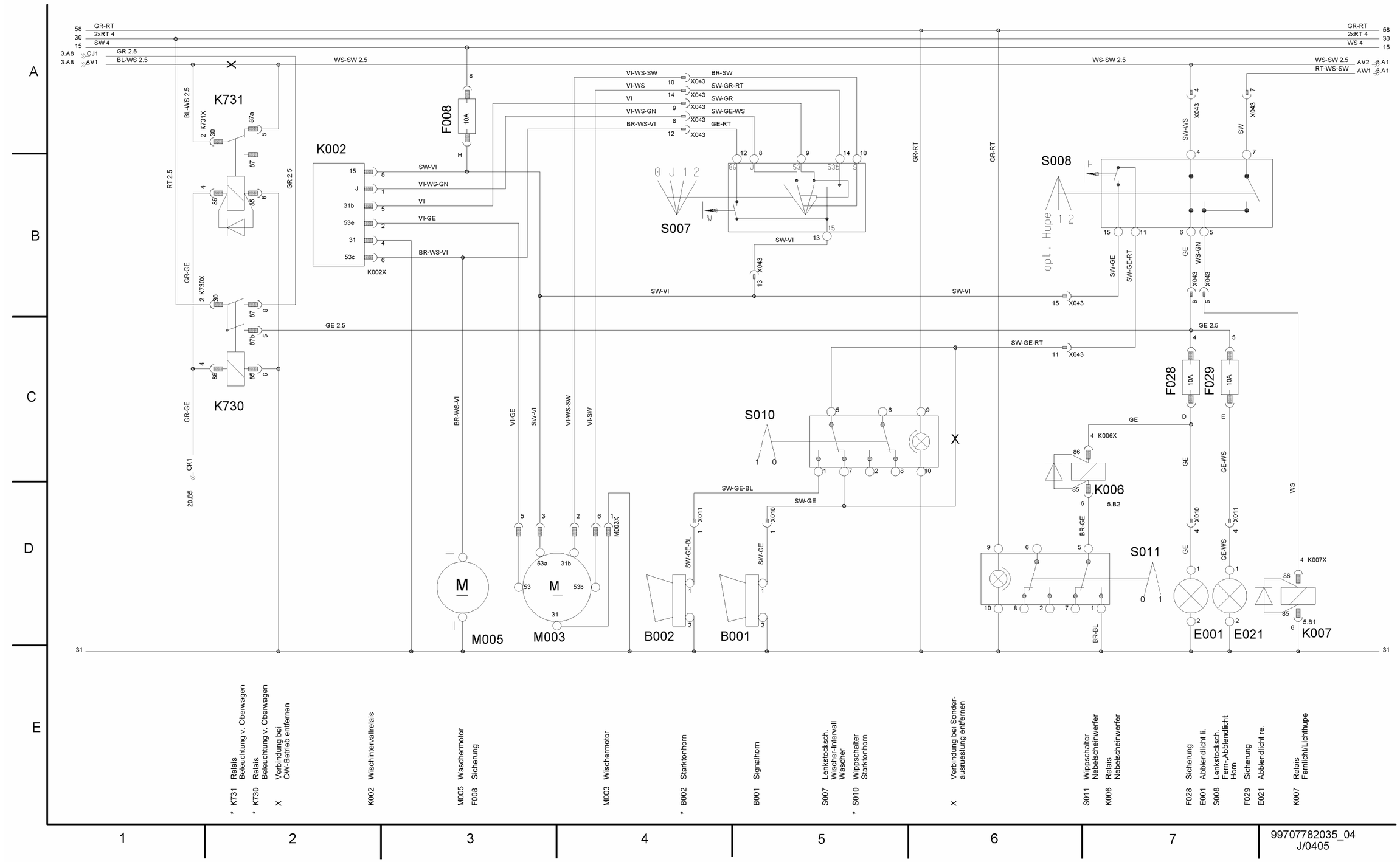

A
B
C
D
E
1
2
3
4
5
6
7
GR-RT
2xRT4
SW 4
F040
7.5A
K004
K004X
V004
V005
K036
K036X
S013
F001
F002
F003
F004
F005
F006
K409
P020
Y419
Y420
W701
WS 4
SW-BL-GN
SW-GN-NR
SW-GE-BL
SW-GN-RT
SW-GN-VI
SW-NT-WS
SW-VI-GR
SW-WS-GN
SW-WS-RT
WS-RT-SW
BL-OR
GE-WS-SW
GE-SW
GE-SW II
Relais Generator D+
Sicherung
Dioden-gruppe CCC-Versorgung
Dioden-gruppe "+" CCC
Relais CCC-Versorgung
Schleifring Unterwagen/Oberwagen
Sicherung
Schlüsselumschalter Unterwagen-Oberwagen
Sicherung
Sicherung
Sicherung
Relais Arbeitsendstellung
CMV Cockpit-Multi-Vision
Sicherung
Sicherung
Magnetventil Arbeitsendstellung re.
Magnetventil Arbeitsendstellung li.
P020
X1.10.7
X1.10.9
X1.10.10
X1.6.3
X1.6.1
X1.6.2
PE
99707782035_02
J/0405



E

E005	Begrenzungsleuchte am Dach li.
F025	Sicherung
E006	Begrenzungsl. vorne li. (Standlicht)
E059	Seitenmarkierleuchte li
* E007	Begrenzungsl. seitl. li. (Frankreich)
E055	Seitenmarkierleuchte li
E061	Seitenmarkierleuchte li
E079	Seitenmarkierleuchte li
E097	Seitenmarkierleuchte li
E011	Kennzeichenleuchte
E057	Seitenmakierleuchte li.
E010	Schlussleuchte li.
* X004	Anhaengersteckdose N
E025	Begrenzungsleuchte am Dach re.
F026	Sicherung
E026	Begrenzungsl. vorne re. (Standlicht)
E060	Seitenmarkierleuchte re.
* E027	Begrenzungsl. seitl. re. (Frankreich)
E056	Seitenmarkierleuchte re
E062	Seitenmarkierleuchte re
E080	Seitenmarkierleuchte re
E098	Seitenmarkierleuchte re
* E031	Kennzeichenleuchte
E058	Seitenmarkierleuchte re.
E030	Schlussleuchte re.
* X004	Anhaengersteckdose N
F027	Sicherung
* W701	Schleifring Unterwagen/Oberwagen
E053	Seitenmarkierleuchte li
E008	Seitenmarkierleuchte li
* E042	Begrenzungsl. vorne li (Frankreich)
* E009	Begrenzungsl. hinten li (Frankreich)
E054	Seitenmarkierleuchte re
E028	Seitenmarkierleuchte re
* E043	Begrenzungsl. vornr re (Frankreich)
* E029	Begrenzungsl. hinten re (Frankreich)
S006	Lichtschalter

99707782035_03
J/0405


A
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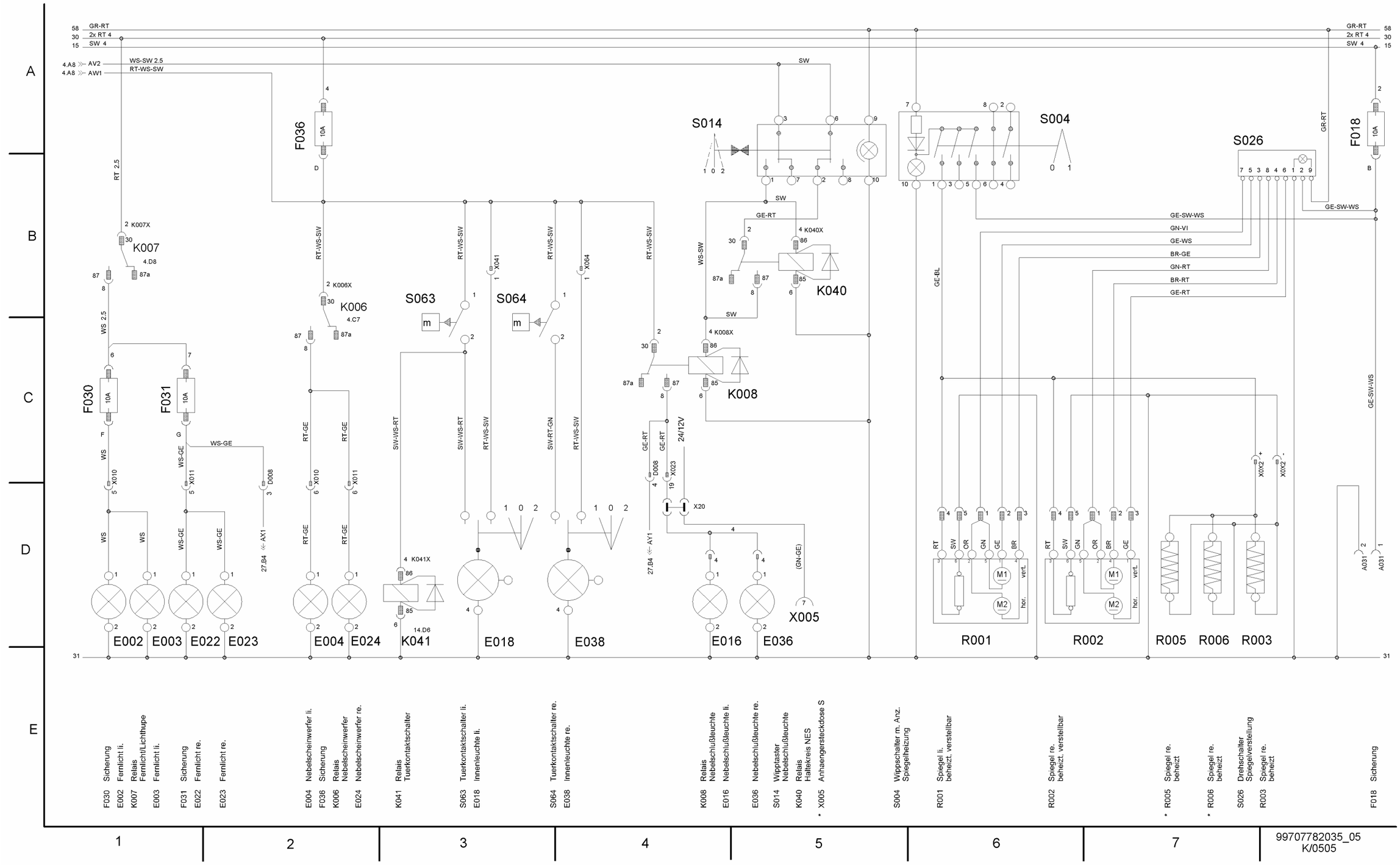
58 GR-RT
30 2xRT 4
15 SW 4
3.A8 CJ1 GR 2.5
3.A8 AV1 BL-WS 2.5
WS-SW 2.5
K731
K730
K002
F008 10A
S007
S008
S010
S011
K006
F028 10A
F029 10A
M005
M003
B002
B001
E001
E021
K007
RT 2.5
GR 2.5
GR-GE
GE 2.5
BR-WS-VI
VI-GE
SW-VI
VI-WS-SW
SW-GE-BL
SW-GE
SW-GE-RT
GR-RT
BR-SW
SW-GR-RT
SW-GR
SW-GE-WS
GE-RT
VI-WS-GN
VI
BR-BL
GE
GE-WS
WS
SW-WS
SW
WS-GN
RT-WS-SW
opt. Hupe
CK1
20.B5
31
Relais Beleuchtung v. Oberwagen
Verbindung bei OW-Betrieb entfernen
Wischintervallrelais
Waschermotor
Sicherung
Wischermotor
Starkstromhorn
Signalhorn
Lenkstocksch. Wischer-Intervall Wischer
Wippschalter Starkstromhorn
Verbindung bei Sonder-ausrüstung entfernen
Wippschalter Nebelscheinwerfer
Relais Nebelscheinwerfer
Sicherung
Abblendlicht li.
Lenkstocksch. Fern-/Abblendlicht Horn
Sicherung
Abblendlicht re.
Relais Fernlicht/Lichthupe
99707782035_04
J/0405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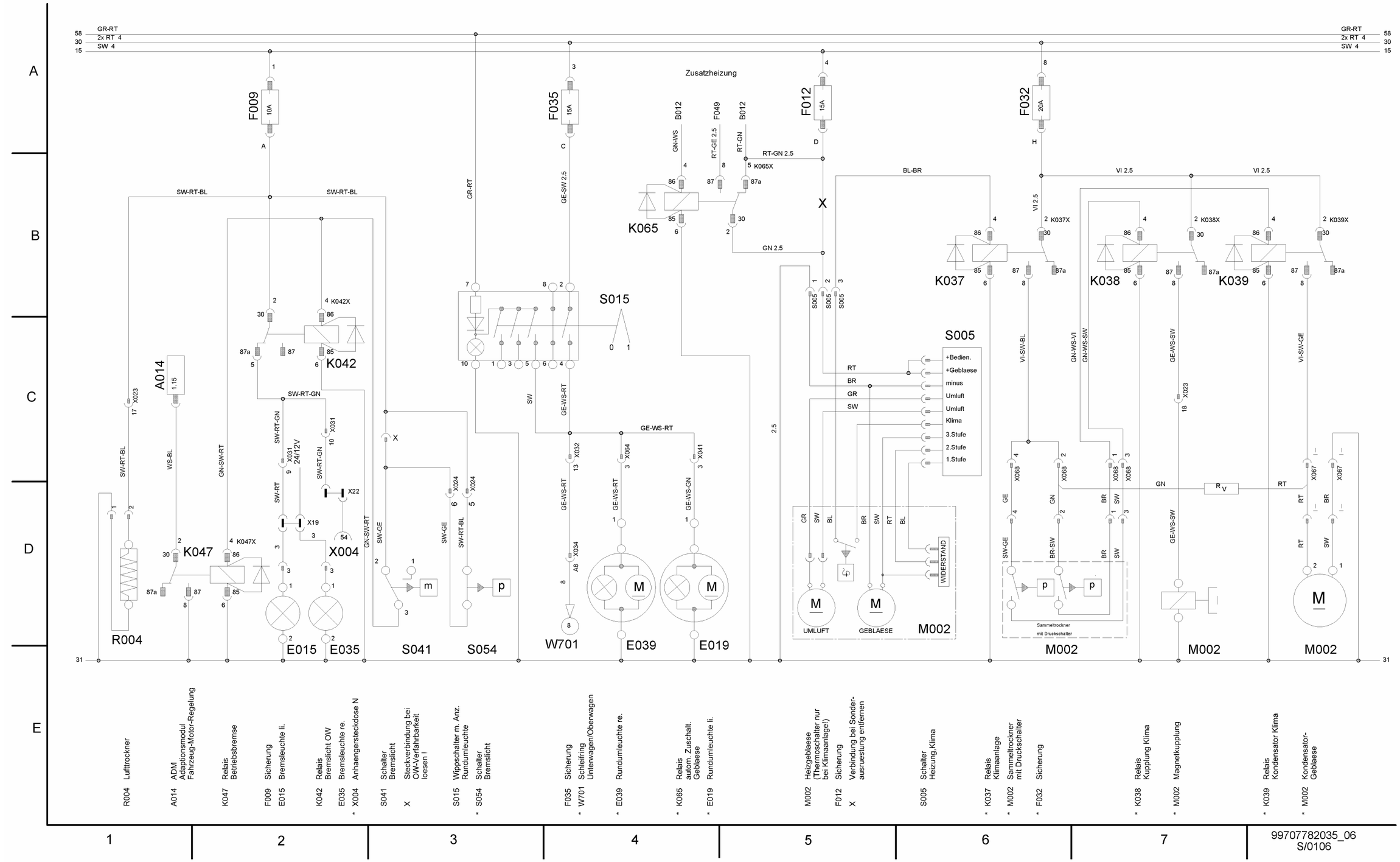
GR-RT
2x RT 4
SW 4
WS-SW 2.5
RT-WS-SW
RT 2.5
WS 2.5
F030 10A
F031 10A
F036 10A
F018 10A
K007
K006
K008
K040
K041
S063
S064
S014
S004
S026
X005
X20
E002 E003 E022 E023
E004 E024
E018
E038
E016 E036
R001
R002
R005 R006 R003
GE-SW-WS
GN-VI
GE-WS
BR-GE
GN-RT
BR-RT
GE-RT
GE-BL
24/12V
F030 Sicherung
E002 Fernlicht li.
K007 Relais Fernlicht/Lichthupe
E003 Fernlicht li.
F031 Sicherung
E022 Fernlicht re.
E023 Fernlicht re.
E004 Nebelscheinwerfer li.
F036 Sicherung
K006 Relais Nebelscheinwerfer
E024 Nebelscheinwerfer re.
K041 Relais Tuerkontaktschalter
S063 Tuerkontaktschalter li.
E018 Innenleuchte li.
S064 Tuerkontaktschalter re.
E038 Innenleuchte re.
K008 Relais NebelschluÃleuchte
E016 NebelschluÃleuchte li.
E036 NebelschluÃleuchte re.
S014 Wipptaster NebelschluÃleuchte
K040 Relais Haltekreis NES
* X005 Anhaengersteckdose S
S004 Wippschalter m. Anz. Spiegelheizung
R001 Spiegel li., beheizt, verstellbar
R002 Spiegel re., beheizt, verstellbar
* R005 Spiegel re. beheizt
* R006 Spiegel re. beheizt
S026 Drehschalter Spiegelverstellung
R003 Spiegel re. beheizt
F018 Sicherung
99707782035_05
K/0505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GR-RT
2x RT 4
SW 4
58
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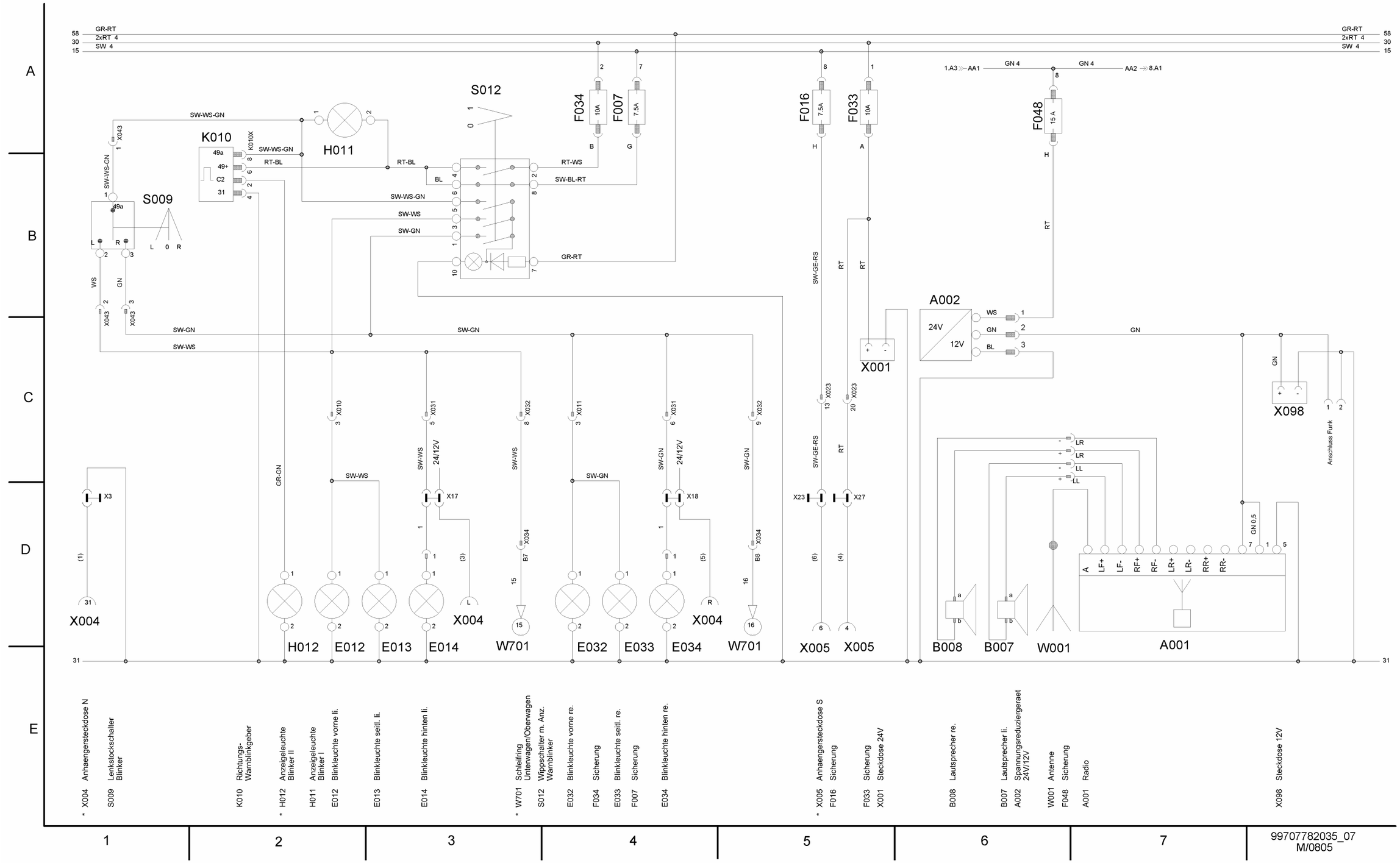
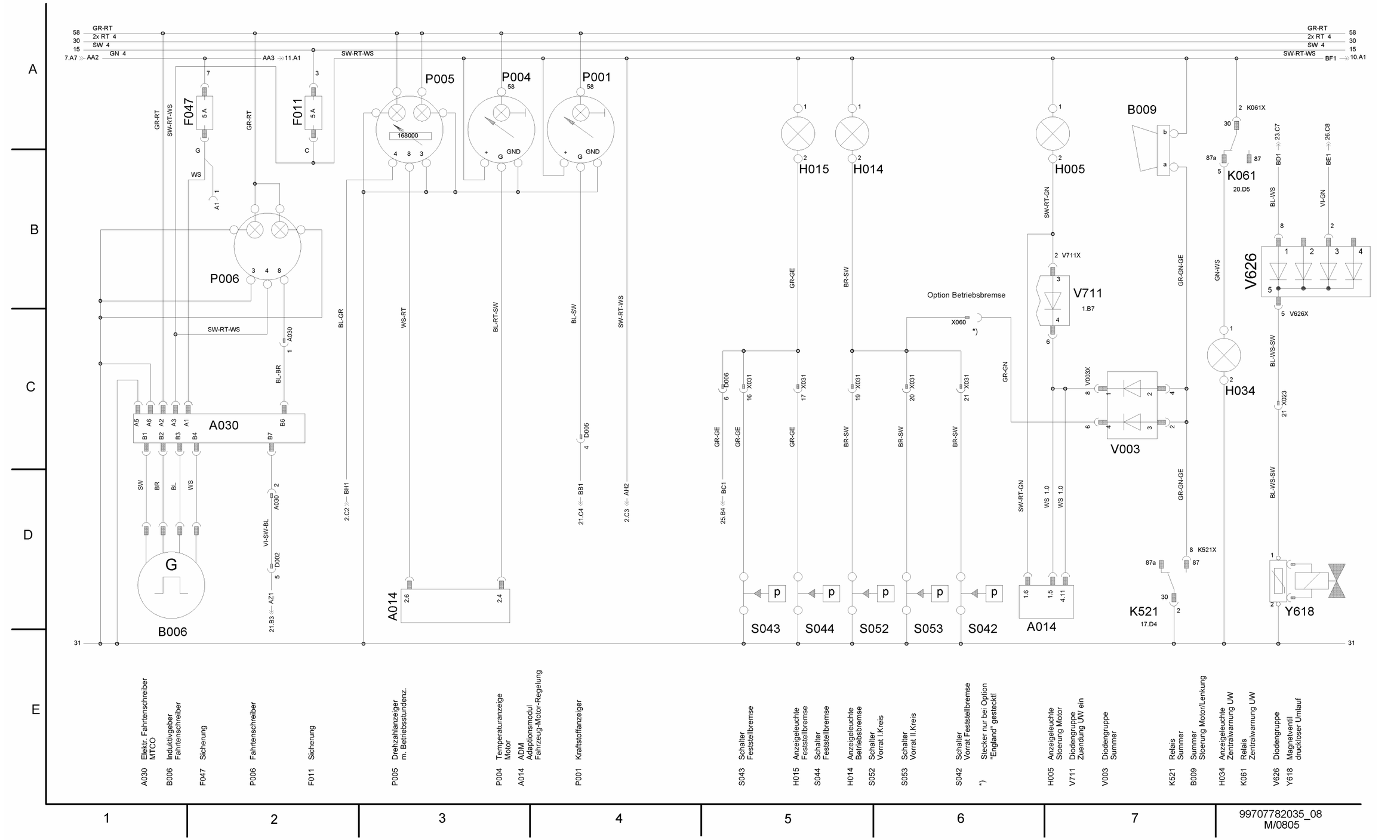
F009
10A
F035
15A
F012
15A
F032
20A
Zusatzheizung
B012
F049
B012
GN-WS
RT-GE 2.5
RT-GN
RT-GN 2.5
K065X
K065
GN 2.5
BL-BR
VI 2.5
K037X
K038X
K039X
K037
K038
K039
S015
S005
+Bedien.
+Geblaese
minus
Umluft
Umluft
Klima
3.Stufe
2.Stufe
1.Stufe
RT
BR
GR
SW
VI-SW-BL
GN-WS-VI
GN-WS-SW
GE-WS-SW
VI-SW-GE
A014
K042X
K042
SW-RT-BL
WS-BL
GN-SW-RT
SW-RT-GN
X031
X023
X022
X019
X004
K047
K047X
R004
E015
E035
S041
S054
W701
E039
E019
M002
UMLUFT
GEBLAESE
WIDERSTAND
Sammeltrockner
mit Druckschalter
GE-WS-RT
GE-WS-SW
GN
RT
BR-SW
SW-GE
GN-SW-RT
SW-GE
SW-RT-BL
X032
X034
X064
X041
X024
X088
X067
R004 Lufttrockner
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
K047 Relais Betriebsbremse
F009 Sicherung
E015 Bremsleuchte li.
K042 Relais Bremslicht OW
E035 Bremsleuchte re.
* X004 Anhaengersteckdose N
S041 Schalter Bremslicht
X Steckverbindung bei OW-Verfahrbarkeit loesen !
S015 Wippschalter m. Anz. Rundumleuchte
* S054 Schalter Bremslicht
F035 Sicherung
* W701 Schleifring Unterwagen/Oberwagen
* E039 Rundumleuchte re.
* K065 Relais autom. Zuschalt. Gebläese
* E019 Rundumleuchte li.
M002 Heizgeblaese (Thermoschalter nur bei Klimaanlage!)
F012 Sicherung
X Verbindung bei Sonder-ausruestung entfernen
S005 Schalter Heizung,Klima
* K037 Relais Klimaanlage
* M002 Sammeltrockner mit Druckschalter
* F032 Sicherung
* K038 Relais Kupplung Klima
* M002 Magnetkupplung
* K039 Relais Kondensator Klima
* M002 Kondensator-Gebläese
99707782035_06
S/0106



*	X004	Anhaengersteckdose N
	S009	Lenkstockschalter Blinker
	K010	Richtungs-Warnblinkgeber
*	H012	Anzeigeleuchte Blinker li
	H011	Anzeigeleuchte Blinker l
	E012	Blinkleuchte vorne li.
	E013	Blinkleuchte seitl. li.
	E014	Blinkleuchte hinten li.
*	W701	Schleifring Unterwagen/Oberwagen
	S012	Wippschalter m. Anz. Warnblinker
	E032	Blinkleuchte vorne re.
	F034	Sicherung
	E033	Blinkleuchte seitl. re.
	F007	Sicherung
	E034	Blinkleuchte hinten re.
*	X005	Anhaengersteckdose S
	F016	Sicherung
	F033	Sicherung
	X001	Steckdose 24V
	B008	Lautsprecher re.
	B007	Lautsprecher li.
	A002	Spannungsreduziergeraet 24V/12V
	W001	Antenne
	F048	Sicherung
	A001	Radio
	X098	Steckdose 12V

99707782035_07
M/0805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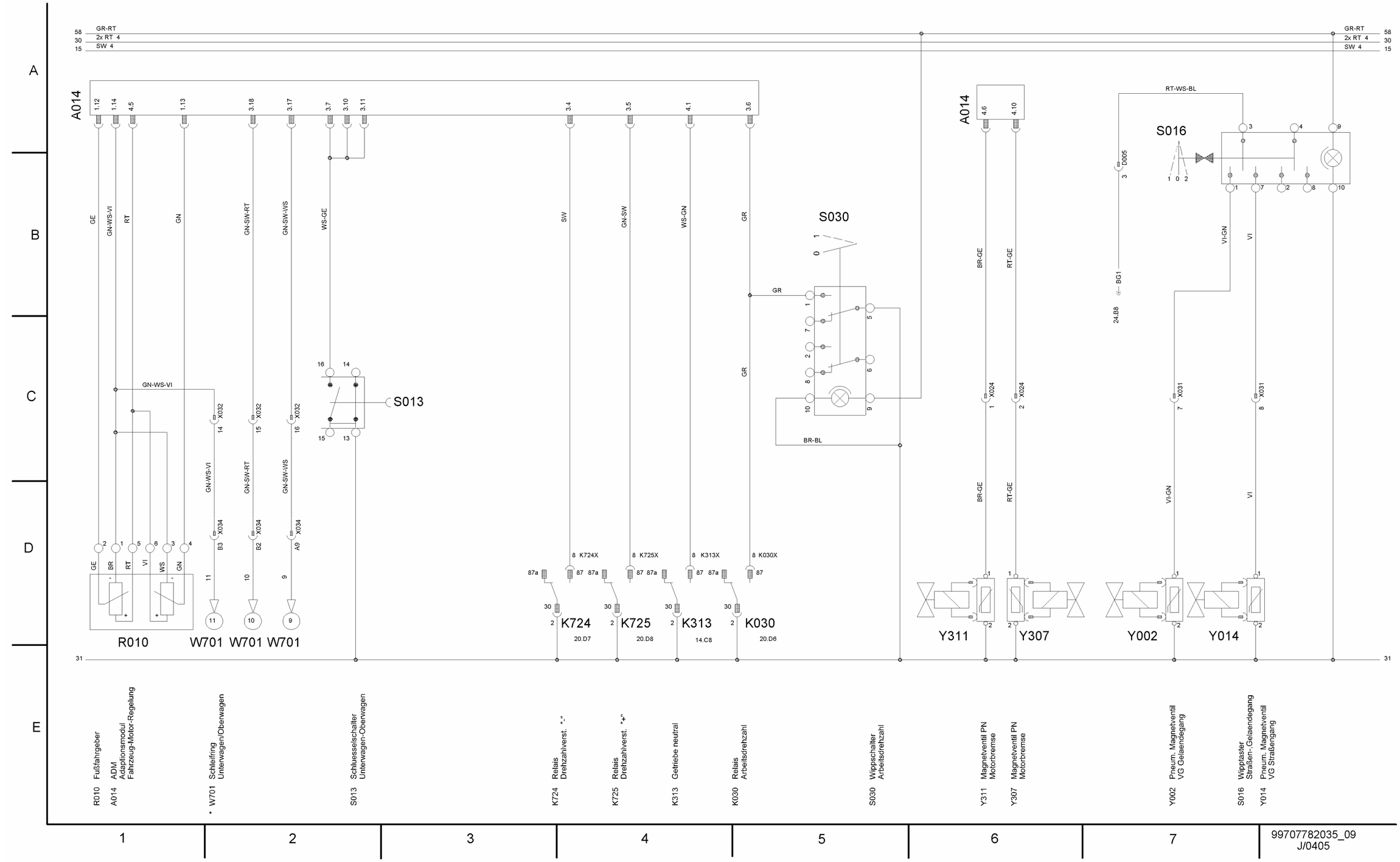
99707782035_08
M/0805
GR-RT
2x RT 4
SW 4
GN 4
7.A7
AA2
AA3
11.A1
SW-RT-WS
BF1
10.A1
F047
5 A
F011
5 A
P005
168000
P004
58
P001
58
GND
P006
A030
B006
H015
H014
H005
B009
K061
20.D5
K061X
V626
V626X
V711
1.B7
V711X
V003
V003X
H034
K521
17.D4
K521X
S043
S044
S052
S053
S042
A014
Y618
Option Betriebsbremse
X060
*)
GR-GE
BR-SW
SW-RT-GN
GR-GN
GR-GN-GE
GN-WS
BL-WS
VI-GN
BL-WS-SW
BL-GR
WS-RT
BL-RT-SW
BL-SW
SW-RT-WS
BL-BR
VI-SW-BL
WS 1.0
B006
A030 Elektr. Fahrtenschreiber MTCO
B006 Induktivgeber Fahrtenschreiber
F047 Sicherung
P006 Fahrtenschreiber
F011 Sicherung
P005 Drehzahlanzeiger m. Betriebsstundenz.
P004 Temperaturanzeige Motor
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
P001 Kraftstofanzeiger
S043 Schalter Feststellbremse
H015 Anzeigeleuchte Feststellbremse
S044 Schalter Feststellbremse
H014 Anzeigeleuchte Betriebsbremse
S052 Schalter Vorrat I.Kreis
S053 Schalter Vorrat II.Kreis
S042 Schalter Vorrat Feststellbremse
*) Stecker nur bei Option "England" gesteckt!
H005 Anzeigeleuchte Steuerung Motor
V711 Diodengruppe Zuendung UW ein
V003 Diodengruppe Summer
K521 Relais Summer
B009 Summer Steuerung Motor/Lenkung
H034 Anzeigeleuchte Zentralwarnung UW
K061 Relais Zentralwarnung UW
V626 Diodengruppe
Y618 Magnetventil druckloser Umlauf


A
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58 GR-RT
30 2x RT 4
15 SW 4
A014
1.12
1.14
4.5
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3.17
3.7
3.10
3.11
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3.5
4.1
3.6
GE
GN-WS-VI
RT
GN
GN-SW-RT
GN-SW-WS
WS-GE
SW
GN-SW
WS-GN
GR
S030
S013
S016
A014
4.6
4.10
BR-GE
RT-GE
RT-WS-BL
D005
BG1
24.B8
VI-GN
VI
X024
X031
X032
X034
GN-WS-VI
GN-SW-RT
GN-SW-WS
BR-BL
K724X
K725X
K313X
K030X
K724
K725
K313
K030
20.D7
20.D8
14.C8
20.D6
R010
W701
Y311
Y307
Y002
Y014
31
R010 Fußfahrgeber
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
* W701 Schleifring Unterwagen/Oberwagen
S013 Schluesselschalter Unterwagen-Oberwagen
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
K313 Getriebe neutral
K030 Relais Arbeitsdrehzahl
S030 Wippschalter Arbeitsdrehzahl
Y311 Magnetventil PN Motorbremse
Y307 Magnetventil PN Motorbremse
Y002 Pneum. Magnetventil VG Geländegang
S016 Wipptaster Straßen-,Geländegang
Y014 Pneum. Magnetventil VG Straßengang
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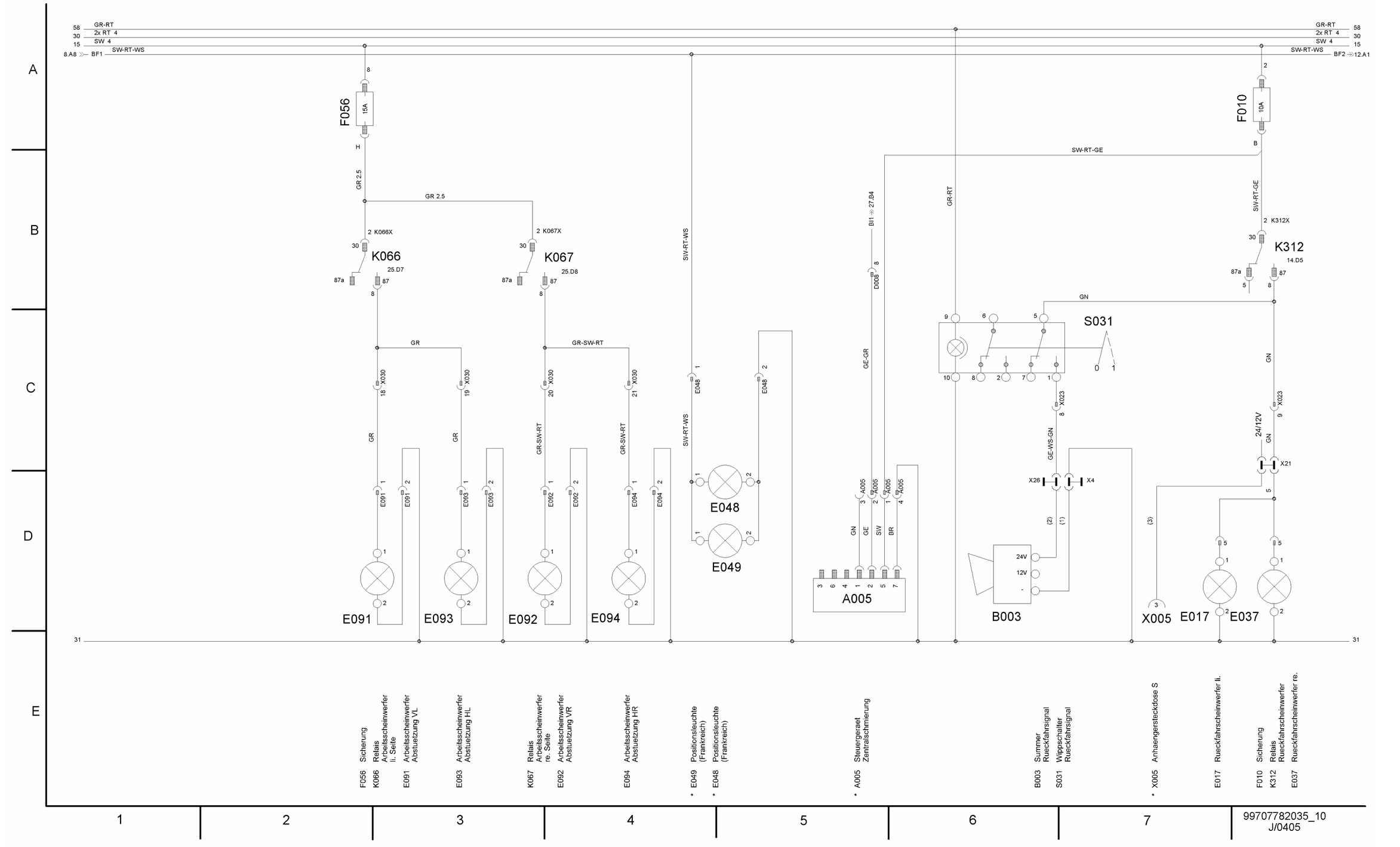
J/0405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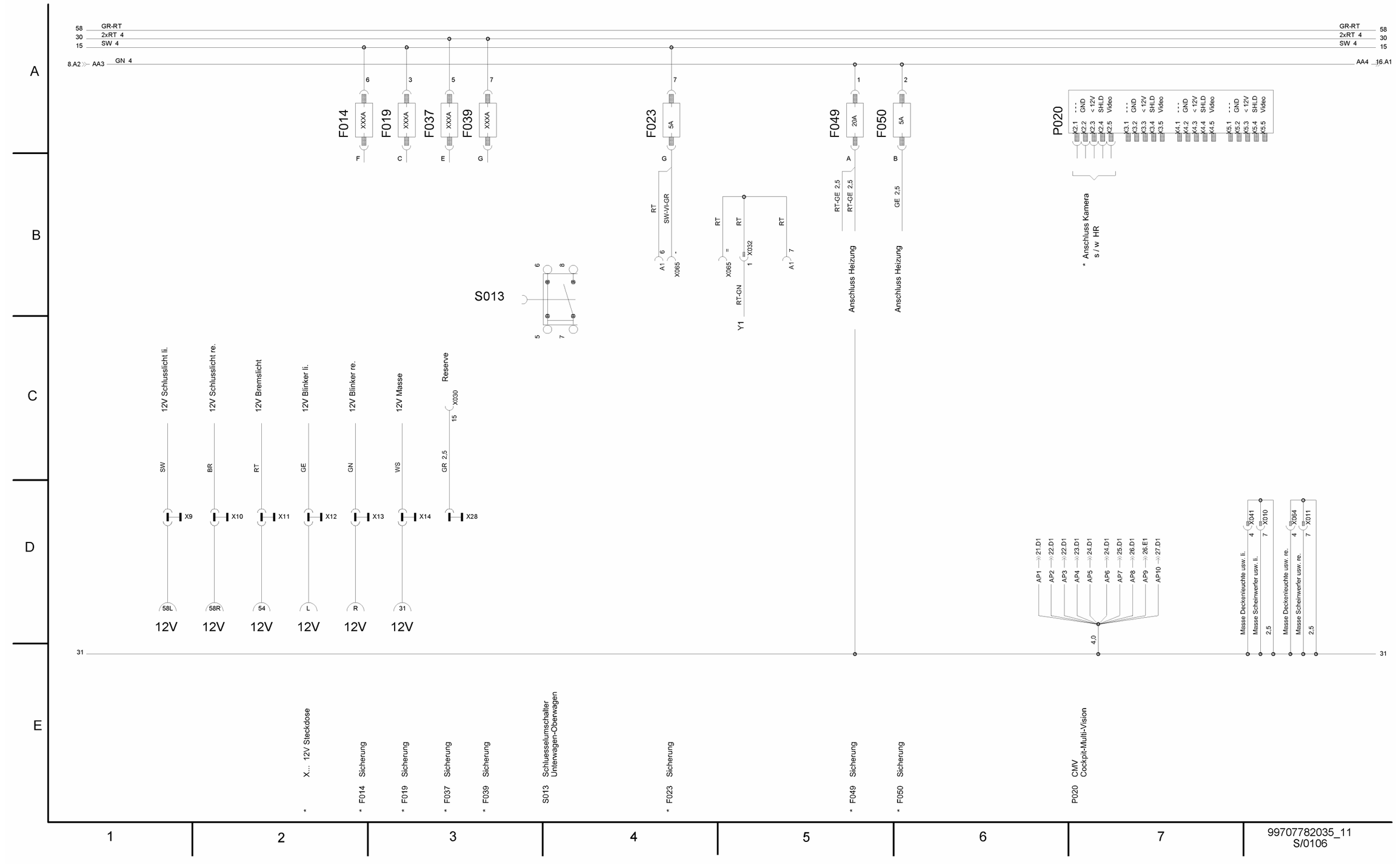
15 SW 4
8.A8 BF1 SW-RT-WS
F056 15A
GR 2.5
K066 25.D7
K067 25.D8
GR
GR-SW-RT
X030
E091
E093
E092
E094
E049
E048
SW-RT-WS
A005
GE-GR
B11 27.B4
D008
S031
GN
GE-WS-GN
X026
X4
B003
24V
12V
X005
E017
E037
F010 10A
SW-RT-GE
K312 14.D5
X023
24/12V
X21
31
A Anhaengersteckdose S
B Rueckfahrscheinwerfer li.
C Sicherung
D Relais Rueckfahrscheinwerfer
E Rueckfahrscheinwerfer re.
F Summer Rueckfahrsignal
G Wippschalter Rueckfahrsignal
H Steuergeraet Zentralschmierung
I Positionsleuchte (Frankreich)
J Positionsleuchte (Frankreich)
K Arbeitsscheinwerfer Abstuetzung HR
L Relais Arbeitsscheinwerfer re. Seite
M Arbeitsscheinwerfer Abstuetzung VR
N Arbeitsscheinwerfer Abstuetzung HL
O Relais Arbeitsscheinwerfer li. Seite
P Arbeitsscheinwerfer Abstuetzung VL
Q Sicherung
1 2 3 4 5 6 7
99707782035_10
J/0405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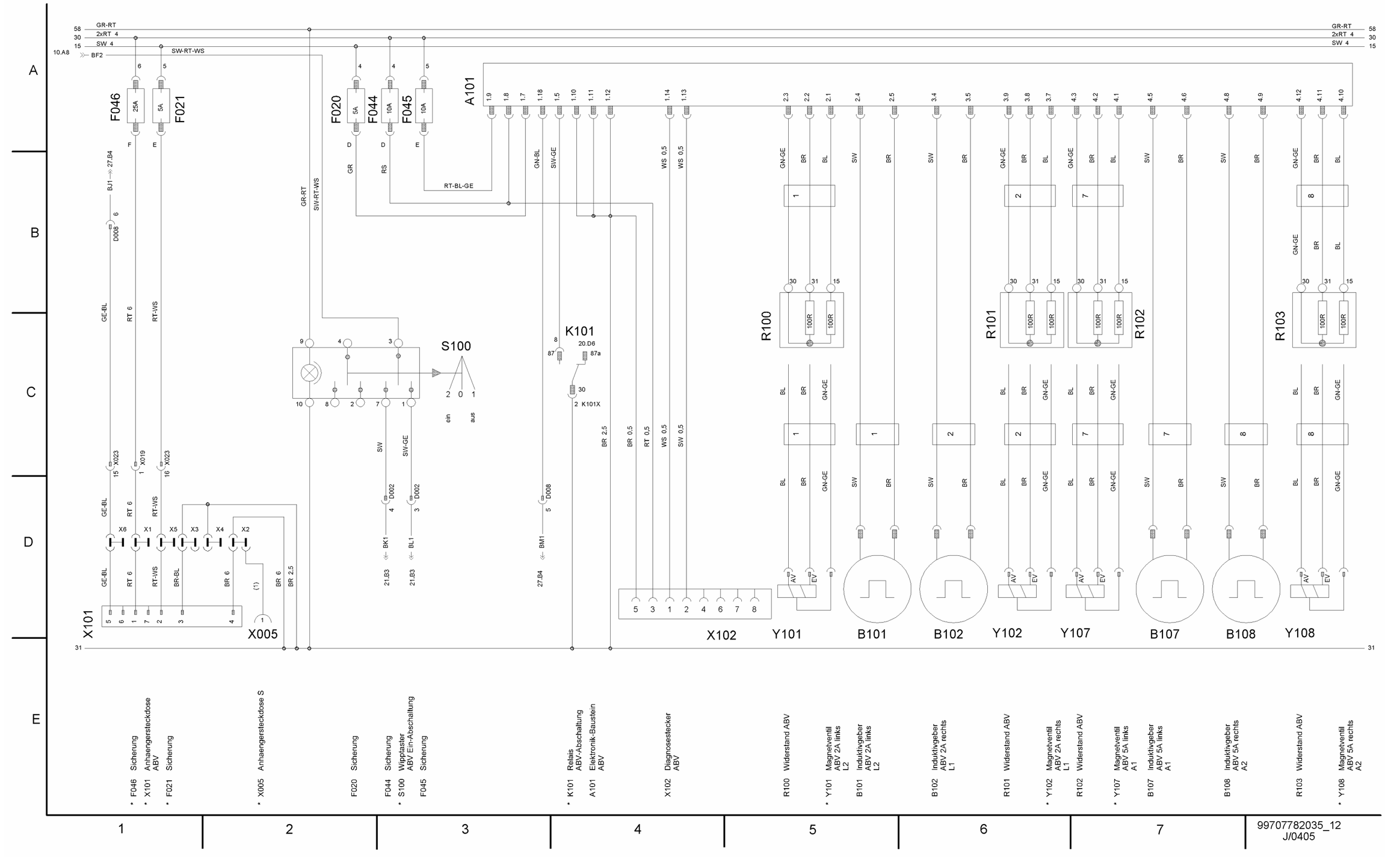
58 GR-RT
30 2xRT 4
15 SW 4
8.A2 AA3 GN 4
AA4 16.A1
F014 XXXA
F019 XXXA
F037 XXXA
F039 XXXA
F023 5A
F049 20A
F050 5A
S013
Y1
RT-GE 2.5
GE 2.5
Anschluss Heizung
P020
* Anschluss Kamera s / w HR
12V Schlusslicht li.
12V Schlusslicht re.
12V Bremslicht
12V Blinker li.
12V Blinker re.
12V Masse
Reserve
SW
BR
RT
GE
GN
WS
GR 2.5
X9
X10
X11
X12
X13
X14
X28
58L
58R
54
L
R
31
12V
21.D1
22.D1
23.D1
24.D1
25.D1
26.D1
26.E1
27.D1
AP1
AP2
AP3
AP4
AP5
AP6
AP7
AP8
AP9
AP10
4.0
Masse Deckenleuchte usw. li.
Masse Scheinwerfer usw. li.
Masse Deckenleuchte usw. re.
Masse Scheinwerfer usw. re.
X041
X010
X064
X011
X... 12V Steckdose
* F014 Sicherung
* F019 Sicherung
* F037 Sicherung
* F039 Sicherung
S013 Schluesselumschalter Unterwagen-Oberwagen
* F023 Sicherung
* F049 Sicherung
* F050 Sicherung
P020 CMV Cockpit-Multi-Vision
99707782035_11
S/0106

1.2 ABV (99707782035)



* F046 Sicherung
* X101 Anhaengersteckdose ABV
* F021 Sicherung

* X005 Anhaengersteckdose S

F020 Sicherung

F044 Sicherung
* S100 Wipptaster ABV Ein-Abschaltung
F045 Sicherung

* K101 Relais ABV-Abschaltung
A101 Elektronik-Baustein ABV

X102 Diagnosestecker ABV

R100 Widerstand ABV

* Y101 Magnetventil ABV 2A links L2
B101 Induktivgeber ABV 2A links L2

B102 Induktivgeber ABV 2A rechts L1

R101 Widerstand ABV

* Y102 Magnetventil ABV 2A rechts L1
R102 Widerstand ABV

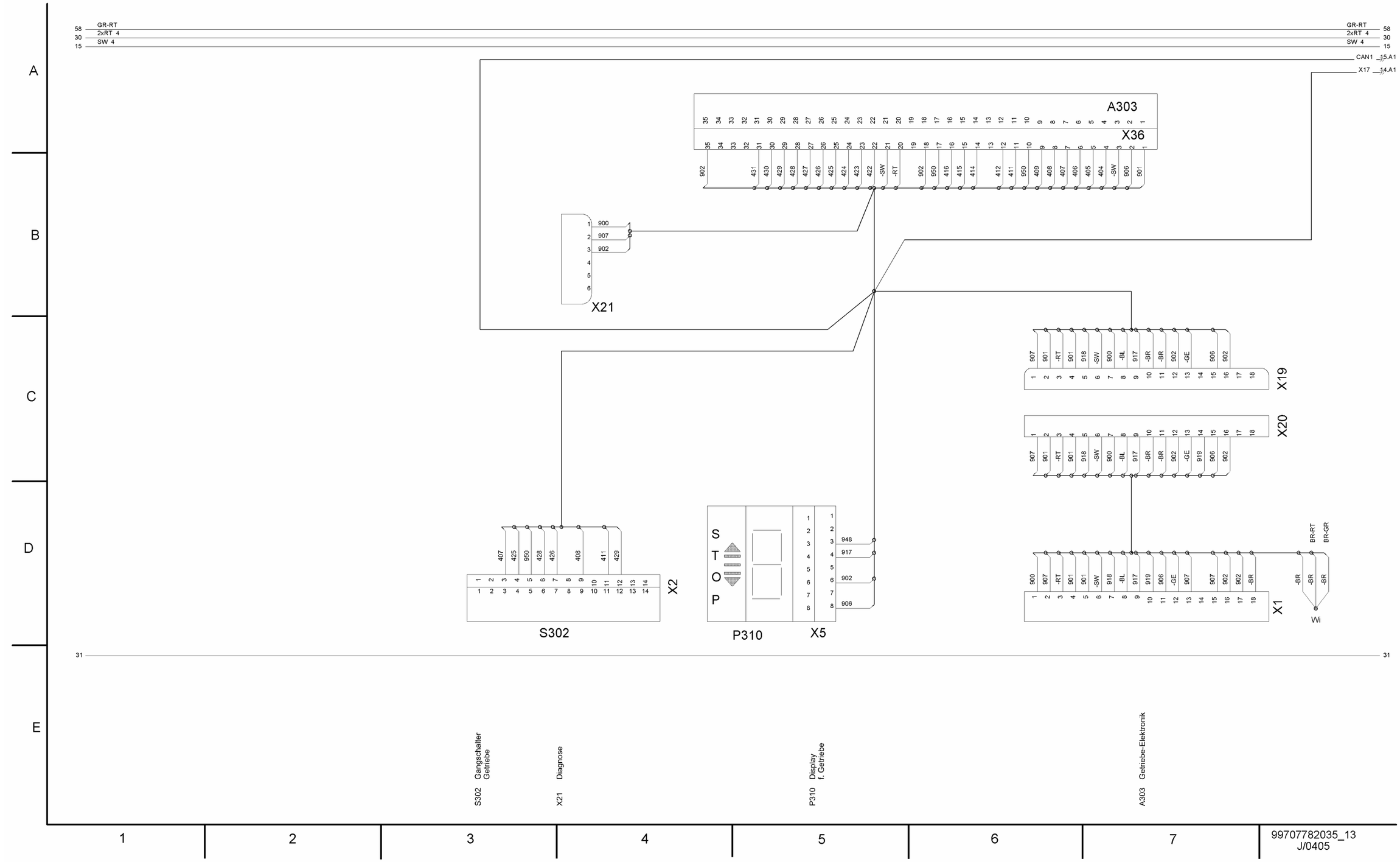
* Y107 Magnetventil ABV 5A links A1
B107 Induktivgeber ABV 5A links A1

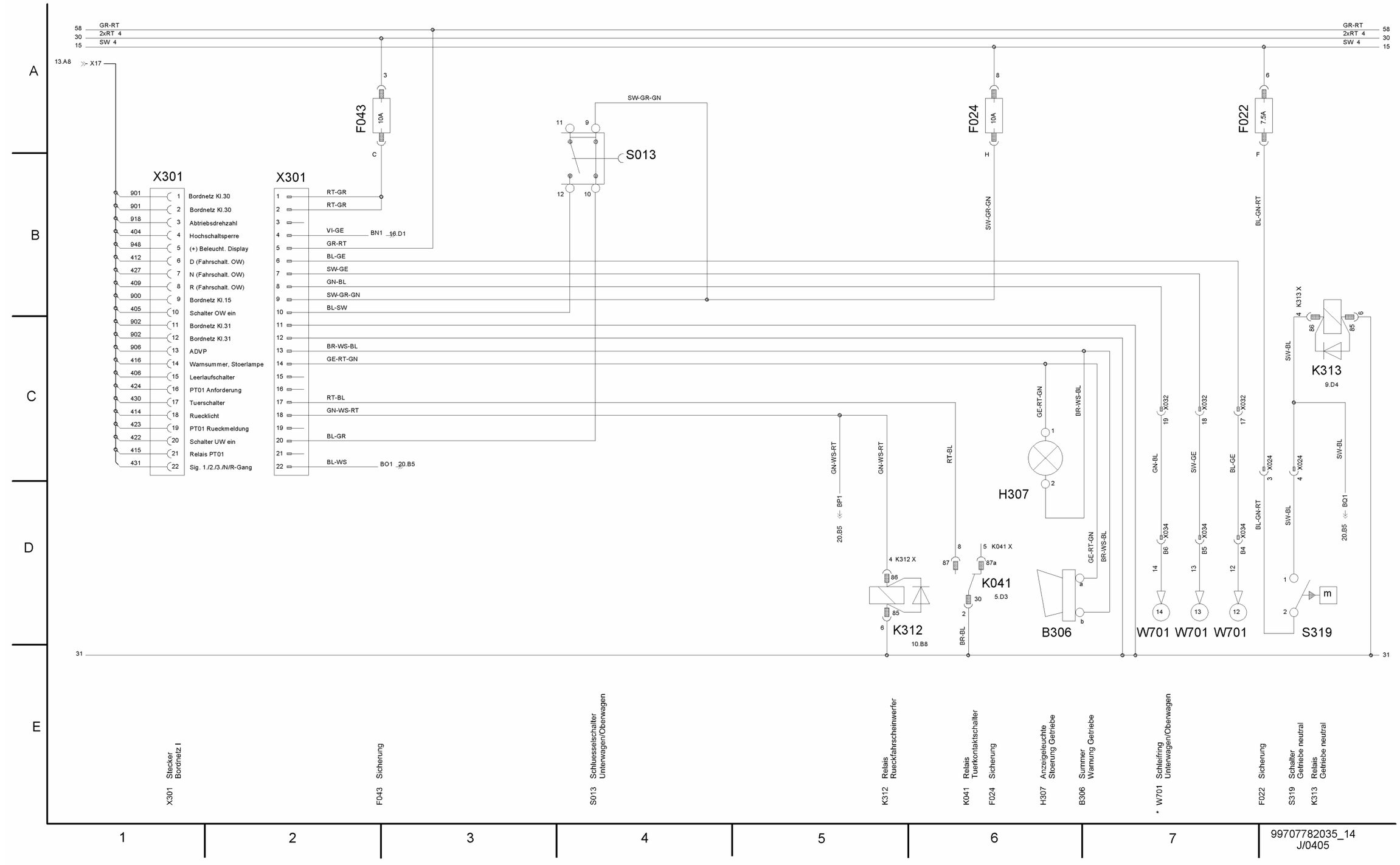
B108 Induktivgeber ABV 5A rechts A2

R103 Widerstand ABV

* Y108 Magnetventil ABV 5A rechts A2

1.3 Gearbox control (99707782035)

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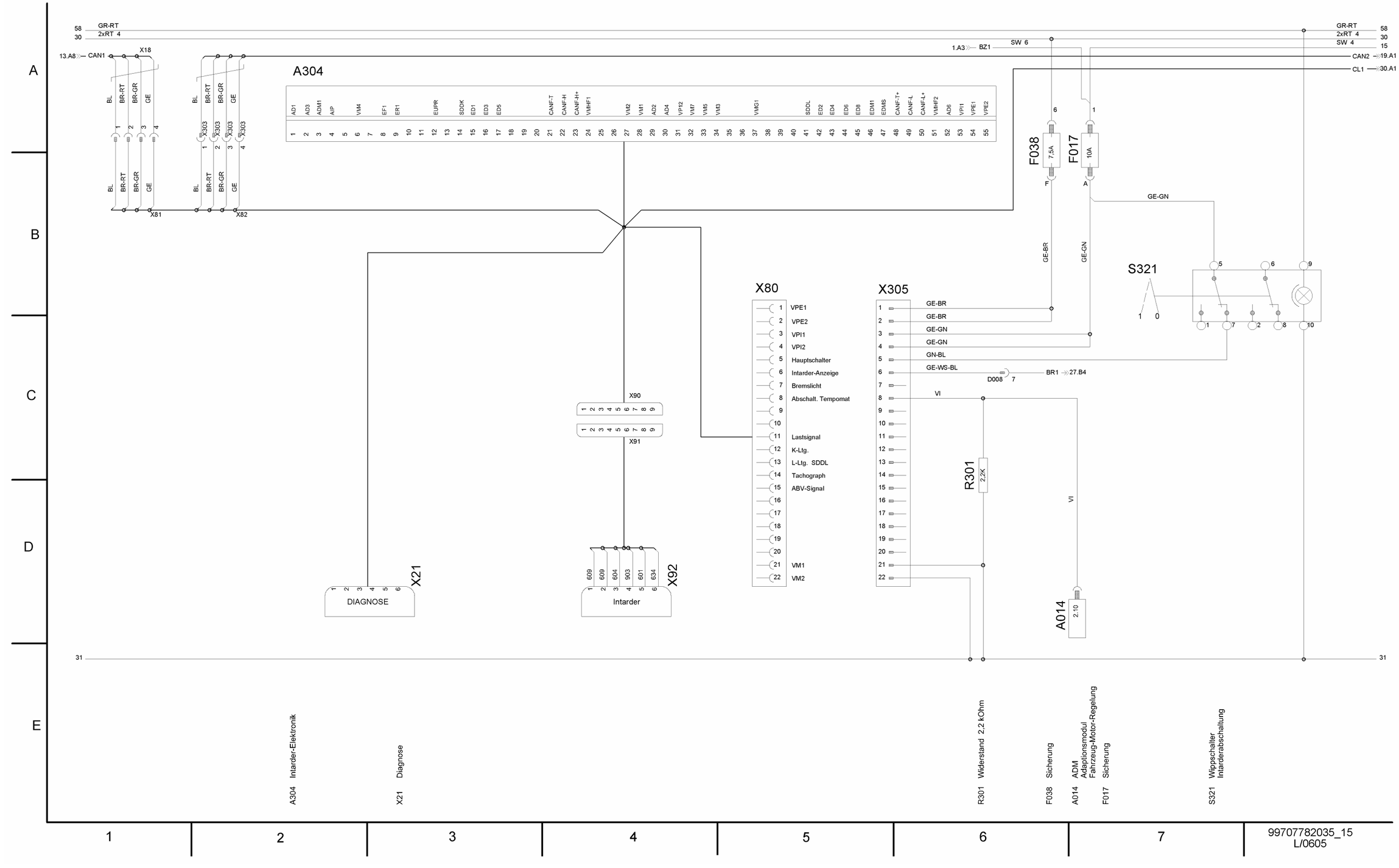
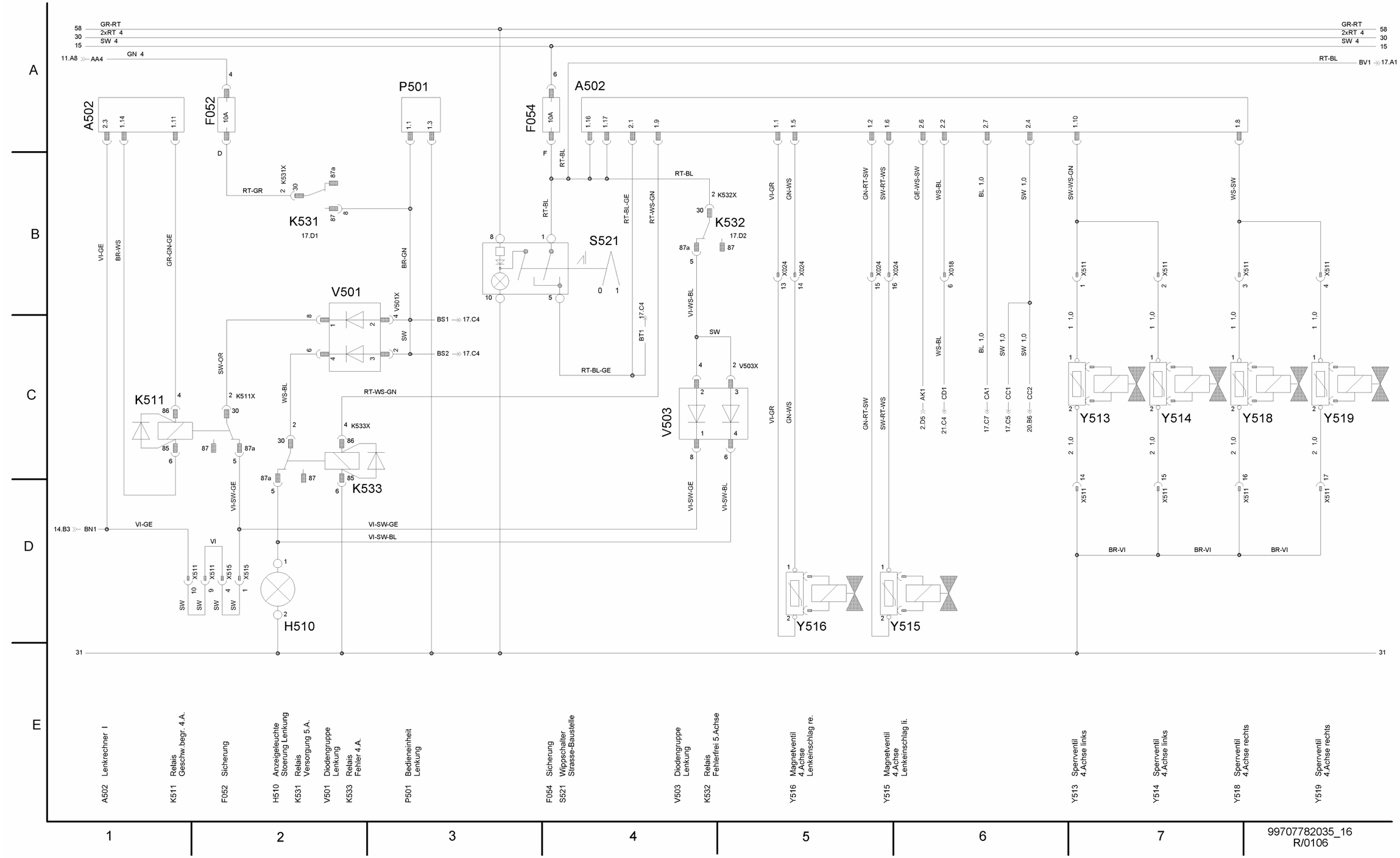
58 GR-RT
30 2xRT 4
15 SW 4
13.A8 X17
F043 10A
F024 10A
F022 7.5A
S013
SW-GR-GN
X301
X301
901 1 Bordnetz Kl.30
901 2 Bordnetz Kl.30
918 3 Abtriebsdrehzahl
404 4 Hochschaltsperre
948 5 (+) Beleucht. Display
412 6 D (Fahrschalt. OW)
427 7 N (Fahrschalt. OW)
409 8 R (Fahrschalt. OW)
900 9 Bordnetz Kl.15
405 10 Schalter OW ein
902 11 Bordnetz Kl.31
902 12 Bordnetz Kl.31
906 13 ADVP
416 14 Warnsummer, Stoerlampe
406 15 Leerlaufschalter
424 16 PT01 Anforderung
430 17 Tuerschalter
414 18 Ruecklicht
423 19 PT01 Rueckmeldung
422 20 Schalter UW ein
415 21 Relais PT01
431 22 Sig. 1./2./3./N/R-Gang
RT-GR
RT-GR
VI-GE BN1 16.D1
GR-RT
BL-GE
SW-GE
GN-BL
SW-GR-GN
BL-SW
BR-WS-BL
GE-RT-GN
RT-BL
GN-WS-RT
BL-GR
BL-WS BO1 20.B5
GN-WS-RT BP1 20.B5
K312 10.B8
K041 5.D3
K313 9.D4
H307
B306
W701 W701 W701
S319
BL-GN-RT
SW-BL
BR-BL
GE-RT-GN
BR-WS-BL
BQ1 20.B5
31
X301 Stecker Bordnetz I
F043 Sicherung
S013 Schluesselschalter Unterwagen/Oberwagen
K312 Relais Rueckfahrscheinwerfer
K041 Relais Tuerkontaktschalter
F024 Sicherung
H307 Anzeigeleuchte Steuerung Getriebe
B306 Summer Warnung Getriebe
* W701 Schleifring Unterwagen/Oberwagen
F022 Sicherung
S319 Schalter Getriebe neutral
K313 Relais Getriebe neutral
99707782035_14
J/0405

1.4 Chassis (99707782035)

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C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
11.A8 AA4
GN 4
A502
F052 10A
P501
F054 10A
A502
RT-BL
BV1 17.A1
K531 17.D1
K532 17.D2
S521
V501
V503
K511
K533
H510
Y516
Y515
Y513
Y514
Y518
Y519
14.B3 BN1
VI-GE
VI-SW-GE
VI-SW-BL
BR-VI
31
A502 Lenkrechner I
K511 Relais Geschw begr. 4.A.
F052 Sicherung
H510 Anzeigeleuchte Stoerung Lenkung
K531 Relais Versorgung 5.A.
V501 Diodengruppe Lenkung
K533 Relais Fehler 4.A.
P501 Bedieneinheit Lenkung
F054 Sicherung
S521 Wippschalter Strasse-Baustelle
V503 Diodengruppe Lenkung
K532 Relais Fehlerfrei 5.Achse
Y516 Magnetventil 4.Achse Lenkeinschlag re.
Y515 Magnetventil 4.Achse Lenkeinschlag li.
Y513 Sperrventil 4.Achse links
Y514 Sperrventil 4.Achse links
Y518 Sperrventil 4.Achse rechts
Y519 Sperrventil 4.Achse rechts
1
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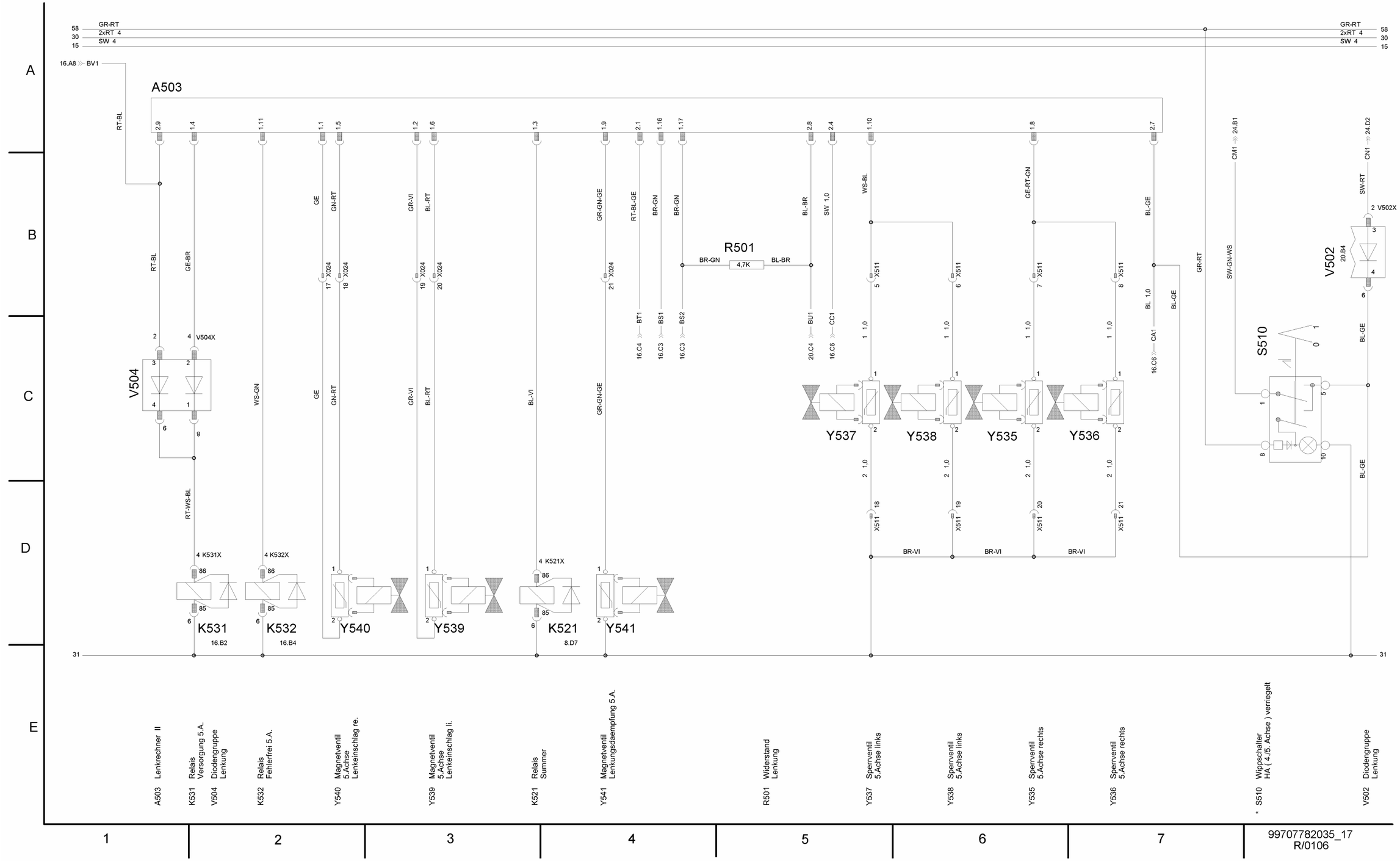
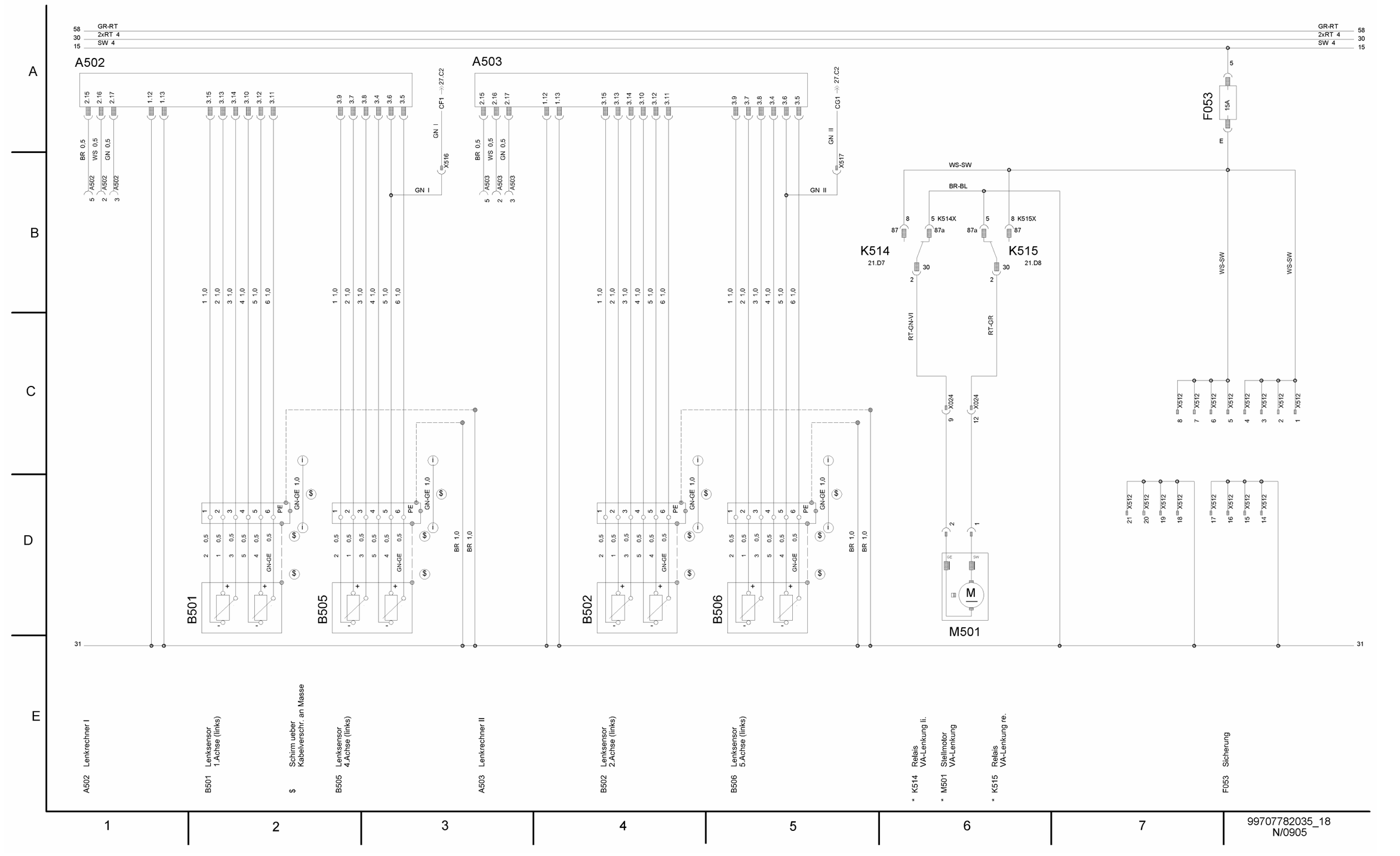
4
5
6
7
99707782035_16
R/0106



A503	Lenkrechner II	
K531	Relais Versorgung 5.A.	
V504	Diodengruppe Lenkung	
K532	Relais Fehlerfrei 5.A.	
Y540	Magnetventil 5.Achse Lenkeinschlag re.	
Y539	Magnetventil 5.Achse Lenkeinschlag li.	
K521	Relais Summer	
Y541	Magnetventil Lenkungsdaempfung 5.A.	
R501	Widerstand Lenkung	
Y537	Sperrventil 5.Achse links	
Y538	Sperrventil 5.Achse links	
Y535	Sperrventil 5.Achse rechts	
Y536	Sperrventil 5.Achse rechts	
* S510	Wippschalter HA (4./5. Achse) verriegelt	
V502	Diodengruppe Lenkung	

99707782035_17
R/0106



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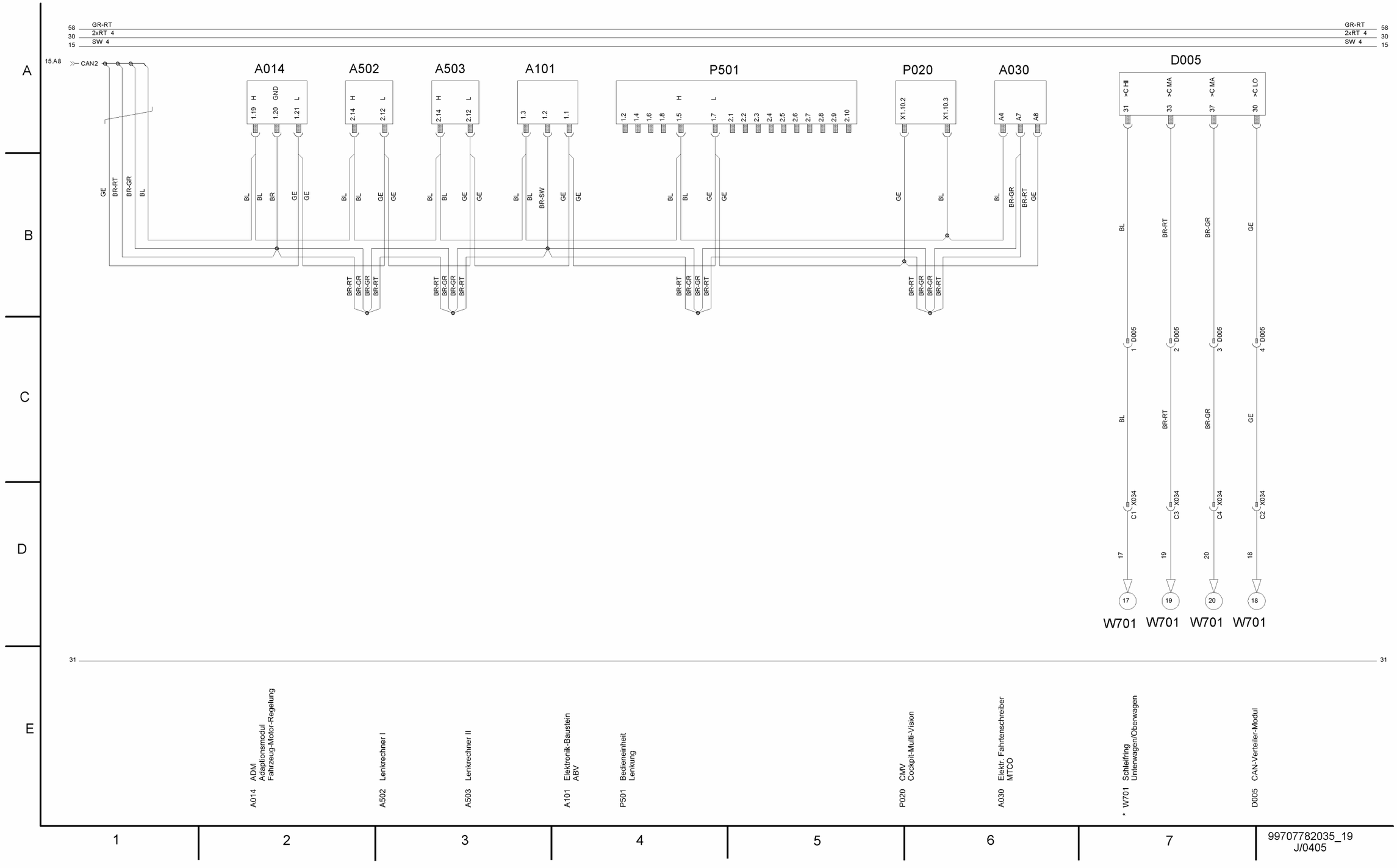
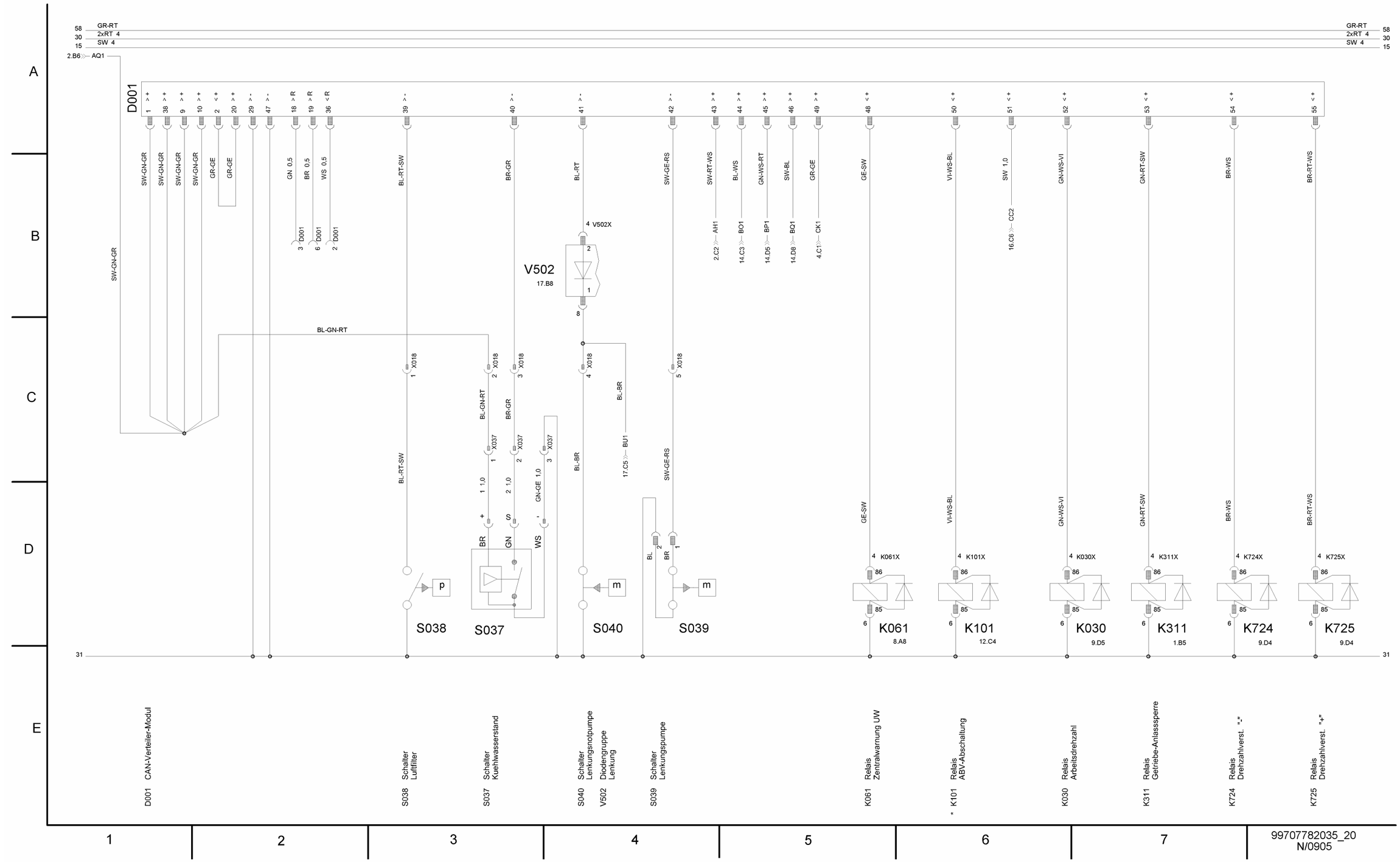
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
15.A8 CAN2
A014
1.19 H
1.20 GND
1.21 L
A502
2.14 H
2.12 L
A503
2.14 H
2.12 L
A101
1.3
1.2
1.1
P501
1.2 1.4 1.6 1.8 1.5 H 1.7 L 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10
P020
X1.10.2
X1.10.3
A030
A4 A7 A8
GE BR-RT BR-GR BL
BL BL BR GE GE
BL BL GE GE
BL BL GE GE
BL BL BR-SW GE GE
BL BL GE GE
GE BL
BL BR-GR BR-RT GE
BR-RT BR-GR BR-GR BR-RT
D005
31 >C HI
33 >C MA
37 >C MA
30 >C LO
BL BR-RT BR-GR GE
1 D005
2 D005
3 D005
4 D005
C1 X034
C3 X034
C4 X034
C2 X034
17 19 20 18
W701 W701 W701 W701
31
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
A502 Lenkrechner I
A503 Lenkrechner II
A101 Elektronik-Baustein ABV
P501 Bedieneinheit Lenkung
P020 CMV Cockpit-Multi-Vision
A030 Elektr. Fahrtenschreiber MTCO
* W701 Schleifring Unterwagen/Oberwagen
D005 CAN-Verteiler-Modul
1 2 3 4 5 6 7
99707782035_19
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
2.B6 AQ1
D001
SW-GN-GR
GR-GE
GN 0,5
BR 0,5
WS 0,5
BL-RT-SW
BR-GR
BL-RT
SW-GE-RS
SW-RT-WS
BL-WS
GN-WS-RT
SW-BL
GR-GE
GE-SW
VI-WS-BL
SW 1,0
GN-WS-VI
GN-RT-SW
BR-WS
BR-RT-WS
V502
17.B8
BL-GN-RT
BL-BR
GN-GE 1,0
S038
S037
S040
S039
K061
8.A8
K101
12.C4
K030
9.D5
K311
1.B5
K724
9.D4
K725
9.D4
31
D001 CAN-Verteiler-Modul
S038 Schalter Luftfilter
S037 Schalter Kuehlwasserstand
S040 Schalter Lenkungsnotpumpe
V502 Diodengruppe Lenkung
S039 Schalter Lenkungspumpe
K061 Relais Zentralwarnung UW
K101 Relais ABV-Abschaltung
K030 Relais Arbeitsdrehzahl
K311 Relais Getriebe-Anlasssperre
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
1
2
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4
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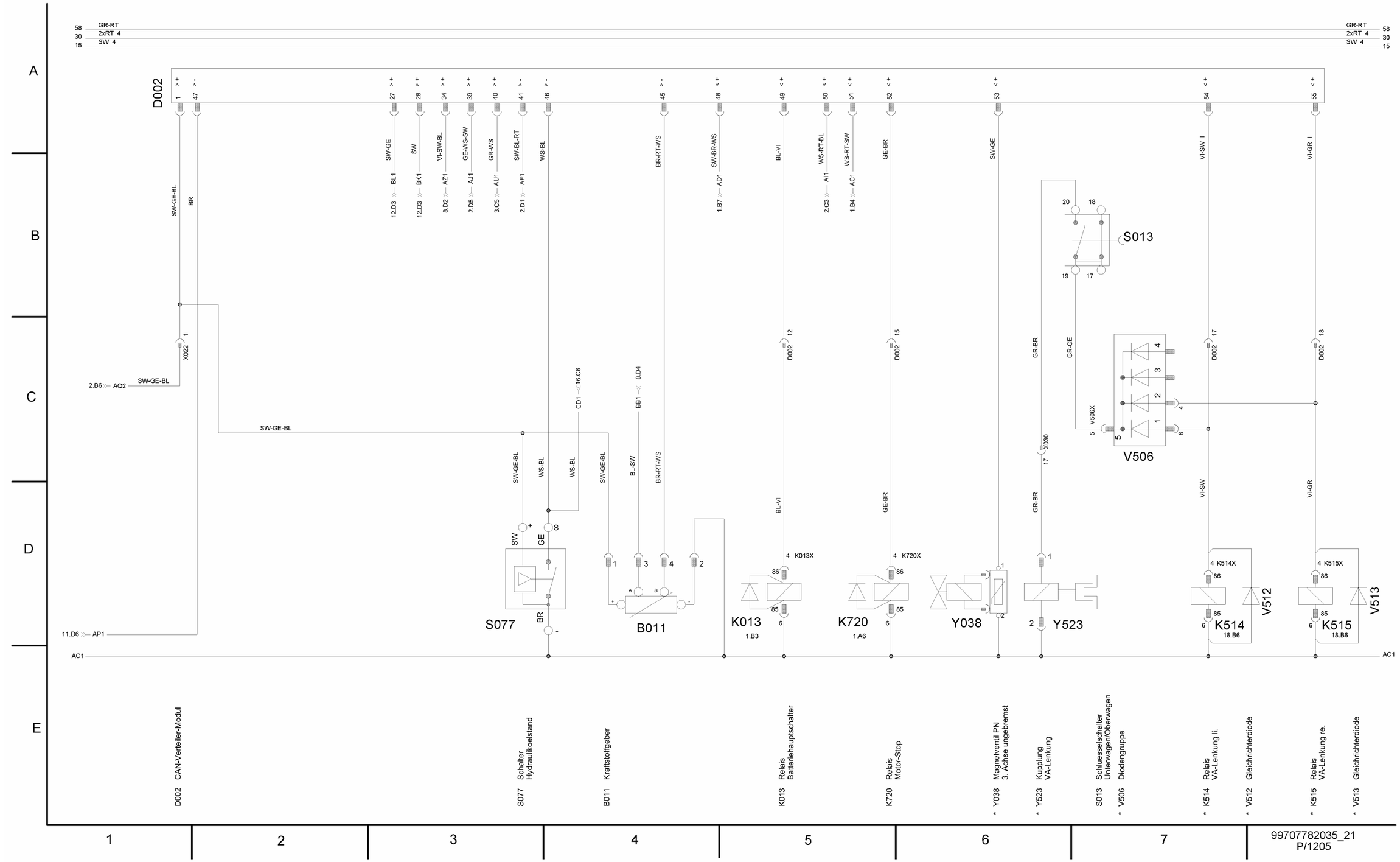
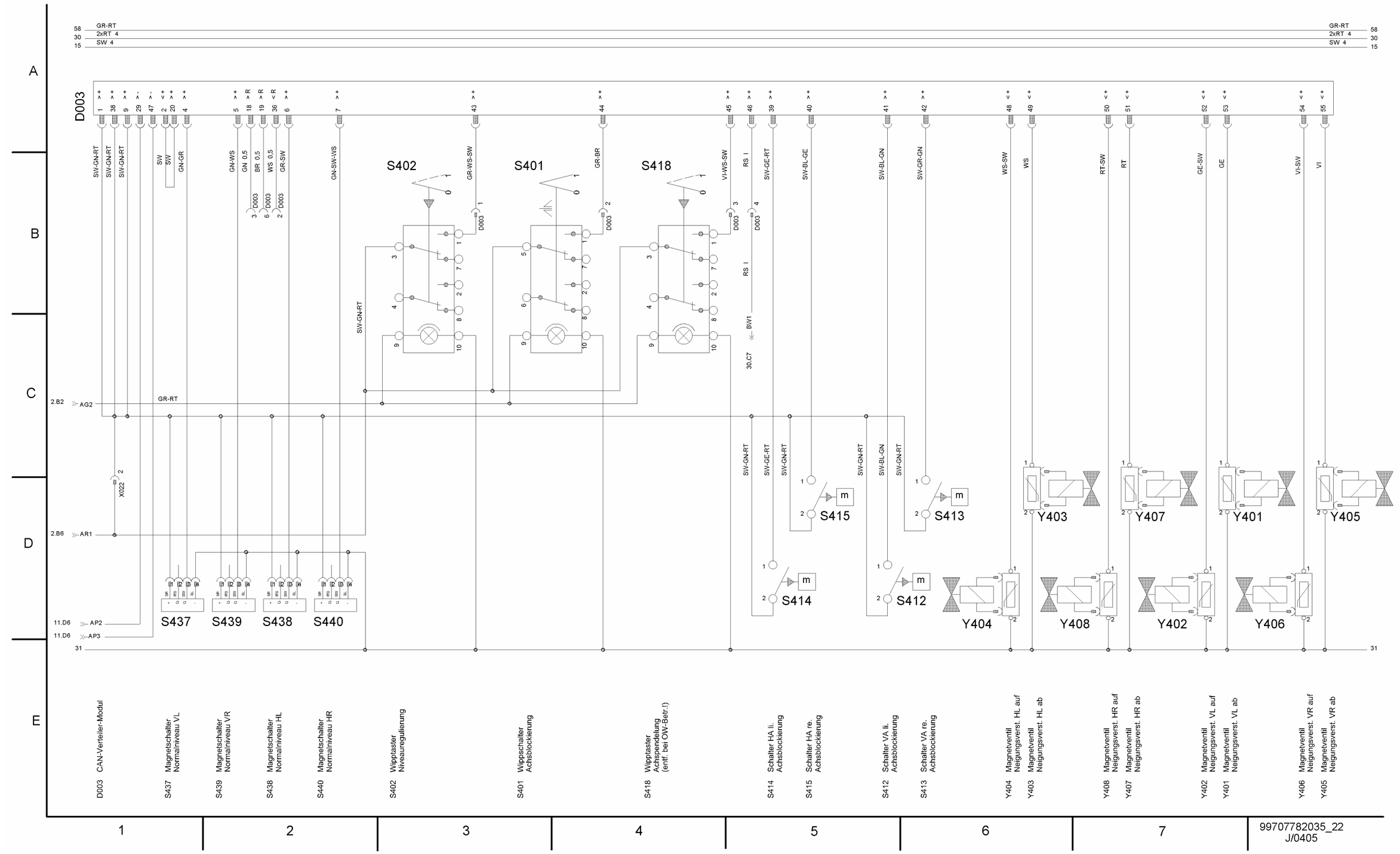
6
7
99707782035_20
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
D002
SW-GE-BL
BR
SW-GE
SW
VI-SW-BL
GE-WS-SW
GR-WS
SW-BL-RT
WS-BL
BR-RT-WS
SW-BR-WS
BL-VI
WS-RT-BL
WS-RT-SW
GE-BR
SW-GE
GR-BR
GR-GE
VI-SW I
VI-GR I
X022
2.B6 AQ2
SW-GE-BL
S013
V506X
V506
X030
CD1 16.C6
BB1 8.D4
S077
B011
K013
1.B3
K720
1.A6
Y038
Y523
K514
18.B6
K515
18.B6
V512
V513
11.D6 AP1
AC1
D002 CAN-Verteiler-Modul
S077 Schalter Hydraulikoelstand
B011 Kraftstoffgeber
K013 Relais Batteriehauptschalter
K720 Relais Motor-Stop
Y038 Magnetventil PN 3. Achse ungebremst
Y523 Kupplung VA-Lenkung
S013 Schluesselschalter Unterwagen/Oberwagen
V506 Diodengruppe
K514 Relais VA-Lenkung li.
V512 Gleichrichterdiode
K515 Relais VA-Lenkung re.
V513 Gleichrichterdiode
99707782035_21
P/1205


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D003
S402
S401
S418
S437
S439
S438
S440
S415
S413
S414
S412
Y403
Y407
Y401
Y405
Y404
Y408
Y402
Y406
2.B2 AG2
2.B6 AR1
11.D6 AP2
11.D6 AP3
31
X022
GR-RT
SW-GN-RT
SW-GE-RT
SW-BL-GN
D003 CAN-Verteiler-Modul
S437 Magnetschalter Normalniveau VL
S439 Magnetschalter Normalniveau VR
S438 Magnetschalter Normalniveau HL
S440 Magnetschalter Normalniveau HR
S402 Wipptaster Niveauregulierung
S401 Wippschalter Achsblockierung
S418 Wipptaster Achspendelung (entf. bei OW-Betr.!)
S414 Schalter HA li. Achsblockierung
S415 Schalter HA re. Achsblockierung
S412 Schalter VA li. Achsblockierung
S413 Schalter VA re. Achsblockierung
Y404 Magnetventil Neigungsverst. HL auf
Y403 Magnetventil Neigungsverst. HL ab
Y408 Magnetventil Neigungsverst. HR auf
Y407 Magnetventil Neigungsverst. HR ab
Y402 Magnetventil Neigungsverst. VL auf
Y401 Magnetventil Neigungsverst. VL ab
Y406 Magnetventil Neigungsverst. VR auf
Y405 Magnetventil Neigungsverst. VR ab
1
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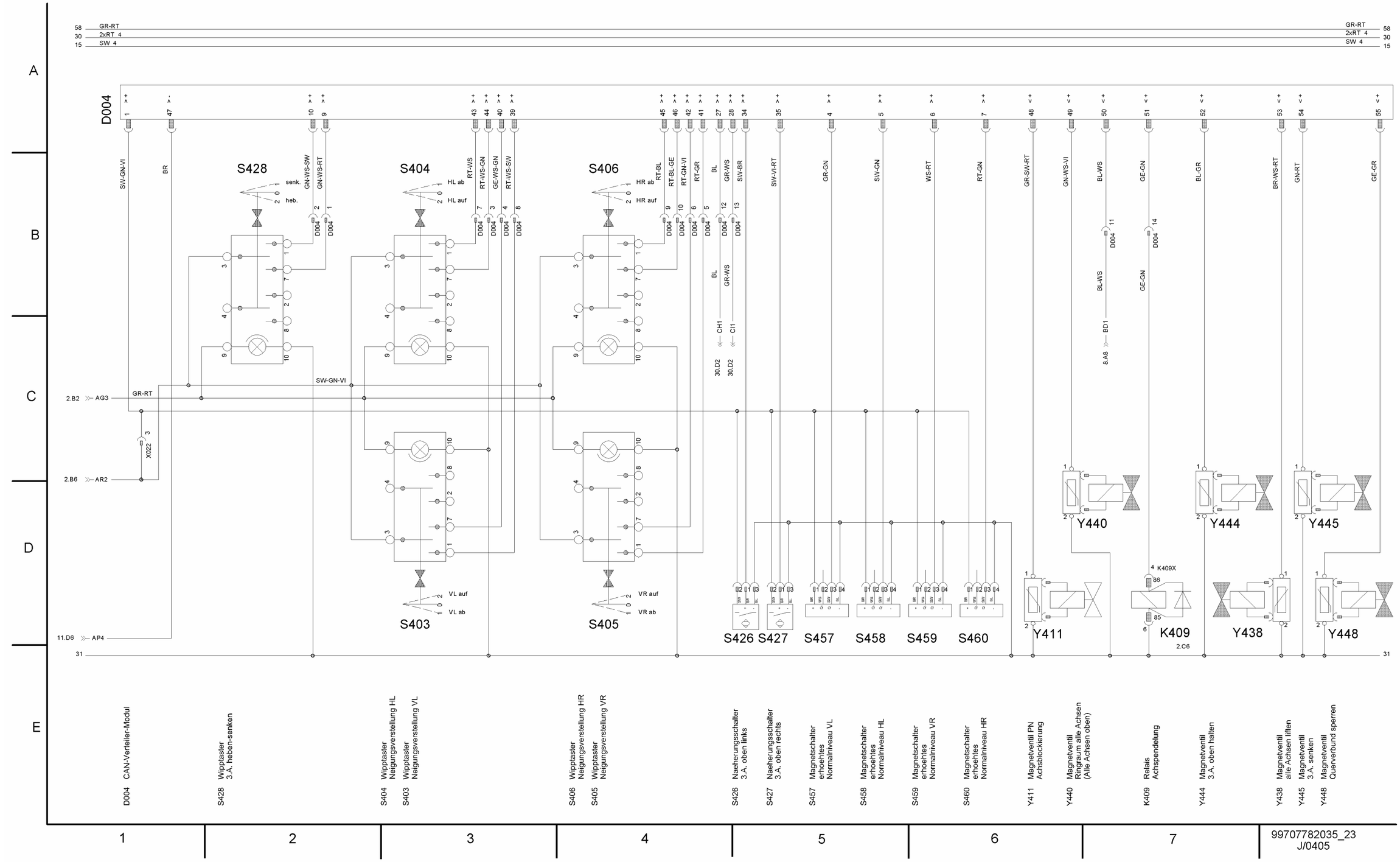
99707782035_22
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
D004
S428
S404
S406
S426 S427
S457
S458
S459
S460
S403
S405
Y411
Y440
Y444
Y445
Y438
Y448
K409
K409X
2.B2 AG3
2.B6 AR2
11.D6 AP4
2.C6
31
SW-GN-VI
GR-RT
BR
X022
VL auf
VL ab
VR auf
VR ab
senk.
heb.
HL ab
HL auf
HR ab
HR auf
D004 CAN-Verteiler-Modul
S428 Wipptaster 3.A. heben-senken
S404 Wipptaster Neigungsverstellung HL
S403 Wipptaster Neigungsverstellung VL
S406 Wipptaster Neigungsverstellung HR
S405 Wipptaster Neigungsverstellung VR
S426 Naeherungsschalter 3.A. oben links
S427 Naeherungsschalter 3.A. oben rechts
S457 Magnetschalter erhoehtes Normalniveau VL
S458 Magnetschalter erhoehtes Normalniveau HL
S459 Magnetschalter erhoehtes Normalniveau VR
S460 Magnetschalter erhoehtes Normalniveau HR
Y411 Magnetventil PN Achsblockierung
Y440 Magnetventil Ringraum alle Achsen (Alle Achsen oben)
K409 Relais Achsspendelung
Y444 Magnetventil 3.A. oben halten
Y438 Magnetventil alle Achsen liften
Y445 Magnetventil 3.A. senken
Y448 Magnetventil Querverbund sperren
1
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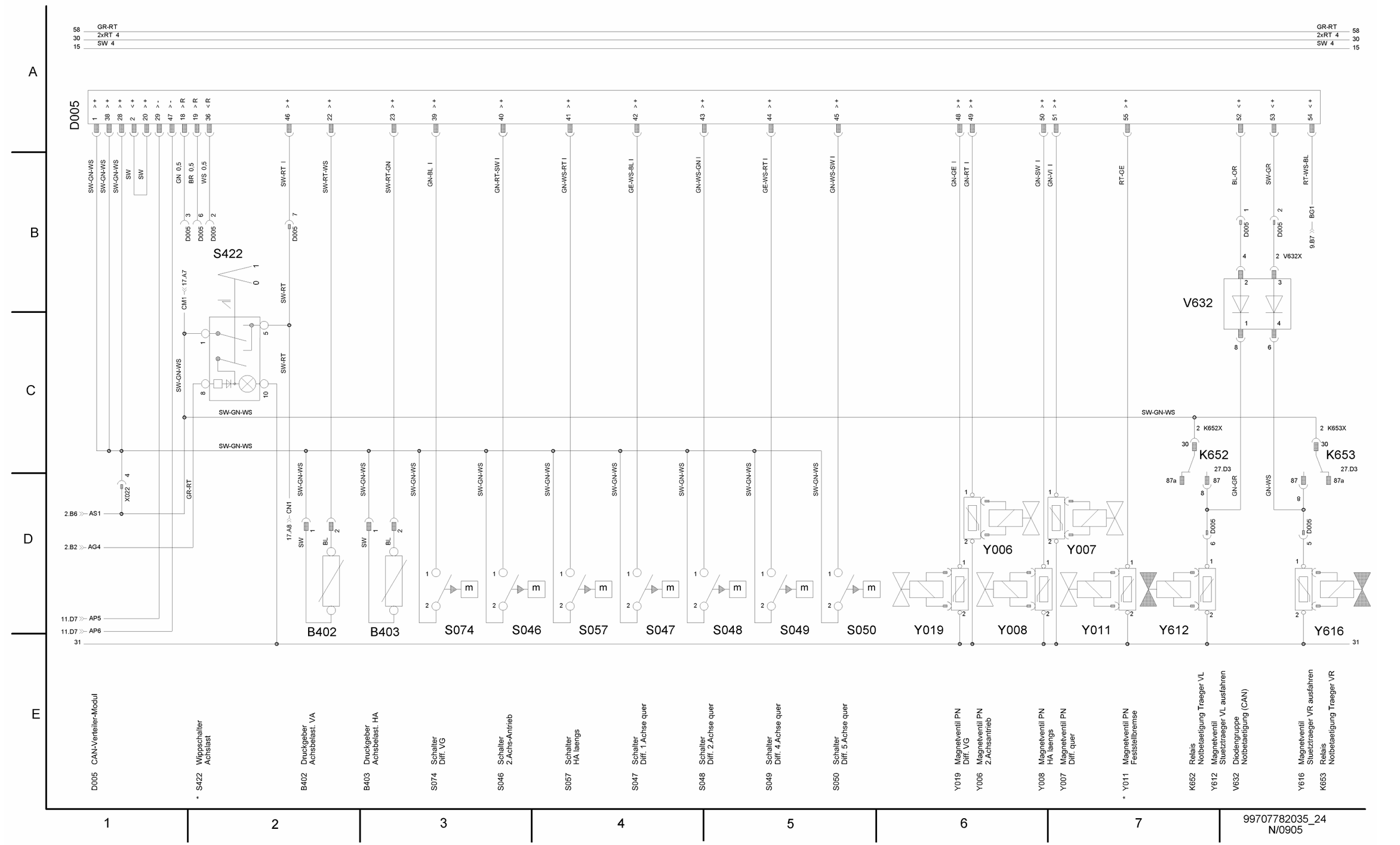
99707782035_23
J/0405


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D005
SW-GN-WS
SW-GN-WS
SW-GN-WS
SW
SW
GN 0,5
BR 0,5
WS 0,5
SW-RT I
SW-RT-WS
SW-RT-GN
GN-BL I
GN-RT-SW I
GN-WS-RT I
GE-WS-BL I
GN-WS-GN I
GE-WS-RT I
GN-WS-SW I
GN-GE I
GN-RT I
GN-SW I
GN-VI I
RT-GE
BL-OR
SW-GR
RT-WS-BL
S422
CM1 17.A7
SW-RT
SW-GN-WS
SW-GN-WS
SW-GN-WS
X022
GR-RT
2.B6 AS1
2.B2 AG4
11.D7 AP5
11.D7 AP6
31
17.A8 CN1
B402
B403
S074
S046
S057
S047
S048
S049
S050
V632
V632X
Y006
Y007
Y019
Y008
Y011
Y612
Y616
K652X
K652
K653X
K653
GN-WS
GN-GR
BG1
D005 CAN-Verteiler-Modul
S422 Wippschalter Achslast
B402 Druckgeber Achsbelast. VA
B403 Druckgeber Achsbelast. HA
S074 Schalter Diff. VG
S046 Schalter 2.Achs-Antrieb
S057 Schalter HA laengs
S047 Schalter Diff. 1.Achse quer
S048 Schalter Diff. 2.Achse quer
S049 Schalter Diff. 4.Achse quer
S050 Schalter Diff. 5.Achse quer
Y019 Magnetventil PN Diff. VG
Y006 Magnetventil PN 2.Achsantrieb
Y008 Magnetventil PN HA laengs
Y007 Magnetventil PN Diff. quer
Y011 Magnetventil PN Feststellbremse
K652 Relais Notbetaetigung Traeger VL
Y612 Magnetventil Stuetztraeger VL ausfahren
V632 Diodengruppe Notbetaetigung (CAN)
Y616 Magnetventil Stuetztraeger VR ausfahren
K653 Relais Notbetaetigung Traeger VR
1
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6
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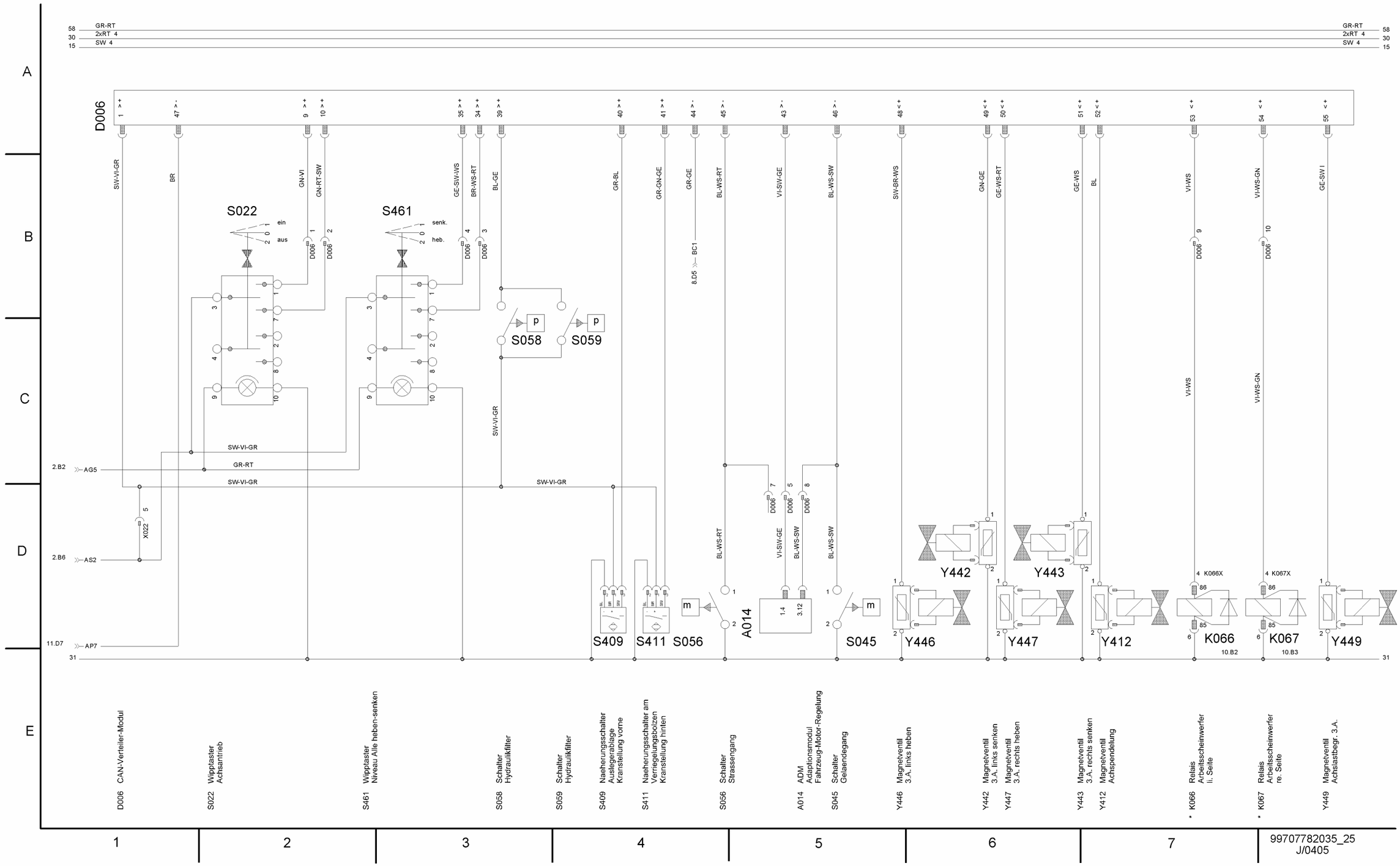
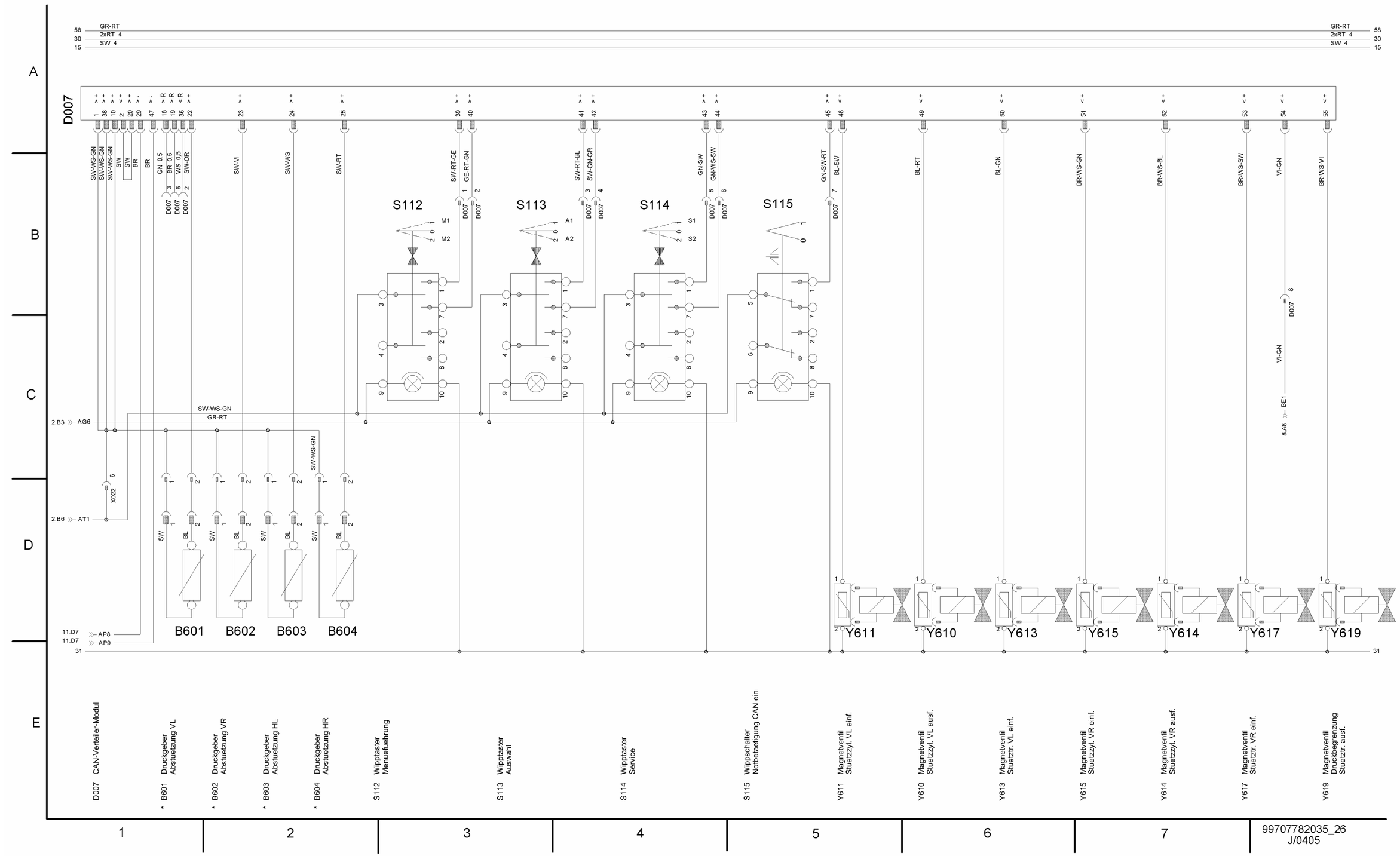
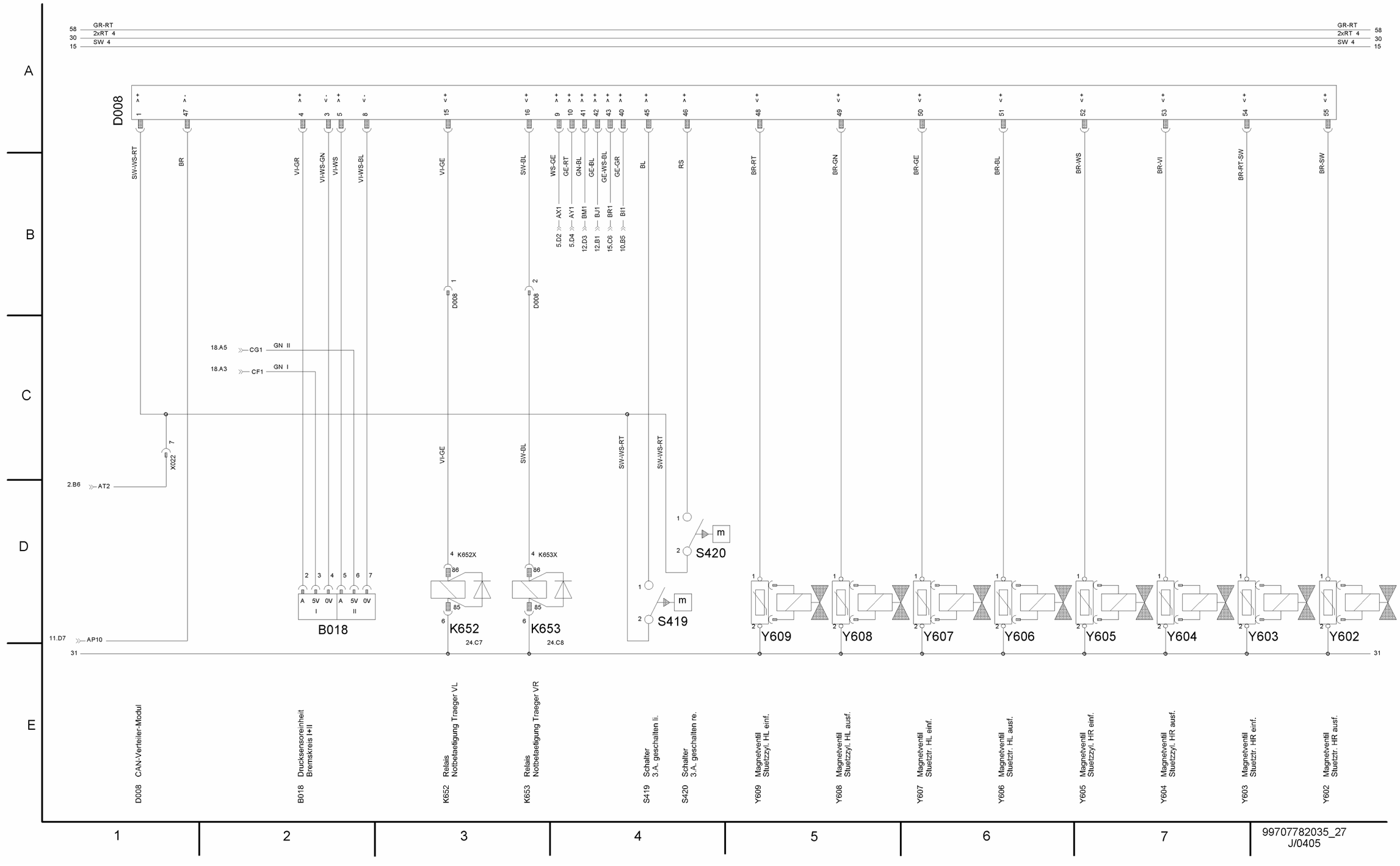
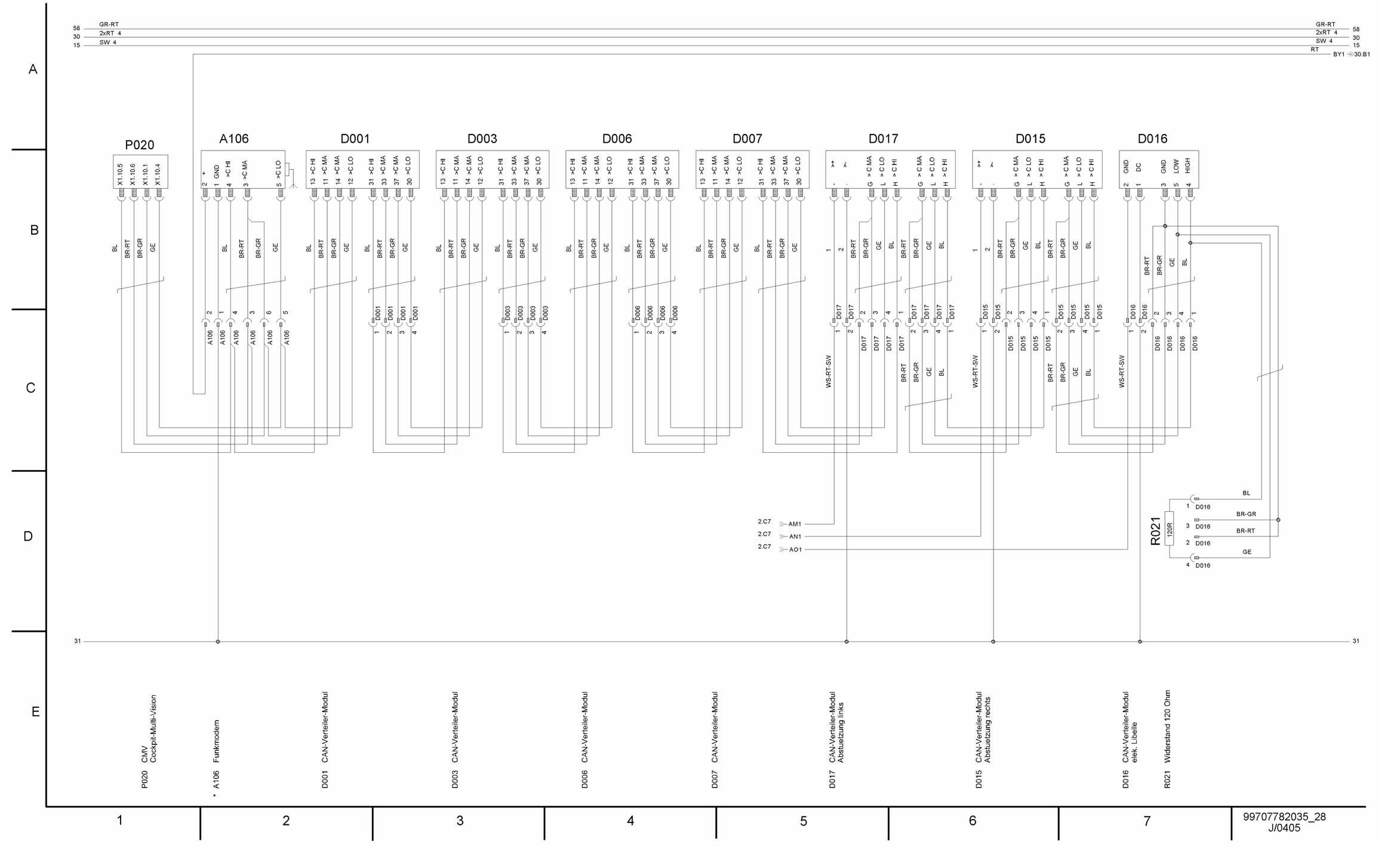
99707782035_24
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
D006
S022 ein aus
S461 senk. heb.
S058
S059
S409
S411
S056
A014
S045
Y442
Y443
Y446
Y447
Y412
K066
K067
Y449
SW-VI-GR
GR-RT
2.B2 AG5
2.B6 AS2
11.D7 AP7
31
X022
10.B2
10.B3
D006 CAN-Verteiler-Modul
S022 Wipptaster Achsantrieb
S461 Wipptaster Niveau Alle heben-senken
S058 Schalter Hydraulikfilter
S059 Schalter Hydraulikfilter
S409 Naeherungsschalter Auslegerablage Kranstellung vorne
S411 Naeherungsschalter am Verriegelungsbolzen Kranstellung hinten
S056 Schalter Strassengang
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
S045 Schalter Gelaendegang
Y446 Magnetventil 3.A. links heben
Y442 Magnetventil 3.A. links senken
Y447 Magnetventil 3.A. rechts heben
Y443 Magnetventil 3.A. rechts senken
Y412 Magnetventil Achspendelung
K066 Relais Arbeitsscheinwerfer li. Seite
K067 Relais Arbeitsscheinwerfer re. Seite
Y449 Magnetventil Achslastbegr. 3.A.
99707782035_25
J/0405

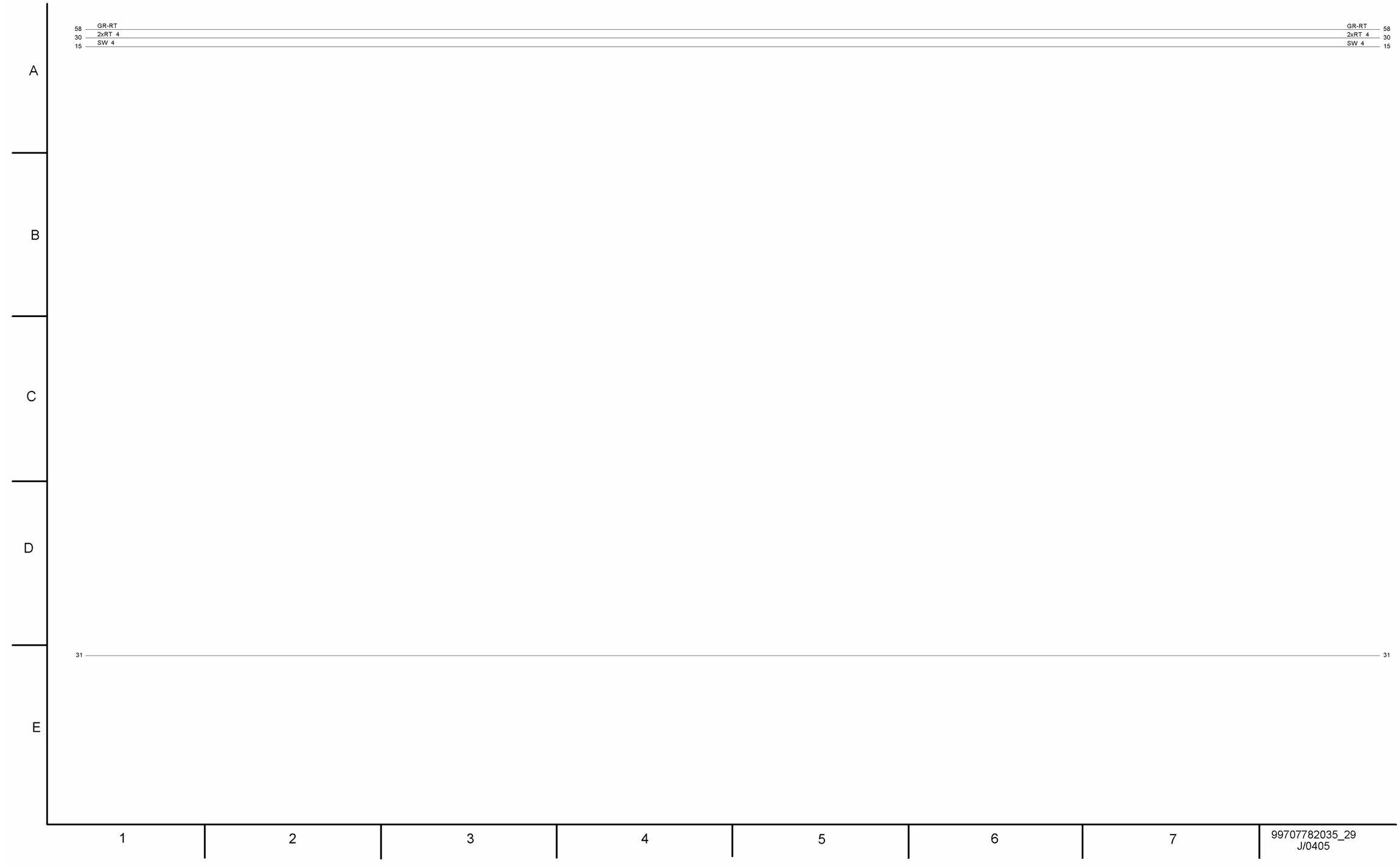

58 GR-RT
30 2xRT 4
15 SW 4
D007
S112
S113
S114
S115
SW-WS-GN
GR-RT
2.B3 AG6
2.B6 AT1
X022
11.D7 AP8
11.D7 AP9
31
B601
B602
B603
B604
Y611
Y610
Y613
Y615
Y614
Y617
Y619
D007 CAN-Verteiler-Modul
* B601 Druckgeber Abstuetzung VL
* B602 Druckgeber Abstuetzung VR
* B603 Druckgeber Abstuetzung HL
* B604 Druckgeber Abstuetzung HR
S112 Wipptaster Menuefuehrung
S113 Wipptaster Auswahl
S114 Wipptaster Service
S115 Wippschalter Notbetaetigung CAN ein
Y611 Magnetventil Stuetzzyl. VL einf.
Y610 Magnetventil Stuetzzyl. VL ausf.
Y613 Magnetventil Stuetztr. VL einf.
Y615 Magnetventil Stuetzzyl. VR einf.
Y614 Magnetventil Stuetzzyl. VR ausf.
Y617 Magnetventil Stuetztr. VR einf.
Y619 Magnetventil Druckbegrenzung Stuetztr. ausf.
99707782035_26
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
D008
SW-WS-RT
BR
VI-GR
VI-WS-GN
VI-WS
VI-WS-BL
VI-GE
SW-BL
WS-GE
GE-RT
GN-BL
GE-BL
GE-WS-BL
GE-GR
BL
RS
BR-RT
BR-GN
BR-GE
BR-BL
BR-WS
BR-VI
BR-RT-SW
BR-SW
18.A5 CG1 GN II
18.A3 CF1 GN I
X022
2.B6 AT2
11.D7 AP10
31
B018
A 5V 0V A 5V 0V
I II
K652X
K653X
K652
24.C7
K653
24.C8
S420
S419
Y609
Y608
Y607
Y606
Y605
Y604
Y603
Y602
D008 CAN-Verteiler-Modul
B018 Drucksensoreinheit Bremskreis I+II
K652 Relais Notbetaetigung Traeger VL
K653 Relais Notbetaetigung Traeger VR
S419 Schalter 3.A. geschalten li.
S420 Schalter 3.A. geschalten re.
Y609 MagnetventII Stuetzzyl. HL einf.
Y608 MagnetventII Stuetzzyl. HL ausf.
Y607 MagnetventII Stuetztr. HL einf.
Y606 MagnetventII Stuetztr. HL ausf.
Y605 MagnetventII Stuetzzyl. HR einf.
Y604 MagnetventII Stuetzzyl. HR ausf.
Y603 MagnetventII Stuetztr. HR einf.
Y602 MagnetventII Stuetztr. HR ausf.
1 2 3 4 5 6 7
99707782035_27
J/0405

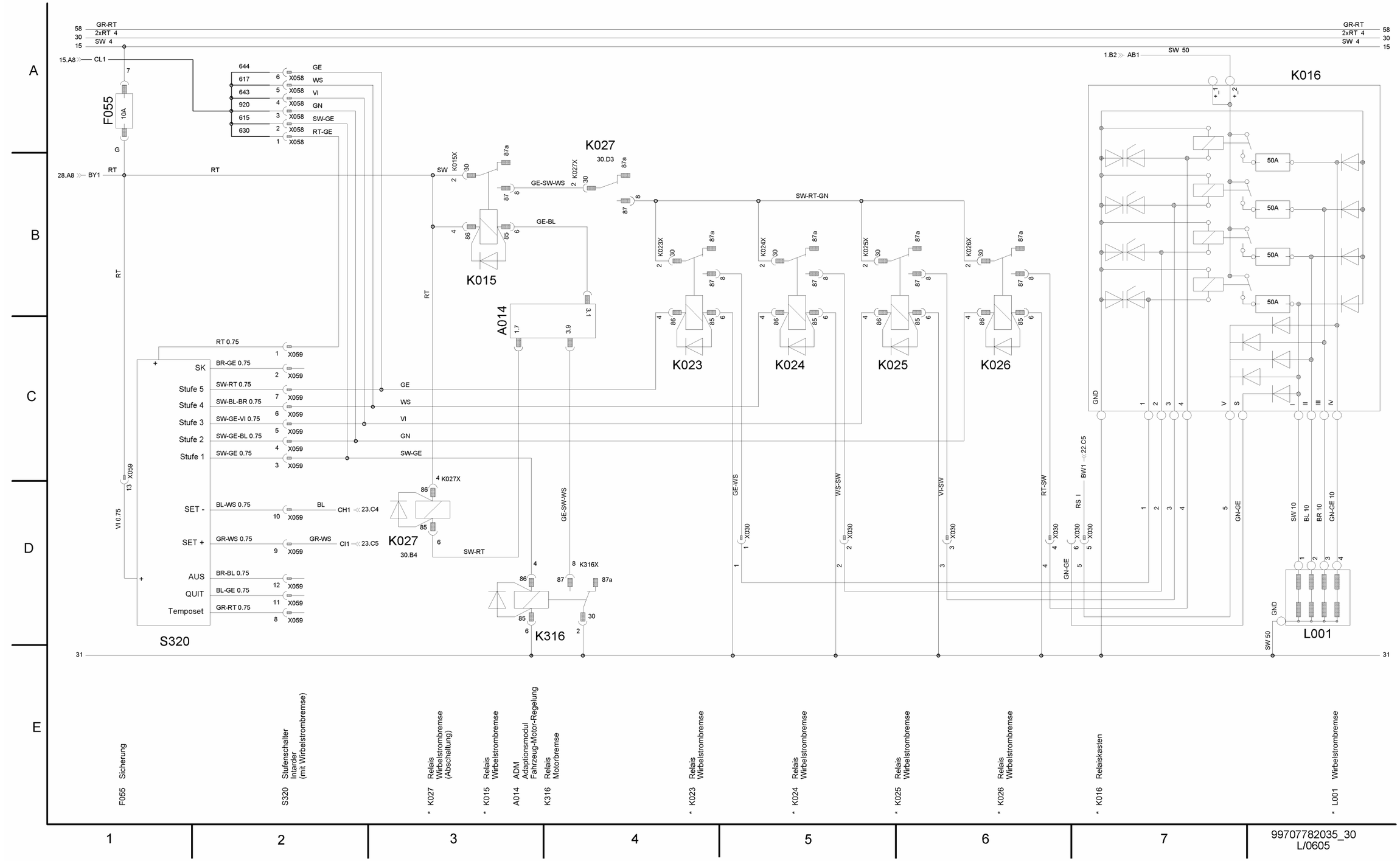
1.5 CAN connections (99707782035)



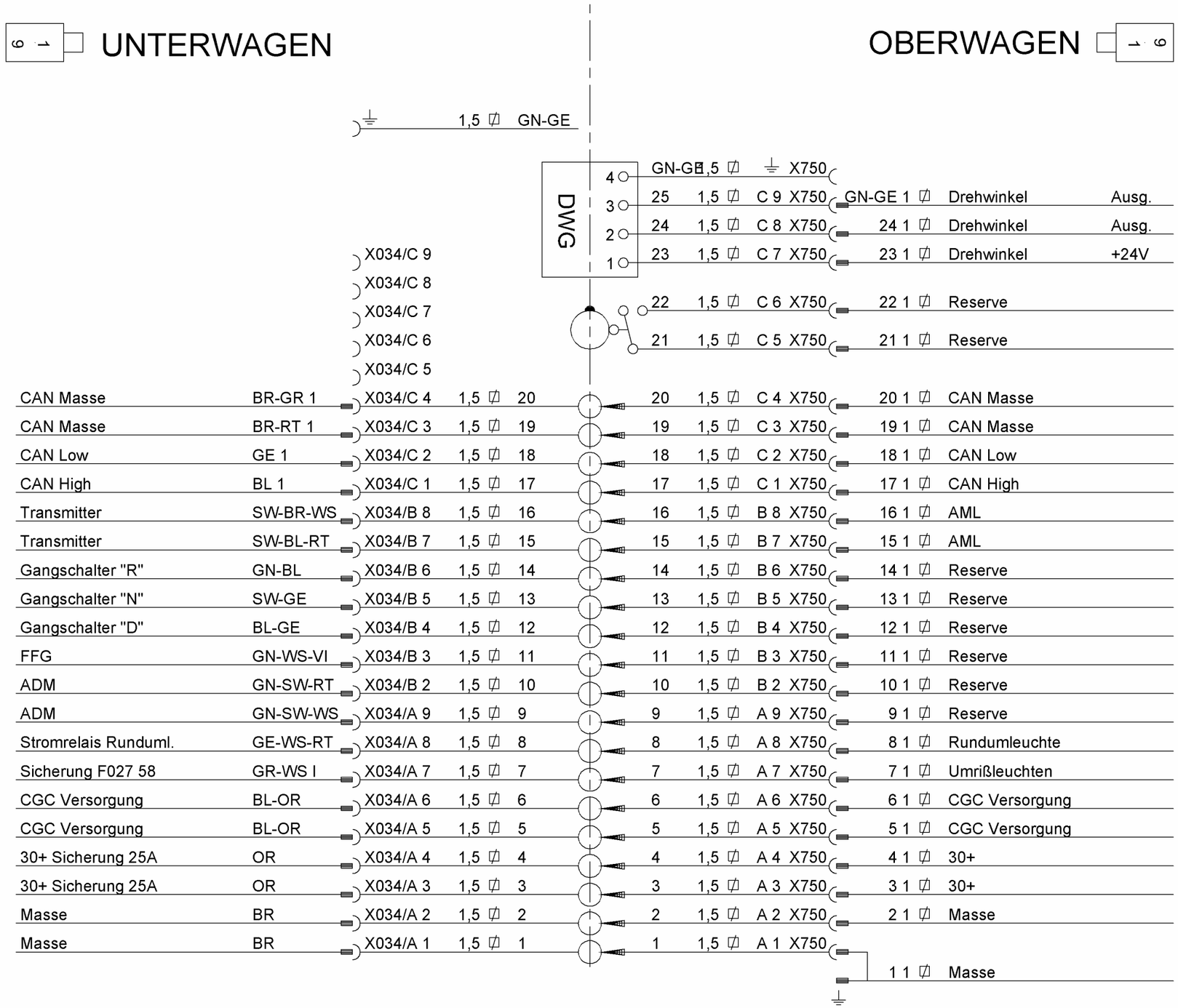
1.6 Chassis (99707782035)



1.7 Eddy-current brake (99707782035)



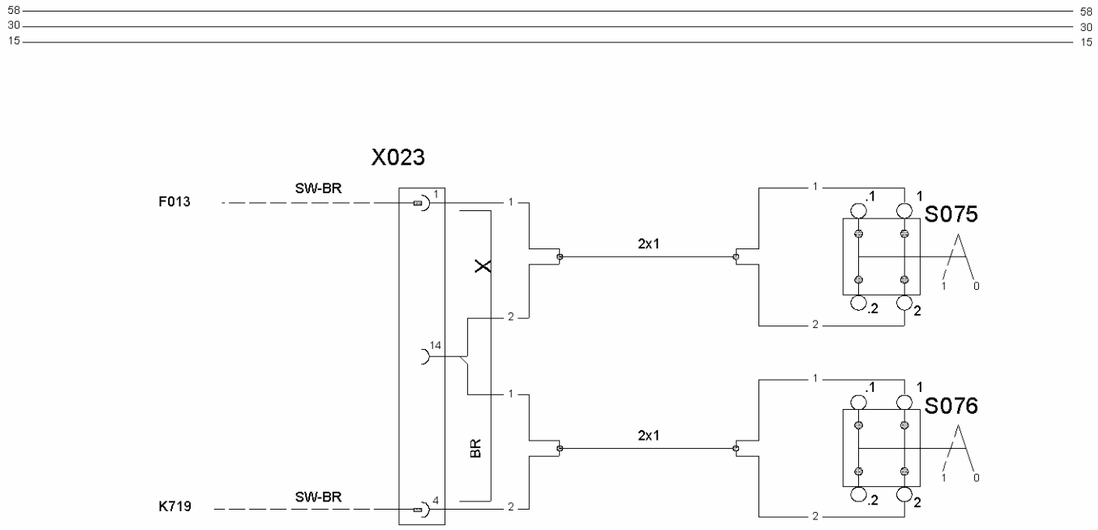
1.8 Connection diagram - Slipring (99707782068)



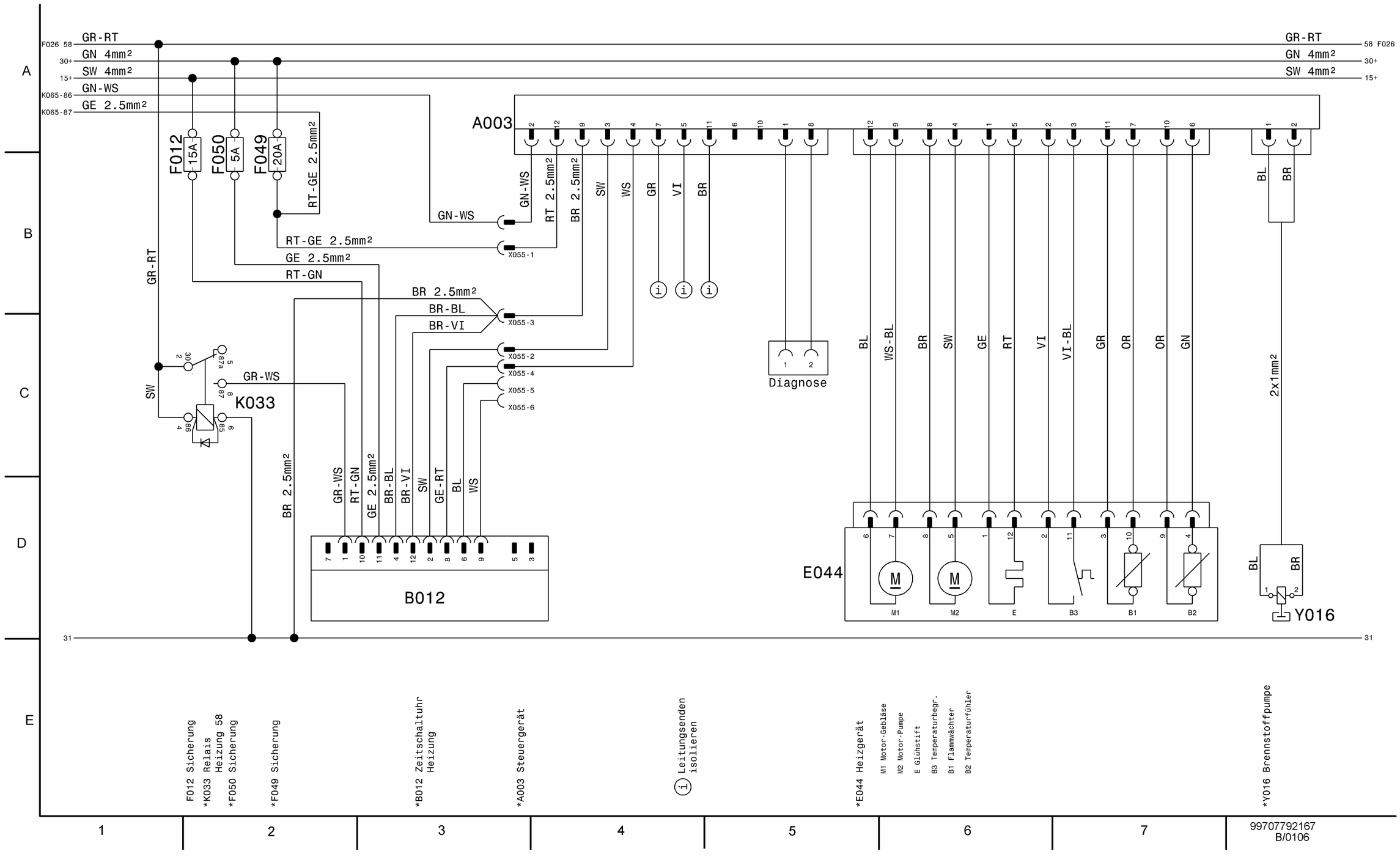
Leitungsfarben Cable colours Couleurs des cables			
BG	beige	beige	beige
BL	blau	blue	bleu
BR	braun	brown	brun
GE	gelb	yellow	jaune
GN	gruen	green	vert
GR	grau	grey	gris
OR	orange	orange	orange
RS	rosa	pink	rose
RT	rot	red	rouge
SW	schwarz	black	noir
TR	transp.	transp	transp.
VI	violett	violet	violet
WS	weiß	white	blanc

99707782068
B/0704

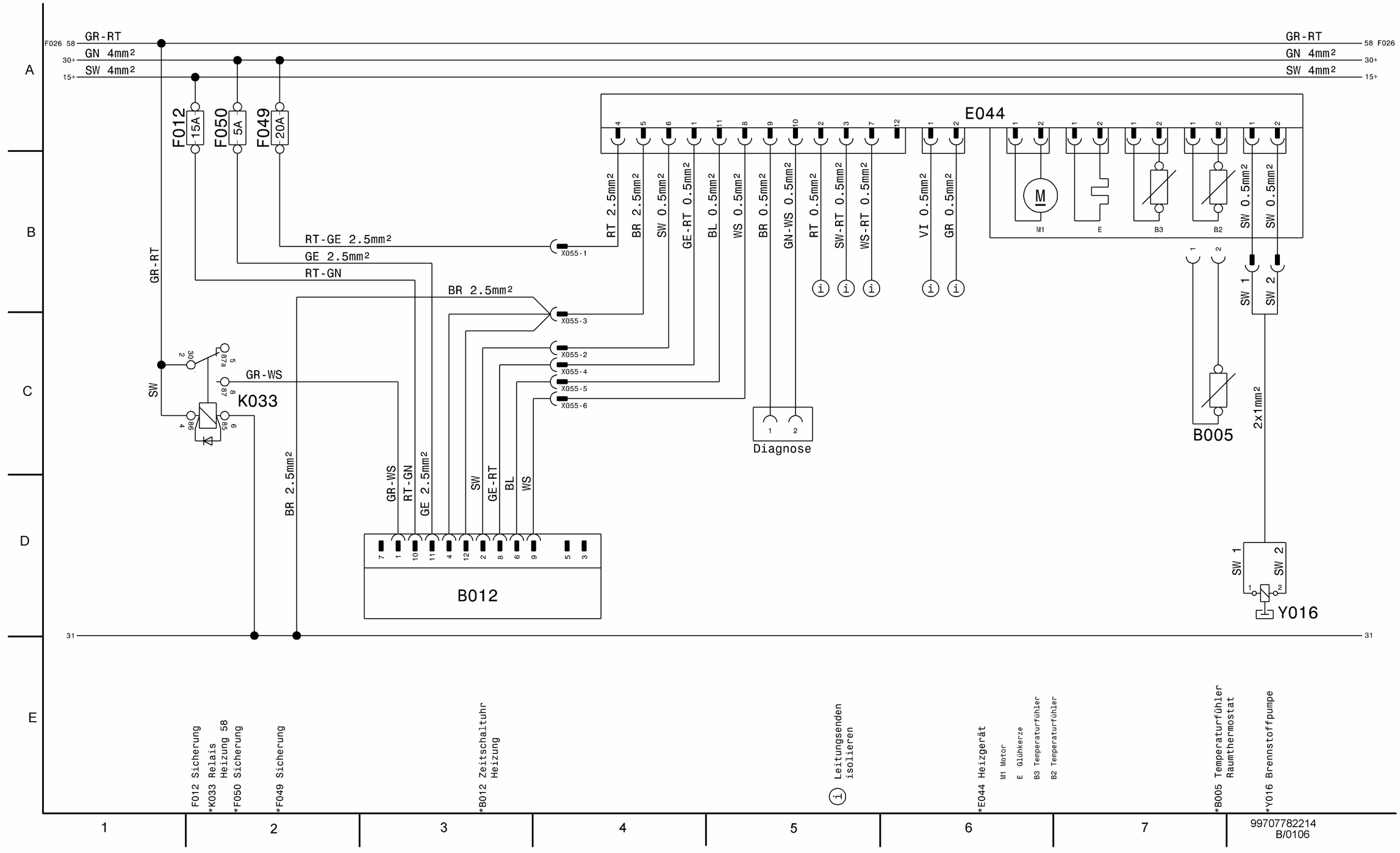
1.9 Emergency OFF - Engine STOP (stalling device) 99707782491



1.10 Heater unit Webasto Thermo 90S (99707792167)

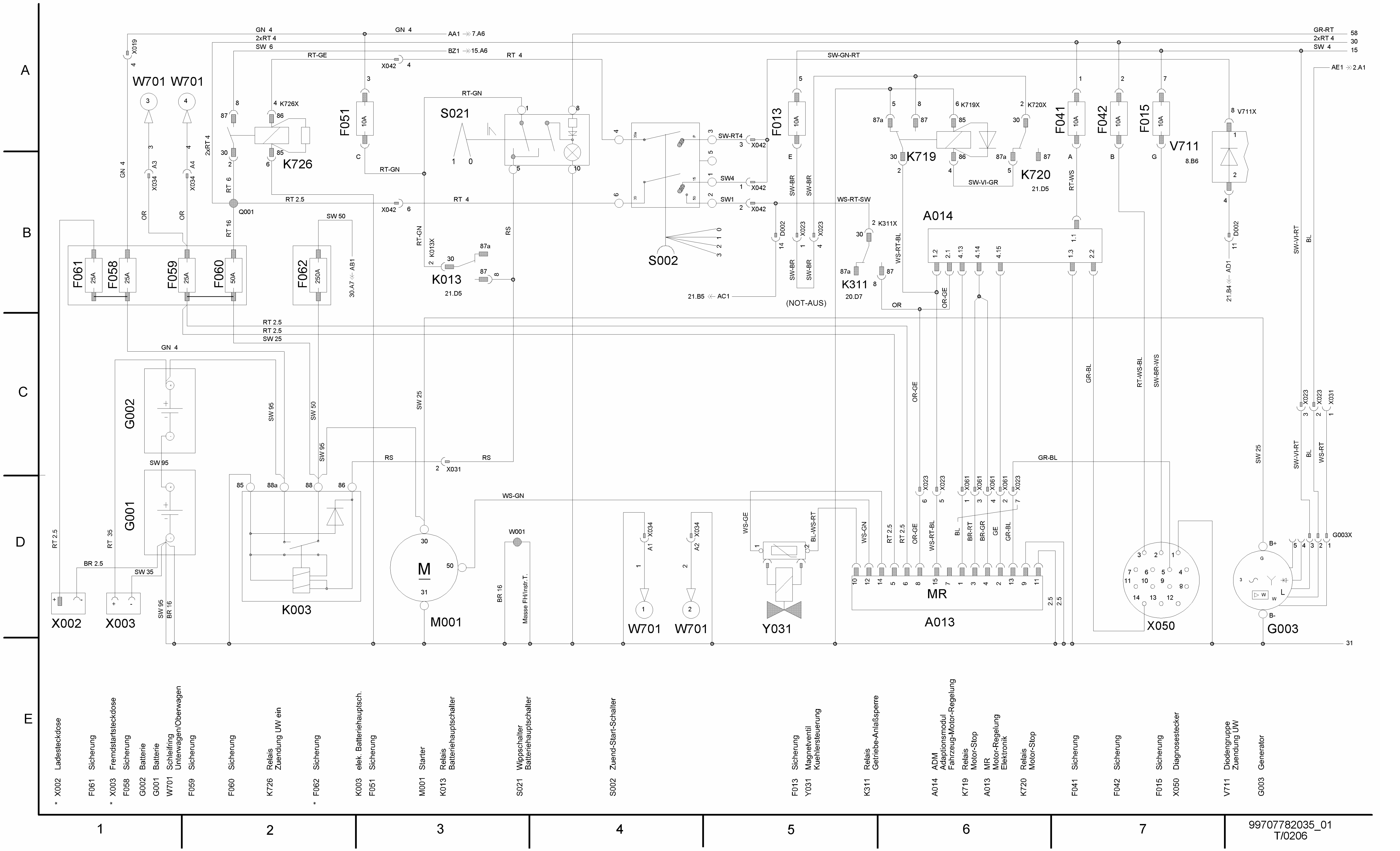


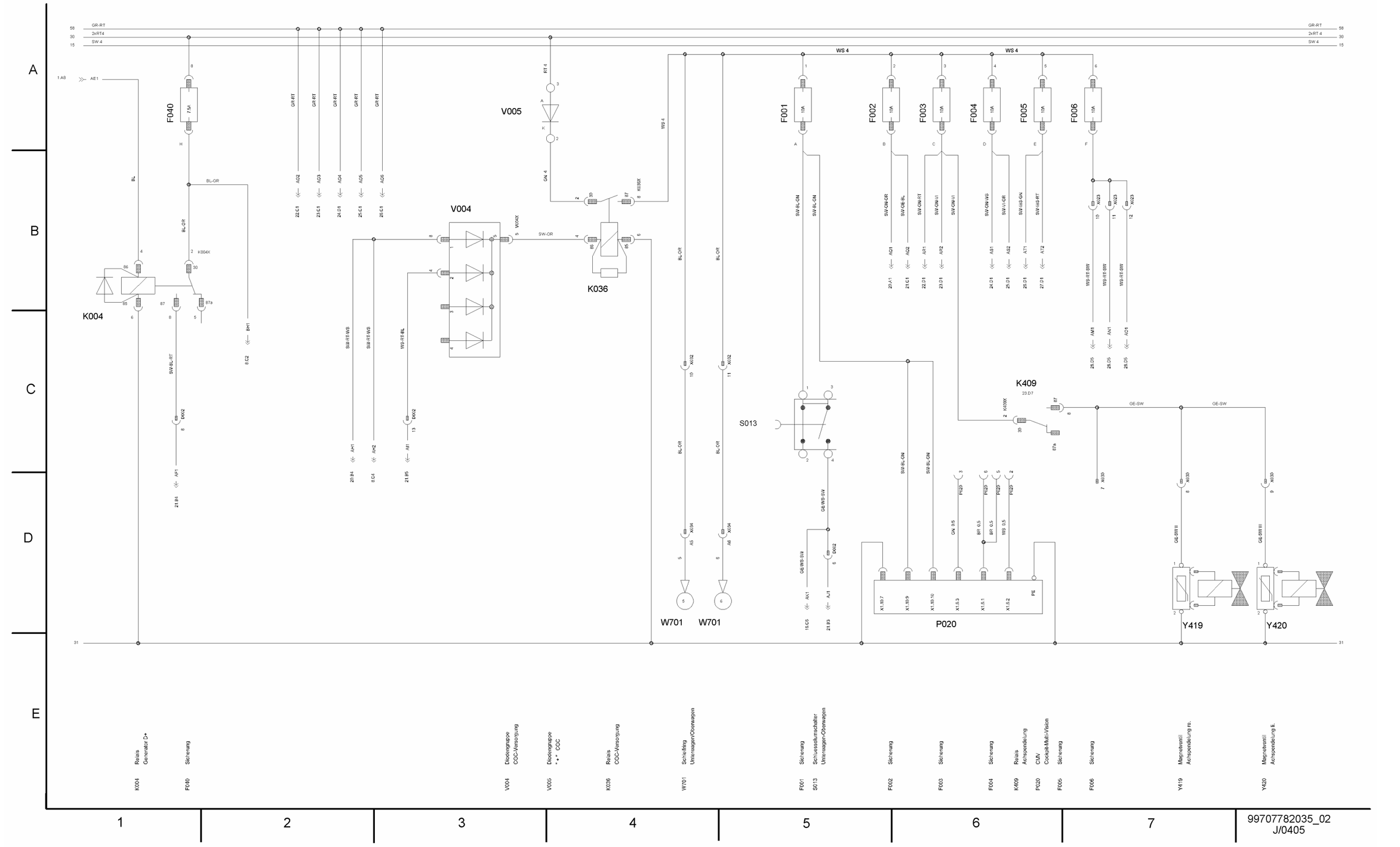
1.11 Heater unit Webasto Air Top 3500 (99707782214)



1 Electric circuit diagrams

1.1 Chassis (99707782035)

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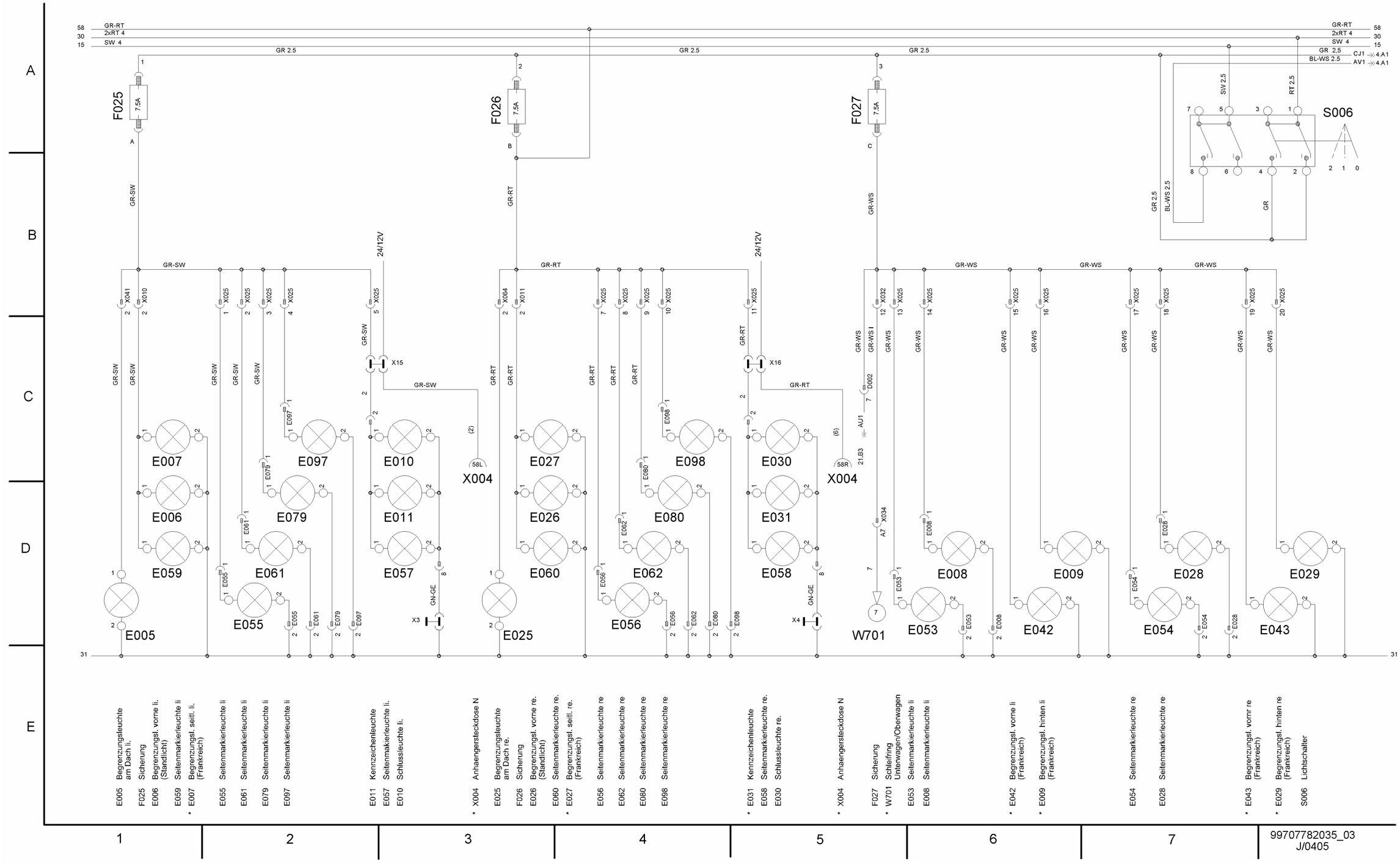
K004
K004X
V005
V004
K036
K036X
W701
F001
F002
F003
F004
F005
F006
10A
WS 4
K409
2S.D7
S013
P020
Y419
Y420
GE-SW
SW-BL-GN
SW-GN-NR
SW-GE-BL
SW-GN-RT
SW-GN-VI
SW-NT-NS
SW-VI-GR
SW-WS-GN
SW-WS-RT
WS-RT-SW
BL-OR
BL
GN 4
RT 4
GE-WS-SW
GE-SW II
Relais Generator D+
Sicherung
Dioden-gruppe CCC-Versorgung
Dioden-gruppe "+" CCC
Relais CCC-Versorgung
Schleifring Unterwagen/Oberwagen
Sicherung
Schluesselumschalter Unterwagen-Oberwagen
Sicherung
Sicherung
Sicherung
Relais Achspendelsperre
CMV Cockpit-Multi-Vision
Sicherung
Sicherung
Magnetventil Achspendelsperre re.
Magnetventil Achspendelsperre li.
99707782035_02
J/0405



E005	Begrenzungsleuchte am Dach li.
F025	Sicherung
E006	Begrenzungsl. vorne li. (Standlicht)
E059	Seitenmarkierleuchte li
* E007	Begrenzungsl. seitl. li. (Frankreich)
E055	Seitenmarkierleuchte li
E061	Seitenmarkierleuchte li
E079	Seitenmarkierleuchte li
E097	Seitenmarkierleuchte li
E011	Kennzeichenleuchte
E057	Seitenmakierleuchte li.
E010	Schlussleuchte li.
* X004	Anhaengersteckdose N
E025	Begrenzungsleuchte am Dach re.
F026	Sicherung
E026	Begrenzungsl. vorne re. (Standlicht)
E060	Seitenmarkierleuchte re.
* E027	Begrenzungsl. seitl. re. (Frankreich)
E056	Seitenmarkierleuchte re
E062	Seitenmarkierleuchte re
E080	Seitenmarkierleuchte re
E098	Seitenmarkierleuchte re
* E031	Kennzeichenleuchte
E058	Seitenmarkierleuchte re.
E030	Schlussleuchte re.
* X004	Anhaengersteckdose N
F027	Sicherung
* W701	Schleifring Unterwagen/Oberwagen
E053	Seitenmarkierleuchte li
E008	Seitenmarkierleuchte li
* E042	Begrenzungsl. vorne li (Frankreich)
* E009	Begrenzungsl. hinten li (Frankreich)
E054	Seitenmarkierleuchte re
E028	Seitenmarkierleuchte re
* E043	Begrenzungsl. vornr re (Frankreich)
* E029	Begrenzungsl. hinten re (Frankreich)
S006	Lichtschalter

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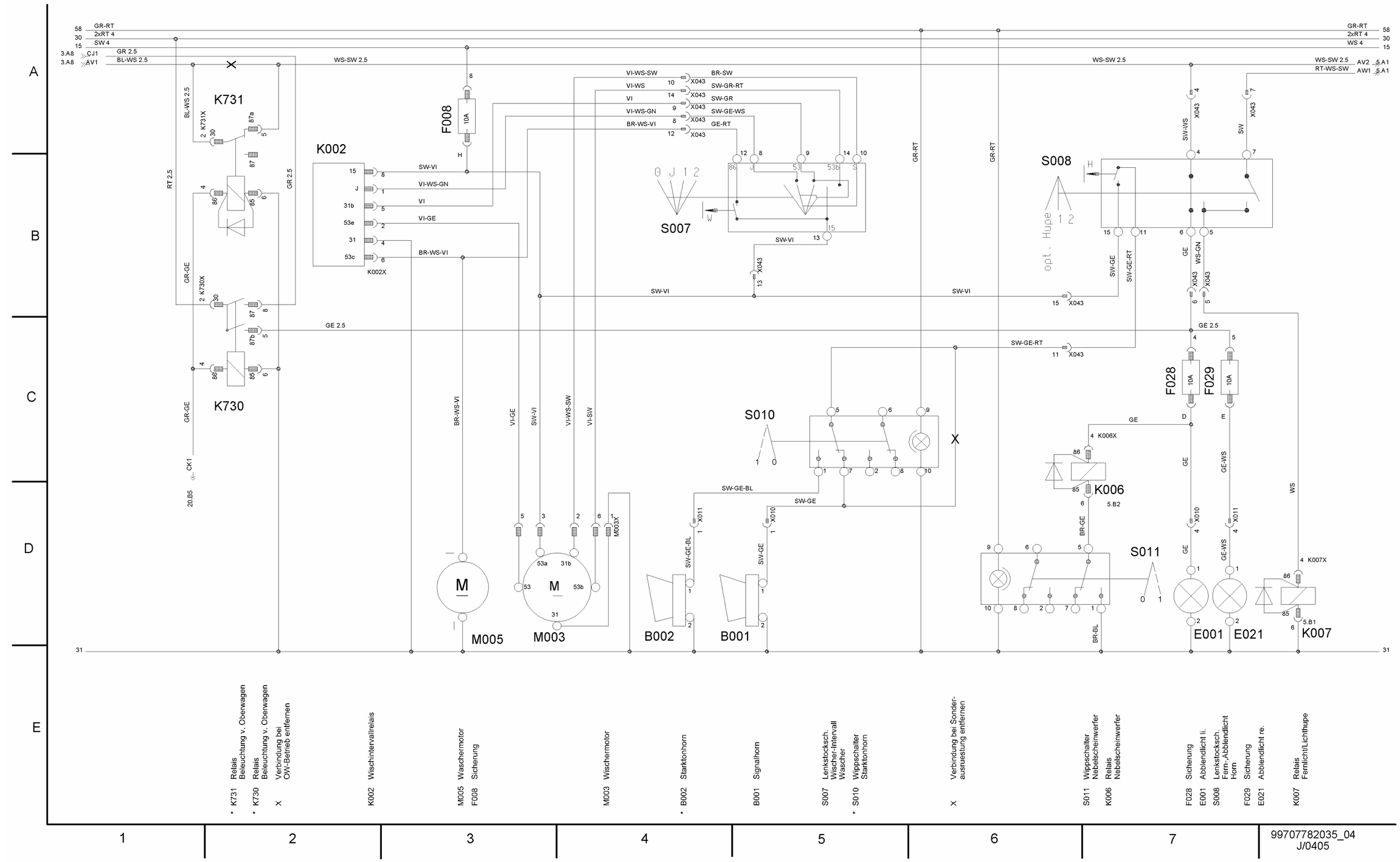
J/0405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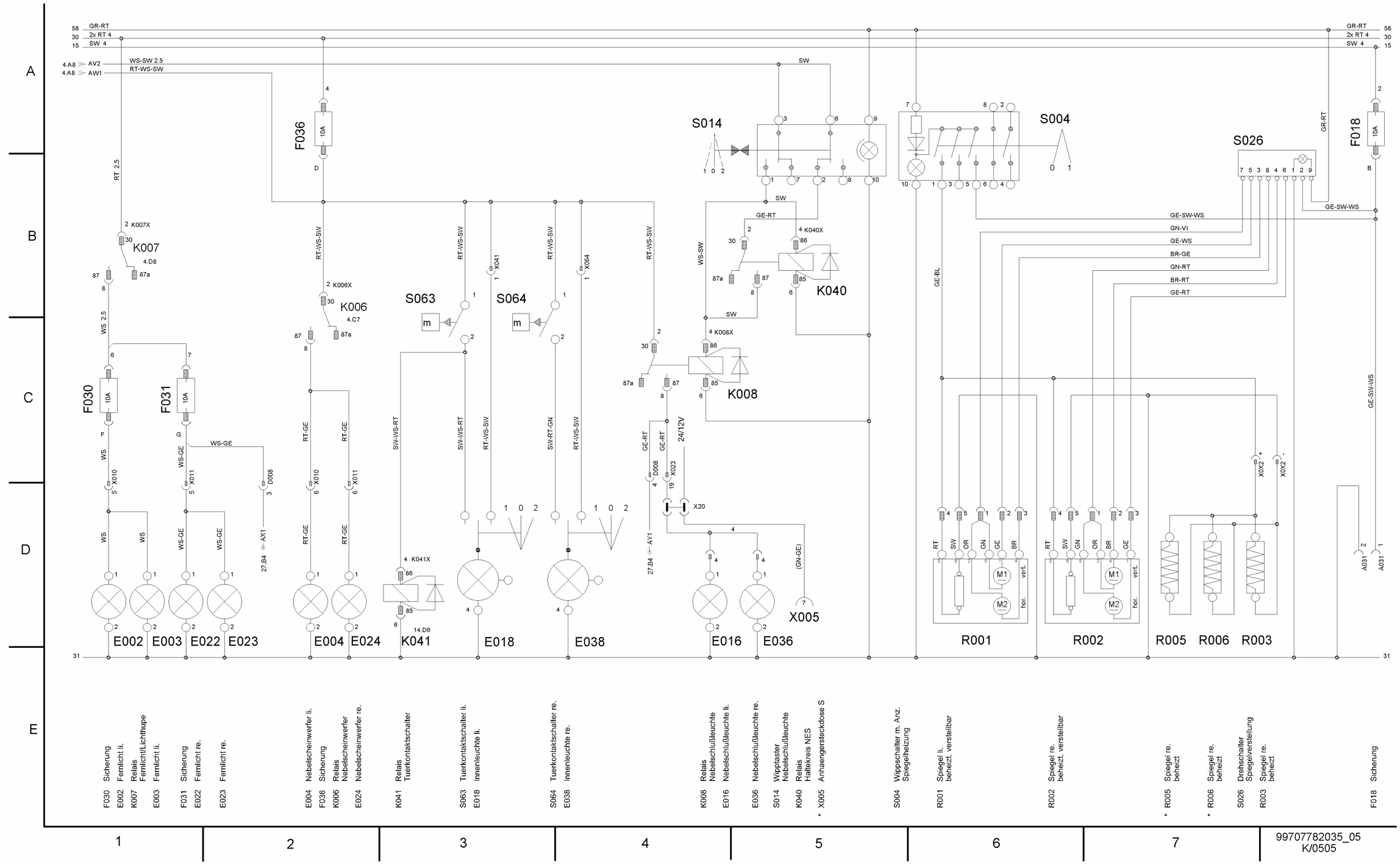
58 GR-RT
30 2xRT 4
15 SW 4
3.A8 CJ1 GR 2.5
3.A8 AV1 BL-WS 2.5
WS-SW 2.5
K731
K730
K002
F008 10A
S007
S008
S010
S011
K006
F028 10A
F029 10A
M005
M003
B002
B001
E001
E021
K007
RT 2.5
GR 2.5
GR-GE
GE 2.5
BR-WS-VI
VI-GE
SW-VI
VI-WS-SW
SW-GE-BL
SW-GE
SW-GE-RT
GR-RT
GE
GE-WS
WS
BR-GE
BR-BL
SW-WS
SW
WS-GN
RT-WS-SW
VI-WS-SW BR-SW
VI-WS SW-GR-RT
VI SW-GR
VI-WS-GN SW-GE-WS
BR-WS-VI GE-RT
opt. Hupe
CK1
20.B5
K002X
K006X
K007X
M003X
5.B2
5.B1
5.A1
AV2
AV1
31
* K731 Relais Beleuchtung v. Oberwagen
* K730 Relais Beleuchtung v. Oberwagen
X Verbindung bei OW-Betrieb entfernen
K002 Wischintervallrelais
M005 Waschermotor
F008 Sicherung
M003 Wischermotor
* B002 Starktonhorn
B001 Signalhorn
S007 Lenkstocksch. Wischer-Intervall Wascher
* S010 Wippschalter Starktonhorn
X Verbindung bei Sonder-ausrüstung entfernen
S011 Wippschalter Nebelscheinwerfer
K006 Relais Nebelscheinwerfer
F028 Sicherung
E001 Abblendlicht li.
S008 Lenkstocksch. Fern-/Abblendlicht Horn
F029 Sicherung
E021 Abblendlicht re.
K007 Relais Fernlicht/Lichthupe
99707782035_04
J/0405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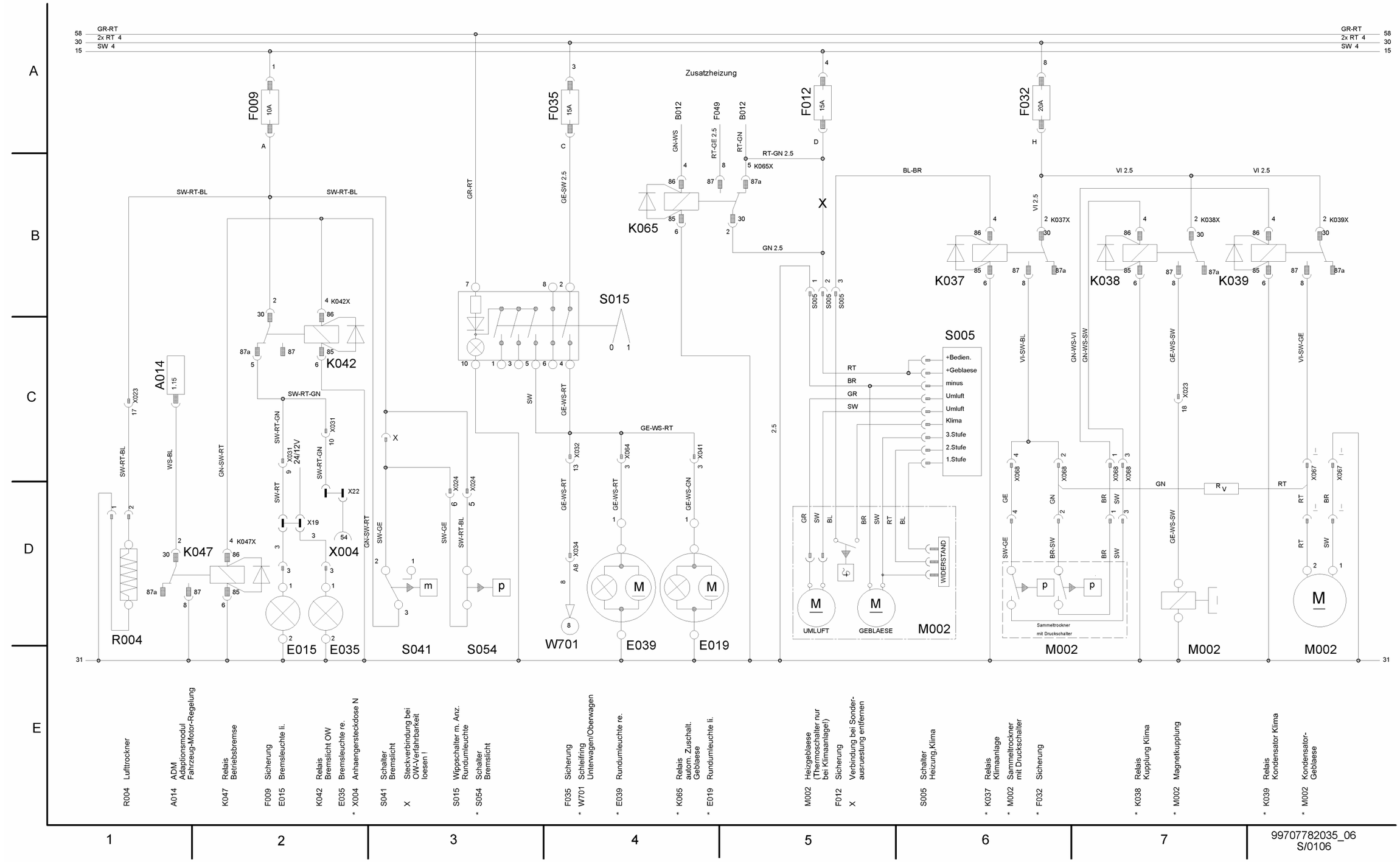
GR-RT
2x RT 4
SW 4
WS-SW 2.5
RT-WS-SW
RT 2.5
WS 2.5
F030 10A
F031 10A
F036 10A
F018 10A
K007
K006
K008
K040
K041
S063
S064
S014
S004
S026
X005
X20
E002 E003 E022 E023
E004 E024
E018
E038
E016 E036
R001
R002
R005 R006 R003
GE-SW-WS
GN-VI
GE-WS
BR-GE
GN-RT
BR-RT
GE-RT
GE-BL
24/12V
F030 Sicherung
E002 Fernlicht li.
K007 Relais Fernlicht/Lichthupe
E003 Fernlicht li.
F031 Sicherung
E022 Fernlicht re.
E023 Fernlicht re.
E004 Nebelscheinwerfer li.
F036 Sicherung
K006 Relais Nebelscheinwerfer
E024 Nebelscheinwerfer re.
K041 Relais Tuerkontaktschalter
S063 Tuerkontaktschalter li.
E018 Innenleuchte li.
S064 Tuerkontaktschalter re.
E038 Innenleuchte re.
K008 Relais NebelschlußleuchteE016 NebelschlußleuchteE036 Nebelschlußleuchte re.
S014 Wipptaster Nebelschlußleuchte
K040 Relais Haltekreis NES
* X005 Anhaengersteckdose S
S004 Wippschalter m. Anz. Spiegelheizung
R001 Spiegel li., beheizt, verstellbar
R002 Spiegel re., beheizt, verstellbar
* R005 Spiegel re. beheizt
* R006 Spiegel re. beheizt
S026 Drehschalter Spiegelverstellung
R003 Spiegel re. beheizt
F018 Sicherung
99707782035_05
K/0505



R004 Lufttrockner

A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung

K047 Relais Betriebsbremse

F009 Sicherung
E015 Bremsleuchte li.

K042 Relais Bremslicht OW
E035 Bremsleuchte re.
* X004 Anhaengersteckdose N

S041 Schalter Bremslicht
X Steckverbindung bei OW-Verfahrbarkeit loesen !

S015 Wippschalter m. Anz. Rundumleuchte
* S054 Schalter Bremslicht

F035 Sicherung
* W701 Schleifring Unterwagen/Oberwagen

* E039 Rundumleuchte re.

* K065 Relais autom. Zuschalt. Gebläese
* E019 Rundumleuchte li.

M002 Heizgeblaese (Thermoschalter nur bei Klimaanlage!)
F012 Sicherung
X Verbindung bei Sonder-ausruestung entfernen

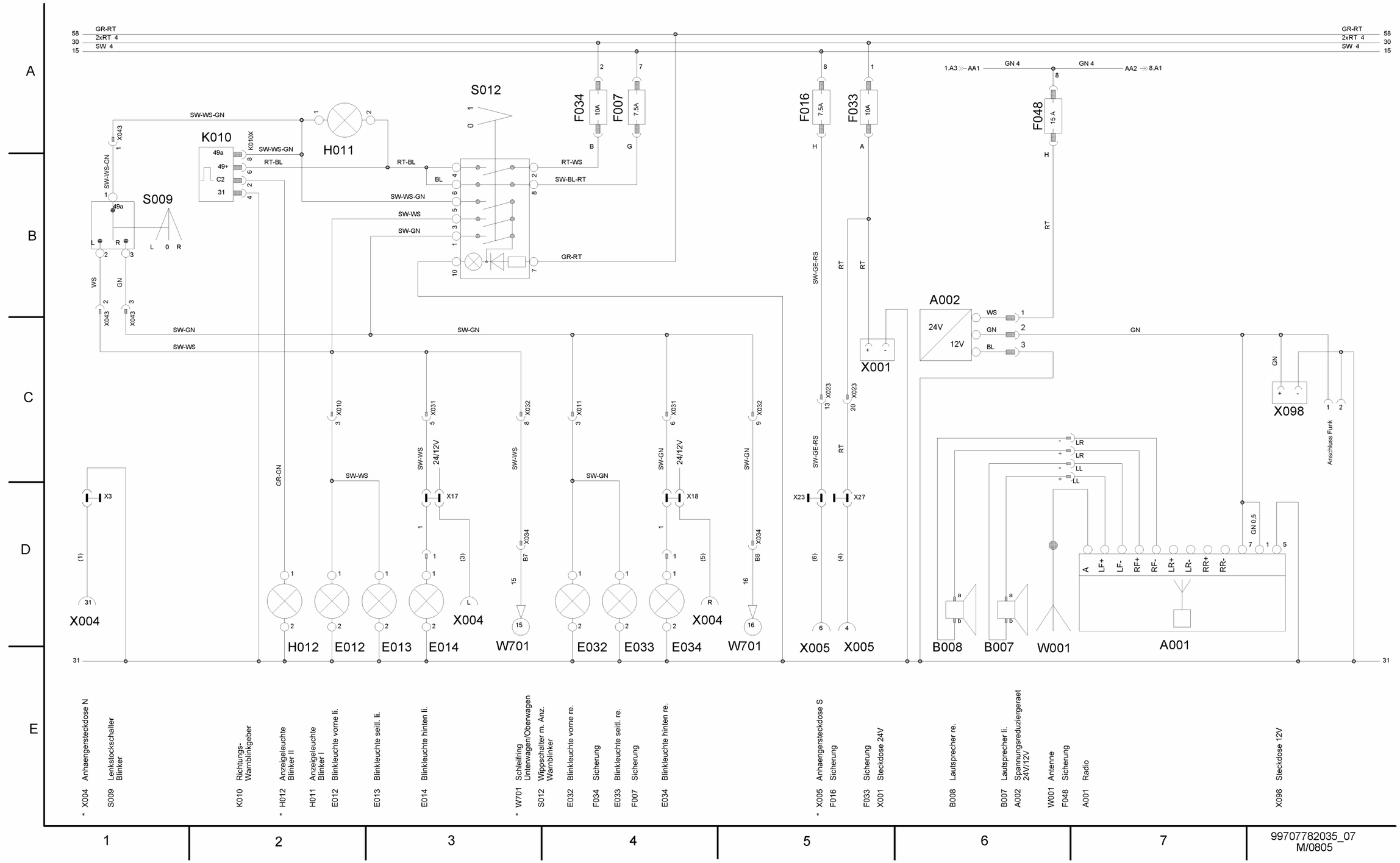
S005 Schalter Heizung,Klima

* K037 Relais Klimaanlage
* M002 Sammeltrockner mit Druckschalter
* F032 Sicherung

* K038 Relais Kupplung Klima
* M002 Magnetkupplung

* K039 Relais Kondensator Klima
* M002 Kondensator-Gebläese

99707782035_06
S/0106


A
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GR-RT
2xRT 4
SW 4
58
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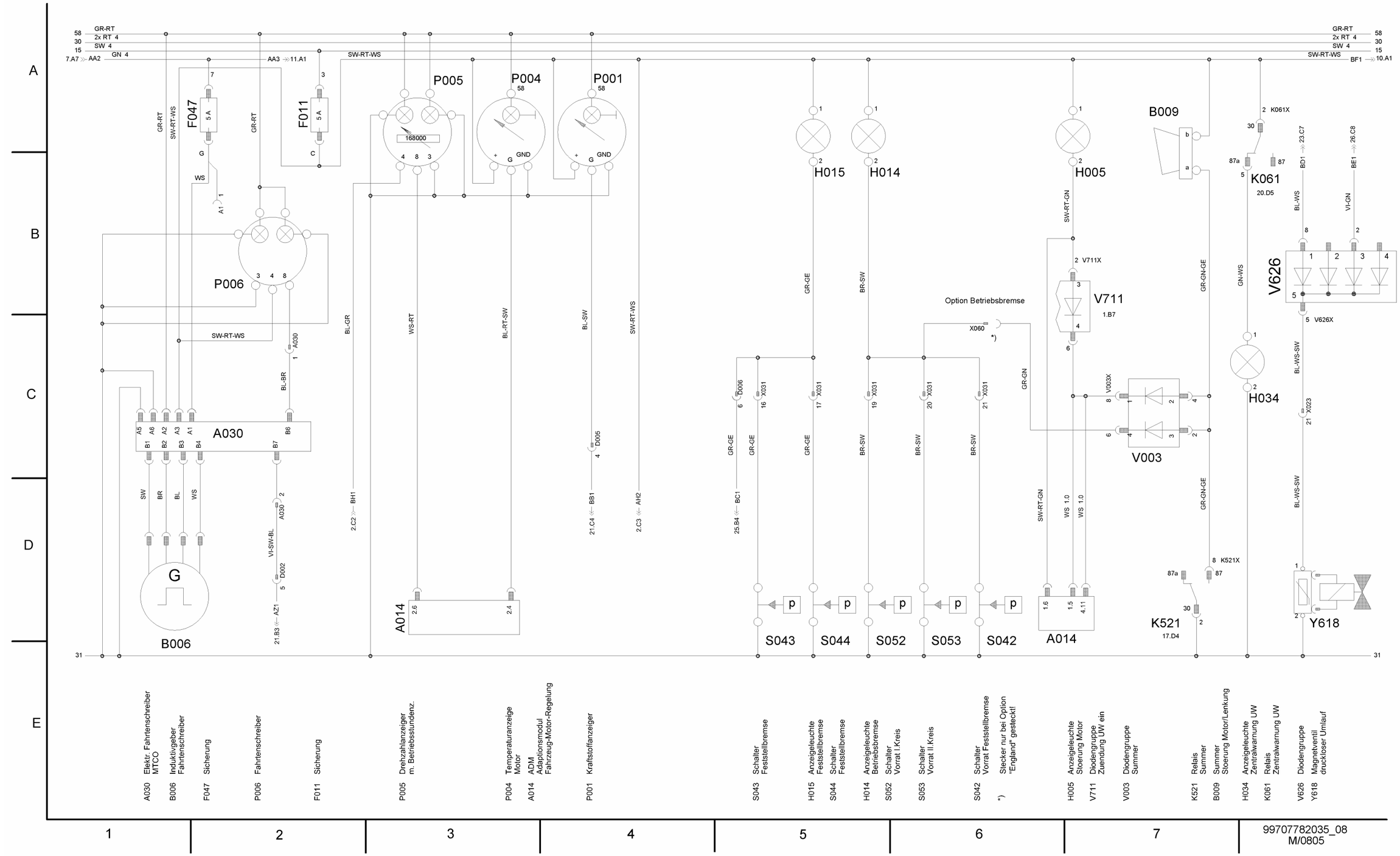
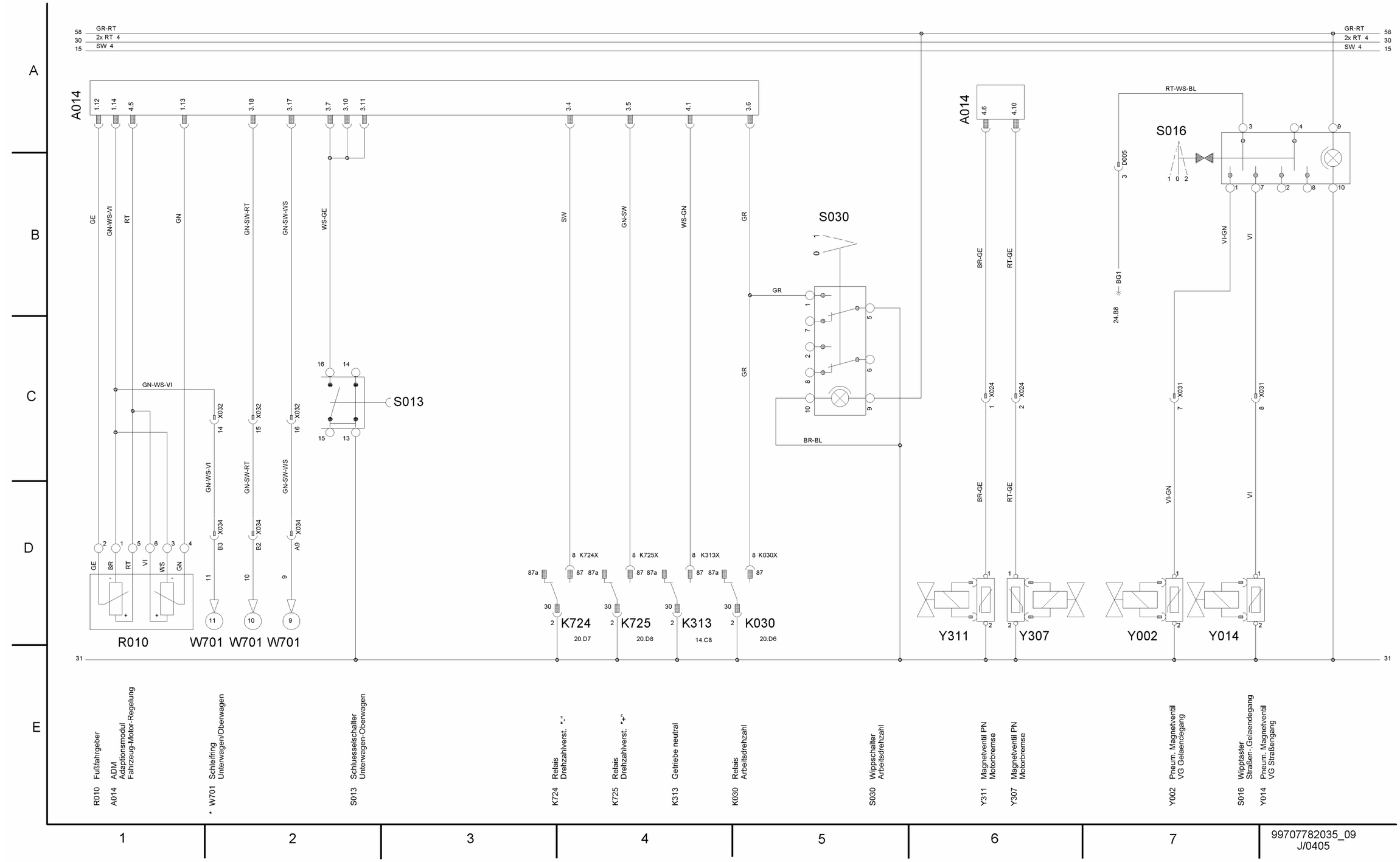
S012
F034
10A
F007
7,5A
F016
7,5A
F033
10A
F048
15 A
1.A3 AA1
GN 4
AA2 8.A1
K010
K010X
49a
49+
C2
31
H011
S009
SW-WS-GN
RT-BL
RT-WS
SW-BL-RT
SW-WS
SW-GN
GR-RT
RT
SW-GE-RS
A002
24V
12V
WS
GN
BL
X001
X098
Anschluss Funk
GN 0,5
LR
LL
A
LF+
LF-
RF+
RF-
LR+
LR-
RR+
RR-
X004
H012
E012
E013
E014
W701
E032
E033
E034
X005
B008
B007
W001
A001
X3
X17
X18
X23
X27
X010
X031
X032
X011
X034
24/12V
* X004 Anhaengersteckdose N
S009 Lenkstockschalter Blinker
K010 Richtungs-Warnblinkgeber
* H012 Anzeigeleuchte Blinker li
H011 Anzeigeleuchte Blinker l
E012 Blinkleuchte vorne li.
E013 Blinkleuchte seitl. li.
E014 Blinkleuchte hinten li.
* W701 Schleifring Unterwagen/Oberwagen
S012 Wippschalter m. Anz. Warnblinker
E032 Blinkleuchte vorne re.
F034 Sicherung
E033 Blinkleuchte seitl. re.
F007 Sicherung
E034 Blinkleuchte hinten re.
* X005 Anhaengersteckdose S
F016 Sicherung
F033 Sicherung
X001 Steckdose 24V
B008 Lautsprecher re.
B007 Lautsprecher li.
A002 Spannungsreduziergeraet 24V/12V
W001 Antenne
F048 Sicherung
A001 Radio
X098 Steckdose 12V
99707782035_07
M/0805



A030 Elektr. Fahrtenschreiber MTCO
B006 Induktivgeber Fahrtenschreiber
F047 Sicherung
P006 Fahrtenschreiber
F011 Sicherung
P005 Drehzahlanzeiger m. Betriebsstundenz.
P004 Temperaturanzeige Motor
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
P001 Kraftstofanzeiger
S043 Schalter Feststellbremse
H015 Anzeigeleuchte Feststellbremse
S044 Schalter Feststellbremse
H014 Anzeigeleuchte Betriebsbremse
S052 Schalter Vorrat I.Kreis
S053 Schalter Vorrat II.Kreis
S042 Schalter Vorrat Feststellbremse
*) Stecker nur bei Option "England" gesteckt!
H005 Anzeigeleuchte Stoerung Motor
V711 Diodengruppe Zuendung UW ein
V003 Diodengruppe Summer
K521 Relais Summer
B009 Summer Stoerung Motor/Lenkung
H034 Anzeigeleuchte Zentralwarnung UW
K061 Relais Zentralwarnung UW
V626 Diodengruppe
Y618 Magnetventil druckloser Umlauf


A
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58 GR-RT
30 2x RT 4
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A014
1.12 1.14 4.5 1.13 3.18 3.17 3.7 3.10 3.11 3.4 3.5 4.1 3.6
GE GN-WS-VI RT GN GN-SW-RT GN-SW-WS WS-GE SW GN-SW WS-GN GR
S013
16 14 15 13
S030
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BR-BL
A014
4.6 4.10
BR-GE RT-GE
S016
RT-WS-BL
D005
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VI-GN VI
BG1
24.B8
X024 X031
GN-WS-VI GN-SW-RT GN-SW-WS
X032 X034
14 15 16 11 10 9
B3 B2 A9
GE BR RT VI WS GN
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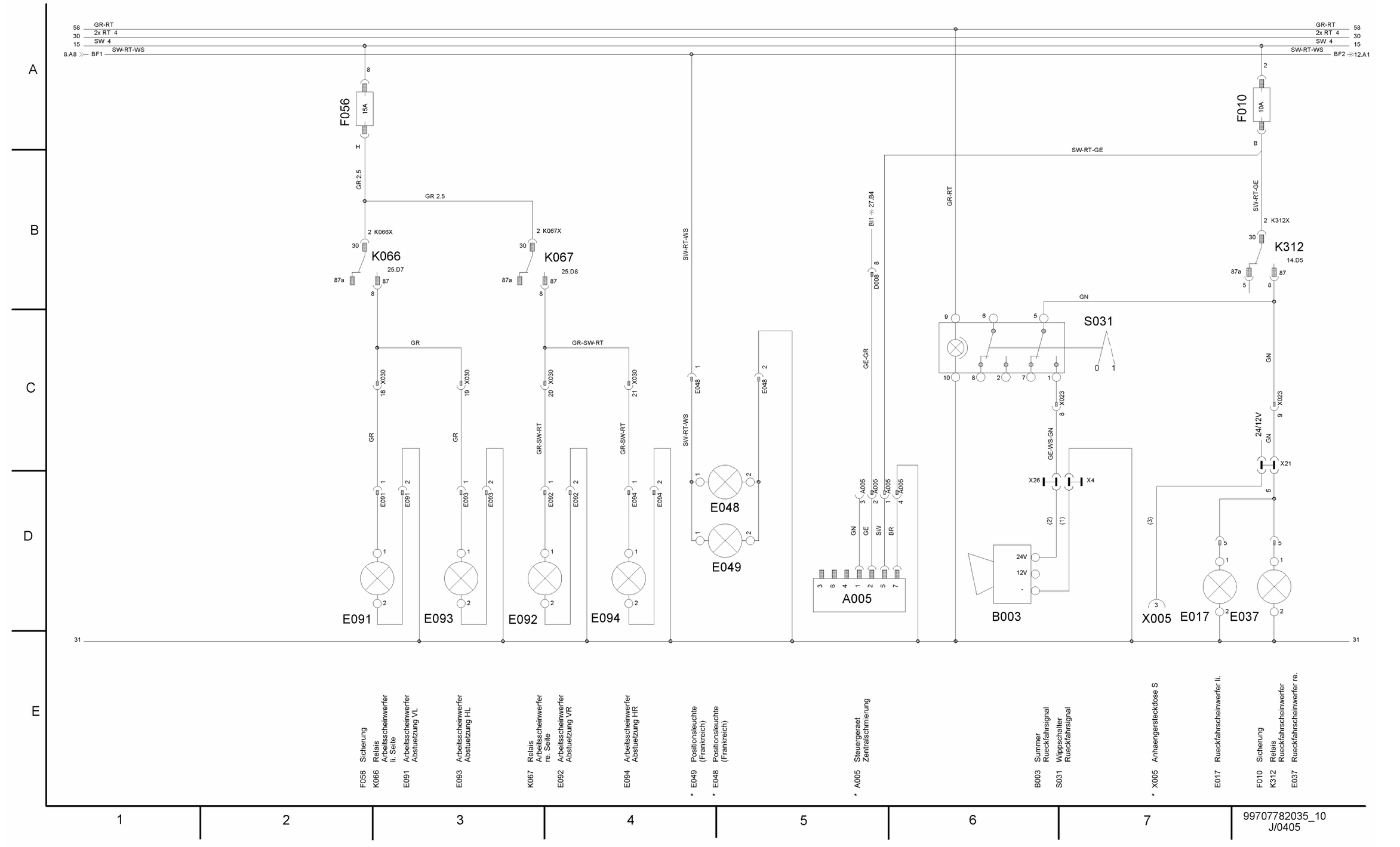
R010
W701 W701 W701
8 K724X 8 K725X 8 K313X 8 K030X
87a 87 87a 87 87a 87 87a 87
30 2
K724 K725 K313 K030
20.D7 20.D8 14.C8 20.D6
Y311 Y307 Y002 Y014
31
R010 Fußfahrgeber
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
* W701 Schleifring Unterwagen/Oberwagen
S013 Schluesselschalter Unterwagen-Oberwagen
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
K313 Gefriebe neutral
K030 Relais Arbeitsdrehzahl
S030 Wippschalter Arbeitsdrehzahl
Y311 Magnetventil PN Motorbremse
Y307 Magnetventil PN Motorbremse
Y002 Pneum. Magnetventil VG Geländegang
S016 Wipptaster Straßen-,Geländegang
Y014 Pneum. Magnetventil VG Straßengang
99707782035_09
J/0405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58 GR-RT
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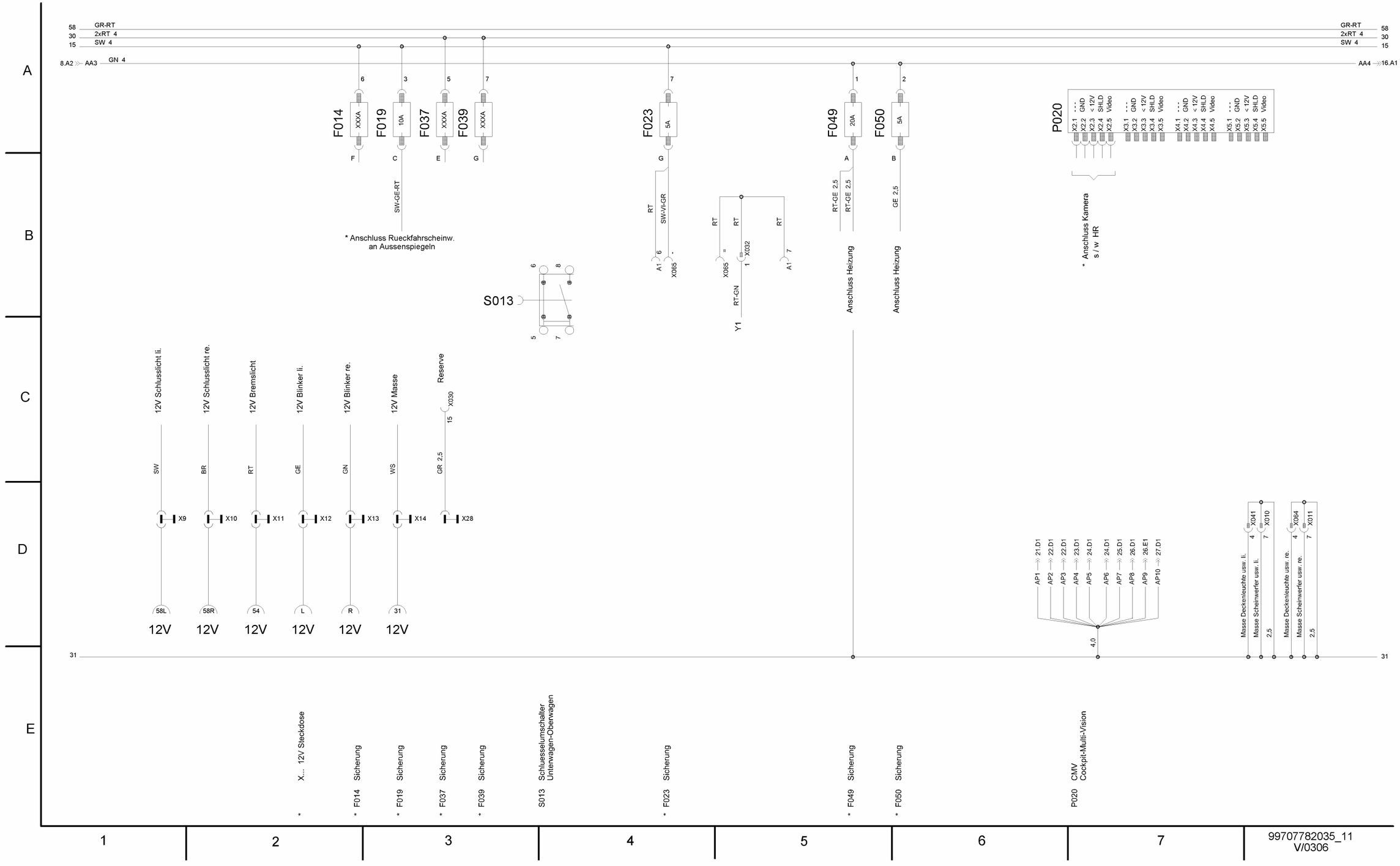
15 SW 4
8.A8 BF1 SW-RT-WS
F056 15A
GR 2.5
K066 K067
25.D7
25.D8
GR
GR-SW-RT
E091 E093 E092 E094
SW-RT-WS
E048 E049
GE-GR
B11 27.B4
D008
A005
GN GE SW BR
B003
24V 12V
S031
GE-WS-GN
X26 X4
F010 10A
SW-RT-GE
K312 K312X
14.D5
X005
X017 X037
24/12V
X21
99707782035_10
J/0405
F056 Sicherung
K066 Relais Arbeitsscheinwerfer li. Seite
E091 Arbeitsscheinwerfer Abstuetzung VL
E093 Arbeitsscheinwerfer Abstuetzung HL
K067 Relais Arbeitsscheinwerfer re. Seite
E092 Arbeitsscheinwerfer Abstuetzung VR
E094 Arbeitsscheinwerfer Abstuetzung HR
E049 Positionsleuchte (Frankreich)
E048 Positionsleuchte (Frankreich)
A005 Steuergeraet Zentralschmierung
B003 Summer Rueckfahrsignal
S031 Wippschalter Rueckfahrsignal
X005 Anhaengersteckdose S
E017 Rueckfahrscheinwerfer li.
F010 Sicherung
K312 Relais Rueckfahrscheinwerfer
E037 Rueckfahrscheinwerfer re.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58 GR-RT
30 2xRT 4
15 SW 4
8.A2 AA3 GN 4
AA4 16.A1
F014 XXXA
F019 10A
F037 XXXA
F039 XXXA
F023 5A
F049 20A
F050 5A
SW-GE-RT
* Anschluss Rueckfahrscheinw. an Aussenspiegeln
SW-VI-GR
RT-GE 2,5
GE 2,5
Anschluss Heizung
P020
X2.1 --- X2.2 GND X2.3 < 12V X2.4 SHLD X2.5 Video
X3.1 --- X3.2 GND X3.3 < 12V X3.4 SHLD X3.5 Video
X4.1 --- X4.2 GND X4.3 < 12V X4.4 SHLD X4.5 Video
X5.1 --- X5.2 GND X5.3 < 12V X5.4 SHLD X5.5 Video
* Anschluss Kamera s / w HR
S013
RT-GN
Y1
X065
X032
12V Schlusslicht li.
12V Schlusslicht re.
12V Bremslicht
12V Blinker li.
12V Blinker re.
12V Masse
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GR 2,5
X9
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X11
X12
X13
X14
X28
58L
58R
54
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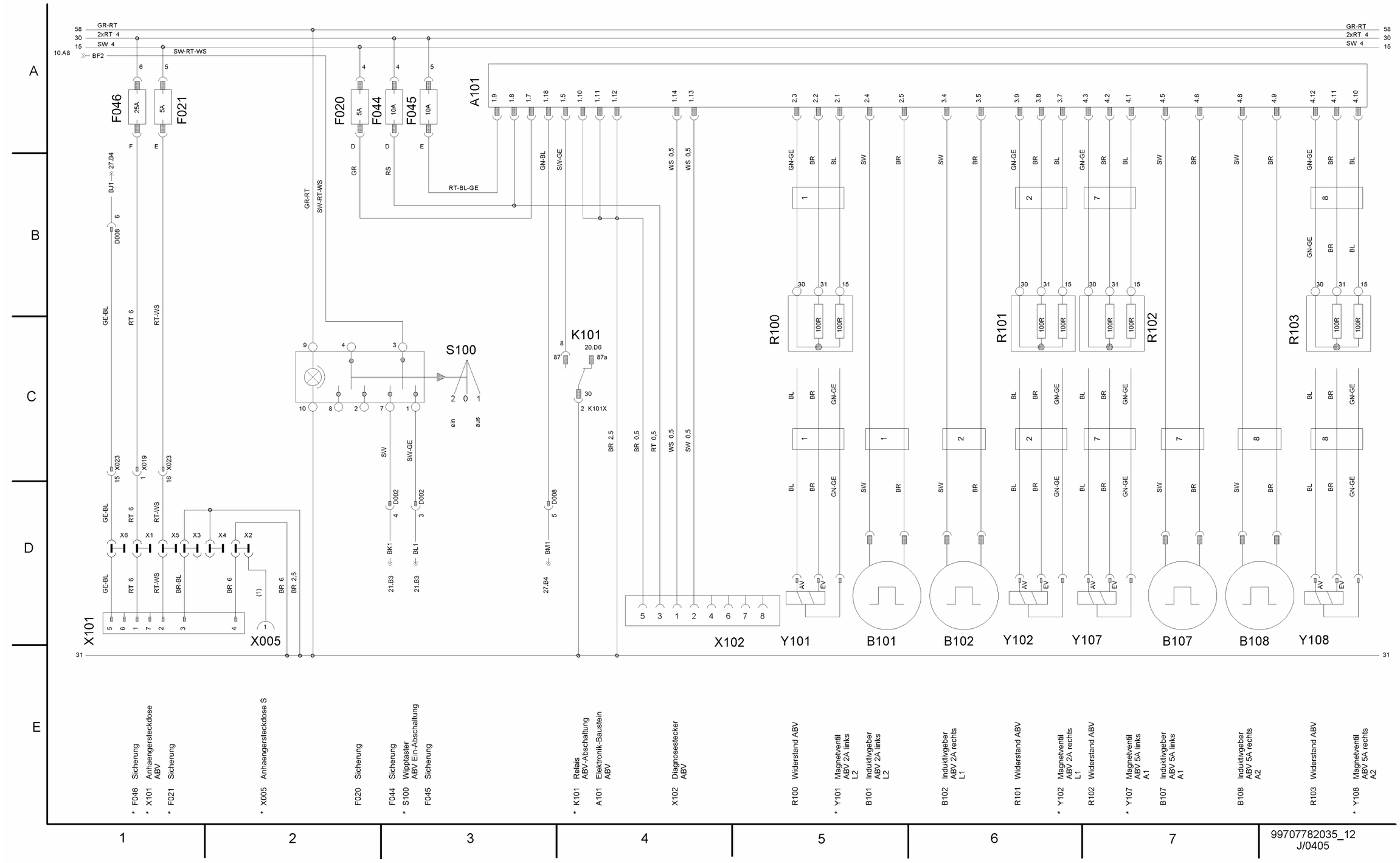
R
31
12V
AP1 21.D1
AP2 22.D1
AP3 22.D1
AP4 23.D1
AP5 24.D1
AP6 24.D1
AP7 25.D1
AP8 26.D1
AP9 26.E1
AP10 27.D1
4.0
Masse Deckenleuchte usw. li.
Masse Scheinwerfer usw. li.
Masse Deckenleuchte usw. re.
Masse Scheinwerfer usw. re.
X041
X010
X064
X011
2,5
X... 12V Steckdose
F014 Sicherung
F019 Sicherung
F037 Sicherung
F039 Sicherung
S013 Schluesselumschalter Unterwagen-Oberwagen
F023 Sicherung
F049 Sicherung
F050 Sicherung
P020 CMV Cockpit-Multi-Vision
99707782035_11
V/0306

1.2 ABV (99707782035)



E

* F046 Sicherung
* X101 Anhaengersteckdose ABV
* F021 Sicherung

* X005 Anhaengersteckdose S

F020 Sicherung

F044 Sicherung
* S100 Wipptaster ABV Ein-Abschaltung
F045 Sicherung

* K101 Relais ABV-Abschaltung
A101 Elektronik-Baustein ABV

X102 Diagnosestecker ABV

R100 Widerstand ABV
* Y101 Magnetventil ABV 2A links L2
B101 Induktivgeber ABV 2A links L2

B102 Induktivgeber ABV 2A rechts L1

R101 Widerstand ABV
* Y102 Magnetventil ABV 2A rechts L1
R102 Widerstand ABV

* Y107 Magnetventil ABV 5A links A1
B107 Induktivgeber ABV 5A links A1

B108 Induktivgeber ABV 5A rechts A2

R103 Widerstand ABV
* Y108 Magnetventil ABV 5A rechts A2

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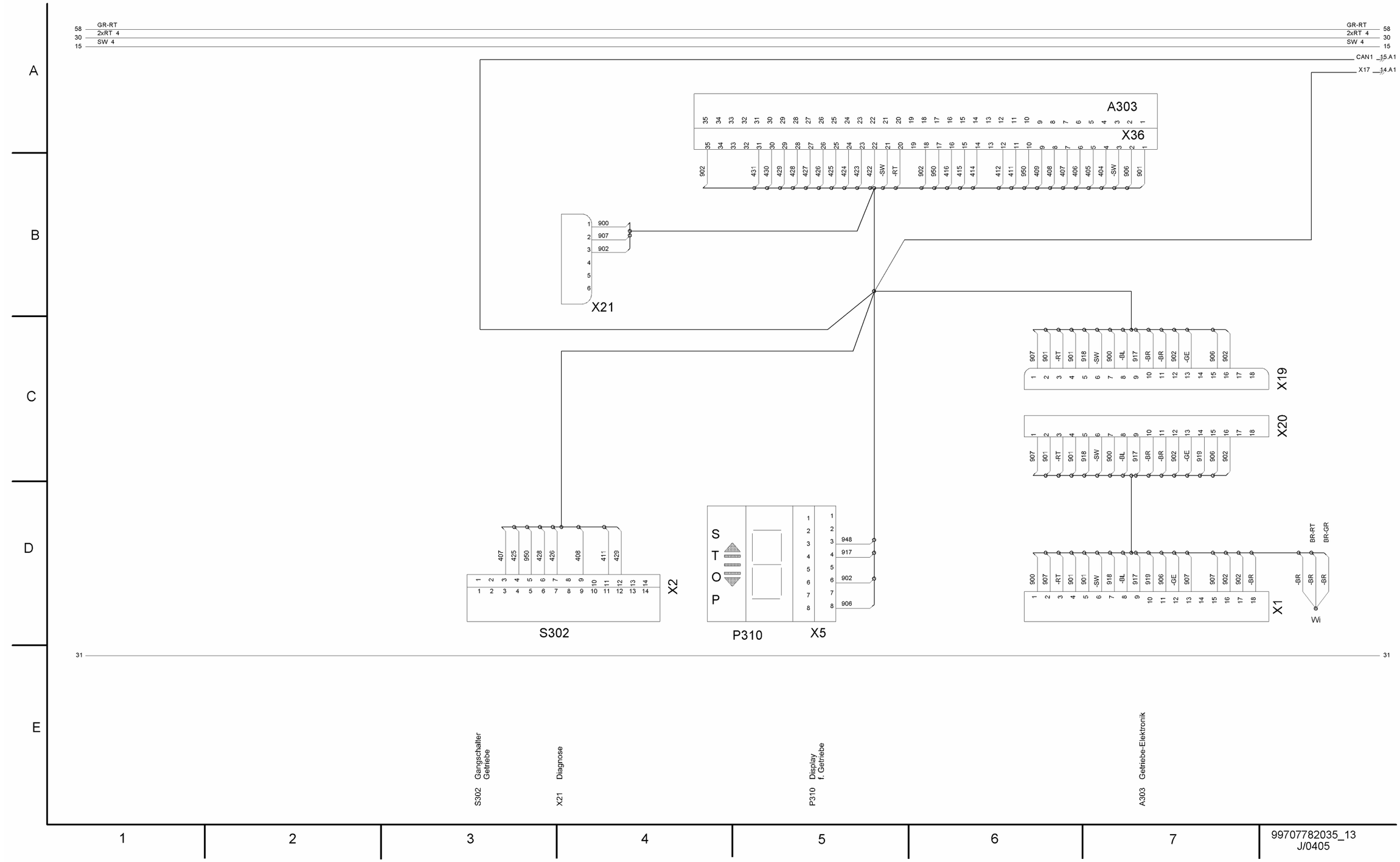
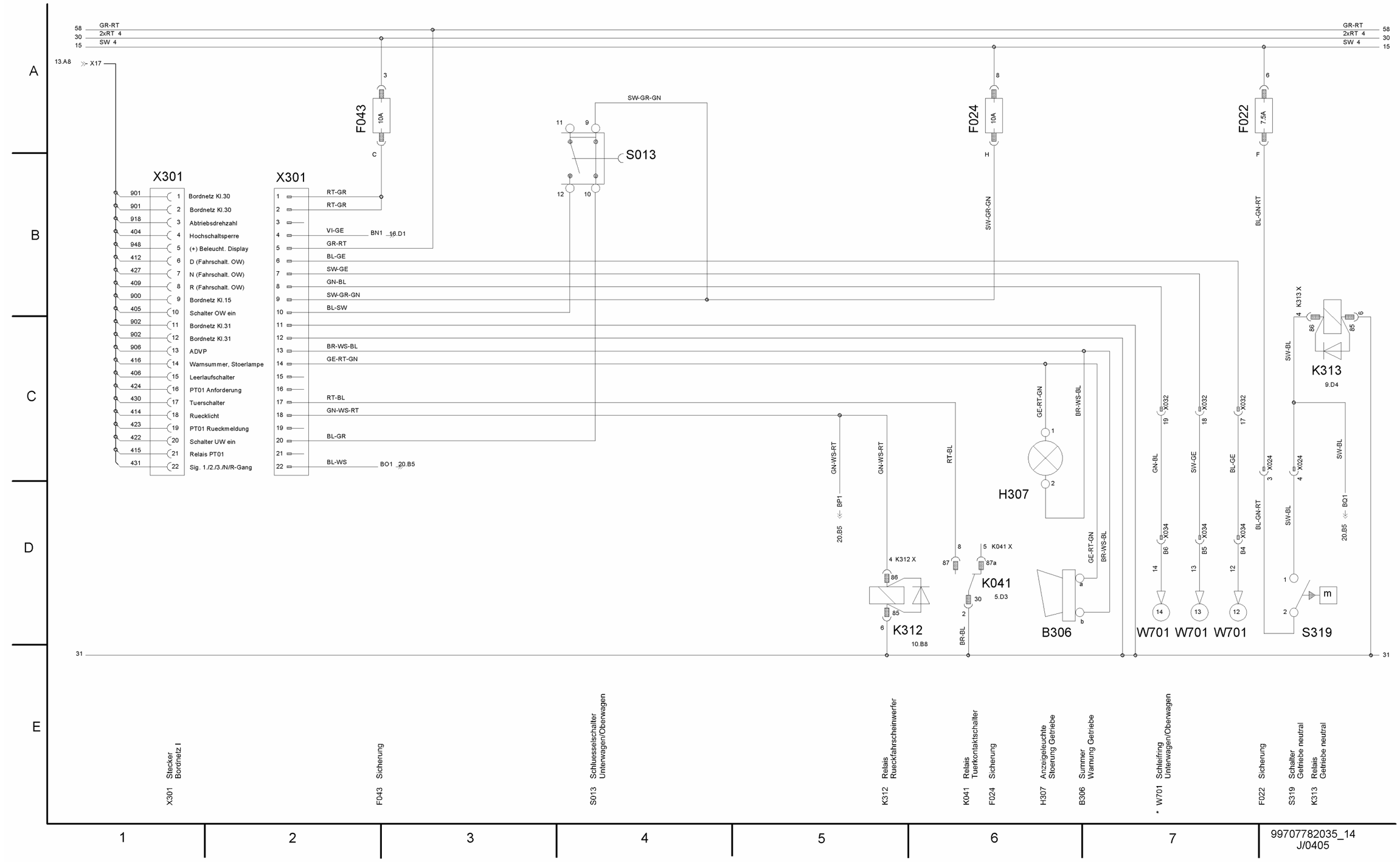
J/0405

1.3 Gearbox control (99707782035)

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58 GR-RT
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15 SW 4
13.A8 X17
F043 10A
F024 10A
F022 7.5A
SW-GR-GN
S013
X301
901 1 Bordnetz Kl.30
901 2 Bordnetz Kl.30
918 3 Abtriebsdrehzahl
404 4 Hochschaltsperre
948 5 (+) Beleucht. Display
412 6 D (Fahrschalt. OW)
427 7 N (Fahrschalt. OW)
409 8 R (Fahrschalt. OW)
900 9 Bordnetz Kl.15
405 10 Schalter OW ein
902 11 Bordnetz Kl.31
902 12 Bordnetz Kl.31
906 13 ADVP
416 14 Warnsummer, Stoerlampe
406 15 Leerlaufschalter
424 16 PT01 Anforderung
430 17 Tuerschalter
414 18 Ruecklicht
423 19 PT01 Rueckmeldung
422 20 Schalter UW ein
415 21 Relais PT01
431 22 Sig. 1./2./3./N/R-Gang
X301
1 RT-GR
2 RT-GR
3
4 VI-GE BN1 16.D1
5 GR-RT
6 BL-GE
7 SW-GE
8 GN-BL
9 SW-GR-GN
10 BL-SW
11
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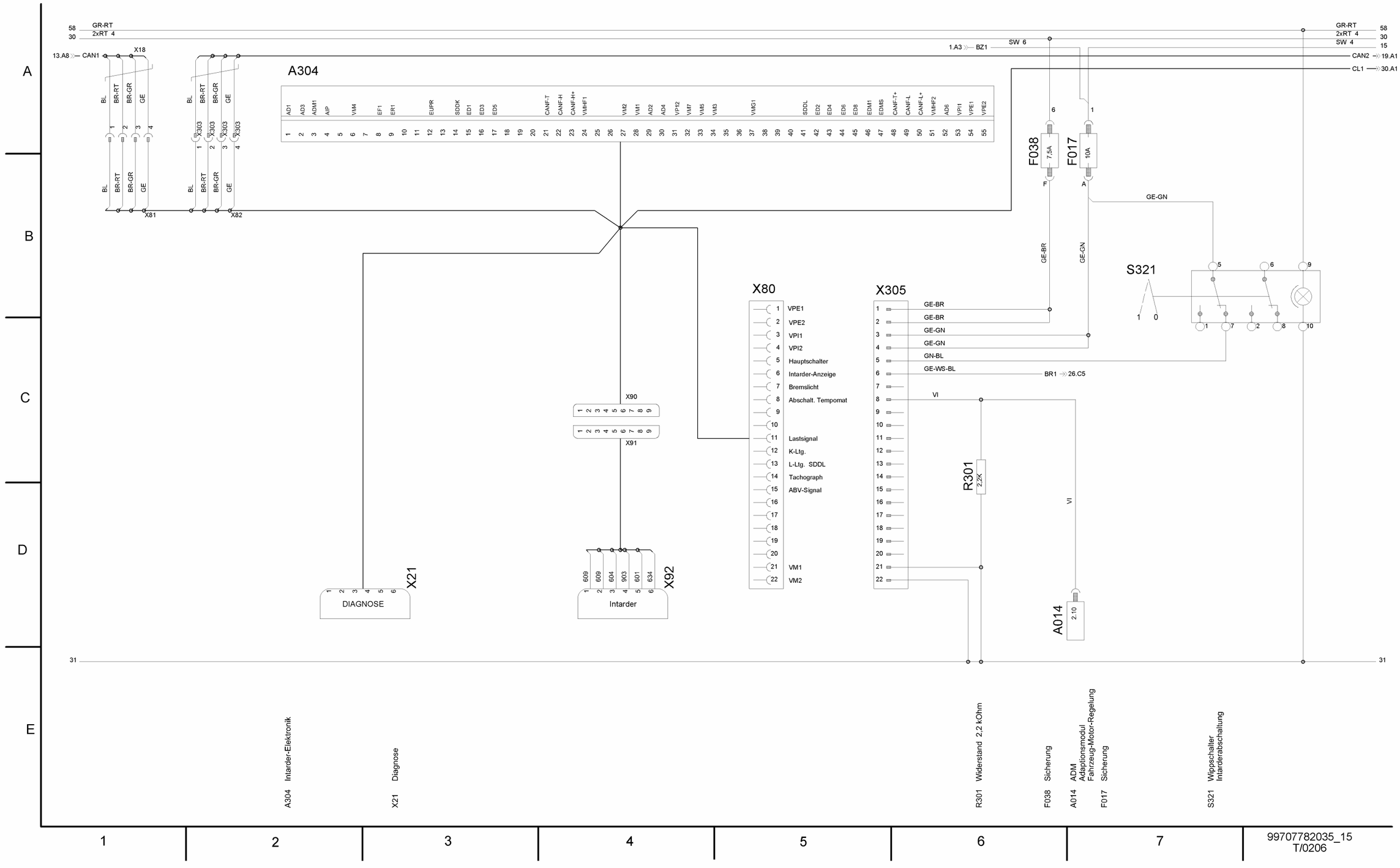
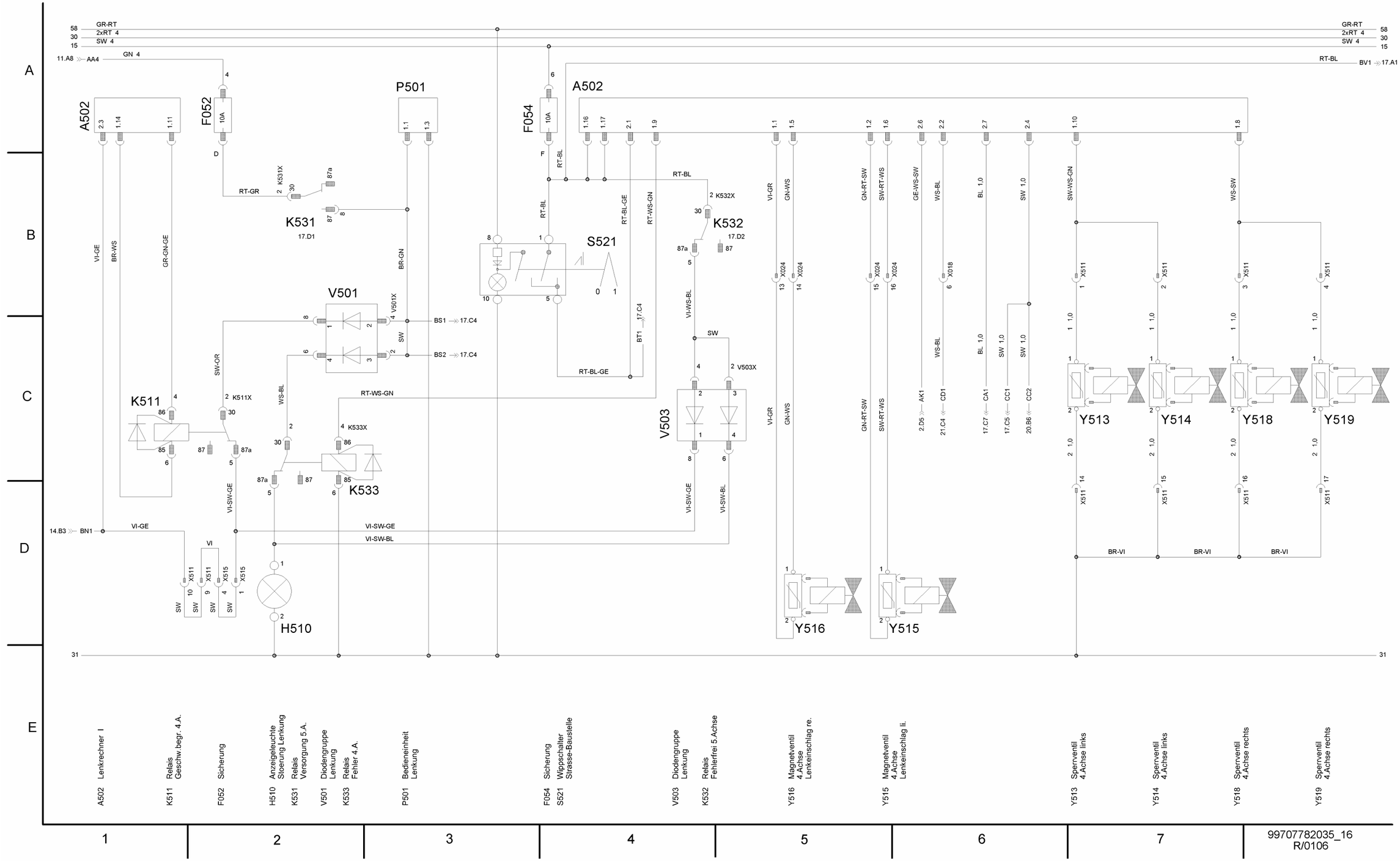
13 BR-WS-BL
14 GE-RT-GN
15
16
17 RT-BL
18 GN-WS-RT
19
20 BL-GR
21
22 BL-WS BO1 20.B5
GN-WS-RT BP1 20.B5
H307
K312 10.B8
K041 5.D3
B306
W701 W701 W701
S319
K313 9.D4
BL-GN-RT
SW-BL
31
X301 Stecker Bordnetz I
F043 Sicherung
S013 Schluesselschalter Unterwagen/Oberwagen
K312 Relais Rueckfahrscheinwerfer
K041 Relais Tuerkontaktschalter
F024 Sicherung
H307 Anzeigeleuchte Steuerung Getriebe
B306 Summer Warnung Getriebe
* W701 Schleifring Unterwagen/Oberwagen
F022 Sicherung
S319 Schalter Getriebe neutral
K313 Relais Getriebe neutral
99707782035_14
J/0405

1.4 Chassis (99707782035)




A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
11.A8 AA4
GN 4
A502
F052
10A
P501
F054
A502
RT-BL
BV1 17.A1
K531
17.D1
RT-GR
K531X
S521
K532
17.D2
K532X
V501
V501X
BS1 17.C4
BS2 17.C4
BR-GN
SW-OR
WS-BL
RT-WS-GN
K511
K511X
K533X
K533
V503
V503X
VI-SW-GE
VI-SW-BL
RT-BL-GE
BT1 17.C4
VI-GE
BR-WS
GR-GN-GE
VI-WS-BL
SW
14.B3 BN1
VI
H510
Y516
Y515
Y513
Y514
Y518
Y519
BR-VI
31
A502 Lenkrechner I
K511 Relais Geschw. begr. 4.A.
F052 Sicherung
H510 Anzeigeleuchte Stoerung Lenkung
K531 Relais Versorgung 5.A.
V501 Diodengruppe Lenkung
K533 Relais Fehler 4.A.
P501 Bedieneinheit Lenkung
F054 Sicherung
S521 Wippschalter Strasse-Baustelle
V503 Diodengruppe Lenkung
K532 Relais Fehlerfrei 5.Achse
Y516 Magnetventil 4.Achse Lenkeinschlag re.
Y515 Magnetventil 4.Achse Lenkeinschlag li.
Y513 Sperrventil 4.Achse links
Y514 Sperrventil 4.Achse links
Y518 Sperrventil 4.Achse rechts
Y519 Sperrventil 4.Achse rechts
1
2
3
4
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6
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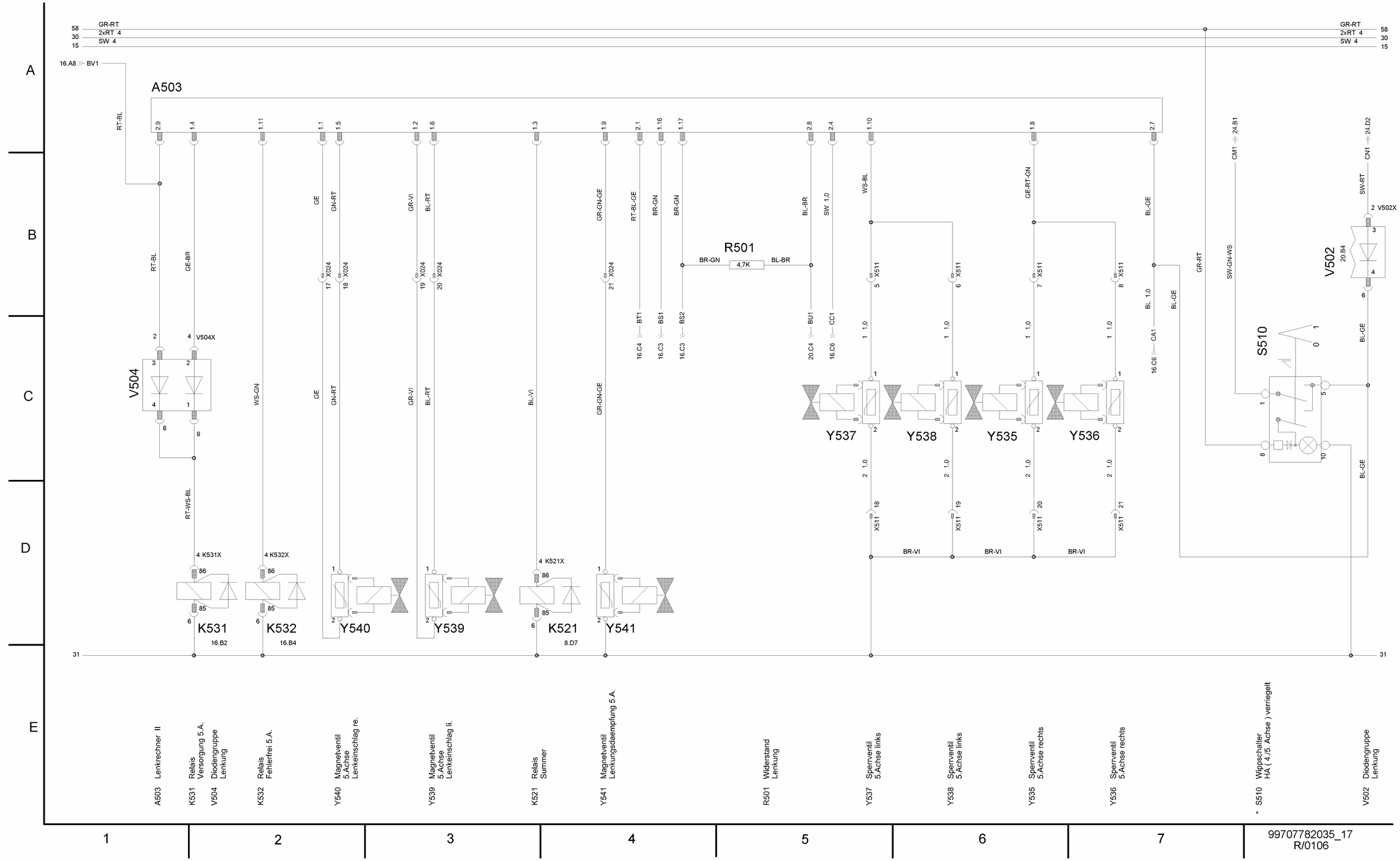
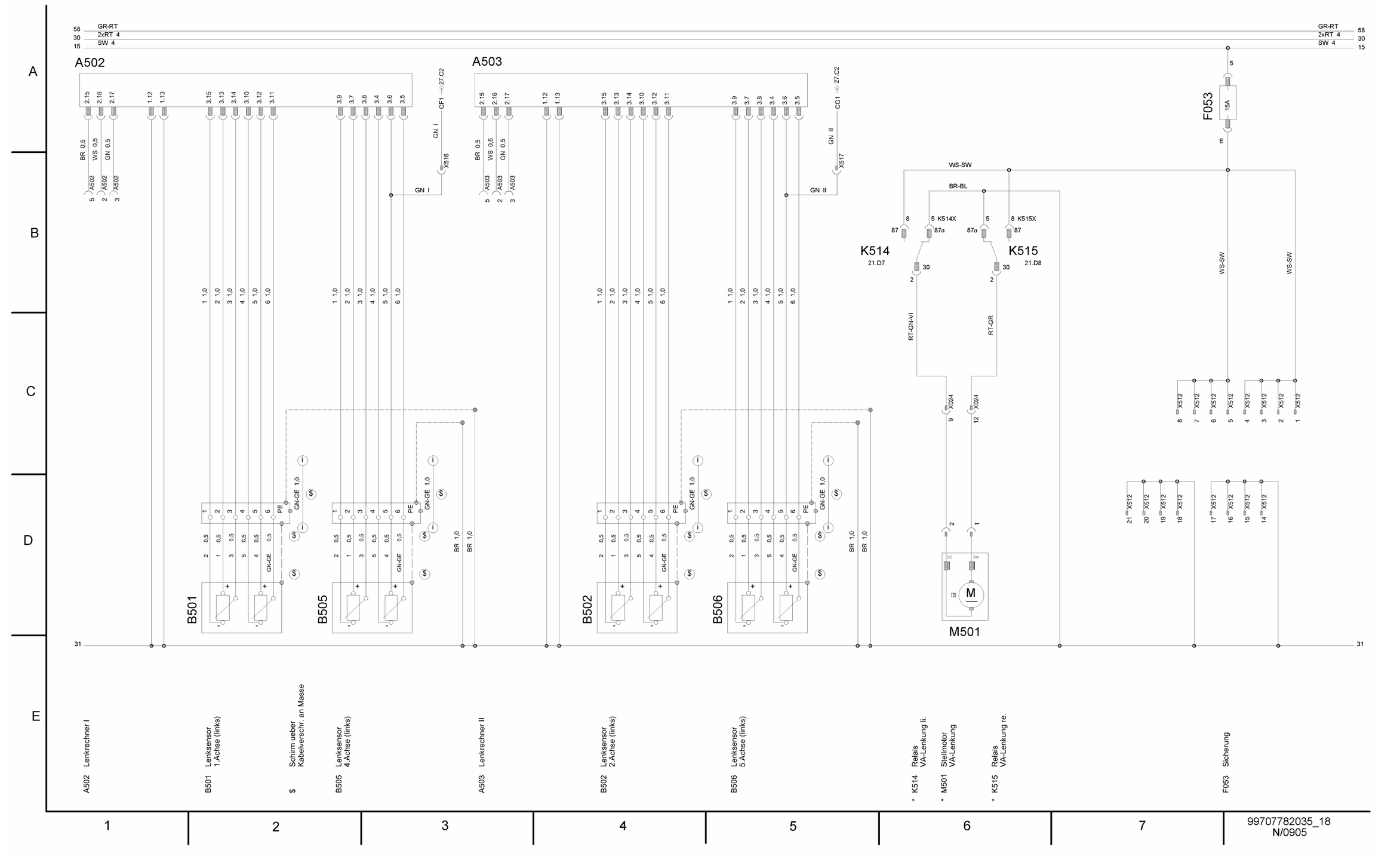
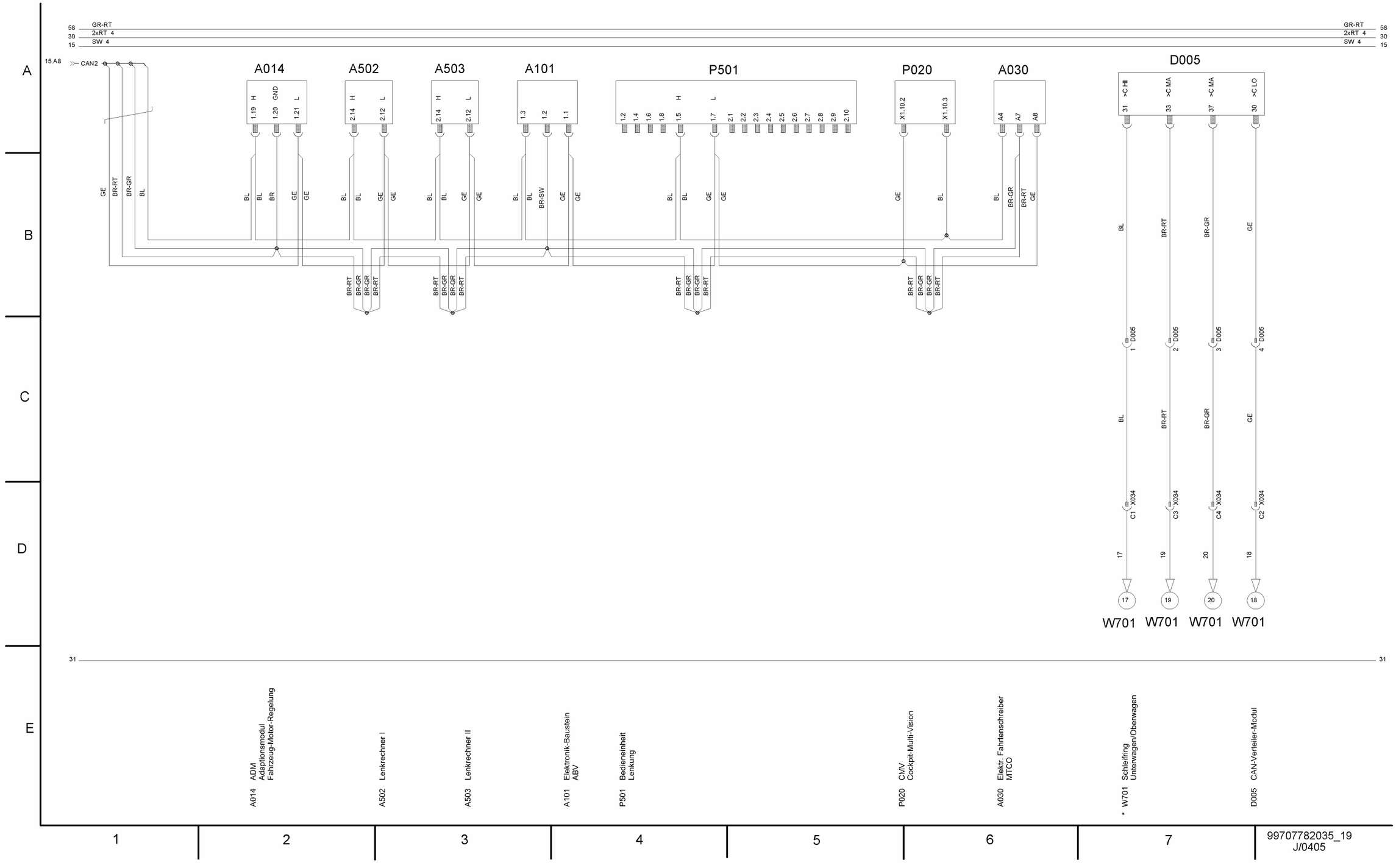
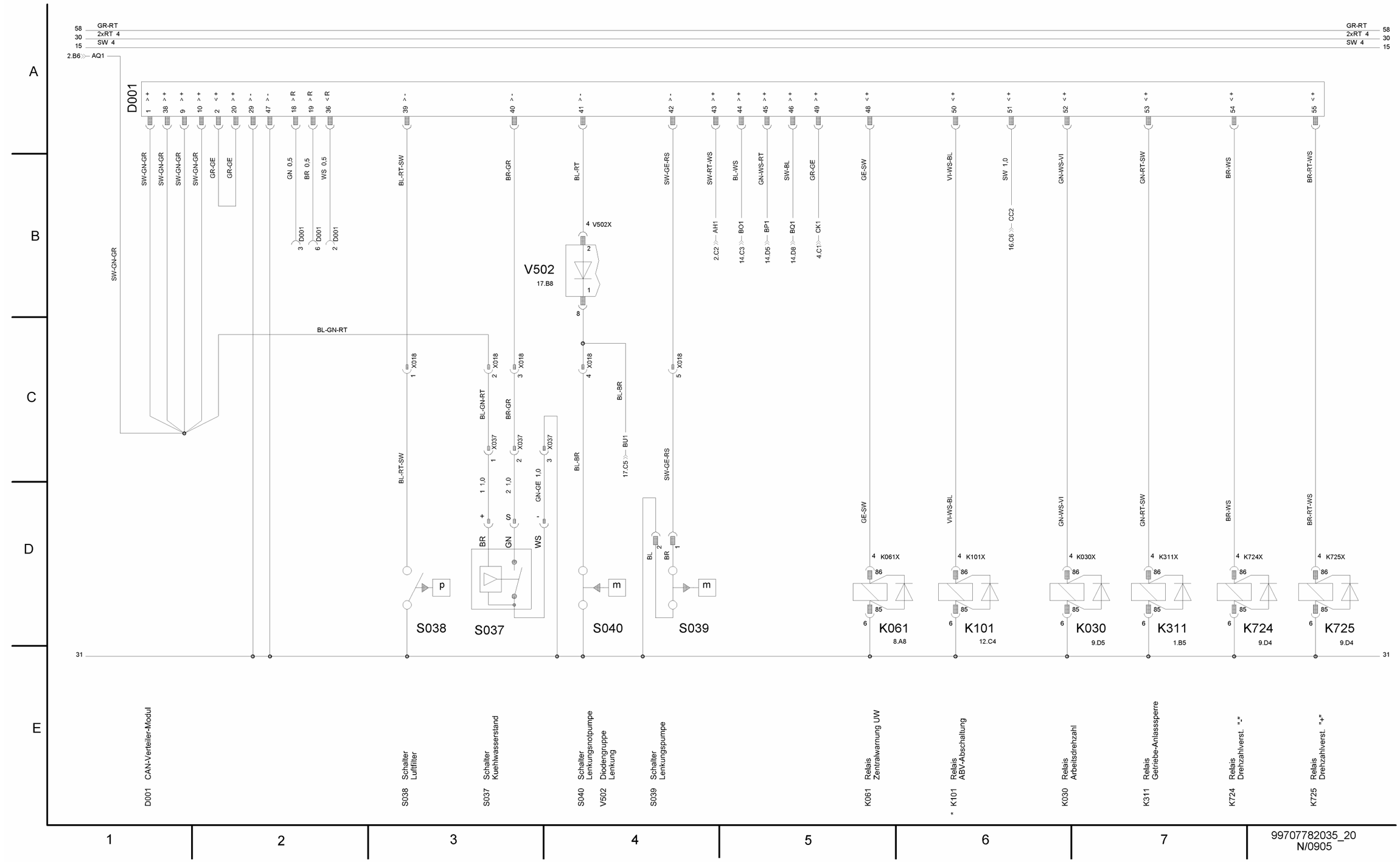
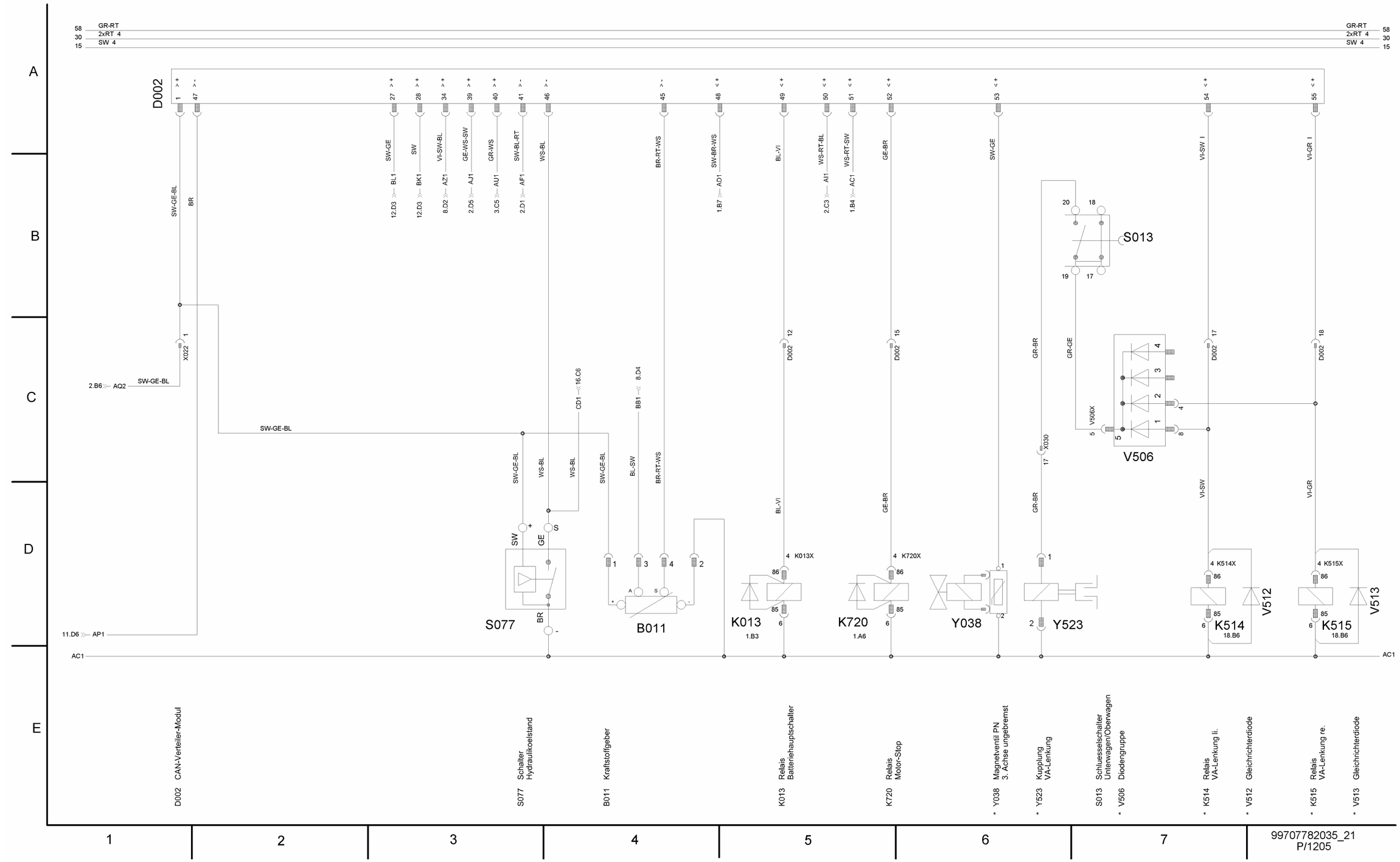
99707782035_16
R/0106

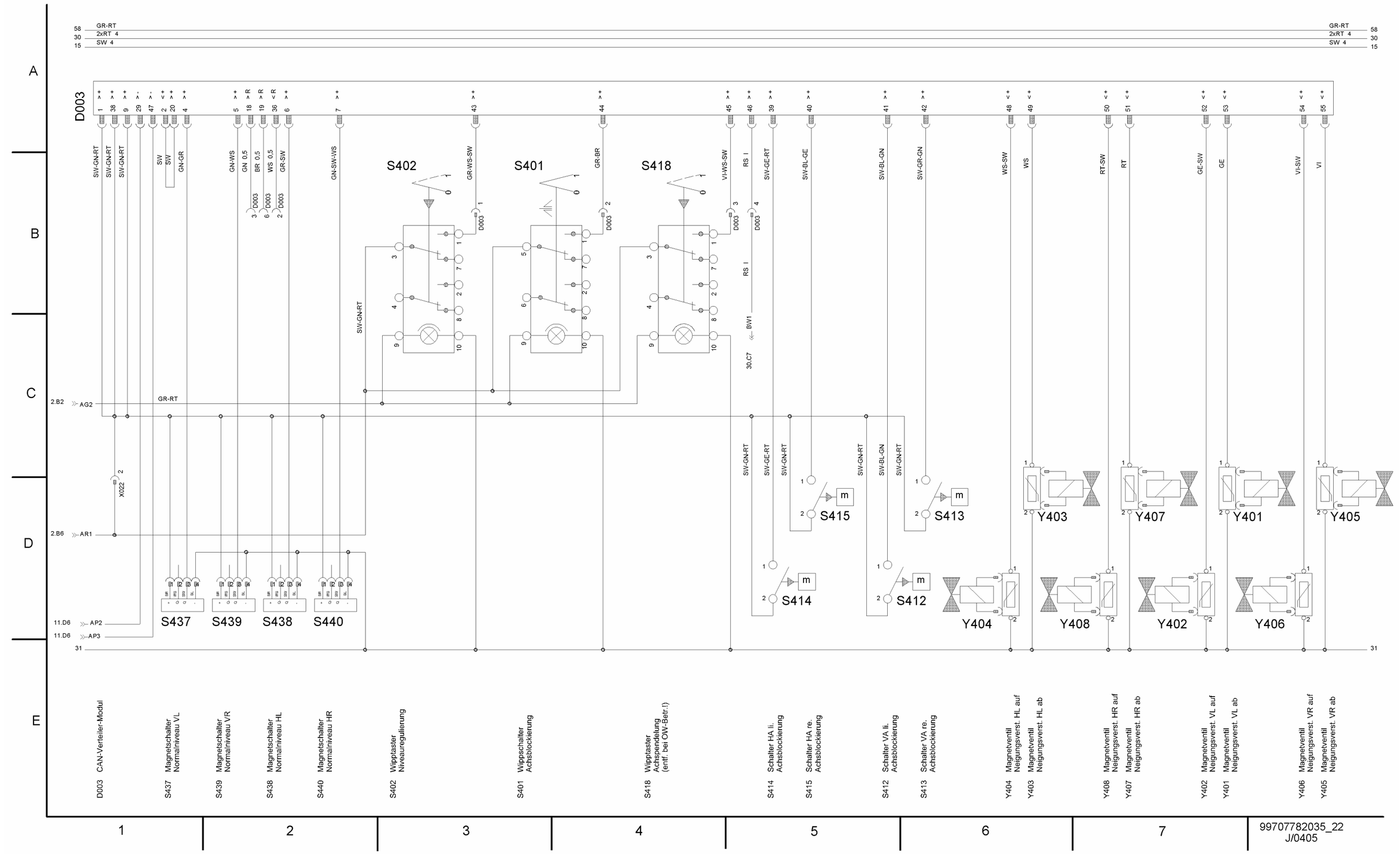

58 GR-RT
30 2xRT 4
15 SW 4
16.A8 BV1
A503
RT-BL
GE-BR
WS-GN
GE
GN-RT
GR-VI
BL-RT
BL-VI
GR-GN-GE
RT-BL-GE
BR-GN
BR-GN
R501
BR-GN 4,7K BL-BR
BL-BR
SW 1,0
WS-BL
GE-RT-GN
BL-GE
BL 1,0
GR-RT
SW-GN-WS
CM1 24.B1
CN1 24.D2
SW-RT
V502 20.B4
S510
V504
V504X
RT-WS-BL
K531 16.B2
K532 16.B4
K521 8.D7
Y540
Y539
Y541
Y537
Y538
Y535
Y536
X511
BR-VI
16.C6 CA1
16.C4 BT1
16.C3 BS1
16.C3 BS2
20.C4 BU1
16.C6 CC1
31
A503 Lenkrechner II
K531 Relais Versorgung 5.A.
V504 Diodengruppe Lenkung
K532 Relais Fehlerfrei 5.A.
Y540 Magnetventil 5.Achse Lenkeinschlag re.
Y539 Magnetventil 5.Achse Lenkeinschlag li.
K521 Relais Summer
Y541 Magnetventil Lenkungsdaempfung 5.A.
R501 Widerstand Lenkung
Y537 Sperrventil 5.Achse links
Y538 Sperrventil 5.Achse links
Y535 Sperrventil 5.Achse rechts
Y536 Sperrventil 5.Achse rechts
* S510 Wippschalter HA (4./5. Achse) verriegelt
V502 Diodengruppe Lenkung
1
2
3
4
5
6
7
99707782035_17
R/0106

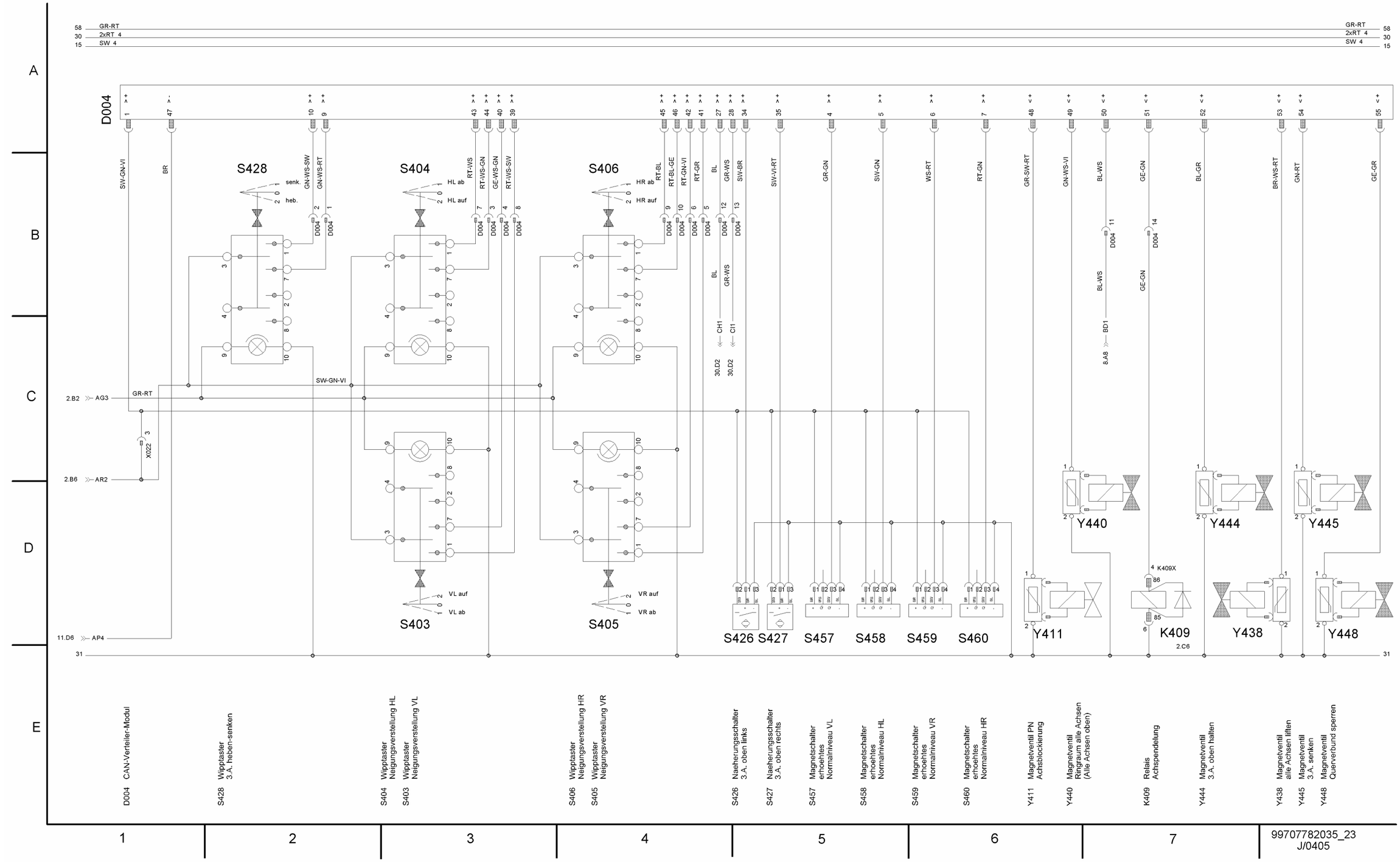

58 GR-RT
30 2xRT 4
15 SW 4
A502
A503
BR 0,5
WS 0,5
GN 0,5
GN I
GN II
CF1 ⇒27.C2
CG1 ⇒27.C2
X516
X517
B501
B505
B502
B506
GN-GE 1,0
GN-GE
BR 1,0
PE
31
F053
15A
WS-SW
BR-BL
K514
21.D7
K515
21.D8
K514X
K515X
RT-GN-VI
RT-GR
X024
M501
X512
A502 Lenkrechner I
B501 Lenksensor 1.Achse (links)
$ Schirm ueber Kabelverschr. an Masse
B505 Lenksensor 4.Achse (links)
A503 Lenkrechner II
B502 Lenksensor 2.Achse (links)
B506 Lenksensor 5.Achse (links)
* K514 Relais VA-Lenkung li.
* M501 Stellmotor VA-Lenkung
* K515 Relais VA-Lenkung re.
F053 Sicherung
99707782035_18
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
15.A8 CAN2
A014
1.19 H
1.20 GND
1.21 L
A502
2.14 H
2.12 L
A503
2.14 H
2.12 L
A101
1.3
1.2
1.1
P501
1.2 1.4 1.6 1.8 1.5 H 1.7 L 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10
P020
X1.10.2
X1.10.3
A030
A4 A7 A8
D005
31 >C HI
33 >C MA
37 >C MA
30 >C LO
GE BR-RT BR-GR BL
BL BL BR GE GE
BL BL GE GE
BL BL GE GE
BL BL BR-SW GE GE
BL BL GE GE
GE BL
BL BR-GR BR-RT GE
BR-RT BR-GR BR-GR BR-RT
1 D005
2 D005
3 D005
4 D005
C1 X034
C3 X034
C4 X034
C2 X034
17
19
20
18
W701 W701 W701 W701
31
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
A502 Lenkrechner I
A503 Lenkrechner II
A101 Elektronik-Baustein ABV
P501 Bedieneinheit Lenkung
P020 CMV Cockpit-Multi-Vision
A030 Elektr. Fahrtenschreiber MTCO
* W701 Schleifring Unterwagen/Oberwagen
D005 CAN-Verteiler-Modul
1 2 3 4 5 6 7
99707782035_19
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
2.B6 AQ1
D001
SW-GN-GR
BL-GN-RT
BL-RT-SW
BR-GR
BL-RT
SW-GE-RS
SW-RT-WS
BL-WS
GN-WS-RT
SW-BL
GR-GE
GE-SW
VI-WS-BL
SW 1,0
GN-WS-VI
GN-RT-SW
BR-WS
BR-RT-WS
GN 0,5
BR 0,5
WS 0,5
V502
17.B8
4 V502X
BL-BR
17.C5 BU1
GN-GE 1,0
S038
S037
S040
S039
K061
8.A8
K101
12.C4
K030
9.D5
K311
1.B5
K724
9.D4
K725
9.D4
16.C6 CC2
31
D001 CAN-Verteiler-Modul
S038 Schalter Luftfilter
S037 Schalter Kuehlwasserstand
S040 Schalter Lenkungsnotpumpe
V502 Diodengruppe Lenkung
S039 Schalter Lenkungspumpe
K061 Relais Zentralwarnung UW
K101 Relais ABV-Abschaltung
K030 Relais Arbeitsdrehzahl
K311 Relais Getriebe-Anlasssperre
K724 Relais Drehzahlverst. "-"
K725 Relais Drehzahlverst. "+"
99707782035_20
N/0905


58 GR-RT
30 2xRT 4
15 SW 4
D002
SW-GE-BL
BR
SW-GE
SW
VI-SW-BL
GE-WS-SW
GR-WS
SW-BL-RT
WS-BL
BR-RT-WS
SW-BR-WS
BL-VI
WS-RT-BL
WS-RT-SW
GE-BR
SW-GE
GR-BR
GR-GE
VI-SW I
VI-GR I
S013
V506X
V506
X030
X022
2.B6 AQ2
11.D6 AP1
AC1
SW
GE
BR
S077
B011
K013
1.B3
K720
1.A6
Y038
Y523
K514
18.B6
K515
18.B6
V512
V513
D002 CAN-Verteiler-Modul
S077 Schalter Hydraulikoelstand
B011 Kraftstoffgeber
K013 Relais Batteriehauptschalter
K720 Relais Motor-Stop
Y038 Magnetventil PN 3. Achse ungebremst
Y523 Kupplung VA-Lenkung
S013 Schluesselschalter Unterwagen/Oberwagen
V506 Diodengruppe
K514 Relais VA-Lenkung li.
V512 Gleichrichterdiode
K515 Relais VA-Lenkung re.
V513 Gleichrichterdiode
99707782035_21
P/1205


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D003
S402
S401
S418
S437
S439
S438
S440
S415
S413
S414
S412
Y403
Y407
Y401
Y405
Y404
Y408
Y402
Y406
2.B2 AG2
2.B6 AR1
11.D6 AP2
11.D6 AP3
31
X022
GR-RT
SW-GN-RT
SW-GE-RT
SW-BL-GN
GN-WS
GN-SW-WS
GR-WS-SW
GR-BR
VI-WS-SW
RS I
SW-GE-RT
SW-BL-GE
SW-GR-GN
WS-SW
WS
RT-SW
RT
GE-SW
GE
VI-SW
VI
BW1
30.C7
1 2 3 4 5 6 7 8 9 10
1 CAN-Verteiler-Modul
2 Magnetschalter Normalniveau VL
Magnetschalter Normalniveau VR
Magnetschalter Normalniveau HL
Magnetschalter Normalniveau HR
3 Wipptaster Niveauregulierung
4 Wippschalter Achsblockierung
Wipptaster Achspendelung (entf. bei OW-Betr.!)
5 Schalter HA li. Achsblockierung
Schalter HA re. Achsblockierung
Schalter VA li. Achsblockierung
Schalter VA re. Achsblockierung
6 Magnetventil Neigungsverst. HL auf
Magnetventil Neigungsverst. HL ab
7 Magnetventil Neigungsverst. HR auf
Magnetventil Neigungsverst. HR ab
Magnetventil Neigungsverst. VL auf
Magnetventil Neigungsverst. VL ab
Magnetventil Neigungsverst. VR auf
Magnetventil Neigungsverst. VR ab
99707782035_22
J/0405


58 GR-RT
30 2xRT 4
15 SW 4
D004
S428
S404
S406
S403
S405
S426 S427
S457
S458
S459
S460
Y411
Y440
Y444
Y445
Y438
Y448
K409
K409X
2.C6
2.B2 AG3
2.B6 AR2
11.D6 AP4
X022
SW-GN-VI
GR-RT
BR
31
D004 CAN-Verteiler-Modul
S428 Wipptaster 3.A. heben-senken
S404 Wipptaster Neigungsverstellung HL
S403 Wipptaster Neigungsverstellung VL
S406 Wipptaster Neigungsverstellung HR
S405 Wipptaster Neigungsverstellung VR
S426 Naeherungsschalter 3.A. oben links
S427 Naeherungsschalter 3.A. oben rechts
S457 Magnetschalter erhoehtes Normalniveau VL
S458 Magnetschalter erhoehtes Normalniveau HL
S459 Magnetschalter erhoehtes Normalniveau VR
S460 Magnetschalter erhoehtes Normalniveau HR
Y411 Magnetventil PN Achsblockierung
Y440 Magnetventil Ringraum alle Achsen (Alle Achsen oben)
K409 Relais Achsspendelung
Y444 Magnetventil 3.A. oben halten
Y438 Magnetventil alle Achsen liften
Y445 Magnetventil 3.A. senken
Y448 Magnetventil Querverbund sperren
1
2
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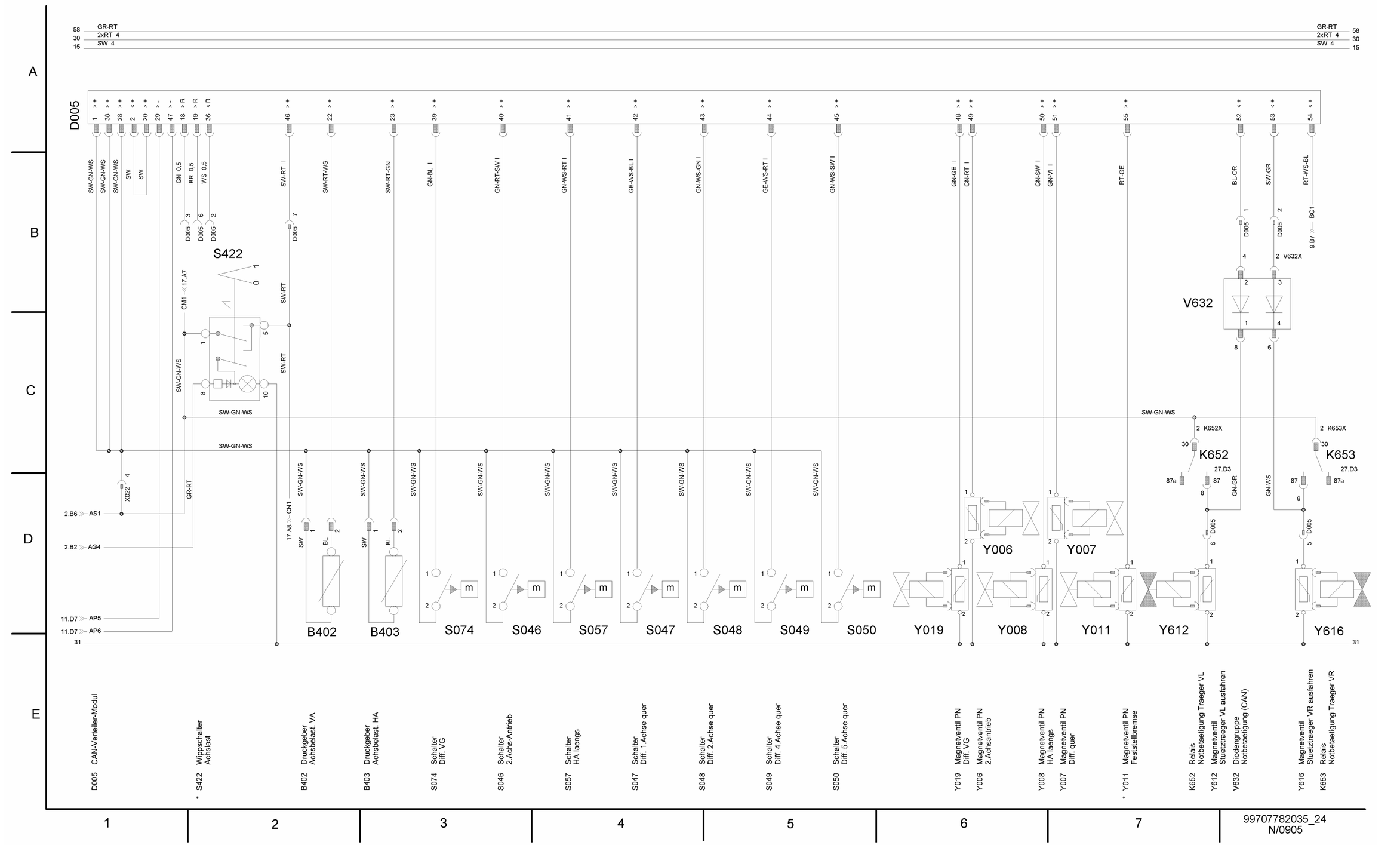
99707782035_23
J/0405


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D005
SW-GN-WS
SW
GN 0,5
BR 0,5
WS 0,5
SW-RT I
SW-RT-WS
SW-RT-GN
GN-BL I
GN-RT-SW I
GN-WS-RT I
GE-WS-BL I
GN-WS-GN I
GE-WS-RT I
GN-WS-SW I
GN-GE I
GN-RT I
GN-SW I
GN-VI I
RT-GE
BL-OR
SW-GR
RT-WS-BL
S422
CM1 17.A7
SW-RT
SW-GN-WS
X022
GR-RT
2.B6 AS1
2.B2 AG4
11.D7 AP5
11.D7 AP6
31
17.A8 CN1
B402
B403
S074
S046
S057
S047
S048
S049
S050
V632
V632X
Y006
Y007
Y019
Y008
Y011
Y612
Y616
K652X
K652
K653X
K653
GN-WS
GN-GR
BG1
D005 CAN-Verteiler-Modul
* S422 Wippschalter Achslast
B402 Druckgeber Achsbelast. VA
B403 Druckgeber Achsbelast. HA
S074 Schalter Diff. VG
S046 Schalter 2.Achs-Antrieb
S057 Schalter HA laengs
S047 Schalter Diff. 1.Achse quer
S048 Schalter Diff. 2.Achse quer
S049 Schalter Diff. 4.Achse quer
S050 Schalter Diff. 5.Achse quer
Y019 Magnetventil PN Diff. VG
Y006 Magnetventil PN 2.Achsantrieb
Y008 Magnetventil PN HA laengs
Y007 Magnetventil PN Diff. quer
* Y011 Magnetventil PN Feststellbremse
K652 Relais Notbetaetigung Traeger VL
Y612 Magnetventil Stuetztraeger VL ausfahren
V632 Diodengruppe Notbetaetigung (CAN)
Y616 Magnetventil Stuetztraeger VR ausfahren
K653 Relais Notbetaetigung Traeger VR
1
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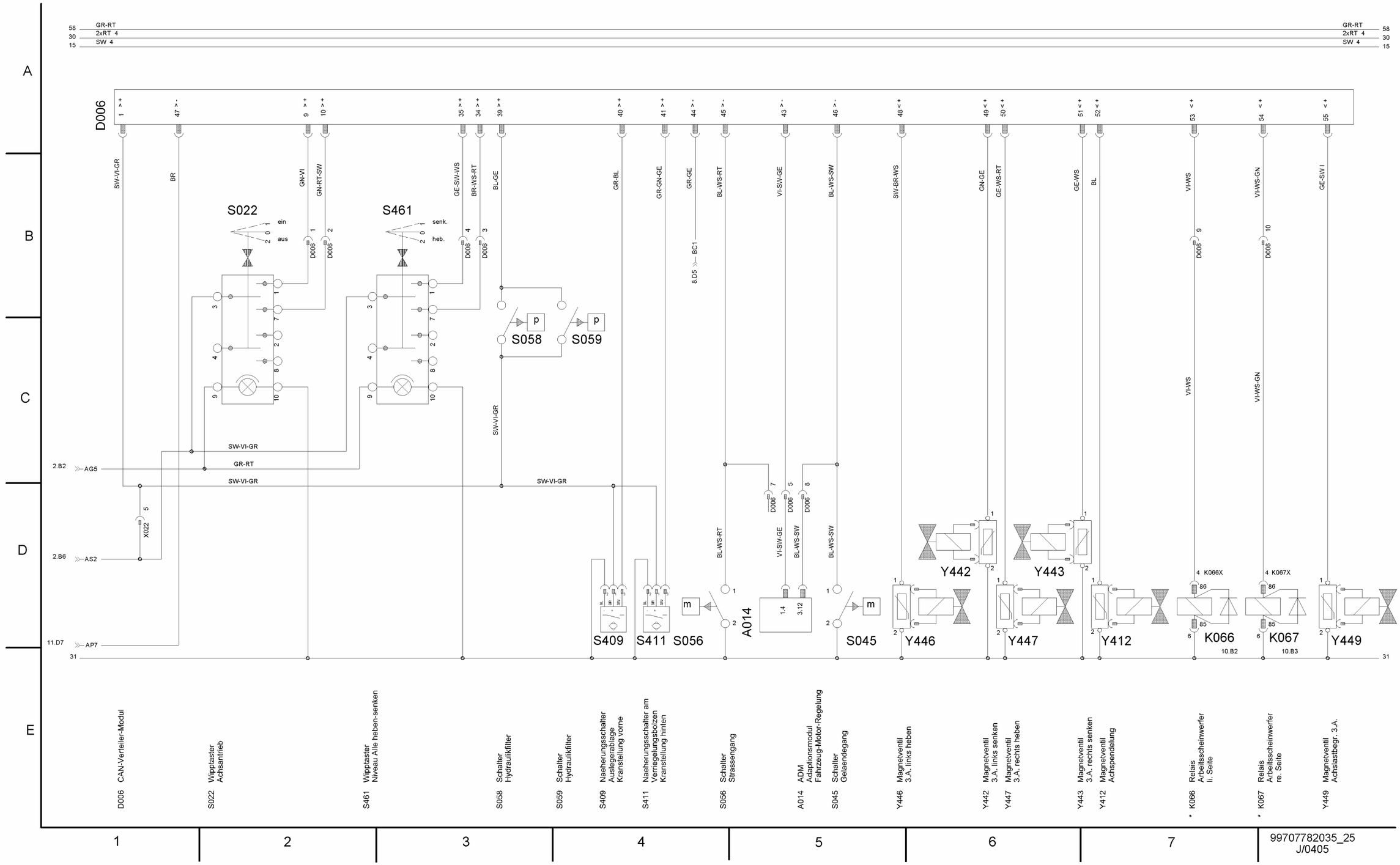
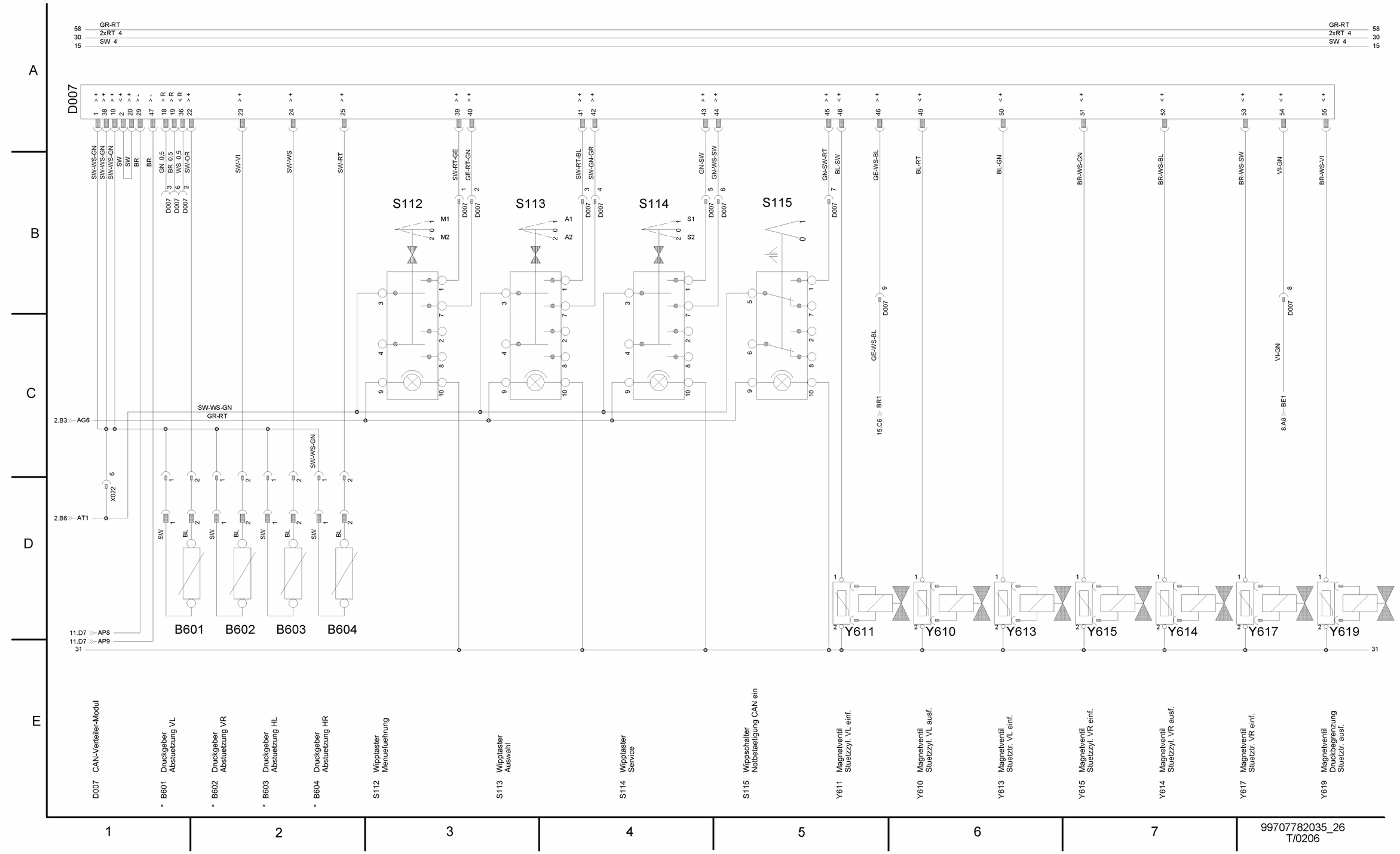
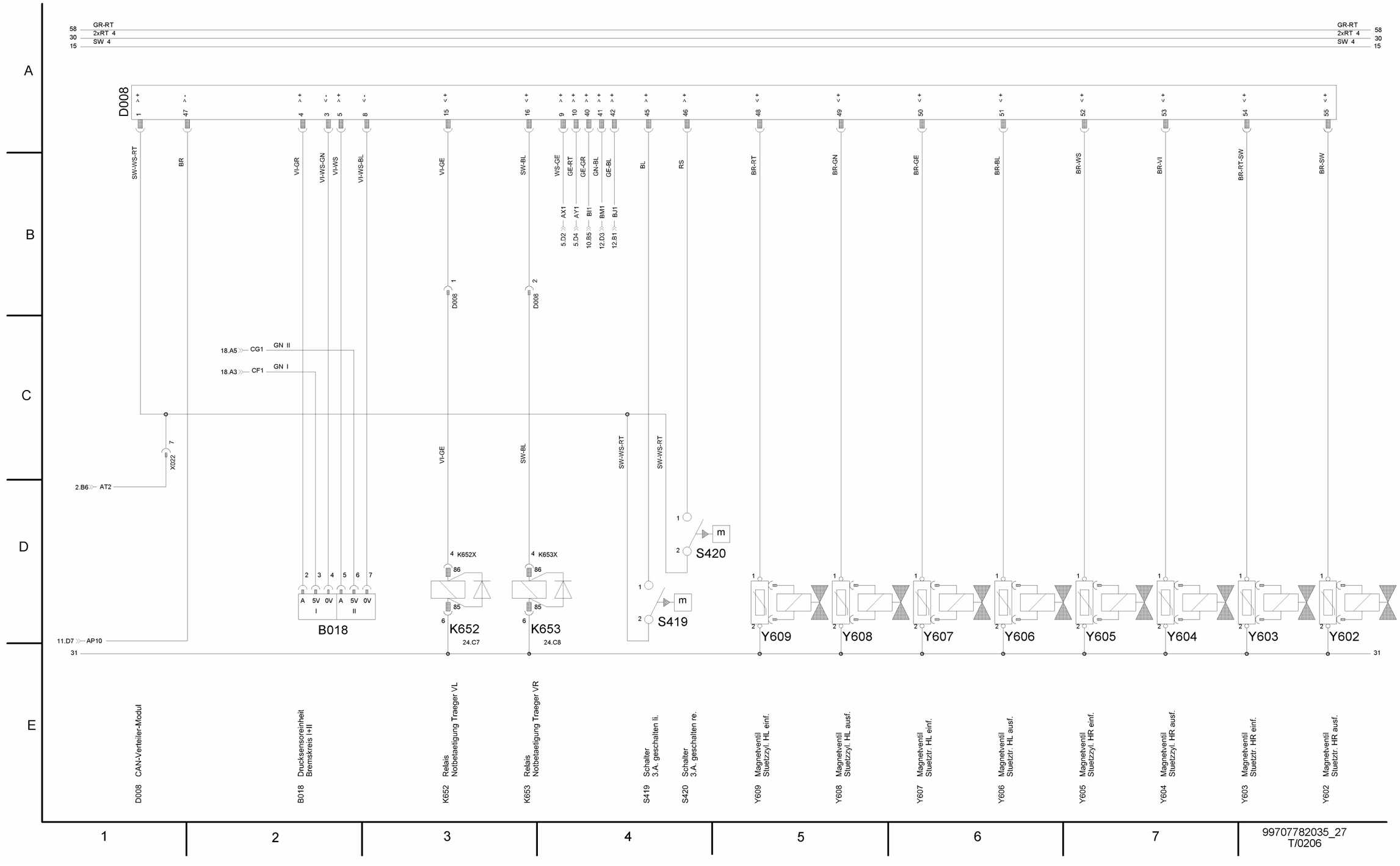
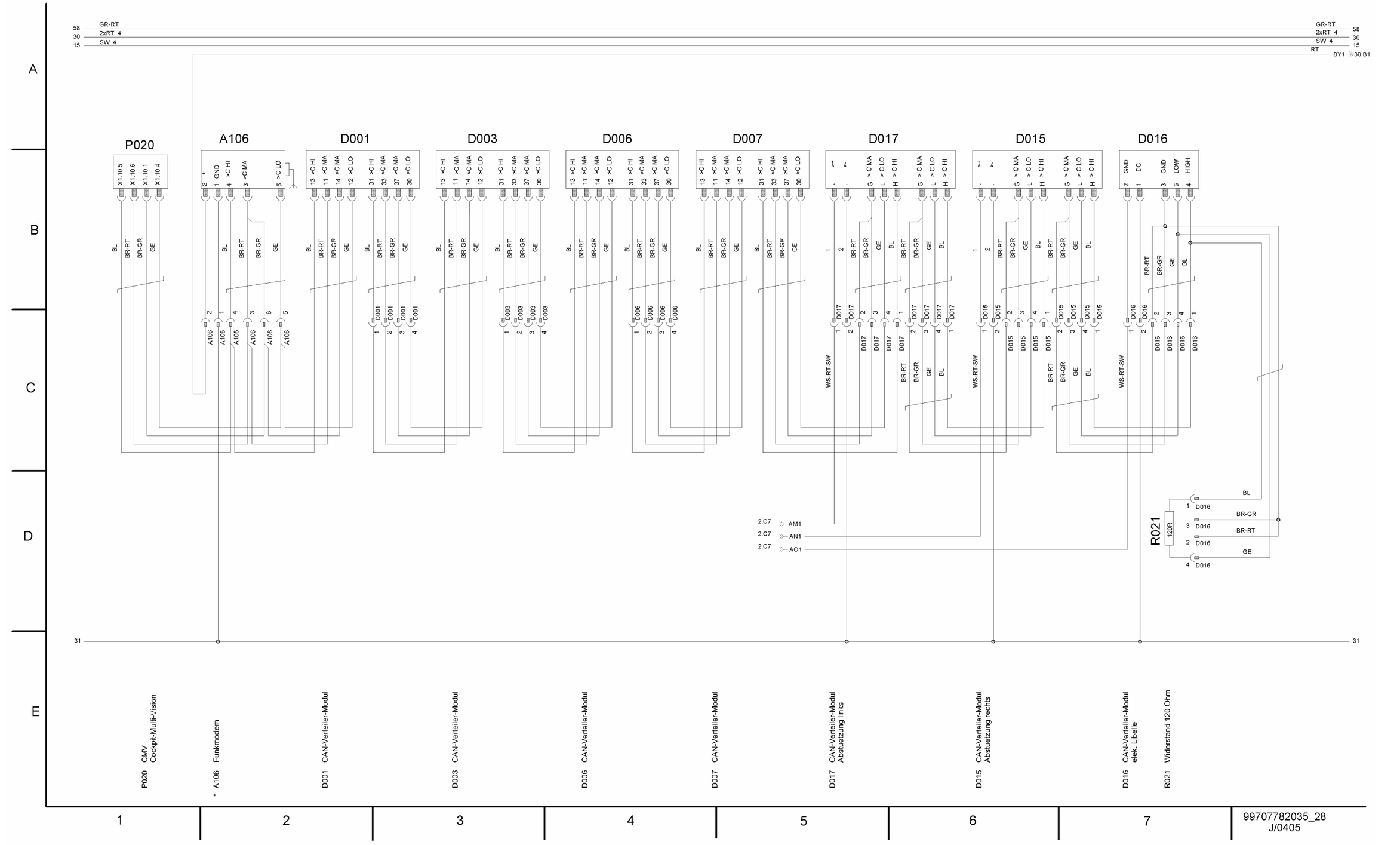
99707782035_24
N/0905


A
B
C
D
E
58 GR-RT
30 2xRT 4
15 SW 4
D006
S022
ein
aus
S461
senk.
heb.
S058
S059
S409
S411
S056
A014
S045
Y442
Y443
Y446
Y447
Y412
K066
K067
Y449
SW-VI-GR
GR-RT
2.B2 AG5
2.B6 AS2
11.D7 AP7
31
X022
10.B2
10.B3
D006 CAN-Verteiler-Modul
S022 Wipptaster Achsantrieb
S461 Wipptaster Niveau Alle heben-senken
S058 Schalter Hydraulikfilter
S059 Schalter Hydraulikfilter
S409 Naeherungsschalter Auslegerablage Kranstellung vorne
S411 Naeherungsschalter am Verriegelungsbolzen Kranstellung hinten
S056 Schalter Strassengang
A014 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
S045 Schalter Geländegang
Y446 Magnetventil 3.A. links heben
Y442 Magnetventil 3.A. links senken
Y447 Magnetventil 3.A. rechts heben
Y443 Magnetventil 3.A. rechts senken
Y412 Magnetventil Achspendelung
K066 Relais Arbeitsscheinwerfer li. Seite
K067 Relais Arbeitsscheinwerfer re. Seite
Y449 Magnetventil Achslastbegr. 3.A.
1 2 3 4 5 6 7
99707782035_25
J/0405

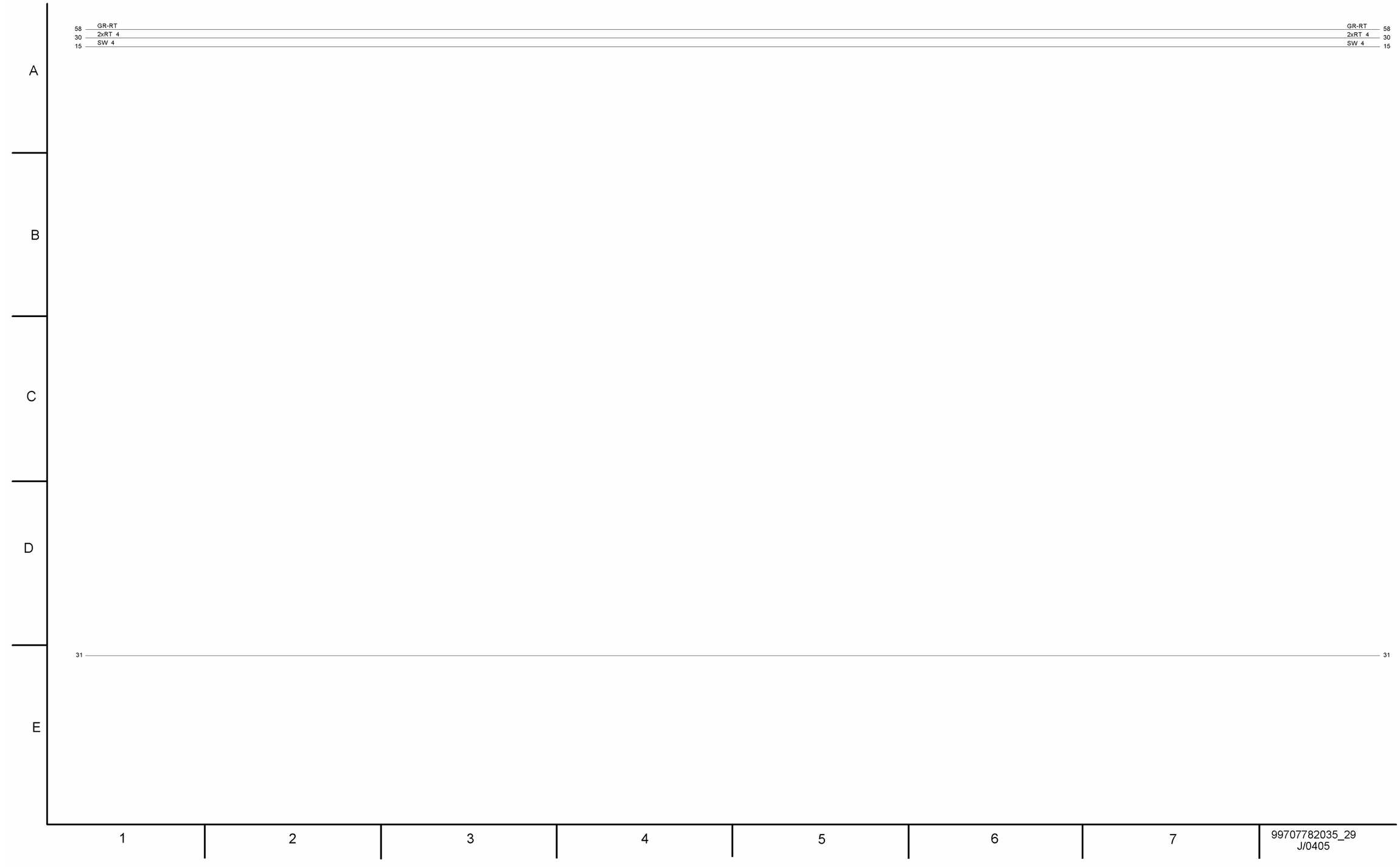

58 GR-RT
30 2xRT 4
15 SW 4
D007
S112
S113
S114
S115
B601
B602
B603
B604
Y611
Y610
Y613
Y615
Y614
Y617
Y619
2.B3 AG6
2.B6 AT1
11.D7 AP8
11.D7 AP9
31
SW-WS-GN
GR-RT
X022
SW-WS-GN
GE-WS-BL
15.C6 BR1
VI-GN
8.A8 BE1
D007 CAN-Verteiler-Modul
B601 Druckgeber Abstuetzung VL
B602 Druckgeber Abstuetzung VR
B603 Druckgeber Abstuetzung HL
B604 Druckgeber Abstuetzung HR
S112 Wipptaster Menuefuehrung
S113 Wipptaster Auswahl
S114 Wipptaster Service
S115 Wippschalter Notbetaetigung CAN ein
Y611 Magnetventil Stuetzzyl. VL einf.
Y610 Magnetventil Stuetzzyl. VL ausf.
Y613 Magnetventil Stuetzstr. VL einf.
Y615 Magnetventil Stuetzzyl. VR einf.
Y614 Magnetventil Stuetzzyl. VR ausf.
Y617 Magnetventil Stuetzstr. VR einf.
Y619 Magnetventil Druckbegrenzung Stuetztr. ausf.
1
2
3
4
5
6
7
99707782035_26
T/0206


58 GR-RT
30 2xRT 4
15 SW 4
D008
SW-WS-RT
BR
VI-GR
VI-WS-GN
VI-WS
VI-WS-BL
VI-GE
SW-BL
WS-GE
GE-RT
GE-GR
GN-BL
GE-BL
BL
RS
BR-RT
BR-GN
BR-GE
BR-BL
BR-WS
BR-VI
BR-RT-SW
BR-SW
18.A5 CG1 GN II
18.A3 CF1 GN I
X022
2.B6 AT2
11.D7 AP10
31
B018
A 5V 0V A 5V 0V
I II
K652
24.C7
K653
24.C8
K652X
K653X
S419
S420
Y609
Y608
Y607
Y606
Y605
Y604
Y603
Y602
D008 CAN-Verteiler-Modul
B018 Drucksensoreinheit Bremskreis I+II
K652 Relais Notbetaetigung Traeger VL
K653 Relais Notbetaetigung Traeger VR
S419 Schalter 3.A. geschalten li.
S420 Schalter 3.A. geschalten re.
Y609 Magnetventil Stuetzzyl. HL einf.
Y608 Magnetventil Stuetzzyl. HL ausf.
Y607 Magnetventil Stuetztr. HL einf.
Y606 Magnetventil Stuetztr. HL ausf.
Y605 Magnetventil Stuetzzyl. HR einf.
Y604 Magnetventil Stuetzzyl. HR ausf.
Y603 Magnetventil Stuetztr. HR einf.
Y602 Magnetventil Stuetztr. HR ausf.
1 2 3 4 5 6 7
99707782035_27
T/0206

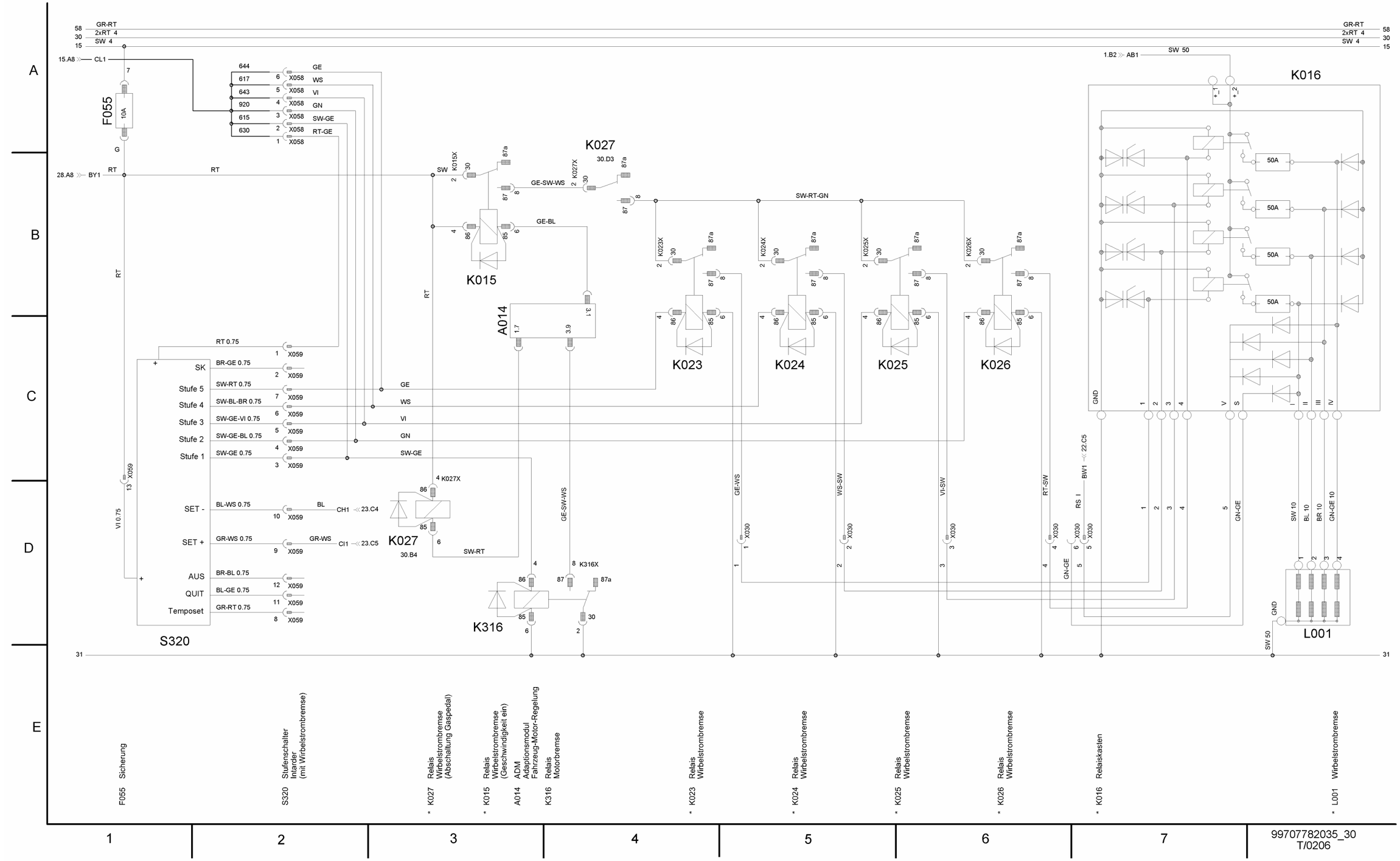
1.5 CAN connections (99707782035)



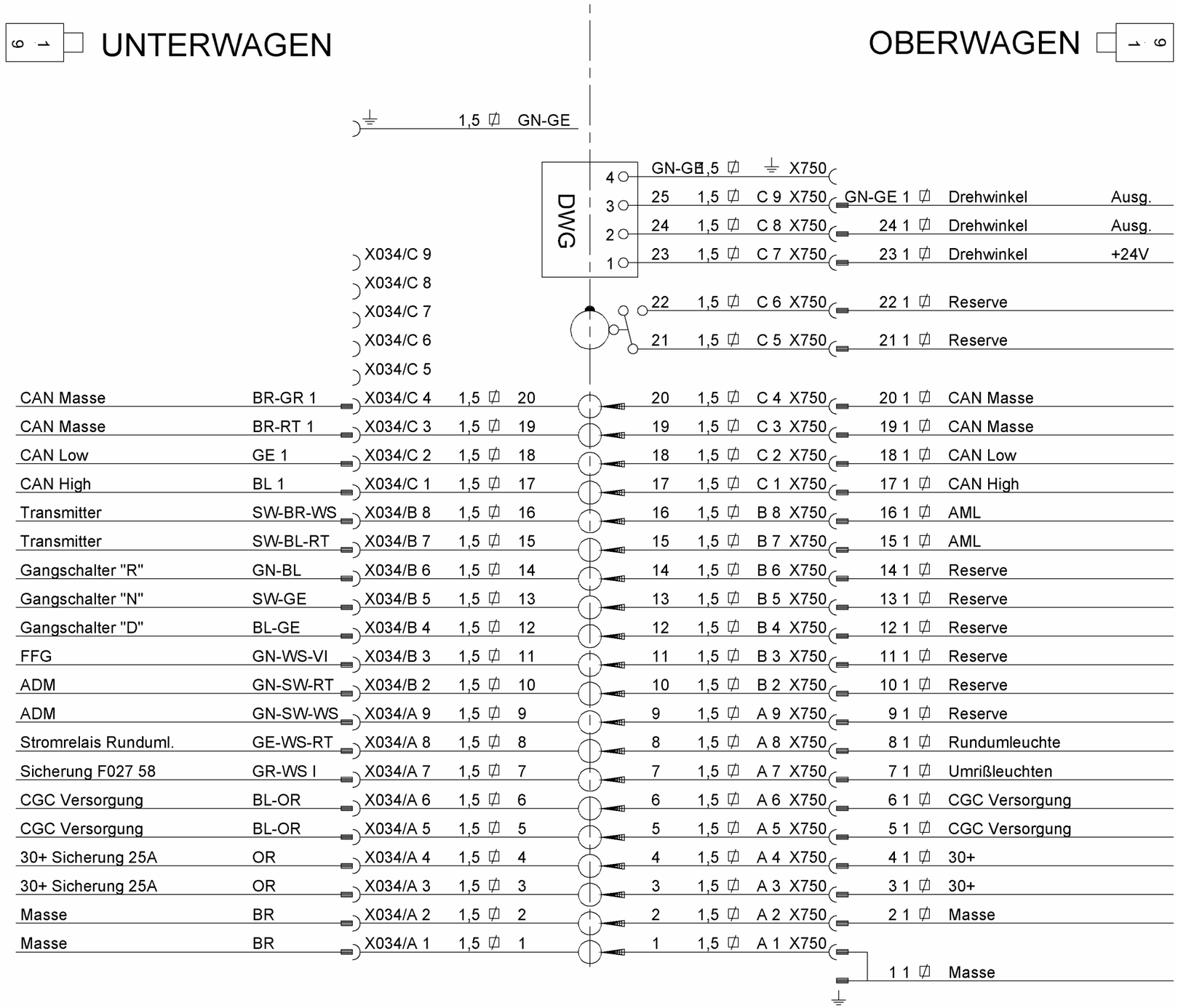
1.6 Chassis (99707782035)



1.7 Eddy-current brake (99707782035)



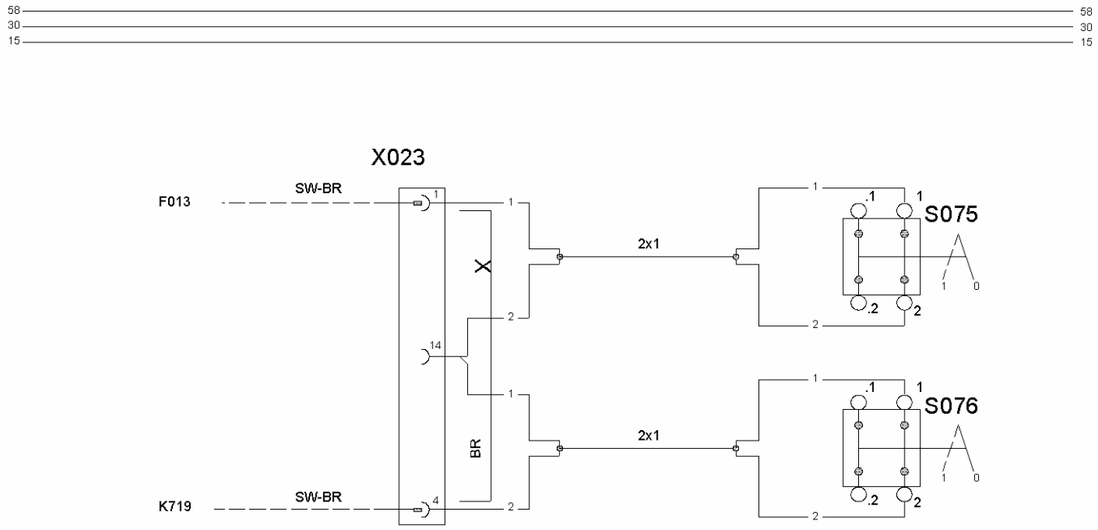
1.8 Connection diagram - Slipring (99707782068)



Leitungsfarben Cable colours Couleurs des cables			
BG	beige	beige	beige
BL	blau	blue	bleu
BR	braun	brown	brun
GE	gelb	yellow	jaune
GN	gruen	green	vert
GR	grau	grey	gris
OR	orange	orange	orange
RS	rosa	pink	rose
RT	rot	red	rouge
SW	schwarz	black	noir
TR	transp.	transp	transp.
VI	violett	violet	violet
WS	weiß	white	blanc

99707782068
B/0704

1.9 Emergency OFF - Engine STOP (stalling device) 99707782491



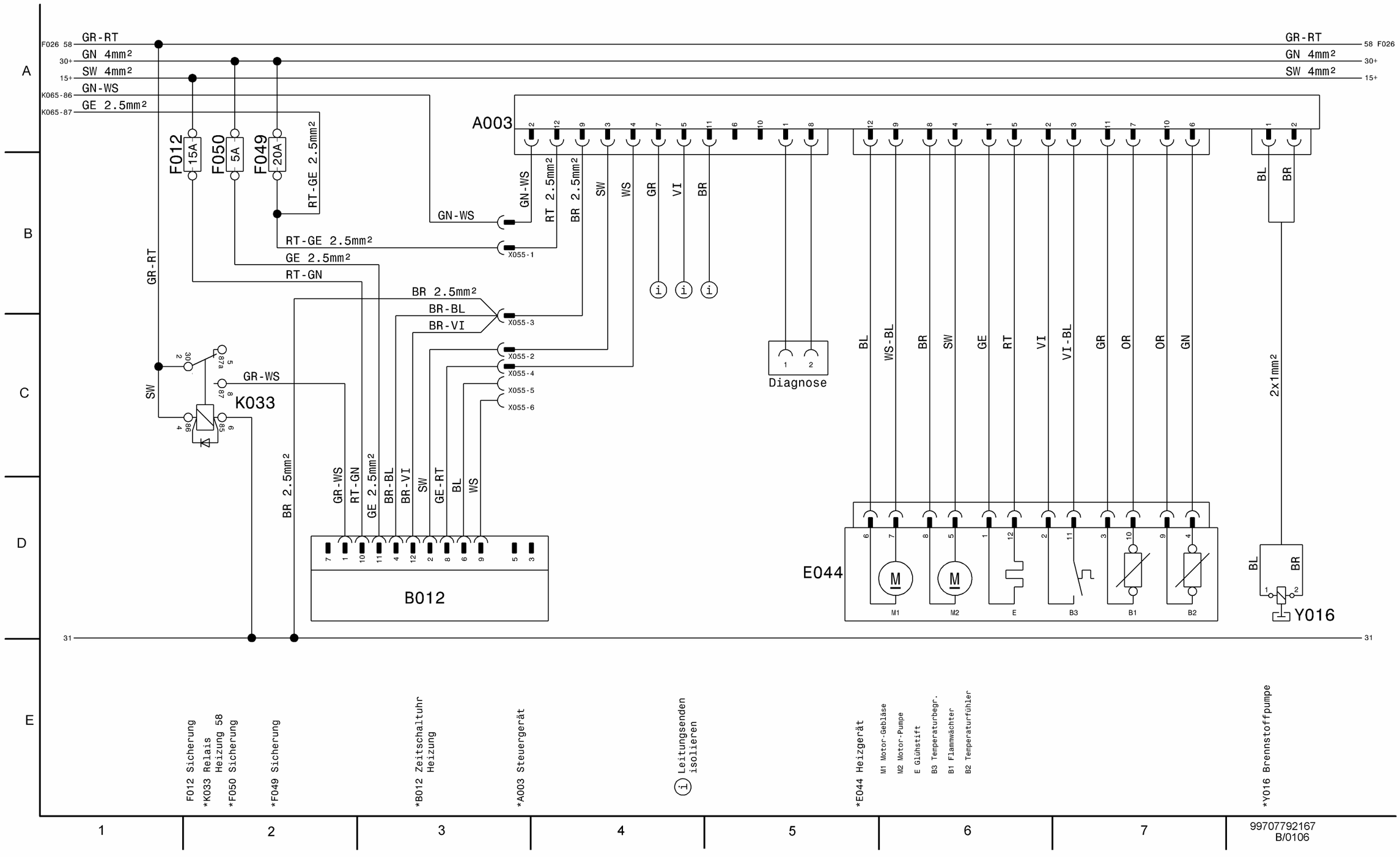
X Verbindung bei Sonder-ausruestung entfernen

S075 Schlagschalter NOT-AUS links

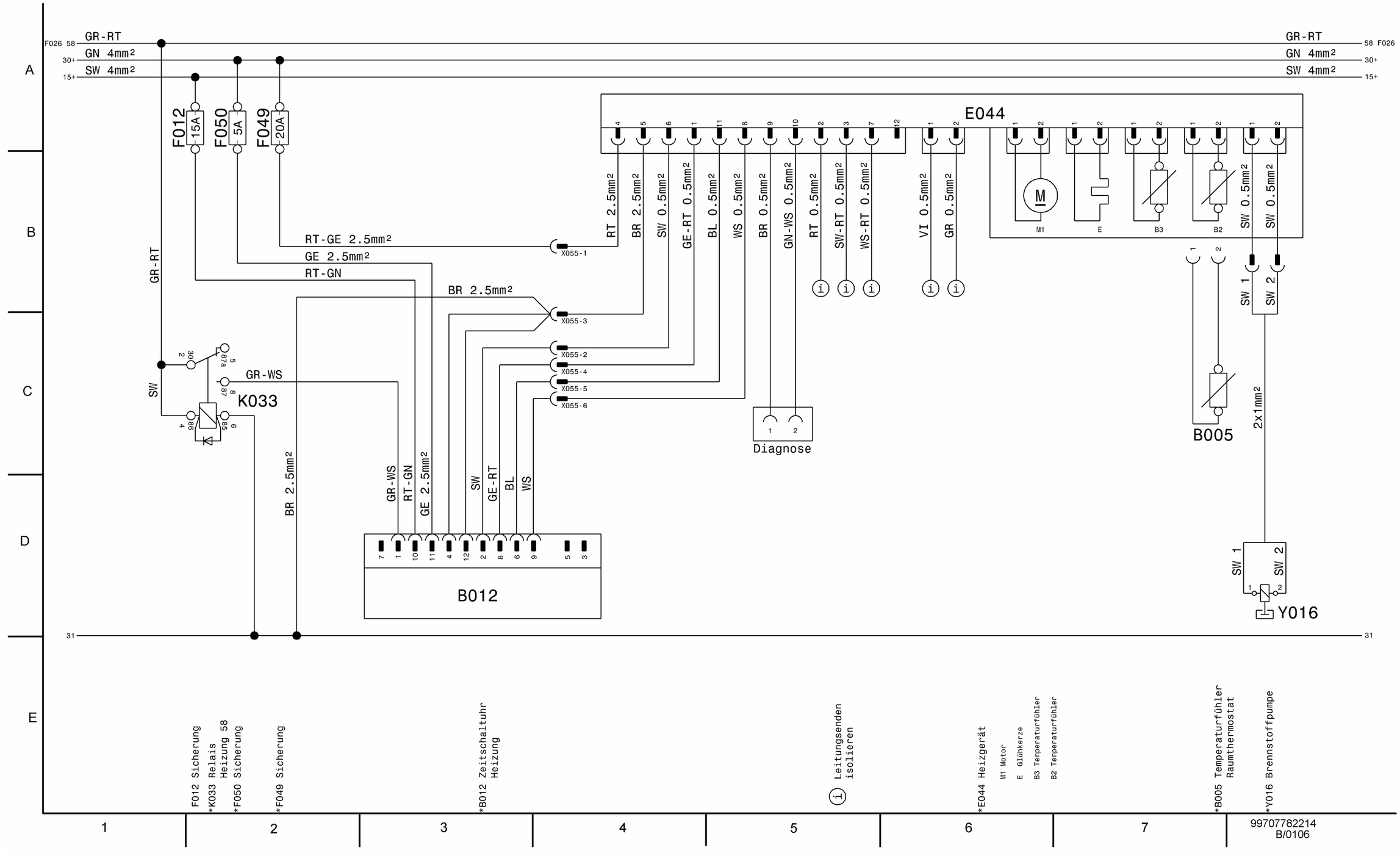
S076 Schlagschalter NOT-AUS rechts

99707782491
0/0105

1.10 Heater unit Webasto Thermo 90S (99707792167)

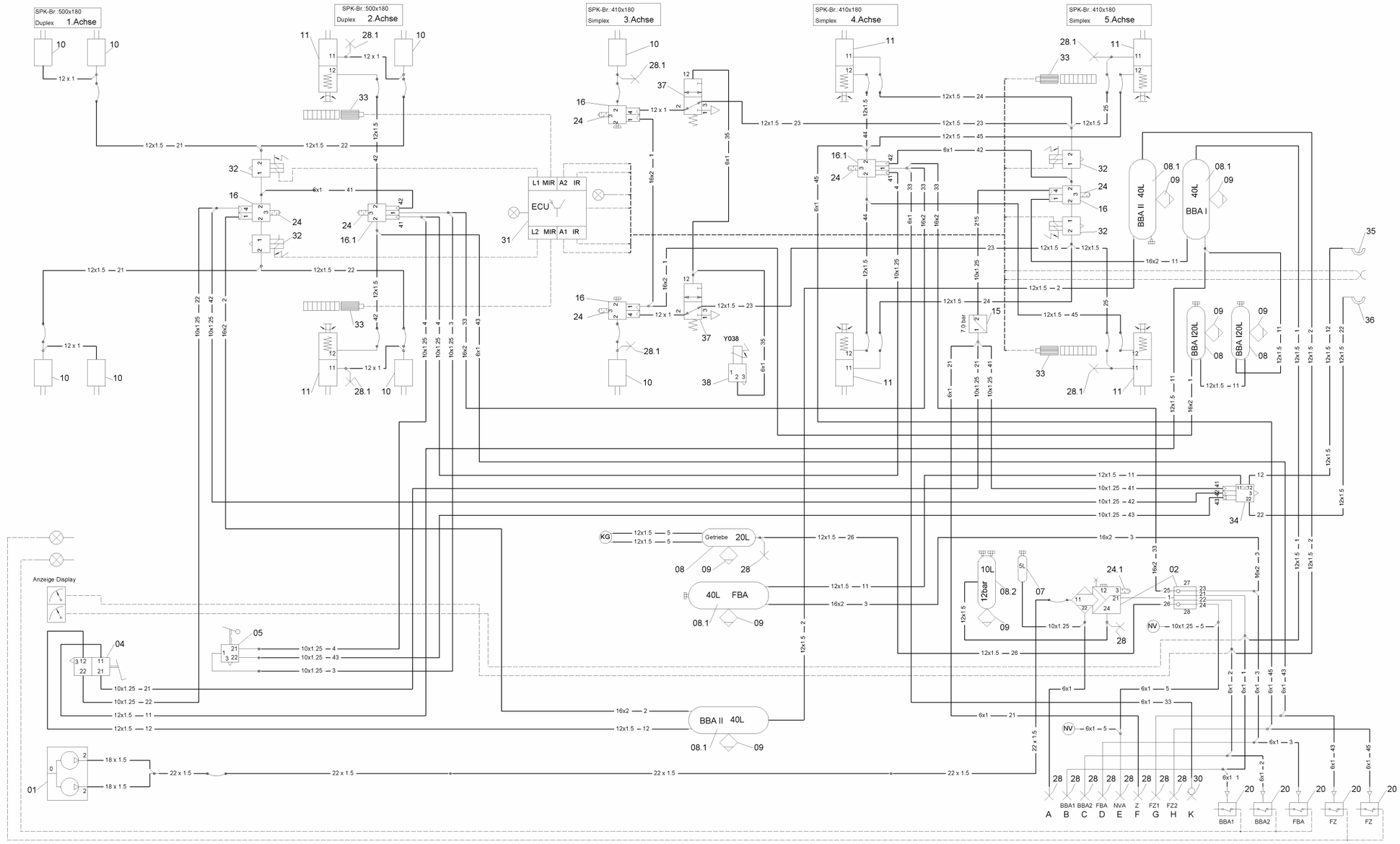


1.11 Heater unit Webasto Air Top 3500 (99707782214)



2 Pneumatic diagrams

2.1 Compressed air system (99707784033_01)



Funktions - Uebersichtsliste (nicht zur Disposition)

Pos.	Benennung	St.	Pos.	Benennung	St.
01	Zweizyl.-Luftpresser	1	20	Druckschalter	5
02	Druckluftaufbereitung	1	24	Geraeuschdaempfer	6
04	Zweikreis-Bremsventil	1	24.1	Geraeuschdaempfer	1
05	Handbremsventil	1	28	Pruefanschluss	10
07	Druckluftbehaelter 5l.	1	28.1	Pruefanschluss	6
08	Druckluftbehälter 20l. Al	3	30	Fuellanschluss	1
08.1	Druckluftbehälter 40l. Al	4	31	Elektr.-Steuerung	1
08.2	Druckluftbehälter 10l. Al	1	32	ABV-Magnetventil	4
09	Entwaesserungsventil	8	33	Stabsensor	4
10	Bremszylinder 20	8	34	Anhaenger-Steuerventil	1
11	Federspeicherzylinder 20/24	6	35	Kupplungskopf V	1
15	Druckbegrenzungsventil	1	36	Kupplungskopf B	1
16	Relaisventil	4	37	Wegeventil - 3/2	2
16.1	Ueberlastschutzventil	2	38	3/2-Wegeventil	1

BREMSTECHNISCHE DATEN:

Abschaltdruck : 11.7 bis 12.3 bar
Einschaltdruck: 10.0 bis 11.0 bar
Betriebsdruck : 9.8 bis 10.2 bar - Kreis 1 und 2
Betriebsdruck : 8.1 bis 8.5 bar - Kreis 3 und 4
Berechnungsdruck: 8.5 bar - 1. und 2. Achse
Druckbegrenzung der 3 bis 5 Achse: 7.0 bis 7.2 bar
Bremskreis 1 = 3. bis 5. Achse
Bremskreis 2 = 1. und 2. Achse

Die Bremsanlage ist mit Polyamidrohr nach DIN 74324 ausgerüstet

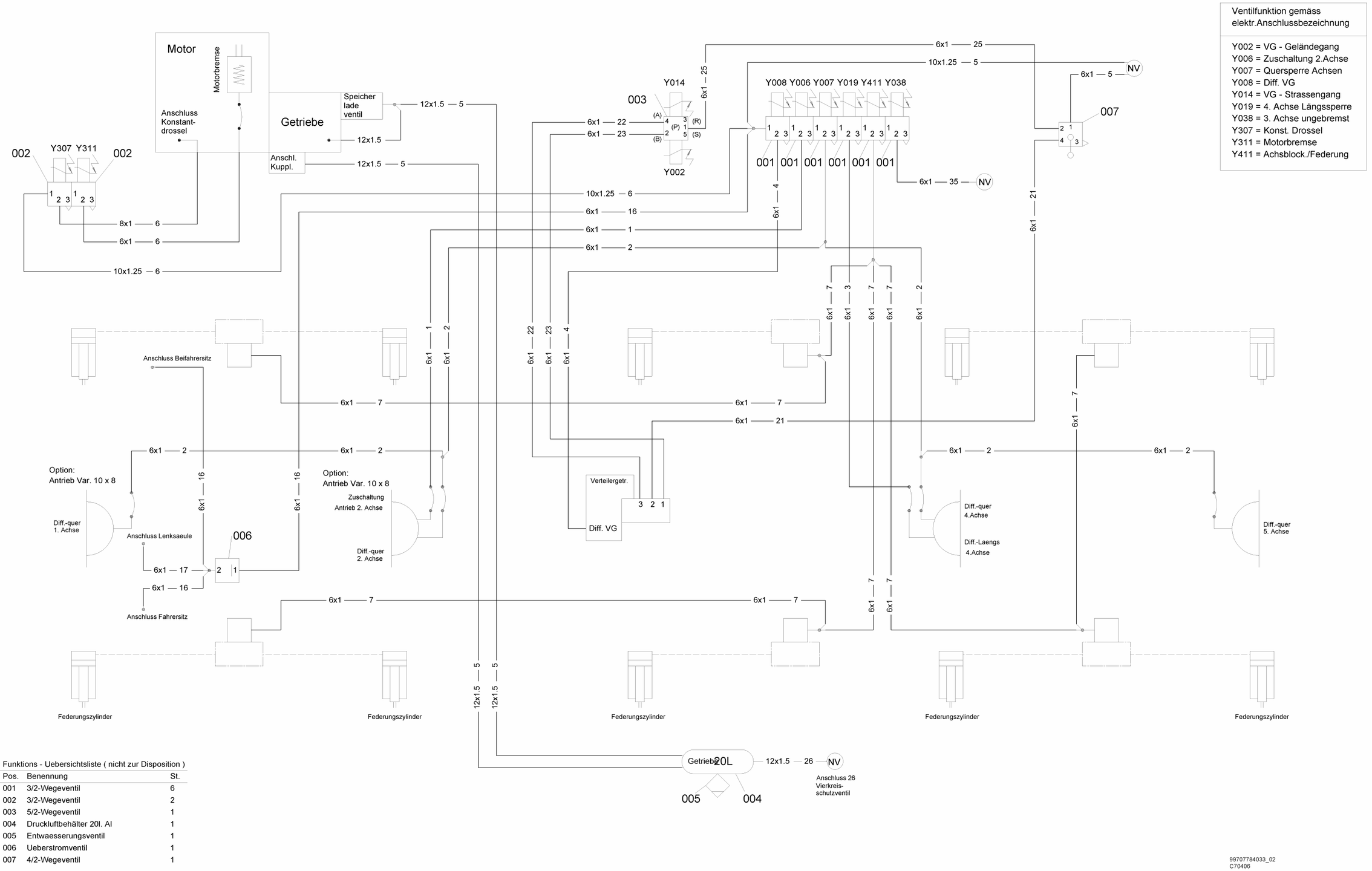
KG = Anschluss für Kupplung und Getriebe

NV = Anschluss für Nebenverbraucher

Y038 = 3. Achse ungebremst

99707784033_01
C/0406

2.2 Compressed air system (99707784033_02)

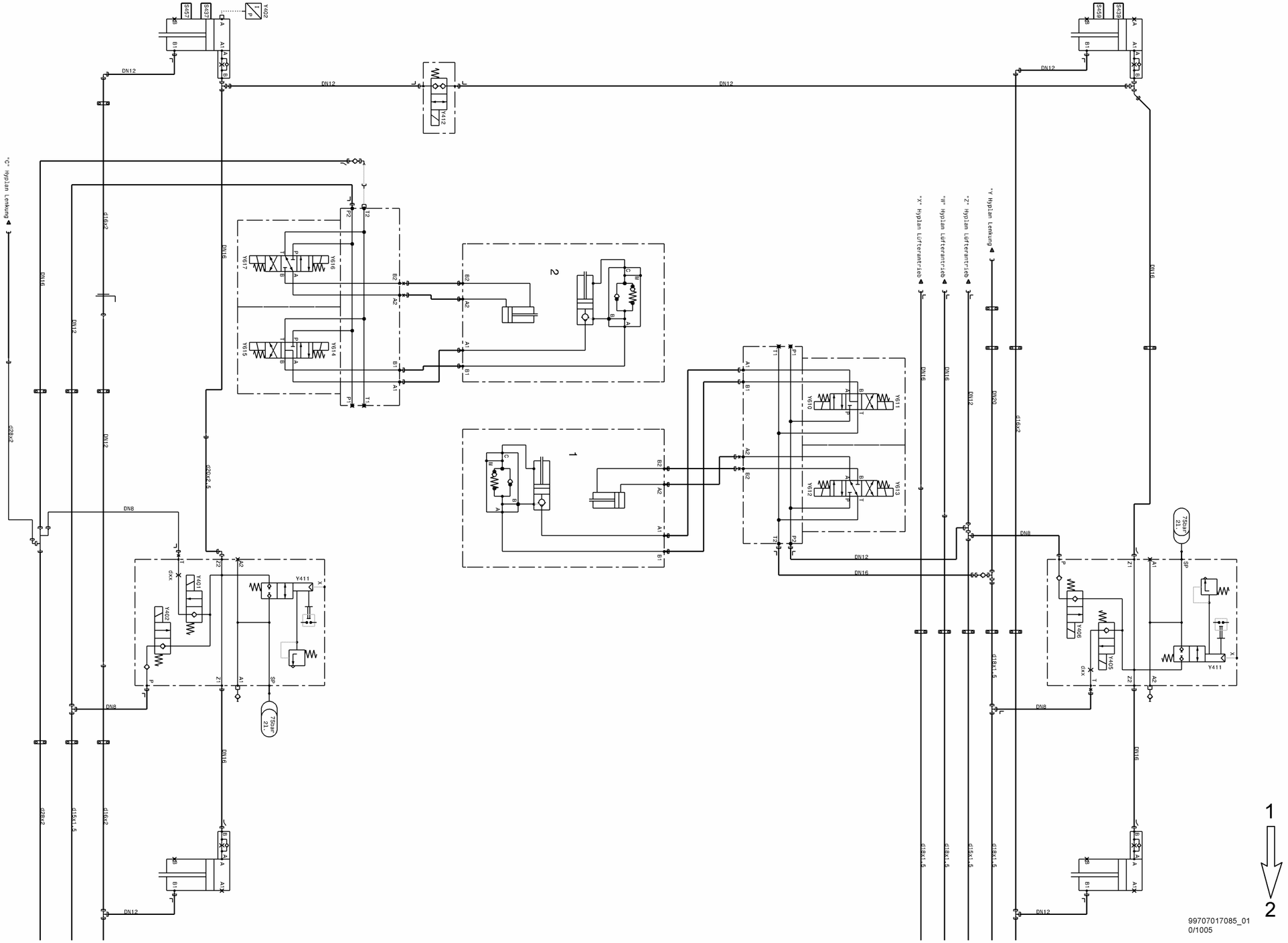


Funktions - Uebersichtsliste (nicht zur Disposition)

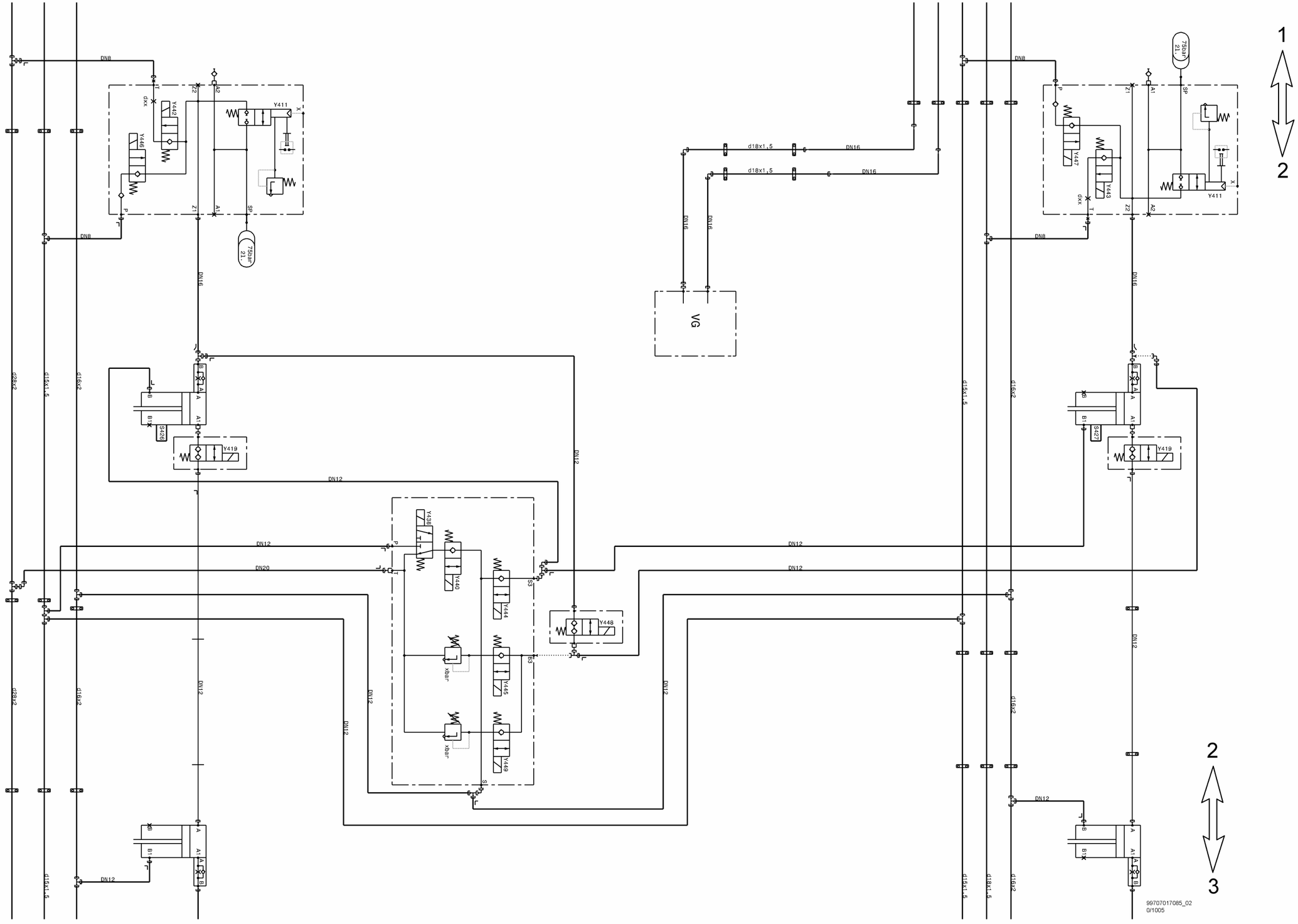
Pos.	Benennung	St.
001	3/2-Wegeventil	6
002	3/2-Wegeventil	2
003	5/2-Wegeventil	1
004	Druckluftbehälter 20l. Al	1
005	Entwaesserungsventil	1
006	Ueberstromventil	1
007	4/2-Wegeventil	1

3 Hydraulic piping diagrams

3.1 Hydraulic system (99707017085)



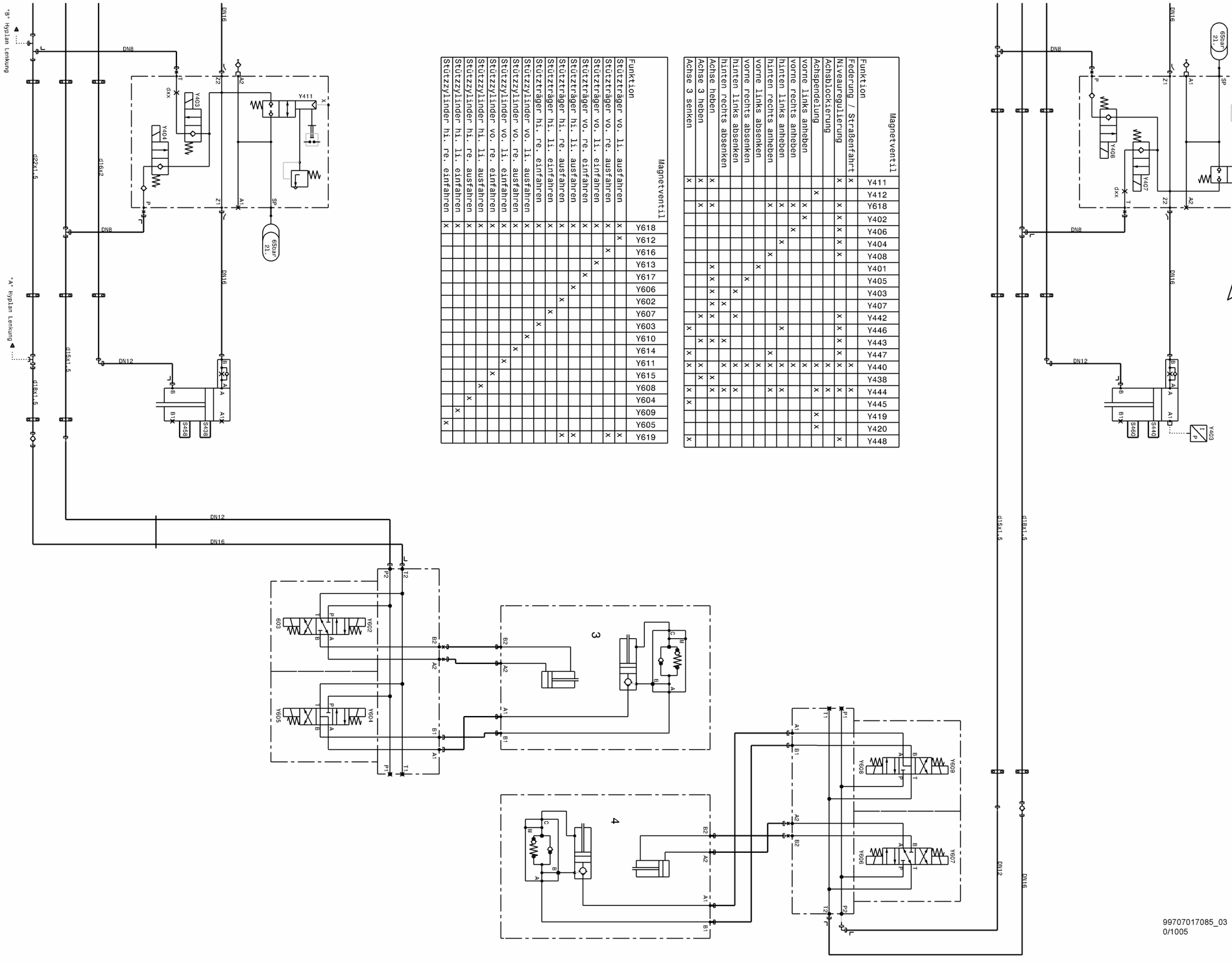
Memo:


DN8
DN16
DN12
DN20
d28x2
d16x2
d15x1,5
d18x1,5
Y442
Y446
Y411
Y419
Y438
Y440
Y441
Y448
Y445
Y449
Y447
Y443
Y427
S426
S3
S5
75bar
21
VG
1
2
3
99707017085_02
0/1005

Memo:

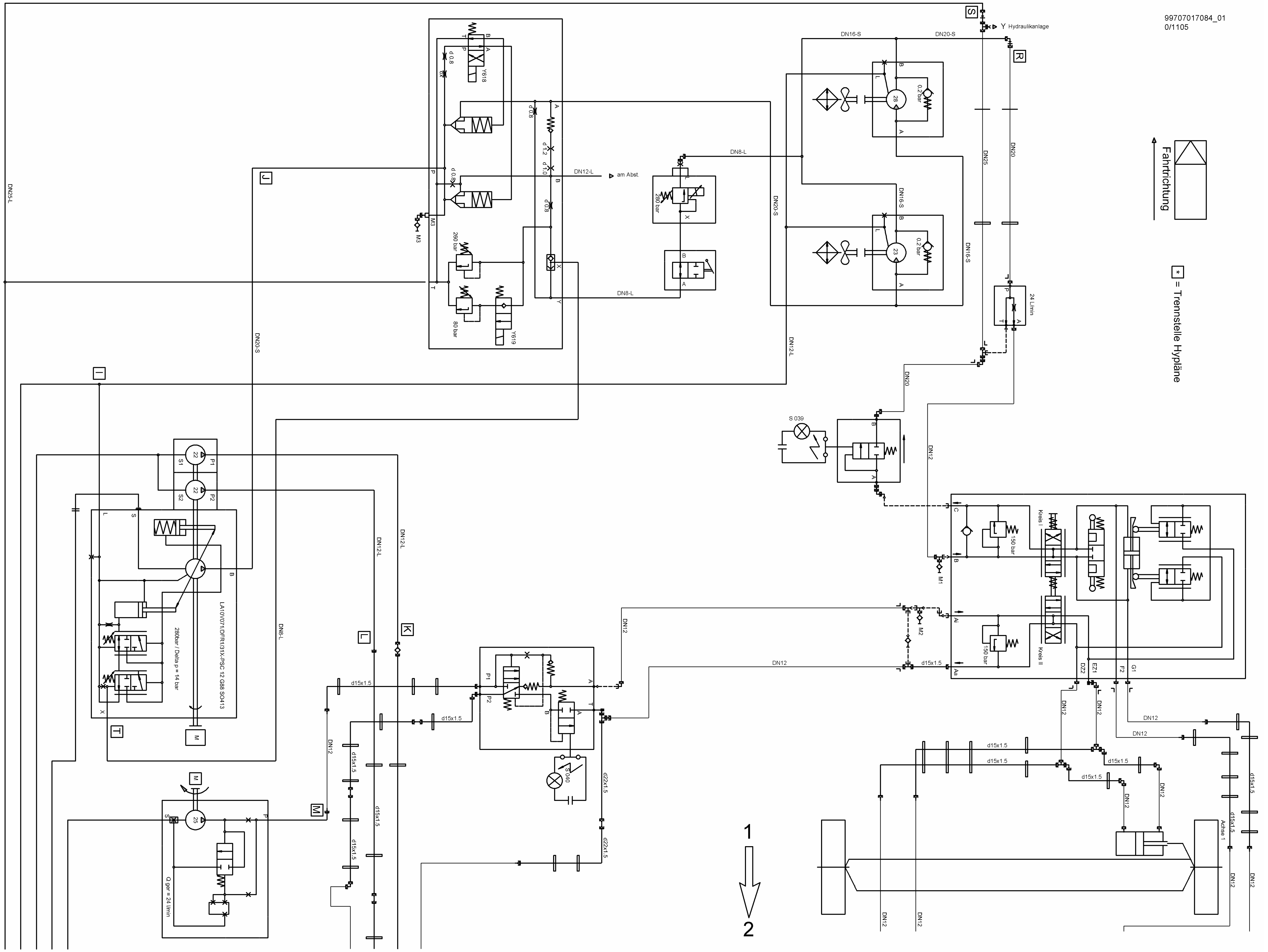
Funktion / Magnetventil	Y411	Y412	Y618	Y402	Y406	Y404	Y408	Y401	Y405	Y403	Y407	Y442	Y446	Y443	Y447	Y440	Y438	Y444	Y445	Y419	Y420	Y448
Federung / Straßenfahrt	x																					
Niveauregulierung			x	x	x	x	x					x	x	x	x	x	x	x				x
Achsblockierung																						
Achspendelung		x																		x	x	
vorne links anheben			x	x	x																	
vorne rechts anheben					x	x																
hinten links anheben			x			x	x															
hinten rechts anheben								x														
vorne links absenken									x													
vorne rechts absenken										x												
hinten links absenken											x											
hinten rechts absenken												x										
Achse heben		x	x						x	x	x											
Achse heben												x										
Achse senken													x	x	x	x	x	x	x			x
Achse 3 heben	x																					
Achse 3 senken		x																				

Funktion / Magnetventil	Y618	Y612	Y616	Y613	Y617	Y606	Y602	Y607	Y603	Y610	Y614	Y611	Y615	Y608	Y604	Y609	Y605	Y619
Stützträger vo. li. ausfahren	x	x																x
Stützträger vo. re. ausfahren	x		x															x
Stützträger vo. li. einfahren	x			x														
Stützträger vo. re. einfahren	x				x													
Stützträger hi. li. ausfahren	x					x												
Stützträger hi. re. ausfahren	x						x											
Stützträger hi. li. einfahren	x							x										
Stützträger hi. re. einfahren	x								x									
Stützzylinder vo. li. ausfahren	x									x								
Stützzylinder vo. re. ausfahren	x										x							
Stützzylinder vo. li. einfahren	x											x						
Stützzylinder vo. re. einfahren	x												x					
Stützzylinder hi. li. ausfahren	x													x				
Stützzylinder hi. re. ausfahren	x														x			
Stützzylinder hi. li. einfahren																x		
Stützzylinder hi. re. einfahren	x																x	x

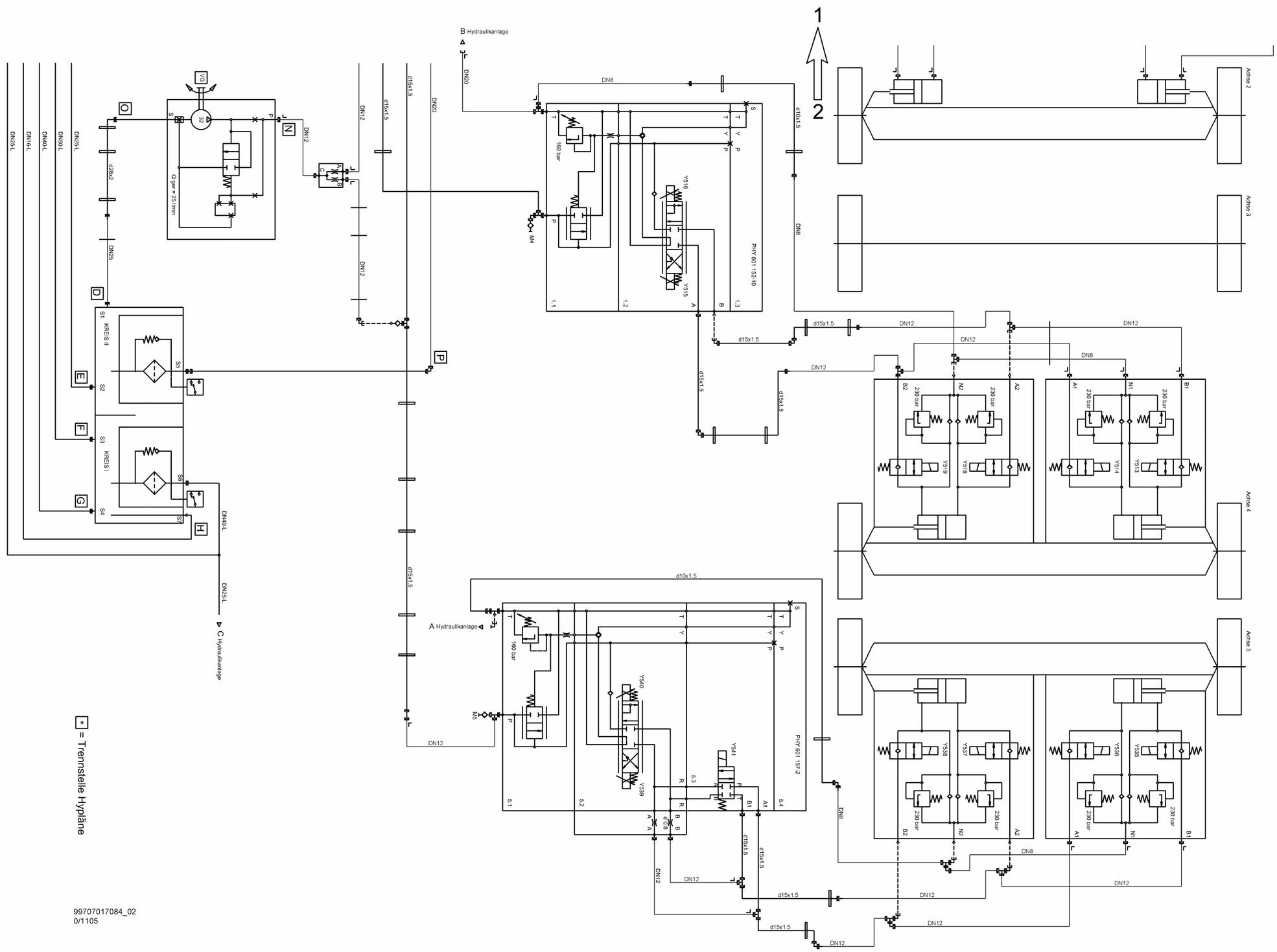


99707017085_03
0/1005

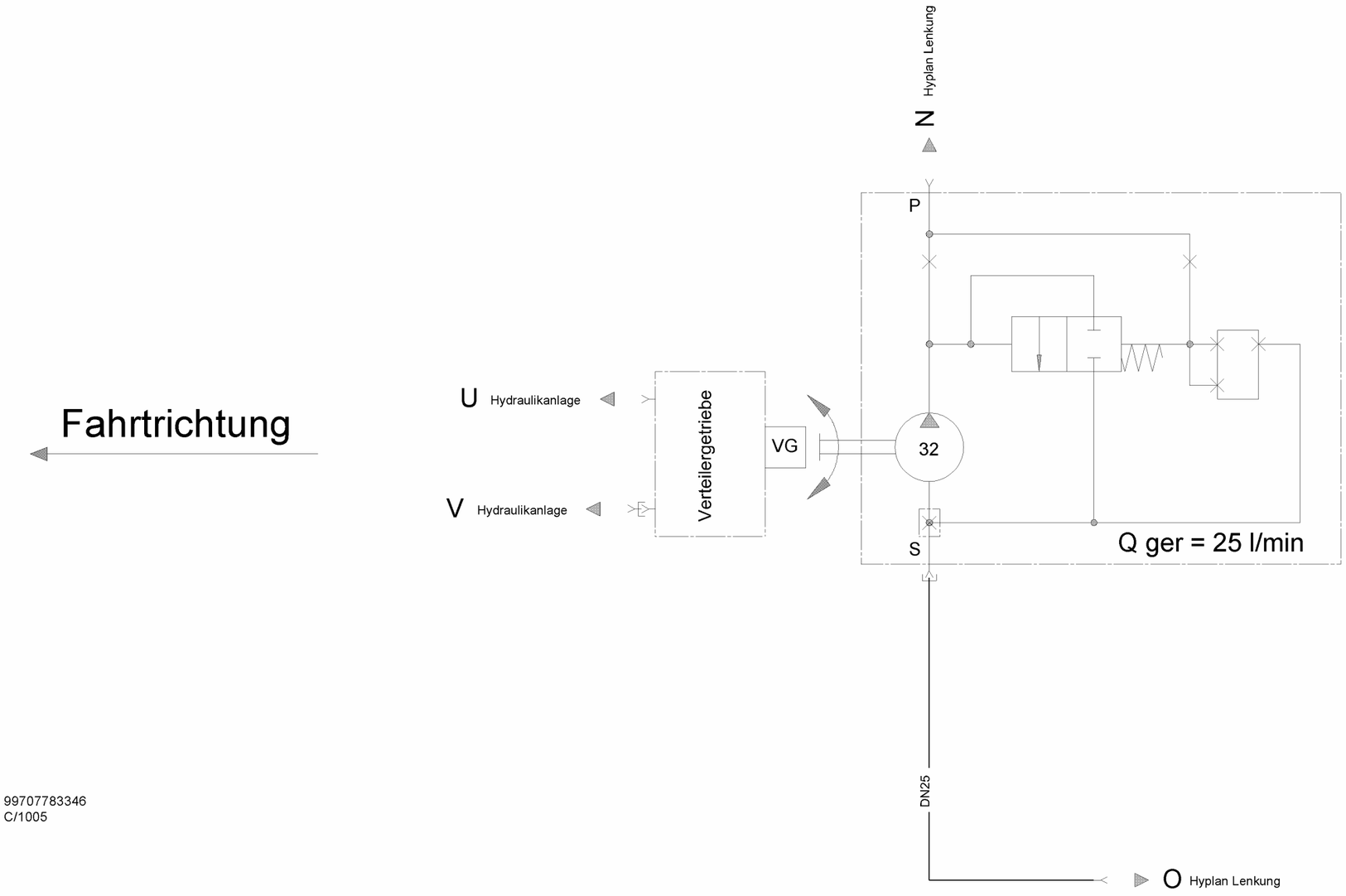
3.2 Steering (99707017084)



Memo:

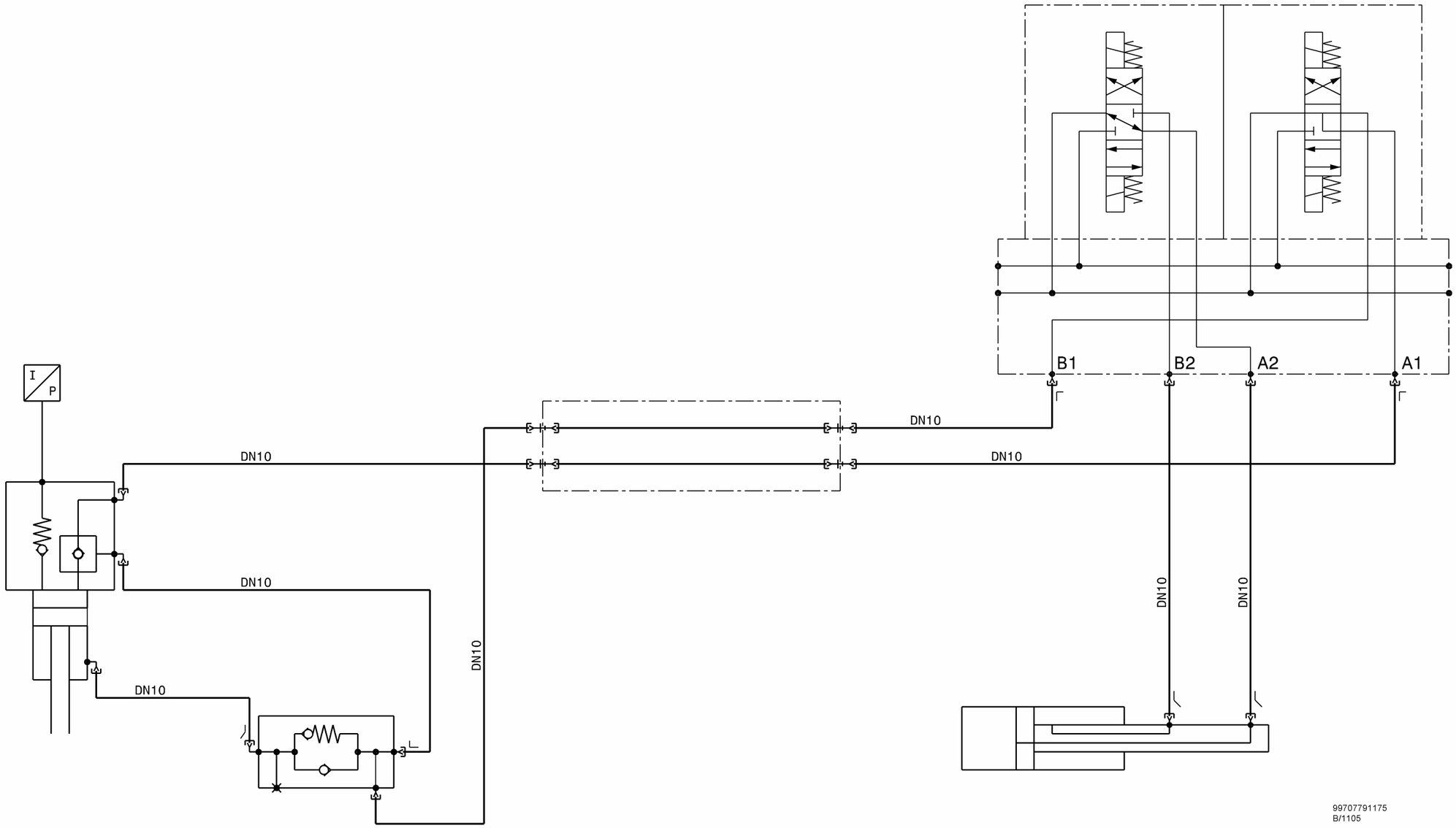

B Hydraulikanlage
A Hydraulikanlage
C Hydraulikanlage
DN20
DN8
d10x1.5
d15x1.5
DN12
DN25
DN40-L
DN25-L
DN16-L
DN50-L
DN32-L
DN40-L
DN25-L
d28x2
Q ger = 25 l/min
160 bar
PHY 601.152-10
PHY 601.157-2
Y516
Y515
Y540
Y541
Y539
M4
M5
KREIS II
KREIS I
S1
S2
S3
S4
S5
S6
S7
S8
Achse 2
Achse 3
Achse 4
Achse 5
A1
A2
B1
B2
N1
N2
230 bar
Y513
Y514
Y518
Y519
Y535
Y536
Y537
Y538
* = Trennstelle Hyplåne
99707017084_02
0/1105

3.3 Transfer box (99707783346)

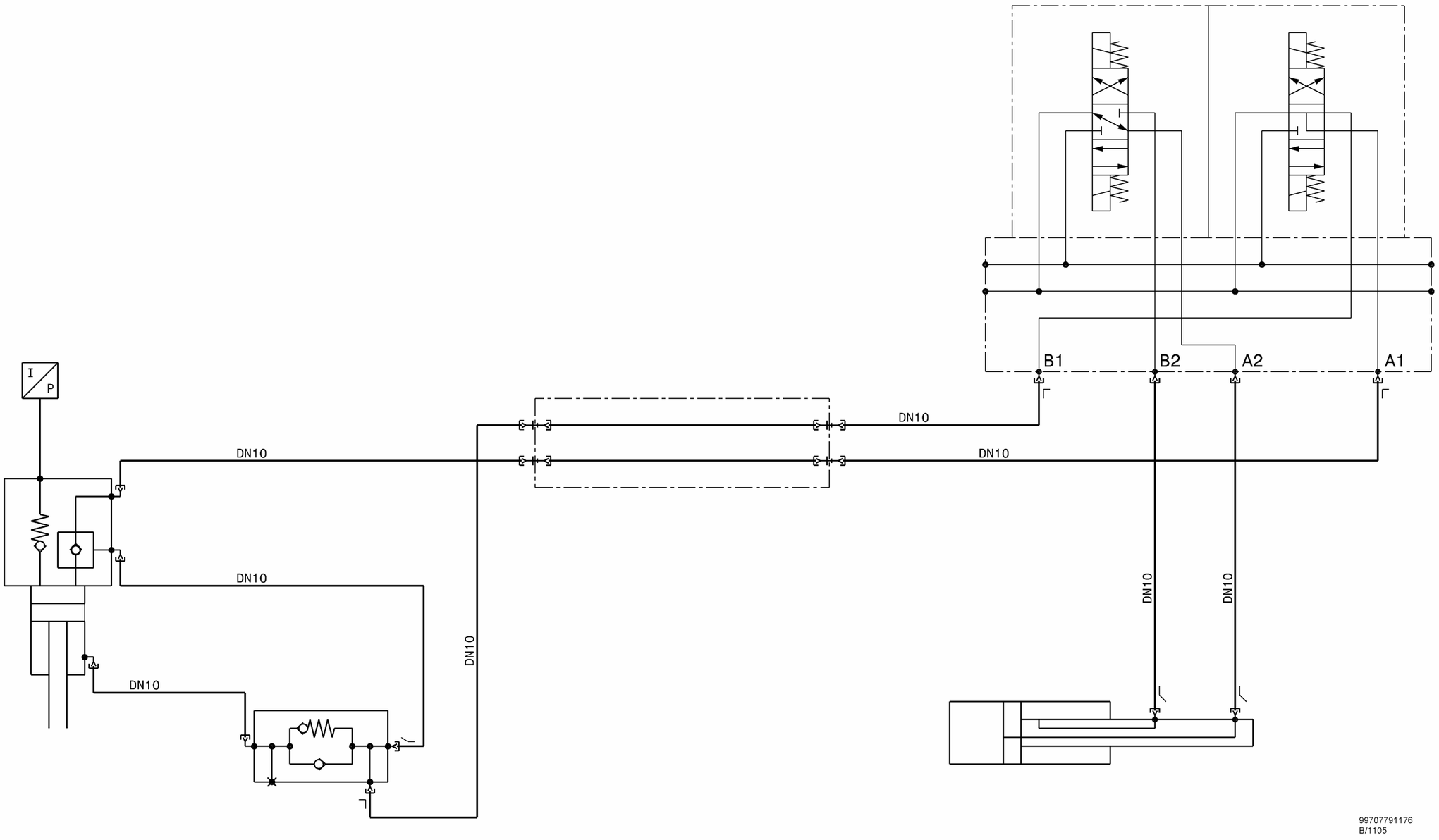


99707783346
C/1005

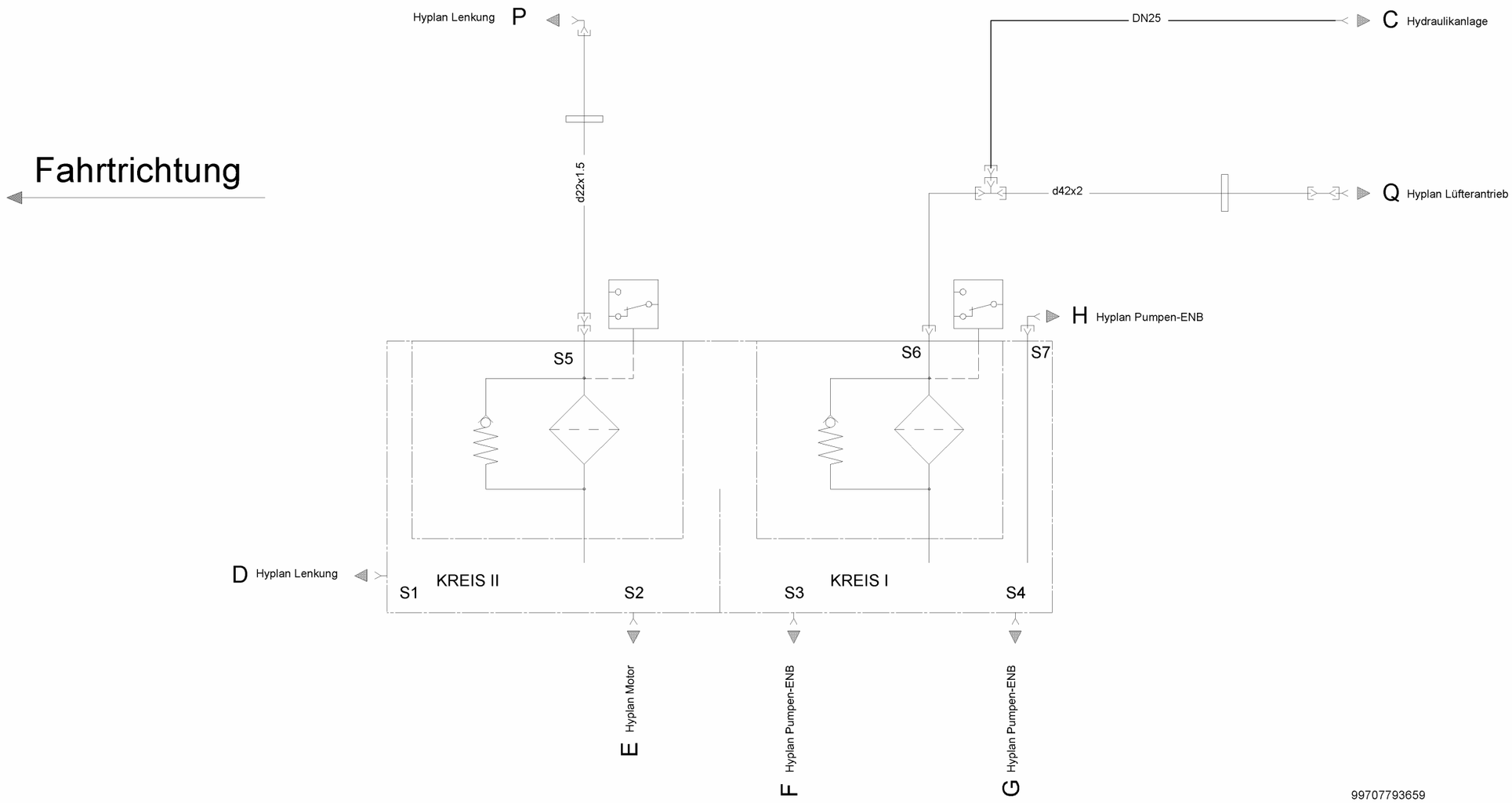
3.4 Front outriggers (99707791175)



3.5 Rear outriggers (99707791176)

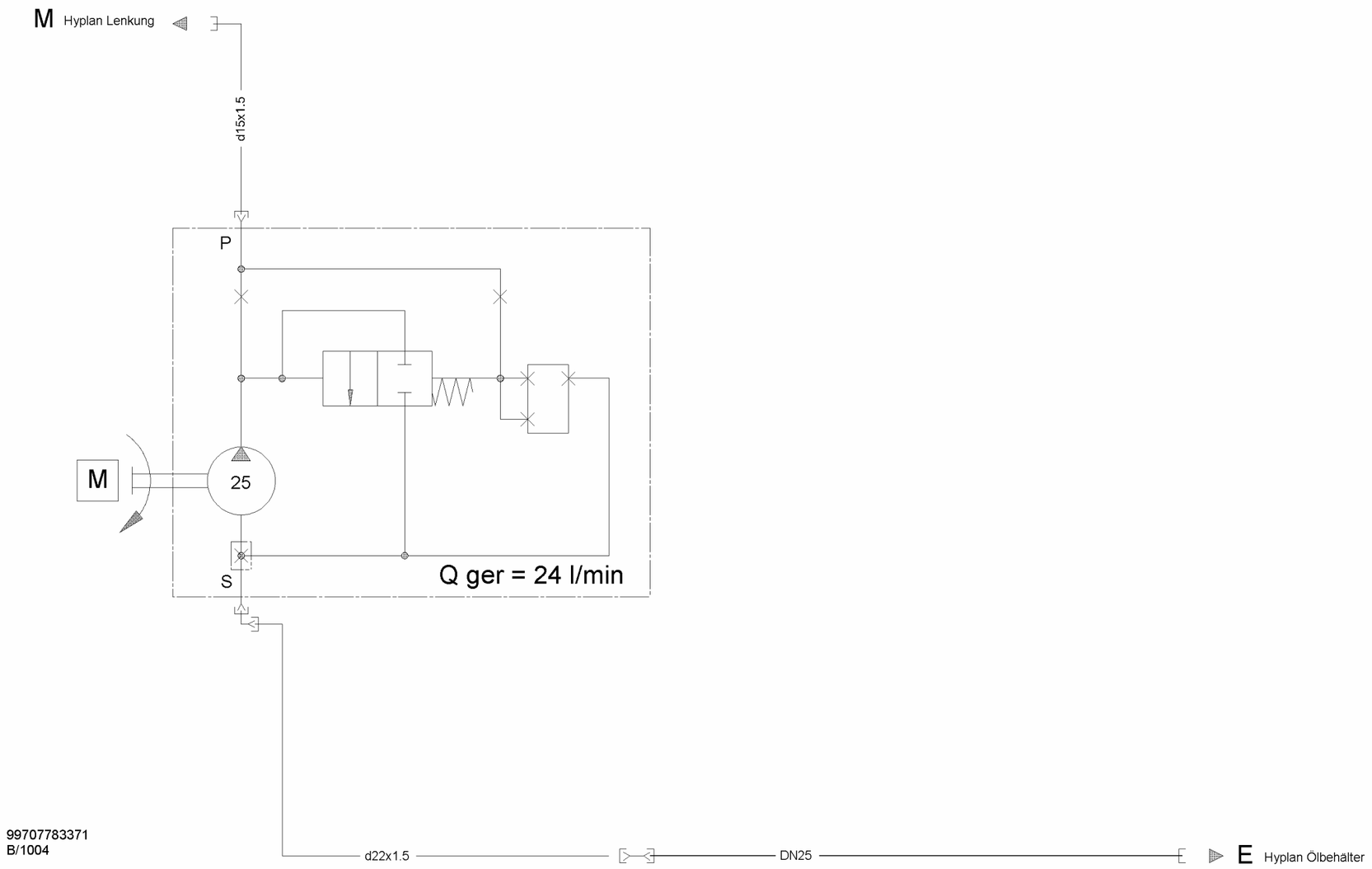


3.6 Oil tank (99707793659)

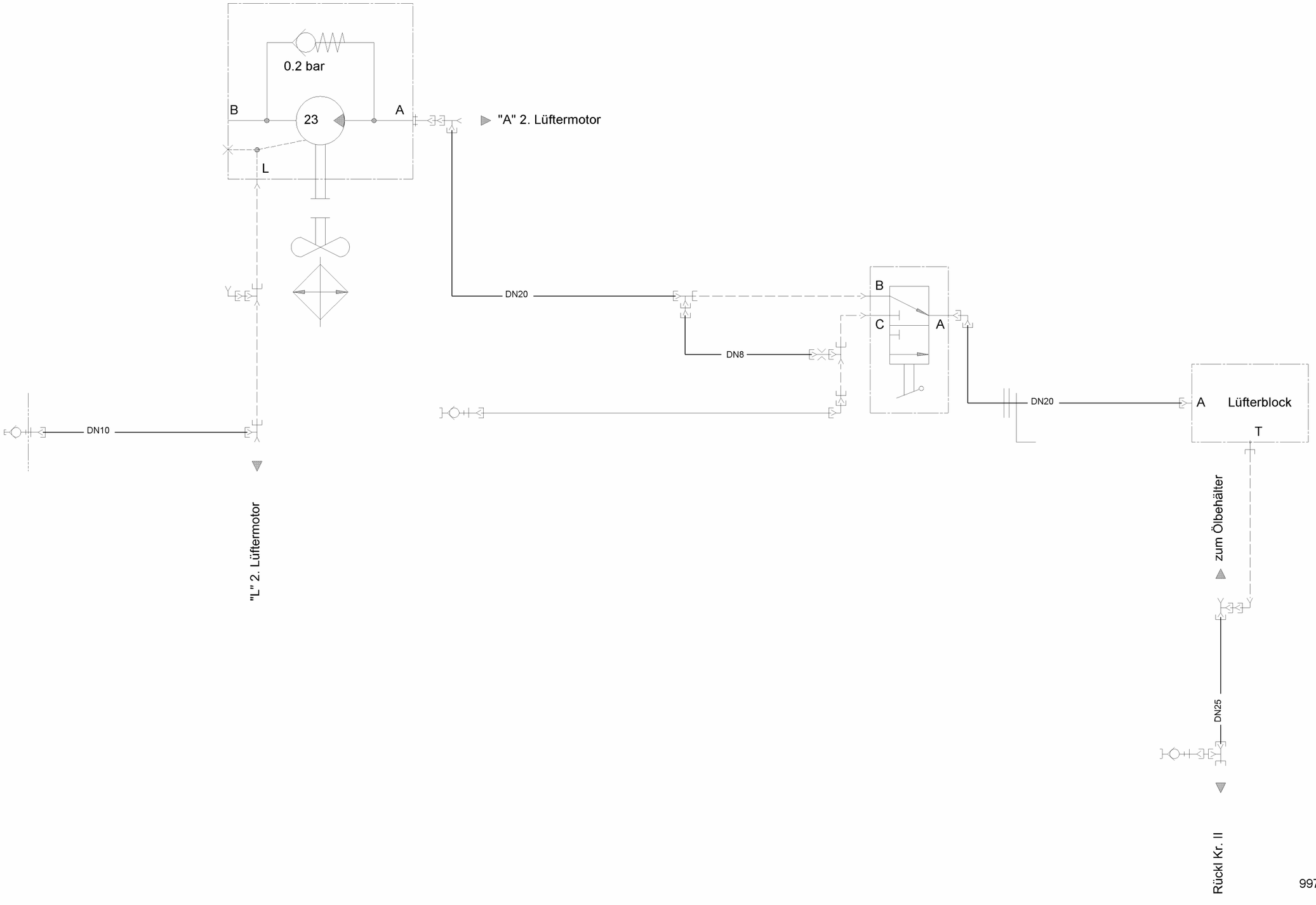


99707793659
0/1005

3.7 Motor (99707783371)

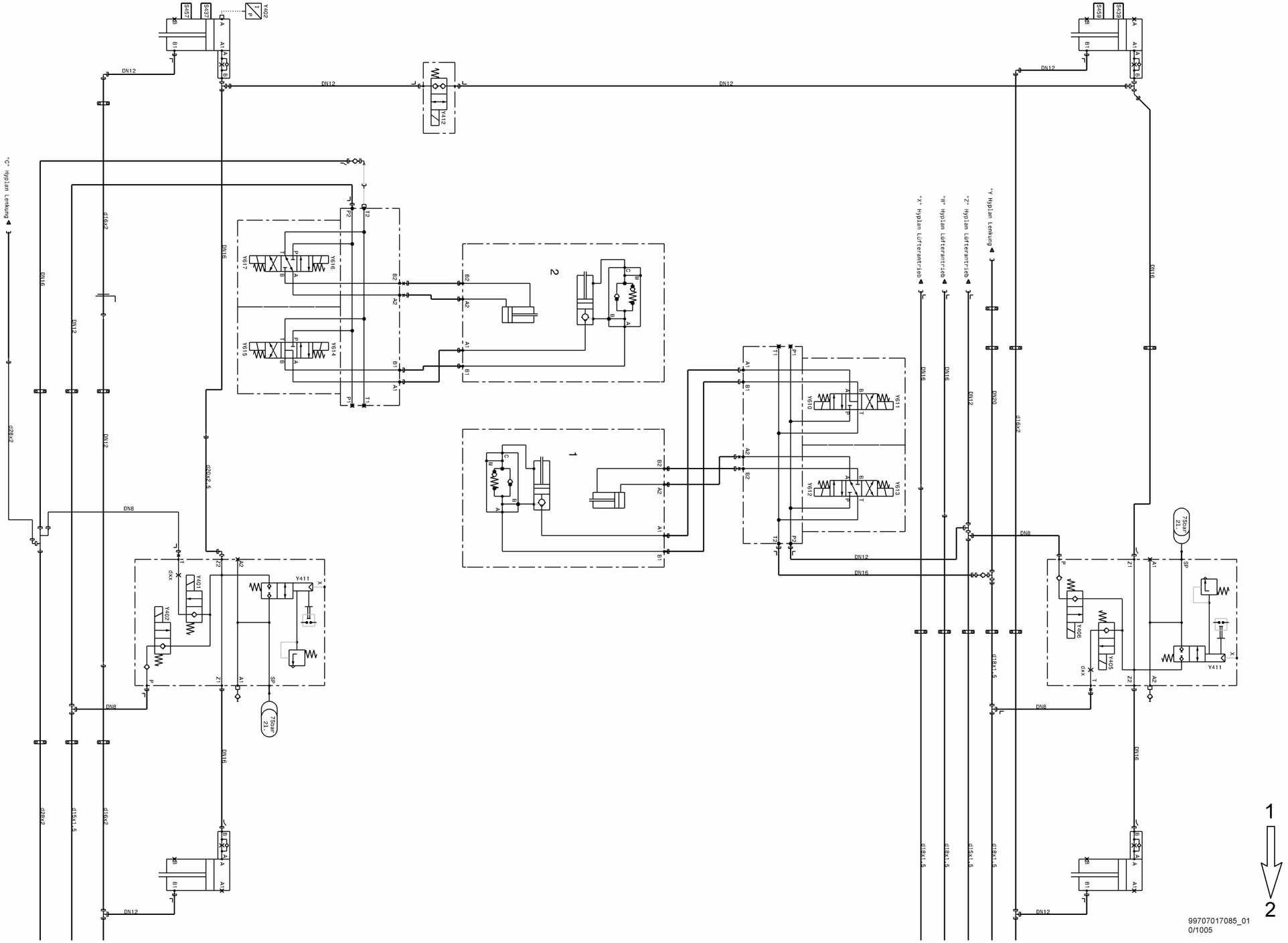


3.8 Emergency control (99707785508)

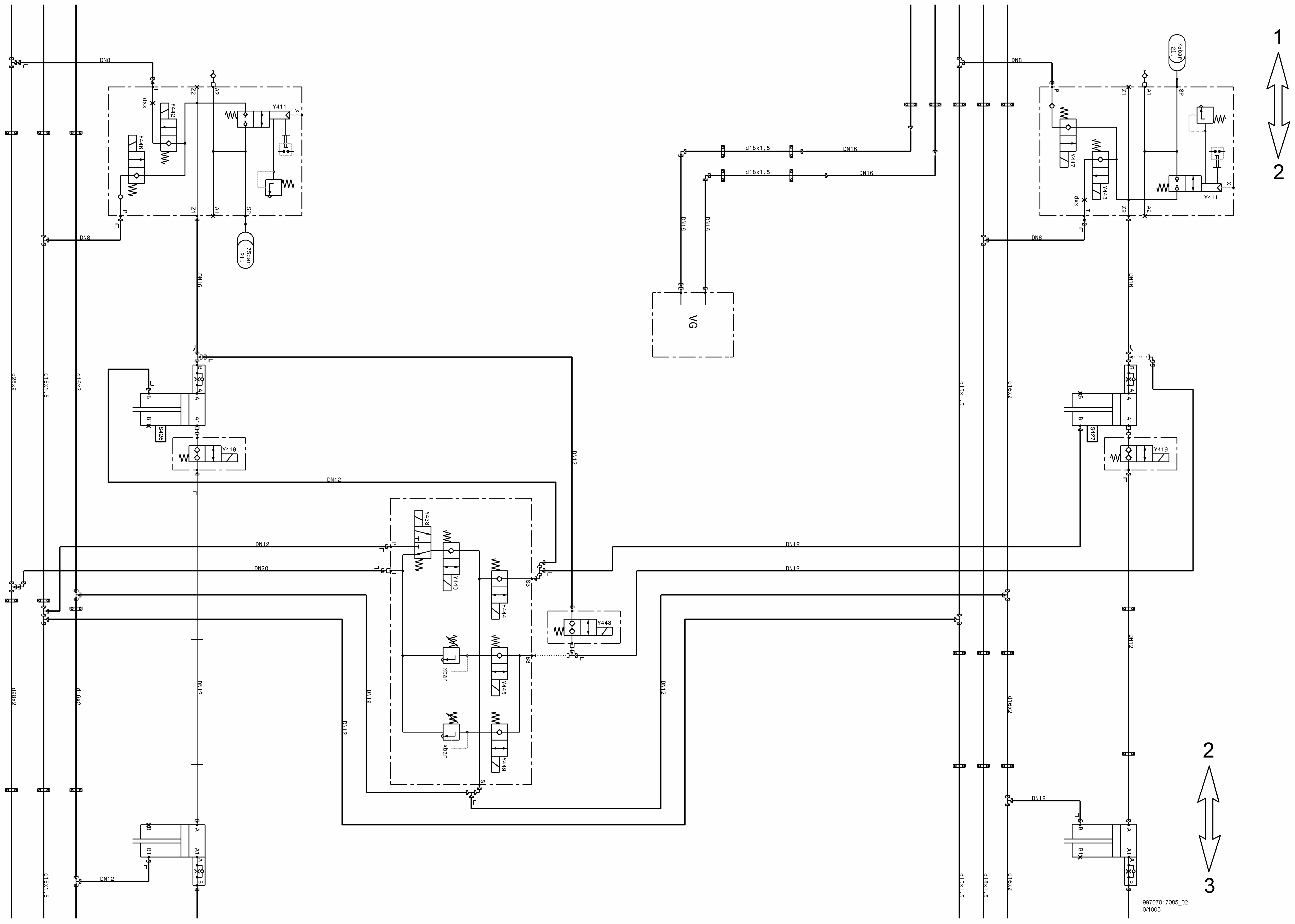


3 Hydraulic piping diagrams

3.1 Hydraulic system (99707017085)



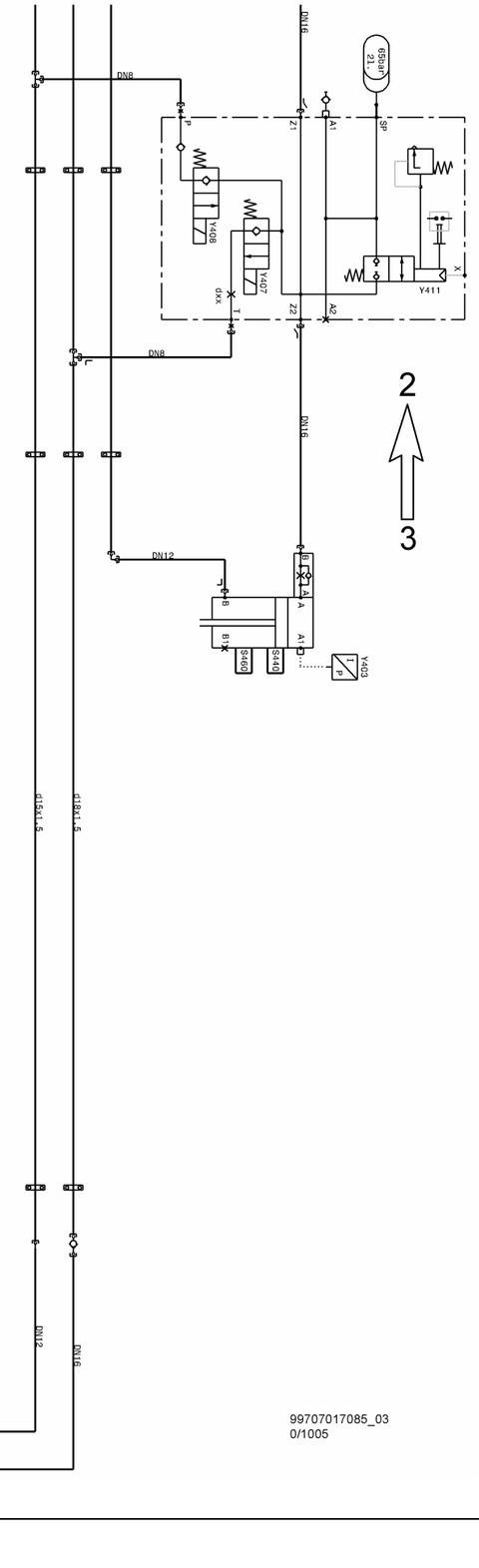
Memo:

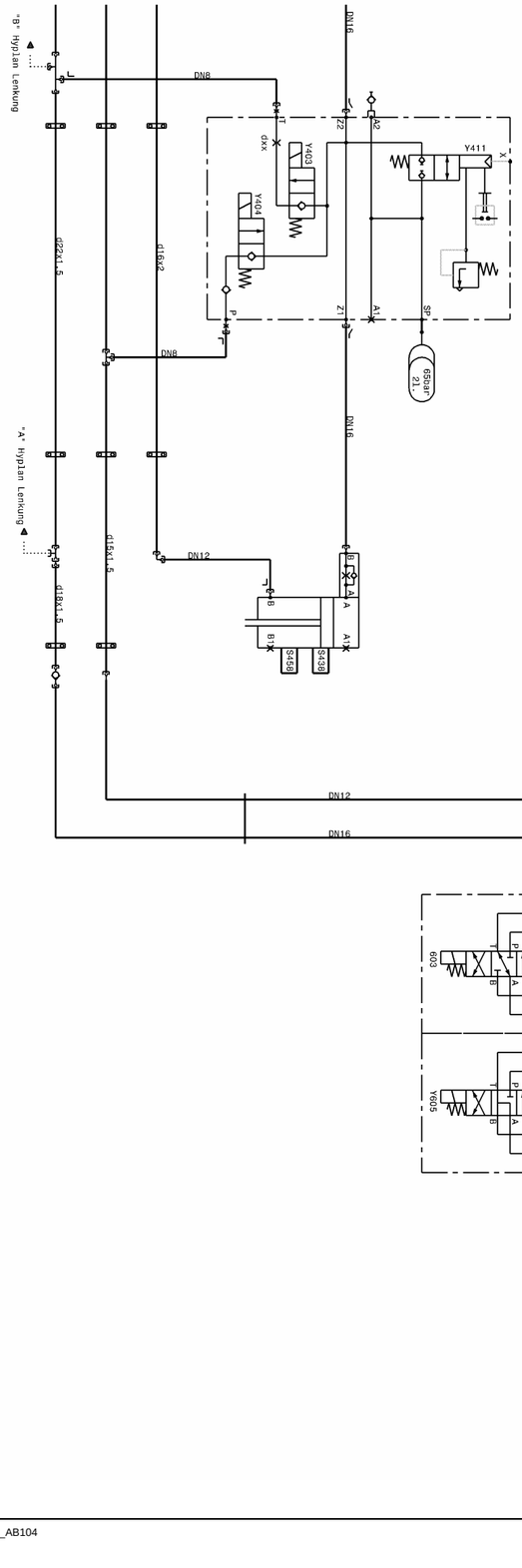

1
2
2
3
VG
DN8
DN16
DN12
DN20
d18x1,5
d28x2
d15x1,5
d16x2
Y411
Y442
Y446
Y447
Y443
Y419
Y438
Y440
Y444
Y445
Y449
Y448
S426
S427
75bar
xbar
99707017085_02
0/1005

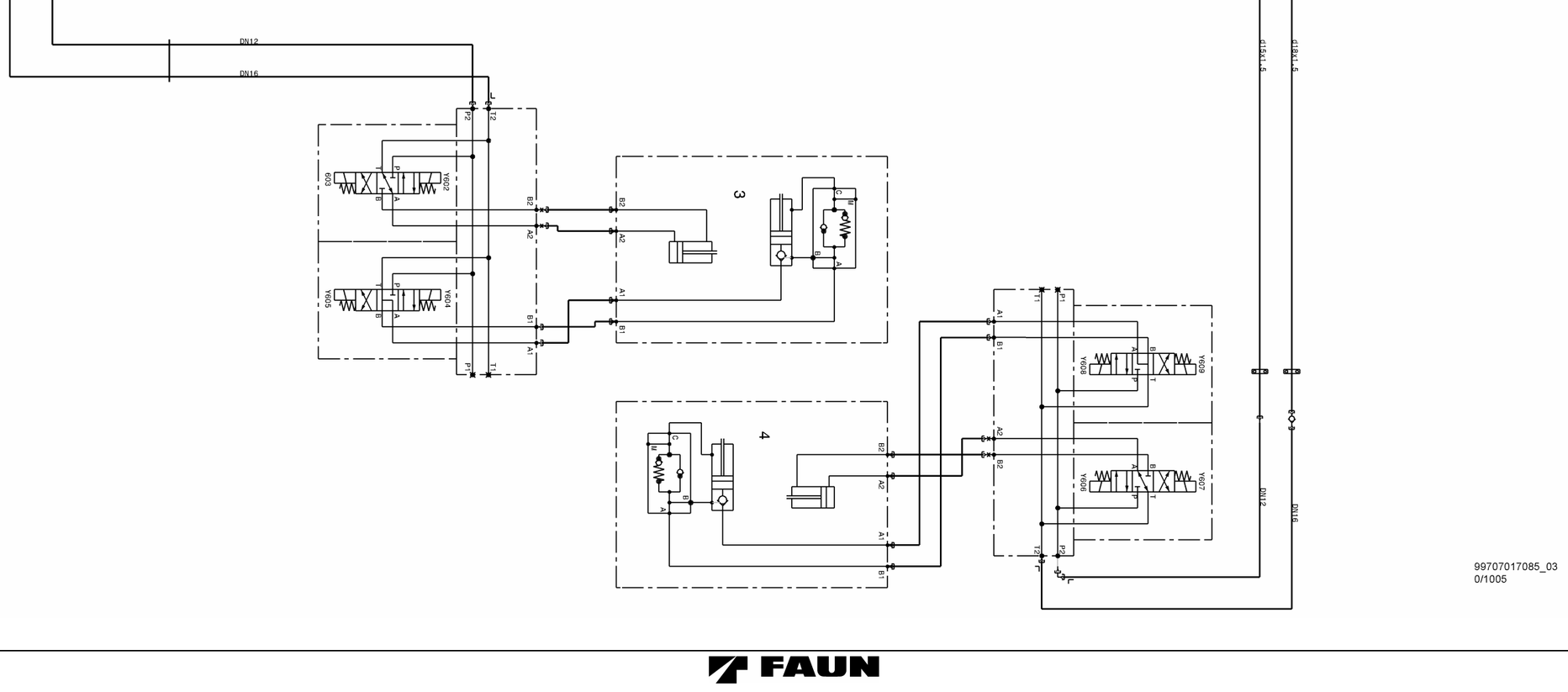
Memo:

Magnetventil	Y411	Y412	Y618	Y402	Y406	Y404	Y408	Y401	Y405	Y403	Y407	Y442	Y446	Y443	Y447	Y440	Y438	Y444	Y445	Y419	Y420	Y448
Funktion																						
Federung / Straßenfahrt	x																					
Niveauregulierung			x	x	x	x	x					x	x	x	x	x	x	x				x
Achsblockierung												x	x	x	x	x	x	x				
Achspendelung		x															x			x	x	
vorne links anheben			x	x	x											x	x					
vorne rechts anheben				x		x										x	x					
hinten links anheben						x																
hinten rechts anheben							x															
vorne links absenken								x														
vorne rechts absenken									x													
hinten links absenken										x												
hinten rechts absenken											x	x										
Achse heben			x	x				x	x	x	x											
Achse 3 heben		x										x	x	x	x							
Achse 3 senken	x																		x			

Magnetventil	Y618	Y612	Y616	Y613	Y617	Y606	Y602	Y607	Y603	Y610	Y614	Y611	Y615	Y608	Y604	Y609	Y605	Y619
Funktion																		
Stützträger vo. li. ausfahren	x	x																x
Stützträger vo. re. ausfahren	x		x															x
Stützträger vo. li. einfahren	x			x														
Stützträger vo. re. einfahren	x				x													
Stützträger hi. li. ausfahren	x					x												
Stützträger hi. re. ausfahren	x						x											
Stützträger hi. li. einfahren	x							x										
Stützträger hi. re. einfahren	x								x									
Stützzylinder vo. li. ausfahren	x									x								
Stützzylinder vo. re. ausfahren	x										x							
Stützzylinder vo. li. einfahren	x											x						
Stützzylinder vo. re. einfahren	x												x					
Stützzylinder hi. li. ausfahren	x													x				
Stützzylinder hi. re. ausfahren	x														x			
Stützzylinder hi. li. einfahren																x		
Stützzylinder hi. re. einfahren	x																x	x

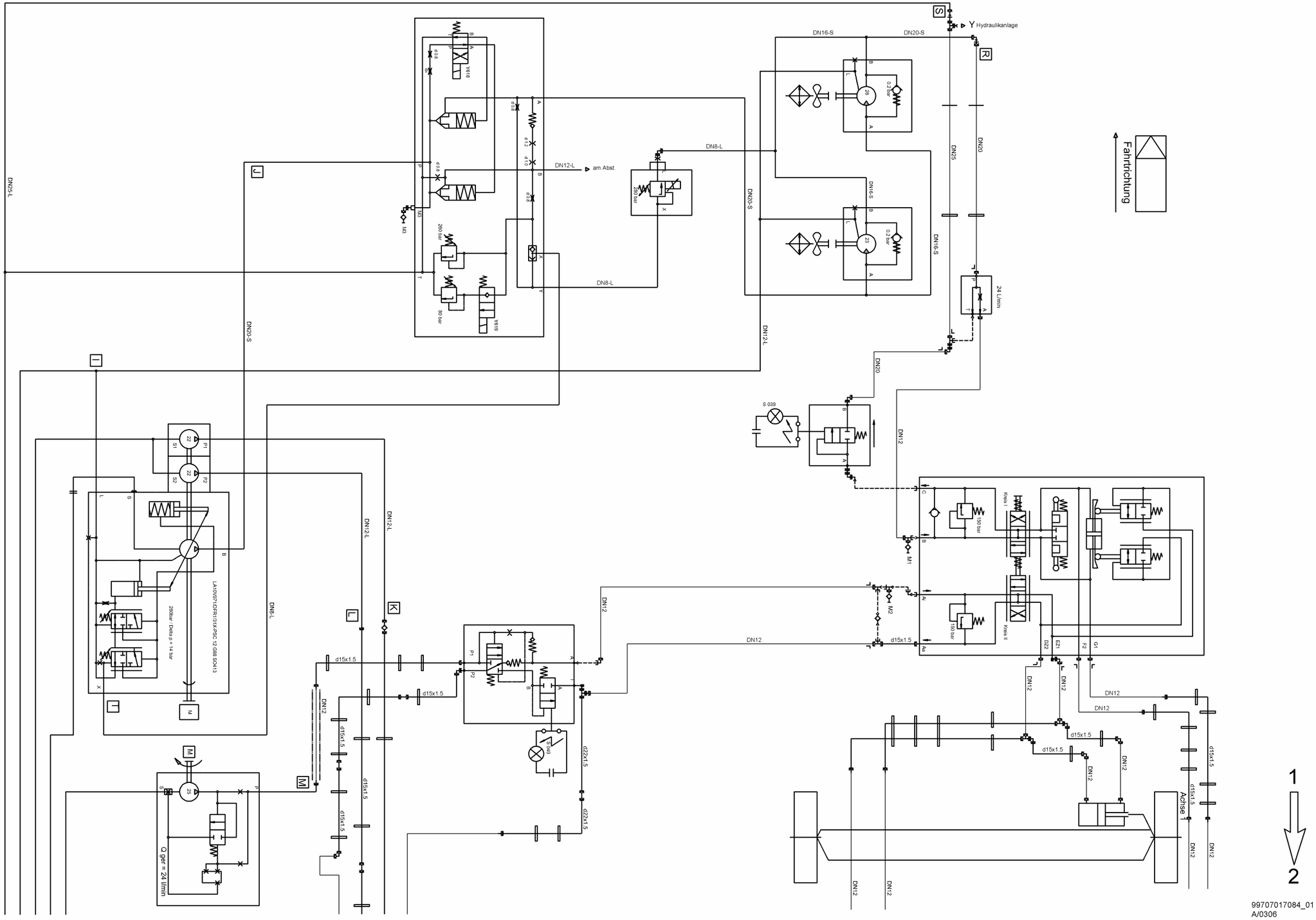




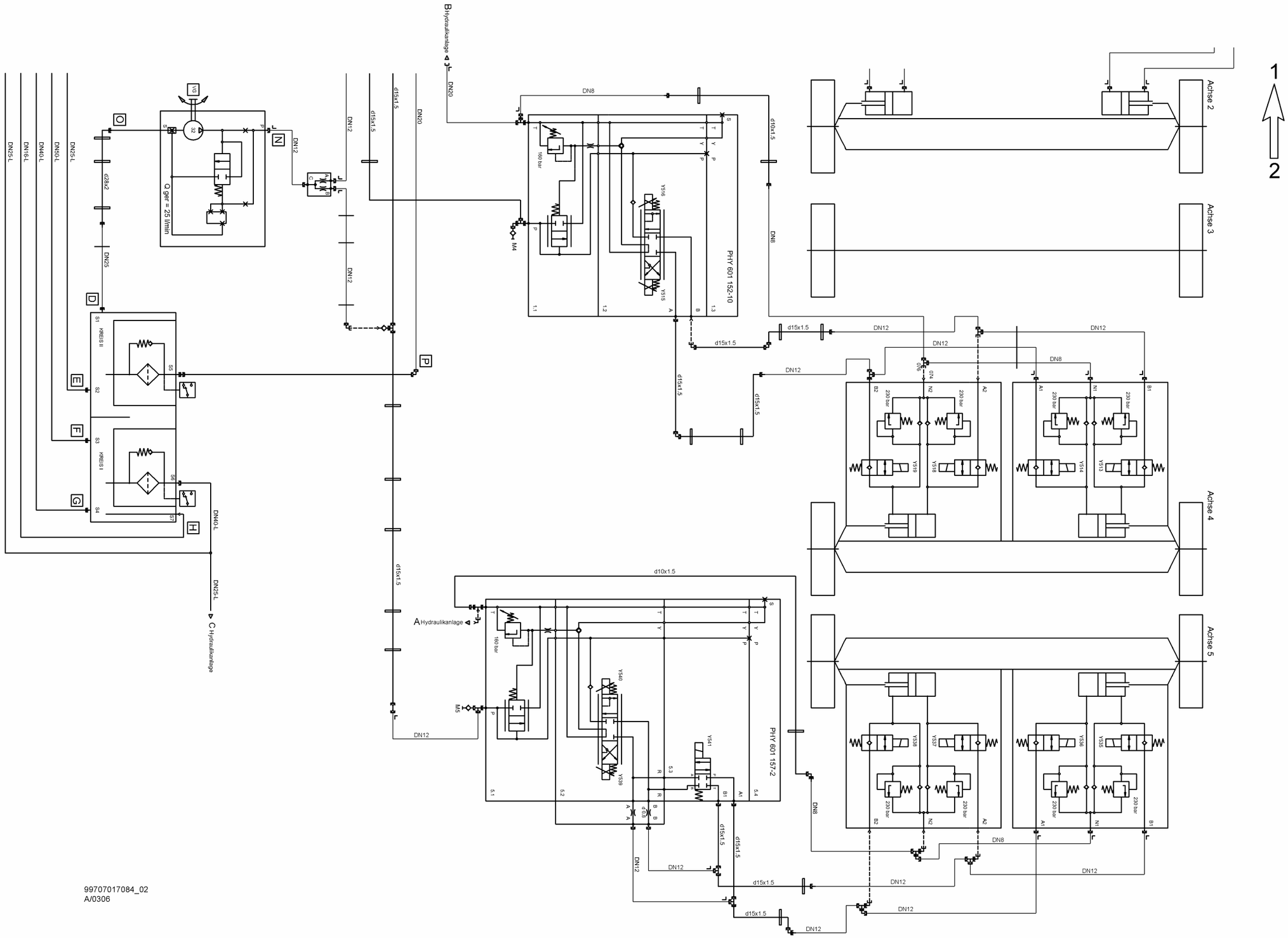


99707017085_03
0/1005

3.2 Steering (99707017084)

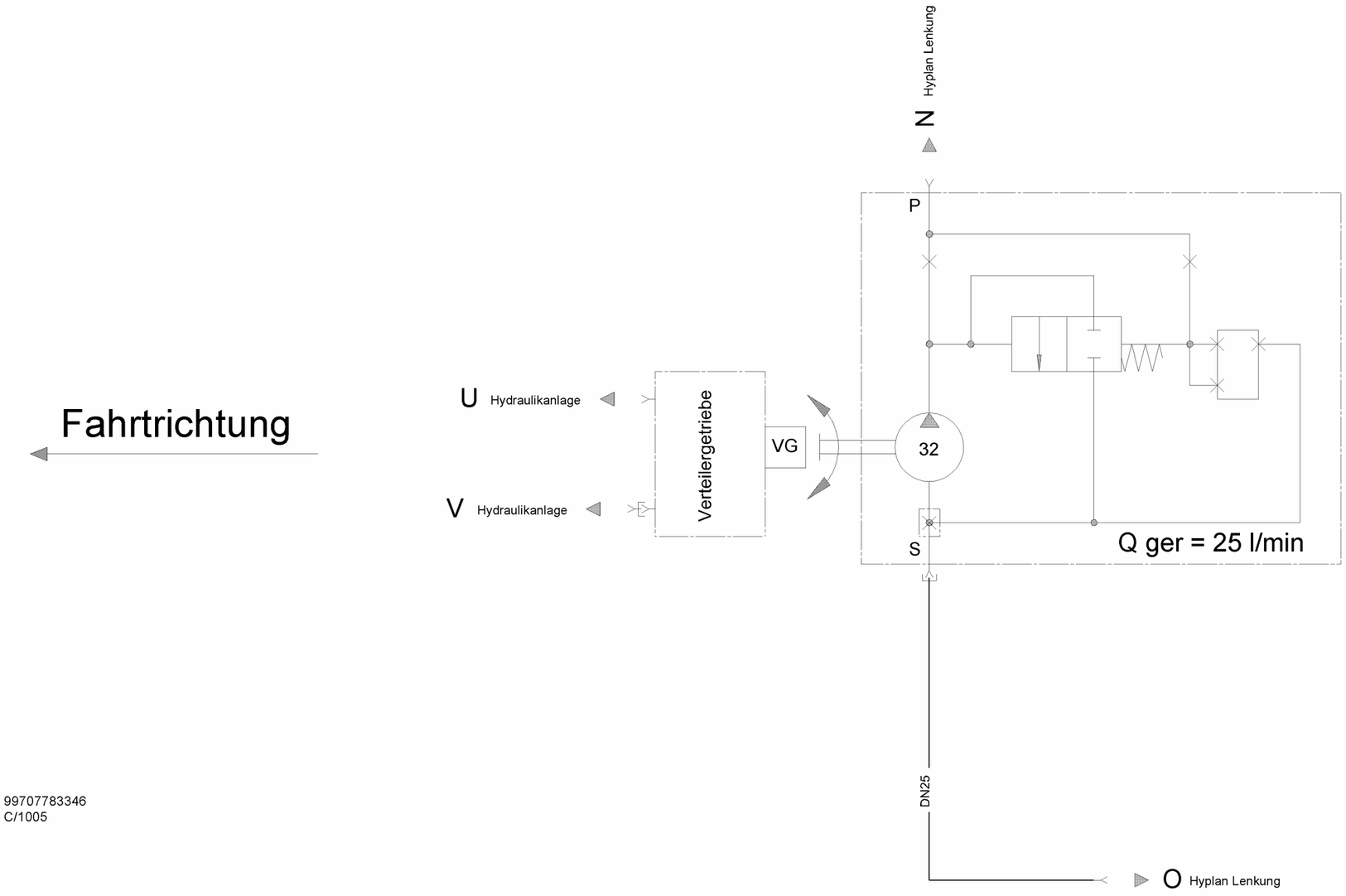


Memo:



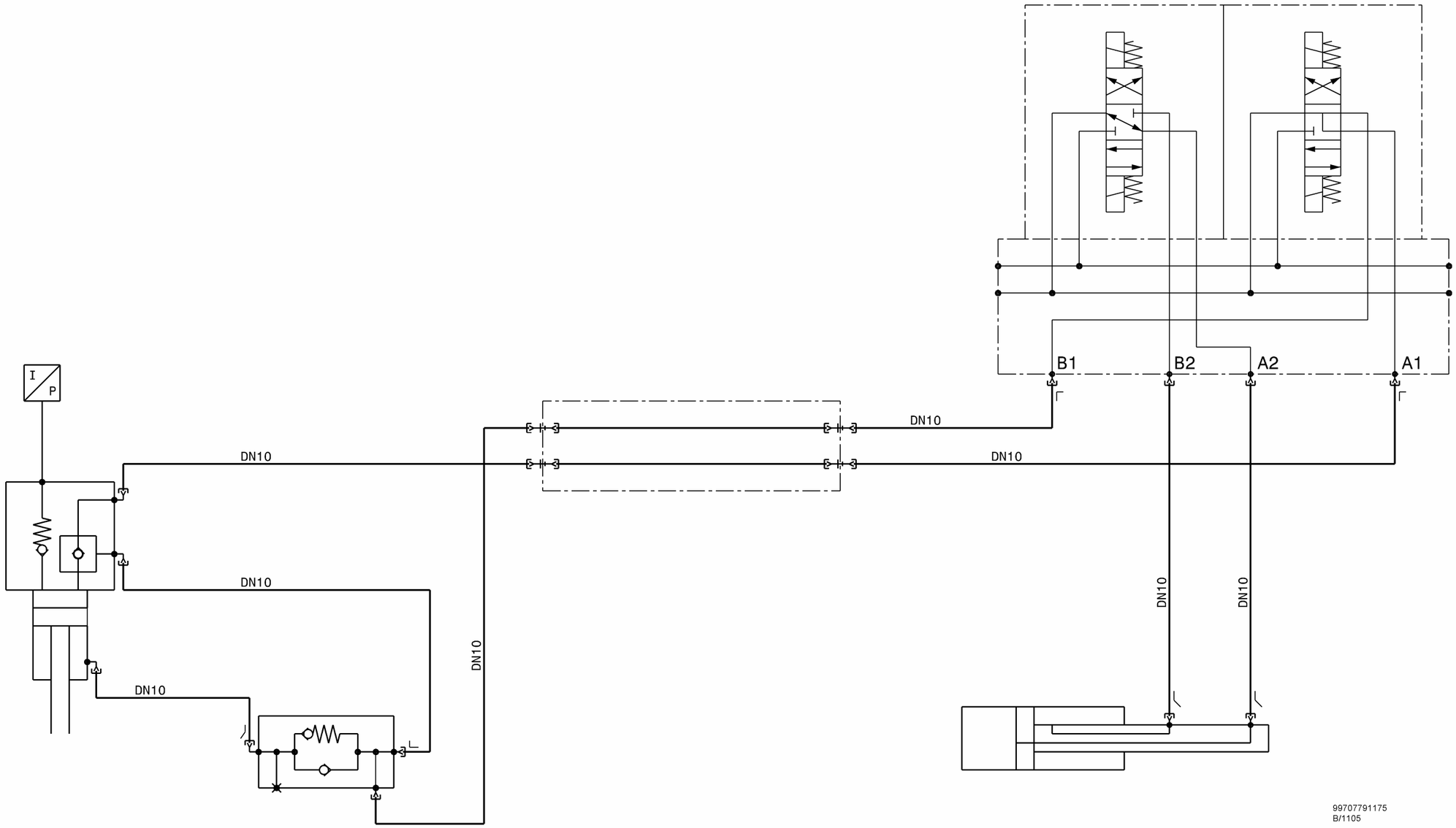
99707017084_02
A/0306

3.3 Transfer box (99707783346)

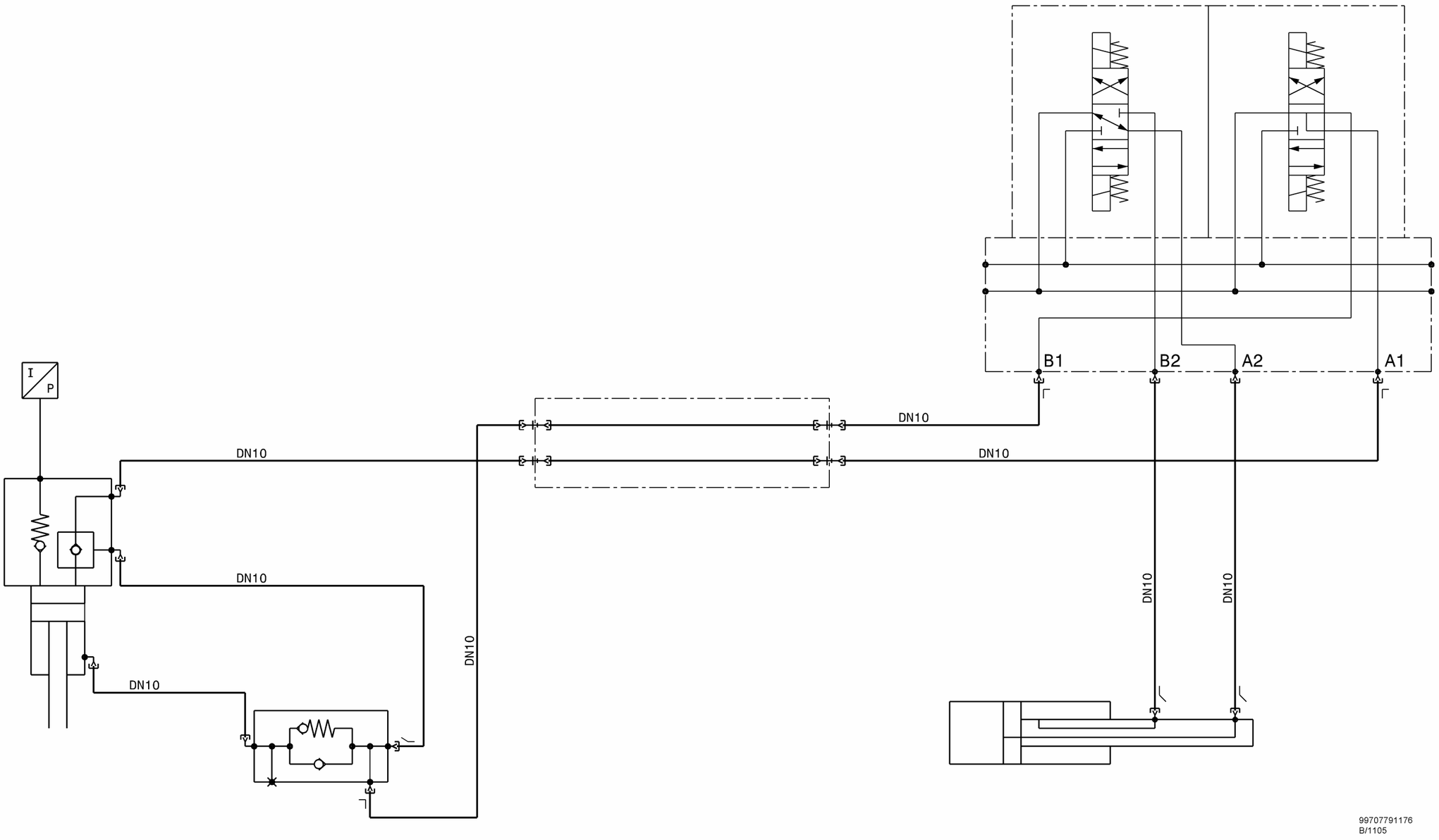


99707783346
C/1005

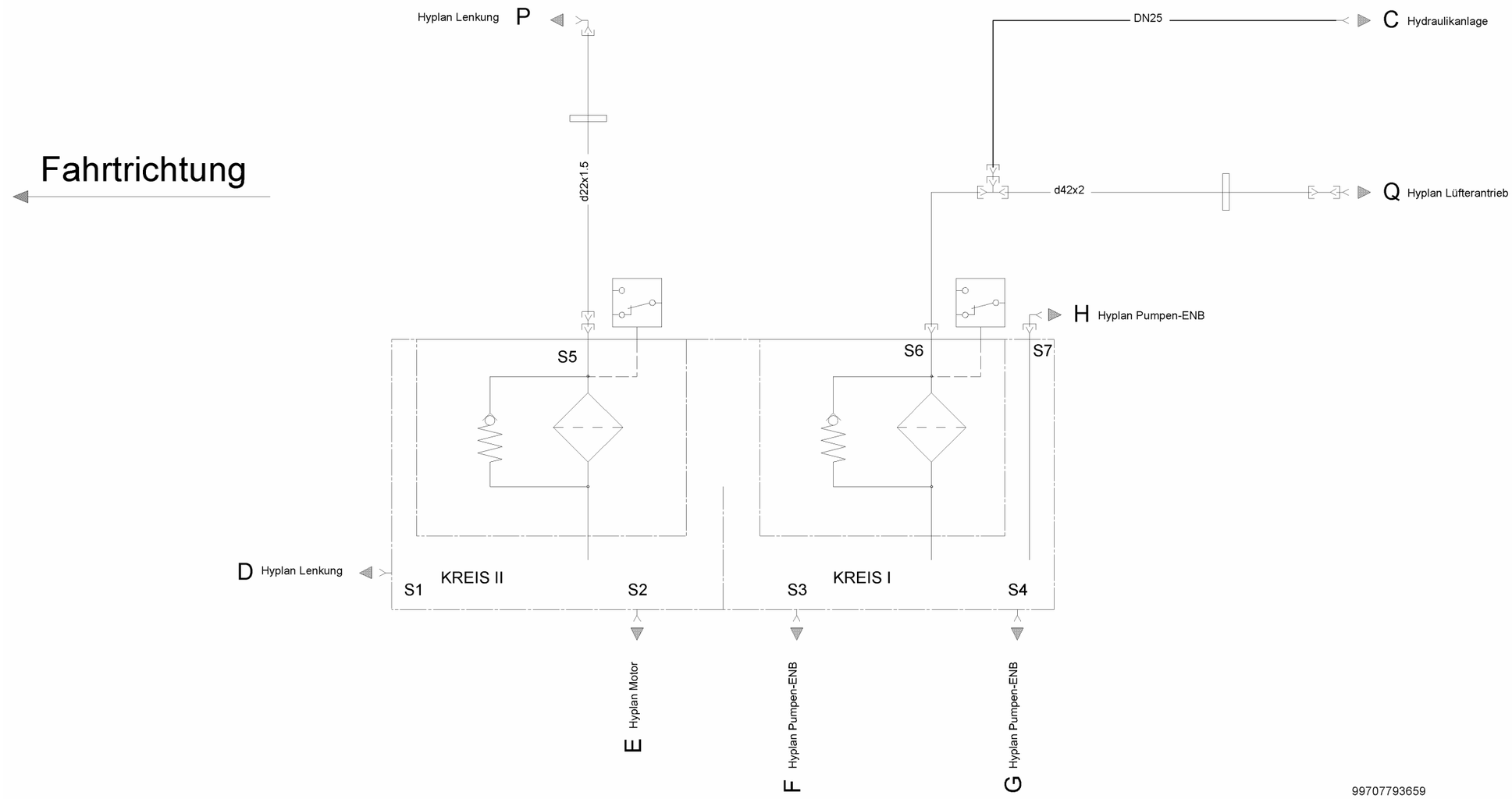
3.4 Front outriggers (99707791175)



3.5 Rear outriggers (99707791176)

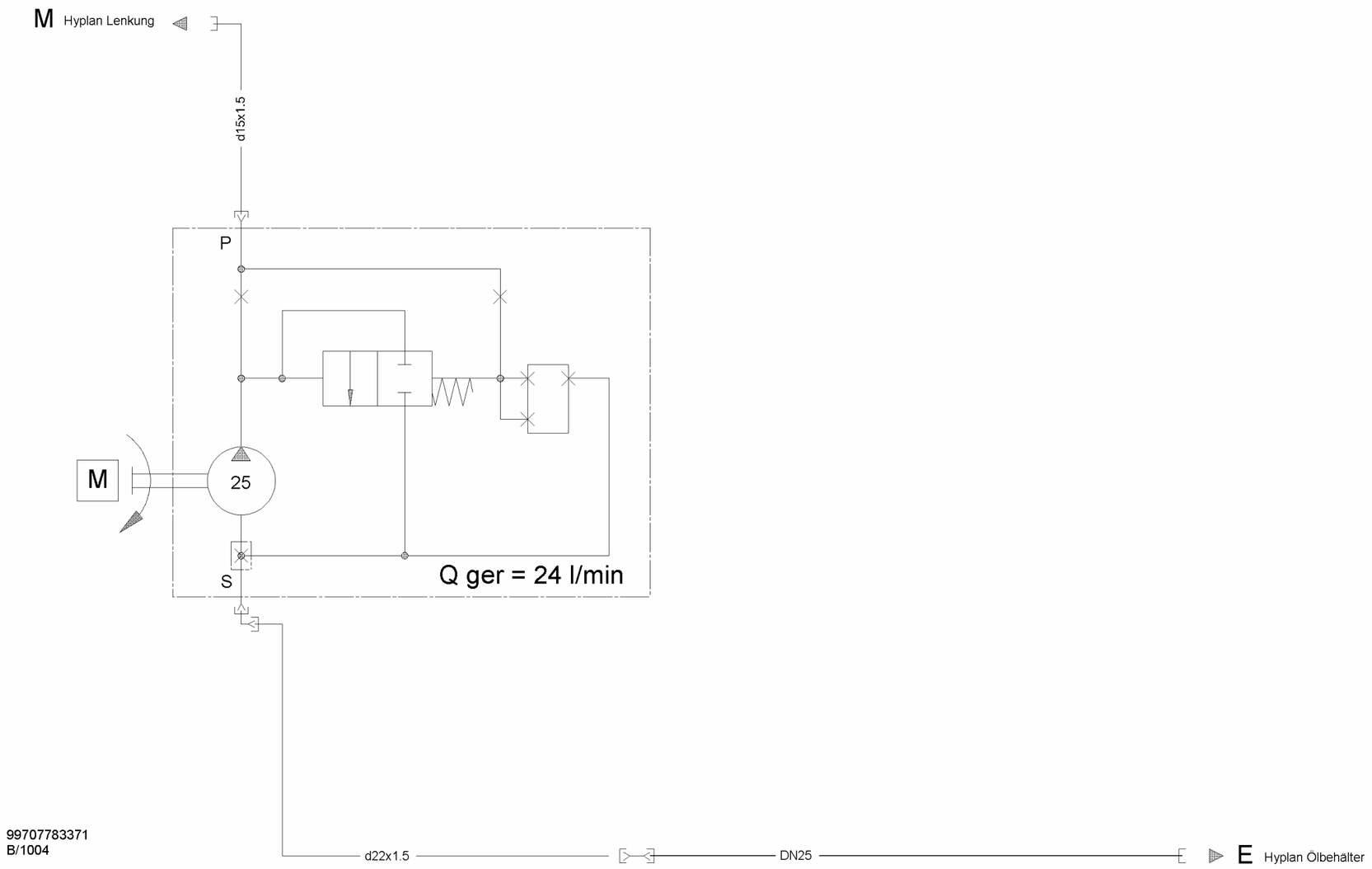


3.6 Oil tank (99707793659)

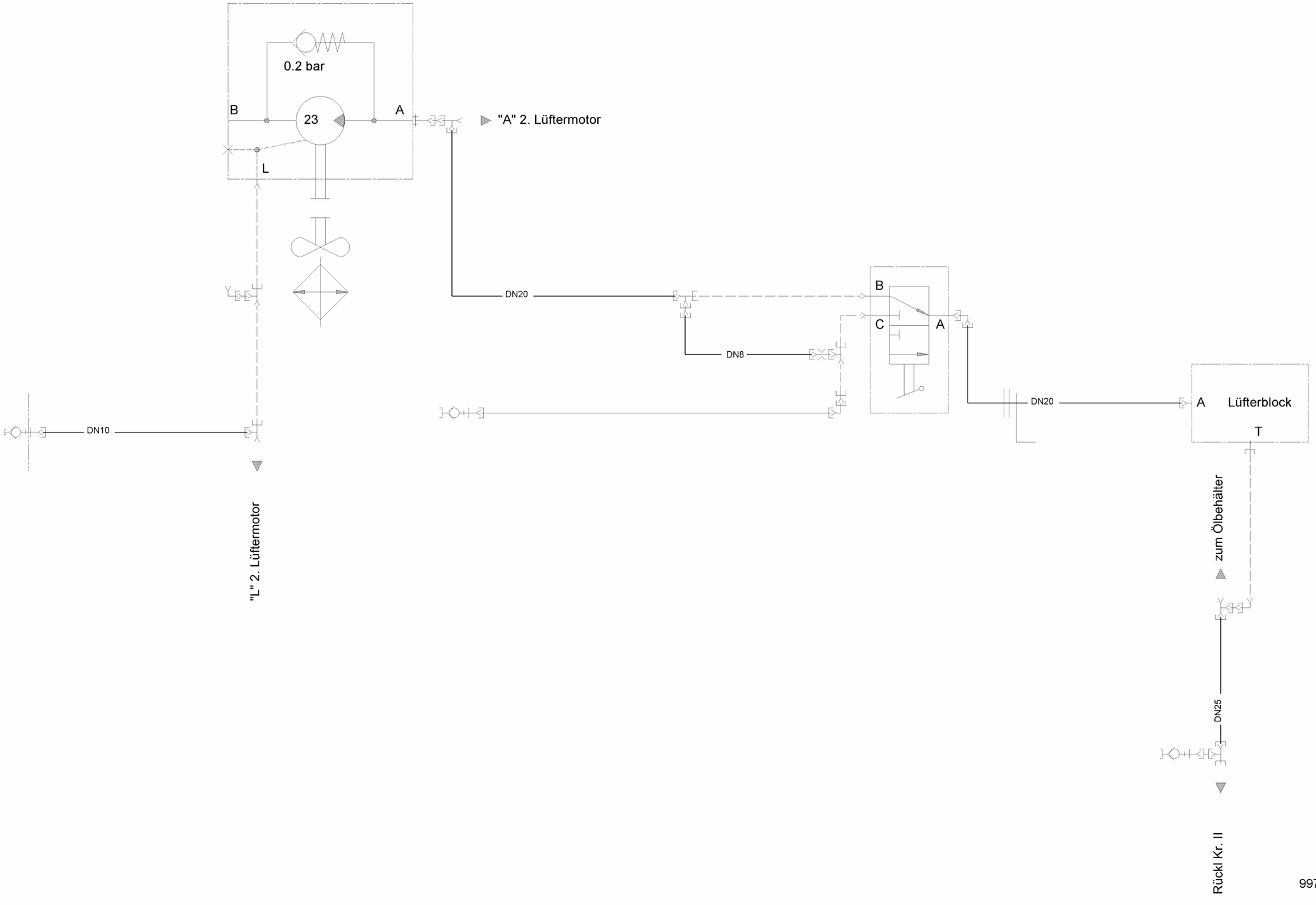


99707793659
0/1005

3.7 Motor (99707783371)



3.8 Emergency control (99707785508)



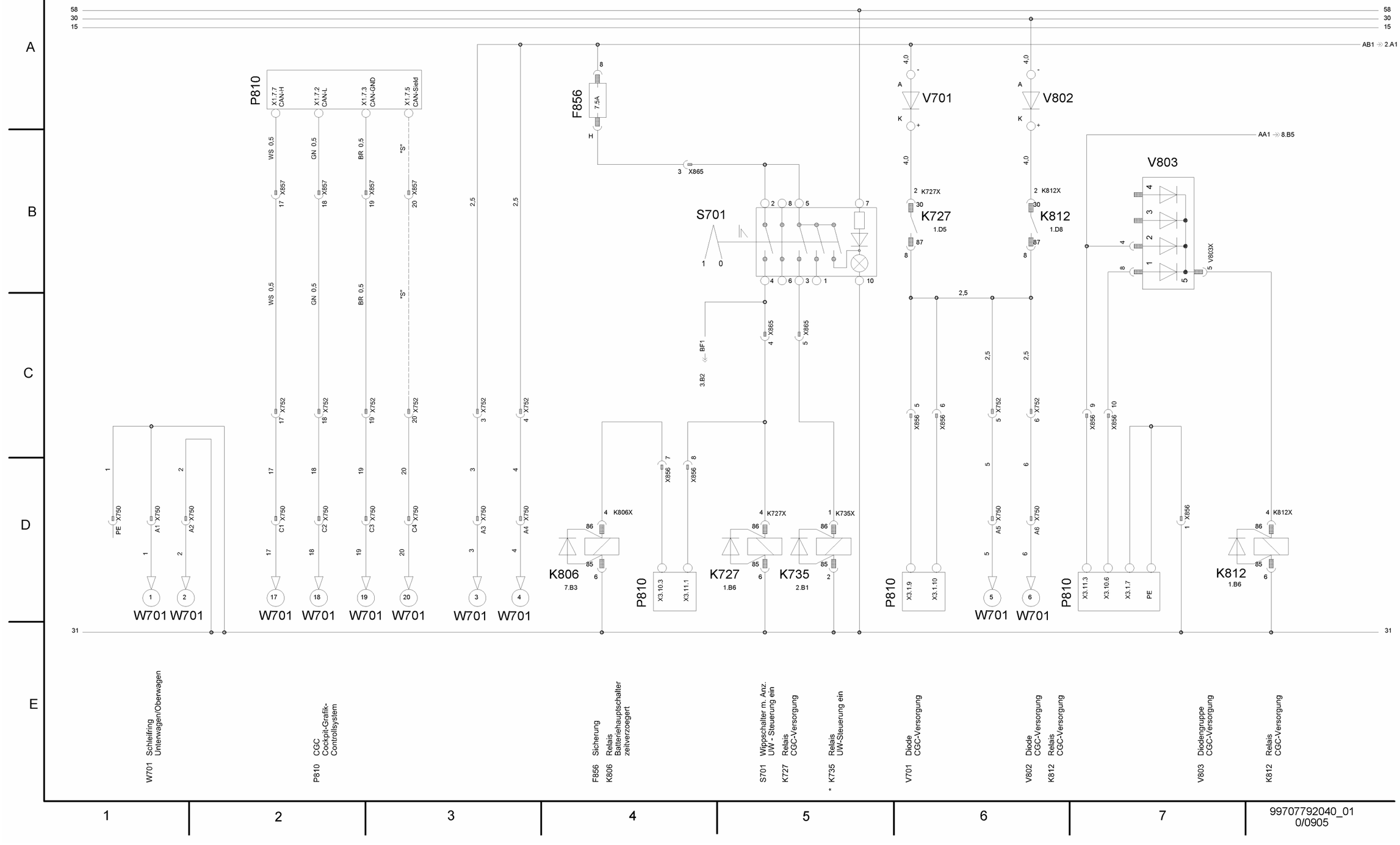
Part D2

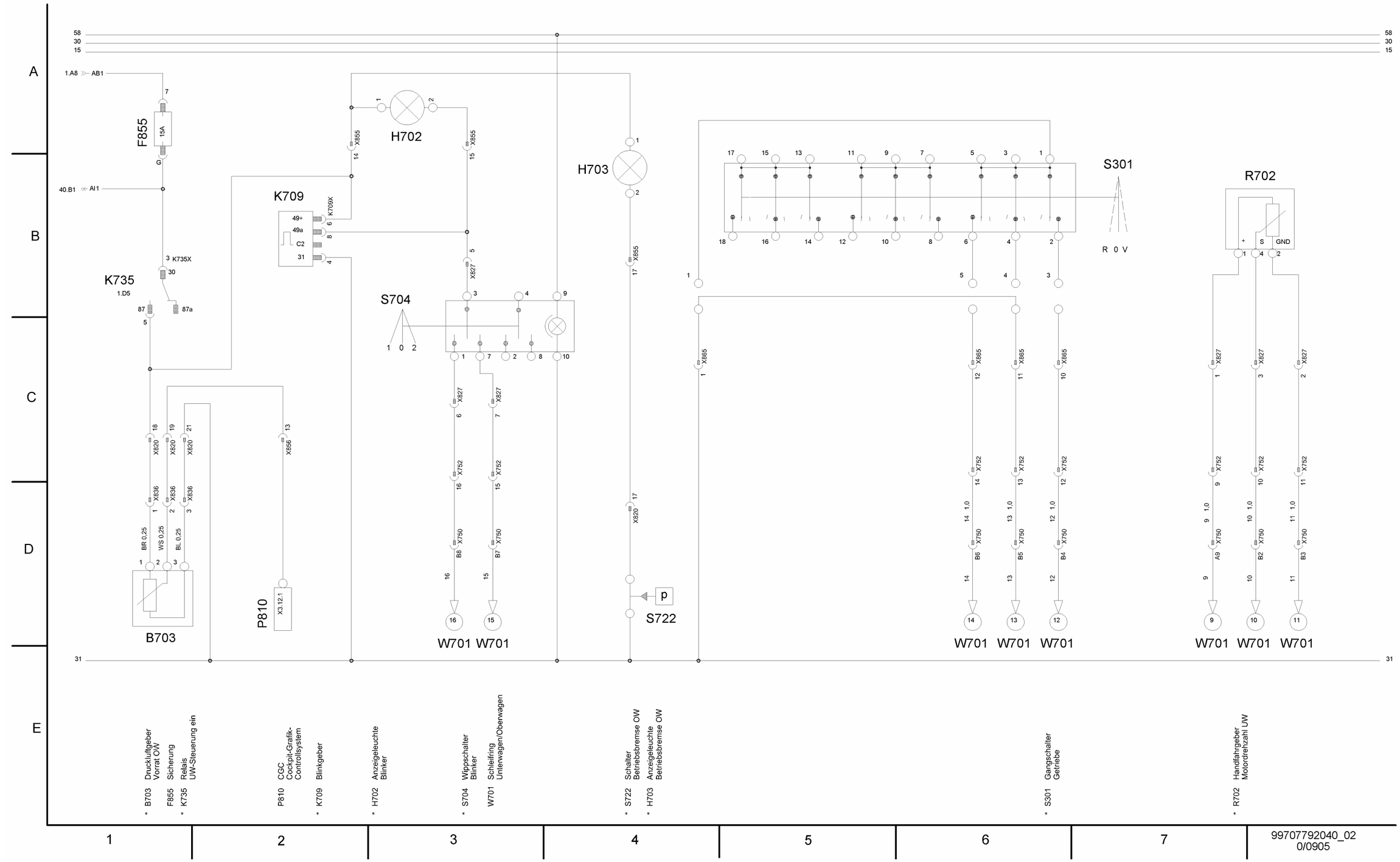
Circuit and piping diagrams

Superstructure

1 Electric circuit diagrams

1.1 Chassis control system (99707792040)

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15
31
A
B
C
D
E
1.A8
AB1
F855
15A
40.B1
AI1
K709
K709X
49+
49a
C2
31
K735X
K735
1.D5
87
87a
H702
H703
S704
1 0 2
S301
R 0 V
R702
+
S
GND
X855
X827
X865
X752
X750
X820
X836
X856
BR 0,25
WS 0,25
BL 0,25
B703
P810
X3.12.1
S722
p
W701
* B703 Druckluftgeber Vorrat OW
F855 Sicherung
* K735 Relais UW-Steuerung ein
P810 CGC Cockpit-Grafik-Controllsystem
* K709 Blinkgeber
* H702 Anzeigeleuchte Blinker
* S704 Wippschalter Blinker
W701 Schleifring Unterwagen/Oberwagen
* S722 Schalter Betriebsbremse OW
* H703 Anzeigeleuchte Betriebsbremse OW
* S301 Gangschalter Getriebe
* R702 Handfahrgeber Motordrehzahl UW
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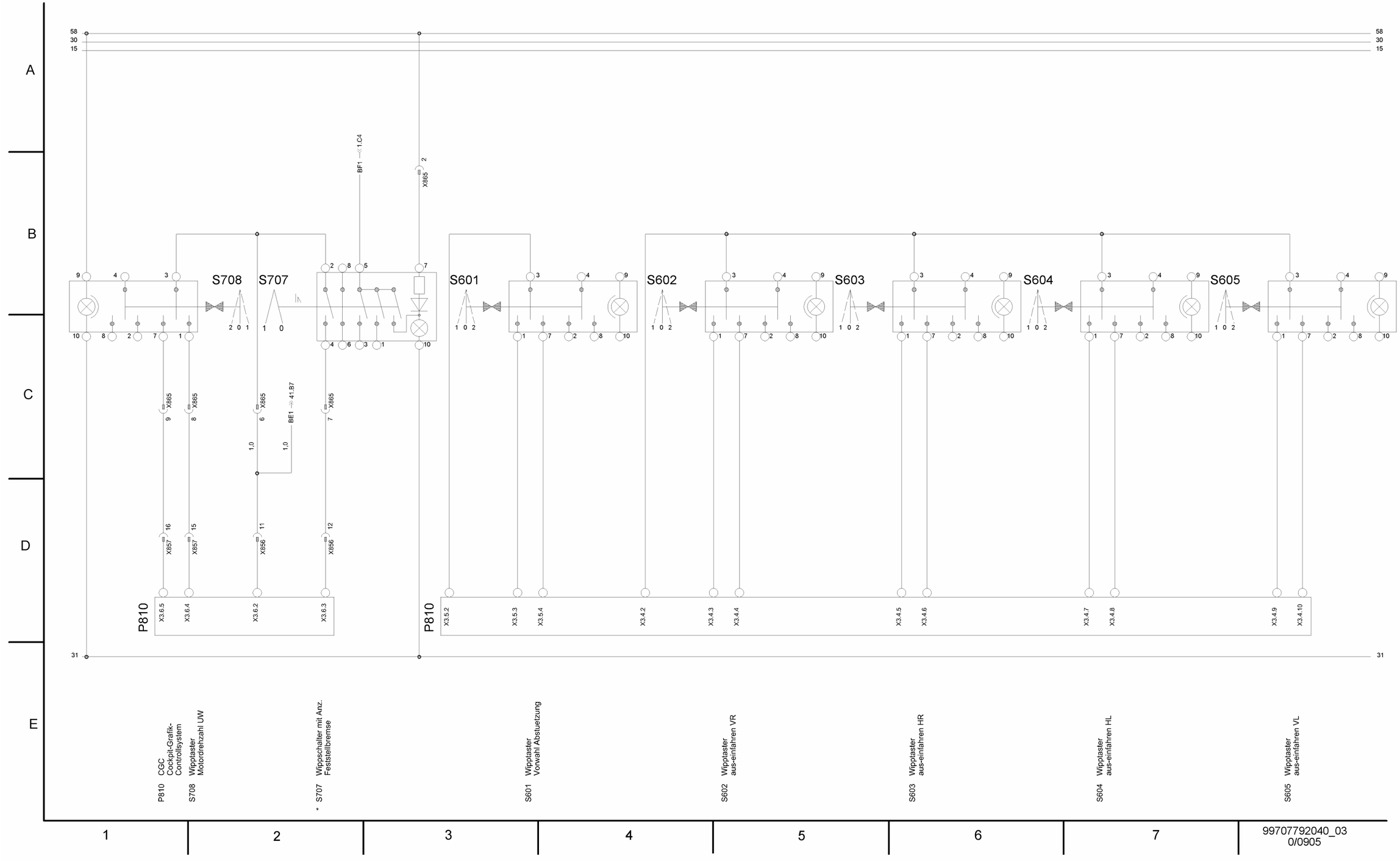
99707792040_02
0/0905


A
B
C
D
E
58
30
15
31
S708
S707
S601
S602
S603
S604
S605
BF1 1.C4
X865 2
BE1 41.B7
1.0
P810
X3.6.5
X3.6.4
X3.6.2
X3.6.3
X3.5.2
X3.5.3
X3.5.4
X3.4.2
X3.4.3
X3.4.4
X3.4.5
X3.4.6
X3.4.7
X3.4.8
X3.4.9
X3.4.10
P810 CGC Cockpit-Grafik-Controllsystem
S708 Wipptaster Motordrehzahl UW
* S707 Wippschalter mit Anz. Feststellbremse
S601 Wipptaster Vorwahl Abstuetzung
S602 Wipptaster aus-einfahren VR
S603 Wipptaster aus-einfahren HR
S604 Wipptaster aus-einfahren HL
S605 Wipptaster aus-einfahren VL
1
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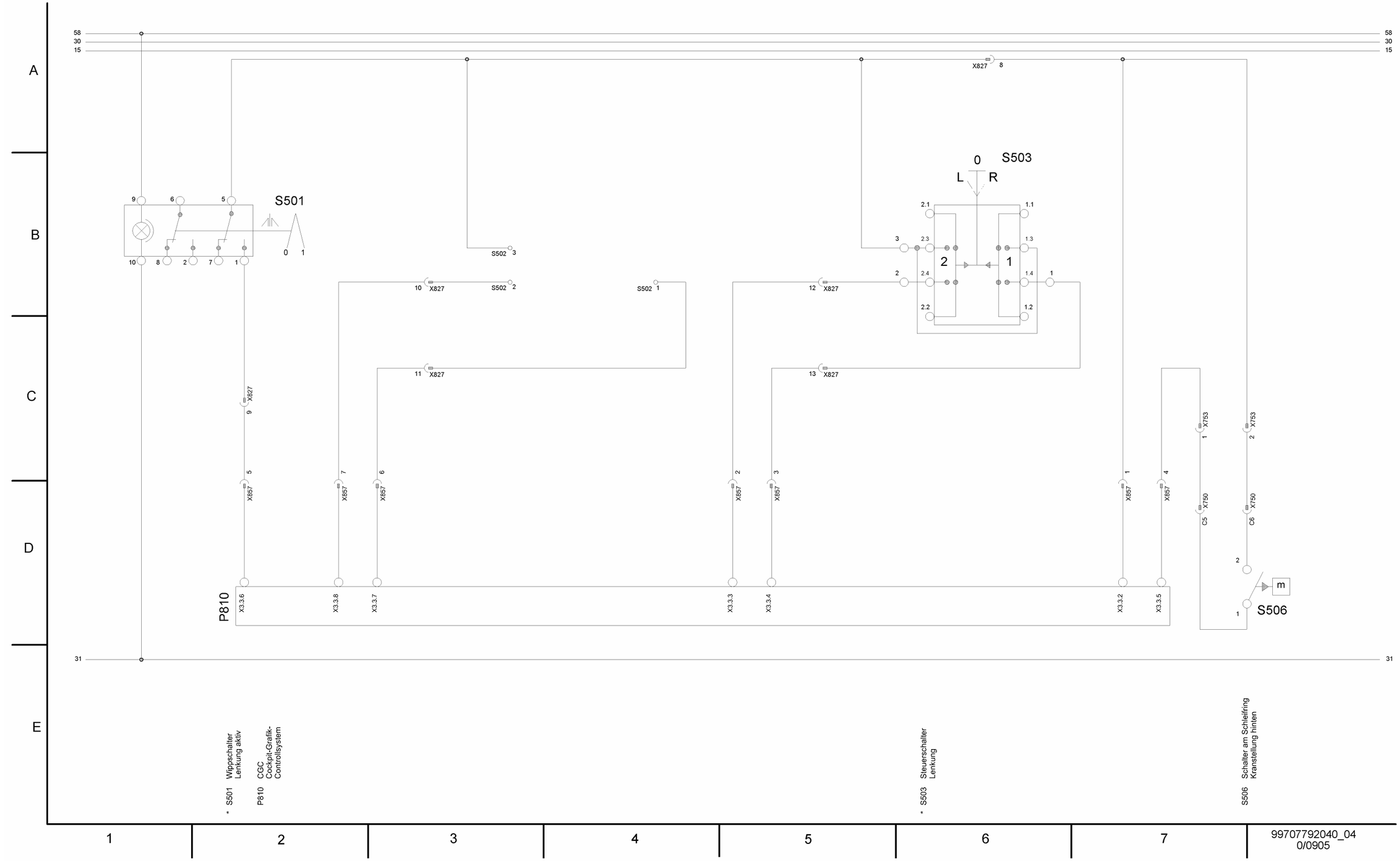
99707792040_03
0/0905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15
A
B
C
D
E
S501
9
6
5
10
8
2
7
1
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1
S502
3
2
1
10 X827
11 X827
9 X827
5 X857
7 X857
6 X857
S503
0
L
R
2.1
1.1
3
2.3
1.3
2
1
2
2.4
1.4
1
2.2
1.2
12 X827
13 X827
2 X857
3 X857
1 X857
4 X857
X827 8
X753
X750
C5
C6
2
1
m
S506
P810
X3.3.6
X3.3.8
X3.3.7
X3.3.3
X3.3.4
X3.3.2
X3.3.5
31
* S501 Wippschalter Lenkung aktiv
P810 CGC Cockpit-Grafik-Controllsystem
* S503 Steuerschalter Lenkung
S506 Schalter am Schleifring Kranstellung hinten
1
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6
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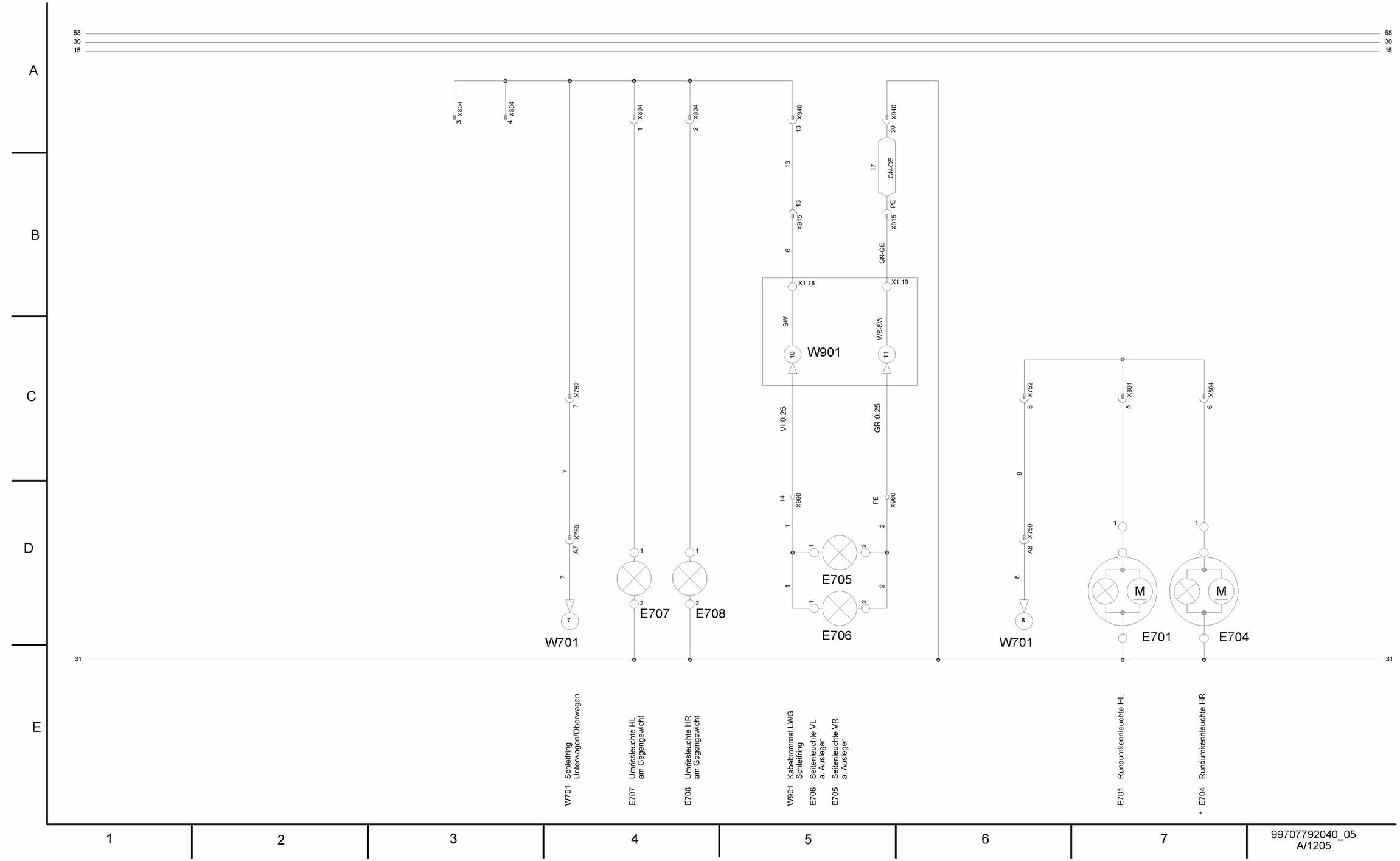
99707792040_04
0/0905

1.2 Superstructure (99707792040)



CAD-Original, Aenderung nur ueüber CAD

CAD-original, change only by CAD

Schutzvermerk nach DIN 34 beachten

Attention to protection mark DIN 34

CODE 1700.00

A ..... B ..... C ..... D ..... E .....

BGR

D	1	F601713	13.09.06	Krause		
IND	X	AEND/CHANG	DAT	NAME		

	DAT	NAME
GEZ/DR	13.09.06	Krause
KON/DE	13.09.06	Kohl
FTG/MA	*	*
NOR/ST	*	*

BENENNUNG/DESCRIPTION

Stromlaufplan OW

TYP/TYPE FA036

GUETEKLASSE QUAL.GRADE I

MASSTAB SCALE *

ROHTEIL-NR UNMACHINED NO *

WERKSTOFF/MERIAL *

0 m^2

PROJ

ISO 128

ZUS-ZEICHNUNG/ASSEMBLY DRAWING *

GEWICHT/WEIGHT 0 KG

FAUN

URSPR/ORIGIN *

ZEICHNUNGS/DRAWING-NR 99707792040

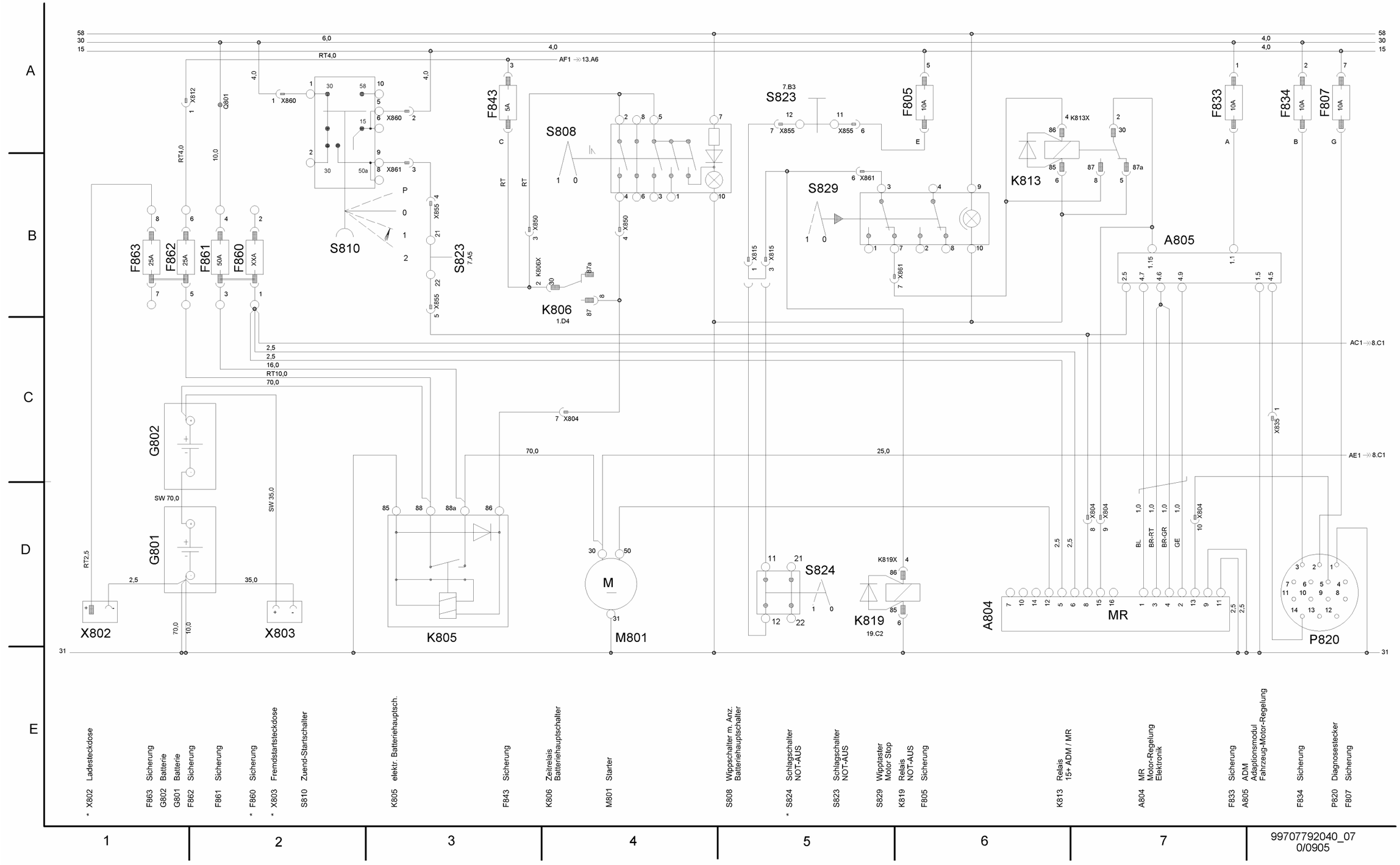
FORMAT 3

BLATT SHEET 6

42 BL/SH

ERSETZT/REPL Zeichn. gl. Nr. vom 24.05.06

99708720-071


A
B
C
D
E
58
30
15
6,0
4,0
RT4,0
AF1 ⇒ 13.A6
X812
Q801
X860
F843
5A
S808
S823
7.B3
F805
10A
K813X
K813
F833
F834
F807
A805
S810
S829
K806
1.D4
K606X
X850
X855
X815
X861
F863
F862
F861
F860
25A
50A
XXA
AC1 ⇒ 8.C1
AE1 ⇒ 8.C1
X804
X835
G802
G801
SW 70,0
SW 35,0
RT2,5
2,5
35,0
70,0
10,0
16,0
RT10,0
25,0
X802
X803
K805
M
M801
S824
K819X
K819
19.C2
A804
MR
BL
BR-RT
BR-GR
GE
P820
31
* X802 Ladestecksdose
F863 Sicherung
G802 Batterie
G801 Batterie
F862 Sicherung
F861 Sicherung
* F860 Sicherung
* X803 Fremdstartsteckdose
S810 Zuend-Startschalter
K805 elektr. Batteriehauptsch.
F843 Sicherung
K806 Zeitrelais Batteriehauptschalter
M801 Starter
S808 Wippschalter m. Anz. Batteriehauptschalter
* S824 Schlagschalter NOT-AUS
S823 Schlagschalter NOT-AUS
S829 Wipptaster Motor Stop
K819 Relais NOT-AUS
F805 Sicherung
K813 Relais 15+ ADM / MR
A804 MR Motor-Regelung Elektronik
F833 Sicherung
A805 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
F834 Sicherung
P820 Diagnosestecker
F807 Sicherung
1
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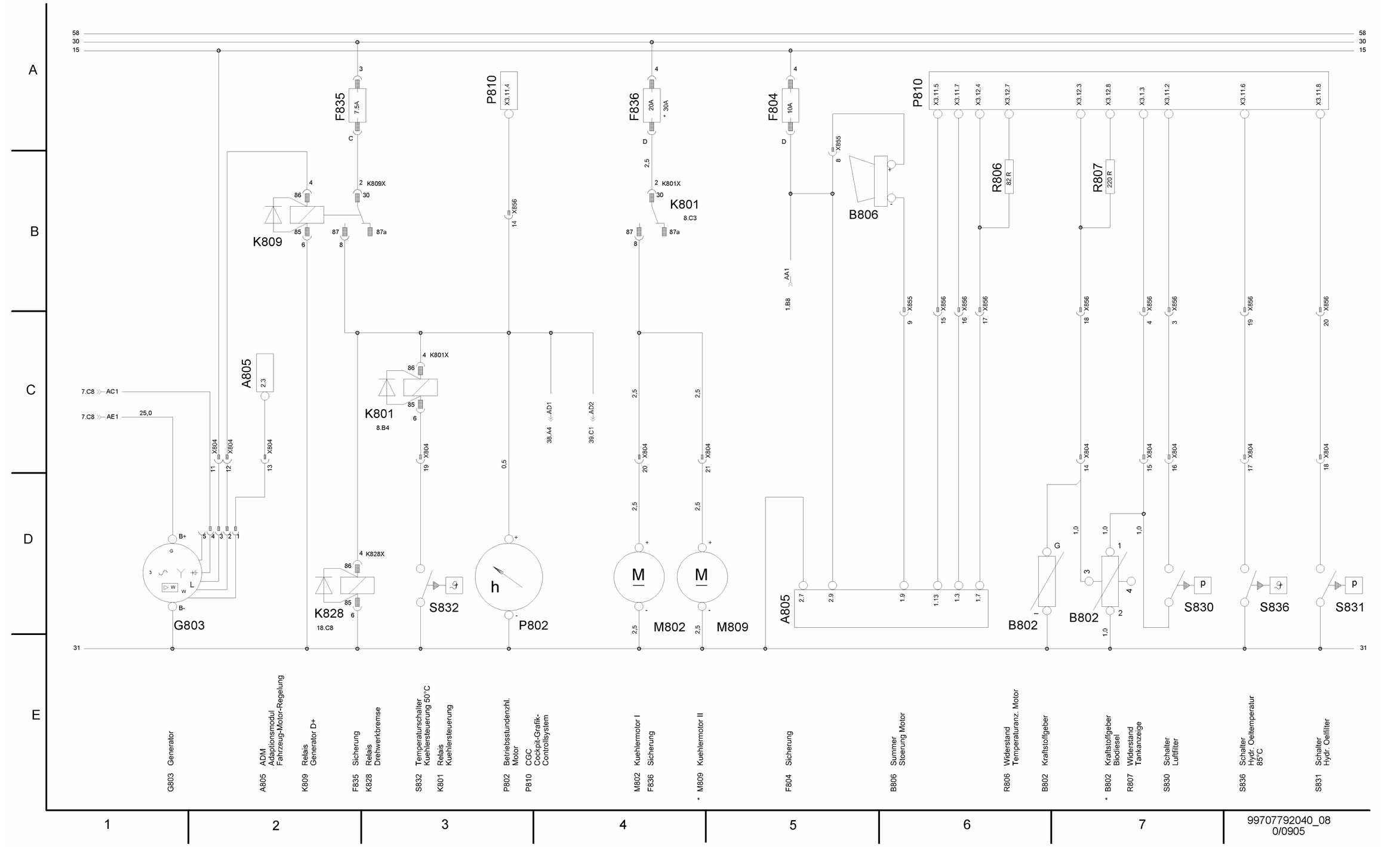
99707792040_07
0/0905



G803 Generator

A805 ADM Adaptionsmodul Fahrzeug-Motor-Regelung

K809 Relais Generator D+

F835 Sicherung

K828 Relais Drehwerkbremse

S832 Temperaturschalter Kuehlersteuerung 50°C

K801 Relais Kuehlersteuerung

P802 Betriebsstundenzhl. Motor

P810 CGC Cockpit-Grafik-Controllsystem

M802 Kuehlermotor I

F836 Sicherung

* M809 Kuehlermotor II

F804 Sicherung

B806 Summer Steerung Motor

R806 Widerstand Temperaturanz. Motor

B802 Kraftstoffgeber

* B802 Kraftstoffgeber Biodiesel

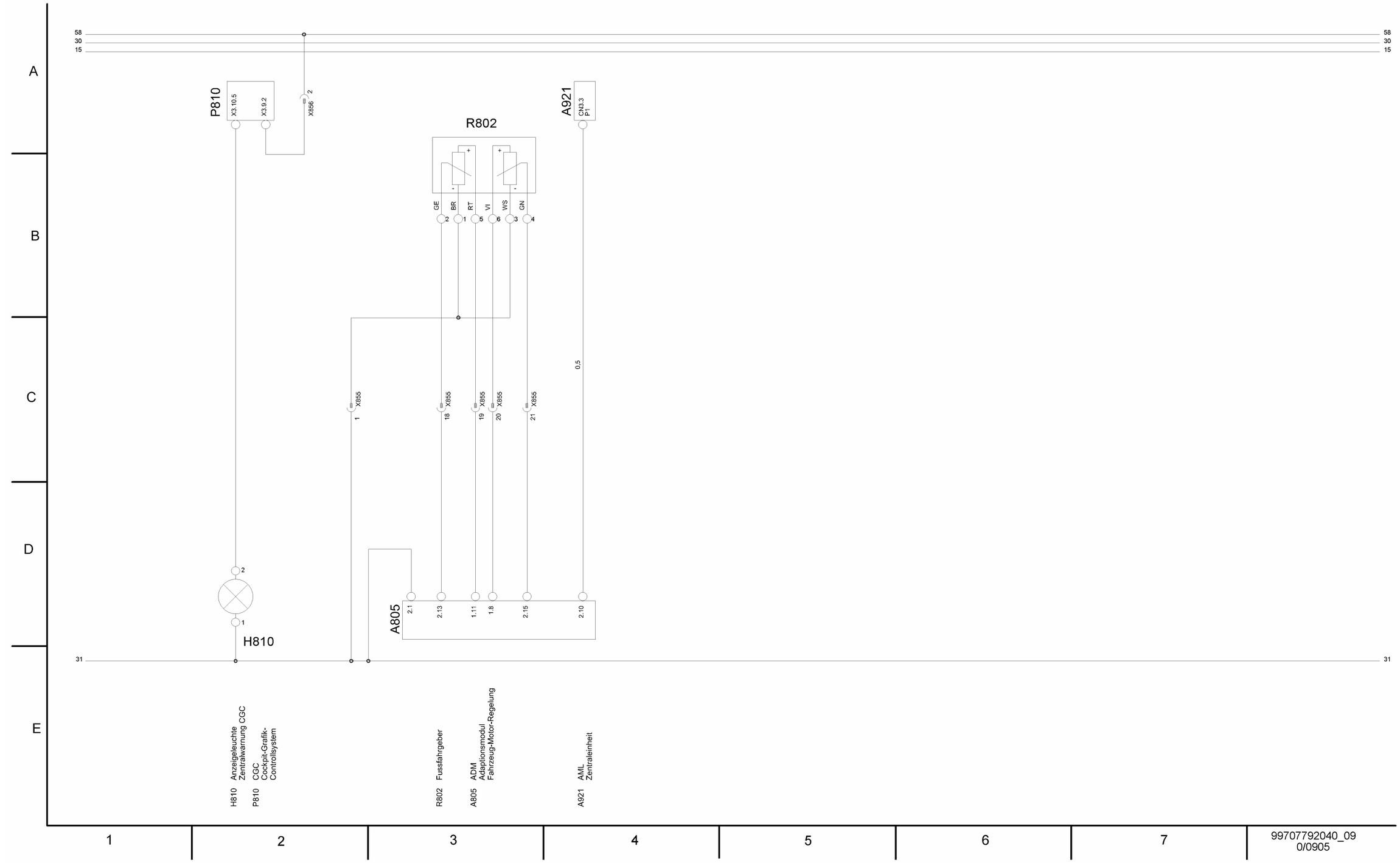
R807 Widerstand Tankanzeige

S830 Schalter Luftfilter

S836 Schalter Hydr. Oeltemperatur 85°C

S831 Schalter Hydr. Oelfilter

99707792040_08 0/0905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30
15
58
30
15
P810
X3.10.5
X3.9.2
X856
2
A921
CN3.3
P1
R802
GE
BR
RT
VI
WS
GN
2
1
5
6
3
4
X855
1
X855
18
X855
19
X855
20
X855
21
0,5
2
1
H810
A805
2.1
2.13
1.11
1.8
2.15
2.10
31
31
H810 Anzeigeleuchte Zentralwarnung CGC
P810 CGC Cockpit-Grafik-Controllsystem
R802 Fussfahrgeber
A805 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
A921 AML Zentraleinheit
A
B
C
D
E
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99707792040_09
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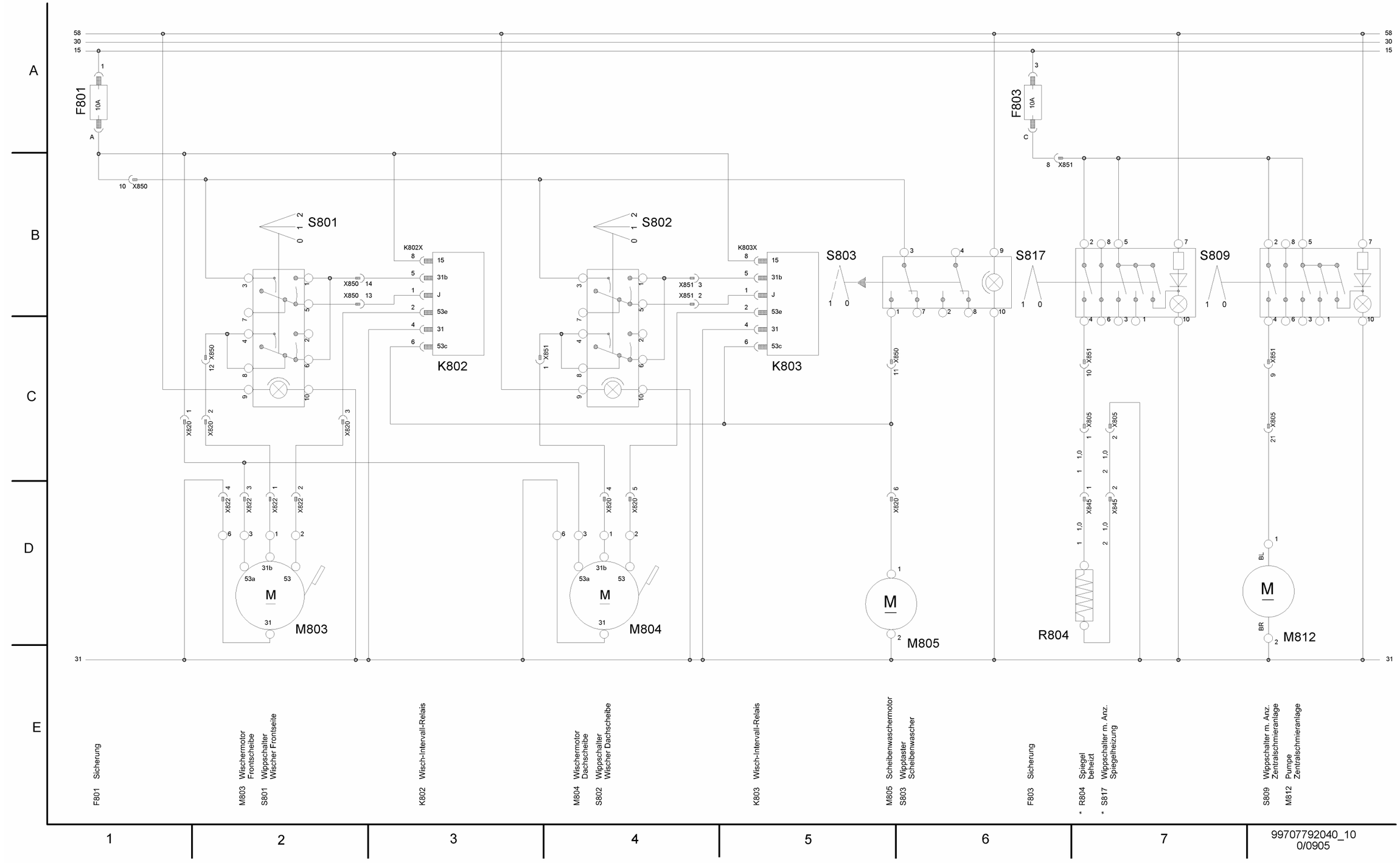
A
B
C
D
E
58
30
15
F801
10A
A
1
10 X850
F803
10A
C
3
8 X851
S801
S802
S803
S817
S809
K802X
K803X
15
31b
J
53e
31
53c
X850 14
X850 13
X851 3
X851 2
K802
K803
X820 1
X820 2
X820 3
X820 4
X820 5
X820 6
X822 4
X822 3
X822 1
X822 2
X851
X850
X805
X645
M803
M804
M805
M812
R804
BL
BR
31
F801 Sicherung
M803 Wischermotor Frontscheibe
S801 Wippschalter Wischer Frontseite
K802 Wisch-Intervall-Relais
M804 Wischermotor Dachscheibe
S802 Wippschalter Wischer Dachscheibe
K803 Wisch-Intervall-Relais
M805 Scheibenwaschermotor
S803 Wipptaster Scheibenwascher
F803 Sicherung
* R804 Spiegel beheizt
* S817 Wippschalter m. Anz. Spiegelheizung
S809 Wippschalter m. Anz. Zentralschmieranlage
M812 Pumpe Zentralschmieranlage
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5
6
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99707792040_10
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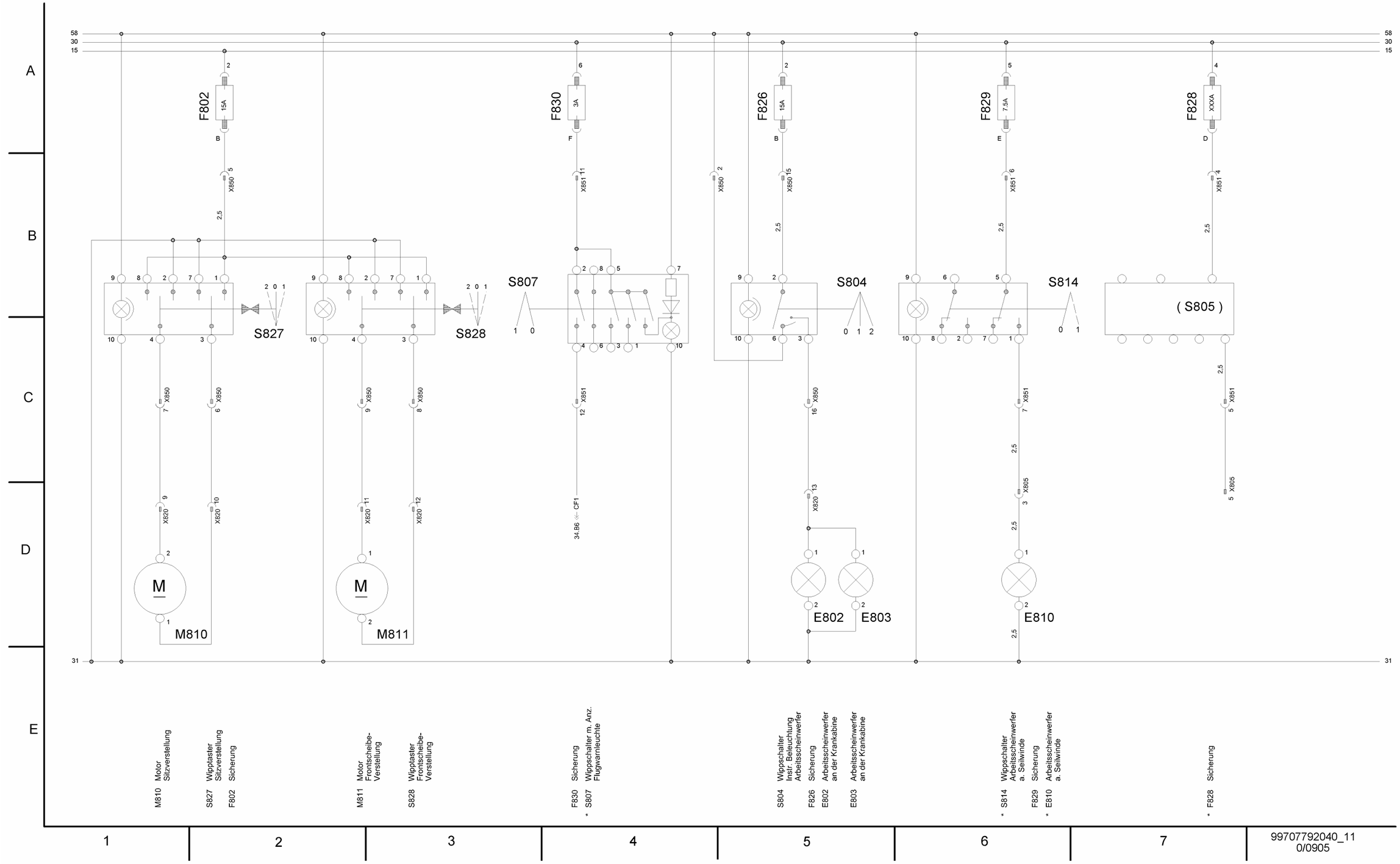
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F830
3A
F826
15A
F829
7.5A
F828
XXXA
S827
S828
S807
S804
S814
(S805)
M
M810
M811
E802
E803
E810
31
A
B
C
D
E
1
2
3
4
5
6
7
M810 Motor Sitzverstellung
S827 Wipptaster Sitzverstellung
F802 Sicherung
M811 Motor Frontscheibe-Verstellung
S828 Wipptaster Frontscheibe-Verstellung
F830 Sicherung
* S807 Wippschalter m. Anz. Flugwarnleuchte
S804 Wippschalter Instr. Beleuchtung Arbeitsscheinwerfer
F826 Sicherung
E802 Arbeitsscheinwerfer an der Krankabine
E803 Arbeitsscheinwerfer an der Krankabine
* S814 Wippschalter Arbeitsscheinwerfer a. Seilwinde
F829 Sicherung
* E810 Arbeitsscheinwerfer a. Seilwinde
* F828 Sicherung
99707792040_11
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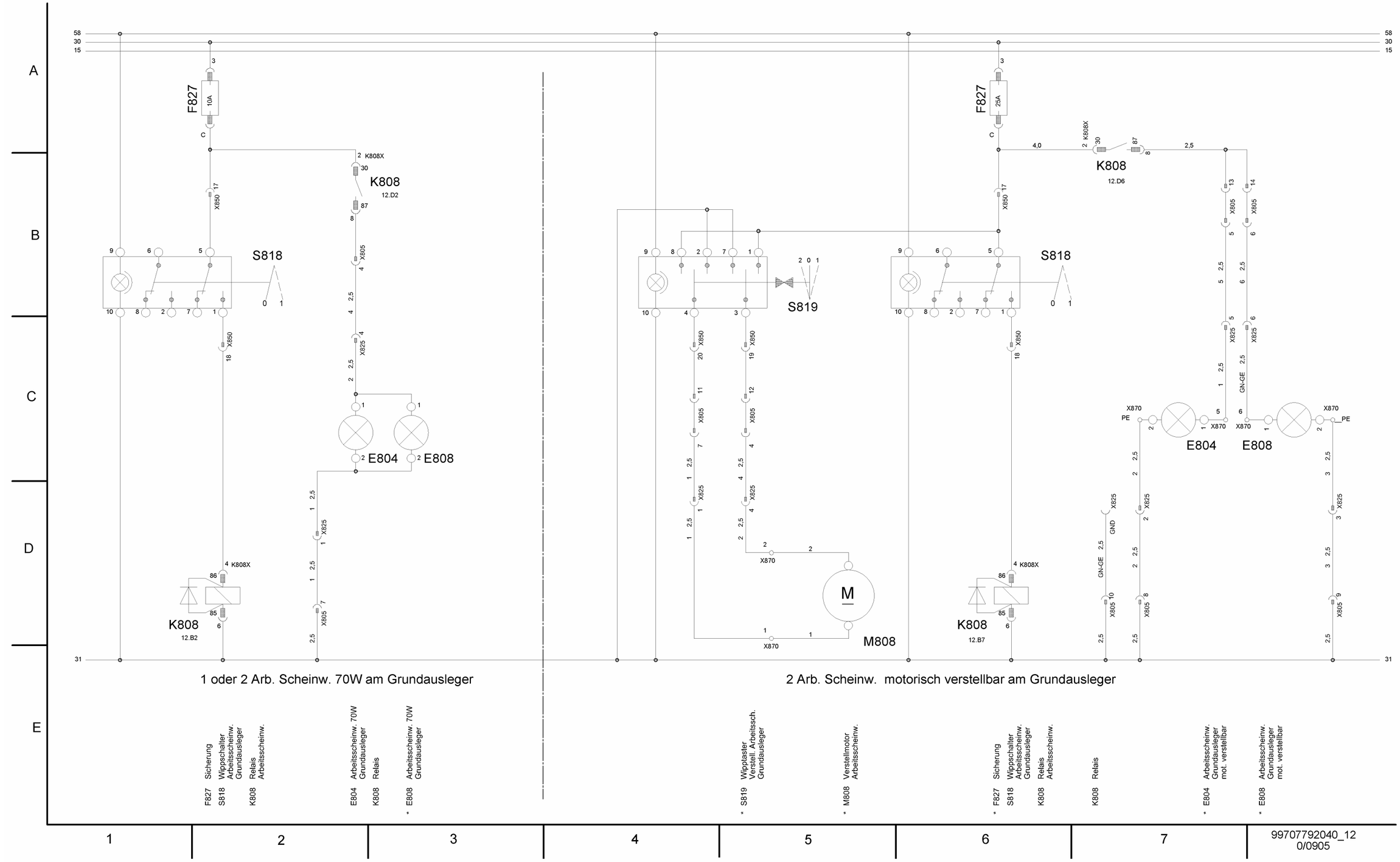
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30
15
F827
10A
X850
S818
K808X
K808
12.D2
X805
X825
E804
E808
K808
12.B2
1 oder 2 Arb. Scheinw. 70W am Grundausleger
F827
25A
4,0
2,5
K808
12.D6
S819
M
M808
K808
12.B7
GN-GE
GND
X870
PE
2 Arb. Scheinw. motorisch verstellbar am Grundausleger
Sicherung
Wippschalter Arbeitsscheinw. Grundausleger
Relais Arbeitsscheinw.
Arbeitsscheinw. 70W Grundausleger
Relais
Arbeitsscheinw. 70W Grundausleger
Wipptaster Verstell. Arbeitssch. Grundausleger
Verstellmotor Arbeitsscheinw.
Sicherung
Wippschalter Arbeitsscheinw. Grundausleger
Relais Arbeitsscheinw.
Relais
Arbeitsscheinw. Grundausleger mot. verstellbar
Arbeitsscheinw. Grundausleger mot. verstellbar
99707792040_12
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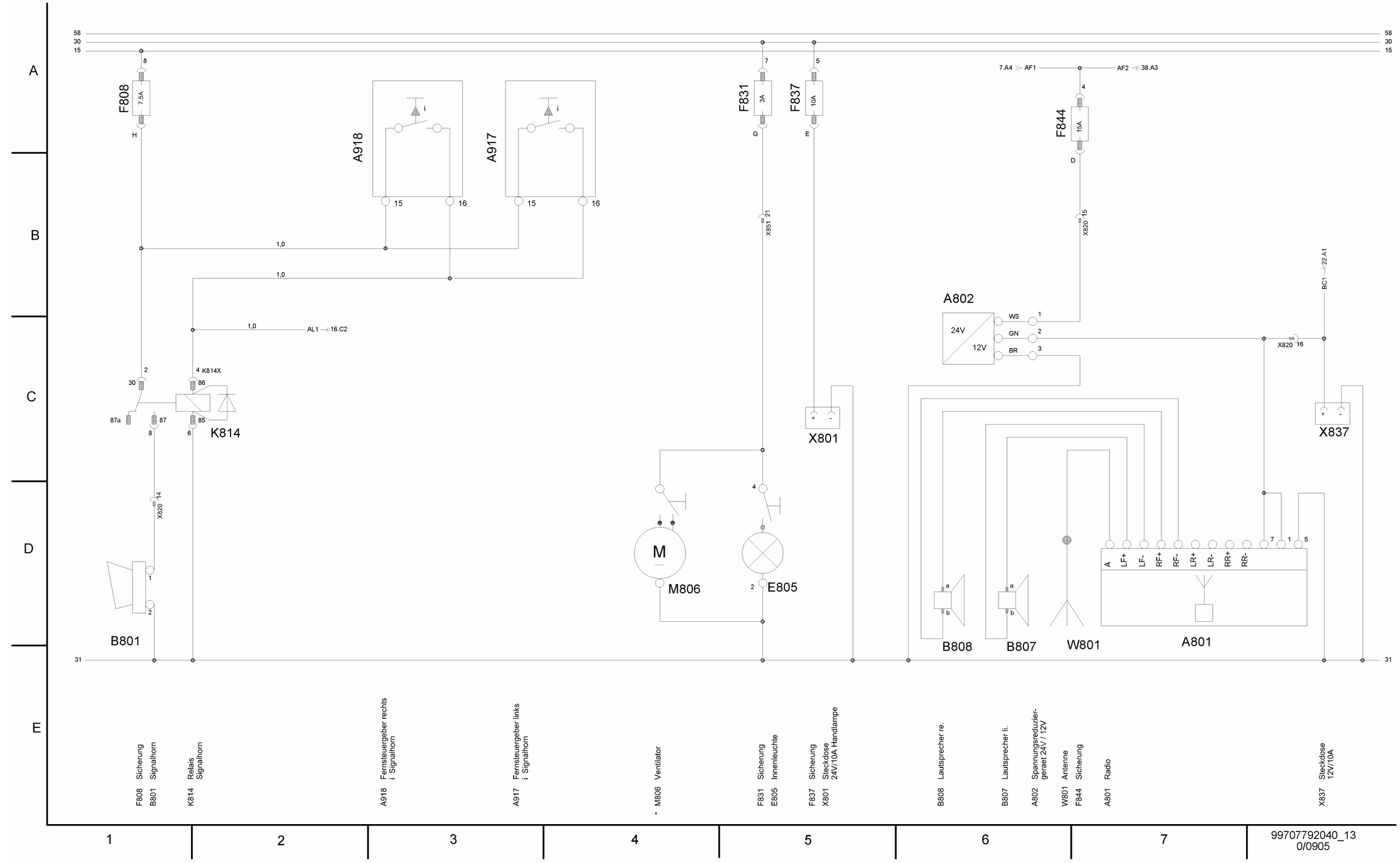
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30
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F808
7.5A
H
8
A918
A917
i
15
16
1,0
AL1 → 16.C2
2
30
4 K814X
86
87a
87
85
8
6
K814
X820 14
1
2
B801
31
F831
3A
G
7
X851 21
F837
10A
E
5
X801
M
M806
4
2
E805
7.A4 >- AF1
AF2 → 38.A3
F844
15A
D
4
X820 15
A802
24V
12V
WS
GN
BR
1
2
3
X820 16
BC1 → 22.A1
X837
B808
B807
W801
A801
A
LF+
LF-
RF+
RF-
LR+
LR-
RR+
RR-
7
1
5
a
b
F808 Sicherung Signalhorn
B801 Signalhorn
K814 Relais Signalhorn
A918 Fernsteuergeber rechts i Signalhorn
A917 Fernsteuergeber links i Signalhorn
* M806 Ventilator
F831 Sicherung Innenleuchte
E805
F837 Sicherung Steckdose 24V/10A Handlampe
X801
B808 Lautsprecher re.
B807 Lautsprecher li.
A802 Spannungsreduzier-geraet 24V / 12V
W801 Antenne
F844 Sicherung
A801 Radio
X837 Steckdose 12V/10A
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5
6
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99707792040_13
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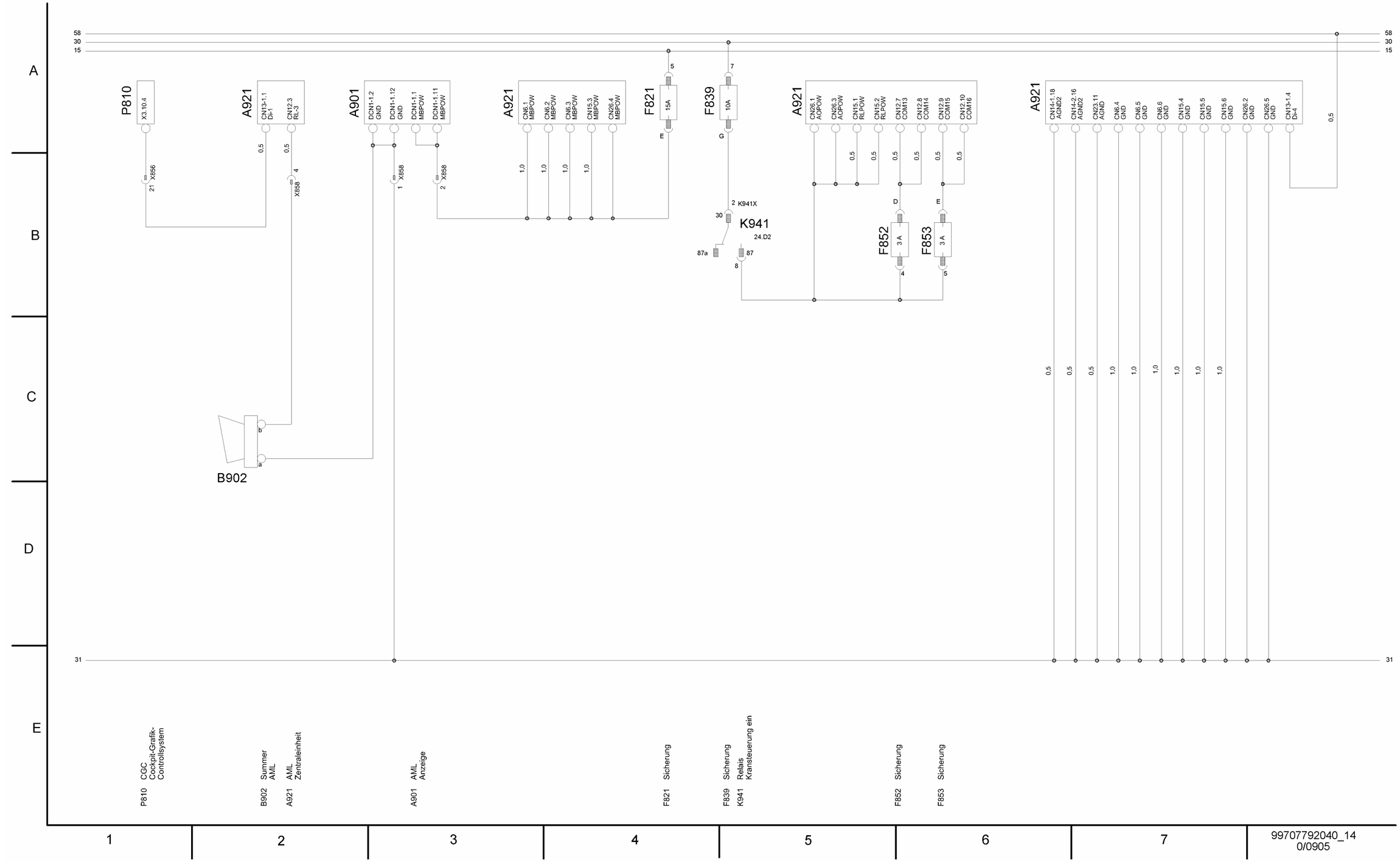
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P810
X3.10:4
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X656
A921
CN13-1.1
DI-1
CN12.3
RL-3
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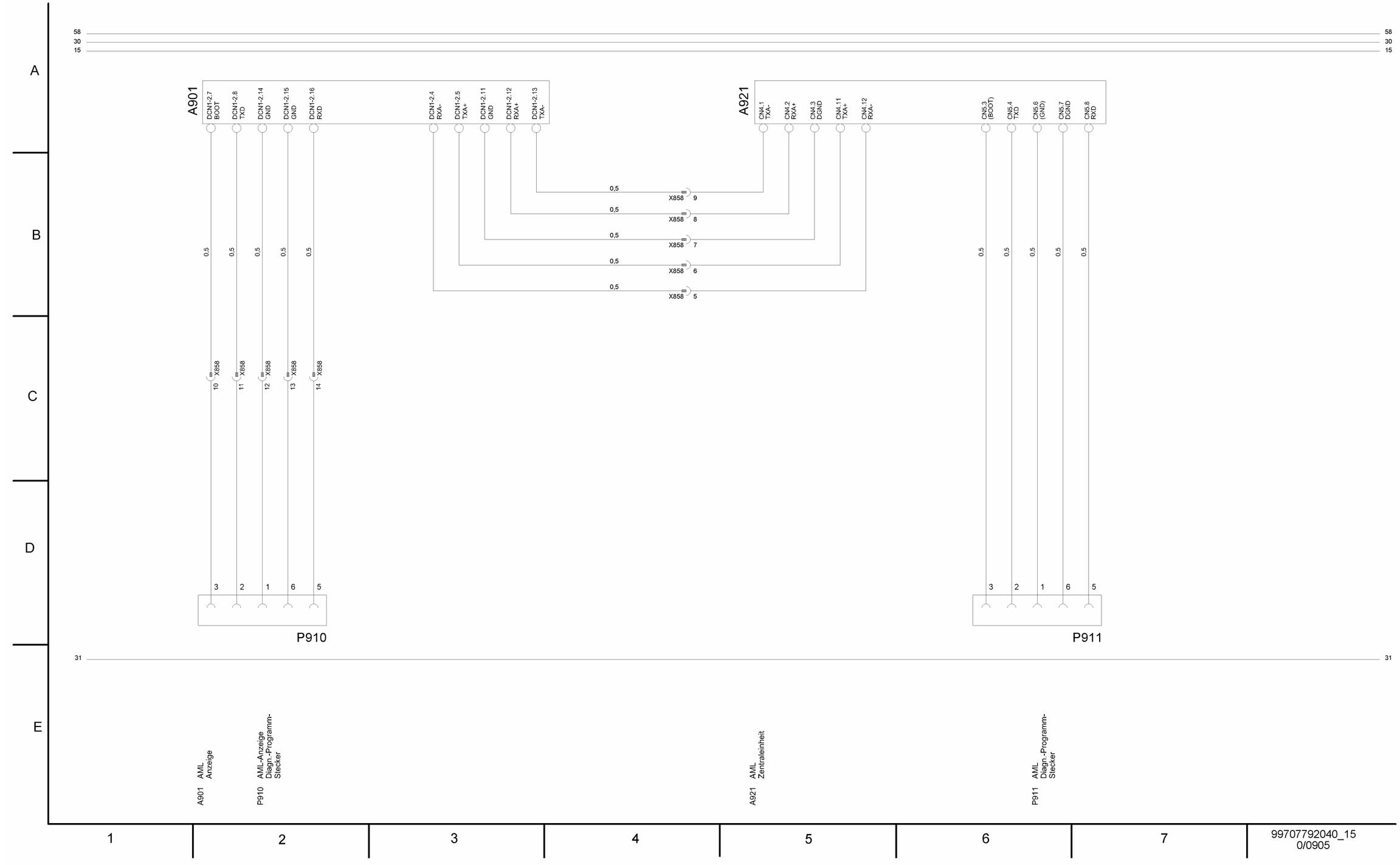
0,5
4
X658
A901
DCN1-1.2
GND
DCN1-1.12
GND
DCN1-1.1
MBPOW
DCN1-1.11
MBPOW
1
X658
2
X658
A921
CN6.1
MBPOW
CN6.2
MBPOW
CN6.3
MBPOW
CN15.3
MBPOW
CN26.4
MBPOW
1,0
1,0
1,0
1,0
F821
15A
5
E
F839
10A
7
G
2
K941X
30
K941
24.D2
87a
87
8
A921
CN26.1
AOPOW
CN26.3
AOPOW
CN15.1
RLPOW
CN15.2
RLPOW
CN12.7
COM13
CN12.8
COM14
CN12.9
COM15
CN12.10
COM16
0,5
0,5
0,5
0,5
0,5
0,5
D
E
F852
3 A
4
F853
3 A
5
A921
CN14-1.18
AGND2
CN14-2.16
AGND2
CN23.11
AGND
CN6.4
GND
CN6.5
GND
CN6.6
GND
CN15.4
GND
CN15.5
GND
CN15.6
GND
CN26.2
GND
CN26.5
GND
CN13-1.4
DI-4
0,5
0,5
0,5
1,0
1,0
1,0
1,0
1,0
1,0
0,5
B902
b
a
31
P810 CGC Cockpit-Grafik-Controllsystem
B902 Summer AML
A921 AML Zentraleinheit
A901 AML Anzeige
F821 Sicherung
F839 Sicherung
K941 Relais Kransteuerung ein
F852 Sicherung
F853 Sicherung
1
2
3
4
5
6
7
99707792040_14
0/0905


58
30
15
A901
DCN1-2.7 BOOT
DCN1-2.8 TXD
DCN1-2.14 GND
DCN1-2.15 GND
DCN1-2.16 RXD
DCN1-2.4 RXA-
DCN1-2.5 TXA+
DCN1-2.11 GND
DCN1-2.12 RXA+
DCN1-2.13 TXA-
A921
CN4.1 TXA-
CN4.2 RXA+
CN4.3 DGND
CN4.11 TXA+
CN4.12 RXA-
CN5.3 (BOOT)
CN5.4 TXD
CN5.6 (GND)
CN5.7 DGND
CN5.8 RXD
0,5
X858 9
X858 8
X858 7
X858 6
X858 5
X858 10
X858 11
X858 12
X858 13
X858 14
3 2 1 6 5
P910
P911
31
A901 AML Anzeige
P910 AML-Anzeige Diagn.-Programm-Stecker
A921 AML Zentraleinheit
P911 AML Diagn.-Programm-Stecker
A
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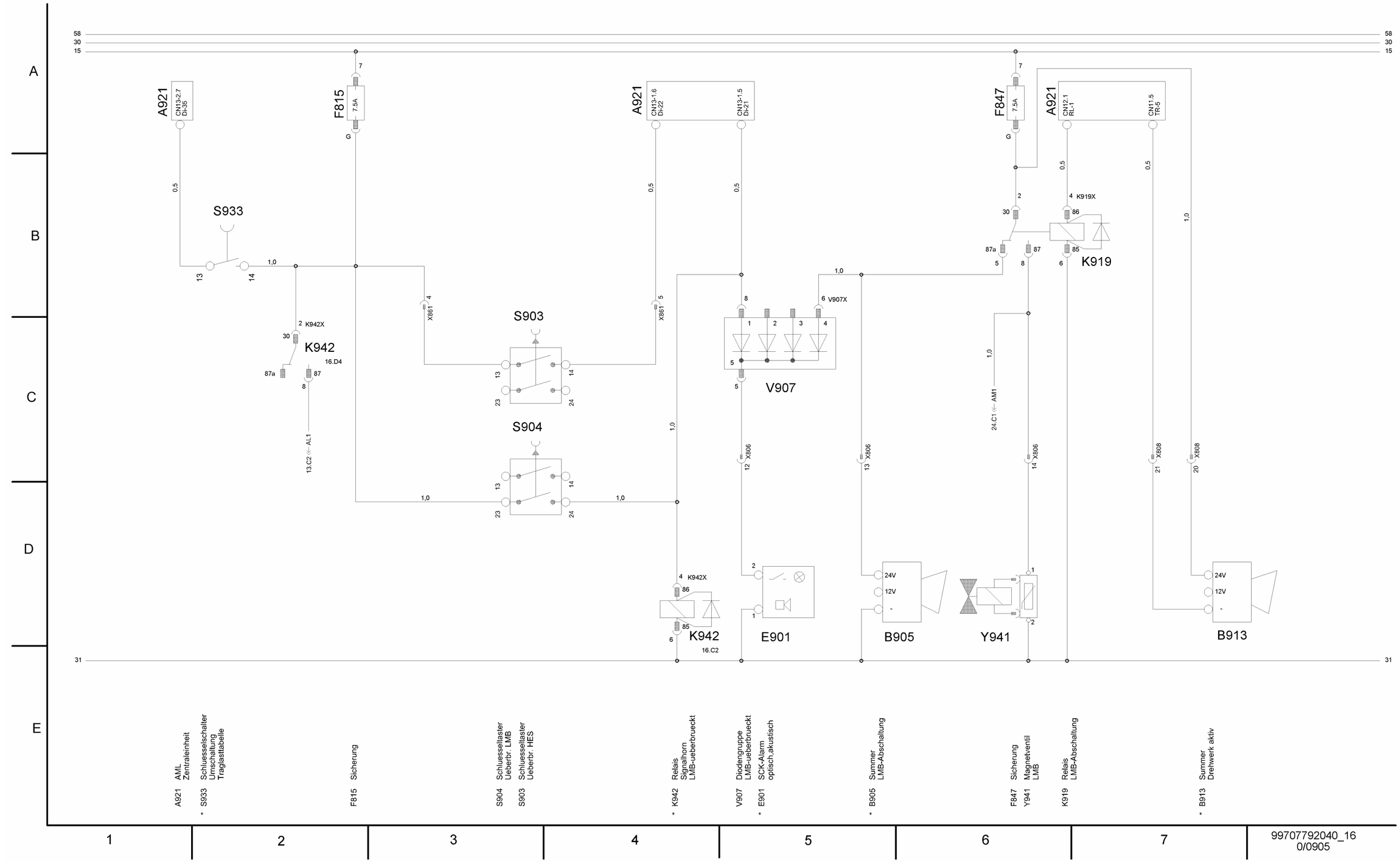
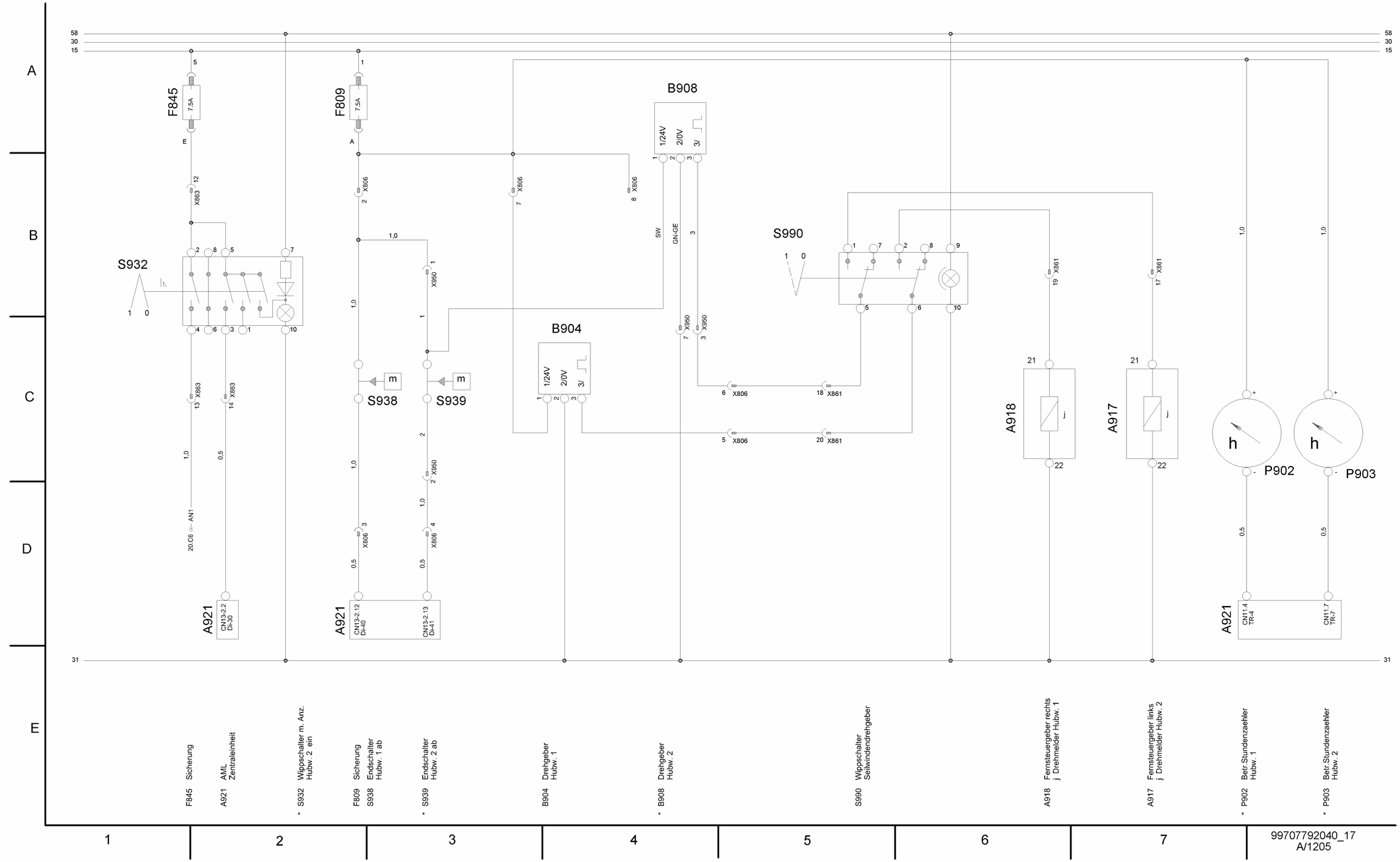
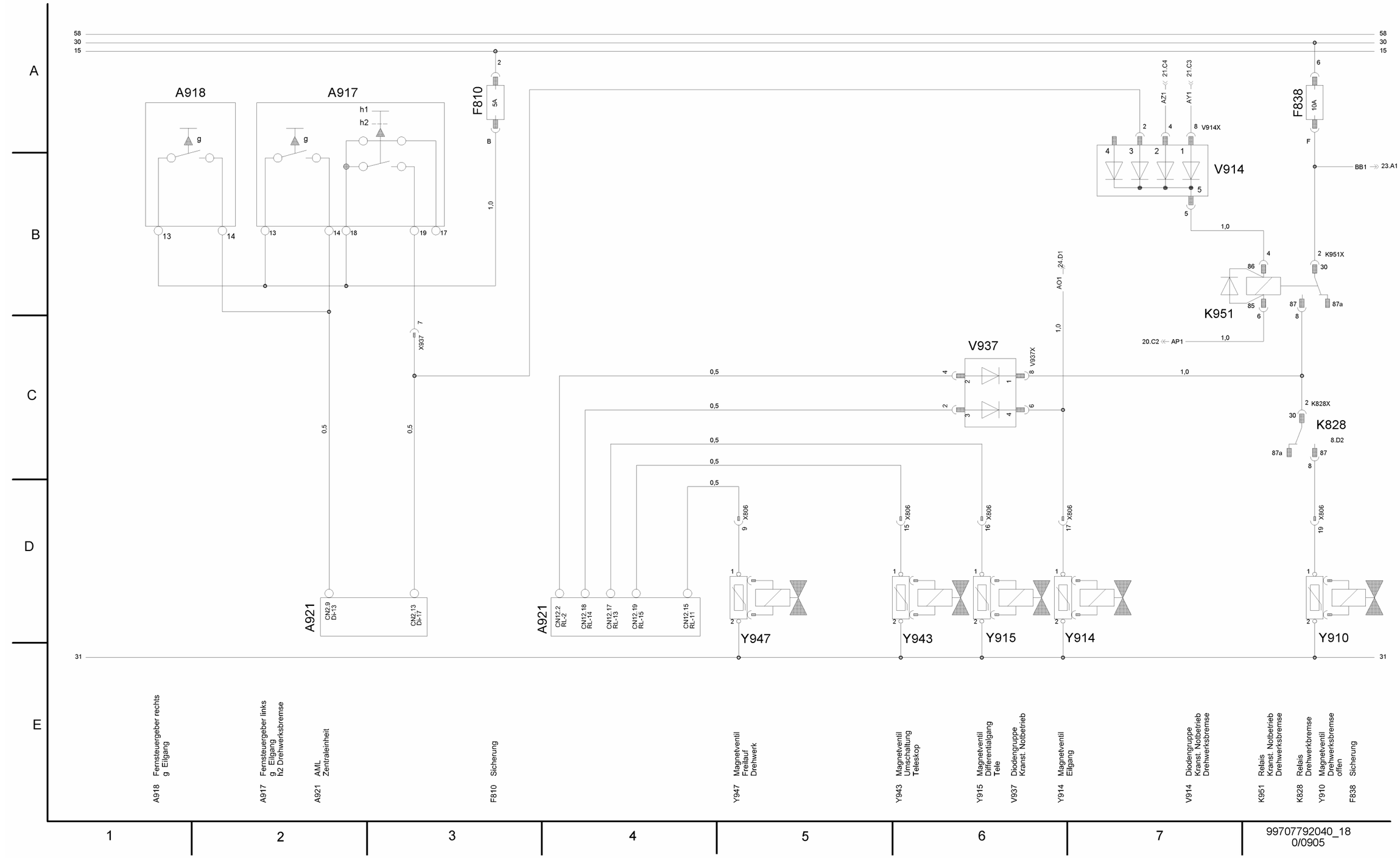
99707792040_15
0/0905

1.3 AML (99707792040)



1.4 Crane control (99707792040)




A
B
C
D
E
58
30
15
A918
A917
h1
h2
g
13
14
18
19
17
F810
5A
2
B
1,0
X937
7
0,5
A921
CN2.9
Di-13
CN2.13
Di-17
CN12.2
RL-2
CN12.18
RL-14
CN12.17
RL-13
CN12.19
RL-15
CN12.15
RL-11
V937
V937X
AO1
24.D1
V914X
AZ1
21.C4
AY1
21.C3
V914
F838
10A
F
BB1
23.A1
K951X
K951
86
85
87
87a
20.C2
AP1
K828X
K828
8.D2
X806
9
15
16
17
19
Y947
Y943
Y915
Y914
Y910
31
A918 Fernsteuergeber rechts g Eilgang
A917 Fernsteuergeber links g Eilgang h2 Drehwerksbremse
A921 AML Zentraleinheit
F810 Sicherung
Y947 Magnetventil Freilauf Drehwerk
Y943 Magnetventil Umschaltung Teleskop
Y915 Magnetventil Differentialgang Tele
V937 Diodengruppe Kranst. Notbetrieb
Y914 Magnetventil Eilgang
V914 Diodengruppe Kranst. Notbetrieb Drehwerksbremse
K951 Relais Kranst. Notbetrieb Drehwerksbremse
K828 Relais Drehwerksbremse
Y910 Magnetventil Drehwerksbremse offen
F838 Sicherung
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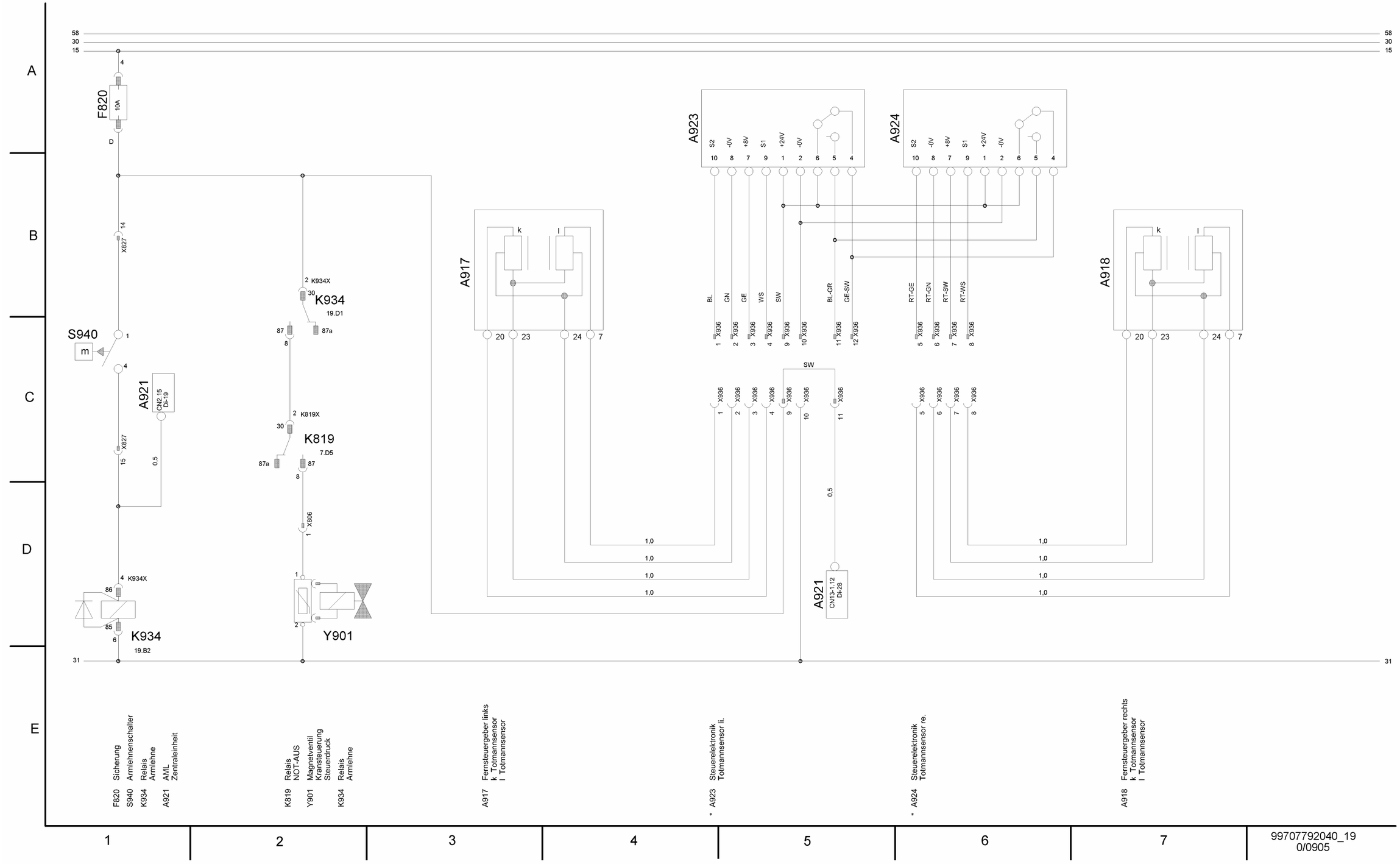
99707792040_18
0/0905



F820 Sicherung
S940 Armlehnenschalter
K934 Relais Armlehne
A921 AML Zentraleinheit

K819 Relais NOT-AUS
Y901 Magnetventil Kransteuerung Steuerdruck
K934 Relais Armlehne

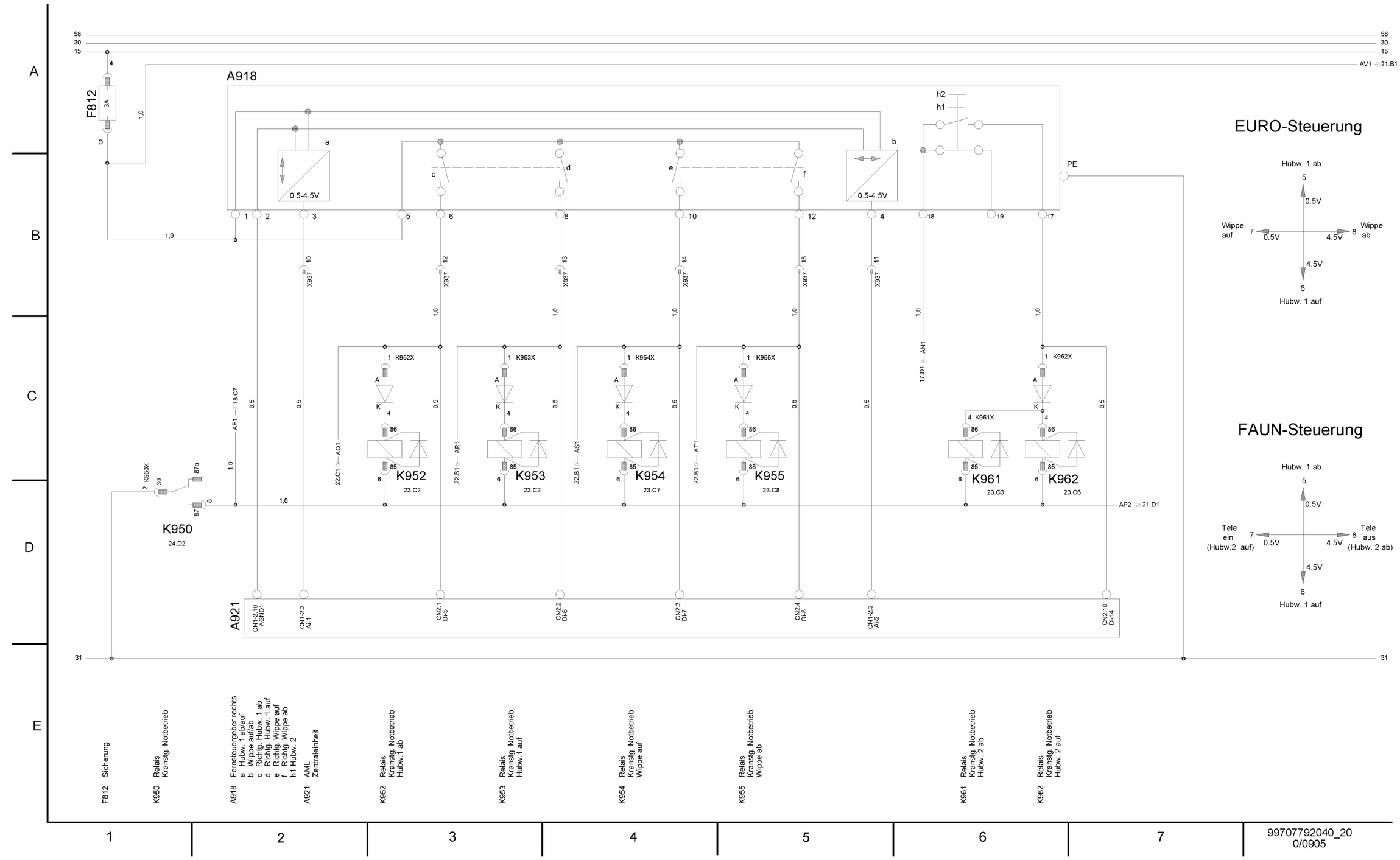
A917 Fernsteuergeber links k Totmannsensor l Totmannsensor

* A923 Steuerelektronik Totmannsensor li.

* A924 Steuerelektronik Totmannsensor re.

A918 Fernsteuergeber rechts k Totmannsensor l Totmannsensor

99707792040_19
0/0905


A
B
C
D
E
58
30
15
AV1 → 21.B1
F812
3A
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D
A918
a
b
c
d
e
f
h2
h1
PE
0.5-4.5V
0.5-4.5V
1
2
3
5
6
8
10
12
4
18
19
17
X937
10
12
13
14
15
11
17.D1 ← AN1
K952X
K953X
K954X
K955X
K962X
K961X
K952
23.C2
K953
23.C2
K954
23.C7
K955
23.C8
K961
23.C3
K962
23.C6
22.C1 ← AQ1
22.B1 ← AR1
22.B1 ← AS1
22.B1 ← AT1
AP1 ← 18.C7
AP2 → 21.D1
K950X
K950
24.D2
A921
CN1-2.10 AGND1
CN1-2.2 Ai-1
CN2.1 Di-5
CN2.2 Di-6
CN2.3 Di-7
CN2.4 Di-8
CN1-2.3 Ai-2
CN2.10 Di-14
31
EURO-Steuerung
Hubw. 1 ab
Wippe auf
Wippe ab
0.5V
4.5V
Hubw. 1 auf
FAUN-Steuerung
Tele ein (Hubw.2 auf)
Tele aus (Hubw. 2 ab)
F812 Sicherung
K950 Relais Kranstg. Notbetrieb
A918 Fernsteuergeber rechts
a Hubw. 1 ab/auf
b Wippe auf/ab
c Richtg. Hubw. 1 ab
d Richtg. Hubw. 1 auf
e Richtg. Wippe auf
f Richtg. Wippe ab
h1 Hubw. 2
A921 AML Zentraleinheit
K952 Relais Kranstg. Notbetrieb Hubw.1 ab
K953 Relais Kranstg. Notbetrieb Hubw.1 auf
K954 Relais Kranstg. Notbetrieb Wippe auf
K955 Relais Kranstg. Notbetrieb Wippe ab
K961 Relais Kranstg. Notbetrieb Hubw. 2 ab
K962 Relais Kranstg. Notbetrieb Hubw. 2 auf
1
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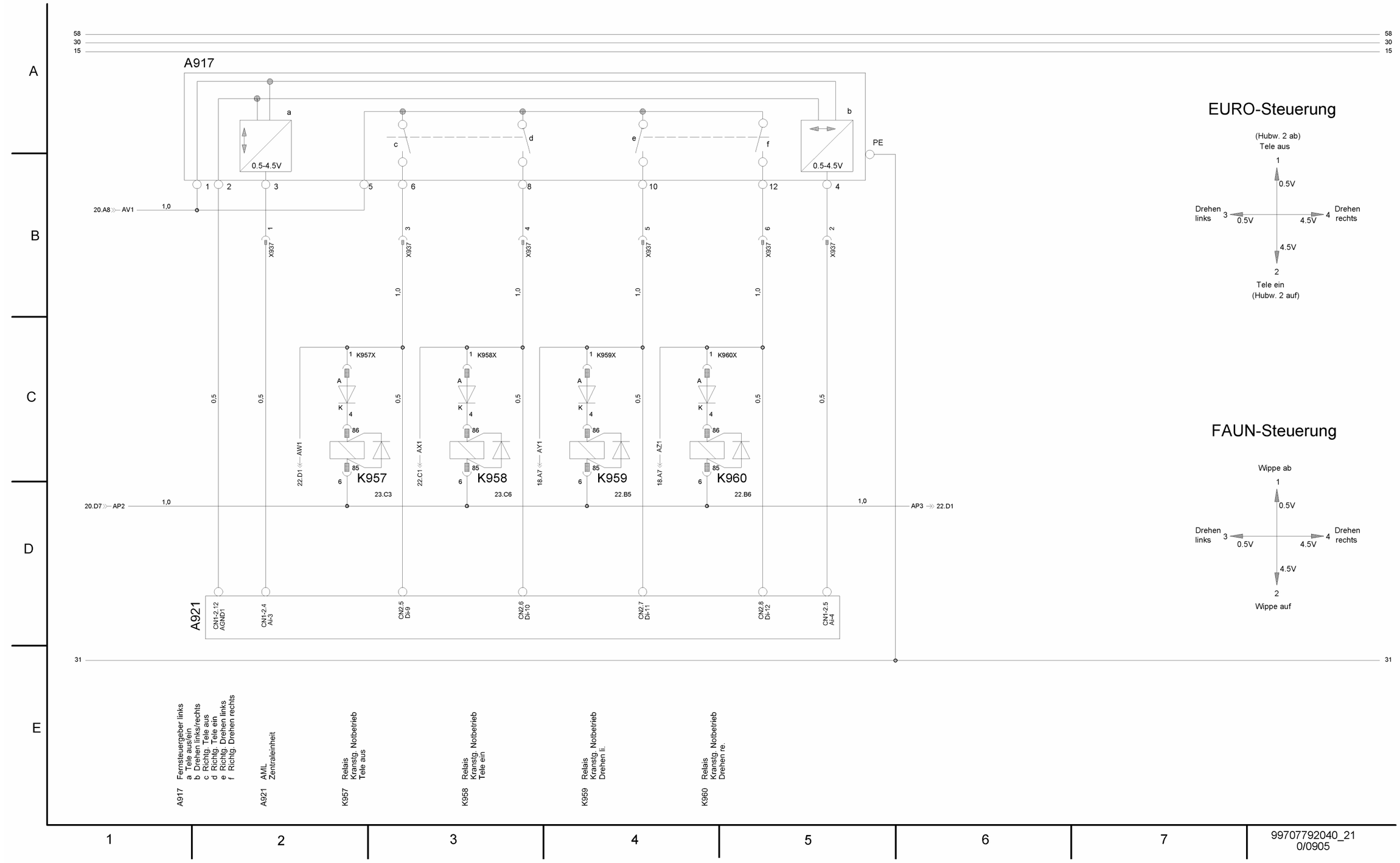
99707792040_20
0/0905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15
A917
a
b
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0.5-4.5V
0.5-4.5V
PE
1 2 3 5 6 8 10 12 4
20.A8 AV1
1,0
X937
1,0
K957X
K958X
K959X
K960X
A
K
4
86
85
6
K957
23.C3
K958
23.C6
K959
22.B5
K960
22.B6
22.D1 AW1
22.C1 AX1
18.A7 AY1
18.A7 AZ1
0,5
1,0
20.D7 AP2
AP3 22.D1
A921
CN1-2.12 AGND1
CN1-2.4 AI-3
CN2.5 DI-9
CN2.6 DI-10
CN2.7 DI-11
CN2.8 DI-12
CN1-2.5 AI-4
31
EURO-Steuerung
(Hubw. 2 ab)
Tele aus
1
0.5V
Drehen links
3
0.5V
4.5V
4
Drehen rechts
4.5V
2
Tele ein
(Hubw. 2 auf)
FAUN-Steuerung
Wippe ab
1
0.5V
Drehen links
3
0.5V
4.5V
4
Drehen rechts
4.5V
2
Wippe auf
A917 Fernsteuergeber links
a Tele aus/ein
b Drehen links/rechts
c Richtg. Tele aus
d Richtg. Tele ein
e Richtg. Drehen links
f Richtg. Drehen rechts
A921 AML
Zentraleinheit
K957 Relais
Kranstg. Notbetrieb
Tele aus
K958 Relais
Kranstg. Notbetrieb
Tele ein
K959 Relais
Kranstg. Notbetrieb
Drehen li.
K960 Relais
Kranstg. Notbetrieb
Drehen re.
A
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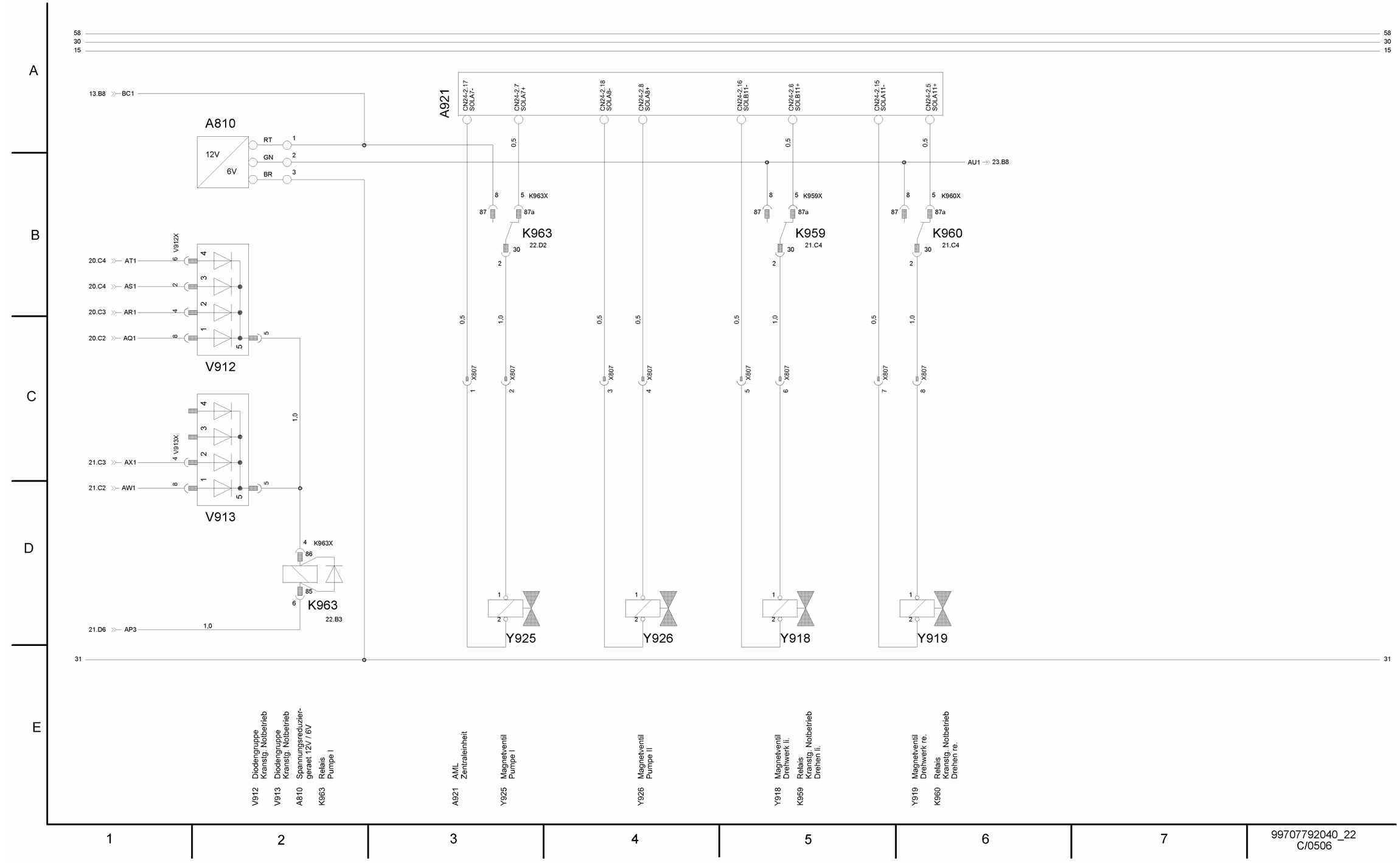
99707792040_21
0/0905


58
30
15
A
B
C
D
E
13.B8 BC1
A810
12V
6V
RT 1
GN 2
BR 3
A921
CN24-2.17 SOLA7-
CN24-2.7 SOLA7+
CN24-2.18 SOLA8-
CN24-2.8 SOLA8+
CN24-2.16 SOLB11-
CN24-2.6 SOLB11+
CN24-2.15 SOLA11-
CN24-2.5 SOLA11+
AU1 23.B8
K963X
K959X
K960X
K963
22.D2
K959
21.C4
K960
21.C4
20.C4 AT1
20.C4 AS1
20.C3 AR1
20.C2 AQ1
V912X
V912
21.C3 AX1
21.C2 AW1
V913X
V913
K963X
K963
22.B3
21.D6 AP3
1,0
X807
Y925
Y926
Y918
Y919
31
V912 Diodengruppe Kranstg. Notbetrieb
V913 Diodengruppe Kranstg. Notbetrieb
A810 Spannungsreduzier-geraet 12V / 6V
K963 Relais Pumpe I
A921 AML Zentraleinheit
Y925 Magnetventil Pumpe I
Y926 Magnetventil Pumpe II
Y918 Magnetventil Drehwerk li.
K959 Relais Kranstg. Notbetrieb Drehen li.
Y919 Magnetventil Drehwerk re.
K960 Relais Kranstg. Notbetrieb Drehen re.
1
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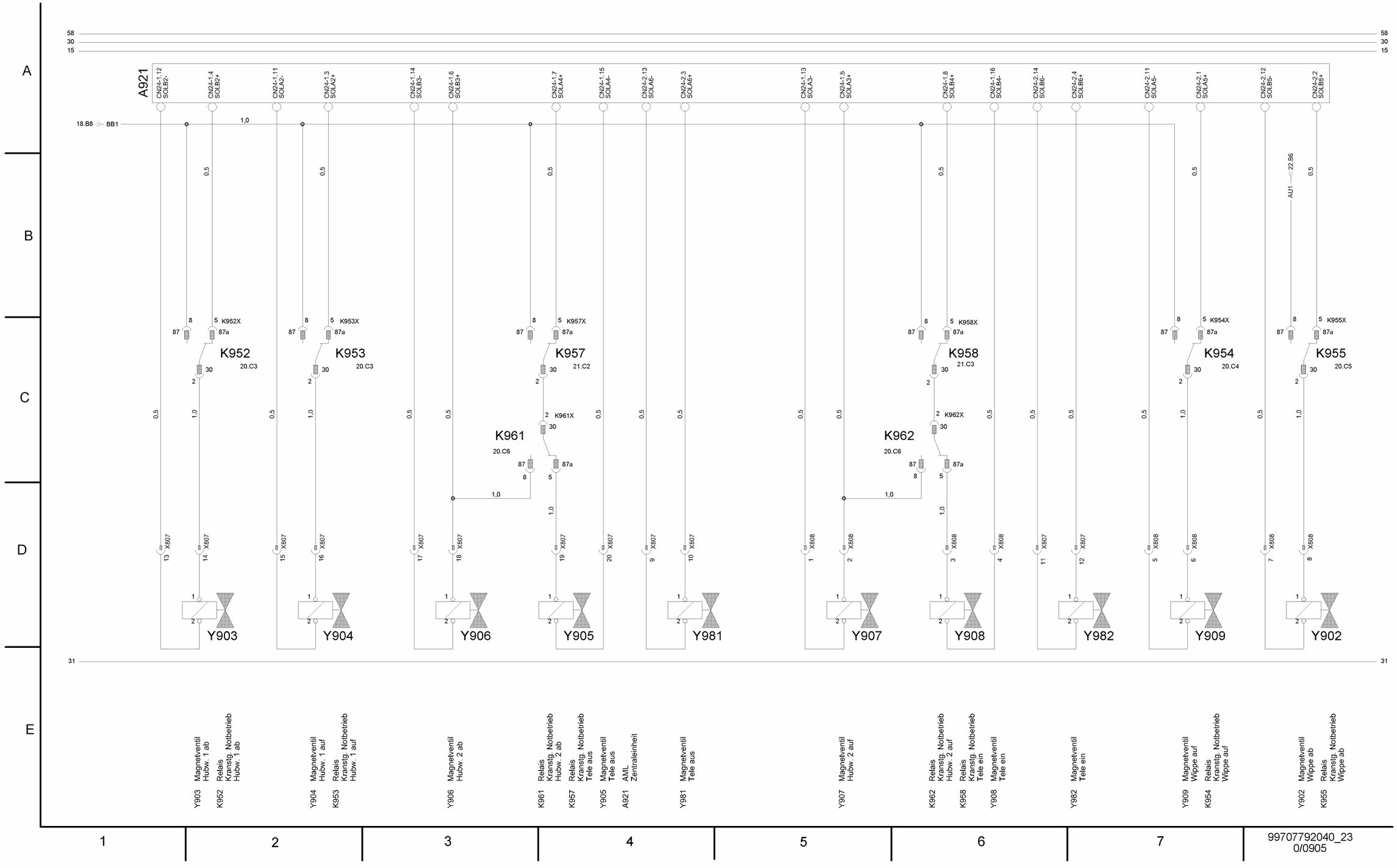
C/0506


A
B
C
D
E
58
30
15
A921
CN24-1.12 SOLB2-
CN24-1.4 SOLB2+
CN24-1.11 SOLA2-
CN24-1.3 SOLA2+
CN24-1.14 SOLB3-
CN24-1.6 SOLB3+
CN24-1.7 SOLA4+
CN24-1.15 SOLA4-
CN24-2.13 SOLA6-
CN24-2.3 SOLA6+
CN24-1.13 SOLA3-
CN24-1.15 SOLA3+
CN24-1.8 SOLB4+
CN24-1.16 SOLB4-
CN24-2.14 SOLB6-
CN24-2.4 SOLB6+
CN24-2.11 SOLA5-
CN24-2.1 SOLA5+
CN24-2.12 SOLB5-
CN24-2.2 SOLB5+
18.B8 >> BB1
1,0
0,5
1,0
AU1 << 22.B6
K952X
K953X
K957X
K958X
K954X
K955X
K952
20.C3
K953
20.C3
K957
21.C2
K958
21.C3
K954
20.C4
K955
20.C5
K961X
K962X
K961
20.C6
K962
20.C6
X807
X808
Y903
Y904
Y906
Y905
Y981
Y907
Y908
Y982
Y909
Y902
31
Y903 Magnetventil Hubw. 1 ab
K952 Relais Kranstg. Notbetrieb Hubw. 1 ab
Y904 Magnetventil Hubw. 1 auf
K953 Relais Kranstg. Notbetrieb Hubw. 1 auf
Y906 Magnetventil Hubw. 2 ab
K961 Relais Kranstg. Notbetrieb Hubw. 2 ab
K957 Relais Kranstg. Notbetrieb Tele aus
Y905 Magnetventil Tele aus
A921 AML Zentraleinheit
Y981 Magnetventil Tele aus
Y907 Magnetventil Hubw. 2 auf
K962 Relais Kranstg. Notbetrieb Hubw. 2 auf
K958 Relais Kranstg. Notbetrieb Tele ein
Y908 Magnetventil Tele ein
Y982 Magnetventil Tele ein
Y909 Magnetventil Wippe auf
K954 Relais Kranstg. Notbetrieb Wippe auf
Y902 Magnetventil Wippe ab
K955 Relais Kranstg. Notbetrieb Wippe ab
1
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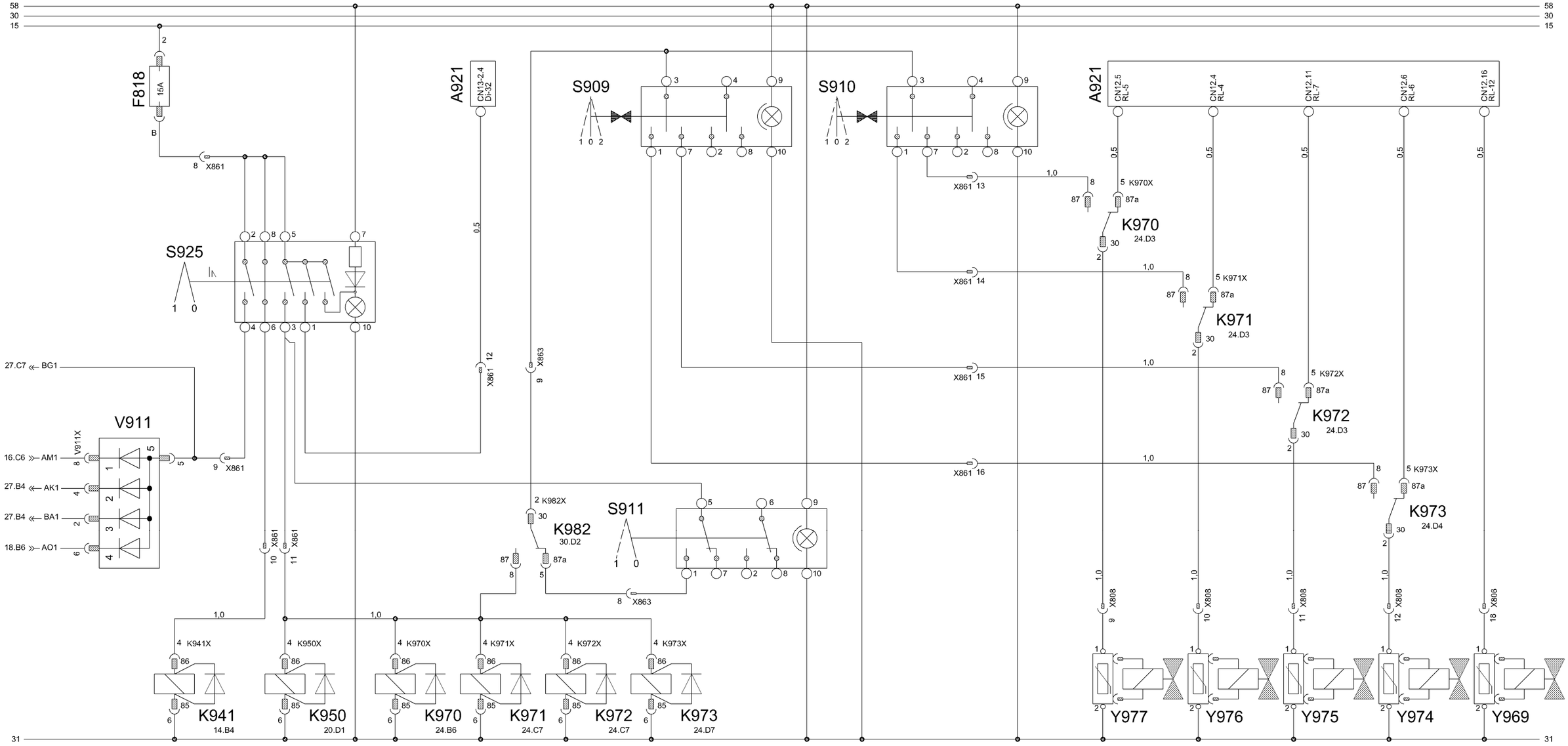
99707792040_23
0/0905



V911 Diodengruppe Kransig. Notbetrieb
F818 Sicherung
K941 Relais Kransteuerg. ein
K950 Relais Kransig. Notbetrieb
S925 Wippschalter m. Anz. Tele Notschaltung
K970 Relais Telesteuerung-Notbetrieb
A921 AML Zentraleinheit
K971 Relais Telesteuerung-Notbetrieb
K982 Relais Tele/Zyl.-Verbolzung
K972 Relais Telesteuerung-Notbetrieb
K973 Relais Telesteuerung-Notbetrieb
S909 Wipptaster Tele-Notschaltung Tele-ver/entriegeln
S911 Wippschalter Tele-Notschaltung
S910 Wipptaster Tele-Notschaltung Zyl-ver/entriegeln
Y977 Magnetventil Zyl.-entriegeln
Y976 Magnetventil Zyl.-verriegeln
Y975 Magnetventil Tele-entriegeln
Y974 Magnetventil Tele-verriegeln
Y969 Magnetventil Verriegelungsdruck

CAD-Original, Aenderung nur ueüber CAD CAD-original, change only by CAD	Schutzvermerk nach DIN 34 beachten Attention to protection mark DIN 34	CODE 1700.00	A	B	C	D	E .....

BGR

	DAT	NAME
GEZ/DR	13.09.06	Krause
KON/DE	13.09.06	Kohl
FTG/MA	*	*
NOR/ST	*	*

BENENNUNG/DESCRIPTION
Stromlaufplan OW
Kransteuerung

PROJ	TYP/TYPE FA036	GUETEKLASSE / QUAL.GRADE I	MASSTAB / SCALE *	ROHTEIL-NR / UNMACHINED NO *	
ISO 128	ZUS-ZEICHNUNG/ASSEMBLY DRAWING *	GEWICHT/WEIGHT 0 KG		WERKSTOFF/MATERIAL *	0 m²

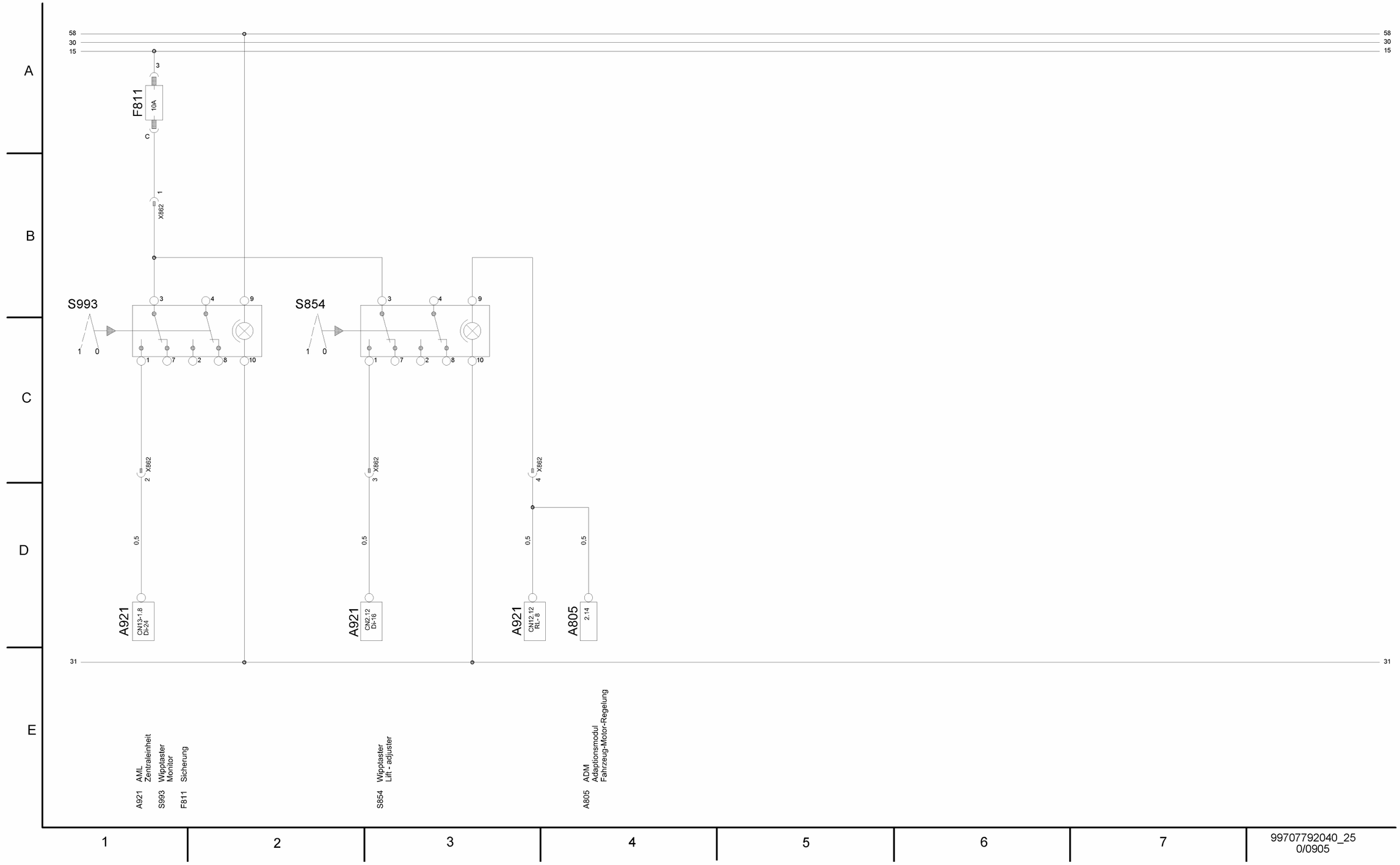
FAUN

ZEICHNUNGS/DRAWING-NR 99707792040
FORMAT 3
BLATT/SHEET 24
42 BL/SH

IND					
D	1	F601713	13.09.06	Krause	
IND	X	AEND/CHANG	DAT	NAME	URSPR/ORIGIN *

ERSETZT/REPL Zeichn. gl. Nr. vom 19.09.05

99708720-071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A
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10A
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C
X662
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S993
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3
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9
1
7
2
8
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S854
1 0
3
4
9
1
7
2
8
10
0,5
2
X862
0,5
3
X862
0,5
4
X862
0,5
A921
CN13-1.8
Di-24
A921
CN2.12
Di-16
A921
CN12.12
RL-8
A805
2.14
31
31
A921 AML Zentraleinheit
S993 Wipptaster Monitor
F811 Sicherung
S854 Wipptaster Lift - adjuster
A805 ADM Adaptionsmodul Fahrzeug-Motor-Regelung
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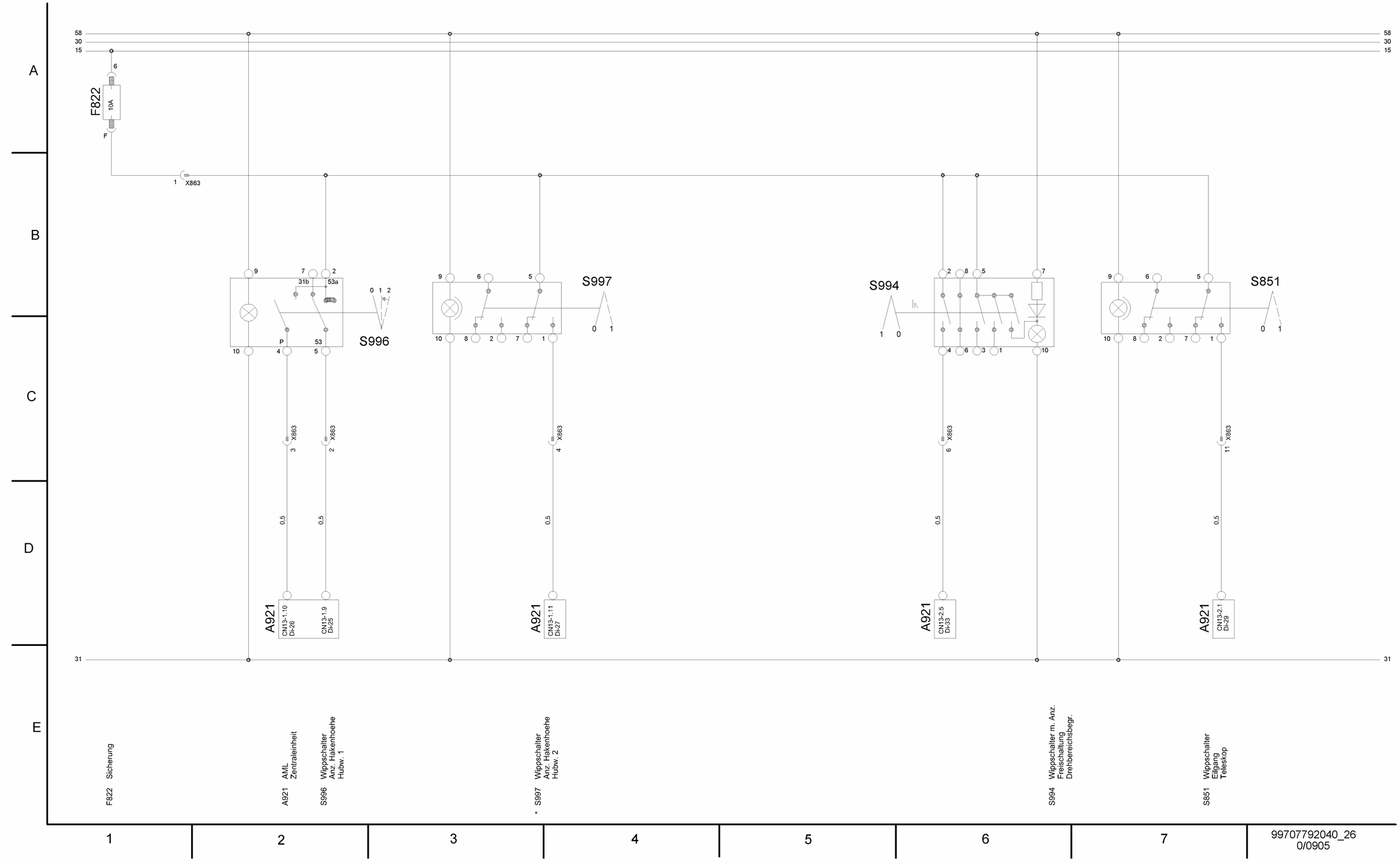
99707792040_25
0/0905


A
B
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58
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F822
10A
F
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X863
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31b
53a
0 1 2
P
53
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S996
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S997
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S994
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S851
0 1
10
8
2
7
1
X863
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A921
CN13-1.10
Di-26
CN13-1.9
Di-25
X863
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A921
CN13-1.11
Di-27
X863
6
0,5
A921
CN13-2.5
Di-33
X863
11
0,5
A921
CN13-2.1
Di-29
31
F822 Sicherung
A921 AML Zentraleinheit
S996 Wippschalter Anz. Hakenhoehe Hubw. 1
* S997 Wippschalter Anz. Hakenhoehe Hubw. 2
S994 Wippschalter m. Anz. Freischaltung Drehbereichsbegr.
S851 Wippschalter Eilgang Teleskop
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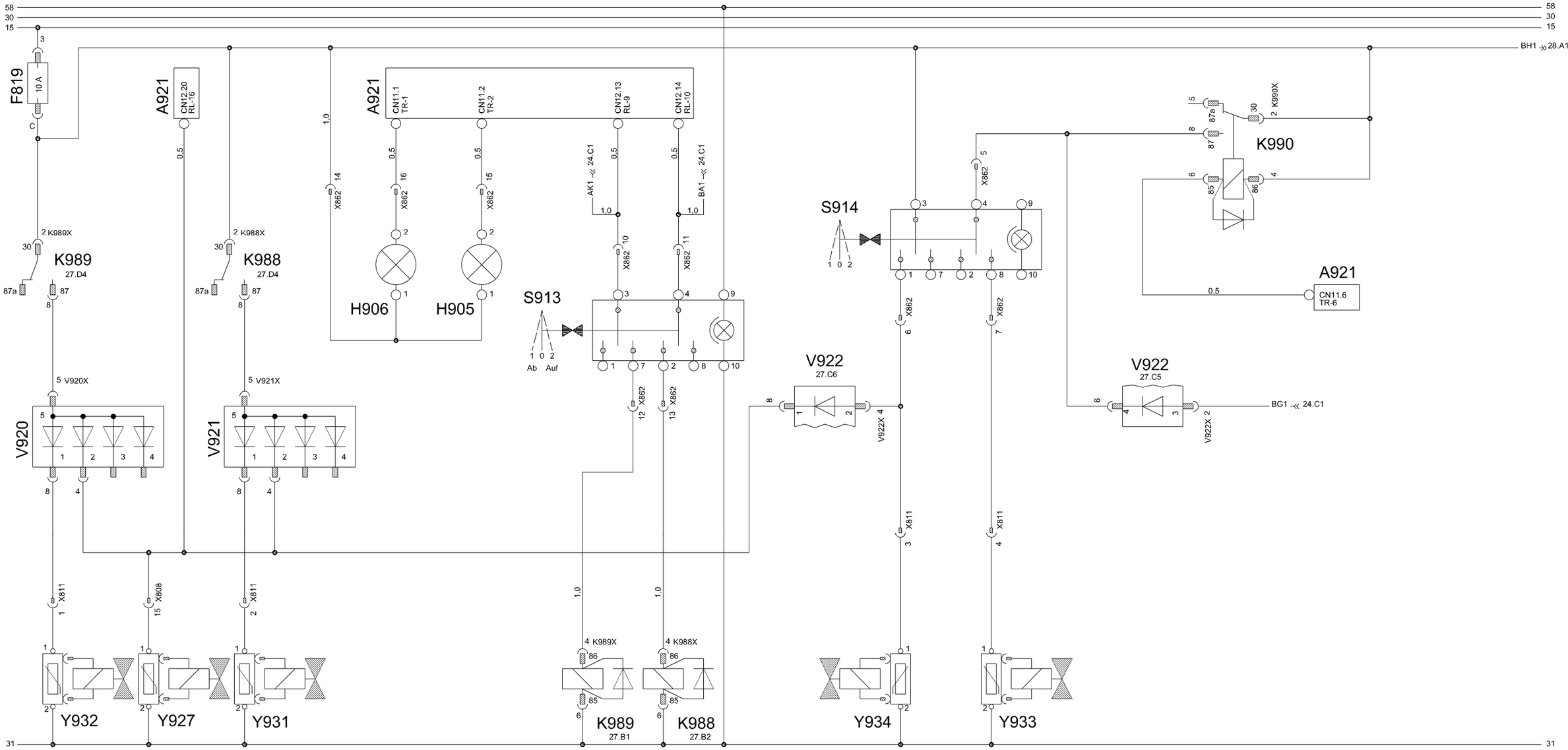
99707792040_26
0/0905



F819 Sicherung
Y932 Magnetventil Gegengewicht auf
V920 Diodengruppe Gegengewicht
Y927 Magnetventil Gegengewicht
A921 AML Zentraleinheit
Y931 Magnetventil Gegengewicht ab
V921 Diodengruppe Gegengewicht
H906 Anzeigeleuchte Gegengewicht unten
H905 Anzeigeleuchte Gegengewicht nicht oben
K989 Relais Gegengewicht auf
S913 Wipplaster Gegengewicht auf - ab
K988 Relais Gegengewicht ab
V922 Diodengruppe Gegengewicht
Y934 Magnetventil Gegengewicht entriegeln
S914 Wipplaster Gegengewicht ver-entriegeln
Y933 Magnetventil Gegengewicht verriegeln
K990 Relais Gegengewicht

CAD-Original, Aenderung nur ueüber CAD

CAD-original, change only by CAD

Schutzvermerk nach DIN 34 beachten
Attention to protection mark DIN 34

CODE 1700.00

A ..... B ..... C ..... D ..... E .....

BGR

PROJ
ISO 128

TYP/TYPE FA036

GUETEKLASSE QUAL.GRADE I

MASSTAB SCALE *

ROHTEIL-NR UNMACHINED NO *

ZUS-ZEICHNUNG/ASSEMBLY DRAWING *

GEWICHT/WEIGHT 0 KG

WERKSTOFF/M[ERIAL *

0 m^2

D	1	F601713	13.09.06	Krause	
IND	X	AEND/CHANG	DAT	NAME	

	DAT	NAME
GEZ/DR	13.09.06	Krause
KON/DE	13.09.06	Kohl
FTG/MA	*	*
NOR/ST	*	*

URSPR/ORIGIN *

BENENNUNG/DESCRIPTION
Stromlaufplan OW
Gegengewicht

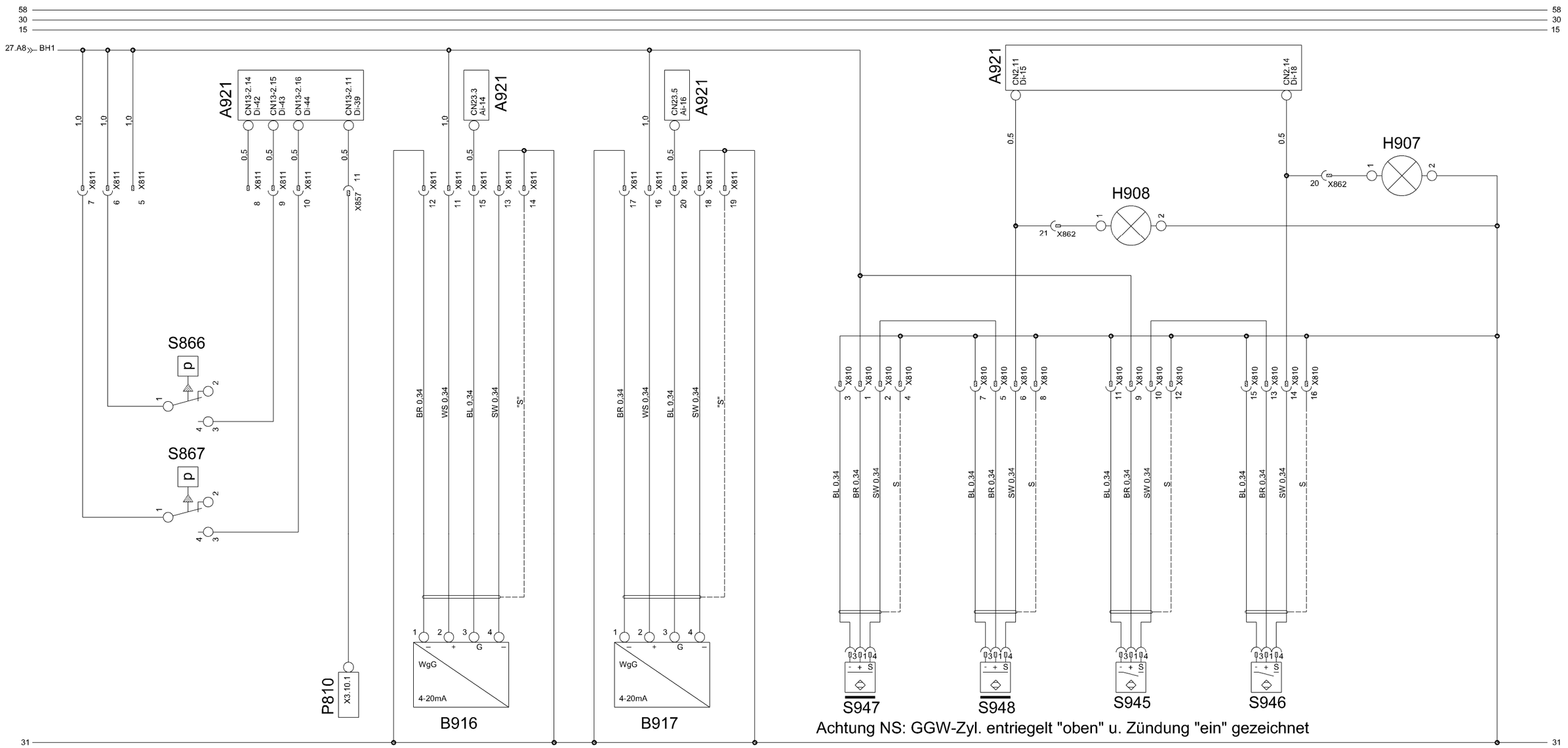
ZEICHNUNGS/DRAWING-NR 99707792040

FORMAT 3

BLATT/SHEET 27
42 BL/SH

ERSETZT/REPL Zeichn. gl. Nr. vom 19.09.05

99708720-071



S866 Druckschalter Gegengewicht li.
S867 Druckschalter Gegengewicht re.
P810 CGC Cockpit-Grafik-Controllsystem
A921 AML Zentraleinheit
B916 Weggeber Gegengewicht Zyl. li.
B917 Weggeber Gegengewicht Zyl. re.
S947 Naeherungsschalter Gegengewicht entr. li.
S948 Naeherungsschalter Gegengewicht entr. re.
H908 Anzeigeleuchte Gegengewicht entr.
S945 Naeherungsschalter Gegengewicht verr. li.
S946 Naeherungsschalter Gegengewicht verr. re.
H907 Anzeigeleuchte Gegengewicht verr.

CAD-Original, Aenderung nur ueüber CAD

CAD-original, change only by CAD

Schutzvermerk nach DIN 34 beachten
Attention to protection mark DIN 34

CODE 1700.00

A ..... B ..... C ..... D ..... E .....

BGR

D	1	F601713	13.09.06	Krause	
IND	X	AEND/CHANG	DAT	NAME	URSPR/ORIGIN *

	DAT	NAME
GEZ/DR	13.09.06	Krause
KON/DE	13.09.06	Kohl
FTG/MA	*	*
NOR/ST	*	*

BENENNUNG/DESCRIPTION
Stromlaufplan OW
Gegengewicht

TYP/TYPE FA036
GUETEKLASSE QUAL.GRADE I
MASSTAB SCALE *
ROHTEIL-NR UNMACHINED NO *
WERKSTOFF/M[ERIAL *
ZUS-ZEICHNUNG/ASSEMBLY DRAWING *
GEWICHT/WEIGHT 0 KG
0 m²

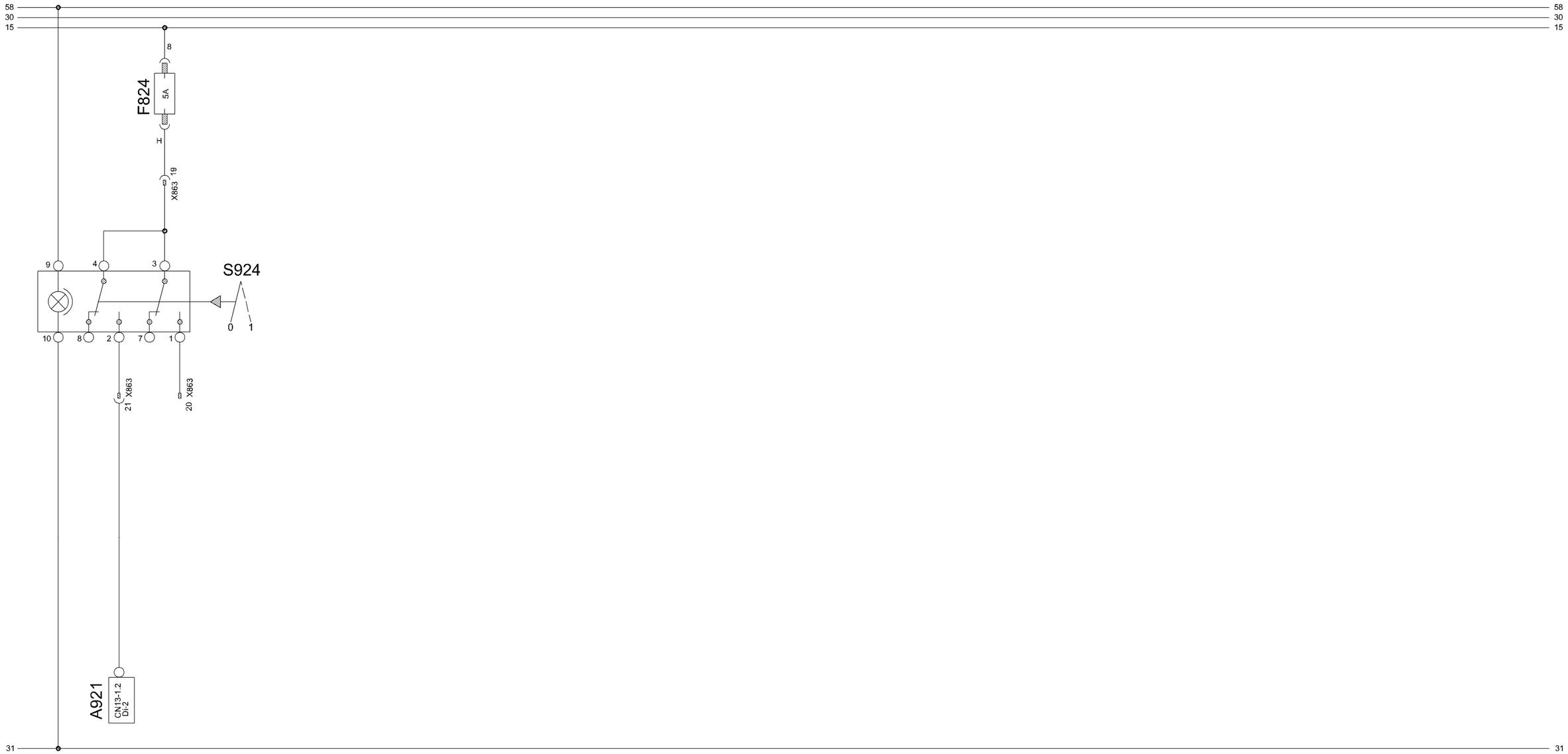
PROJ
ISO 128

FAUN

ZEICHNUNGS/DRAWING-NR 99707792040
FORMAT 3
BLATT SHEET 28
42 BL/SH

ERSETZT/REPL Zeichn. gl. Nr. vom 19.09.05 ⚠3

99708720-071



CAD-Original, Aenderung nur ueüber CAD

CAD-original, change only by CAD

Schutzvermerk nach DIN 34 beachten

Attention to protection mark DIN 34

CODE 1700.00

A	B	C	D	E
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BGR

	DAT	NAME
GEZ/DR	13.09.06	Krause
KON/DE	13.09.06	Kohl
FTG/MA	*	*
NOR/ST	*	*

BENENNUNG/DESCRIPTION: Stromlaufplan OW

TYP/TYPE: FA036

GUETEKLASSE QUAL.GRADE: I

MASSTAB SCALE: *

ROHTEIL-NR UNMACHINED NO: *

WERKSTOFF/M[ERIAL: *

0 m^2

PROJ ISO 128

ZUS-ZEICHNUNG/ASSEMBLY DRAWING: *

GEWICHT/WEIGHT: 0 KG

IND		AEND/CHANG	DAT	NAME
D	1	F601713	13.09.06	Krause
	X			

URSPR/ORIGIN: *

ZEICHNUNGS/DRAWING-NR: 99707792040

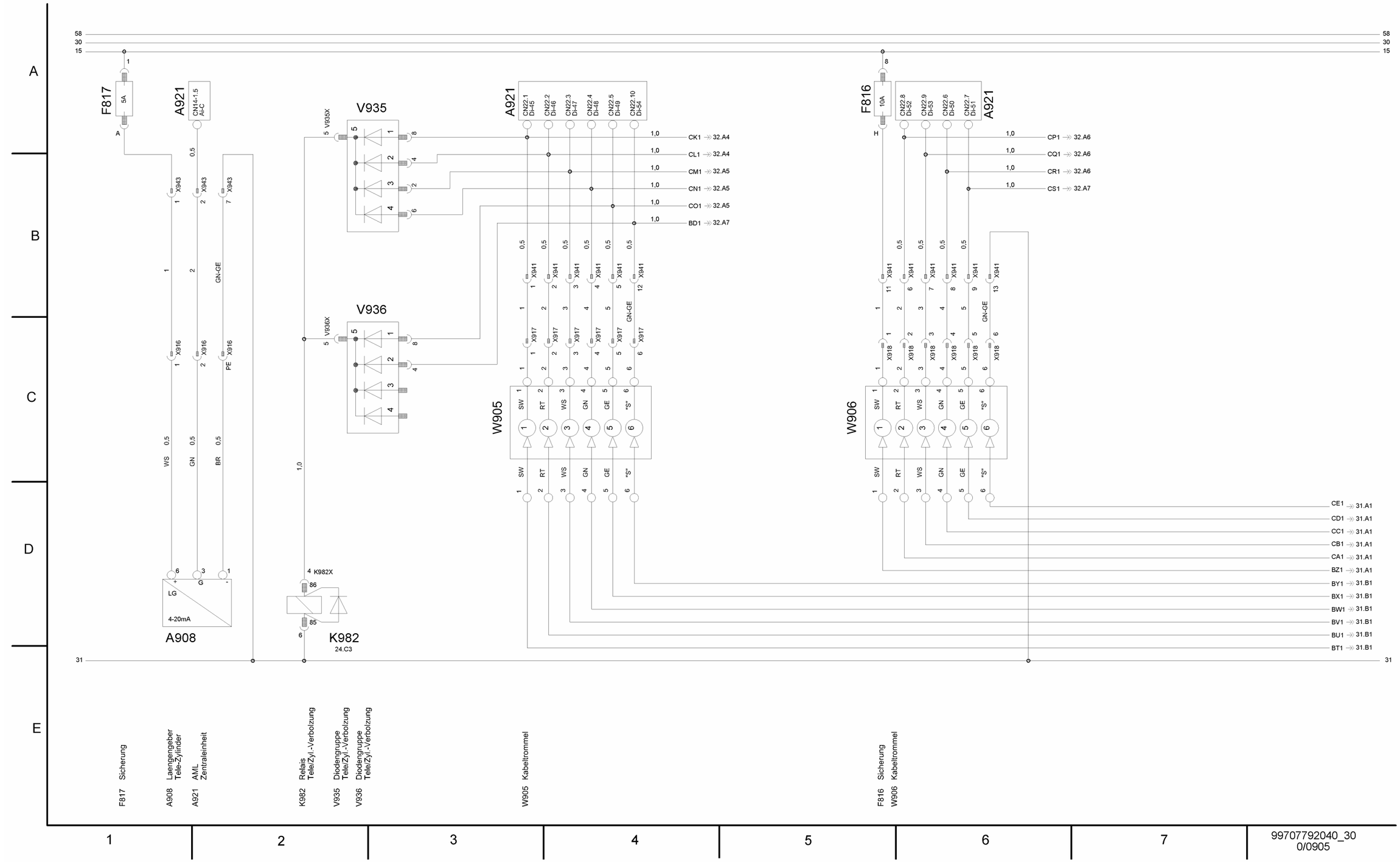
FORMAT: 3

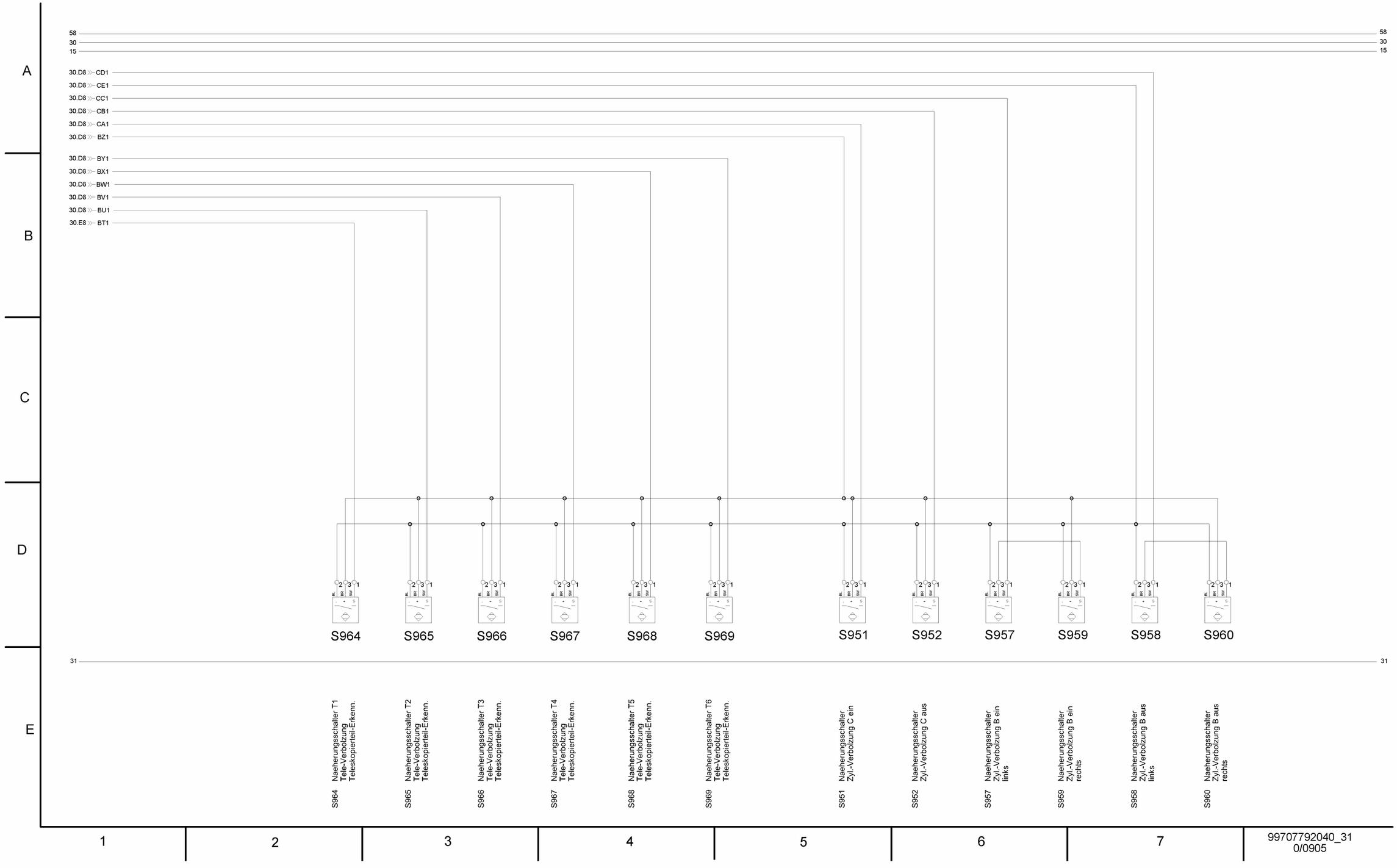
BLATT SHEET: 29 / 42 BL/SH

ERSETZT/REPL: Zeichn. gl. Nr. vom 19.09.05 (3)

99708720-071

1.7 Telescope control (99707792040)




A
B
C
D
E
58
30
15
30.D8 CD1
30.D8 CE1
30.D8 CC1
30.D8 CB1
30.D8 CA1
30.D8 BZ1
30.D8 BY1
30.D8 BX1
30.D8 BW1
30.D8 BV1
30.D8 BU1
30.E8 BT1
S964
S965
S966
S967
S968
S969
S951
S952
S957
S959
S958
S960
31
S964 Naeherungsschalter T1 Tele-Verbolzung Teleskopierteil-Erkenn.
S965 Naeherungsschalter T2 Tele-Verbolzung Teleskopierteil-Erkenn.
S966 Naeherungsschalter T3 Tele-Verbolzung Teleskopierteil-Erkenn.
S967 Naeherungsschalter T4 Tele-Verbolzung Teleskopierteil-Erkenn.
S968 Naeherungsschalter T5 Tele-Verbolzung Teleskopierteil-Erkenn.
S969 Naeherungsschalter T6 Tele-Verbolzung Teleskopierteil-Erkenn.
S951 Naeherungsschalter Zyl.-Verbolzung C ein
S952 Naeherungsschalter Zyl.-Verbolzung C aus
S957 Naeherungsschalter Zyl.-Verbolzung B ein links
S959 Naeherungsschalter Zyl.-Verbolzung B ein rechts
S958 Naeherungsschalter Zyl.-Verbolzung B aus links
S960 Naeherungsschalter Zyl.-Verbolzung B aus rechts
1
2
3
4
5
6
7
99707792040_31
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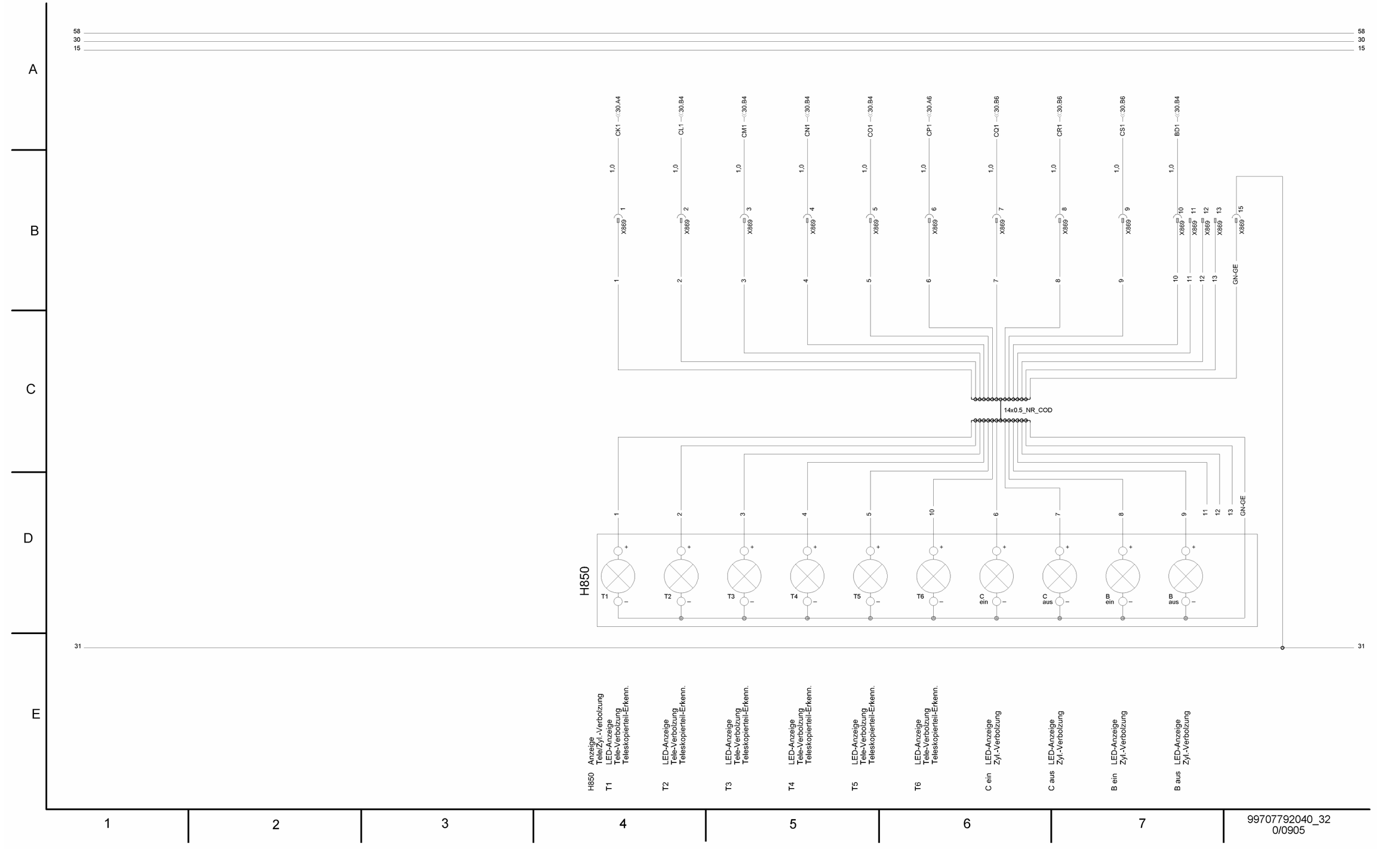

58
30
15
CK1 <30.A4
CL1 <30.B4
CM1 <30.B4
CN1 <30.B4
CO1 <30.B4
CP1 <30.A6
CQ1 <30.B6
CR1 <30.B6
CS1 <30.B6
BD1 <30.B4
1,0
X869
14x0.5_NR_COD
GN-GE
H850
T1
T2
T3
T4
T5
T6
C ein
C aus
B ein
B aus
31
Anzeige Tele/Zyl.-Verbolzung
LED-Anzeige Tele-Verbolzung Teleskopierteil-Erkenn.
LED-Anzeige Zyl.-Verbolzung
99707792040_32
0/0905

CAD-Original, Aenderung nur ueüber CAD

CAD-original, change only by CAD

Schutzvermerk nach DIN 34 beachten

Attention to protection mark DIN 34

CODE	A	B	C	D	E
1700.00	.....	.....	.....	.....	.....

BGR

						DAT	NAME
					GEZ/DR	13.09.06	Krause
					KON/DE	13.09.06	Kohl
					FTG/MA	*	*
					NOR/ST	*	*
D	1	F601713	13.09.06	Krause			
IND	X	AEND/CHANG	DAT	NAME	URSPR/ORIGIN	*	

BENENNUNG/DESCRIPTION

Stromlaufplan OW

TYP/TYPE	GUETEKLASSE / QUAL.GRADE	MASSTAB / SCALE	ROHTEIL-NR / UNMACHINED NO
FA036	I	*	*

ZUS-ZEICHNUNG/ASSEMBLY DRAWING	GEWICHT/WEIGHT	WERKSTOFF/MATERIAL
*	0 KG	*

0 m^2

FAUN

ZEICHNUNGS/DRAWING-NR 99707792040

FORMAT 3

BLATT/SHEET 33 / 42 BL/SH

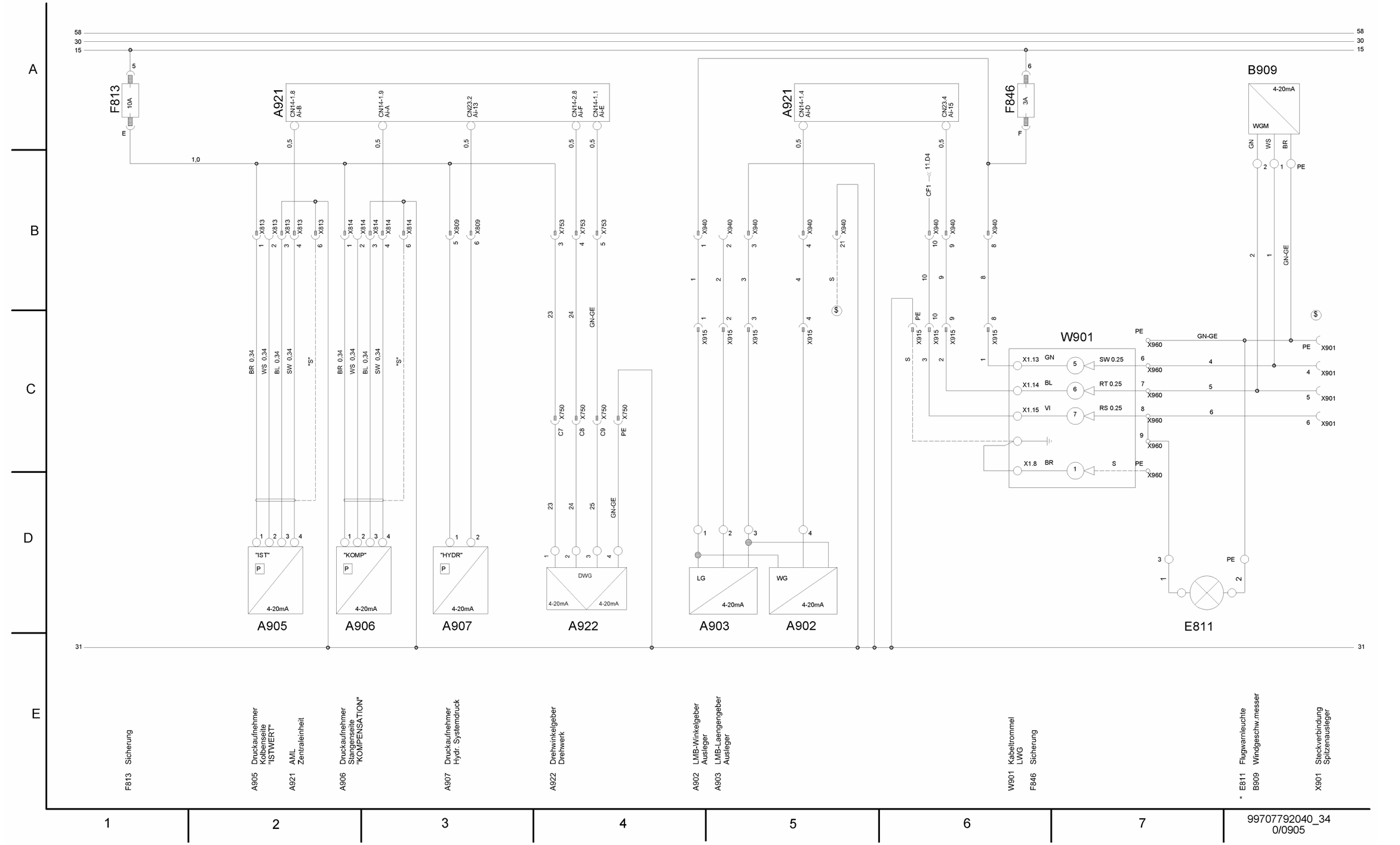
ERSETZT/REPL Zeichn. gl. Nr. vom 19.09.05

PROJ

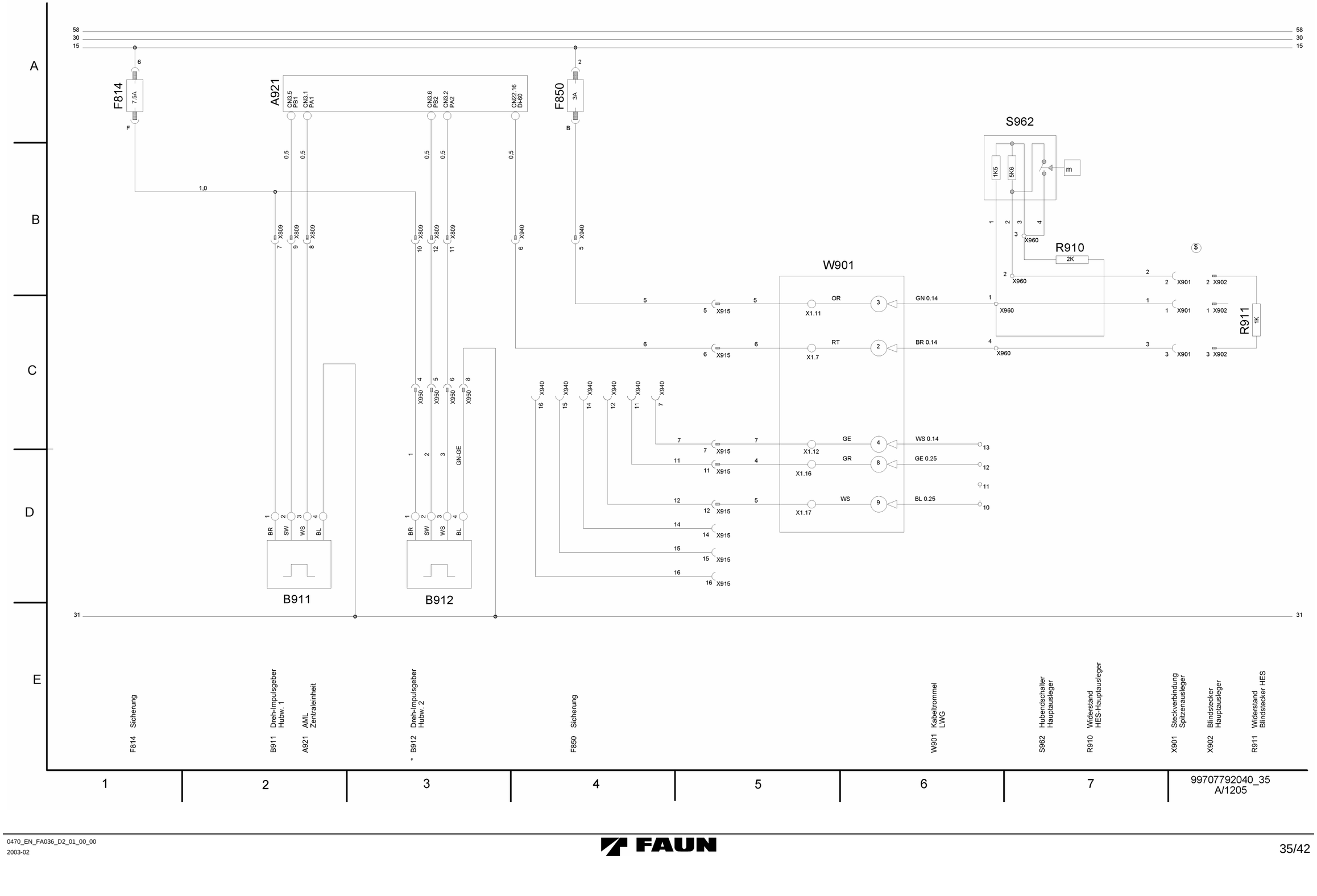
ISO 128

99708720-071

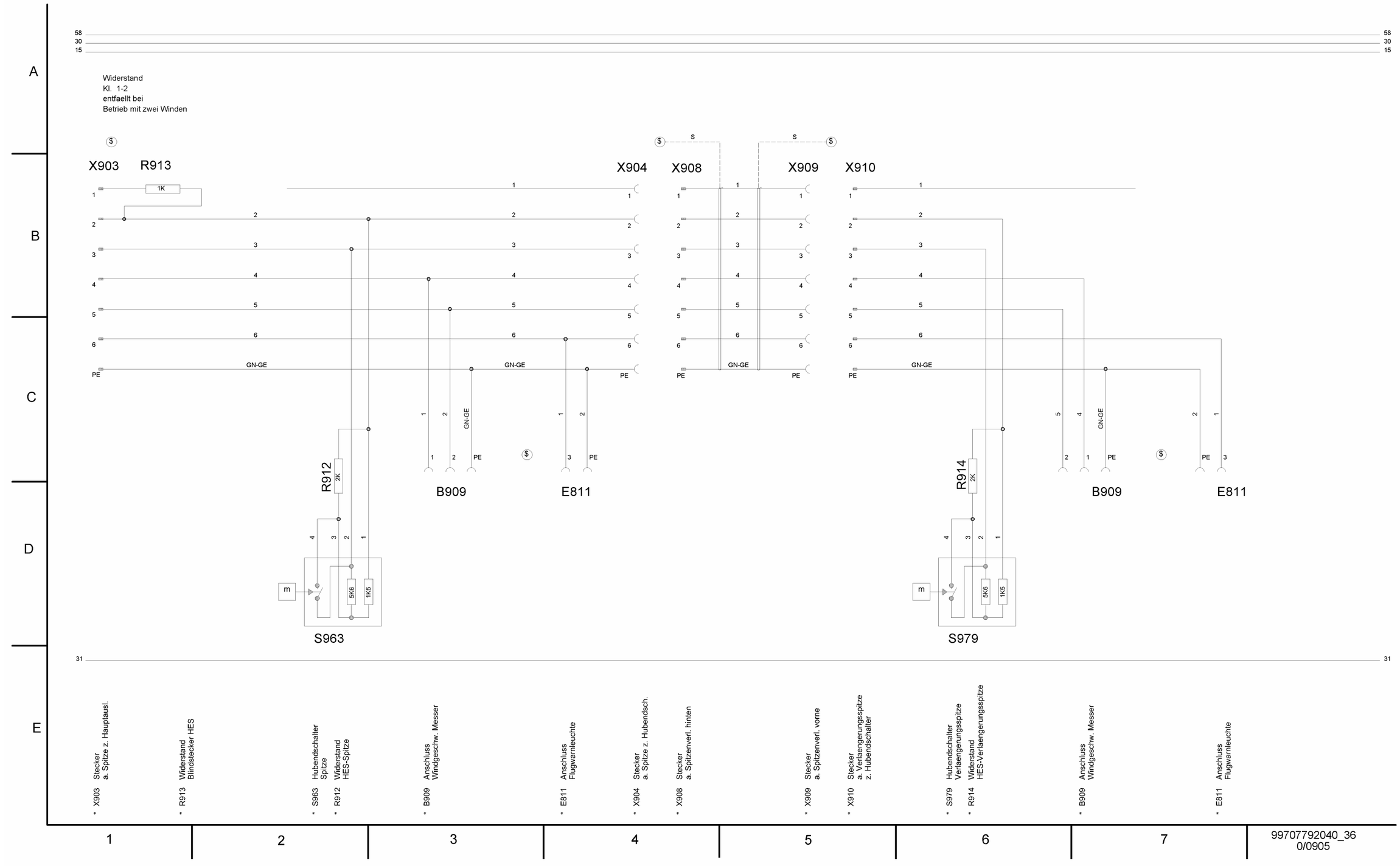
1.9 AML (99707792040)



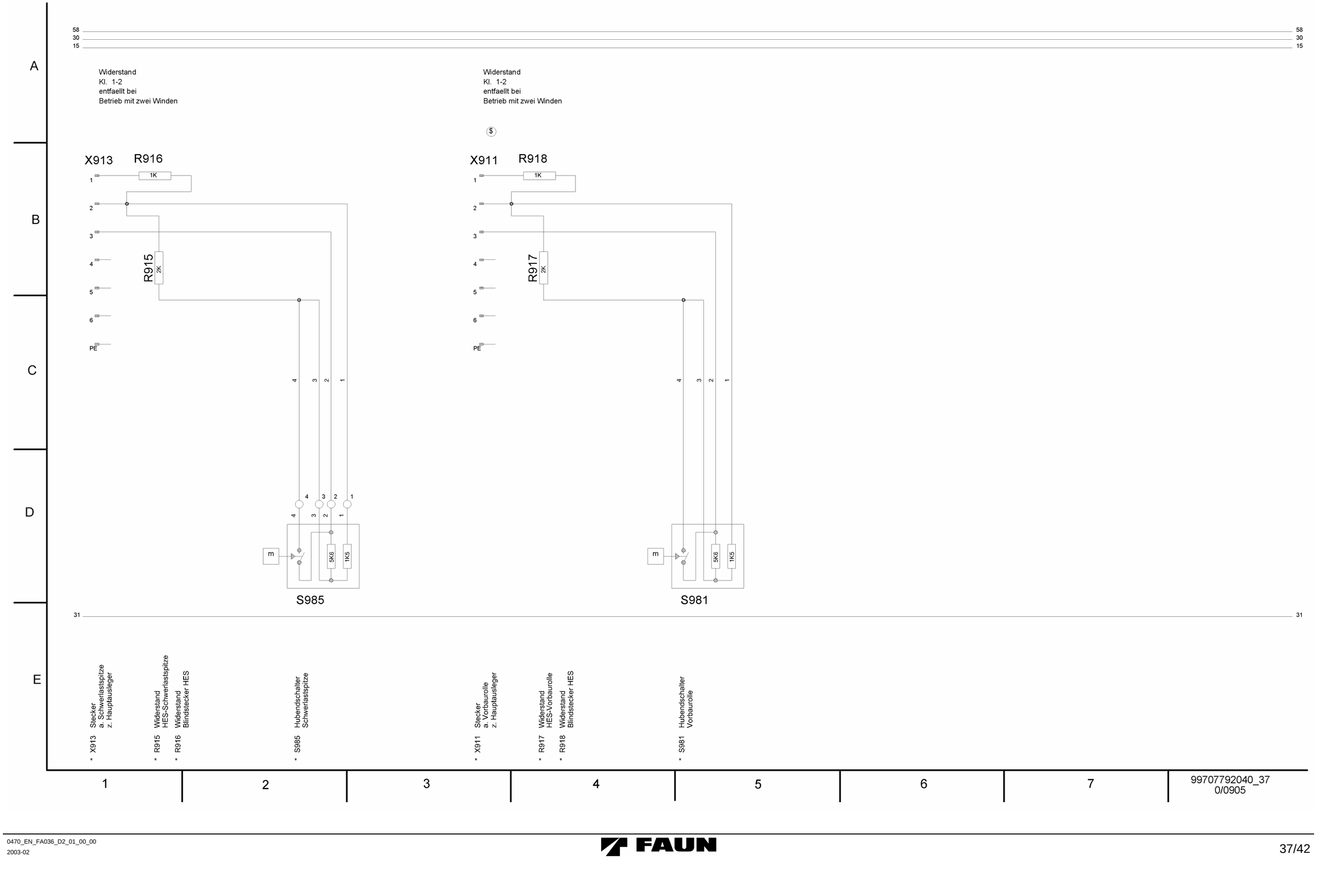
1.10 Jib (99707792040)



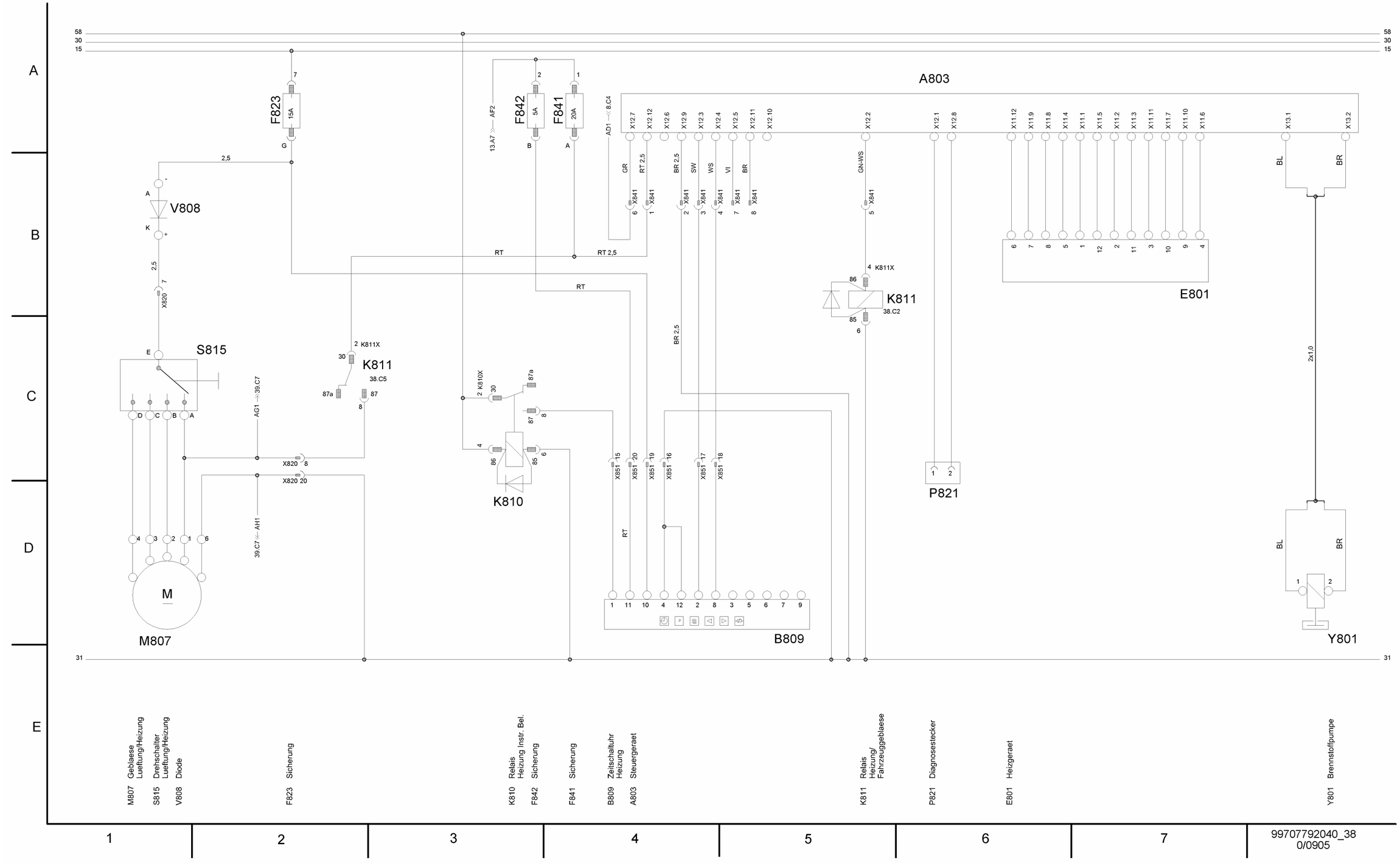
1.11 Heavy-lift fly jib / single top (99707792040)



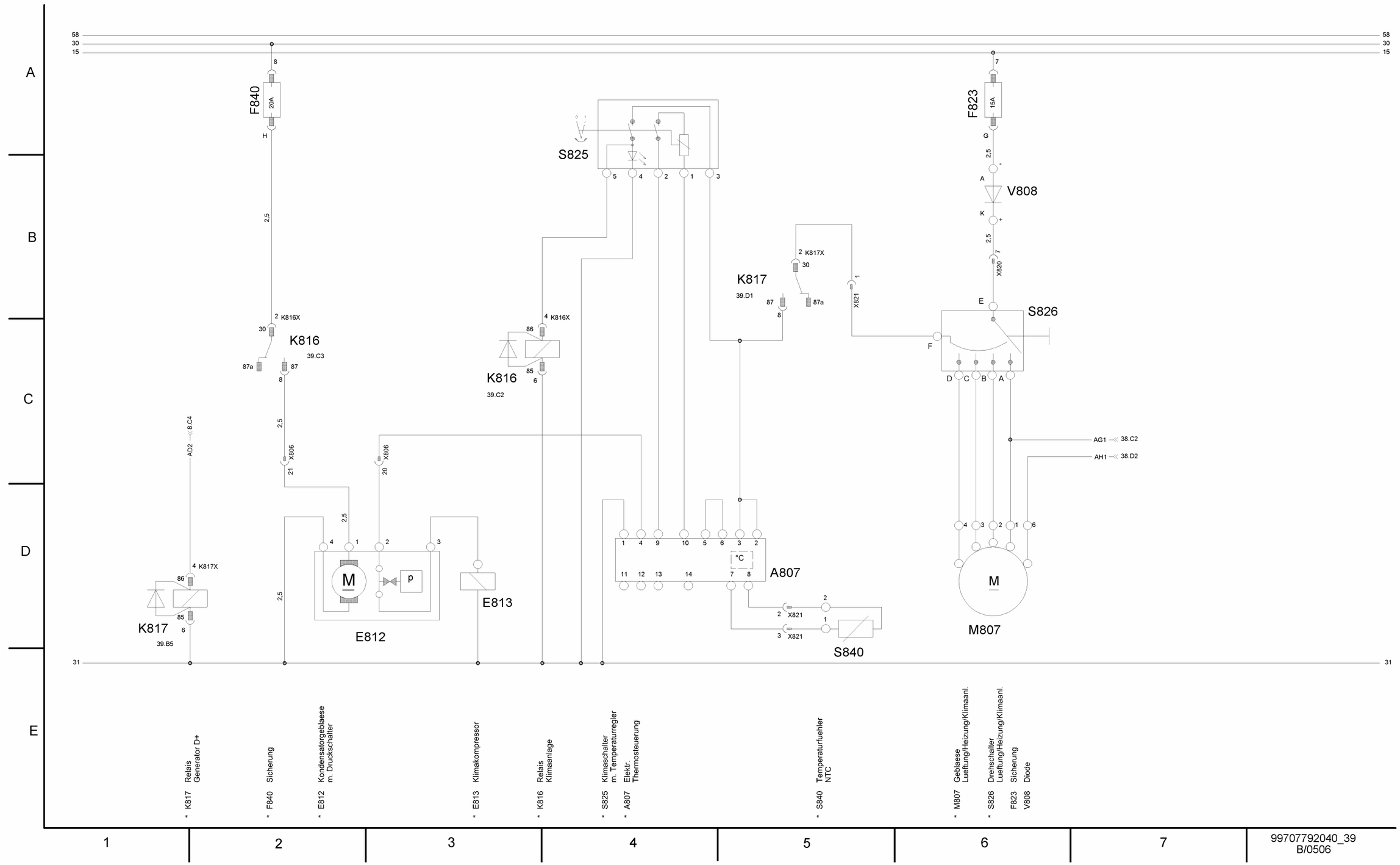
1.12 Superstructure (99707792040)



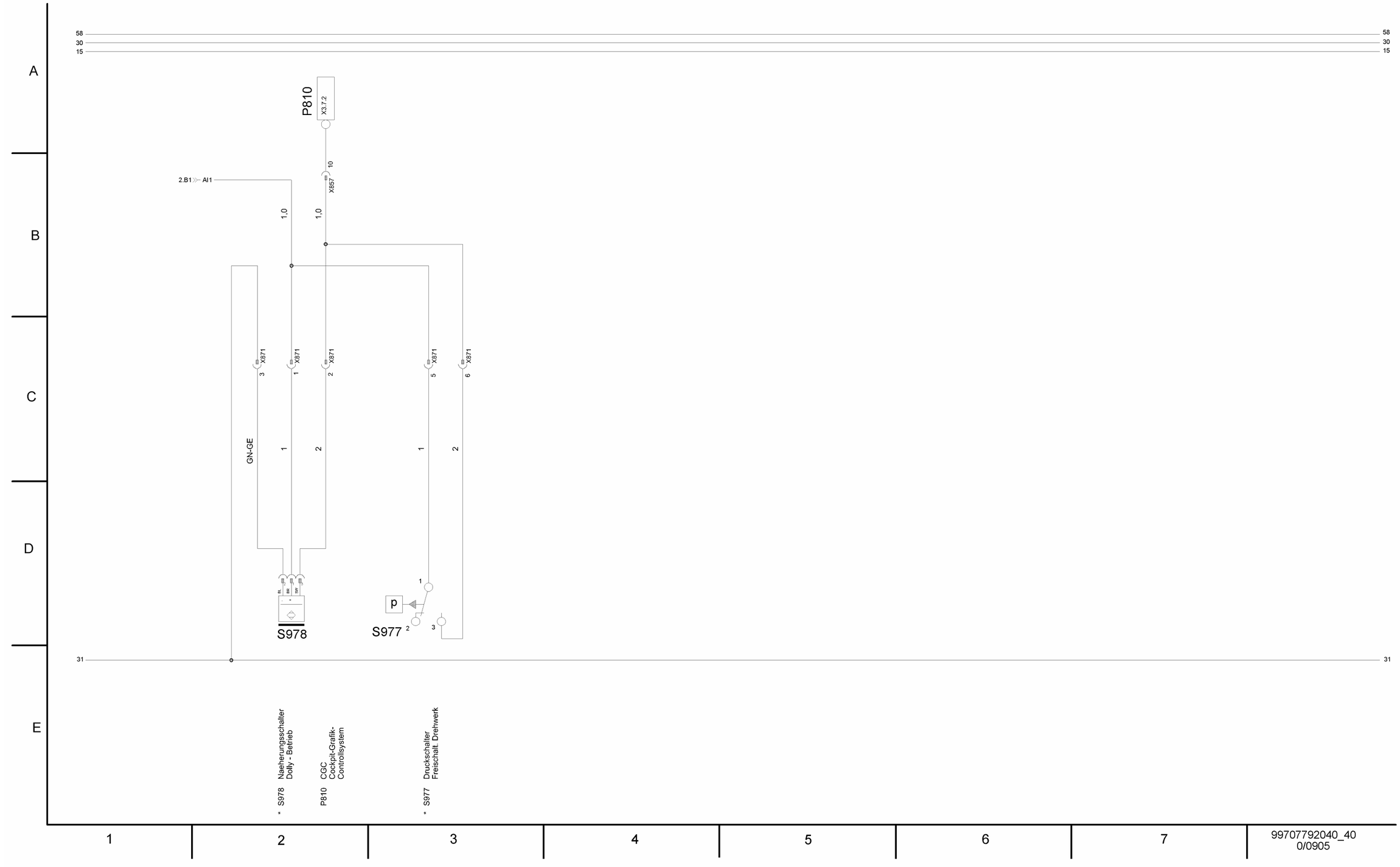
1.13 Webasto heating, type Thermo 90 (99707792040)



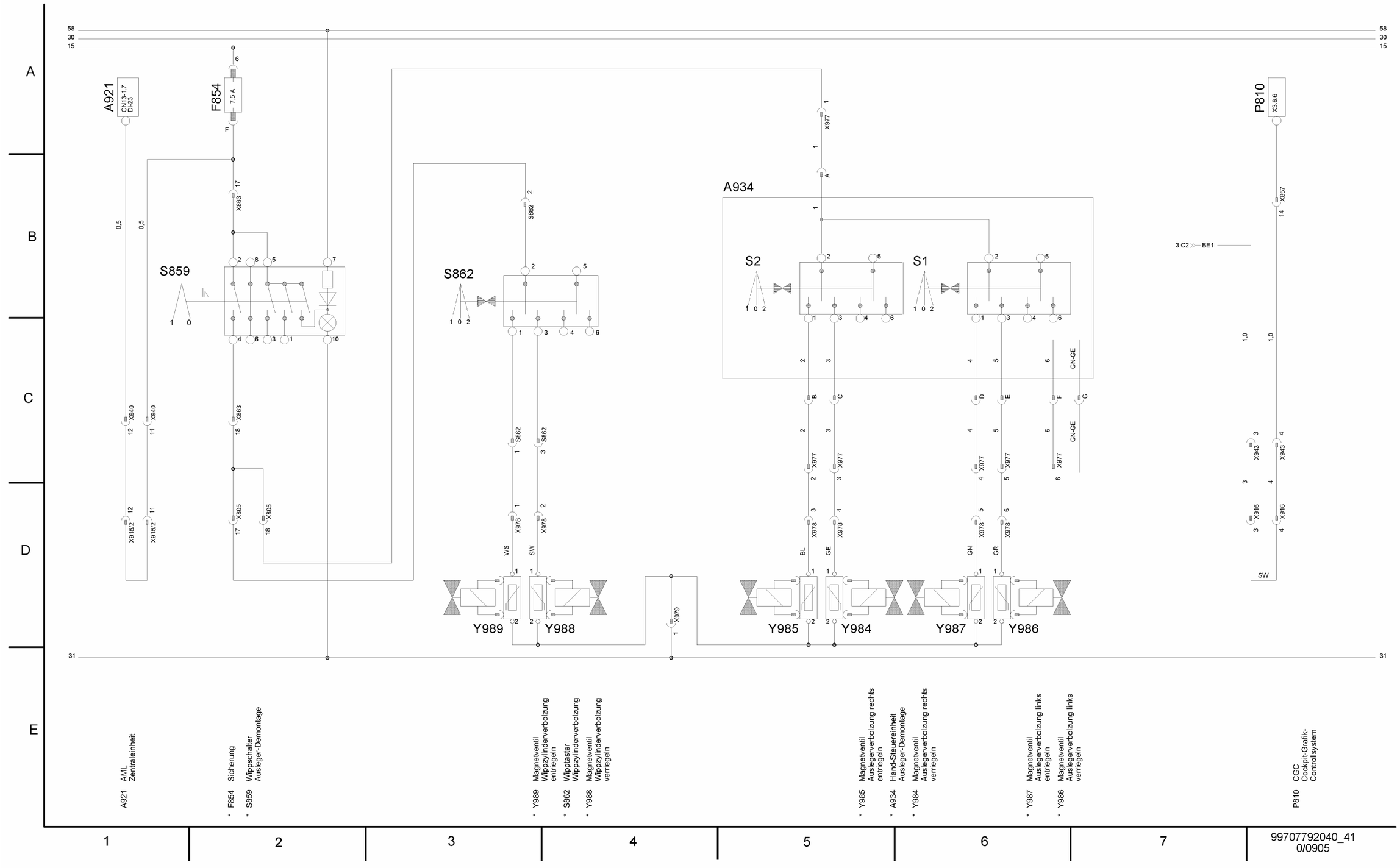
1.14 Air conditioning system (99707792040)



1.15 Superstructure (99707792040)



1.16 Removal the boom (99707792040)



1.17 Superstructure (99707792040)

A

B

C

D

E

Leitungsfarben Cable colours Couleurs des cables			
BG	beige	beige	beige
BL	blau	blue	bleu
BR	braun	brown	brun
GE	gelb	yellow	joune
GN	gruen	green	vert
GR	grau	grey	gris
OR	orange	orange	orange
RS	rosa	pink	rose
RT	rot	red	rouge
SW	schwarz	black	noir
TR	transpa	transpa	transpa
VI	violett	violet	violet
WS	weiss	white	blanc

$ = aeusserer Schirm
ueber Kabelverschraubung
an Masse

S = Abschirmung

* = Sonderausruestung
Kundenwunsch

Masseleitungen: braun

Nicht angegebene Leitungsfarben: weiss

Nicht angegebene Leitungsquerschn.: 1,5 ⎚

1 2 3 4 5 6 7

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0/0905

3 Hydraulic piping diagrams

3.1 Hydraulic system (99707785519)

Y901	Steuerdruckabschaltung
Y902	Wippe ab
Y903	Winde ab
Y904	Winde auf
Y905	Tele aus
Y906	2. Winde ab
Y907	2. Winde auf
Y908	Tele ein
Y909	Wippe auf
Y910	Drehwerkbremse auf
Y914	Eilgang
Y915	Differentialgang Tele
Y918	Drehwerk links
Y919	Drehwerk rechts
Y925	Pumpe 1 (Tele; Wippe)
Y926	Pumpe 2 (Winde)
Y927	Aktivierung Gegengewicht
Y931	Gegengewicht ab
Y932	Gegengewicht auf
Y933	Gegengewicht verriegeln
Y934	Gegengewicht entriegeln
Y938	Gegengewicht links auf/ab
Y939	Gegengewicht rechts auf/ab
Y941	LMB-Abschaltung
Y943	Druckumschaltung Tele
Y947	Freilauf Drehwerk
Y969	Zuschaltung Televerriegelung
Y974	Ausleger verriegeln
Y975	Ausleger entriegeln
Y976	Telezylinder verriegeln
Y977	Telezylinder entriegeln
Y981	Tele aus
Y982	Tele ein

pilot pressure cutoff	
derricking system down	
main hoisting drive down	
main hoisting drive up	
telescop extend	
auxiliary hoisting drive down	
auxiliary hoisting drive up	
telescop retract	
derricking system up	
summation valve on	
slewing brake open	
differential valve on	
slewing system left	
slewing system right	
pump 1 (derricking system)	
pump 2 (hoisting drive)	
countervweight activation	
counterweight down	
counterweight up	
counterweight lock	
counterweight unlock	
counterweight left up/down	
load moment device cutoff	
telescop pressure switching	
slewing free mode	
telescop locking	
boom lock	
boom unlock	
slewing system left	
telescoping cylinder lock	
telescoping cylinder unlock	
telescop extend	
telescop retract	

S831	Oelfilter	oil filter
S832	Oelkuehler zuschalten	oil cooler switch on
S836	Warnung Oeltemperatur	oil temperature

Uebersicht Schalter

Drehwerk
slewing system

Gegengewicht
counterweight

1

2

99707785519_01
C/0606

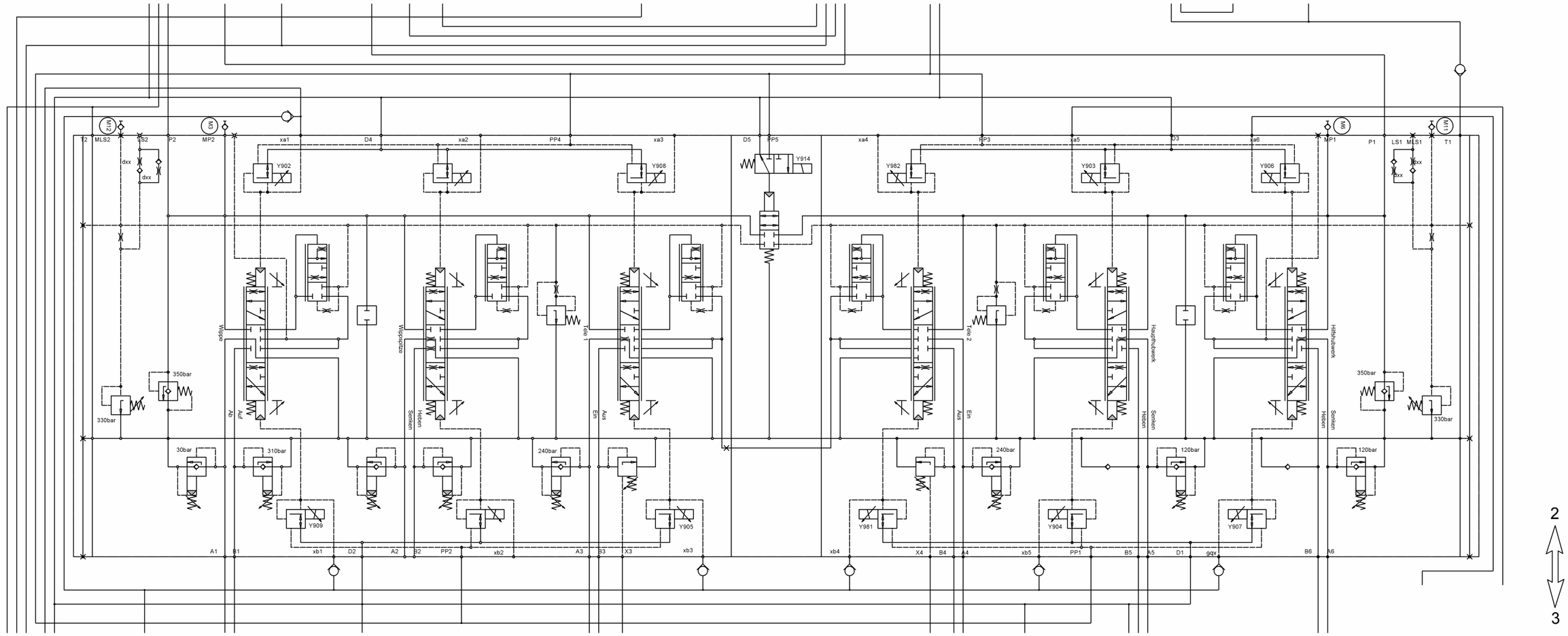
Memo:

Y901	Steuerdruckabschaltung	pilot pressure cutoff
Y902	Wippe ab	derricking system down
Y903	Winde ab	main hoisting drive down
Y904	Winde auf	main hoisting drive up
Y905	Tele aus	telescop extend
Y906	2. Winde ab	auxiliary hoisting drive down
Y907	2. Winde auf	auxiliary hoisting drive up
Y908	Tele ein	telescop retract
Y909	Wippe auf	derricking system up
Y910	Drehwerkbremse auf	slewing brake open
Y914	Eilgang	summation valve on
Y915	Differentialgang Tele	differential valve on
Y918	Drehwerk links	slewing system left
Y919	Drehwerk rechts	slewing system right
Y925	Pumpe 1 (Tele; Wippe)	pump 1 (derricking system)
Y926	Pumpe 2 (Winde)	pump 2 (noisting drive)
Y927	Aktivierung Gegengewicht	counterweight activation
Y931	Gegengewicht ab	counterweight down
Y932	Gegengewicht auf	counterweight up
Y933	Gegengewicht verriegeln	counterweight lock
Y934	Gegengewicht entriegeln	counterweight unlock
Y938	Gegengewicht links auf/ab	counterweight left up/down
Y939	Gegengewicht rechts auf/ab	counterweight right up/down
Y941	LMB-Abschaltung	load moment device cutoff
Y943	Druckumschaltung Tele	telescop pressure switching
Y947	Freilauf Drehwerk	slewing free mode
Y969	Zuschaltung Televerriegelung	telescop locking
Y974	Ausleger verriegeln	boom lock
Y975	Ausleger entriegeln	boom unlock
Y976	Telezylinder verriegeln	telescoping cylinder lock
Y977	Telezylinder entriegeln	telescoping cylinder unlock
Y981	Tele aus	telescop extend
Y982	Tele ein	telescop retract

S831	Oelfilter	oil filter
S832	Oelkuehler zuschalten	oil cooler switch on
S836	Warnung Oeltemperatur	oil temperature

Uebersicht Schalter

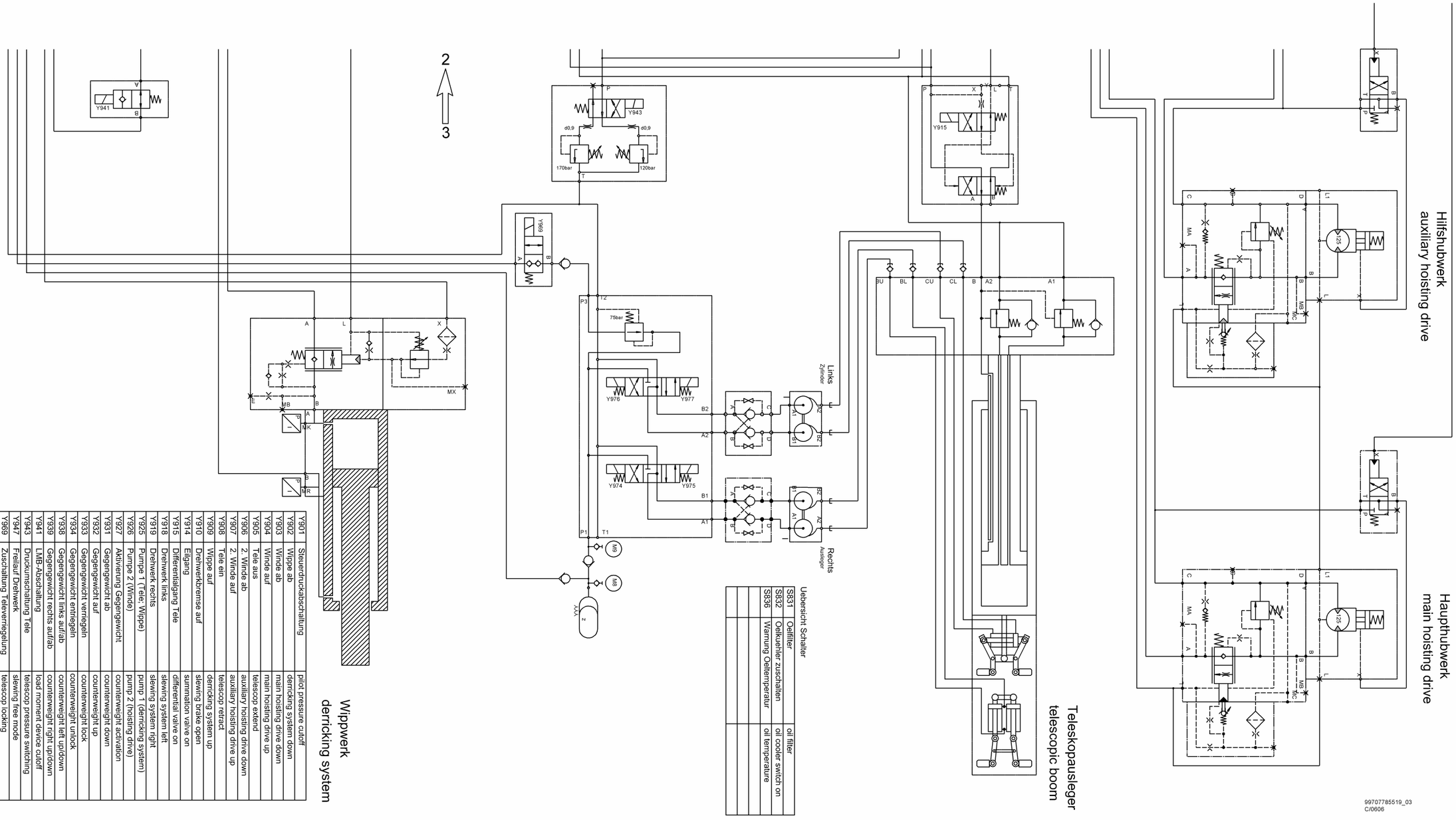
1 2



2 3

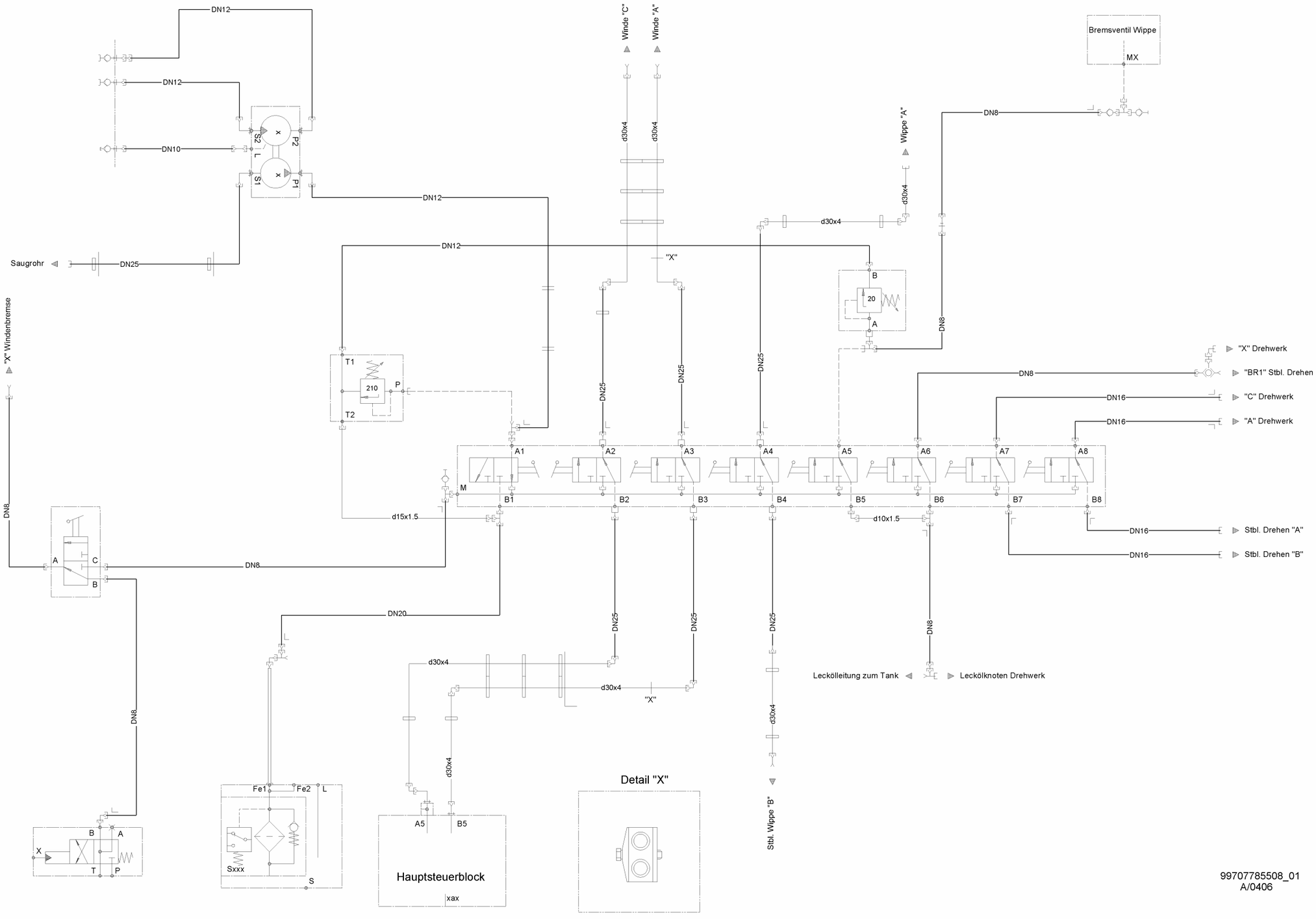
99707785519_02
C/0606

Memo:



Y901	Steuerdruckabschaltung	pilot pressure cutoff
Y902	Wippe ab	derricking system down
Y903	Winde ab	main hoisting drive down
Y904	Winde auf	main hoisting drive up
Y905	Tele aus	telescop extend
Y906	2. Winde ab	auxiliary hoisting drive down
Y907	2. Winde auf	auxiliary hoisting drive up
Y908	Tele ein	telescop retract
Y909	Wippe auf	derricking system up
Y910	Drehwerkbremse auf	slewing brake open
Y914	Eilgang	summation valve on
Y915	Differentialgang Tele	differential valve on
Y918	Drehwerk links	slewing system left
Y919	Drehwerk rechts	slewing system right
Y925	Pumpe 1 (Tele; Wippe)	pump 1 (derricking system)
Y926	Pumpe 2 (Winde)	pump 2 (hoisting drive)
Y927	Aktivierung Gegengewicht	counterweight activation
Y931	Gegengewicht ab	counterweight down
Y932	Gegengewicht auf	counterweight up
Y933	Gegengewicht verriegeln	counterweight lock
Y934	Gegengewicht entriegeln	counterweight unlock
Y938	Gegengewicht links auf/ab	counterweight left up/down
Y939	Gegengewicht rechts auf/ab	counterweight right up/down
Y941	LMB-Abschaltung	load moment device cutoff
Y943	Druckumschaltung Tele	telescop pressure switching
Y947	Freilauf Drehwerk	slewing free mode
Y969	Zuschaltung Televerriegelung	telescop locking
Y974	Ausleger verriegeln	boom lock
Y975	Ausleger entriegeln	boom unlock
Y976	Telezylinder verriegeln	telescoping cylinder lock
Y977	Telezylinder entriegeln	telescoping cylinder unlock
Y981	Tele aus	telescop extend
Y982	Tele ein	telescop retract

3.2 Emergency control (99707785508)



Part E

Crane testing instructions

Recurrent Crane Inspections

Every FAUN crane is tested before delivery according to the DIN standards or the Regulations for the Prevention of Accidents according to BGV D6 valid in the Federal Republic of Germany.

The accident prevention provisions valid in the Federal Republic of Germany specify that inspections be effected at yearly intervals; corresponding regulations are valid abroad, and have to be observed.

Attention **These national provisions must be applied for the inspection of the vehicle. They may supplement these testing instructions, or even suspend them completely, if applicable.**

If no appropriate regulations exist in the country of use, it is recommended to perform these recurrent inspections according to the provisions for the prevention of accidents valid in Germany. The inspections described in the following sections are based on these provisions.

Recurrent inspections of cranes can be effected by experts or persons who have acquired special knowledge in the crane sector. This inspection is essentially a visual inspection, which serves to assess the condition of the crane as a whole and of its components.
Any deficiencies detected in the course of this inspection have to be recorded in the crane's documentation; the operator is obliged to eliminate these deficiencies. A subsequent inspection may be necessary.

In the scope of the recurrent inspections, the automatic safe load indicator and all hydraulic and electronic control and safety devices must also be checked thoroughly.

The expert or the person who has acquired special knowledge in the crane sector is solely responsible for the entire extent of inspection to be covered by the recurrent inspection.
The following text contains a few important instructions which are to be observed in the scope of the recurrent inspections.
However, we should like to point out that this text does not specify all items pertaining to the extent of inspection.

1 Inspection of supporting steel structures

All supporting steel structures, such as boom, superstructure rotary platform with the screws and bolts of the ball bearing slewing ring, chassis frame, outrigger casings and outrigger beams have to be checked regularly depending on the operating conditions, however at least once per year. Weld seams, even those which are subjected to less stress, must also be checked thoroughly.

If the crane has been subjected to inadmissible stress during service (e.g. to a high shock load caused by a load "dropping" in the rope etc.), the machine must be checked to determine that its supporting components are in perfect working order.

DANGER **Any damage caused to supporting components of the crane entails an increased risk of accidents.**

Various stress cycle figures have been determined for the various high-tensile fine grain steels according to ***DIN 15017 part 3***. According to this standard, FAUN cranes have been designed for the load ensemble S_1 light and a stress cycle figure of 25000 load cycles. They can be used to calculate the service life of the crane in question, depending on the crane's operating conditions. This service life does not only depend on the stress cycle figure, but also on the loads to which the crane was subjected during the period of operation.

The following drawings (refer to item 1.1) are examples for some load-supporting steel structures of the crane and are to provide some guidelines for the inspector regarding the areas to be checked. The areas marked with arrows are subject to high stress and must be checked in the scope of the inspections, or depending on the operating conditions.
However, please note expressly that the drawings are not meant to be complete, but are only to be considered as guidelines.

1 Inspection of supporting steel structures (cond't)

If damage (e.g. cracks, deformations) is detected during these inspections, an expert must be consulted.
After the damage has been recorded, the vehicle manufacturer must be consulted based on the remark under C1-1, item 1.2 "Welding and straightening work".
The way how to effect repair must be determined by the vehicle manufacturer in agreement with the expert.

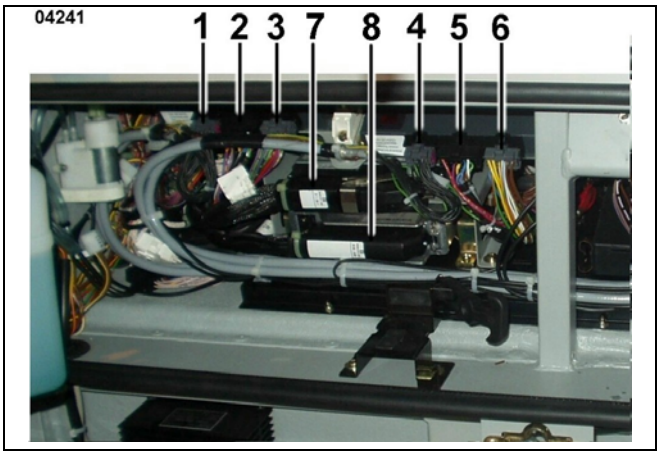
Measures to protect electronic components during welding work

If welding work must be effected on the mobile crane, the following measures must be taken before work is commenced, in order to protect the electronic control units:

- Turn the battery switch in chassis and superstructure OFF;
- disconnect battery cables in chassis and superstructure from the negative terminal, then disconnect the battery cables from the positive terminal and connect them;
- remove the connectors from the following **electronic components**.

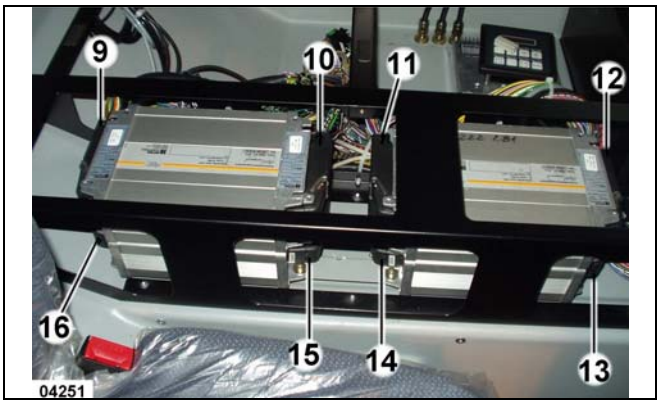
Below the front lid of the cabin in the chassis:

1 steering computer 1,
2 steering computer 1,
3 steering computer 1,
4 steering computer 2,
5 steering computer 2,
6 steering computer 2,
7 gearbox control 1,
8 gearbox control 2.



After removing the cover of the center console of the cabin in the chassis:

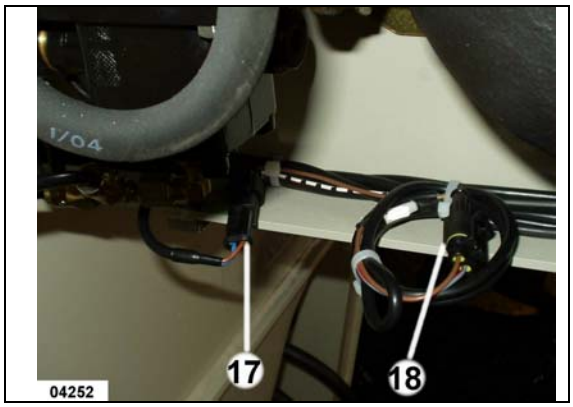
9-16 crane function computer.



(cont'd.) **1 Inspection of supporting steel structures**

Behind the control boxes of the outrigger actuating systems on both sides of the vehicle:

17-18 power supply of the outrigger actuating system.



Attention **During electrical welding work, the ground terminal of the welding unit must be connected directly to the part to be welded.**
If this instruction is not observed, the current flow may cause damage to loose connections, e.g. tooth faces, bearings, slide pieces, shafts, the electronic system, the ASLI, etc.

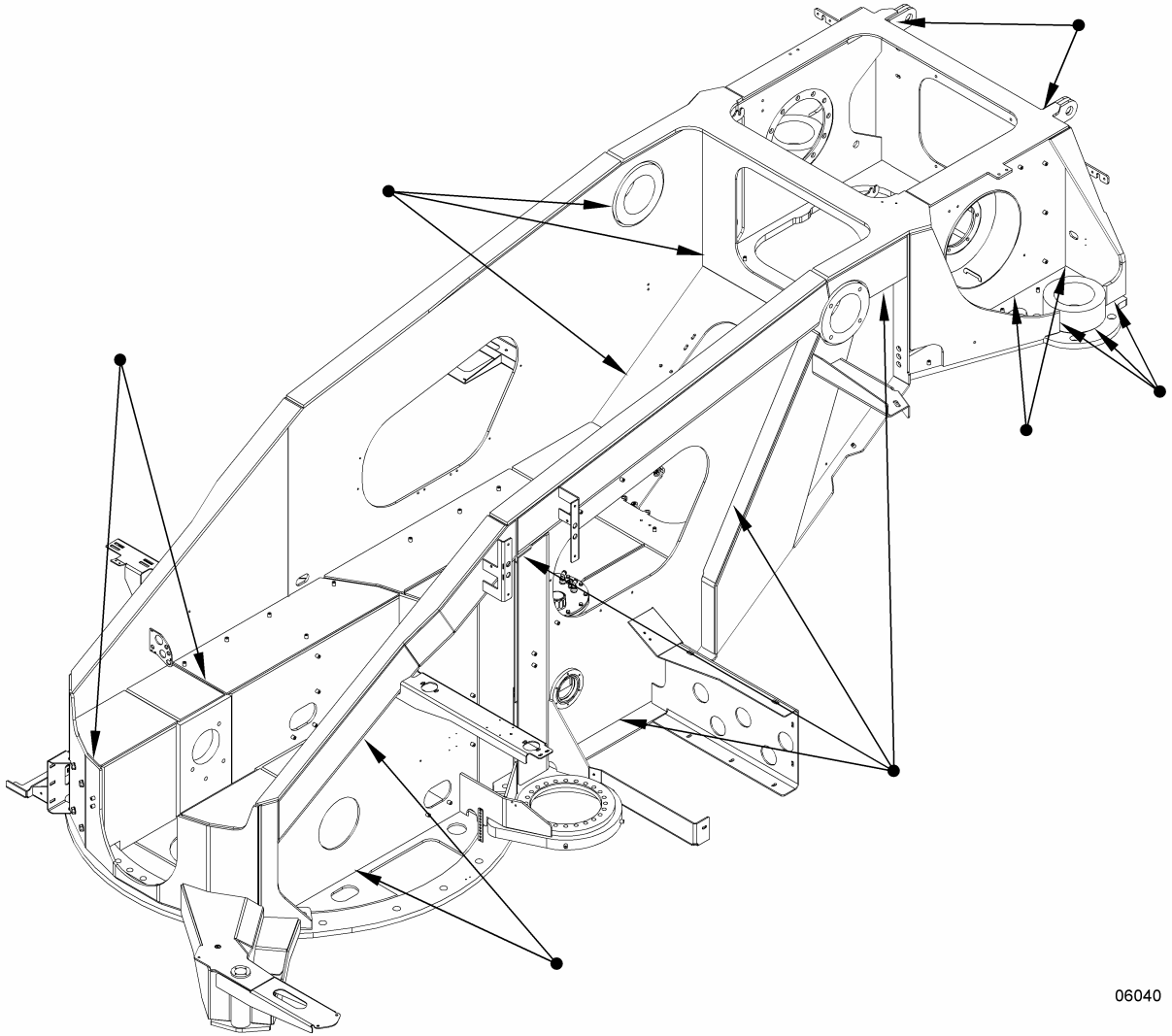
DANGER **Make sure that the welding instructions are observed.**

Once welding work is finished, all plug-and-socket connectors must be re-connected. It is recommended to mark the plug-and-socket connectors to avoid confusion during assembly.

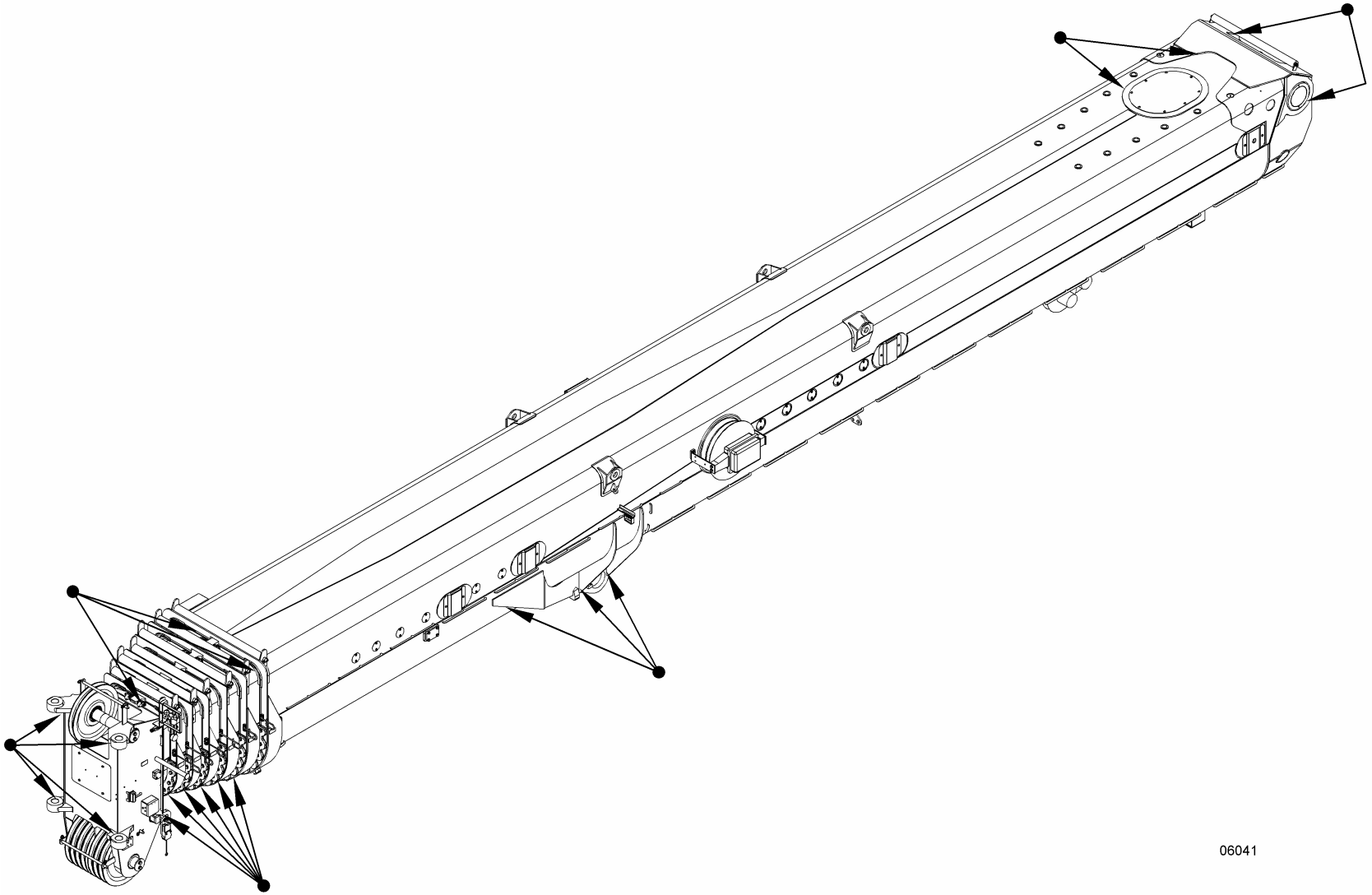
Memo:

1.1 Guidelines for areas to be checked

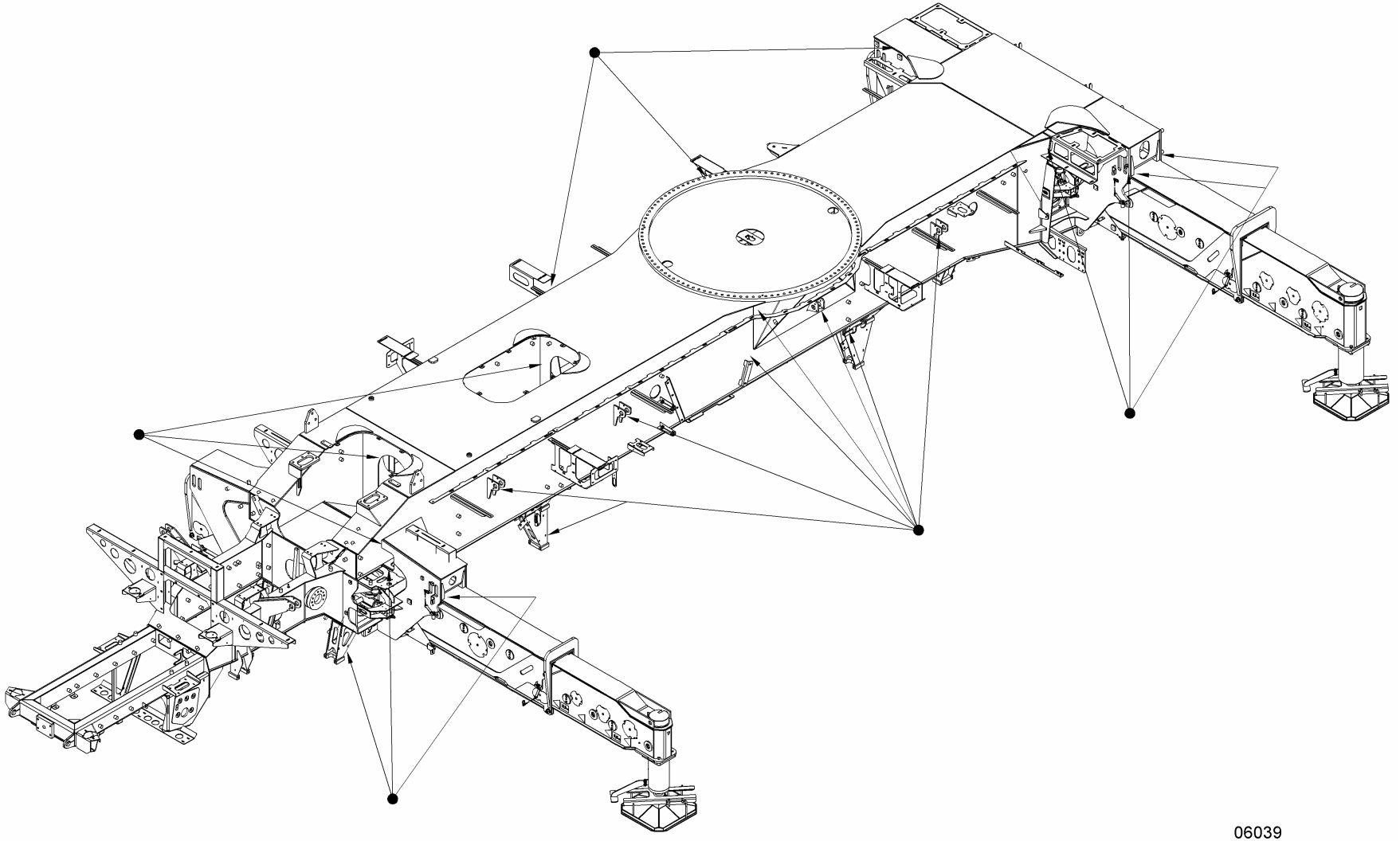
1.1.1 Superstructure frame



1.1.2 Boom



1.1.3 Chassis frame



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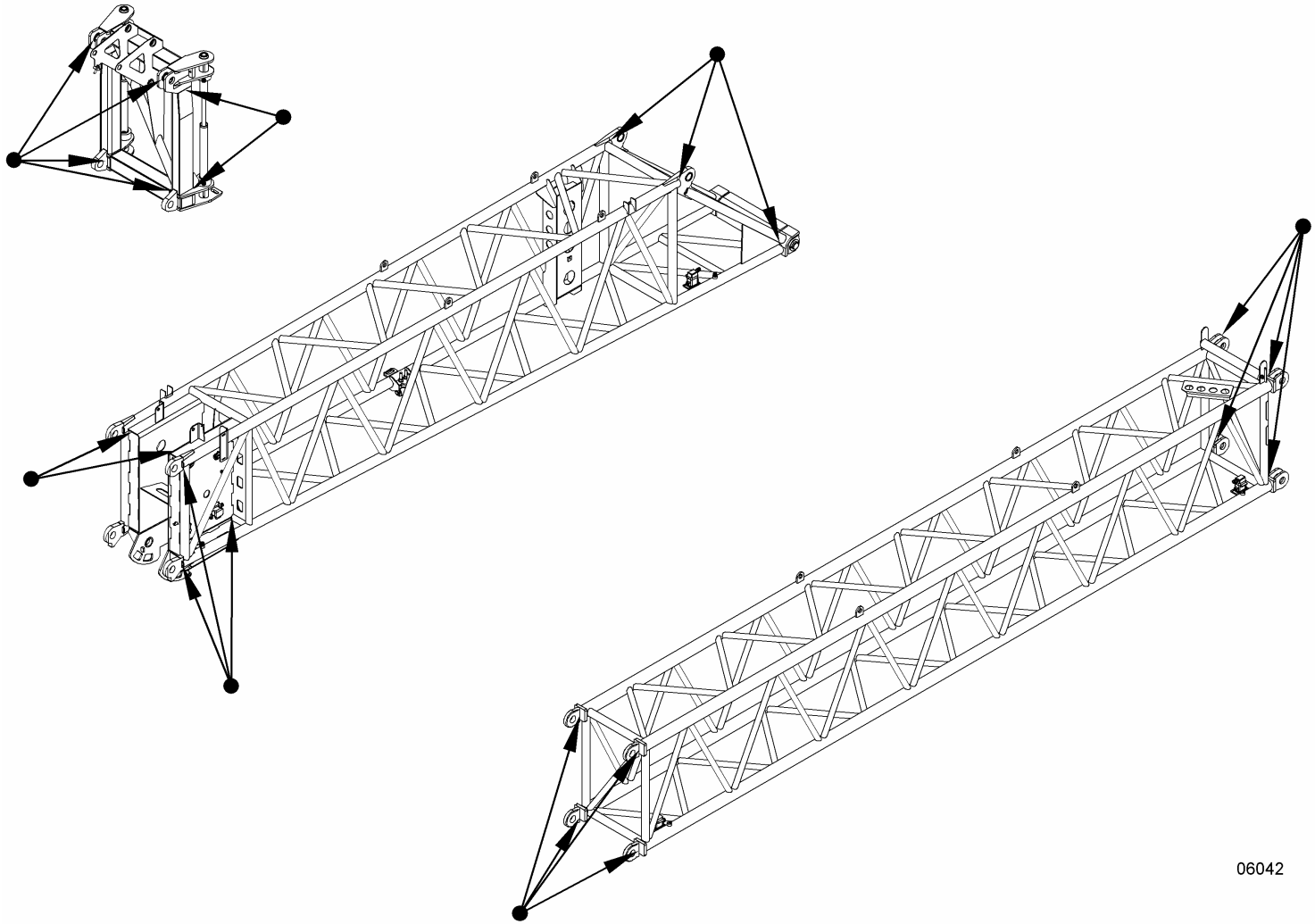
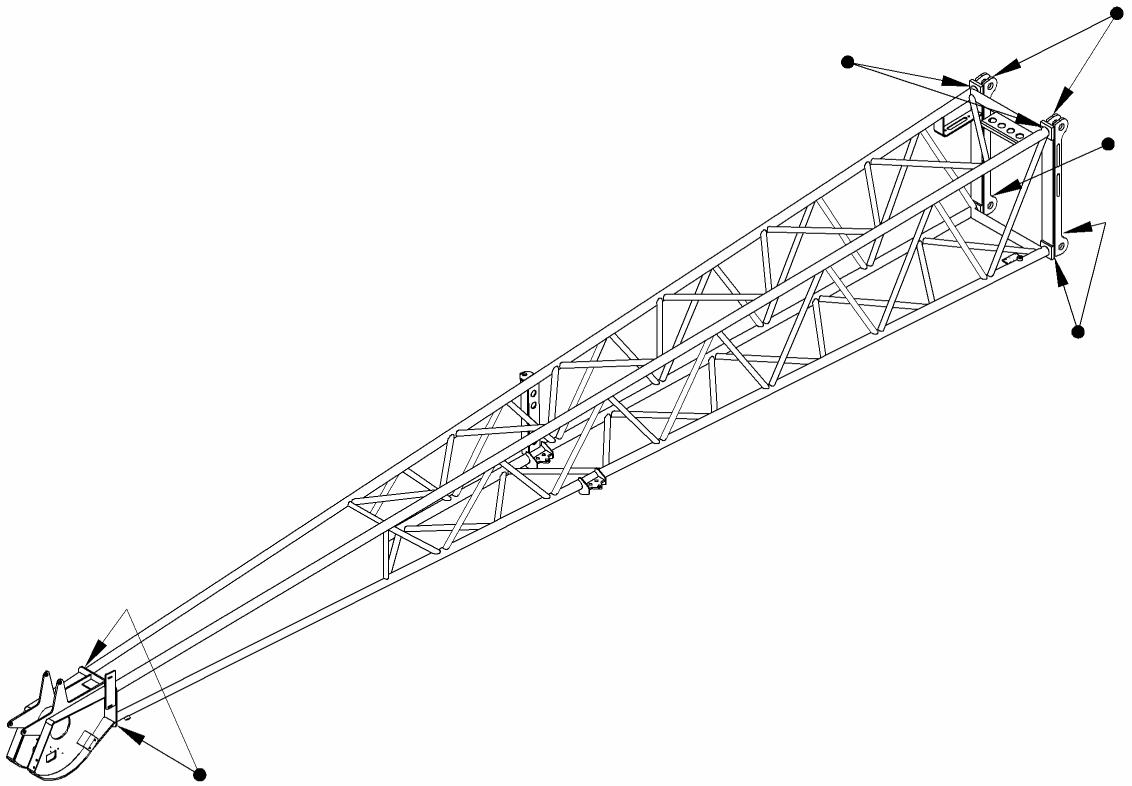
1.1.4 Boom extension (jib)**)



**) Optional equipment

1.1.4 Boom extension (jib)**) (cont'd.)



04249

**) Optional equipment

Memo:

2 Inspection of the hook blocks

DANGER **Crane work using worn or faulty hook blocks is prohibited. Otherwise, accidents involving damage to property or personal injury would be inevitable.**

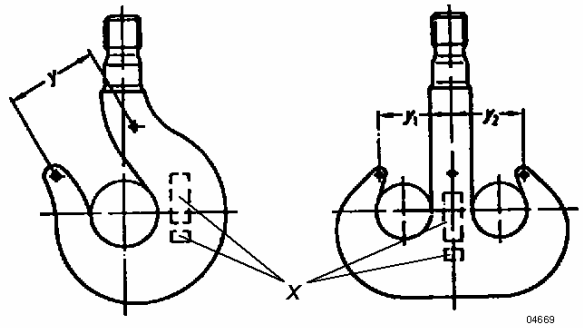
Thus, hook blocks must be checked at regular intervals for proper working order and good condition.
These inspections must be performed by experts. It is essential to comply with the appropriate national regulations and directives.
Please do not hesitate to contact your TADANO-FAUN after sales service in case of queries or problems.
He will be pleased to perform for you all the servicing and maintenance work required.

The hook blocks or the load hooks have to be checked regularly by persons who dispose of special knowledge in this field, at intervals which depend on the operating conditions of the crane, however at least once per year. These regular inspections are intended to prevent accidents which might be due to deficiencies.

The deficiencies detected in the course of this inspection have to be recorded, and eliminated; afterwards, the crane must be subjected to subsequent verification to ensure that the deficiencies have been eliminated.

2.1 Inspection for widening of the hook mouth

The hook mouth has to be checked for deformation at regular intervals, as required, depending on the operating conditions of the crane, at least however once per year.
The widening of the hook mouth must not exceed 10 %, referred to the original dimension **"y"**, or **"y_1"** and **"y_2"**.
The original dimensions are specified on the load hook and in the crane documentation. The dimensions **"y"** are measured between two dotting marks.



X = Identification
Measured length **„y“** or **„y_1“** and **„y_2“** in the case of hammer-forged load hooks

DANGER **If the determined widening of the hook exceeds 10%, the load hook must not be used any longer.**

NOTE **If any deformation is detected (even less than 10%), the load hook must be checked for superficial cracks using appropriate means.**

2.2 Inspection for wear

According to German regulations, the wear of single and double hooks must not exceed 5 % of the height **h_2**.

DANGER **If the determined wear of the hook exceeds 5%, the load hook must not be used any longer.**

2.3 Inspection for corrosion

Especially the thread of the load hook has to be checked for corrosion. The load hook nut must be removed from the hook stem to expose the thread turns of the lood hook stem so that they can be judged.

DANGER **The load hook must not be used any longer if traces of corrosion or wear are visible at the thread.**

Memo:

3 Inspection of lifting ropes

DANGER **Crane work using worn or faulty winch ropes is prohibited. Otherwise, accidents involving damage to property or personal injury would be inevitable.**

Thus, winch ropes must be checked at regular intervals for proper working order and good condition.
These inspections must be performed by experts. It is essential to comply with the appropriate national regulations and directives.
Please do not hesitate to contact your TADANO-FAUN after sales service in case of queries or problems.
He will be pleased to perform for you all the servicing and maintenance work required.

The rope drives of mobile cranes are not designed for high endurance strength. Thus, wire breaks occur during operation. The principles for monitoring rope drives used for working applications are recorded in the following text.

The ropes must be checked regularly, taking account of the prevailing operating conditions of the crane. The rope must be observed more attentively at shorter intervals especially in the time just after it has been placed, after a lifting rope has ben replaced and after extraordinary stress situations, or if internal damage is suspected which is not visible on the outside.
The reliability of metallic ropes used in working applications can be judged by the following criteria:

- Type and number of wire breaks
- Position and time intervals at which the wires break
- Reduction of the rope diameter during the operating time
- Corrosion
- Abrasion
- Deformations of the rope
- Influence of heat
- Service life

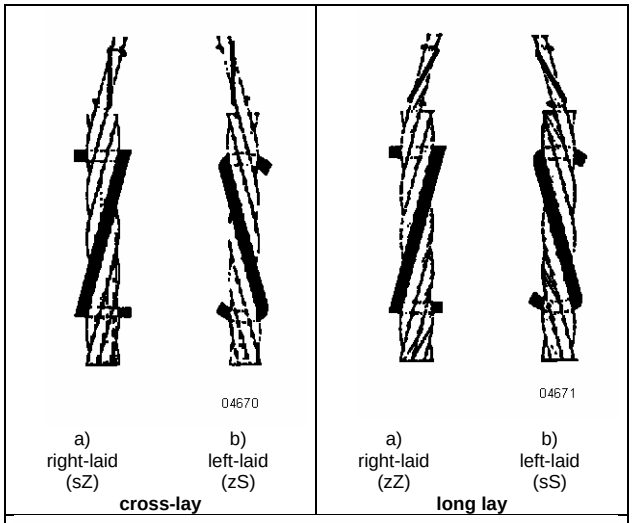
Rope fastening and rope suspension devices must also be checked for safe condition. It should be pointed out especially that wire breaks tend to be difficult to detect on these components. Other parts of the rope drive, such as the rope drum or the rope pulley, must move easily in their bearings.

3.1 Lifting ropes: Long lay - Cross-lay

NOTE **The type of the lifting rope supplied with the vehicle and its type of lay is recorded in the documentation supplied with the vehicle.**

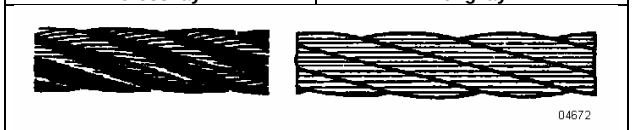
3.1.1 Direction of lay and type of lay of round ropes

The term "direction of lay" (direction of rope winding) refers to the direction of the helical line of the outer strands.
A distinction is made between right-laid ropes (symbol Z) and left-laid ropes (symbol S).

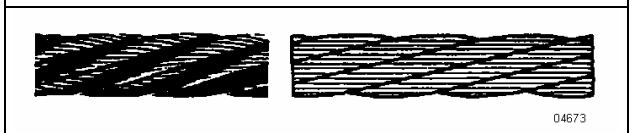


CROSS-LAY:

The direction of turning of the wires in the strands is opposite to the direction of turning of the strands in the rope.



cross-lay: right-laid
DIN designation: s/Z

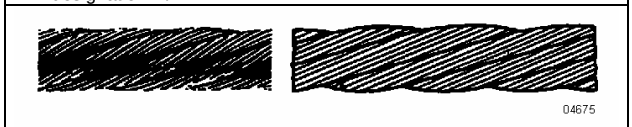


cross-lay: left-laid
DIN designation: z/S

LONG LAY:

The wires in the strands and the strands in the rope have the same turning direction.

long lay: right-laid
DIN designation: z/Z



long lay: left-laid
DIN designation: s/S

3.1.2 Approved winch ropes

For approved winch ropes, refer to crane inspection booklet or crane testing documents.

3.2 Replacement state of repair of metallic ropes due to:

3.2.1 Wire breaks

A metallic rope must be discarded at the latest when the number of visible wire breaks which is specified in the following table appears in any place of the rope.

Long-lay ropes

Number of load-bearing wires in the outer strands	Number of visible wire breaks when the rope is ready for discarding, for a length of	
	6 x d	30 x d
76 - 100	2	4
101 - 120	2	5
121 - 140	3	6

Cross-lay ropes

Number of load-bearing wires in the outer strands	Number of visible wire breaks when the rope is ready for discarding, for a length of	
	6 x d	30 x d
76 - 100	4	8
101 - 120	5	10
121 - 140	6	11

DANGER **The rope must be discarded when the specified number of wire breaks is reached; otherwise, there is an increased risk of accidents.**

NOTE **After the first wire breaks have been detected, the test intervals must be shortened to ensure timely detection of the replacement state of wear.**

It may be useful to record the occurrence of wire breaks via time. In this case, an increasing number of wire breaks in the course of of time helps the user determine the expected time when the rope should be discarded.

3.2.2 Replacement state of wear of metallic ropes due to tangles of broken wires

If tangles of broke wire occur, the metallic rope must be discarded. In case of breakage of a strand, the metallic rope must be discarded immediately.

3.2.3 Reduction of diameter

The metallic rope must be discarded if its diameter is reduced, due to structural changes, by 15 % or more over an extended length, as compared to its nominal diameter.

3.2.4 Corrosion

The metallic rope must be discarded if its diameter is reduced, due to corrosion damage, by 10 % or more, as compared to the nominal diameter, even if no wire breaks are detected. It is difficult to determine corrosion in wires which are not visible externally.

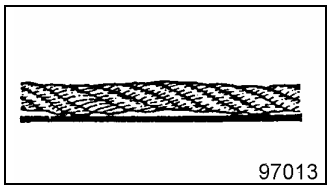
3.2.5 Abrasion

The wire rope must be discarded if its diameter is reduced, due to abrasion, by 10 % or more, as compared to the nominal diameter, even if no wire breaks are detected. Abrasion may reduce the rope's static breaking load (due to reduction of the metallic rope cross-section), and the endurance strength (due to abrasion notches).

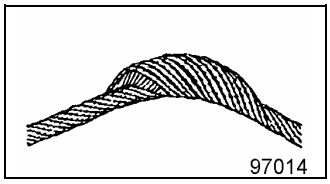
3.2.6 Rope deformation

Deformations of the rope are visible changes in the metallic rope's wire structure. The following deformations can be distinguished by their appearance:

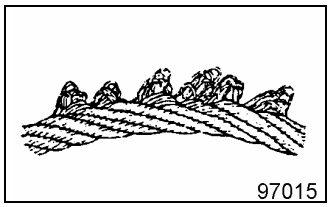
- **Corkscrew-shaped deformations**: The rope must be discarded as soon as the unevenness reaches 1/3 or more of the ropes diameter.



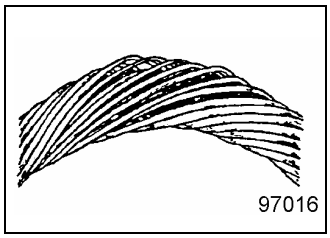
- **Basket-shaped deformations** occur when the outer wire layer is loosened, or when the outer strands are longer than the inner strands. As the outer wire or strand layers are shifted with reference to the outer layers, the excess length is shifted to one area. The metallic rope must be discarded as soon as basket-shaped deformations appear.



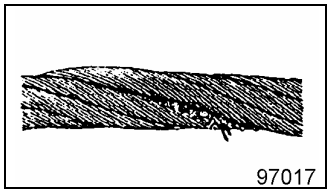
- **Loop-shaped deformations**. In this case, single wires or wire groups resembling hairpins protrude from the rope structure on the opposite side of the rope groove. If the rope structure is changed substantially, the rope must be discarded.



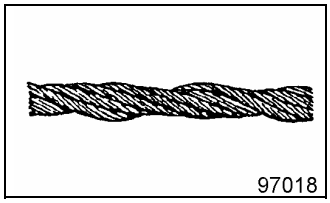
- **Loosening of single wires or strands**: In this case, the outer wires or single strands of the metallic rope, which is under load, can be shifted. Thus, they are not bearing the portion of the traction force for which they are intended, which means that the other wires or strands are overcharged. If wires are loosened due to corrosion or wear, the metallic rope has to be discarded. If this deformation is due to other causes, the resulting number of wire breaks determines the time when the rope must be discarded.



- **Knots** are "swellings" within the metallic rope which occur repeatedly over a certain rope length. Knots cause additional movements in the rope. Metallic ropes which have numerous knots must be discarded.

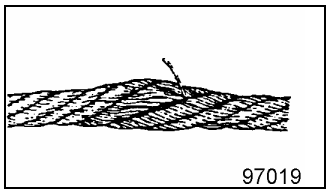


- **Contractions** are reductions in the rope's diameter over short rope lengths. Metallic ropes which present substantial contractions must be discarded.

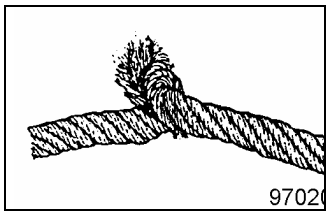


3.2.6 Rope deformation (cont'd.)

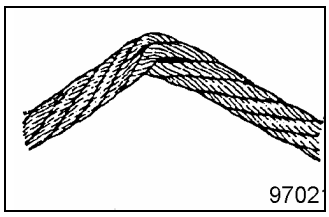
- **Flat spots** are permanent deformations of the metallic rope which are due to bruising. Wire breaks tend to occur at flat spots.



- **Buckling** is deformation which occurs when an eyelet-shaped rope loop is pulled straight, whereby the resulting deformation cannot be eliminated by the rope turning around its axis. Metallic ropes presenting one or several buckles must be discarded.



- **Kinks** are deformations which occur if external violent loads act on the metallic rope. Metallic ropes with kinks must be discarded.



- **"Curl-shaped" deformations** occur if the stressed metallic rope is pulled over an edge. Metallic ropes containing such deformations must be discarded.

3.2.7 Influence of heat

These metallic ropes have been exposed to enormous heat, and are distinguished by tarnishing appearing in various colours on the external wires. These metallic ropes must be discarded.

3.2.8 Service life

Provided that operating conditions are identical and the same metallic rope is used, the persons in charge of a crane can estimate approximately the time when a metallic rope is to be replaced in the scope of preventive maintenance of the crane, to the extent that they dispose of sufficient knowledge and experience in the operation of a rope drive.

All the criteria specified above (items 3.2.1 to 3.2.8.) are nevertheless decisive for determination of the replacement state of wear of a metallic rope.

DANGER **A metallic rope must be replaced immediately if it contains one of the following deficiencies; otherwise, there would be an increased risk of accidents.**

If there are doubts as regards the future suitability of a specific metallic rope, it should be discarded on principle, or a specialist, e.g. a staff member of the rope manufacturer, should check the rope thoroughly.

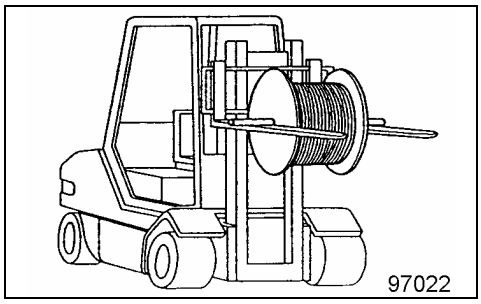
NOTE **Should any particular deficiencies be detected on the metallic rope, the reason for those deficiencies must be determined and eliminated. A new rope should not be placed until after this measure has been taken.**

3.3 Replacement of a metallic rope

DANGER **When a new rope is placed, make sure that only a rope of the same strength, make and with the same nominal diameter as the former one (when new) is mounted.**

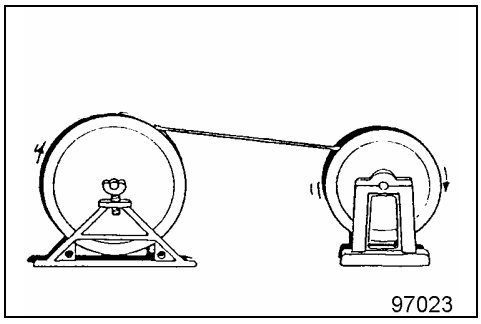
The use of a different rope type requires the prior written approval of the crane manufacturer.

Metallic ropes must be unloaded, transported and stored with sufficient care. During unloading and transport, the rope must be protected against mechanical damage, which may be caused by the tines of forklift trucks or load hooks.



Ropes stored for use at a future date should be stored in a clean, cool and dry place covered by a roof, and without touching the ground, e.g. on pallets.

When a new lifting rope is mounted, it is essential to ensure that the new rope is spooled up on the winch without being twisted and damaged. A rope supplied as a ring or on a reel should be spooled up preferably using a rotary table or a trestle.
When the rope is spooled from the reel to the drum, the bending direction must not changed.

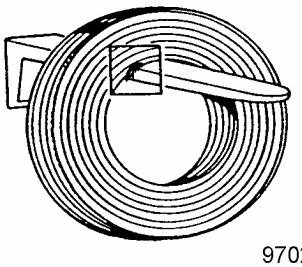


The rope windings must definitely not be pulled off the ring or the reel laterally, as this would twist the rope.

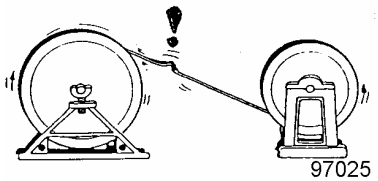
NOTE **When placing the new rope, do not drag it on the ground. The sand which may stick to the rope lubricant may damage wires in the contact area between the rope pulley and the rope.**

When the new metallic rope is mounted by means of the used rope to be discarded, or by means of an auxiliary rope, the new rope must not be twisted. Moreover, the two ropes must be connected safely. This connection between the two ropes can either be established by means of welded-on eyelets or via a rope hose.

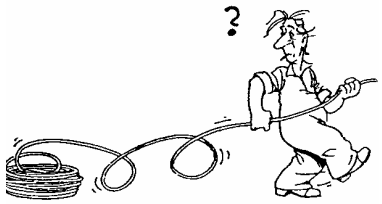
3.3 Replacement of a metallic rope (cont'd.)


97024

Wrong


97025

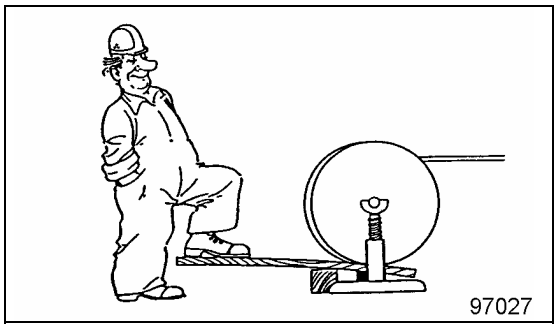
Wrong


97026

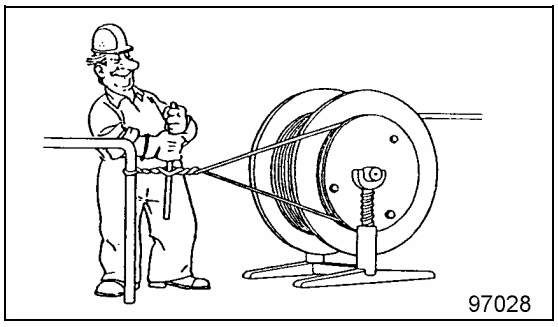
Wrong

To ensure that the metallic rope is spooled up correctly, particularly if several layers are to be arranged on the drum, it is very important that the new rope is spooled on the drum under a pre-load of approx. 1 % to 2 % of the minimum breaking force of the rope. If the lower layers are spooled up on the drum with excessive play, the upper layers may be squeezed between the loose, lower rope windings when subject to load. This may cause serious damage to the rope.

The pre-load should be produced by braking the reel flange using a board,


97027

or using a brake disc mounted to the reel, by means of brake strings.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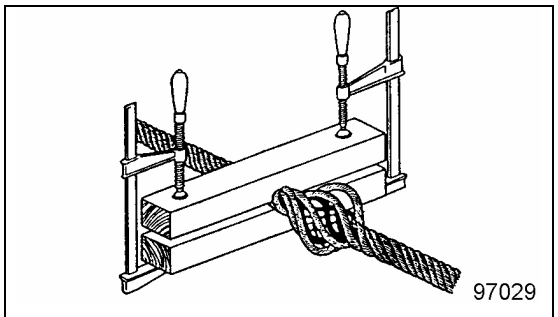
It is absolutely inadmissible to produce the required pre-load by clamping the metallic rope between two blocks of wood.


97029

Wrong

After the new rope has been mounted, it should be initially "run-in" under low partial loads. This way, the rope "settles", and adapts better to the bending direction or the bending radii of the rope drum and the pulley.

3.4 Service and Maintenance

Metallic ropes require maintenance at regular intervals which depend on the operating conditions. The service life of a metallic rope can be extended considerably if it is subject to regular care.
The metallic ropes must be re-greased at regular intervals which depend on the operating circumstances. Ropes which are well greased reach an essentially higher number of reversed bending stress cycles, and thus a substantially longer service life.

NOTE **The lubricant intended for re-greasing should be selected so that it is compatible with the original lubricant supplied by the rope manufacturer.**

Metallic ropes which are exposed to substantial quantities of dirt must be cleaned at regular intervals. This cleaning should be performed preferably using brushes.

In many cases, metallic ropes have to be discarded which are only damaged on a relatively short length which is subject to severe stress, e.g. at the transition from the first to the second layer, even though the rest of the rope is still in good condition. Thus, the service life of a rope can be extended if the corresponding rope length is cut off*), so that the rope length which was previously exposed to severe stress is now in an area subject to less stress.

*) However, in case of ropes equipped with steel wire rope clamp (execution with Super-Stop rope socket), the rope clamp must be press-fitted anew according to the provisions of the rope manufacturer.

3.5 Elimination of elongation spin

This spin caused by elongation becomes apparent as a hook block without load turns during operation with several rope falls. This indicates that spin compensation is required due to the settling and lengthening of the rope after an extended period of use, and after a new rope has been placed. Due to this elongation spin, the outer strands of the metallic rope can become loose, and may even form "baskets" under certain circumstances.

To eliminate this elongation spin, the following steps should be taken:

1. Deposit the hook block on the ground; to this effect, make sure that a maximum rope length is available for spin compensation between the hook block and the boom pulley head.
2. Determine the inward turning direction; as this may prove to be difficult, a check twist should be effected to find out whether the tress is twisted inwards or outwards.
3. Release the rope from the fixed point on the hook block or on the boom head; this work is considerably facilitated if the spin compensation is effected with an odd number of rope falls, or if an odd number of rope falls is reeved. With an odd number, the fixed point of the rope is always located at the hook block, and thus is easily accessible.
4. To compensate the spin, turn the rope fall released from the fixed point accordingly; it is important to note that the rope released from the fixed point must be turned against the direction of turning which has caused the dissolution of the rope tress during trial turning.

NOTE **It is essential to ensure that this turn is applied to a rope section which is as long as possible. Turning a short rope length using force is strictly prohibited, as this might destroy the rope structure.**

5. Fasten the rope fall at the fixed point using the rope clamp by means of pins and the retaining clip.
6. After the spin compensation has been accomplished, a few lifting cycles in no-load condition have to be effected so that this compensation can spread via the rope pulleys over the entire length of the rope.

NOTE **In case of a particularly strong elongation spin, this spin compensation may have to be effected several times, until the rope is moving correctly again.**

4 Working life of the rope winch gear assemblies

DANGER **Should the hoisting gears not operate correctly or even be faulty, crane work is prohibited. Otherwise, accidents involving damage to property or personal injury would be inevitable.**

Thus, hoisting gears must be checked at regular intervals for proper working order and good condition.
These inspections must be performed by experts. It is essential to comply with the appropriate national regulations and directives.
Should there be no national regulations, we recommend - regarding the inspection intervals - to proceed as described in the following example.
Please do not hesitate to contact your TADANO-FAUN after sales service in case of queries or problems.
He will be pleased to perform for you all the servicing, maintenance and repair work required.

4.1 Theoretical service life of the winch

The winch was designed and dimensioned on the basis of certain operating conditions and of a rated total operating time, which enable the calculation of a theoretical service life of the winch.

The winch installed in the crane is rated as follows:

Drive assembly group	M 3
Load ensemble	L 1
Load ensemble factor	Km = 0.125
Theoretical service life	D = 3200 h

NOTE **The theoretical service life must not be equated with the actual (real) service life of the winch.**

The actual (real) service life is affected additionally by a number of external influences, e.g.:

a) Overload if the crane is used for purposes not included within its intended fields of application;
b) Insufficient maintenance, e.g. neglect of the specified oil-change intervals;
c) Operating errors, extreme decelerations, or loads "dropping" in the rope;
d) Maintenance faults, e.g. incorrect oil type or filling volume; contamination in the course of oilchange;
e) Assembly errors in the course of maintenance and repair;
f) Leaks which are not eliminated;
g) Incorrectly set safety equipment, e.g. pressure limiting valves;
h) Concealed damage due to accidents;
i) Extreme environmental conditions, e.g. dust and dirt; aggressive atmosphere, high or low temperatures.

4.2 Consumed portion of the theoretical service life

The crane operator has the duty to check the crane or to have it checked at least once per year.

In this context, the consumed portion of the theoretical service life also has to be determined. If the crane operator is not able to do this work on his own, he has to commission an expert with this task. In Germany, this inspection is performed by a crane expert, based on ***§ 28 BGV D6***. In other countries, this is done by the "expert engineer" pursuant to ***ISO 9927-1***. Any deviation provisions valid in those countries must be adhered to.

To calculate the consumed portion of the theoretical service life, the real operating conditions (load ensemble) and the service hours of the winch per inspection interval must be determined. The operator is responsible for recording this data in the crane documentation correctly.

4.2.1 Determination of the operating conditions

On the basis of the actual known operating conditions, one of the following load ensembles must be selected and entered in the crane documentation for the appropriate inspection interval.

The load ensemble of the crane is divided into the following groups.

Load ensemble, class	Definitions	Portions of operating time	Load ensemble factor	Schematic diagram
light Q 1 L 1	Drive assemblies or parts of drive assemblies which are only exceptionally subject to maximum load, which however, are subject to very light stress on a routine basis.	10 % of operating time with max. load (dead load + 1/1 payload) 40 % of operating time with dead load + 1/3 payload 50 % of operating time with dead load only	Km = 0.125	Load % Last % 100 50 40 % 10 % 0 50 100 Laufzeit % 97030 Service life %
medium Q 2 L 2	Drive assemblies or parts of drive assemblies which are rather frequently subject to maximum load, which however, are subject to light stress on a routine basis.	1/6 of operating time with max. load (dead load + 1/1 payload) 1/6 % of operating time with dead load + 2/3 payload 1/6 % of operating time with dead load + 1/3 payload 50 % of operating time with dead load only	Km = 0.25	Load % Last % 100 73 % 50 47 % 20 % 0 50 100 Laufzeit % 97031 Service life %
heavy Q 3 L 3	Drive assemblies or parts of drive assemblies which are frequently subject to maximum load, which however, are subject to medium stress on a routine basis.	50 % of operating time with max. load (dead load + 1/1 payload) 50 % of operating time with dead load only	Km =0.5	Load% Last % 100 50 40 % 0 50 100 Laufzeit % 97032 Service life %
very heavy Q 4 L 4	Drive assemblies or parts of drive assemblies which are regularly subject to maximum load and stress in a similar range	90 % of operating time with max. load (dead load + 1/1 payload) 10 % of operating time with dead load only	Km =1	Load% 97033 Last % 100 80 % 50 0 50 100 Laufzeit % Service life %

NOTE **When mobile cranes are used for assembly work, the load ensemble factor Km = 0.125 must be used normally for the load ensemble L1.**

4.2.2 Determination of the effective service hours Ti

The service hours which are to be determined as described in the following text, have to be entered into the crane documentation for the winch, for the appropriate inspection interval. Depending on the crane model, it may be necessary to determine the effective service hours according to one of the following four cases:

NOTE **Normally, the reference value specified below in per cent for the determination of the service hours of hoisting gears are only valid for the main hoist winches. The portions of the total service hours of any auxiliary hoist winches **) may be essentially lower and must consequently be estimated by the operator according to the prevailing operating conditions.**

4.2.3 Hourmeter provided on each winch

If the crane is equipped with an hourmeter on each winch, the actual number of service hours "Ti" is indicated directly for the inspection interval in question.

4.2.4 Hour-meter provided for superstructure operation as a whole

The actual portion of the service hours of the winch, referred to the total number of service hours of the superstructure, is to be estimated by the operator.

NOTE **If a mobile crane is used for assembly work, a value of 20 % can normally be assumed for the portion of service hours of the winch, referred to the service hours used for superstructure operation as a whole.**

4.2.5 One combined hour-meter provided for crane and driving operation

The actual portion of the service hours of the winch, referred to the total service hours of the machine is to be estimated by the operator.

NOTE **In the case of mobile cranes used for assembly work, a portion of 60 % can normally be assumed for the service hours of the superstructure, referred to the machine's total service hours. If 20 % are assumed for the portion of the service hours of the winch, referred to the service hours of the superstructure (as specified under item 4.2.4), a portion of 12 % results for the winch, referred to the machine's total service hours.**

4.2.6 No hour-meter provided - neither for the chassis nor for the crane

In this case, the operator has to estimate and to record the actual service hours of the winch according to the operating conditions.

NOTE **The indicated percentage values apply normally for the main winch. For the auxiliary winch **), the portion of the entire accumulated service hours can be considerably lower. It must be estimated by the operating company.**

**) Optional equipment, possible for various vehicle types

4.3 Determination of the consumed portion of the theoretical service life

The following formula is used to compute the consumed portion "**Si**" of the theoretical service life "**D**" for an inspection interval "**i**" (maximum 1 year):

$$Si = (Kmi : Km) \times Ti$$

Km = Load ensemble factor used as a basis for design of the winch. This factor has been recorded in the operating manual.

Kmi = Load ensemble factor in the inspection interval **"i"** according to section 4.2.1.

Ti = Effective service hours of the winch in the inspection interval **"i"** according to section 4.2.2.

After each inspection interval, this consumed portion **"Si"** of the theoretical service life is deducted from the remaining theoretical service life **"Di"** (refer to example).

The operator has to ensure a general overhaul of the winch as soon as the remaining theoretical service life is presumably no longer sufficient for the next inspection interval.

Once the theoretical service life "D" has been reached (refer to section 4.1), winch operation may only be continued after a general overhaul.

DANGER **A general overhaul must be performed at the latest on expiry of the theoretical service life of the hoist winch, however in any case after 10 years.**

The general overhaul is to be initiated by the crane operating company, and is to be effected by the hoist winch manufacturer or by persons authorized by the hoist winch manufacturer; the overhaul must be recorded accordingly in the crane inspection booklet.

After the general overhaul has been performed, a new theoretical service life "D" is specified by the hoist winch manufacturer or by persons authorized by him. This new theoretical service life "D" must be recorded in the crane inspection booklet.

DANGER **The subsequent general overhaul must be performed at the latest after the hoist winch's theoretical service life has expired, or after 10 years.**

If the theoretical service life has not yet been consumed after 10 years, winch operation can be continued without general overhaul, if the crane expert confirms by signing in the crane inspection booklet on the occasion of each expert inspection that the consumed portion of the service life has been determined correctly and conveniently.

In this case, the winch must be subjected to a thorough test by the crane expert:

a) External visual inspection (deformations, damage, leakage etc.)
b) Inspection of the oil - specifically for metallic residues
c) Load tests at the maximum speed possible at maximum and minimum rope pull. At least one rope layer must be spooled on the drum. In this load test, pay attention to abnormal sounds.

The crane expert must confirm this inspection in the crane inspection booklet and state whether winch operation may be continued or not. The next inspection is to be effected prior to expiry of the 12th service year; all the other inspections must be performed at yearly intervals.

4.3.1 Example showing the determination of the consumed portion of the theoretical service life

The mobile crane has been equipped with **a separate hourmeter** in the superstructure. According to the Operating Manual, the rope winch has the following rating:

Drive assembly group	M 3
Load ensemble	L 1, Km = 0.125
Theoretical service life	D = 3200 h

The consumed portion **"Si"** of the theoretical service life of the winch is calculated using the various inspection intervals (once per year), as described below:

First inspection (after the first year of operation)

A separate hour-meter is provided on the superstructure. The crane has been used exclusively for assembly work in the past 12 months. The load ensemble is:

L 1, i.e.: $\mathbf{Km_1 = 0.125}$.

The hour-meter of the superstructure indicates **800 h;** the portion of service hours used for the winch is estimated at **20 %**,

i.e.: $\mathbf{T_1 = 160\ h}$.

Thus, at the time of the first inspection, the consumed portion $\mathbf{S_1}$ of the theoretical service life amounts to:

$$\mathbf{S_1 = (Km_1 : Km) \times T_1 = (0.125 : 0.125) \times 160}$$

$$\mathbf{S_1 = 160\ h}$$

Consequently, the remaining theoretical service life amounts to:

$$\mathbf{D_1 = D - S_1 = 3200\ h - 160\ h}$$

$$\mathbf{D_1 = 3040\ h}$$

These values must be recorded in the crane documentation (see Table).

4.3.1 Example showing the determination of the consumed portion of the theoretical service life (cont'd.)

Second inspection (after the second year of operation)

The crane has been used mainly for unloading work in a port during the past 12 months. The load ensemble is: **L 3**, i.e. **$Km_2 = 0.5$**.

The hour-meter of the superstructure indicates **2000 h**, i.e. the crane has been operated for **2000 h - 8000 h** = **1200 h** *(these 800 h have already been accumulated during the first year).*

The portion of service hours consumed by the winch is estimated at **40%** of the superstructure's service hours,

i.e.: **$T_2 = 480$ h**

Thus, at the time of the second inspection, the consumed portion **S_2** of the theoretical service life amounts to:

$$S_2 = (Km_2 : Km) \times T_2 = (0.5 : 0.125) \times 480$$

$$S_2 = 1920 \text{ h}$$

Consequently, the remaining theoretical service life amounts to:

$$D_2 = D_1 - S_2 = 3040 \text{ h} - 1920 \text{ h}$$

$$D_2 = 1120 \text{ h}$$

These values must also be recorded in the crane documentation (see Table).

Third inspection (after the third year of operation)

During the past 12 months, the crane has been used mainly for assembly work, and occasionally for unloading work in a port. The load ensemble is: **L 2**, i.e. **$Km_3 = 0.25$**.

The hour-meter of the superstructure indicates **3000 h**, i.e. the crane has been operated for **3000 h - 800 h - 1200 h = 1000 h** during the third year of operation *(2000 h have been accumulated in total during the first and second years).*

The portion of service hours consumed by the winch are estimated at **30 %** of the service hours of the superstructure,

i.e. **$T_3 = 300$ h**

Thus, at the time of the third inspection, the consumed portion **S_3** of the theoretical service life amounts to:

$$S_3 = (Km_3 : Km) \times T_3 = (0.25 : 0.125) \times 300$$

$$S_3 = 600 \text{ h}$$

Consequently, the remaining theoretical service life amounts to:

$$D_3 = D_2 - S_3 = 1120 \text{ h} - 600 \text{ h}$$

$$D_3 = 520 \text{ h}$$

These values must also be recorded in the crane documentation (see Table).

4.3.1 Example showing the determination of the consumed portion of the theoretical service life (cont'd.)

Operation of the machine in its fourth year

If the crane is to be used in this year of intended operation like in the third year of operation (mainly assembly work and occasional use for unloading work in a port with the load ensemble **L2** and with an expected similar number of service hours), the winch of this crane can be assumed to require a **general overhaul approximately at the end of the fourth year of operation**, as its theoretical service life limit will be reached or even have been exceeded at that time.

4.3.2 Example for the entries to be made in the table of the crane documentation

Serial No. Table for determination of the remaining theoretical service life of the hoisting gear Page No.

Hoisting gear no. 1
Identification no. according to nameplate: abc
Last general overhaul effected on: .....
Drive assembly group: M 3
Load ensemble: L 1
Load ensemble factor: Km = 0.125
Theoretical service life: 3200 h

Inspection no.	Date of initial operation / inspection	Operating conditions since the last inspection (load ensemble)	Load ensemble factor Km	Service hours of the whole crane (h)	Service hours of superstructure (h)	Service hours of superstructure since the last inspection (h)	Portion of hoisting gear of the service hours of superstructure (h)	Service hours of hoisting gear since the last inspection (h)	Consumed portion of theoret. service life D: Si=Kmx Ti (h)	Remaining theoret. service life Di=Di-Si (h)	Name of inspector	Signature	Remarks
0	15.5.1991	-		-		-	-	-	0	3200			
1	05.5.1992	L 1	0.125	-	800	800	20	160	160	3040	XYZ		
2	20.5.1993	L 3	0.5	-	2000	1200	40	480	1920	1120	XXZ		
3	01.6.1994	L 2	0.25	-	3000	1000	30	300	600	520	YXX		
4													
5													
6													
7													
8													
9													
10													

Attention: A general overhaul must be performed at the latest on expiry of the theoretical service life of the hoist winch, however in any case after 10 years.
General overhaul effected on: (Company): Name: Signature:

4.3.3 Example showing the determination of the consumed portion of the theoretical service life in case of machine models with separate hourmeter for hoisting winch**)

The mobile crane is equipped with a **separate hourmeter** for the hoisting winch. According to the Operating Manual, the hoisting winch has the following rating:

Drive assembly group	M 3
Load ensemble	L 1, Km = 0.125
Theoretical service life	D = 3200 h

The consumed portion "**Si**" of the theoretical service life of the hoisting winch is calculated using the various inspection intervals (once per year), as described below:

1. inspection (after the first year of operation)

The hoisting winch is equipped with a **separate hourmeter**. The crane has been used exclusively for assembly work during the past 12 months. The load ensemble is:

L 1, i.e:. **$\underline{Km_1 = 0.125}$**.

The hoisting winch hourmeter indicates **160 hours**.

i.e:. **$\underline{T_1 = 160\ h}$**.

Consequently, at the time of the first inspection, the consumed portion **S_1** of the theoretical service life amounts to: **$S_1 = (Km_1 : Km) \times T_1 = (0.125 : 0.125) \times 160$**

$\underline{S_1 = 160\ h}$

Thus, the remaining theoretical service life amounts to:

$D_1 = D - S_1 = 3200\ h - 160\ h$

$\underline{D_1 = 3040\ h}$

These values must be recorded in the crane inspection booklet (refer to Table).

**) Optional equipment

4.3.3 Example showing the determination of the consumed portion of the theoretical service life (cont'd.)

2. inspection (after the 2nd year of operation)

The crane has been used mainly for unloading work in a port during the past 12 months. The load ensemble is: **L 3**, i.e. **$Km_2 = 0.5$**.

The hourmeter of the hoisting winch indicates **640 h**, i.e. the crane has been operated for **640 h - 160 h = 480 h** during the 2nd year of operation *(these 160 h have already been accumulated during the first year)*.

i.e.: **$T_2 = 480$ h**

Consequently, at the time of the second inspection, the consumed portion **S_2** of the theoretical service life amounts to: **$S_2 = (Km_2 : Km) \times T_2 = (0.5 : 0.125) \times 480$**

$S_2 = 1920$ h

Thus, the remaining theoretical service life amounts to:

$D_2 = D_1 - S_2 = 3040$ h - 1920 h

$D_2 = 1120$ h

These values must also be recorded in the crane inspection booklet (refer to Table).

3. inspection (after the 3rd year of operation)

During this year, the crane has been used mainly for assembly work, and occasionally for unloading work in a port. The load ensemble is: **L 2**, d. h. **$Km_3 = 0.25$**.

The hourmeter of the superstructure indicates **940 h**, i.e. the crane has been operated for **940 h - 160 h - 400 h = 300 h** during the 3rd year of operation *(640 h have already been accumulated in total during the first and second years)*.

i.e.: **$T_3 = 300$ h**

Consequently, at the time of the third inspection, the consumed portion **S_3** of the theoretical service life amounts to: **$S_3 = (Km_3 : Km) \times T_3 = (0.25 : 0.125) \times 300$**

$S_3 = 600$ h

Thus, the remaining theoretical service life amounts to:

$D_3 = D_2 - S_3 = 1120$ h - 600 h

$D_3 = 520$ h

These values must also be recorded in the crane inspection booklet (refer to Table).

4.3.3 Example showing the determination of the consumed portion of the theoretical service life (cont'd.)

Operation of the machine in the following, 4th year

If the crane is to be used in this year of intended operation like in the third year of operation (mainly assembly work and occasional use for unloading work in a port with the load ensemble **L2** and with an expected similar number of service hours), the winch of this crane can be assumed to require a **general overhaul approximately at the end of the fourth year of operation**, as its theoretical service life limit will be reached or even have been exceeded at that time.

4.3.4 Example for the entries to be made into the table of the crane inspection booklet

Serial No. **Table for determination of the remaining theoretical service life of the hoisting gear** **Page No.**

Hoisting gear no. 1
Identification no. according to nameplate: abc
Last general overhaul effected on: .....
Drive assembly group: M 3
Load ensemble: L 1
Load ensemble factor: Km = 0.125
Theoretical service life: 3200 h

Inspection no.	Date of initial operation / inspection	Operating conditions since the last inspection (load ensemble)	Load ensemble factor Km	Service hours of the whole crane (h)	Service hours of superstructure (h)	Service hours of superstructure since the last inspection (h)	Portion of hoisting gear of the service hours of superstructure (h)	Service hours of hoisting gear since the last inspection (h)	Consumed portion of theoret. service life D: Si=Kmx Ti (h)	Remaining theoret. service life Di=Di-Si (h)	Name of inspector	Signature	Remarks
0	15.5.1991	-		-		-	-	-	0	3200			
1	05.5.1992	L 1	0.125	-	800	800	20	160	160	3040	XYZ		
2	20.5.1993	L 3	0.5	-	2000	1200	40	480	1920	1120	XXZ		
3	01.6.1994	L 2	0.25	-	3000	1000	30	300	600	520	YXX		
4													
5													
6													
7													
8													
9													
10													

Attention: A general overhaul must be performed at the latest on expiry of the theoretical service life of the hoist winch, however in any case after 10 years.
General overhaul effected on: (Company): Name: Signature:

5 Monitoring the slewing device

5.1 Inspection of the ring-gear securing pins

The securing pins of the ball-bearing slewing device may have to be retightened due to setting of the appropriate components. The tightening torques required to this effect are specified in the Operating Manual.

The first inspection of the securing pins is to be effected after approx. 100 service hours. The ring-gear pins must be checked at regular intervals, depending on the actual operating conditions of the crane, at least, however, every 500 service hours.

If the crane has been subjected to an inadmissible load during operation (e.g. a high shock load caused by a load "dropping" in the rope, or similar stress), the pins of the ring-gear and the other supporting components of the crane must be checked within the scope of an additional inspection.

Memo:

Part F

Troubleshooting

Part F1

Troubleshooting

Chassis

Troubleshooting in the chassis

The following table is intended to help you locate the reason of, and - if necessary - repair any failures or certain malfunctions of the machine. Of course, this table cannot cover all causes of malfunctions.
The hydraulic piping diagrams, brake system diagrams and electric circuit diagrams also help you locate and eliminate malfunctions.

A troubleshooting guide is no substitute for a specialist. If the cause of the malfunction cannot be determined or eliminated by means of the table, please contact the After-Sales Service of **TADANO-FAUN** GmbH.

Memo:

1 Engine

For malfunctions concerning specifically the engine and the appropriate remedial measures, please refer to the operating manual of the engine manufacturer

Malfunction	Possible cause	Remedy
Engine does not start	A gear is engaged	Set gearbox selector lever to neutral "N"
	No electrical connection between battery and consumers	Battery main switch is not set to "ON".
	Key-actuated switch is set to wrong position	Set key switch to position I (chassis).
Engine operates irregularly or with an insufficient power output	Air cleaner clogged	Replace filter element, clean filter bowl
	Leakage in air intake lines	Check air intake system for leakage, re-tighten hose clamps
	Injection system and turbocharger are not in proper working order	Have these components checked in a specialist workshop

1 Engine (cont'd.)

Malfunction	Possible cause	Remedy
Excessive radiator temperature although the engine is not subject to load (thermometer indicates more than 100°C and the indicator in the CGC display is lit)	Radiator fins clogged	Clean fins by blowing out with compressed air or a steam jet unit
	Coolant drain cocks open	Check cocks
Coolant level too low (the inidcator in the CGC display is lit).	Leakage in coolant hose connections.	Re-tighten hose clamps.
	Pressure relief valve on expansion tank faulty.	Check pressure relief valve for proper working order; replace it, if necessary.
	Coolant hoses attacked by porosity.	Replace.
Engine cannot be stalled	Electric connections loosened, or switch defective	Slip-on cable lugs or replace switch

2 Gearbox

For information and an error list, refer to the enclosed operating manuals (gearbox and Intarder) of the gearbox manufacturer.

How to read out the error codes:
- The vehicle is parked.
- The engine is stopped.
- The gearshift lever is in "neutral" position.
- The parking brake is engaged.
- The battery main switch is turned ON.
- The ignition is ON.
- Actuate the service brake.
- Push jogging lever to the left.

The gearbox display (refer to item B1-4.6.4.2) indicates the error codes.

Memo:

3 Transfer box

Malfunction	Possible cause	Remedy
The change-over from on-road to off-road gear is not possible.	Pneumatic control pressure insufficient.	Brake-air pressure of compressed air system (min. 6 bar).
	Rocker tip switch or electrical connectors faulty or loosened.	Replace rocker tip switch, check connections.
	Solenoid valve faulty.	Replace valve.
	Change-over valve in neutral position.	Set change-over valve to on-road gear.
The vehicle cannot be set into motion.	Change-over valve in neutral position.	Set change-over valve to on-road gear.
Transfer box is overheating.	Insufficient oil level.	Inspection for leakage. Replenish oil.
	Wrong oil type.	Observe recommendations regarding oil types.

Memo:

4 Axle differential locks and drive assemblies

Malfunction	Possible cause	Remedy
Connection of differential locks and 2nd axle drive not possible	Pneumatic control pressure insufficient.	Brake-air pressure of brake system (min. 6 bar).
	Rocker tip switch or electrical connectors faulty or loosened.	Replace rocker tip switch, check connections.
	Solenoid valve faulty.	Replace valve.
Drive assemblies produce a roaring sound	Insufficient oil level	Check for leakages; replenish oil
	Wrong oil type	Observe recommendations regarding oil types
	Balancing plates on propeller shafts are missing	Replace propeller shafts
	Propeller shafts are worn	Replace propeller shafts

Memo:

5 Hydraulic system in general

Malfunction	Possible cause	Remedy
Pump produces excessive noise	Pump defective	Repair or replace pump
	Intake line on tank blocked	Clean, and remove dirt from tank
	Hydraulic oil pump sucks in air	Stop pump immediately; check pump for leakages and oil supply
Hydraulic system operates jerkily	Air entered into hydraulic system	Check oil level; bleed cylinder
	Pump not properly fastened	Tighten screws and bolts
	Leaks in suction pipe	Re-tighten screw couplings; replace seals
	Oil in tank is foaming	Check hydraulic oil level
	Pump pressure	Check pressure at test connector.
	Valve block or solenoid valves or pressure limiting valves on valve block defective	Repair valve block or replace valves on block
	Cylinders worn or damaged	Replace cylinder(s)
Hydraulic system does not reach full power output	Control pressure insufficient	Check pressure at test connector.
	Pressure limiting valves or solenoid valves on valve block clogged or defective	Remove valves; check them for dirt accumulation; replace, if necessary
	Oil of incorrect viscosity grade	Fill in oil sort specified according to the prevailing ambient temperature

5.1 Steering system - mechanical section

Malfunction	Possible cause	Remedy
Excessive backlash of steering wheel	Connection of track rod loosened	Readjust and re-tighten
	Backlash in steering gear	Check backlash in gearing; readjust, if necessary
	Backlash in ball joints of track rod and steering rod	Replace ball joints
	Adjustable steering wheel - steering column loosened.	Check rocker tip switches on steering wheel; actuate them.
Excessive wear of tires; wheels are fluttering	Incorrect wheel toe	Set wheel toe to ± 0
	Incorrect tire pressure	Check and, if necessary, readjust tire inflating pressure
	Wheel bearings defective	Check and, if necessary, replace bearings
	Lateral or vertical movement of rim or disc wheel	Check in specialist workshop; if necessary, *)Replace the rim
	Piston rod of steering cylinder or track rod deformed	*)Replace cylinder, or *)Replace track rod
	Wheel nuts loosened	Check wheel nuts for tight fit and re-tighten, if necessary

*) **Make sure that only genuine FAUN spare parts are used**

5.2 Steering system - hydraulic / electrical section

Malfunction	Possible cause	Remedy
Steering hard to operate	Pump of steering hydraulics does not supply enough oil; insufficient pressure	Check setpoint pressure by applying a pressure gauge to the test connectors M1 = steering circuit 1 M2 = steering circuit 2
	Piston packing ring on steering cylinder damaged	Replace cylinder
	Piston rod of a steering cylinder deformed	Replace cylinder
	Pump, circuit I or II, defective	Replace pump
	Valve block or multi-way valve in block defective or clogged	Repair, clean or replace the multi-way valve
	Leakages in steering block	Check screw couplings and seals
Pilot lamp of a steering circuit goes on	Flowmeter defective	Replace
	Flow limiting valve defective	Replace
	Hose pipe leaking	Replace hoses
	Screw coupling in pipe system loosened; loss of oil	Check screw couplings for tight fit and seals for perfect condition
Steering pump produces excessive noise	Pump defective	Repair or replace pump
	Pump sucks in air	Check for leakages and good condition of screw couplings
	Leakages in suction pipe	Check screw couplings
Steering of rear axles not possible (Diagonal steering).	Insufficient pump pressure (pump defective, leakages, filter in return pipe etc.)	Check pressure at test connector.
Pilot lamp "emergency pump" is lit although the two steering circuits are in proper working order	Flowmeter or flow limiting valve defective	Replace
	Emergency steering pump defective	Replace

5.3 Hydraulic system of suspension

Malfunction	Possible cause	Remedy
Blocking of axle suspension is not possible; Symbol is not lit	Rocker switch defective or electrical cable interrupted	Replace rocker tip switch; check cable connection
	Key switch set to wrong position	Set key switch to position 2 (operation from superstructure)
	Fuse defective	Replace fuse
Blocking of axle suspension is not possible; although the pilot lamp is lit	Valve block or solenoid valves in valve block defective (blocking valve on each cylinder)	Replace valve block or exchange solenoid valves (if necessary, check electrical components)
	Suspension block defective	Replace valve block
Front axle transverse oscillation does not operate.	Fuse defective	Replace fuse
	Electro-hydraulic ball cock defective (front axle)	Replace ball cock
	Lock pin in superstructure is not completely moved in, the proximity switch has not operated.	Check pin fastening assembly
	Proximity sensor is defective.	Replace switch
	Leveling valve defective (front axles)	Replace valve
	Check solenoid valve on the blocking valves of the front axles	Replace solenoid valve

5.3 Hydraulic system of suspension (cont'd.)

Malfunction	Possible cause	Remedy
Axle locking cylinder sinks in	Valve block on cylinder leaking	Replace valves and seals
	Screw coupling leaking	Check screw couplings for tight fit
	Leveling valves leaking or defective	Replace valve
	Cylinder defective	Replace cylinder
	Hydraulic accumulator defective	Check preload pressure; replace accumulator, if necessary. **DANGER** **The oil bearing end of the accumulator must be depressurized before the pressure check.** Check pressure via the test connector at the valve block of each cylinder
	Air inclusions in the suspension system	Bleed suspension system by lowering the vehicle several times while actuating the leveling valve
	Hydraulic hoses attacked by porosity	Replace hoses
Suspension too stiff	Insufficient pressure of nitrogen accumulator in hydraulic accumulator	Check accumulator pressure. Adjust or replenish pre-load pressure in a specialist workshop
	Leakages in the hydraulic accumulator	Replace accumulator
	Solenoid valves in the valve block of each cylinder defective	Replace solenoid valves

5.4 Inclination adjustment and level control

Malfunction	Possible cause	Remedy
Inclination adjustment or lowering the vehicle is not possible	Rocker tip switch defective	Replace tip switch
	Axle suspension not locked via rocker switch	Actuate rocker switch (Symbol must be lit)
	Valve block or solenoid valve in block defective	Check valve block; replace valve, if necessary
	No flow in return line	Check return flow at hydraulic oil tank (also bleeding function)
Leveling not possible	Axle suspension still locked via rocker switch	Unlock axle locking assembly via the rocker switch (Symbol must not be lit)
	Rocker tip switch defective	Replace rocker tip switch
	Leveling valve defective	Replace valve
	Valve block defective or pressure control valve in valve block defective	Replace valve block
	Suspension cylinder leaking, or screw coupling loosened	Check cylinder for leakages; check screw couplings; readjust, if necessary
	Insufficient pump pressure	Check pressure at test connector.

5.5 Hydraulic system of outriggers

Malfunction	Possible cause	Remedy
Outriggers cannot be extended / retracted	Key switch in wrong position	Set key switch in chassis to position 2
	Locking pins are still inserted	Remove pins from beams
	Electronic system of outriggers is faulty.	*) Have the fault eliminated.
	Fuse defective	Replace fuse
	Relay "change-over: beams / cylinders" defective	Replace relay
	Solenoid valve "outrigger beams / cylinders" defective	Replace valve
	Diode defective	Replace diode
	Insufficient pump pressure	Check pressure at test connector.
	Pump defective	Replace pump
	Pressure limiting valve in valve block defective or clogged	Replace valve

*) in a specialist workshop

5.5 Hydraulic system of outriggers (cont'd.)

Malfunction	Possible cause	Remedy
Outrigger cylinder is retracted without being actuated, while the machine is being supported by outriggers	Solenoid valve defective	Replace valve
	Shut-off valve on cylinder leaking or clogged	Clean and check valve, replace if necessary
	Piston seal of cylinder defective	Replace sealing kit; replace cylinder, if necessary
	Air penetrated in cylinder or line	Bleed cylinder
Outrigger cylinder, when retracted, moves downwards without being actuated	Stop valve at cylinder leaky or clogged	Clean and check valve; replace, if necessary
	Line or hose leaky	Check and re-tighten screw couplings; if necessary; replace hose
	Solenoid valve defective	Replace valve
Outriggers can only be extended / retracted very slowly	Insufficient engine speed	Increase engine speed
	Insufficient pump pressure	Check pressure at test connector.
	Return line to filter or filter clogged	Check and clean return line, if necessary; replace filter in return line
	Suction pipe to pump leaking	Check and re-tighten screw couplings, if necessary
	Solenoid valve is seized	Replace valve
	Viscosity grade of hydraulic oil too high	Fill in the specified oil type according to the prevailing ambient temperature

6 Brake system

Malfunction	Possible cause	Remedy
Specified brake-air pressure is not reached (warning lamp is lit). The indicator in the CGC display indicates less than 5.5 bar.	Insufficient air compressor delivery rate	*) Check for proper function
	Pressure governor does not stop or blows off permanently	*) Functional inspection - check for proper setting of switch-off pressure
	Leakages in brake line	*) Replace
	Air tank drainage valve defective	Replace valve
	Deficiency in air accumulator circuit	*) Check
Warning lamp is lit although the indicator in the CGC display indicates more than 5.5 bar	Pressure switch in BBA I or BBA II defective	Replace switch
	Brake cylinders (air accumulator section) are not completely vented	Handbrake is not completely released
	Deficiency in air accumulator circuit, functionality of valves	*) Check
Insufficient braking effect despite correct supply pressure	Brake linings worn or dirty (oily)	*) Renew brake linings
	Wear of spreading wedge system	*) Repair spreading wedge system; replace wear parts
	Excessive air gap between lining and drum	*) Adjust air gap
High wear of linings; brakes get hot	No air gap, or insufficient air gap between brake lining and drum	*) Readjust air gap; renew linings if necessary
	Spreading wedge system seized	*) Repair

*) in a specialist workshop

6 Brake system (cont'd.)

Malfunction	Possible cause	Remedy
High wear of linings; brakes get hot	Bleeding of brake valves or brake cylinders clogged Pedal plate valve adjusted incorrectly	Clean Check and correct setting
The wheel sensor warning lamp does not go out after the ignition has been switched on.	Sensors are not fitting correctly, cable connections faulty. Electrical cables damaged. Electronic system faulty.	Check and, if necessary, repair. Replace damaged components. Take the machine to a specialist workshop.

7 Electrical equipment

Malfunction	Possible cause	Remedy
Batteries are not charged at all or not sufficiently	Battery defective	Replace batteries
	Cables loosened or defective	Re-tighten or replace
	Battery main switch not correctly turned ON, or cable loosened	Check switch; check cable
The symbol in the CGC display is lit or flashes while the engine is running.	Cable is short-circuited to ground, or loosened.	Insulate or fasten.
	Governor defective	Replace governor
	Generator defective	Check or replace
No current available when ignition is switched ON	No connection between negative battery terminal and ground	Turn battery main switch ON (actuate rocker switch in the dashboard)
	Ground strap loose	Secure strap safely
Engine cannot be started	Ignition starter switch defective	Replace switch
	Relay defective	Replace relay
	Battery defective or discharged	Replace / recharge battery; use a battery having the same capacity
	Gearbox selector lever not in "neutral"	Set gearbox selector lever to "N"
	Starter interlock relay defective when gearbox selector lever is in "neutral"	Replace relay

Memo:

8 Eddy current brake**)

Malfunction	Possible cause	Remedy
Eddy current brake does not react when hand switch is actuated, warning lamp is not lit.	Hand switch or contact faulty.	*)Replace switch.
	Fuse defective	Replace fuse in fuse box
	Relay or diodes in relay box defective	*) Check relay box; replace defective components
	Fuse in relay box defective	Replace fuse
	Fuse in battery box defective	Replace fuse
Bad braking effect in all gearsteps	Insulation and condition of cabling; or ground connection loosened	*) Check; replace cabling, if necessary
	Excessive backlash "rotor / stator"; excessive air gap, wear of silent blocks	*) Have measured, checked and repaired
	Coils of stator defective	*) Check or replace
Excessive current consumption of batteries while vehicle or engine is not running; consequently, eddy current brake gets hot	Hand switch is not in "0" position	Set hand switch into "0" position. Turn battery main switch OFF if machine is inoperative for an extended period of time (e.g. at night)

**) Optional equipment

*) in a specialist workshop

Memo:

Part F2

Troubleshooting

Superstructure

Troubleshooting

The following table is intended to help you locate the reason of, and - if necessary - repair any failures or certain malfunctions of the machine in a short time. Of course, this table cannot cover all causes of malfunctions.
The hydraulic piping diagrams and the electric circuit diagrams also help you locate and eliminate malfunctions.

A troubleshooting guide is no substitute for a specialist. If the cause of the malfunction cannot be determined or eliminated by means of the table, please contact the After-Sales Service of **TADANO-FAUN** GmbH.

Memo:

1 Engine

For malfunctions concerning specifically the engine, and the appropriate remedial measures, please refer to the operating manual of the engine manufacturer.

Malfunction	Possible cause	Remedy
Engine in superstructure does not start (for further possible causes, please refer to item electrical, electrical equipment)	No electrical connection between battery and consumers	Battery main switch (rocker switch) is not turned ON. Actuate rocker switch in dashboard of superstructure
	Switch in superstructure set to the wrong position.	Change position of switch.
	Ignition starter switch defective or electric plug-and-socket connector loosened	Replace switch Check plug-and-socket connectors
Engine operates irregularly or with an insufficient power output	Air cleaner clogged	Replace filter elements, clean filter bowl (observe servicing indicator)
	Leakage in air intake lines	Check air intake system for leakage, re-tighten hose clamps
	Function of the injection system	Have checked in a specialist workshop
Excessive coolant temperature although the engine is not subject to load (the indicator in the CGC display is lit).	Radiator fins clogged	Clean fins or blow them out with compressed air; if necessary, check Vee belts
	Leakage in cooling system	Check system for leakage
Coolant level too low (the indicator in the CGC display is lit).	Leakage in coolant hose connections	Re-tighten hose clamps
	Pressure relief valve on compensating tank defective	Check pressure relief valve for proper working order; replace, if necessary
	Coolant hoses attacked by porosity	Replace hoses completely

Memo:

2 Hydraulic system of the superstructure in general

Malfunction	Possible cause	Remedy
Hydraulic system does not reach its full power output	Air penetrated in the system	Bleed
	Insufficient pilot pressure (supply with control oil)	Pressure limiting valve (DBV): Check pressure setting, readjust, if necessary. Check pressure at test connector.
	Pump control signal is not emitted at all, or not completely	Check pressure setting, readjust, if necessary.
	Pressure limiting device not adjusted correctly	Check pressure, readjust, if necessary
	Continued suction valve contaminated	Clean valve
	Hydraulic pump or pump controller defective	Check pump, check setting of controller, or repair it
	Oil of incorrect viscosity grade	Fill in the oil specified according to the prevailing ambient temperature
Pumps produce excessive noise	Pumps suck in air	Stop engine immediately; check suction pipes for leakage; check hydraulic oil level
	Pumps defective Stop cock closed.	Repair or replace the pumps Open stock cock.
Hydraulic system of superstructure does not operate	Left-hand seat bracket is not folded down completely	Fold armrest down to enable the switch functions
	Switch defective	Replace switch
	Pump defective	Replace the pump
	Mechanical connection to the pumps loosened	Check the screw couplings
	AML in shut-off condition	Select the proper AML program
	Pilot valve missing	Check control system
Excessive temperature of the hydraulic oil	Oil cooler clogged (For further possible causes, please refer to item Electrical equipment)	Clean the cooler

Memo:

3 Slewing gear

Malfunction	Possible cause	Remedy
Slewing gear turns but slowly	Insufficient control oil pressure	Check pressure at test connector.
	Manual control valve defective	Replace valve
	Axial piston motor defective	Repair or replace
	Slewing gear pump defective	Overhaul or replace.
	Pump control valve defective	Replace valve.
Slewing gear turns only in one direction	Manual control valve defective	Replace valve
	Check valves in triple control block defective	Replace valves
Slewing gear cannot be braked completely	Multiple discs worn	Replace complete disc package
	Solenoid valve defective	Replace solenoid valve.
Slewing gear does not operate in spite of actuation of the manual control valve	Brake is not released	Check hydraulic pressure
	Manual control valve faulty	Replace
Pilot lamp "Slewing gear locked" is not lit in spite of actuation of the superstructure lock.	Proximity sensor in the chassis defective.	Replace proximity sensor.
Swing brake cannot be disengaged.	Insufficient hydraulic pressure.	Check pressure at test connector.

Memo:

4 Telescoping mechanism

Malfunction	Possible cause	Remedy
Boom is extended and retracted by jerks	Boom sliding surfaces and slideway linings are not lubricated	Grease according to lubricating scheme, readjust slideway linings; replace, if necessary
	Air inclusions in the cylinder	Bleed cylinder
Telescopes do neither extend nor retract	Fuses in telescope control defective	Replace fuses
	Relay of telescope control defective	Replace relay
	Solenoid valve defective	Replace solenoid valve (see electrical circuit diagrams)
Fast speed not available when telescopes are extended	Fast speed valve in valve block defective	Replace valve
	Tip switch in manual control valve defective	Replace tip switch

Memo:

5 Boom elevation

Malfunction	Possible cause	Remedy
Boom elevation cylinder sinks in	Air inclusion in cylinder	Bleed cylinder
	Brake valve defective	Replace valve
Upward and downward movement of boom elevation too slow.	Control pressure insufficient.	Readjust.
	Control piston in double control block defective.	Replace valve.
	Brake valve defective.	Replace brake valve.
	Sinter filter in brake valve clogged.	Replace filter.
Lowering via boom elevation no longer possible	Brake valve defective	Replace valve
	Pressure limiting valve defective	Replace valve
	Sinter filter clogged	Replace filter
Fast speed not available for lifting via the boom elevation	Fast speed valve in valve block defective	Replace valve
	Tip switch in manual control valve defective	Replace tip switch

Memo:

6 Hoisting gear

Malfunction	Possible cause	Remedy
Load is lowered slowly or jerkily while the manual control lever is in central position	Hydraulic multiple-disc brake worn Damage to free wheeling	Replace complete disc package Replace free wheeling
Hoisting gear turns too slowly Lowering movement of hoisting gear is too slow	Insufficient control oil pressure Continued suction valve leaking Sinter filter clogged	Check pressure at test connector. Replace valve Replace filter
Hoisting gear does not operate	AML in shut-off condition Hoist limit switch is in shut-off condition or defective Manual control valve defective Valve in simple control block defective Winch motor defective	Set AML into operating condition Lower bottom block or replace switch Replace valve Replace valve Replace motor
No fast speed	Fast speed valve in valve block defective Tip switch in manual control valve defective	Replace valve Replace tip switch

Memo:

7 Counterweight

Malfunction	Possible cause	Remedy
Weight units are lowered slowly without corresponding actuation	Leakage of ballast cylinder(s)	Replace cylinder seals, replace cylinder(s), if necessary
	Air inclusion in cylinder(s)	Bleed cylinder(s)
	Load retaining valve defective	Replace valve
Ballast cylinders are not evenly lowered	Nozzle in flow divider clogged	Clean nozzle
Weight units cannot be lifted or lowered	Valve in triple control block defective	Replace valve
Ballast cylinders are extended or retracted too slowly	Insufficient hydraulic pressure	Check pressure at test connector.
	Insufficient pilot pressure	Check pressure at test connector.

Memo:

8 Electrical equipment

Malfunction	Possible cause	Remedy
No power supply	No connection between ground and negative (-) battery terminal	Switch on battery main switch
	Grounding strip detached	Fasten the strip
Engine in superstructure cannot be started.	Fuse faulty	Replace the fuse.
	Starter defective.	Overhaul or replace starter.
	Ignition starter switch defective.	Replace switch.
Excessive hydraulic oil temperature (the symbol in the CGC display is lit)	Temperature switch, radiator motor defective	Replace switch
	Relay radiator control, defective	Replace relay (refer also to part C2) "Relay arrangement")
	Cooler engine or fuse defective	Replace engine or fuse (refer also to part C2 "Fuse arrangement")

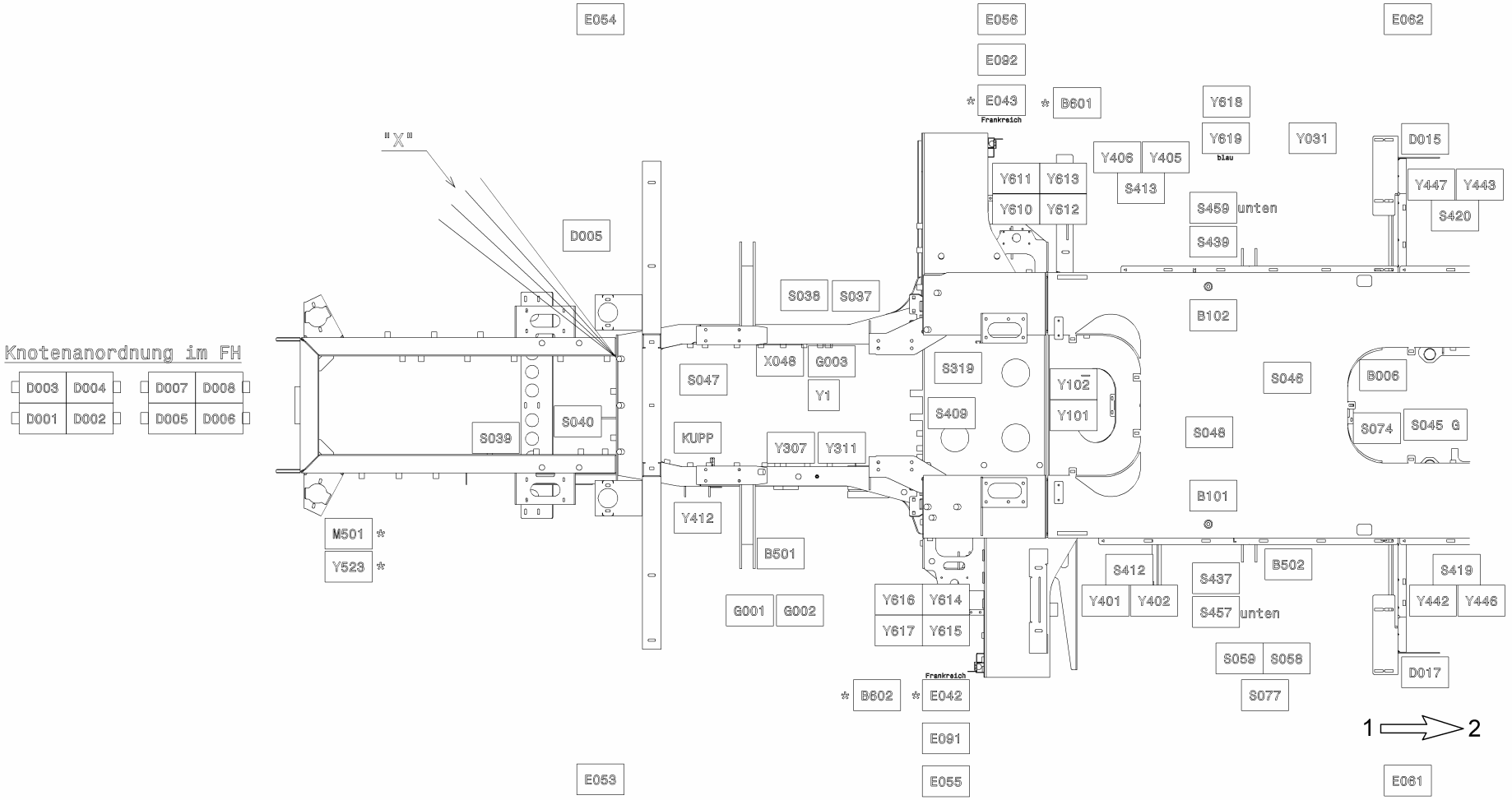
Memo:

Part F4

Connection diagram

Chassis

4 Connection diagram - Chassis



* = Sonderausrüstung

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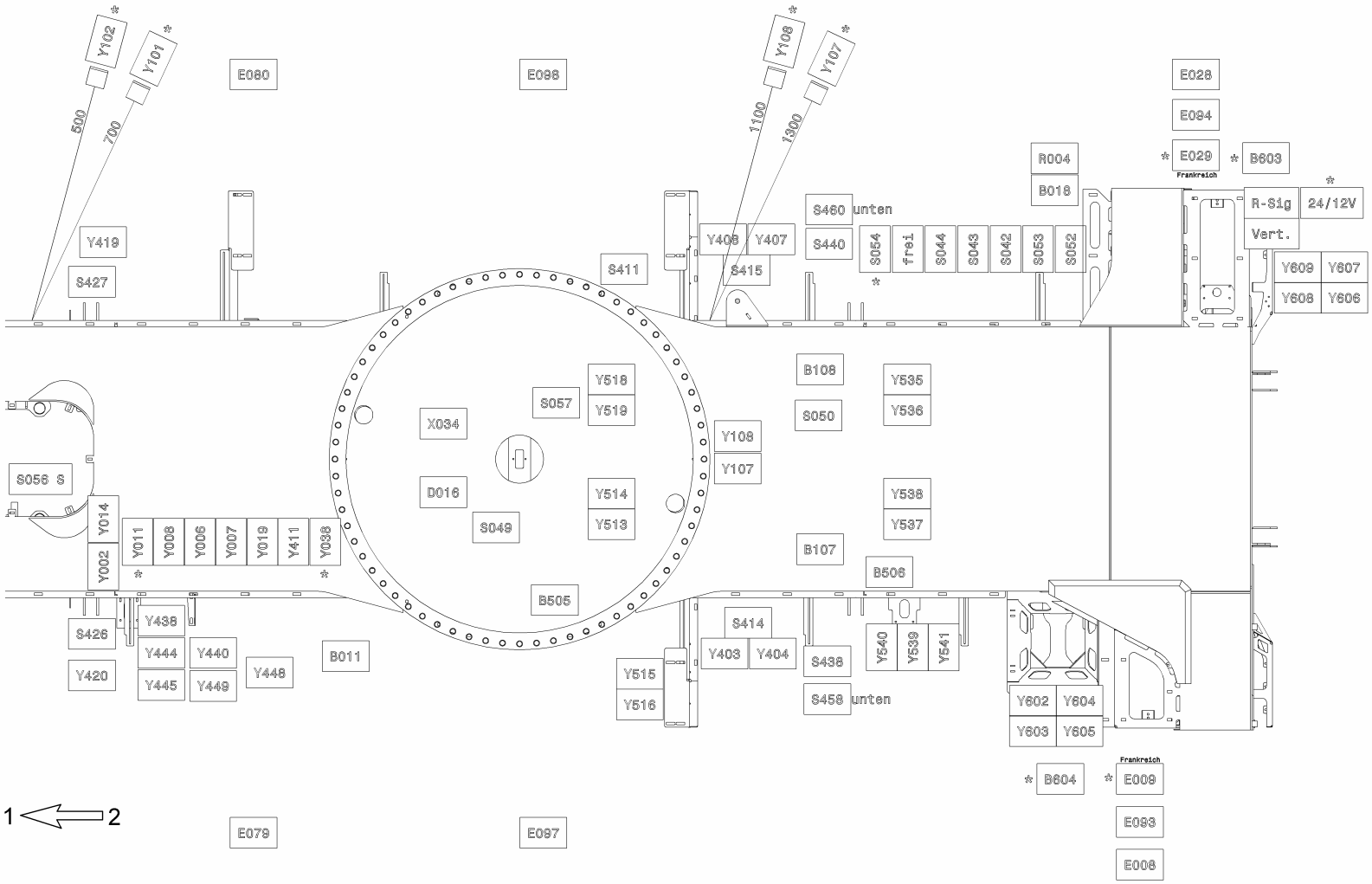
key to drawing, refer to page 4

(cont'd.) **4 Connection diagram - Chassis**



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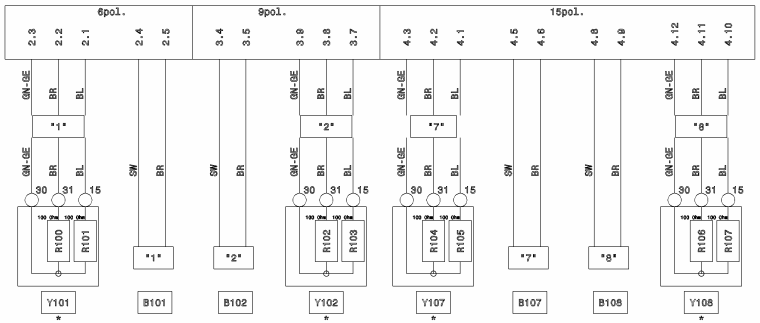
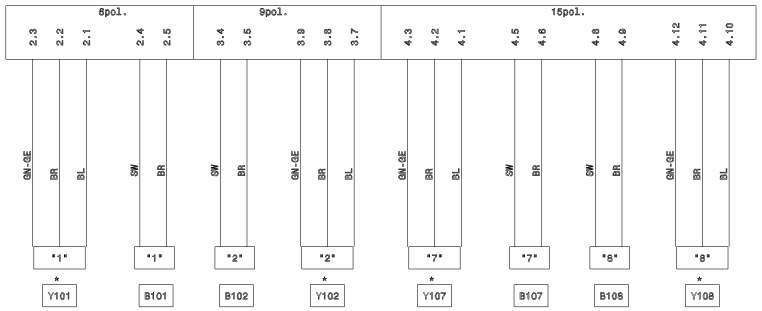
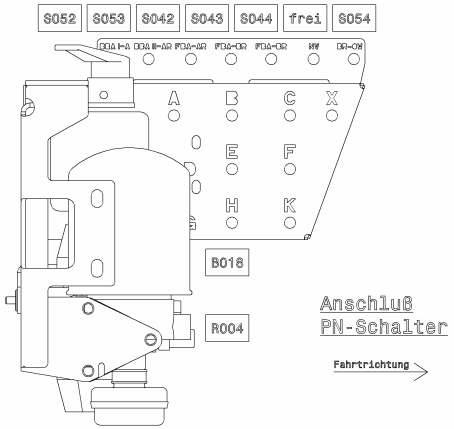
(cont'd.) **4 Connection diagram - Chassis**

"X" Anschlußplan ABV-Stecker mit Dummy



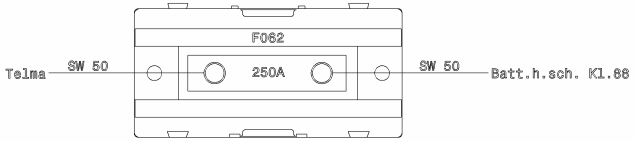
"X" Anschlußplan ABV-Stecker ohne Dummy



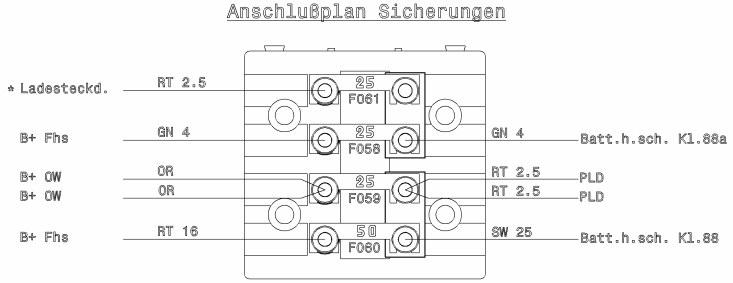


* = Sonderausrüstung

* nur bei Option TELMA Bremse



Anschlußplan Sicherungen



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key to drawing, refer to page 4

Key to drawings on pages 1-3:

Anschlussplan ABV-Stecker mit Dummy	Connection diagram ABV - connector with dummy
Anschlussplan ABV-Stecker ohne Dummy	Connection diagram ABV - connector without dummy
Anschlussplan Transmitter Tadano D700	Connection diagram - Tadano D700 transmitter
Knotenanordnung im FH	Node arrangement in the driver’s cab
* nur bei Option Telma Bremse	* only in case of optional equipment eddy current brake
* Telma	Eddy current brake
Batt.h.sch	Battery main switch
Anschlußplan Sicherung	Connection diagram fuses
Ladesteckdose	Charging plugbox
Frankreich	France
frei	free
R-Sig.	Reversing signal
unten	at the bottom
Vert.	distrib.
x-pol.	x-pin

Part G

Annex

Part G1

Annex

Chassis

Operating instructions for ZF gearbox

ZF-ASTRONIC®

12 AS 2301 / 16 AS 2601

ZF Standard

1328 758 104

Subject to alterations in design

Printed in Germany

Edition: 2000 - 09

Foreword

Please read this operating manual carefully before driving your vehicle.
When operating the shift system, please note the special instructions provided in the vehicle manufacturer's operating manual.
Your vehicle is fitted with a ZF-*AS* TRONIC automatic shift system. The more you familiarize yourself with this system, the more economically you can drive your vehicle. This operating manual will provide you with all the information you require to be able to make full use of the advanced technical features of the ZF-*AS* TRONIC. To ensure operating safety, please note the maintenance specifications. Specialists employed by ZF After-Sales Service are always available to help with maintenance work on the transmission and are there to assist you should any other problems occur. The relevant addresses can be obtained from ZF in Friedrichshafen.

We would like to wish you pleasant driving with your ZF-*AS* TRONIC

ZF Friedrichshafen AG
Truck Transmissions Division
D-88038 Friedrichshafen
Telefon: (0 75 41) 77-0
Telefax: (0 75 41) 77-90 80 00

Important work safety notice

The following safety instructions appear in this manual:

NOTE
Refers to special processes, techniques, data, etc.

CAUTION
This is used when incorrect, unprofessional working practices could damage the product.

⚠ **DANGER! !**
This is used when lack of care could lead to personal injury and damage to property.

⚠ **ENVIRONMENTAL HAZARD !**
Lubricants and cleaning agents must not be allowed to enter the ground, the water table or the sewage system.

- **Request safety information for the products concerned from your local environmental protection authority and follow any instructions herein at all times.**
- **Always collect used oil in a suitably large container.**
- **Always dispose of used oil, clogged filters, lubricants and cleaning agents in accordance with environmental protection laws.**
- **Always observe manufacturer instructions when dealing with lubricants and cleaning agents.**

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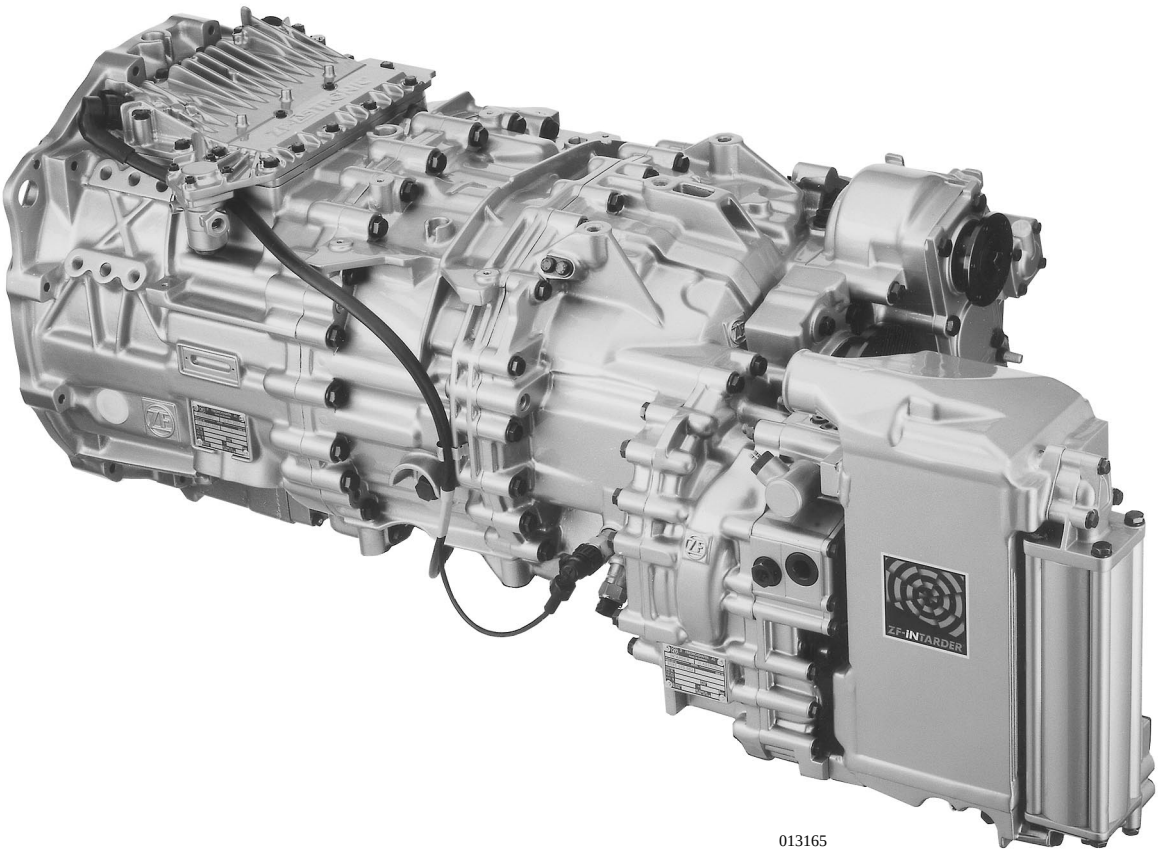
16 AS 2601 with Intarder



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1 Description of system

1.1 General description

The ZF-*AS* TRONIC automatic transmission is adapted to the engine by means of a standard dry clutch. Since the clutch is also controlled by the ZF-*AS* TRONIC transmission system, the clutch pedal can be dispensed with.

The ZF-*AS* TRONIC consists of a basic transmission and an integrated splitter and planetary group.

The basic transmission is shifted using constant mesh gears. The splitter and planetary group are synchronized.

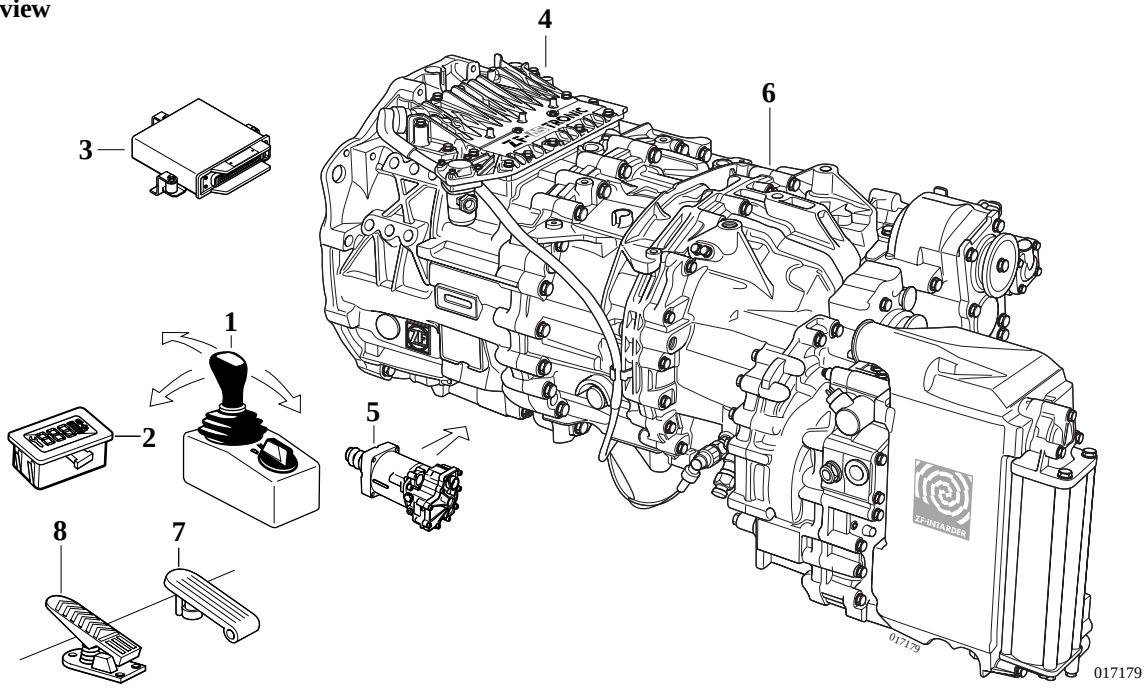
A **display** in the dashboard shows the driver all the system information required (e.g. gear stage, fault, etc.)

The **transmission actuator** and the **clutch actuator** are the components most crucial to complete transmission automation.

The transmission actuator consists of the transmission electronics, shift valves, shift cylinders and sensors.

The clutch actuator is electro-pneumatically controlled and is responsible for the entire clutch actuation process.

1.2 Overview



Key

1 *Console range selector*

2 *Display*

3 *E module*

4 *Transmission actuator with integrated electronic transmission control unit*

5 *Clutch actuator*

6 *Transmission*

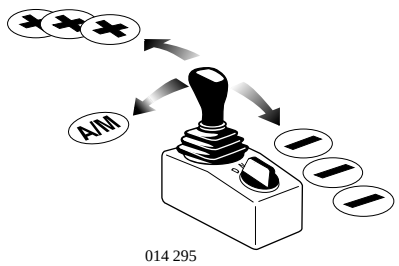
7 *Accelerator*

8 *Brake pedal*

1.3 Range selector

The **range selector** consists of a **rotary switch** and a **tip lever** (shift lever).

Console range selector



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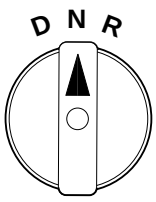
The **rotary switch** has 3 settings:



013 176

« **D** » forwards travel
« **N** » neutral (no gears selected in transmission)
« **R** » reverse travel

When the rotary switch is in the « **N** » position, the tip lever does not function.

The **tip lever** is used to select gears and change operating mode.

Whenever actuated, the tip lever always springs back into its original position.

Upshifts and downshifts covering several stages can be performed by toggling the tip lever several times.

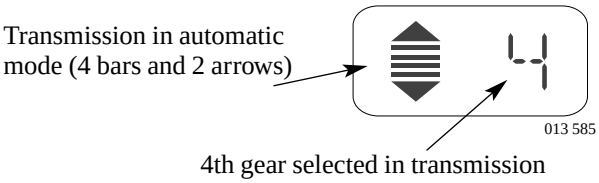
\+ Upshift through **one** stage
\+ \+ Upshift through **two** stages
– Downshift through **one** stage
– – Downshift through **two** stages

A/M

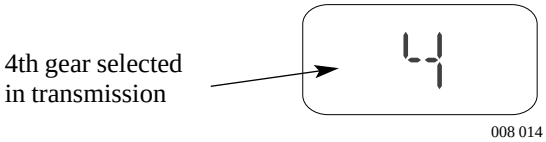
Mode changes:
Press tip lever to the left
to switch between manual mode and automatic mode and vice versa.

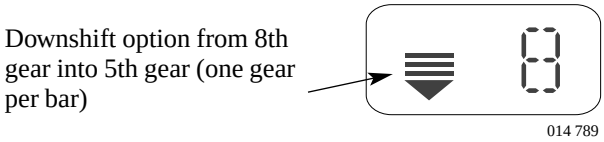
1.4 Display

Automatic mode



Manual mode





1.5 Accelerator

When a gear is engaged, to move the vehicle, you simply have to depress the accelerator. Do not alter the accelerator pedal setting during the shift operation.
The ZF-*AS* TRONIC takes full charge of clutch operation.
During the gear change, the engine is controlled by the ZF-*AS* TRONIC.

1.6 Automatic mode

Rotary switch in « **D** » position. The shift system automatically selects the most appropriate gear for starting off.
The ZF-*AS* TRONIC shift system automatically performs upshifts and downshifts during travel.
Change from automatic to manual mode is always possible.

1.7 Manual mode

Rotary switch in « **D** » position. If the tip lever is actuated, the ZF-*AS* TRONIC transmission switches into manual mode.
Using the tip lever, the driver can also select a gear for setting off other than that suggested.
The driver must avoid over-revving the engine.
The engine stall if the accelerator is depressed in too high gear.

1.8 ZF auxiliary units

Depending on the vehicle version, the ZF-*AS* TRONIC can be equipped with the following auxiliary units.

ZF-Intarder
ZF PTO (clutch-dependent)
ZF emergency steering pump

Please refer to the Operating Manual to find out how to operate and maintain the auxiliary equipment.

2 Operation

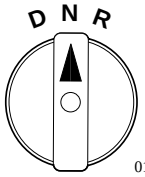
Some deviations from the operating processes are permitted depending on the manufacturer and vehicle type.
Therefore, also consult the vehicle manufacturer's operating manual.

⚠ **DANGER !**
The driver must not leave the vehicle when the engine is running and a gear is selected.

2.1 Starting the engine

⇨ Engage parking brake.

⇨ Rotary switch is pointing to « **N** » (transmission in neutral setting).



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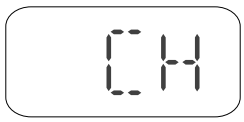
⇨ Switch on "ignition".

⇩ Self-check of shift system (« CH »display).



008 010

⇨ Start the engine.

⇩ Self-check is complete. « **N** » appears on the display, transmission is in neutral setting.

008 011

NOTE
Gear shifts are not possible when the engine is at a standstill.

2.2 Setting off, forwards travel

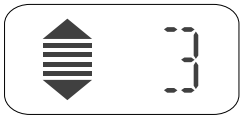
⇨ Start the engine (see 2.1).

⇨ Turn rotary switch from « **N** » to « **D** ».

013 178

↳ Automatic mode is activated.

↳ The display shows the starting gear selected. (The system selects the starting gear itself, the clutch remains separated (disengaged)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⇨ Depress accelerator and at the same time release the parking brake.

⚠ **DANGER!**
The vehicle may roll away even if the accelerator is not depressed.

↳ Vehicle sets off (clutch closes automatically).

2.2.1 Correcting the starting gear

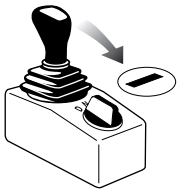
The driver may correct the starting gear selected by the system.

How to make a correction:

⇨ Press tip lever in the « – » or « + » direction.

↳ The display shows the starting gear selected.

Console range selector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2.3 Maneuvering

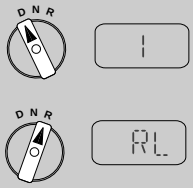
For extremely slow-speed travel (e.g. connecting or disconnecting a trailer or semi-trailer), a maneuvering option is provided.

For maneuvering purposes, the system can call on the first 2 forward gears and both reverse gears.
In other gears, the maneuvering option is not available.

The system recognizes maneuvering status from the position of the accelerator pedal and the low roadspeed.

In maneuvering mode, the vehicle (accelerator) is more responsive and clutch actuation is different from normal status.

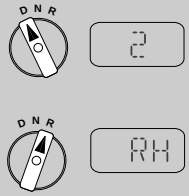
⚠ **DANGER !**
Depending on the accelerator position and vehicle roadspeed the system switches from maneuvering to startup mode.
The vehicle can accelerate.
RISK OF ACCIDENT!



Unlimited maneuvering time

In the event of clutch overload, the display shows « **CL** ».

Whenever clutch overload occurs, the display unit shows « **CL** ».



⚠ **DANGER !**
If the driver fails to respond to the display « **CL** », the system switches from maneuvering.
The vehicle can accelerate at this point.
RISK OF ACCIDENT!

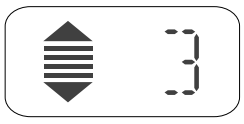
2.4 Starting to roll on slopes

Precondition: the engine must be running.

⚠ **DANGER!**
If the vehicle starts to roll and no gears are selected - rotary switch pointing to « N » - the engine brake is ineffective!
Do not allow the vehicle to roll in the opposite direction of travel to that of the gear selected.

If the vehicle rolls forwards - with transmission in neutral - once the brake is released and the driver shifts from « **N** » to « **D** », then the system selects a gear suitable for the roadspeed. The driveline is then fully engaged.

013 178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2.5 Changing between manual and automatic mode

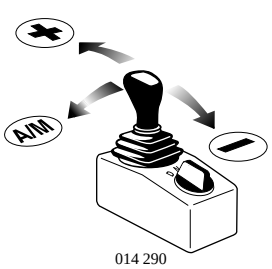
Always possible, even while the vehicle is in motion.

Changing from manual to automatic mode:

(A/M) ⇨ tip lever to the left.

Changing from automatic to manual mode:

⇨ tip lever to the left or push tip lever in the « + » or « – » direction.



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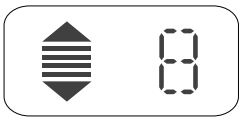
2.6 Changing gear

2.6.1 Changing gear in automatic mode

All upshifts and downshifts are performed automatically.

These depend on:

- driving resistance
- loading
- accelerator-position
- speed
- engine speed



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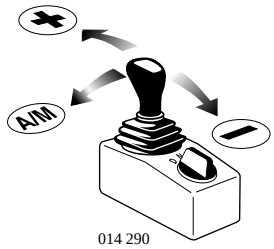
The gear indication appears as a digit in the display during travel.

2.6.2 Changing gear in manual mode

⇨ Push tip lever in « + » or « – » direction.



014 290

When a shift is performed manually, the shift system automatically exits automatic mode.
If the driver moves the tip lever to the left, automatic mode is reactivated.

Jumping gears

Jumping one gear:

⇨ Twice in rapid succession, push tip lever in the direction required.

Jumping two gears:

⇨ Three times in rapid succession, push tip lever in the direction required.

NOTES

➢ You can use the rotary switch to shift any gear to neutral at any time. This shift process always takes priority.

➢ The position of the accelerator must not be changed during the shift process because the engine is automatically controlled.

➢ A shift command is not carried out if this shift would lead to the maximum engine speed being exceeded.

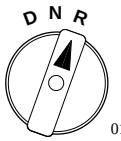
⚠ **DANGER !**
The driver may shift to "Neutral" during travel. If the driver does shift to "Neutral", the driveline is interrupted.
The engine brake is then no longer effective.

2.7 Reversing

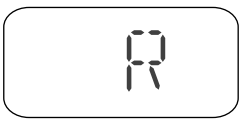
⚠ **DANGER !**
If the vehicle is rolling, shifts cannot be made into reverse! Stop the vehicle immediately.

Selecting reversing gear:

- ⇨ The vehicle must be at a standstill.
- ⇨ Turn rotary switch to « **R** ».
- ↳ « **R** » appears in the display (clutch remains separated/ disengaged).
- ⇨ Depress accelerator and at the same time, release brake (clutch closes automatically).
- ↳ Vehicle moves backwards.



013 177

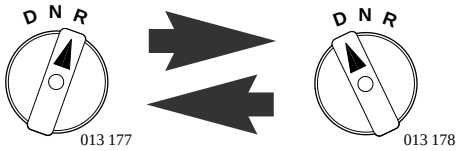


010 765

2.7.1 Changing direction of travel

Changing from reverse « **R** » to forwards travel « **D** » and vice versa.

⇨ Turn rotary switch from « **R** » to « **D** ».



013 177 013 178

⚠ **DANGER !**
A change in the direction of travel, performed by moving the rotary switch from « R » to « D » and vice versa « D » to « R », may only be undertaken when the vehicle is at a standstill otherwise the transmission will shift into neutral.

2.8 Engine brake

⚠ **DANGER !**
The engine braking action is interrupted during the gear change process. The vehicle may accelerate when travelling downhill.

Manual driving mode
The engine brake is deactivated by the system during gear changes. After successful shifts, the engine brake is automatically re-engaged.

Automatic driving mode
When the engine brake is employed, the system changes down to deliver maximum braking torque.

2.9 Stopping

- ➢ After releasing the accelerator pedal, retard the vehicle using the service brake, until it comes to a complete stop.
- ➢ The clutch opens automatically before the vehicle comes to a complete stop, preventing the engine from stalling.
- ➢ If ever the vehicle is stationary for extended periods, ZF advises you to select transmission neutral.

⚠ **DANGER !**
- ➢ **If ever the vehicle is stationary with the engine run ning and the gear engaged, you only have to press the accelerator pedal for the vehicle to set off unless the parking brake is applied!**
- ➢ **Before leaving the vehicle with the engine running, the transmission must be in neutral and the parking brake engaged.**
- ➢ **The engine may stall if the parking brake is actuated while the vehicle is in motion on slippery road surfaces. If this happens, power steering assistance is NO LONGER available!**

2.10 Switching off engine/parking vehicle

- ⇨ Bring vehicle to a standstill.
- ⇨ Engage parking brake.
- ⇨ Move rotary switch to « **N** ».
- ⇨ Switch off engine via ignition key.
- ⇨ Place chocks under vehicle wheels (e.g. on gradients).

014 176

⚠ **DANGER !**
The ZF *AS* TRONIC automatically selects Neutral whenever the engine is switched off. The vehicle may roll away if brakes are not actuated.

2.11 Towing

Vehicle manufacturer instructions must be observed when towing!

CAUTION
For towing purposes, always disconnect the propeller shaft flange from the rear axle before setting off. If it cannot be disconnected, remove both stub shafts.
Avoid polluting the environment in the event of oil loss.

2.12 Tow-starting

The engine **cannot** be tow-started.

2.13 Clutch protection

« **CL** » appears in display if there is a risk of clutch overload resulting from several starting process occurring in rapid succession or of crawling in too a high starting gear.

NOTE
Select an operating mode in which the clutch will not be overloaded, for example:
- ➢ accelerate vehicle (to close the clutch).
- ➢ stop the vehicle.
- ➢ set off in a lower gear.

⚠ **DANGER !**
If the driver ignores the warning signal, the clutch will close when the accelerator is depressed.
The clutch thereby avoids further loading.
This may cause the engine to "stall" and, if on an incline, it is possible that the vehicle will roll backwards.
The clutch opens again when speed is reduced.

- ➢ To conserve the mechanical components of the clutch release device, the transmission should be shifted to neutral if the vehicle stops for long periods of time (for more than approx. 1 to 2 min., for example, in traffic jams, at railway crossings etc.).This closes the clutch and relieves the clutch release device.

Even though the clutch is automated, the driver still has considerable influence on clutch service life.
To keep levels of wear on the clutch low, we would recommend that when setting off, **you always select the lowest gear possible**.

2.14 Overspeed protection

To protect the entire driveline from excessive speeds, the ZF-*AS* TRONIC only permits gear shifts which fall within the vehicle manufacturer's specified range of engine speeds.

2.14.1 Manual mode

➢ Ensure that the engine does not exceed the permitted speed range.

➢ If the vehicle accelerates on downhill slopes, **there is no automatic upshift** into a higher gear.

CAUTION
The engine may be damaged if the vehicle is accelerated on downhill gradients and the engine thereby enters the overspeed range.

2.14.2 Automatic mode

⚠ **DANGER !**
The vehicle may accelerate on downhill slopes. The system will undertake upshifts to protect the engine from damage in the overspeed range (red range).

2.15 Operation with a clutch-dependent PTO

2.15.1 In stationary mode

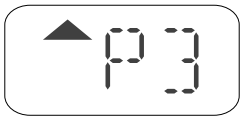
➢ During non-stationary operation of the PTO, only the following forward gears and reverse gear « **RL** » can be selected:

Direct drive gear ➢ setting off in gears 1, 3, 5
Overdrive gear ➢ setting off in gears 2, 4, 6

➢ Gear shifts only take place while the vehicle is stationary. There is no scope for making gear changes while the vehicle is in motion.

⇨ Engage the PTO and select a gear for setting off.

↳ The display then shows, e.g.:



008 018

i.e.: PTO 1 is activated, setting off gear 3 is engaged. Also refer to Chapter entitled "Displays".

2.15.2 Stationary operation

When the PTO is in stationary mode, no gear can be selected. The transmission remains in neutral position.

2.16 Roller test rig

Having driven onto the roller test rig (brake test rig), shift transmission into "neutral".

014 176

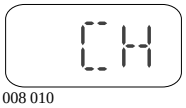
➢ When the roller is activated, the system recognizes the "driving vehicle" function. If the driver selects a gear, the clutch closes.
➢ Reverse gear cannot be selected when the roller is activated.

⚠ **DANGER !**
The vehicle may drive off the roller even if the accelerator is not depressed.

2.17 Display for ZF-*AS* TRONIC

The display provides information on the status of the transmission. It usually shows the gear selected (e.g.: 1 - 16 or « **N** », « **R** »).

Additional display information:



008 010

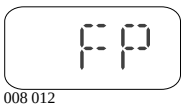
- « **CH** » = system self-check.
- Display appears when «ignition is ON ».

008 128

- « **AL** » = Airless (Luftmangel).
- Alternates with the normal display. The transmission compressed air system hasinsufficient pressure.

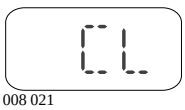
NOTE
Only set off once there is sufficient air pressure in the system. If air pressure is too low when the vehicle stops, do not open the clutch otherwise the engine will "stall".

⚠ **DANGER !**
If shifts are undertaken when pneumatic pressure is too low, the transmission may remain in neutral to ensure that there is no direct drive and that the engine brake is ineffective.



008 012

- « **FP** » = drive pedal (accelerator)
- Bring accelerator to idling position.
- If the display does not go out, there is a system error. The vehicle cannot be driven!



008 021

- « **CL** » = clutch (clutch)
- Alternates with the normal display. Clutch is overloaded.
- Remedy: chapter 2.11 Clutch protection.

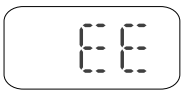
008 029

- **« CW »** = clutch wear (clutch wear)
- Proceed to approved workshop to have clutch exchanged at next opportunity.

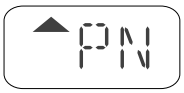
013 586

- **Automatic mode** is shown in the display by means of 4 bars and 2 arrows. (8th gear is selected in transmission)

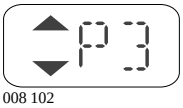
Operation


008 122

- **«EE» = Electronic Error**
- Appears if display communicationis impaired by the transmission electronics.

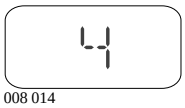

008 024

- «▲PN» = PTO* 1, transmission in «Neutrtal»
- PTO is activated. The transmission may for example be in neutral position.
  ▲ Arrow facing upwards = PTO 1 is activated.


008 102

- «▲▼P3» = PTO* 1 + 2, transmission in 3rd gear
- PTOs 1 and 2 are activated. The transmission is in its 3rd setting off gear.
  ▲ Arrow facing upwards = PTO 1 is activated.
  ▼ Arrow pointing downwards = PTO 2 is activated.

**PTO = Power Take Off*


008 014

- **Manual mode**
- 4th gear selected in transmission.


014 789

- **Manual mode**
- Downshift option from 8th gear into 5th gear (one gear per bar).


008 026

- « Spanner » = system error
- Appears if the operating mode is only available with restrictions.
- Visit a specialist workshop as soon as possible.

NOTE
When certain system error occurs, automatic mode is deactivated and the transmission system remains in manual mode.

008 027

- « **STOP** » + « spanner »
  = serious system error
- **Stop** the vehicle. Vehicle may no longer be driven and must be taken to workshop.

⚠ **DANGER !**
If possible, do not stop the vehicle when it is in a danger zone.

➢ Also refer to chapter 2.18.

2.18 System error (error messages)

- If a « spanner symbol » appears in the display, a system error has occurred. Operation may only be possible with restrictions. If « STOP » and the « spanner symbol » appear in display, a serious system error has occurred. Stop the vehicle. Vehicle may no longer be driven (refer to chapter 2.17 and 4).

- Error messages and the reactions resulting from these errors can be deleted with the vehicle at a standstill and the «ignition OFF», wait until the display goes out. If the display does not go out once the ignition has been turned Off, use the battery isolator to switch off the system. Switch the ignition back on. If the error message is still in place, the vehicle will have to be taken to a service point. Please specify the error number(s) when the service point is contacted.

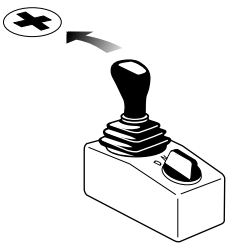
Calling up error numbers:

⇨ Switch on ignition

⇨ Turn rotary switch to « **N** »

⇨ Hold tip lever in « + » position

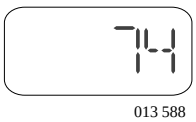
Console range selector



014 289

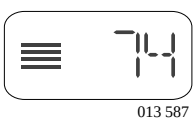
Depending on the version, a 2 or 3-digit error number appears on the display. This corresponds to the error currently in place.

If **4 bars** are displayed in addition to the number, this means: **error no.** + **100** (only applies to two-digit displays).



013 588

e.g.: error no. 74



013 587

error no. 174

Calling up inactive error numbers from the error memory:

⇨ switch on ignition.

⇨ turn rotary switch to « **N** » and at the same time depress foot brake.

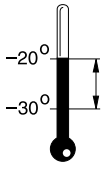
⇨ hold tip lever in « + » position.

The errors stored are shown on the display one after another.

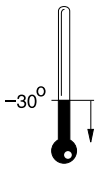
2.19 Starting the vehicle at very low temperatures

The transmission is filled in accordance with ZF List of Lubricants TE-ML 02. It can therefore be used in outside temperatures of down to -30 °C.
The following should be noted:

The vehicle manufacturer's specifications should always be observed.



◆ **At outside temperatures of below -20 °C,** the transmission will require a warming up phase once the engine is started. The engine must be operated for at least 10 minutes with the vehicle at a standstill until the transmission oil has warmed up.



◆ **At outside temperatures of below -30 °C,** warm air must be used to heat transmission up to a temperature above -30 °C before the engine is started.

2.19.1 Using the vehicle when the outside temperature is between 0 °C and -40 °C

If the outside temperature is **continually** very low, specifications for starting the vehicle must be requested from the engineering department at ZF.

2.19.2 Parking the vehicle at very low temperatures

The vehicle may be parked for a long time or the transmission may be stored at outside temperatures of down to -40 °C.

3 Maintenance

Regular maintenance work increases the operational safety of the transmission.
Visual check for oil leaks conducted during the scheduled vehicle service check.
When driving with transmissions fitted with ZF Intarder, the ZF Intarder operating manual 6085 758 002 should be observed.

3.1 Transmission oil

3.1.1 Oil grade

According to ZF List of Lubricants TE-ML 02. The ZF List of Lubricants is available from all ZF subsidiaries or via Internet http://www.zf.com/zf-n

3.1.2 Oil quantities

To ensure correct oil quantities when changing oil, always conduct the oil filling process as specified (refer to chapter 3.2.2).

Transmission	Oil changes	Initial fill at OEM or after repair work
12 AS 2301	**11** / 12* litres	**11** / 21* litres
16 AS 2601	**12** / 13* litres	**12** / 23* litres

** with intarder*

3.2 Oil changes

NOTE
Vehicle should be on horizontal ground when oil is changed.

3.2.1 Oil change intervals

To safeguard reliable operation of the transmission, compliance with the oil change intervals specified in ZF List of Lubricants TE-ML 02 is mandatory!

3.2.2 Draining oil

Always change oil after long journeys provided that the transmission oil is still at operating temperature and is still thin.

⚠ **DANGER !**
Risk of burning upon contact with parts and with the transmission oil.

- ⇨ Remove oil drain plugs from transmission (Figs. 1.1 and 1.2, items 1 and 2) and collect transmission oil in a suitable container. Dispose of in an environmentally-friendly manner.
- ⇨ Clean oil drain plug with magnetic plug and replace seal.
- ⇨ Tighten oil drain plugs to the specified torque.

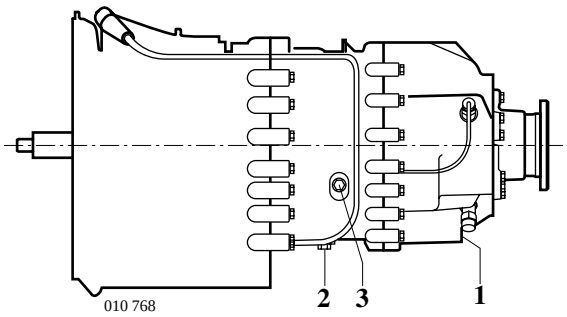


Fig. 1.1 Version: solo transmission

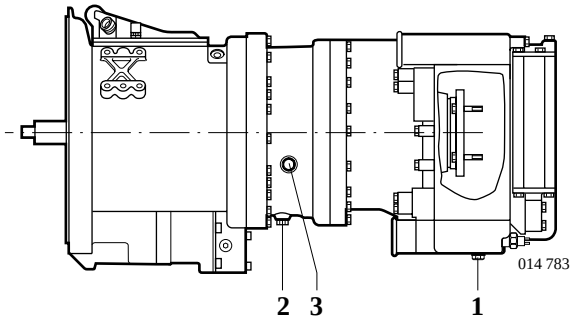


Fig. 1.2 Version: transmission with Intarder

Key to Figs. 1.1 and 1.2

1 *Oil drain plug*
tightening torque T_A = 60 Nm

2 *Oil drain plug*
tightening torque T_A = 60 Nm

3 *Oil fill and overflow measurement point*
There is a notice on this screw indicating the oil grades and oil change intervals.
tightening torque T_A = 60 Nm

3.2.3 Oil filling

⇨ Top up with oil through the oil filling point. (Figs. 1.1 and 1.2, item 3).

⇩ The oil level is correct once the top of the oil has reached the bottom of the filling point or once oil has already started to escape from the filling point.

3.3 Checking oil level

⚠ **DANGER !**
The transmission will be damaged if it does not contain enough oil.
RISK OF ACCIDENT!

Regularly check the oil level in the transmission:

- Check the oil level when the vehicle is on horizontal ground.
- Do not check oil level straight after a journey (incorrect measurement). Only check once the transmission oil has cooled down (<40 °C).
- ⇨ Remove oil fill screw (item 3).
- ⇨ If the oil level has fallen below the oil filling point, it will have to be topped up (section 3.2.2).

NOTE
Each time you check the oil, also watch out for any leakages on the transmission.

3.4 Transmission ventilation

The transmission oil heats up during travel. This causes excess pressure which is continually reduced by a breather valve.
Ensure that the breather valve is always functioning correctly. The breather (item 5) must be clean and must not have a plastic cover.

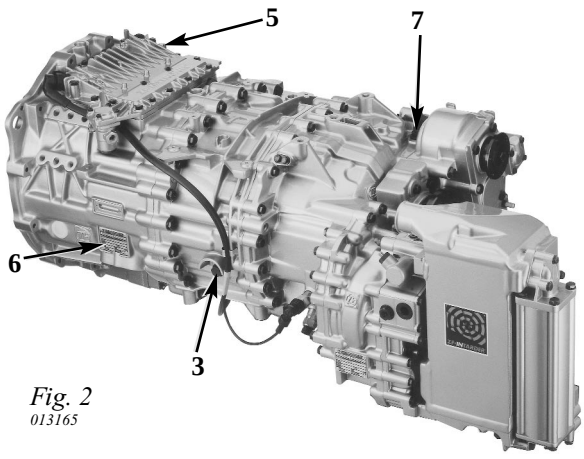


Fig. 2
013165

3 *Oil fill screw*
5 *Transm. breather*
6 *Type plate*
7 *Initial fill or oil top ups after repairs, only in Intarder version*

3.5 Type plate

The type plate contains the most important data. It can be found on the left-hand side of the transmission when viewed from the output.

The following should always be specified when making inquiries or repairs:

- parts list no. of transmission
- transmission type
- serial no. of transmission

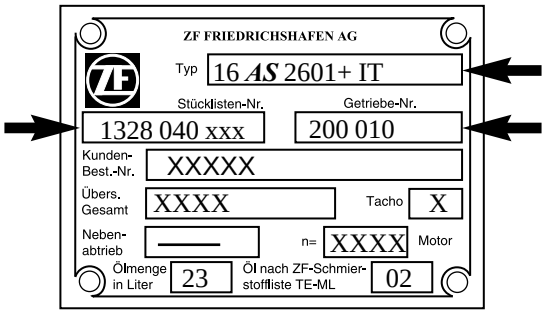


Fig. 3 Type plate (example)

3.6 Visual inspection of wiring

⇨ Check wiring for damage.

⇨ Ensure that connectors are seated correctly, connectors must be fitted with tension relief.

3.7 Pneumatic system maintenance

⇨ The maintenance instructions of the vehicle manufacturer must be observed.

⇨ The compressed air reservoir must be drained every week (every day in winter).

NOTE
When the compressed air reservoir is drained, the compressed air cleaner and water separator must also be drained unless these operate automatically.

4 List of errors

4.1 Key to error list

GV setting: odd or even gear numbers

GP setting:

In 12th gear
Low ratio (gears 1 - 6) or
High ratio (gears 7 - 12) range-change group

With 16 ratios
Low ratio (gears 1 - 8) or
High ratio (gears 9 - 16) range-change group

PTO: Power Take Off

RESET: Switch off ignition while vehicle is stationary and wait until display goes out. Then switch on the ignition. If there is an error in the system, visit a workshop without delay.

Standard error list (status 2000-09-08)

Section 1:	Implications
02,03,04,05,06,07,08,09,22,34, 35,36,37,38,39,40,41,54,61,62, 66,67,68,69,70,71,72,73,77,78, 82,83,84,85,90,101,105,117,132136 ,140,144,169,170,177,179, 180,181,188,189,190,191,193.	In motion: gear shifts are inhibited. Stationary: automatic shift to neutral and gear change inhibited. No longer possible to continue driving. System not available.
Section 2	If two or more errors occur from Section 2, the system responds in the same manner as in Section 1.
10,42	Motion: gear shift action inhibited including neutral. Setting-off gear: only if lowest gear is selected in the high-range GP. Ignition ON: system not available.
17,18,19, 20,21,49,50,51, 52,53, 97, 98, 99,107,120,121,122,123, 124, 164,165	This may have the following implications! Motion: Reduced comfort when setting off, maneuvering, shifting, extended shift time and engagement time for PTO. Stationary: average setting-off gear. No maneuvering mode.
81	Motion: gear shift action inhibited. Stationary: selection of setting-off gears is possible. Setting off is possible.
110	Motion: gear shift action inhibited, including shift attempts to Neutral. Stationary: Setting off is possible.
118	Motion: gear shift action inhibited. Stationary: engine stalls if clutch fails to open.
119	Motion: Clutch closes rapidly. Gear shift inhibited. Stationary: automatic neutral shift. System not available.
Section 3:	Errors which, even if they occur frequently, do not have to lead to impaired availability of the system.
11	Warning buzzer permanently active.
12,44	Activation of reversing light not possible.
13,14,45,46,59,60,63,64	PTO 1 or 2 not available. No other system limitations.
23	Continuous activation of warning lamp.
25,89	Display EE. No system response.
26,27,28,30,31,32,33,91,92,93, 94,96,113,171,173,182,183,184,192 ,197,199	The following effects can occur! Motion: reduced comfort when setting off, maneuvering, shifting gear, increased shift time. Stationary: mean setting-off gear. No maneuvering mode.
43,75	Warning buzzer cannot be activated.
55,87	Warning lamp cannot be activated.
76	Reversing light is permanently switched on.
86	Display cannot be switched off. Speed range selector does not switch off. No restrictions on system availability.
95,100,104,111,112,125,127, 128,167,174,195,196,198	As an isolated error, no impact on system or on certain calculations, e.g. clutch wear assessment is not possible.
102,163	Motion: gear shift action inhibited, including shift attempts to neutral. Stationary: setting off is possible.
108,175	The following errors can occur! Motion: gear selection inhibited. Stationary: system not available, setting off is possible
126	System function not impaired. Any possible pressure loss is not displayed. Longer learning period.
129,130,131	Motion: gear shift action inhibited, shift from neutral is possible. Stationary: setting-off gears are possible.

133,134,135	Motion: restricted number of gears. Stationary: Restricted gear choice for setting off, no reverse gear.
137,138,139,145,146,147	Motion: GP shift is inhibited. Only gears in shifted GP range can be selected. Reduced shift comfort, extended shift time. Stationary: setting-off gears are possible
141,142,143,148,149,152	Motion: automatic gear correction (last GV setting) or neutral shift. Stationary: setting off in last GV setting or via Speed range selector.
150	System not available. Subsequent GV shift attempts are possible.
151	Motion: automatic gear correction or neutral shift. Stationary: setting-off gear only selectable using speed range selector.
153,155,156	Motion and stationary: automatic neutral selection. Subsequent shifts using speed range selector.
154	Motion: clutch closes. Next shift attempt using speed range selector. Stationary: set off in lowest gear, high-range GP.
158,159,160	Automatic gear correction.
166	Motion: shifts possible while vehicle is in motion. Stationary: system not available.
168	Motion: no restriction on system. Stationary: after reset, setting off can be possible.

Operating instructions for ZF-Intarder

Operating Manual

The **in**tegrated re**tarder** for
trucks and buses with
ZF transmissions
ECU 42 control unit

6085 758 102a

Subject to alterations in design

Printed in Germany

ZF Friedrichshafen AG, MC-C / 2004-03

Edition: 2004-03

TRUCK:

Ecosplit	New Ecosplit
16 S 151 IT	16 S 1621 TD
	16 S 1821 TO
16 S 181 IT	16 S 1921 TD
	16 S 2221 TO
16 S 221 IT	16 S 2221 TD
	16 S 2521 TO
16 S 251 IT	16 S 2721 TO
Ecomid	
9 S 109 IT	
16 S 109 IT	
AS Tronic	
12 AS 2301 IT	12 AS 1631 TD
	12 AS 1931 TD
	12 AS 1931 TO
	12 AS 2131 TO
	12 AS 2331 TO
16 AS 2601 IT	16 AS 2231 TD
	16 AS 2631 TO

BUS:

8 S 180 IT	8 S 2101 BD
	8 S 2101 BO
6 S 1600 IT	6 S 1601 BD
horizontal on the right	6 S 1701 BO
and heat exchanger at	6 S 1901 BO
bottom	
6 S 1600 IT	6 S 1601 BD
vertical	6 S 1701 BO
heat exchanger on the	6 S 1901 BO
right	
6 S 1600 IT	6 S 1601 BD
horizontal on the right	6 S 1701 BO
and heat exchanger on	6 S 1901 BO
the right	
10 AS 2010 B IT	10 AS 2001 BD
10 AS 2310 B IT	10 AS 2001 BO
	10 AS 2301 BD
	10 AS 2301 BO
	10 AS 2701 BO
12 AS 2000 B IT	12 AS 2001 BO
12 AS 2300 B IT	12 AS 2301 BO
	12 AS 2701 BO

Before first starting up the ZF Intarder, we would ask drivers to:

- **carefully read through these operating instructions so that the Intarder can be used correctly and effectively.**
- **observe the maintenance instructions to ensure that the Intarder is operated correctly.**
- **note the special information provided by the vehicle manufacturer. The details in this are binding in all cases.**

Specialists from the Customer Service department are available to you for maintenance work and if any problems arise on the transmission and ZF-Intarder. You can find the individual addresses in the “ZF directory of companies” (order no. 0000 762 703) which we would be more than happy to send out to you on request.

NOTE
This operating manual deals with the standard version. Customer-specific modifications are possible.

We wish you a pleasant journey with your ZF-Intarder

ZF Friedrichshafen AG
Commercial Vehicle Driveline Technology Division
D-88038 Friedrichshafen
Telephone: +49 75 41 77-0
Telefax: +49 75 41 77-908000
Internet: www.zf.com

The following safety instructions appear in this operating manual:

NOTE
Refers to special processes, techniques, data, etc.

CAUTION
This is used when incorrect, unprofessional working practices could damage the product.

⚠ **DANGER !**
This is used when lack of care could lead to personal injury or death.

⚠ **THREATS TO THE ENVIRONMENT!**
Lubricants and cleaning agents must not be allowed to enter the soil, ground water or sewage system.

- **Ask your local environment agency for safety information on the relevant products and adhere to their requirements.**
- **Collect used oil in a suitably large container.**
- **Dispose of used oil, dirty filters, lubricants and cleaning agents in accordance with environmental protection guidelines.**
- **When working with lubricants and cleaning agents, always refer to the manufacturer's instructions.**

1 General Intarder Safety Notice

⚠ **DANGER !**
Use the Intarder very cautiously in the event of: black ice, wet road surfaces, unladen vehicle, just tractor operations.

RISK OF ACCIDENT!

Your vehicle may skid.

Vehicles without ABS equipment have a greater risk of skidding as a result of unintentional Intarder operating errors. To prevent this from happening, switch off the Intarder's master switch.

→ If your vehicle is fitted **with an ABS or EBS braking system**, then Intarder brake actions are interrupted while the ABS/EBS system is active.
The last Intarder operating mode activated is subsequently reactivated.

→ Using the Intarder does **not** affect how your transmission functions.
– When the **clutch is separated** (to change gear), **the Intarder's braking force remains in place (and is not reduced).**

→ If your vehicle has an **engine brake**, this can be engaged in addition to the Intarder.

CAUTION
Before and while travelling downhill, ensure that your engine speed does not fall to below n = 1600 rpm. Only briefly depress the clutch to change gear. Do not travel downhill in idling mode or with the clutch depressed otherwise sufficient cooling of the engine coolant is not ensured.

– If necessary, downshift by one gear to increase the engine speed and therefore the water pump and fan output.

If the max. coolant temperature is nevertheless reached, the Intarder electronics automatically govern the Intarder back to the maximum permissible level of brake torque (Intarder governing).

– The driver must take this reduced braking power into account and change his/her driving style (gear changes, engine brake or service brake) accordingly.

2 Description

The ZF-Intarder is an additional brake integrated in the transmission which functions hydro-dynamically and with no wear.

It reduces wear of the wheel brakes

- when braking from high roadspeeds
- when travelling on downhill stretches

The ZF-Intarder is conducive to more consistent and more cost-effective driving styles.

The advantages of the ZF-Intarder are:

- high braking power
- short response times
- shares oil supply with the transmission and therefore one common oil change
- low weight
- low constant transmission operating temperatures due to integrated, constant cooling

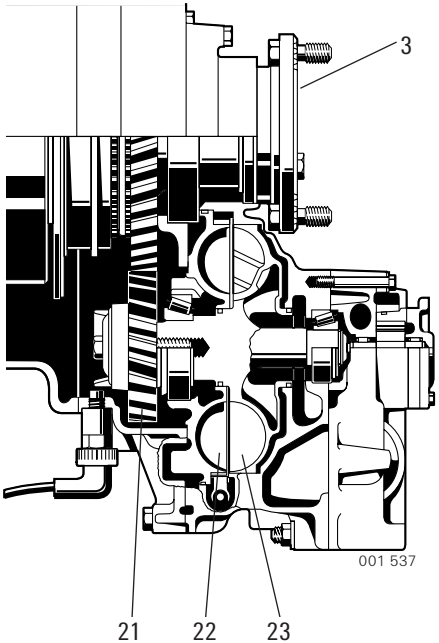


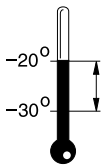
Fig. 1
Structure of the ZF-Intarder taking the example of a ZF-Ecosplit transmission: **3** = Transmission output flange
21 = Spur gear stage
22 = Stator
23 = Rotor

3 Operation

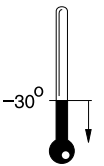
3.1 Initial Vehicle Start-Up at Low Temperatures

The transmission and Intarder must be filled with an oil listed in the ZF List of Lubricants TE-ML 02. It can then be used down to an outside temperature of below - 40 °C (also refer to 3.1.1).
The following points should be noted:

⚠ **DANGER**
When leaving the vehicle with the engine running, close the parking brake. This prevents the vehicle from accidently starting to roll.



- **At outside temperatures of below –20 °C,** a warm-up phase is needed for the transmission once the engine has been started.
  The engine must be run at low speed in the partial load range until the transmission oil has warmed up.



- **At outside temperatures of below –30 °C,** warm air should be used to warm up the transmission to a temperature of at least –30 °C before the engine is started. Ensure that a temperature of 150 °C is not exceeded on the transmission.

NOTE
It is essential that the vehicle manufacturer's instructions are observed.

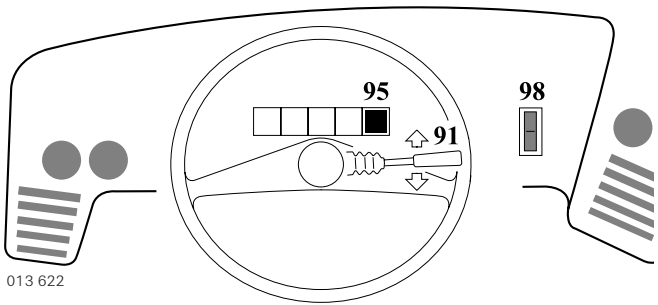
3.1.1 Vehicle Applications at Persistent Low Temperatures of Between 0 °C and –60 °C

The relevant oil grades should be used at persistent low temperatures.
Refer to TE-ML 02 for low temperatures.

3.2 Intarder Master Switch

The master switch (98) is used to switch the Intarder on or off. This can even be done during travel. The master switch is fitted on the dash panel.

Fig 2 Fittings (example)



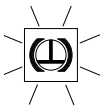
95 = Intarder monitoring display
91 = Brake step lever
98 = Intarder master switch

3.3 Intarder monitoring display

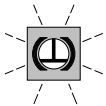
The Intarder monitoring display lights up during Bremsomat operations if the Intarder is active and when in constant brake steps.

NOTE
Check whether the Intarder functions match the light displays described below.

When the ignition has been switched on and when the Intarder master switch is in the “ON” position, the Intarder system automatically checks that the monitoring display is functioning.



Monitoring display lights up for 3 sec.



If there is a defect in the electric system, **the monitoring display flashes when the Intarder is switched on.**

Take your vehicle to the nearest specialist ZF workshop.

For error code output via flash code, refer to 3.7

In addition to its normal function, the Intarder monitoring display is used to output the flash code (error number), refer to section 3.7, Flash Code Output.

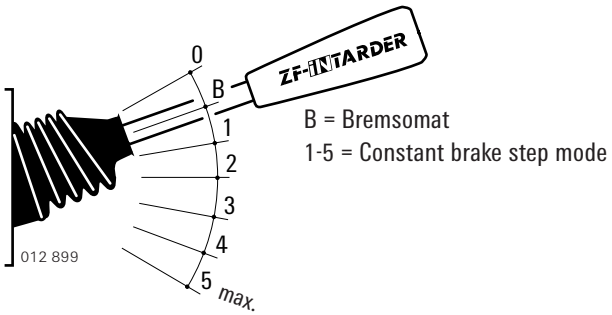
3.4 Constant Brake Step Mode

The Intarder's braking efficiency increases constantly between the first and last brake stage according to the lever position.

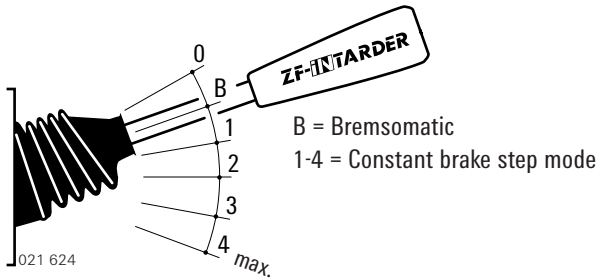
The "constant brake steps" function produces intentional vehicle braking (relieves the service brake system).

- **Activating "constant" brake step mode**
  Move the brake step lever to a position between 1 and max.
  The vehicle is constantly braked in accordance with the position selected.

→ in Position **1** = slight braking to
→ in Position **max.** = high-level braking



B = Bremsomat
1-5 = Constant brake step mode

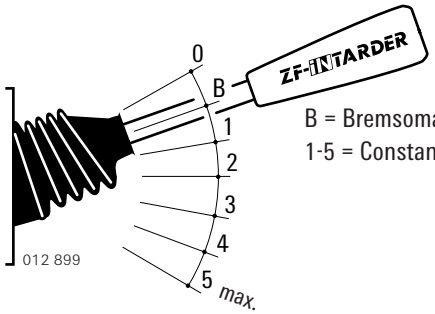


B = Bremsomatic
1-4 = Constant brake step mode

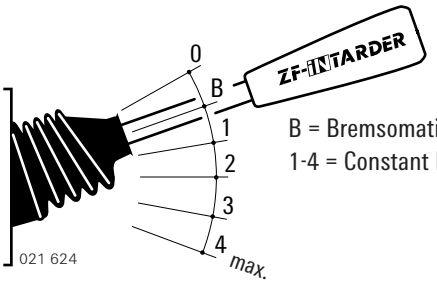
- **Deactivating “constant” brake step mode**
  Move the brake step lever either

→ into position **0** or
→ into position **B** = BREMSOMAT function and/or
BREMSOMATIC function
Applications depends on the vehicle manufacturer).

NOTES
→ If the **braking power needed is greater than the maximum braking power of the Intarder**, the engine or service brake should also be activated.
→ See section **1 General Intarder Safety Notice**



B = Bremsomat
1-5 = Constant brake step mode



B = Bremsomatic
1-4 = Constant brake step mode

3.5 BREMSOMAT Function

(The way in which the Bremsomat functions depends on the vehicle)

You can use this function to keep your vehicle's roadspeed constant when travelling downhill. You set the value at which you want to keep the speed.
The Intarder electronics automatically set the braking torque needed for this.
The Bremsomat function is automatically interrupted when the accelerator is depressed and the current roadspeed is set once the accelerator is released again.

NOTES

→ If when travelling downhill the **braking power needed is greater than the maximum braking power of the Intarder**, the engine or service brake should also be activated.

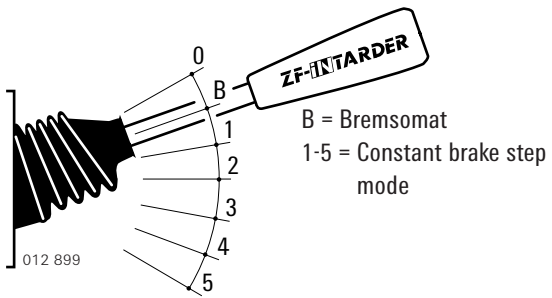
→ If the **current roadspeed is less than the speed set,** the Intarder remains off. Once the roadspeed returns to the value saved, the Intarder is again activated.

CAUTION

When programming the Bremsomat and cruise control functions at the same time, ensure that the roadspeed set for cruise control is lower than that selected for Bremsomat operations.

If this is not done, the functions will be working against one another.

3.5.1 ZF Brake step lever (standard)



BREMSOMAT = roadspeed constant on downhill slopes

- **Setting and maintaining a roadspeed:**
  Select step **B** = activate Bremsomat

The current roadspeed is now saved in the electronics and maintained during downhill travel. When in Bremsomat mode, the braking torque gradually and automatically adjusts to that required.

Monitoring display: lights up continuously when Intarder is active

The Bremsomat function only operates in step B.

NOTE
If the brake step lever is returned to position **B** once constant brake step mode has been
activated, then automatic speed control takes effect using the **current** roadspeed.

- **Cancelling the Bremsomat function:**
  Move brake step lever either
  → into position **0** or
  → into position **1 - 5 (= constant brake step mode)**.
  → into position **B and depress accelerator**
  (as soon as the accelerator is **no** longer depressed, the Bremsomat function is reactivated with the **new current** roadspeed).

→ Monitoring display OFF:
→ in position 0
→ always when Intarder is **not** active

3.6 Bremsomatic Function

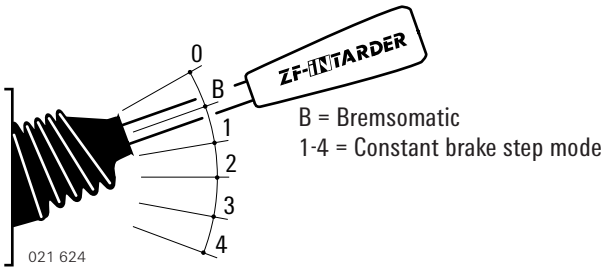
(The way in which the Bremsomat functions depends on the vehicle)

Function same as Bremsomat in position **B**, but the current roadspeed is set once the accelerator, brake pedal or engine brake is released.

Advantages of the Bremsomatic:

- Cruise control and Bremsomatic **cannot** work against one another.
- The brake step lever remains in position **B**.
  Constant manual interventions on the brake step lever are **not** needed.

3.6.1 ZF-Brake Step Lever (Bremsomatic)



BREMSOMATIC = roadspeed constant in downhill stretches

- **Setting and maintaining a roadspeed:**
  Select step **B** = activate Bremsomatic

The current roadspeed is now saved in the electronics and maintained during downhill travel. In Bremsomatic mode, the braking torque gradually and automatically adjusts to that required.

The Bremsomatic function only operates in step **B**.

NOTE
If the brake step lever is returned to position **B** once constant brake step mode has been
activated, then automatic speed control takes effect using the **current** roadspeed.

- Cancelling the **Bremsomat function:**
  Move brake step lever either

  → into position 0 or
  → into position **1-4** (= constant brake step mode)

- **Changing roadspeed and saving new value:**
  Change the roadspeed by depressing the

  → accelerator or
  → brake pedal or
  → engine brake

  and the **new** roadspeed is automatically saved.

3.7 Flash Code Output and Deleting Error Memory

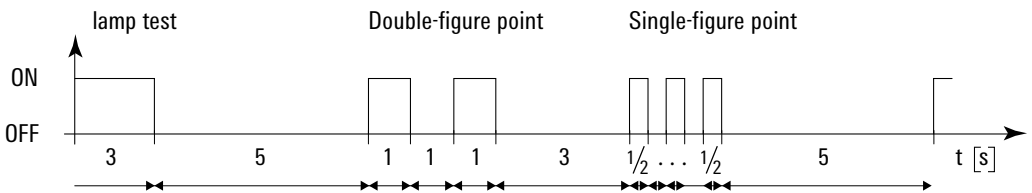
Flash code (error number) output and deletion of the error memory can triggered using the brake step lever. The flash code is output via the Intarder monitoring display.

Triggering flash code output
Example using 5-step brake step lever.

1. Switch off ignition.
2. Move brake step lever to one step below the max. brake step, in this case position 4.
3. Switch ignition on and wait for the Intarder monitoring display to light up continuously (3 seconds) or flash (5 seconds).
4. Move the brake step lever to two steps below the max. brake step (in this case position 3) and then move it back to the position one step below the max. brake step (in this case position 4) within the next 5 seconds.
5. Wait for the flash code output (refer to: “Functions of the Intarder monitoring display”.

In addition to its normal function, the Intarder monitoring display is also used to output the flash code (error numbers).
If flash code output is triggered via the brake step lever, the error numbers saved in the error memory are output in order once the lamp test has been completed and/or once (if an error is present).

Example taking error number 23



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Deleting the Error Memory

1. Switch ignition off.
2. Move brake step lever to position 4 (max. position -1).
3. Switch ignition on and wait for Intarder monitoring display to light up permanently (3 seconds) or flash (5 seconds).
4. Within the next 5 seconds, move the brake step lever into position 3 (max. position -2), back to position 4 (max. position -1) and then to position 0.
5. All errors to be displayed via flash code output are deleted for flash code output.

Only those errors from the control unit which impair function can be called up using the flash code output. Errors which have no impact whatsoever on control unit functions can only be called up using an external diagnosis unit.
Deleting the error memory with the aid of the brake step lever makes the errors entered in the error memory invisible for flash code output. All errors can still be seen when using an external diagnosis device and remain visible until deleted using the diagnosis device.

3.8 Flash Code Error List

NOTE
This error list is a “reduced summary” of all possible individual errors. Types of errors, such as open circuit and/or short circuit can be called up in the error memory of the ZF control unit (ECU) for optimum diagnosis. Please contact your nearest ZF Service Center for more details.

Error code	Meaning
11	El. defect - accumulator charge valve
12	El. defect - engine brake activation
13	El. defect - Intarder monitoring display activation
14	El. defect - “Reduced power” warning light activation
15	El. defect - brake lights activation
16	El. defect - fault lamp activation
17	El. defect - cruise control deactivation during constant brake step operation
18	El. defect - brake step lever supply
19	El. defect - proportional solenoid (AIP) activation
21	El. defect - prop. solenoid return (ADM1)
23	Proportional solenoid error (control unit / ECU internal)
24	LED lamp activation (brake step lever defect)
25	El. defect - Bremsomat activation, disengagement when Bremsomat is active

Error code	Meaning
26	Flash code lights activation defective
31	El. defect - speed sensor
32	El. defect - temperature sensor
33	Brake step lever inputs not verifiable
34	El. defect - engine speed sensor
41	CAN message, EEC2 defective
42	CAN message, TSC1 defective
43	Send error, CAN messages
44	CAN BUS off
45	CAN message, EBC1 defective
46	Communication error, CAN messages
47	CAN message, EEC1 defective
48	CAN message, TCO1
49	CAN message, CCVS defective
51	Engine brake, CAN message, ERC1 defective
52	CAN message, ETC1 defective
53	CAN message, ETP defective
54	On-board computer, CAN message, ERC1 defective

Error code	Meaning
55	On-board computer, CAN message, TSC1 defective
56	CAN message, TIME/DATE defective
57	CAN message, HRVD
58	CAN message, ABS defective (IES-ID 512)
59	CAN message, FMR1 defective (IES-ID 592)
61	CAN message, FMR2 defective (IES-ID 593)
62	CAN message, EPS1 defective (IES-ID 556)
63	CAN message, BC_DR
64	ExtensionBox, CAN message, TSC1
65	Adaptive Cruise Control (ACC), CAN message, TSC1
66	Transmission 2, CAN message, ETC1 defective
67	CAN message, EPS2 defective (IES-ID 557)
71	Open circuit, term. 30
72	Undervoltage / overvoltage, term. 15
81	Parameter setting defective
82	Loss of operating hours counter
83	Loss of error memory
84	Error, Intarder control unit (ECU)

4 Maintenance

CAUTION
This maintenance section SUPERSEDES the corresponding sections of the maintenance instructions for your transmission.

4.1 Oil Level Check

⚠ **DANGER !**
Too little oil in the transmission will cause transmission damage:
Risk of accident!

CAUTION
To check the oil level, the Intarder must not be activated just before the vehicle is stopped.
This ensures that the transmission has the correct oil volume.

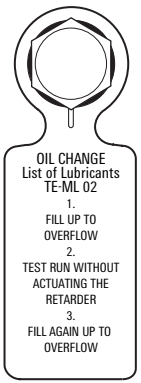
NOTES
→ In order to prevent incorrect measurements, the oil level on transmissions fitted with a ZF-Intarder must be checked with
– the vehicle horizontal
– the engine off
– cooled transmission oil (< 40 °C).
→ Regularly check the oil level.
→ During the check, look out for leaks on the:
– transmission,
– Intarder,
– oil/water heat exchanger,
– associated coolant pipes.

CHECK:
- Stop and park the vehicle without activating the Intarder.
- The oil overflow plug, item 4 should be opened during the oil level check.
- If the oil level is below the edge of the oil overflow aperture, oil must be topped up at the oil overflow aperture until it overflows.
  Screw oil overflow plug (**4**) back in with new seal (for tightening torque, refer to pages 41 and 42).

4.2 Instruction Plate on Oil Overflow Plug

There is an instruction plate for oil changes on the oil overflow plug.

This plate must not be removed from the oil overflow plug.



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4.2.1 Instruction Plate on Oil Drain Plug
(only with synthetic oil fill)

There is an instruction plate on the oil drain plug bearing the inscription: Warning synthetic oil fill - oil change interval has changed.

This plate may only be removed from the oil drain plug if synthetic oils are no longer being used.
Warning: Other oil change intervals then apply **depending** on the lubricant classes for transmissions fitted with a ZF-Intarder in accordance with List of Lubricants TE-ML 02.

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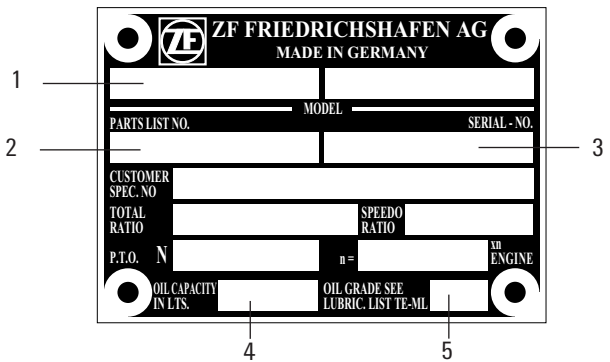
4.3 Type Plate

The type plate contains important Intarder data. It can be found to the side of the Intarder housing.

The following items MUST be specified when making enquires, placing orders or undertaking repair work:

1. Type of transmission
2. Intarder parts list no.
3. Serial no. of Intarder
4. Oil volume
5. List of lubricants



Example of type plate

4.4 Draining Oil

CAUTION
The Intarder must NOT be activated just before stopping the vehicle for an oil change.
This ensures that the correct oil change volume is used.

NOTE
→ When changing the oil, the oil must be drained into a suitable container and disposed of in accordance with environmental legislation.
→ Always: Undertake oil change after a long journey while the transmission oil is still warm and thin.

- Stop vehicle in horizontal position and switch off engine.
- To drain the oil, the drain plug on the transmission **(item 1)** and the drain plug on the oil filter housing **(item 2)** should be unscrewed.

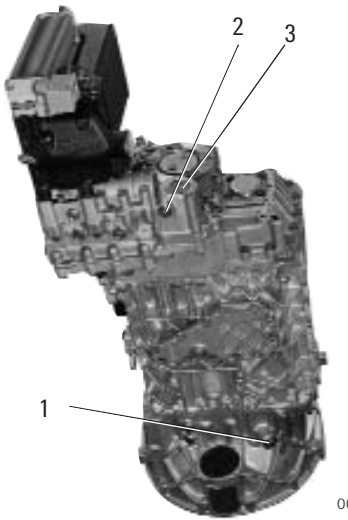
⚠ **DANGER !**
Hot transmission oil:
RISK OF BURNING

- Once the oil has been drained, the drain screws (solenoids) must be cleaned and the seals replaced.
- Insert new filter.
- Then screw the drain plugs back in.

CAUTION
Observe the specified tightening torques on the table on pages 41 and 42 (T_A) for the drain plugs; otherwise transmission damage is possible.

4.5 Truck - Oil Drain, Oil Fill and Oil Overflow Plugs

Fig. 1
e.g.
Ecosplit transmission and New-Ecosplit



Alternatively, the heat exchanger in truck transmissions may be fitted horizontally at the bottom. Oil maintenance points depend on the transmission type.

1 = Transmission oil drain point

2 = Intarder housing oil drain point

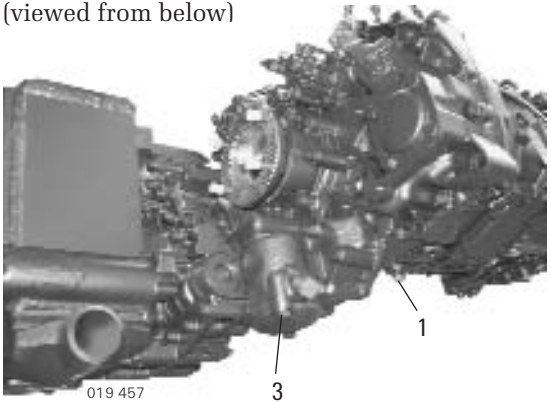
3 = Intarder housing oil filter cover

4 = Oil overflow plug and oil filling after oil change

9 = Oil fill plug after repairs

For tightening torques, refer to table on page 41

Fig. 2 e.g.
Ecomid transmissions 9/16 S 109 with ZF-Intarder (viewed from below)



Alternatively, the heat exchanger in truck transmissions may be fitted horizontally at the bottom.
Oil maintenance points depend on the transmission type.

1 = Transmission oil drain point

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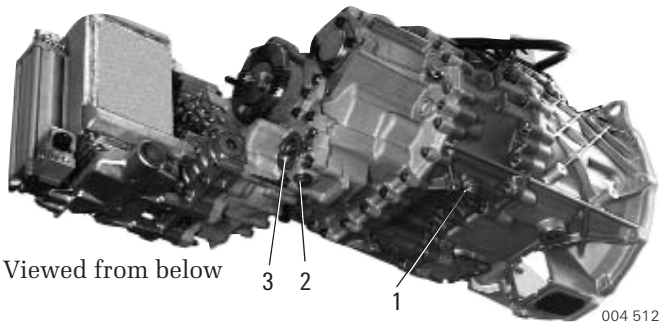
3 = Intarder housing oil filter cover

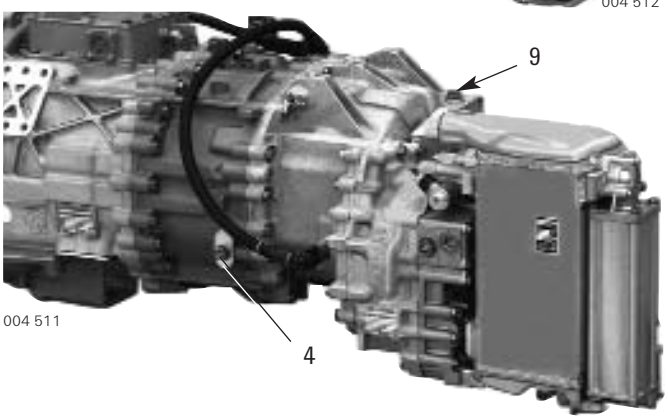
4 = Oil overflow plug and oil filling after oil change

9 = Oil fill plug after repairs

For tightening torques, refer to table on page 41

Fig. 3
AS Tronic transmission – e.g.
12 AS 2301/ 16 AS 2601
(with ZF-Intarder)





Alternatively, the heat exchanger in truck transmissions may be fitted horizontally at the bottom.
Oil maintenance points depend on the transmission type.

1 = Transmission oil drain point

2 = Intarder housing oil drain point

3 = Intarder housing oil filter cover

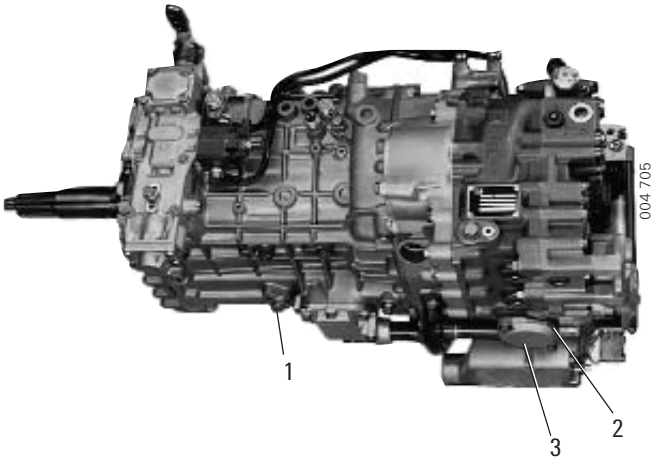
4 = Oil overflow plug and oil filling after oil change

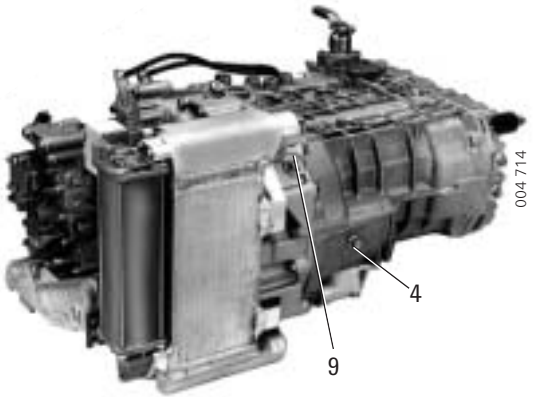
9 = Oil fill plug after repairs

For tightening torques, refer to table on page 41

4.6 Bus - Oil Drain, Oil Fill and Oil Overflow Plugs

Fig 4
Transmission 8 S 2101 BD/BO with ZF-INTARDER





1 = Transmission oil drain point

2 = Intarder housing oil drain point

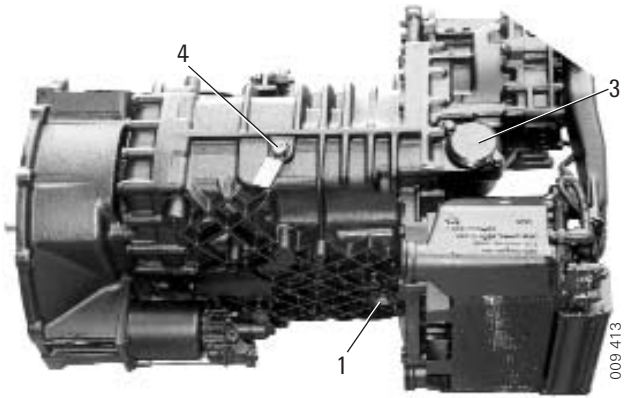
3 = Intarder housing oil filter cover

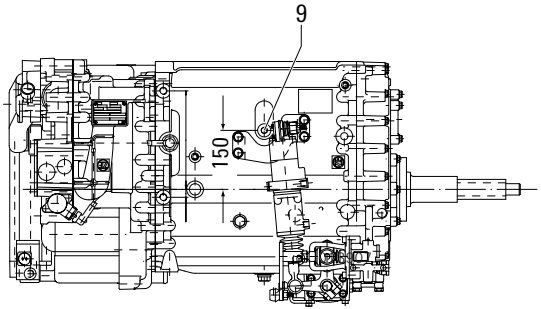
4 = Oil overflow plug and oil filling after oil change

9 = Oil fill plug after repairs

For tightening torques, refer to table on page 42

Fig. 5
Transmission 6 S 1600 IT
Heat exchanger at bottom
6 S 1601 BD, 6 S 1701 BO, 6 S 1901 BO





1 = Transmission oil drain point

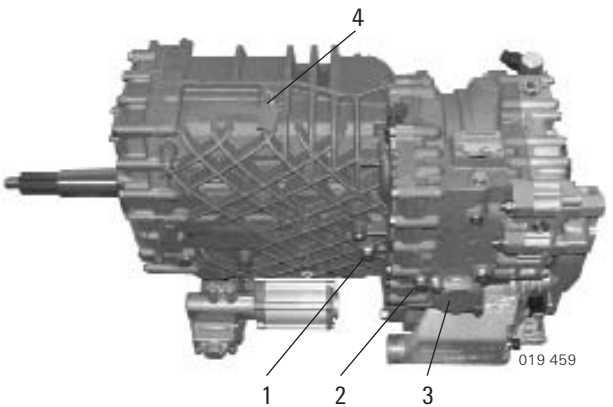
3 = Intarder housing oil filter cover

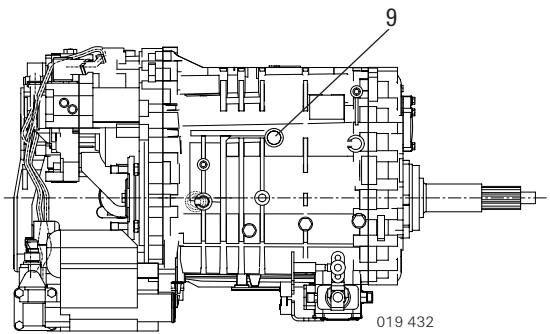
4 = Oil overflow plug and oil filling after oil change

9 = Oil fill plug after repairs

For tightening torques, refer to table on page 42

Fig. 6
Transmission 6 S 1600 IT
Heat exchanger on the right
6 S 1601 BD, 6 S 1701 BO, 6 S 1901 BO





1 = Transmission oil drain point

2 = Intarder housing oil drain point

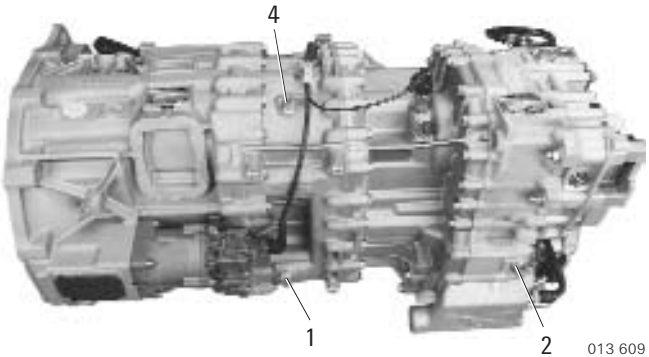
3 = Intarder housing oil filter cover

4 = Oil overflow plug and oil filling after oil change

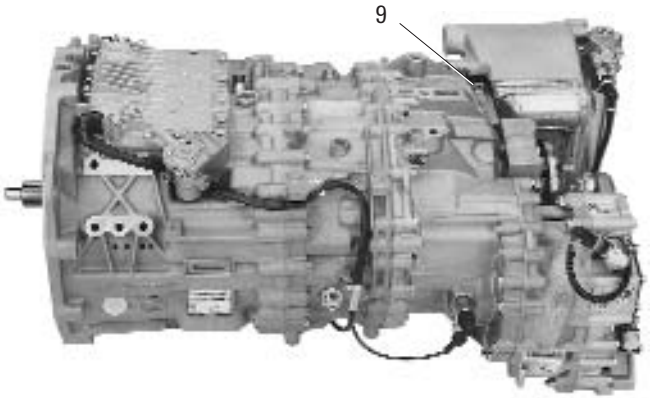
9 = Oil fill plug after repairs

For tightening torques, refer to table on page 42

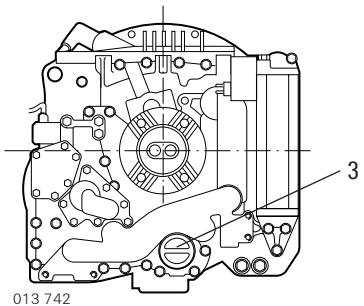
Fig 7
Transmission 10 AS 2301 BO, 10 AS 2310 B IT



013 609



013 610



013 742

1 = Transmission oil drain point

2 = Intarder housing oil drain point

3 = Intarder housing oil filter cover

4 = Oil overflow plug and oil filling after oil change

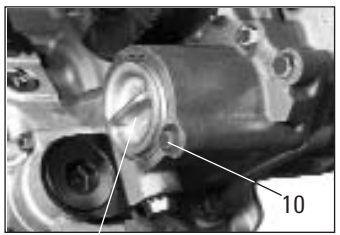
9 = Oil fill plug after repairs

For tightening torques, refer to table on page 42

4.7 Oil Filter Change

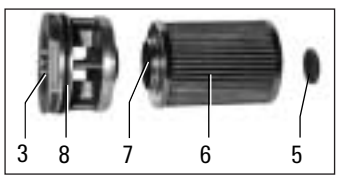
NOTE: Use new oil filter for each oil change (for order no., refer to table on pages 41 and 42).

⚠ DANGER: Hot transmission oil: risk of burning.



000 529


000 552



004 467

ZF-Ecosplit / ZF-AS Tronic	ZF-Ecomid / ZF-6 S 1600

Unscrew plug (**10**) from oil filter housing cover (**3**).

Remove cover (**3**) with filter attached. Take oil filter off filter cover.	Remove cover (**3**) and pull filter out of filer housing.

(CAUTION: there will some residual oil in the oil filter housing)

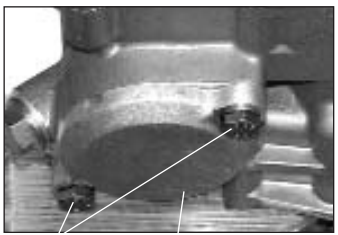
Check O-ring (**8**) on filter cover for damage and replace and grease.

Securely attach solenoid (**5**) to the new filter.

When using new filter, grease the O-ring (**7**).

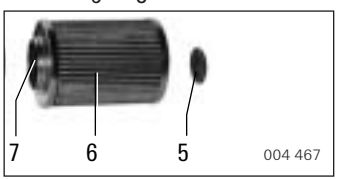
Attach oil filter housing cover (**3**) to the new filter (**6**). Insert complete unit until firmly home in the filter housing.	Insert new filter (**6**) in filter housing.

Use screws (**10**) to fit cover (**3**). For tightening torques, refer to table on pages 41 and 42.



019 485

004 707



004 467

4.8 Oil Filling

after oil change	after repairs

NOTE

Only fill transmission and Intarder when vehicle is stationary and horizontal and engine is switched off. Drain off oil. For oil grade and volume, refer to table on pages 41 and 42.

Open oil overflow plug (**4**).	Open oil fill plug (**9**).
Fill transmission until oil overflows.	Fill with oil at pos. 9.
Screw in oil overflow plug (**4**) with new seal.	Screw in oil fill plug (**9**) with new seal.

For tightening torque, refer to table on pages 41 - 42.

Undertake test run: distance 2-5 km

Test run: Do **NOT** activate Intarder.	Test run: Activate Intarder **BRIEFLY ONCE** at the start (max. stage) and return to position 0.

End of test run:

Vehicle stationary. **Do not activate Intarder**. Open oil overflow plug (**4**).
Do not remove instruction plate.

CAUTION

Check oil level again and if necessary, top up oil until it overflows.

Use new seal to close oil overflow plug (**4**) again.

4.9 Engine Coolant

CAUTION
When topping up the engine coolant, instructions provided by the vehicle manufacturer MUST be observed. Otherwise, the oil/water heat exchanger may be damaged.

- **Engine coolant**
  (mixture of fresh water and **antifreeze-corrosion protection agent)**
  – The recommended volume of **antifreeze-corrosion protection agent**:
  35 - 50 vol. %, should be checked using a coolant tester

Antifreeze-corrosion protection agent
Basic fluid: ethylene glycol with corrosion protection inhibitors
Fresh water
pH value of 6.5 -8.0; total hardness 3-10° dH

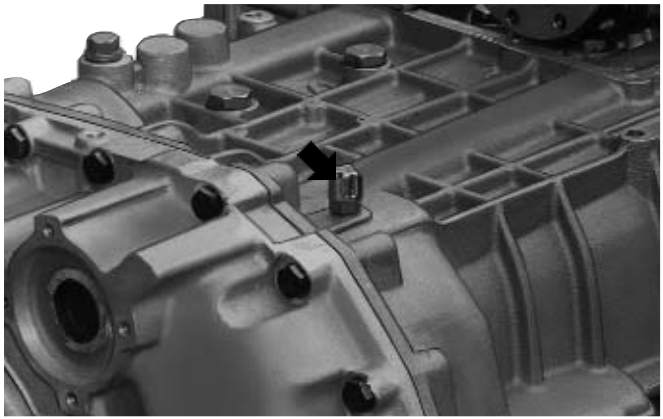
- **Interval for changing oil coolant:**
  max. 2 years (mix liquids before filling)

NOTE
If sludge starts to form or if the concentration suddenly falls, the coolant must be replaced immediately.

4.10 Bleeding the Transmission

Differences in pressure are rectified by a bleed valve.

NOTE
Ensure that valve is functioning correctly. The breather must be clean and not feature a plastic
cover. Do not spray directly with compressed water (water in transmission – risk of corrosion).



004 711

Product-family	Transm. type	Oil volume after oil change approx.	Oil volume after repairs approx.*	Tightening torque [Nm] for position 1	2	4	9	10	Filter no.	Oil grade	Oil change interval
Ecosplit	16 S 151 IT	11.0 dm³	18.5 dm³	M 38 120 or M 24 60	60	60	60	23	6085 298 026	In accordance with List of Lubricants TE-ML 02	In accordance with List of Lubricants TE-ML 02 corresponding to transmission type with ZF-Intarder
New Ecosplit	16 S 1621 TD										
	16 S 1821 TO										
16 S 181 IT	16 S1921 TD	12.0 dm³	21.5 dm³								
	16 S 2221 TO										
16 S 221 IT	16 S 2221 TD										
	16 S 2521 TO										
16 S 251 IT	16 S 2721 TO	12.5 dm³	22.0 dm³								
Ecomid 9 S 109 IT		12.0 dm³	21.0 dm³	120	60	60	60	46			
16 S 109 IT		12.5 dm³	22.0 dm³								
AS Tronic											
12 AS 2301 IT	12 AS 1631 TD	12.0 dm³	21.0 dm³	60	60	60	60	23			
	12 AS 1931 TD										
	12 AS 1931 TO										
	12 AS 2131 TO										
	12 AS 2331 TD										
16 AS 2601 IT	16 AS 2231 TD	13.0 dm³	23.0 dm³								
	16 AS 2631 TO										

1 = Transmission oil drain point; 2 = Intarder housing oil drain point; 4 = Oil overflow plug and oil filling after oil change;
9 = Oil fill plug after repairs; 10 = Screws for oil filter cover, Intarder
*If the heat exchanger is fitted horizontally, the oil volume increases by 1 dm³

Product-family	Transm. type	Oil volume after oil change approx.	Oil volume after repairs approx.	Tightening torque for [Nm] for position 1	2	4	9	10	Filter no.	Oil grade	Oil change intervals
8 S 180 IT	8 S 2101 BD 8 S 2101 BO	12.0 dm^3	21.0 dm^3	120	60	60	60	46	6085 298 026	In accordance with List of Lubricants TE-ML 02	In accordance with List of Lubricants TE-ML 02 corresponding to transmission type with ZF-Intarder
6 S 1600 IT horizontal, right heat exchanger at bottom	6 S 1601 BD 6 S 1701 BO 6 S 1901 BO	13.5 dm^3	21.5 dm^3	120	-	60	60	46			
6 S 1600 IT horizontal, right heat exch, right	6 S 1601 BD 6 S 1701 BO 6 S 1901 BO	19.0 dm^3	25.0 dm^3	120	60	60	60	46			
10 AS 2010 B IT 10 AS 2310 B IT 12 AS 2000 B IT 12 AS 2300 B IT	10 AS 2001 BD 10 AS 2001 BO 10 AS 2301 BD 10 AS 2301 BO 10 AS 2701 BO 12 AS 2001 BO 12 AS 2301 BO 12 AS 2701 BO	12.0 dm^3	21.0 dm^3	60	60	60	60	23			

1 = Transmission oil drain point; 2 = Intarder housing oil drain point: 4 = Oil overflow plug and oil filling after oil change;
9 = Oil fill plug after repairs; 10 = Screws for oil filter cover, Intarder

Chart of lubricants for ZF gearbox

Commercial Vehicle and
Special Driveline Technology

Manual and automatic transmissions for trucks and buses

List of lubricants TE-ML 02

Product groups (1)	Lubricant classes for service fills (2)	
Transmission types see page 3!	Transmissions without ZF-Intarder	Transmissions with ZF-Intarder
VAN	ZF-Ecofluid M (02E) 02D / 02F (3) / 02G alternative (4): 02A / 02B / 02L	---
Ecolite / AS Tronic lite truck 1 + bus 1		
truck 2 + bus 2	ZF-Ecofluid M (02E) 02G alternative (4): 02A / 02B / 02C / 02D	---
Hydraulic actuators	02K	---
truck 3 + bus 3	ZF-Ecofluid M (02E) 02A / 02B / 02C / 02D / 02H / 02L	ZF-Ecofluid M (02E) 02C / 02D / 02H / 02L
Ecomid / Ecomid with NMV truck + bus		
Ecosplit / Ecosplit with NMV truck 1		
truck 2	ZF-Ecofluid M (02E) alternative (6): 02A / 02B / 02D / 02H / 02L	ZF-Ecofluid M (02E) alternative (6): 02D / 02H / 02L
NewEcolite / AS Tronic lite truck + bus	ZF-Ecofluid M (02E) 02D / 02L alternative (4): 02A / 02B	---
New Ecomid truck		ZF-Ecofluid M (02E) 02D / 02L
NewEcosplit / NewEcosplit with NMV truck 1	ZF-Ecofluid M (02E) 02A / 02B / 02C / 02D / 02H / 02L	ZF-Ecofluid M (02E) 02C / 02D / 02H / 02L
truck 2	ZF-Ecofluid M (02E) alternative (6): 02A / 02B / 02D / 02H / 02L	ZF-Ecofluid M (02E) alternative (6): 02D / 02H / 02L
Classic Line truck + bus	ZF-Ecofluid M (02E) 02A / 02B / 02C / 02D / 02H / 02L	---
Transmatic	02C (5)	---

Warning: Note continuation of table and footnotes on page 2!

The list of lubricants TE-ML 02, **Edition 01.04.2006** replaces all previous editions. The current list can be requested from any ZF after-sales service center or accessed on the Internet under www.zf.com.	**ZF Friedrichshafen AG** D-88038 Friedrichshafen phone: + 49 7541 77 3505 fax: + 49 7541 77 7319

Product groups (1)	**Lubricant classes for service fills** (2)	
Transmission types see page 3!	**Transmissions without ZF-Intarder**	**Transmissions with ZF-Intarder**
AS Tronic mid truck + crane vehicle	ZF-Ecofluid M (02E) 02A / 02B / 02D (6)	---
AS Tronic 1 truck	ZF-Ecofluid M (02E) 02A / 02B / 02C / 02H	ZF-Ecofluid M (02E) 02C / 02H
AS Tronic 2 truck, bus + crane vehicle	ZF-Ecofluid M (02E) 02A/ 02D (6) / 02H / 02L	ZF-Ecofluid M (02E) 02D (6) / 02H / 02L
TC Tronic Transmission AS Tronic 2		---
Torque converter lock-up clutches TC 2	02C (5) / ATF in accordance with TE-ML 14	---

(1) Approved lubricant classes for models not listed here:
- Torque converter lock-up clutches (WSK) with separate oil circuit: 02C, ATF in accordance with TE-ML 14
- Constant-mesh and synchronised transmissions for commercial vehicles: 02A / 02B / 02C / 02H / ZF-Ecofluid M (02E)

(2) Refer to the following pages for approved commercial products, oil change intervals and low temperature limits.

(3) Product groups **VAN, Ecolite - truck 1 + bus 1:** TE-ML 02 applies only after the transmission has reached a total of 2,500 km. This also applies to repairs.

(4) Product groups **VAN, Ecolite**: In moderate climate zones, shift quality is impaired if oils of the lubricant classes 02A / 02B / 02C / 02D / 02H / 02L are used.

(5) Lubricants marked (*) on the following pages must not be used.

(6) Lubricant classes can only be used after a total transmission mileage of 540 000 km / 3 years (long-haul / coach operation) or 360 000 km / 3 years (local / distribution / service route operation, heavy-duty operation).

Comments:

1. Instructions for transmission ventilation in accordance with Installation Guidelines 1203 765 010 and 1328 765 001 must be followed.
2. A lithium saponified multipurpose grease of NLGI class 2 which is mixable with mineral oil is to be used at greasing points (grease code KP2K-30 in acc. with DIN 51825 or ISO-L-XCCHB2 in accordance with ISO 6743-9).
3. Additives of any kind added **later** to the oil change the oil in a manner that is unpredictable, and they are therefore not permitted. No liability of any kind will be accepted by ZF for any damage resulting from the use of such additives.

Transmission classification in accordance to product groups

List of lubricants TE-ML 02

Product groups	Transmission types (only basic transmission named)
	(type in bold/italic are available with ZF Intarder)
VAN	5S200, 5S270, 5S510, 5S640, 6S300, 6S320, 6S350, 6S380, 6S420, 6S650, 6S720
Ecolite / AS Tronic lite truck 1 + bus 1	S5-18, S5-24, S5-42, S5-420, S5-680, S6-36, S6-36/2
truck 2	6S850, 6AS850
bus 2	6S890, 6S700BO
truck 3 + bus 3	S6-85, 6S1000BO, 6S1200***, 6S1600, 6S1900, 6S1700***
Ecomid / Ecomid with NMV truck	9S75, ***9S109, 16S109***
bus	***8S180, 8S2100***
Ecosplit / Ecosplit with NMV truck 1	***8S151, 16S151, 8S181, 16S181, 16S221, 16S251***
truck 2	***16S231***
NewEcolite / AS Tronic lite truck + bus	6S700TO, 6AS700TO, 6S700TD, 6AS700TD, 6S800TO, 6AS800TO, 6S800TD, 6AS800TD, 6S1000TO, 6AS1000TO; 6S710BO, 6AS710BO, 6S710BD, 6AS710BD, 6S810BO, 6AS810BO, 6S810BD, 6AS810BD, 6S1010BO, 6AS1010BO
NewEcomid truck	***9S1110, 9S1310***
NewEcosplit / NewEcosplit with NMV truck 1	***8S1620, 16S1620, 8S1820, 16S1820, 8S1920, 16S1920, 16S2020, 8S2220, 16S2220, 16S2520, 16S2720***
truck 2	***16S2320***
Classic Line truck	8S1350, 16S1650, 16S1950
bus	S6-1550, 6S1380
Transmatic (Ecosplit with WSK / NewEcosplit with WSK)	16S151, 16S221, 16S251, 16S1623, 16S1823, 16S2223, 16S2523, 16S2720
AS Tronic mid truck	12AS1010, 12AS1210, 12AS1220, 12AS1420, 12AS1620
crane vehicle	12AS1620SO
AS Tronic 1 truck	***12AS1800, 16AS2200***
AS Tronic 2 truck	***12AS1630, 12AS1930, 12AS2130, 16AS2230, 12AS2300, 12AS2330, 12AS2340, 12AS2530, 12AS2540, 16AS2600, 16AS2630, 12AS2740, 12AS2940***
bus	***10AS2300, 12AS2000, 12AS2300, 10AS2310, 12AS2700***
crane vehicle	***12AS2300, 16AS2600***
TC Tronic	12TC2740, TC2

Warning: Refer to the table on page 1 for the lubricant classes authorized for the individual product groups.

Oil change intervals — List of lubricants TE-ML 02

Lubricant class	02A	02B, 02C, 02F, 02G, 02H ATF	02D, 02L	ZF-Ecofluid M (02E)	02K
Application	**oil change interval (8)**				
VAN transmissions	60.000 km	120.000 km	240.000 km	No oil change needed	---
Short-distance transport (trucks), scheduled routes (buses), tough operating conditions	60.000 km 1 year	120.000 km 1 year	240.000 km 2 years	With dry room breather (7): 360.000 km 3 years	---
Long-distance transport (trucks) Long-distance coach journeys (buses)	90.000 km 1 year	160.000 km 1 year	300.000 km 2 years	With dry room breather (7): 540.000 km 3 years	---
Hydraulic actuators	---	---	---	---	No oil change needed

(7) These intervals only apply to a hose breather in a dry room. If there is no hose breather in the dry room, the oil change intervals specified for lubricant classes 02D / 02L apply.

(8) Oil change required, depending on what occurs first.

Low temperatures limits

Lubricant classes	Oil type / SAE viscosity grade	Use at oil sump temperatures
ZF-Ecofluid M (02E) / 02B / 02D / 02F / 02G / 02K / 02L / ATF	75W / 75W-80 / 75W-85 / 75W-90 / ATF	above -40°C
02A / 02B / 02H	80W / 80W-85 / 80W-90	above -25°C
02C	40	above 0 °C
	30	above -15°C
	20W (Transmatic, TC Tronic only)	below -15°C

Lubricant class 02A

Gear oil of viscosity grades: SAE 80W / 80W-85 / 80W-90 (not applicable for Intarder)

Note:

In moderate climate zones, shift quality is impaired if viscosity grades higher than SAE 80W are used.

Manufacturer (02A)	Trade name (02A)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GS 80W
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GS 80W-90
AGIP SCHMIERTECHNIK GMBH, WÜRZBURG/D	AUTOL GETRIEBEÖL 80W-90
ARAL AG, BOCHUM/D	ARAL GETRIEBEOL EP 80W
ARAL AG, BOCHUM/D	ARAL GETRIEBEOL EP 80W-90
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA GEAR OIL MZ 80
BAYWA AG, MÜNCHEN/D	BAYWA MEHRZWECKGETRIEBEÖL SAE 80
BEHRAN OIL CO., TEHRAN/IR	BEHRAN SAMAND MB 80W-90
BELGIN MADENI YAGLAR, GEBZE KOCAELI/TR	BELGEAR EP MB 80
BLASER SWISSLUBE AG, HASLE-RÜEGSAU/CH	EP-GETRIEBEÖL 80W-100
BLASER SWISSLUBE AG, HASLE-RÜEGSAU/CH	EP-GETRIEBEÖL 80W-68
BLASER SWISSLUBE AG, HASLE-RÜEGSAU/CH	EP-GETRIEBEÖL 80W90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR EP 80W
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR EP 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL MEHRZWECKGETRIEBEÖL SAE 80W
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX GEAR OIL EP 80W
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX GEAR OIL EP 80W/90
CALPAM MINERALÖL-GMBH, ASCHAFFENBURG/D	CALPAM MP GEAR OIL 80W GL 4
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EP 80W90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL EP80W
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL UNITRON 80W
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA TRANSMISIONES 80W-90
CEPSA LUBRICANTS S.A., MADRID/E	ERTOIL TRANSMISIONES 80W-90
CEPSA LUBRICANTS S.A., MADRID/E	ERTOIL TRANSMISIONES F SAE 80
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	UNIVERSAL EP SAE 80W
CHEVRONTEXACO, GHENT/B	GEARTEX EP-A 80W
CHEVRONTEXACO, GHENT/B	GEARTEX EP-A 80W-90
COMP.BRASIL. D. PETRO. IPIRANGA, RIO DE JANEIRO/BR	IPIRGEROL EP 80W
CONDAT LUBRIFIANTS, CHASSE SUR RHONE/F	GEAR A (80W)
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR MULTIPURPOSE GEAR OIL SAE 80W90
EKOPROM, UFA/RUS	EKOIL ECO-TRANS SAE 80W
EKOPROM, UFA/RUS	EKOIL ECO-TRANS SAE 80W-85
ENI S.P.A. REFINING & MARKETING DIVISION, ROME/I	ROTRA HY 80W-90
ENI S.P.A. REFINING & MARKETING DIVISION, ROME/I	ROTRA HY DB 80W
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO GEAR OIL GP-D 80W
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE GX-A 80W
FUCHS PETROLUB AG, MANNHEIM/D	TITAN GEAR MP SAE 80W
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 791 SAE 80W85
HAFA, PARIS/F	HAFA MPB SAE 80W
HUILES BERLIET S.A., SAINT PRIEST/F	RTO EP 80W
HUILES BERLIET S.A., SAINT PRIEST/F	RTO EP 80W-90
IGOL FRANCE SA, AMIENS/F	TRANS EPA SAE80W-85W
KOMPRESSOL-OEL VERKAUFS GMBH, KÖLN/D	KOMPRESSOL-MEHRZWECK-GETRIEBEOEL SAE 80W-90
KRAFFT S.L., ANDOAIN/E	HIDROIL SAE 80W90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 35 SAE 80 W
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 35 SAE 80W-90
LIQUI MOLY GMBH, ULM/D	LIQUI MOLY GETRIEBEÖL GL 4 SAE 80W
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSMOL DB 80W
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSMOL HD 80W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL MEHRZWECKGETRIEBEOEL GL 4 SAE 80W
MOL-LUB LTD., ALMASFUZITO/H	MOL HYKOMOL 80W
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL GEAR MB 80W
NESTE MARKKINOINTI OY, ESPOO/FIN	NESTE GEAR EP 80W-90
NEW PROCESS AG, TÜBACH/CH	EP GEAROIL SAE 80W
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND SUPER M 4 80W
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL SAE 80W
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL SAE 80W-90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV GEAR OIL MP SAE 80W-85
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GEAR OIL EP/FZ SAE 80W
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GEAR OIL EP/FZ SAE 80W/90
PANOLIN AG, MADETSWIL/CH	PANOLIN EP GEAR 80W
PANOLIN AG, MADETSWIL/CH	PANOLIN EP GEAR 80W/90

PETROGAL S.A., LISBOA/P	GALP TRANSOIL 80W90
PETROGAL S.A., LISBOA/P	GALP TRANSOIL 80W
PRISTA OIL AD, ROUSSE/BG	PRISTA EP 80W
PT PERTAMINA (PERSERO), JAKARTA/RI	RORED EP-A SAE80W-90
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL 10 ZF
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL SUPER GL-4 80W
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL SUPER GL-4 80W-90
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL MZ-GETRIEBEÖL 80 GL 4
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL MZ-GETRIEBEÖL 80W-90 GL4
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CS EP M SAE 80W
S.A.E.L., MADRID/E	GULF GEAR LUBRICANT 80W-85
SHELL BRASIL, BARRA DA TIJUCA - RIO DE JANEIRO/BR	SHELL SPIRAX G 80W
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX MA 80W
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WIOLIN MEHRZWECK-GETRIEBEÖL 80
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WIOLIN MEHRZWECK-GETRIEBEÖL 80W-90
TOTAL ISU OIL CO. LTD., SEOUL/ROK	TOTAL EP 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR EP 80W
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR EP 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA PONTONIC N 80W-85
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA PONTONIC N 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL EP 80W-85
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL EP 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TRANSELF EP 80W
TOTAL LUBRIFIANTS S.A., PARIS/F	TRANSELF EP 80W-90
UNIL S.A., SAUMUR CEDEX/F	UNIL OPAL GEAR EP SAE 80W85W
VALVOLINE EUROPE, DORDRECHT/NL	HIGH PERFORMANCE GEAR OIL GL-4 80W
VEEDOL INTERNATIONAL, PANGBOURNE READING/GB	VEEDOL MULTIGEAR SAE 80W
YACCO, ST PIERRE LES ELBEUF/F	BVX M 100 80W85

Lubricant class 02B

Gear oil of viscosity grades: SAE 80W / 80W-85 / 80W-90 / 75W-80 / 75W-85 / 75W-90
(not applicable for Intarder)

Note:

In moderate climate zones, shift quality is impaired if viscosity grades higher than SAE 80W are used.

Manufacturer (02B)	Trade name (02B)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL GETRIEBEÖL GX 80 W 90 ML
AGIP SCHMIERTECHNIK GMBH, WÜRZBURG/D	AGIP ROTRA TRUCK GEAR S, SAE 75W-90
ARAL AG, BOCHUM/D	ARAL GETRIEBEOL EP PLUS 80W-90
ARMORINE S.A., LANESTER CEDEX/F	BM 80
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA SYNTOGEAR FE 75W-90 EP
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA SYNTOGEAR FE 80W-90
BAYWA AG, MÜNCHEN/D	BAYWA SUPER 8090 MC
BEHRAN OIL CO., TEHRAN/IR	BEHRAN SAMAND OEM 1 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR DL 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR HT 80W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	ENERGEAR SHX-M SAE 75W-90
BP INTERNATIONAL, PANGBOURNE, READING/GB	FRONTOL GETRIEBEÖL FE SAE 80W-90
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX UNISYNT TX
CALPAM MINERALÖL-GMBH, ASCHAFFENBURG/D	CALPAM MULTI GEAR OIL FE 80W90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL AGRI GEAR ULTRA
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL DYNADRIVE 80W-90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL DYNADRIVE PLUS 75W90
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL MULTIDRIVE 80W90
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA TRANSMISIONES EP FE+LD 75W-90
CHEVRONTEXACO, GHENT/B	MULTIGEAR 80W-90
CHEVRONTEXACO, GHENT/B	MULTIGEAR S 75W-90
CHEVRONTEXACO, SYDNEY/AUS	CALTEX TRANSLUBE LD SAE 80W
CHEVRONTEXACO, SYDNEY/AUS	CALTEX TRANSLUBE LD SAE 80W-90
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR UNIGEAR 75W90 LD
ENI S.P.A. REFINING & MARKETING DIVISION, ROME/I	ROTRA LSX 75W-90
ENI S.P.A. REFINING & MARKETING DIVISION, ROME/I	ROTRA TRUCK GEAR 80W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	ESSO GEAR OIL TDL 75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE 1 SHC 75W-90
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE S 80W-90
FALCON OIL COMPANY LTD., SHARJAH/UAE	FALCON SUPER EP GEAR OIL 80W/90 GL-4
FUCHS PETROLUB AG, MANNHEIM/D	TITAN SUPERGEAR MC 80W-90
GENOL GMBH & CO., WIEN/A	GENOL GEAR-SYN 80W-90
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 896
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF GEAR TDL 80W-90
GULF OIL INTERNATIONAL, PITTSBURG/USA	GULF SYNGEAR 75W-90
HAFA, PARIS/F	EUROGEAR SAE 75W-90
HUILES BERLIET S.A., SAINT PRIEST/F	RTO LONGEVIA P ECO 80W-90
HUILES BERLIET S.A., SAINT PRIEST/F	RTO LONGEVIA PXD ECO 75W-90
IGOL FRANCE SA, AMIENS/F	GEAR M 80W90
IGOL FRANCE SA, AMIENS/F	SYNTHEGEAR SAE75W90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 GEAR OIL XG SAE 80W-90
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 TRANS XGS SAE 75W-90
LIQUI MOLY GMBH, ULM/D	HYPOID GETRIEBEÖL TDL SAE 80W-90
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA HIPENOL TDL 80W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL GETRIEBEOEL TRUCK-SYNTH SAE 75W-90
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL HYPOID-GETRIEBEOEL TDL SAE 80W-90
MILLERS OILS LIMITED, BRIGHOUSE/GB	SYNTRAN FE/MILLERS TRX SYNTH 75W/90
MINERALÖL-RAFFIN. DOLLBERGEN, UETZE-DOLLBERGEN/D	PENNASOL MEHRZWECK-GETRIEBEOEL GL 4 SAE 80W
MODRICA OIL REFINERY, MODRICA/BIH	TRANSLUBE GL-4 SAE 80W
MOL-LUB LTD., ALMASFUZITO/H	MOL HYKOMOL KZ 80W-90
MORRIS LUBRICANTS, SHREWSBURY/GB	LODEXOL SS 80W
MORRIS LUBRICANTS, SHREWSBURY/GB	SERVOL EP 80W/90
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL GEAR SYNT TDL 75W-90
NESTE MARKKINOINTI OY, ESPOO/FIN	NESTE HYPOIDI TDL S 75W-90
NEW PROCESS AG, TÜBACH/CH	GEAROIL SYNTH
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND SUPER M 5 80W-90
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST MEHRZWECK-GETRIEBEÖL FE SAE 80W-90
OEST, GEORG MINERALÖLWERK, FREUDENSTADT/D	OEST SYNTH GETRIEBEÖL SAE 75W-90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV GEAR OIL XD-4 SAE 80W-85
OMV REFINING & MARKETING GMBH, WIEN/A	OMV UNIGEAR S SAE 75W-90
OMV REFINING & MARKETING GMBH, WIEN/A	OMV UNIGEAR SAE 80W-90

PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR CBS SAE 75W/85
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 80W
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 80W/85
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL GEAR SA SAE 80W/90
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GLOBAL MULTIGEAR TS SAE 75W/90
PANOLIN AG, MADETSWIL/CH	PANOLIN SUPER DUTY SYNTH 75W/90
PANOLIN AG, MADETSWIL/CH	PANOLIN TOPGEAR 80W/90
PETROGAL S.A., LISBOA/P	GALP TRANSVEX TDL 75W90
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL EXTRA GL-4 80W-90
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL EXTRA GL-5 80W-90
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SLG SPEC. LKW GETR.ÖL 80W90
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CARTAGO FE LD 75W90
S.A.E.L., MADRID/E	GULF SYTHETIC GEAR LUBRICANT 75W-90
SHARJAH NATIONAL LUBE OIL CO. LTD., SHARJAH/UAE	SHARLU EP GEAR LUBE 80W/90 (GL-4)
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX GX 80W
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX GX 80W-90
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL SPIRAX MX 80W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL GETRIEBEFLUID SML 80W-90
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL WIOLIN RSG 80
STATOIL LUBRICANTS, STOCKHOLM/S	GEARWAY G4 80W
STRUB + CO AG, REIDEN/CH	STRUB MULTIGEAR SGO 80W-90
STRUB + CO AG, REIDEN/CH	VULCOGEAR SYNT SGX 75W-90
TEDEX PRODUCTION SP.Z.O.O., TOMASZOW MAZOWIECKI/PL	TEDEX SUPER GEAR OIL (3343ML) SAE 80W90
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR EPS 75W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR UNIVERSAL FE 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA PONTONIC FDL 75W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA PONTONIC MDL 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL TRANSMISSION MDL 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL TRANSMISSION RS FE 80W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL TRANSMISSION SYN FE 75W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TRANSELF SYNTHESE FE 75W-90
TOTAL LUBRIFIANTS S.A., PARIS/F	TRANSELF UNIVERSAL FE 80W-90
VALVOLINE EUROPE, DORDRECHT/NL	SYNPOWER GEAR OIL TDL 75W-90
VALVOLINE EUROPE, DORDRECHT/NL	VALVOLINE STX GEAR OIL GL-5 80W-90
YACCO, ST PIERRE LES ELBEUF/F	BVX 1000
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL GEAR OIL STO SAE 80W-90
ZF FRIEDRICHSHAFEN AG, FRIEDRICHSHAFEN/D	ZF-ECOFLUID X

Lubricant class 02C

Monograde engine oil of viscosity grades: SAE 30 / 40
(mineral oil-based, applicable for Intarder)

Note:

1. In moderate climate zones, shift quality is impaired if viscosity grade SAE 40 is used.
2. Product group **Transmatic/TC Tronic**: At ambient temperatures below -15°C, engine oil of viscosity grade SAE 20W (API CD/CE/CF-4/CF/CG-4/CH-4/CI-4/SF/SG/SH/SJ/SL specifications or ACEA categories A/B/E) must be used. If possible, any one of the below-mentioned commercial products in the viscosity class SAE 20W is to be used.
3. Product group **Transmatic/TC Tronic:** The lubricants marked thus (*) may not be used.

Manufacturer (02C)	Trade name (02C)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL TURBO DIESEL MD 305 SAE 30
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL TURBO DIESEL MD 405 SAE 40 (*)
ARAL AG, BOCHUM/D	ARAL BASIC TURBORAL 30
ARAL AG, BOCHUM/D	ARAL BASIC TURBORAL 40 (*)
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA SPECIAL HDC SAE 30
BEHRAN OIL CO., TEHRAN/IR	BEHRAN TURBO DIESEL SAE 40 (*)
BLASER SWISSLUBE AG, HASLE-RÜEGSAU/CH	BLASOL 30
BLASER SWISSLUBE AG, HASLE-RÜEGSAU/CH	BLASOL 40 (*)
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP VANELLUS C3 MONO SAE 30
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP VANELLUS C3 MONO SAE 40 (*)
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX EXTRA 30
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX MULTI DF 30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL ASSURON T PLUS SAE 30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL ASSURONT PLUS SAE 40 (*)
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL CRF 30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL CRF 40 (*)
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL TROPICAL TURBO 40 ZF (*)
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	URSA LA 3 SAE 40 (*)
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	URSA TRANS FF SAE 40 (*)
CHEVRONTEXACO, GHENT/B	URSA SUPER LA 30
CHEVRONTEXACO, GHENT/B	URSA SUPER LA 40 (*)
FUCHS LUBRICANTS (UK) PLC, HANLEY/GB	TITAN TXE 30
FUCHS PETROLUB AG, MANNHEIM/D	TITAN UNIVERSAL HD 30
GENOL GMBH & CO., WIEN/A	GENOL MULTI-TURBO 30
HINO MOTORS LTD, HINO-SHI TOKYO/J	BLUE RIBBON BIG SUPER 30 SAE#30
HUILES BERLIET S.A., SAINT PRIEST/F	RTO PREXIMA 40 (*)
IGOL FRANCE SA, AMIENS/F	TRANS TURBO 4 SAE30
INA MAZIVA RIJEKA, RIJEKA/HR	INA GORGONELA S 30
INA MAZIVA RIJEKA, RIJEKA/HR	INA SAGARTIA 30
INA MAZIVA RIJEKA, RIJEKA/HR	INA SUPER 3 30
INA MAZIVA RIJEKA, RIJEKA/HR	INA SUPER 5 30
KRAFFT S.L., ANDOAIN/E	MONOGRADO SUPER S-3 SAE 40 (*)
LIQUI MOLY GMBH, ULM/D	LIQUI MOLY TOURING HIGH TECH HD 40 (*)
LIQUI MOLY GMBH, ULM/D	TOURING HIGH TECH MOTOROIL SAE 30
LUBRICATION ENGINEERS, INC., FORT WORTH, TEXAS/USA	MONOLEC GFS ENGINE OIL SAE 30
MAGNA INDUSTRIAL CO. LIMITED, HONG KONG/HK	OMEGA 643 SAE 40 (*)
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL MOTORENOEL HD-C3 SG SAE 30
MEGUIN GMBH & CO. KG MINERALOELWERKE, SAARLOUIS/D	MEGOL MOTORENOEL HD-C3 SG SAE 40 (*)
NEW PROCESS AG, TÜBACH/CH	MONO DIESEL SAE 30
OMV REFINING & MARKETING GMBH, WIEN/A	OMV TRUCK SAE 30
OMV REFINING & MARKETING GMBH, WIEN/A	OMV TRUCK SAE 40 (*)
ORLY INTERNATIONAL G.I.E., VIEUX-THANN/F	ORLY DRACO 3001 SAE 30
ORLY INTERNATIONAL G.I.E., VIEUX-THANN/F	ORLY DRACO 3001 SAE 40 (*)
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO PKO HD 4 SAE 30
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO PKO HD 4 SAE 40 (*)
PANOLIN AG, MADETSWIL/CH	PANOLIN EXTRA DIESEL 30
PANOLIN AG, MADETSWIL/CH	PANOLIN EXTRA DIESEL 40 (*)
PROFI-TECH GMBH, GINGEN/D	PROFI-CAR EXTRA C SAE 40 (*)
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SUPER TRUCK SAE 30
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL SUPER TRUCK SAE 40 (*)
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL GADINIA 30
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL GADINIA 40 (*)
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL RIMULA X 30
STATOIL LUBRICANTS, STOCKHOLM/S	STATOIL DIESELWAY 30

STATOIL LUBRICANTS, STOCKHOLM/S	STATOIL DIESELWAY 40 (*)
STRUB + CO AG, REIDEN/CH	TURBO HD SAE 30
SUOMEN PETROOLI OY, HAMINA/FIN	TEBOIL POWER D SAE 30
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR TRAXOLIA Z 40 (*)
TOTAL LUBRIFIANTS S.A., PARIS/F	ELF PERFORMANCE SUPER D 30
TOTAL LUBRIFIANTS S.A., PARIS/F	ELF PERFORMANCE SUPER D 40 (*)
YACCO, ST PIERRE LES ELBEUF/F	YACCO TRANSPRO MAS3 SAE 30

Lubricant class 02D

Gear oil of viscosity grades: SAE 75W-80
(semi-synthetic, synthetic, applicable for Intarder)

Manufacturer (02D)	Trade name (02D)
AGIP SCHMIERTECHNIK GMBH, WÜRZBURG/D	AUTOL GETRIEBEÖL VSL-4 75W-80
ARAL AG, BOCHUM/D	ARAL GETRIEBEÖL SNS SAE 75W-80
BUCHER AG LANGENTHAL, LANGENTHAL/CH	MOTOREX PRISMA TF 75W/80
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA TRANSMISIONES FE+LD 75W-80
CHEVRONTEXACO, GHENT/B	MULTIGEAR MTF 75W-80W
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR MT/LD GEAR OIL 75W80
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILTRANS SHC 30
EXXON MOBIL CORPORATION, FAIRFAX, VIRGINIA/USA	MOBILUBE XHP 75W-80
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA TRUCK GEAR FE (SAE 75W80)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA TRUCK GEARLITE SAE 75W80
FUCHS PETROLUB AG, MANNHEIM/D	TITAN CYTRAC LD 75W-80
GINOUVES GEORGES SA, LA FARLEDE/F	YORK 894 75W-80
HANDEL MIJ NOVIOL B.V., NIJMEGEN/NL	KENNOCO FLEET TRANSMISSION LUBE ED SAE 75W-80W
HUILES BERLIET S.A., SAINT PRIEST/F	RTO LONGEVIA ECO 75W-80
IGOL FRANCE SA, AMIENS/F	TRANS GEAR ZF 75W80
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 T 60 SAE 75W-80
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA TRANSMOL HD 75W-80
MOTUL SA, AUBERVILLIERS CEDEX/F	MOTUL MOTYLGEAR 75W-80
OEL-BRACK AG, HUNZENSCHWIL/CH	MIDLAND CRYPTO GEAR
OMV REFINING & MARKETING GMBH, WIEN/A	OMV GEAR OIL LDI SAE 75W-80
PAKELO MOTOR OIL S.R.L, SAN BONIFACIO (VR)/I	PAKELO GOLDENGEAR LD SAE 75W/80
PANOLIN AG, MADETSWIL/CH	PANOLIN TRANSGEAR 75W/80W
PETROGAL S.A., LISBOA/P	GALP TRANSVEX TDL ULTRA 75W80
RALOY LUBRICANTES S.A. DE C.V., TIANGUISTENCO/MEX	NEW EXPERIENCE SYNTHETIC OIL 341
REPSOL YPF LUBRICANTES Y ESPECIALIDADES, MADRID/E	CARTAGO CAJAS FE LD 75W-80
S.A.E.L., MADRID/E	GULF INTARDER GEAR OIL 75W-80
SHELL INTERNATIONAL PETROLEUM COMP LTD, LONDON/GB	SHELL TRANSMISSION OIL ZFLD 75W-80
TOTAL LUBRIFIANTS S.A., PARIS/F	ANTAR LD 75W-80
TOTAL LUBRIFIANTS S.A., PARIS/F	FINA PONTONIC TI 75W-80
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL TRANSMISSION TI 75W-80
TOTAL LUBRIFIANTS S.A., PARIS/F	TRANSELF LD 75W-80
UNIL S.A., SAUMUR CEDEX/F	GERION LD 75W80
YACCO, ST PIERRE LES ELBEUF/F	BVX Z-500 75W-80

Lubricant class 02E

Gear oil of viscosity grades: SAE 75W-80
(synthetic, applicable for Intarder)

Manufacturer (02E)	Trade name (02E)
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL SYNTRANS MAX 75W-80
ZF FRIEDRICHSHAFEN AG, FRIEDRICHSHAFEN/D	ZF-ECOFLUID M

Lubricant class 02F
ATF

Manufacturer (02F)	Trade name (02F)
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL ATF D II D
ADDINOL LUBE OIL GMBH, LEUNA/D	ADDINOL ATF D III
AGIP SCHMIERTECHNIK GMBH, WÜRZBURG/D	AGIP DEXRON III
AMERICAN AGIP COMPANY, CABOT/USA	AGIP HD SYNTHETIC BLEND ATF
AVIA MINERALÖL-AG, MÜNCHEN/D	AVIA FLUID ATF 98
BEHRAN OIL CO., TEHRAN/IR	BEHRAN AUTOMATIC II
BELGIN MADENI YAGLAR, GEBZE KOCAELI/TR	LUBEX ATF-II
BELGIN MADENI YAGLAR, GEBZE KOCAELI/TR	LUBEX ATF-III M
CEPSA LUBRICANTS S.A., MADRID/E	CEPSA ATF 2000 (SAE 10W)
CHEVRON BRASIL LTDA., RIO DE JANEIRO/BRAZIL	TEXAMATIC 7045E
CHEVRONTEXACO, GHENT/B	TEXTRAN PSM
CHEVRONTEXACO, SYDNEY/AUS	CALTEX ATF-HDM
DE OLIEBRON B.V., ZWIJNDRECHT/NL	TOR ATF DMM
ENGEN PETROLEUM LTD., CAPE TOWN/ZA	ENGEN ATF III
FL BRASIL, CONTAGEM/BR	TUTELA GI/A PLUS
FL SELENIA S.P.A., VILLASTELLONE/I	AKCELA TRANS XHD
FL SELENIA S.P.A., VILLASTELLONE/I	AMBRA HYDRODEX 3
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA CAR GI/E
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA GI/A
FUCHS PETROLUB AG, MANNHEIM/D	TITAN ATF 4000
GRUPA LOTOS SA, GDANSK/PL	LOTOS ATF IID
IGOL FRANCE SA, AMIENS/F	ATF 430
KLORA AS, GEBZE/KOCAELI / TR	KLORA ATF II K
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 AUTO 14
KUWAIT PETROLEUM R&T B.V., EUROPOORT RT/NL	Q8 AUTO 15
LUBRICATION ENGINEERS, INC., FORT WORTH, TEXAS/USA	1150 TRANS-ALL EHP AUTOMATIC TRANSMISSION FLUID
MAZIVA ZAGREB D.O.O, ZAGREB/HR	INA ATF DX IID
MORRIS LUBRICANTS, SHREWSBURY/GB	LIQUIMATIC SUPER ATF
OMV REFINING & MARKETING GMBH, WIEN/A	OMV ATF III
PANOLIN AG, MADETSWIL/CH	PANOLIN ATF DEXRON III
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CDN	HEAVY DUTY SYNTHETIC BLEND ATF
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CDN	MERCON V ATF H-36007
PETRO-CANADA LUBRICANTS, MISSISSAUGA/CDN	SYNTHETIC BLEND ATF
PETROL OFISI A.S, MASLAK-ISTANBUL-TURKEY/TR	PO ATF-2
PRISTA OIL AD, ROUSSE/BG	PRISTA ATF
PRZEDSIEBIORSTWO MODEX-OIL, KWIDZYN/PL	VECO MATIC IID
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL ATF II D
RAFINERIA NAFTY JEDLICZE SA, JEDLICZE/PL	HIPOL ATF III
RAVENSBERGER SCHMIERSTOFFVERTRIEB GMBH, WERTHER/D	RAVENOL DEXRON F III
REDOIL ITALIA SPA, SAN VITALIANO (NA)/I	CHALLOILS ATF III
SRS SCHMIERSTOFF VERTRIEB GMBH, SALZBERGEN/D	WINTERSHALL ATF III
SYNECO SPA, SAN GIULIANO MILANESE/I	ATF PLUS
TOROS MADENI YAGLAR NAKLIYAT, SELCUKLU - KONYA/TR	TOROS OIL ATF II
TOROS MADENI YAGLAR NAKLIYAT, SELCUKLU - KONYA/TR	TOROS OIL ATF III
TOTAL LUBRIFIANTS S.A., PARIS/F	FINAMATIC HP
TOTAL LUBRIFIANTS S.A., PARIS/F	TOTAL FLUIDE AT 42
VEEDOL INTERNATIONAL, PANGBOURNE READING/GB	VEEDOL ATF DEXRON III (F-30521)
WARREN OIL CO., DUNN, NORTH CAROLINA/USA	UNIVERSAL SYNTHETIC BLEND AUTOMATIC TRANSMISSION F
YACCO, ST PIERRE LES ELBEUF/F	YACCO ATF III
ZELLER + GMELIN GMBH & CO., EISLINGEN/D	DIVINOL FLUID III F

Lubricant class 02G

Gear oil

Viscosity grade: SAE 75W (mineral oil-based, not applicable for Intarder)

Manufacturer (02G)	Trade name (02G)
CHEVRONTEXACO, GHENT/B	MULTIGEAR MTF LT
FUCHS PETROLUB AG, MANNHEIM/D	TITAN EG 75 ZF
FUCHS PETROLUB AG, MANNHEIM/D	TITAN GEAR ZF

Lubricant class 02H

Gear oil of viscosity grades: SAE 75W-80 / 75W-85 / 75W-90 / 80W / 80W-90 / 85W-90 / 30 (mineral oil-based, applicable for Intarder)

Note:

In moderate climate zones, shift quality is impaired if viscosity grades higher than SAE 80W are used.

Manufacturer (02H)	Trade name (02H)
FL SELENIA S.P.A., VILLASTELLONE/I	TUTELA TRUCK ZC 90 SAE80W-90

Lubricant class 02K
Hydraulic fluid

Manufacturer (02K)
DEUTSCHE PENTOSIN WERKE GMBH, WEDEL/D

Trade name (02K)
PENTOSIN CHF 11S HYDRAULIC FLUID (70W-75)

Lubricant class 02L

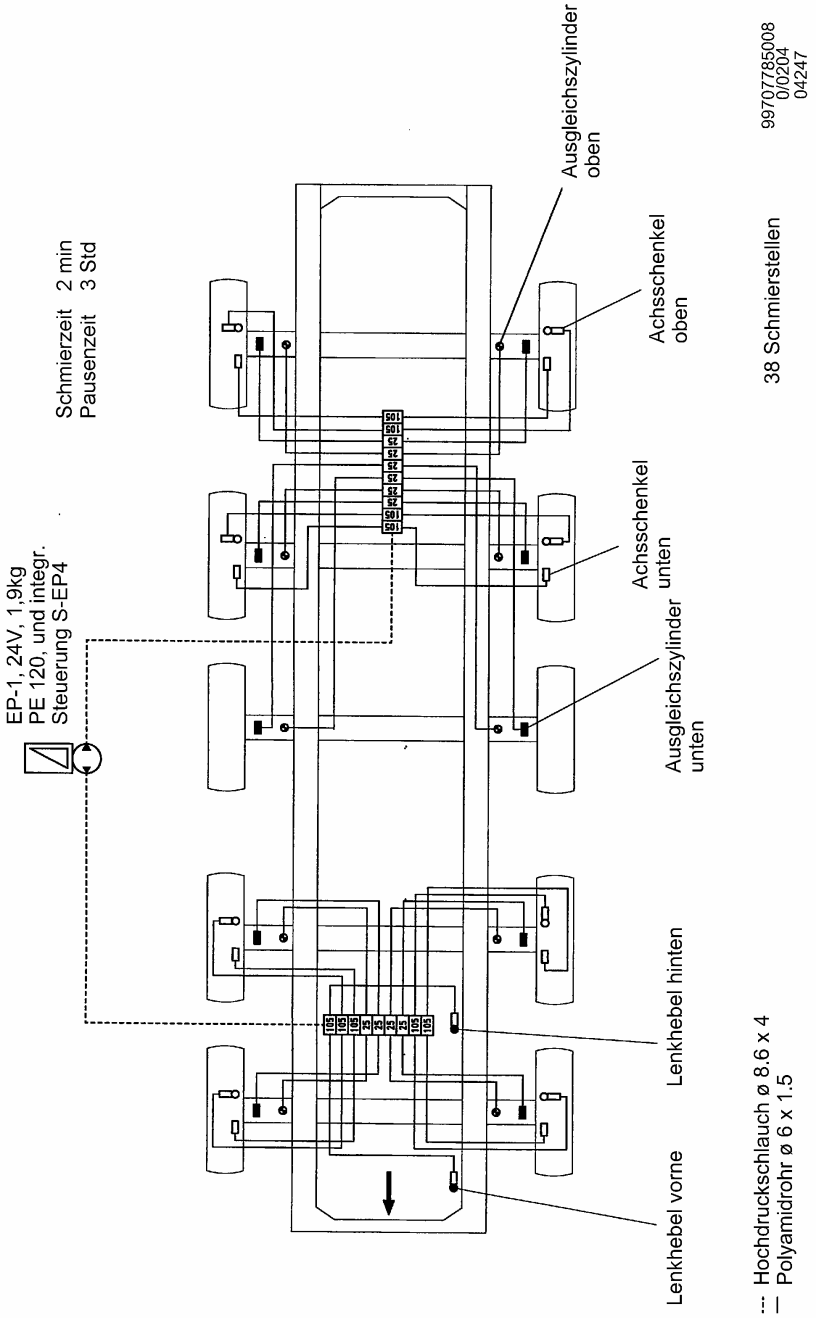
Gear oil of viscosity grades: SAE 75W-80 / 75W-85
(semi-synthetic, synthetic, applicable for Intarder)

Manufacturer (02L)	Trade name (02L)
BP INTERNATIONAL, PANGBOURNE, READING/GB	BP ENERGEAR SHX 30
CASTROL INTERNATIONAL, PANGBOURNE READING/GB	CASTROL SYNTRANS
COGNIS DEUTSCHLAND GMBH, MONHEIM/D	EMGARD 2924
VEEDOL INTERNATIONAL, PANGBOURNE READING/GB	VEEDOL SYNMESH

Centralized lubrication system

Overview of lubricating points

Achsschenkel unten	Lower stub axle
Achsschenkel oben	Upper stub axle
Lenkhebel vorne	Front drop arm
Lenkhebel hinten	Rear drop arm
Ausgleichzylinder unten	Lower compensation cylinder
Ausgleichzylinder oben	Upper compensation cylinder
Schmierstellen	Lubricating points
Hochdruckschlauch	High pressure hose
Polyamidrohr	Polyamid tube
EP-1, 24V, 1,9kg PE 120, und integrierter Steuerung S-EP4	EP-1, 24V, 1.09 kg PE 120 and integrated control S-EP4
Schmierzeit	Lubrication time
Pausenzeit	Pause time



Memo:

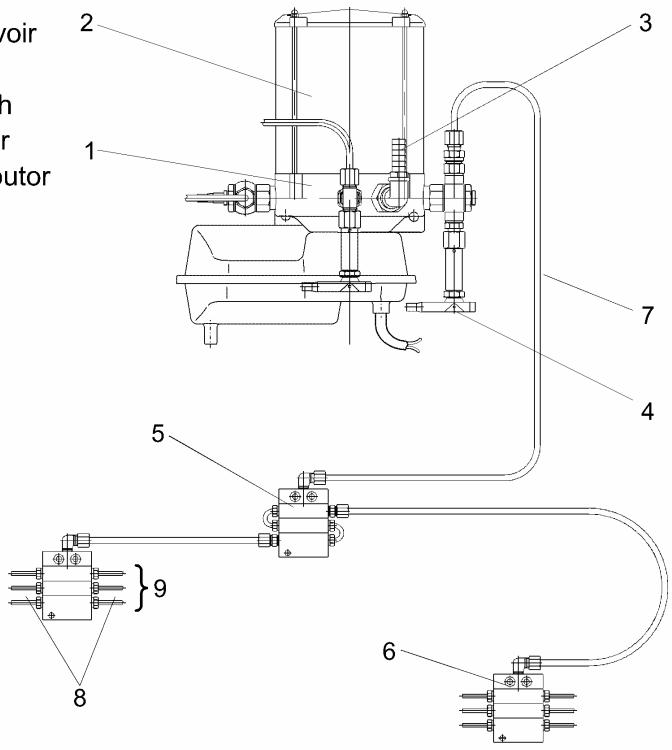
1 Method of operation of the BEKA-MAX central grease lubrication system:

The BEKA-MAX central grease lubrication system operates on a progressive basis and is capable of using grease to NLGI Class 2. "Progressive" signifies that the bearings are lubricated in a progressive sequence, i.e. one after the other. This design principle permits easy monitoring of the system by means of an in-built pressure relief valve in the pump element. If any lubrication point cannot be lubricated from the distributor, a back pressure of up to 280 bar will be built up in system and at that point, a controlled discharge will be effected by the pressure relief valve. A micro switch on the relief valve of the pump element send a warning signal to a pilot light in the driver's cabin.
Normally, progressive systems are operated using commercially available standard greases to NLGI Class 2.

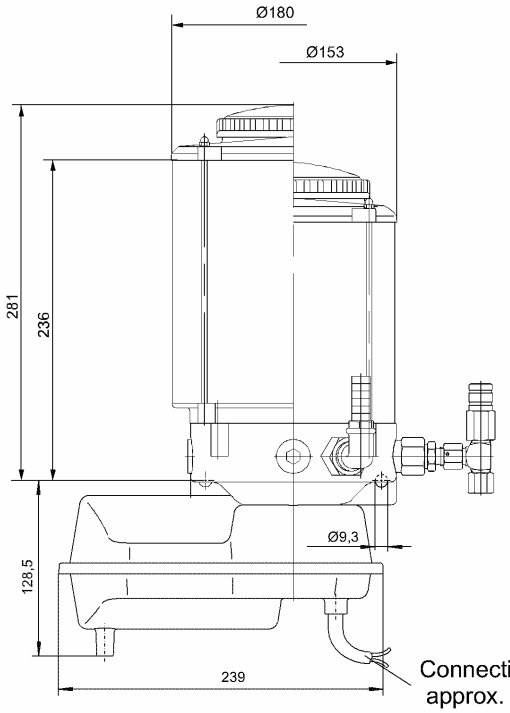
Design of the BEKA-MAX central grease lubrication system:

An electrically actuated piston pump, with up to three pump elements, supplies lubricant to the main progressive distributor (if installed) which, in turn, distributes grease to the secondary distributors in the correct ratio. These secondary distributors then supply the lubricant to the various bearings on the vehicle. If there are less than twenty lubrication points on the vehicle, only one distributor will be required. An electronic control module will trigger lubricating and "off" times of the pump and hence the total quantity of lubricant supplied.

1 central grease pump EP-1
2 transparent lubricant reservoir
3 filling nipple
4 relief valve with micro switch
5 main progressive distributor
6 auxiliary progressive distributor
7 main pipe
8 lubricant pipes
9 lubrication points



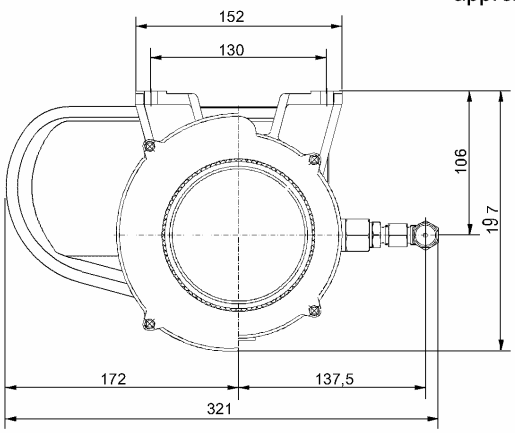
2 Function description, central lubricating pump EP-1:



Method of Operation:

The DC motor (10) provides a continuos drive to the eccentric (5) with thrust ring (6). This cam arrangement produces the suction and pressure stroke of the primary piston (7) and the integrated check value (8) prevents return of lubricant.

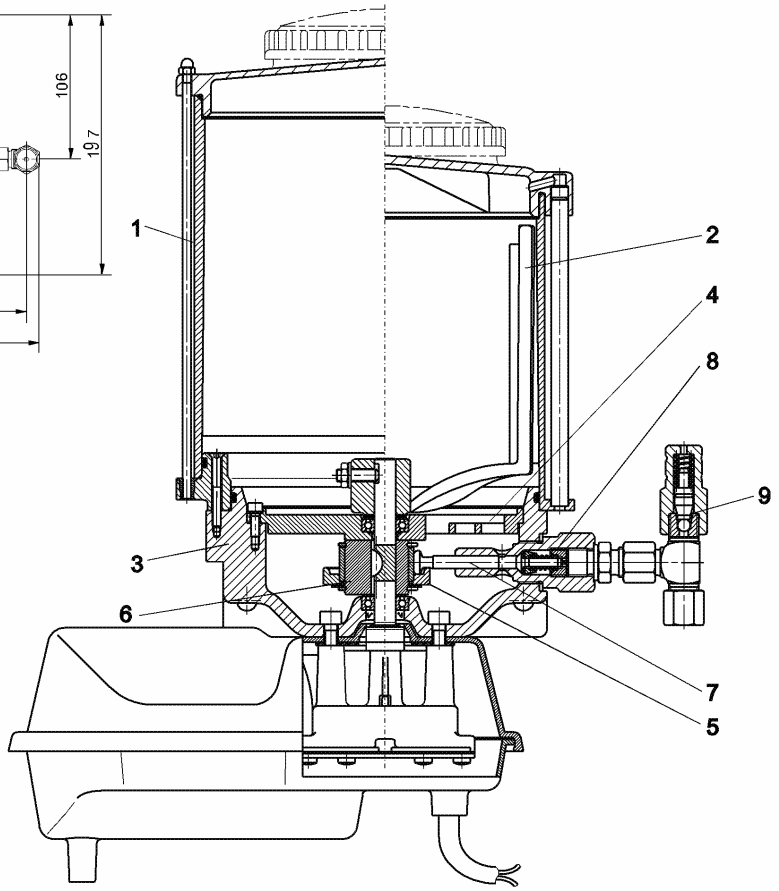
The rotating charging arm (2) forces lubricant from the reservoir (1) via the perforated base plate (4) into the pump housing at the bottom end of the pump body. The combination of charging arm and perforated plate serves to reduce air bubbles to insignificant dimensions. A rubber wiper blade on the charging arm (2).



Permits visual check of grease level in the transparent reservoir (1).

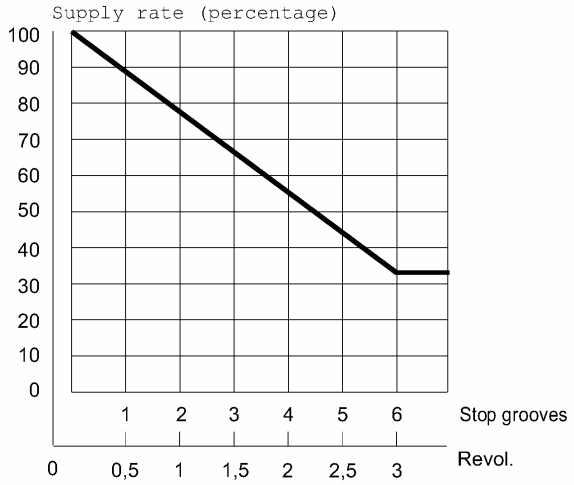
Filling of the reservoir is effected via the hydraulic grease nipple.

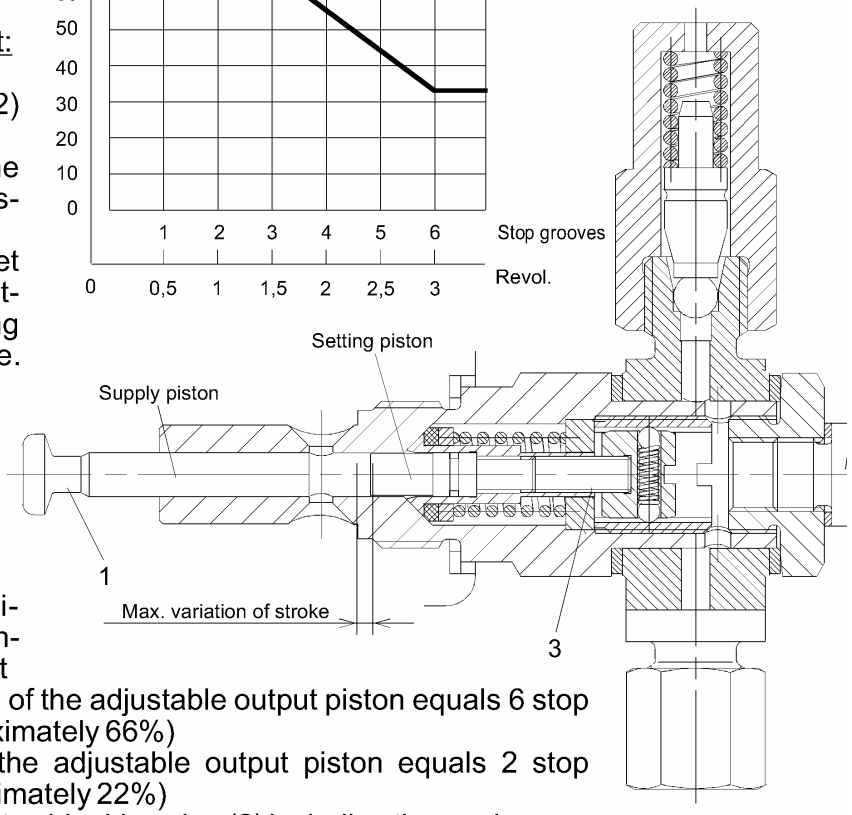
The pressure relief valve (9), is pre-set to 280 bar operating pressure, to provide protection for the pump and piping system.



Adjusting output of the pump element PE-120 V:

Adjustability of the output allows use of this pump element for supplying lubrication systems of different sizes.





Adjusting pump unit:

- Remove plug (2) using Allen key.
- Adjustment of the va´riable rate piston
- The piston is set at maximum output, when leaving the factory, i.e. stop groove 0.
- Clockwise rotation decreases the output (1 stop groove equals approx. 11 % of output)
- Counter-clockwise rotation will increase the output
- Maximum stroke of the adjustable output piston equals 6 stop grooves (approximately 66%)
- 1 revolution of the adjustable output piston equals 2 stop grooves (approximately 22%)
- Replace and tighten blanking plug (2) including the washer.

Installation of pump elements into the electric pump EP-1:

- Removal and installation of pump unit must be carried out when the pump is not working.
- Remove blanking plug.
- Install pump element with piston partially extended.
- Insert with pump piston angled upwards.
- When the piston head touches thrust ring, move to horizontal position (Fig. 11).
- Tighten pump element in place.
- Removal is effected by a reserve sequence of operations.
- During removal of the pump element, ensure that the piston (1) is not left behind within the housing.
- When installing pump element, carry out pump rotation test to establish that the unit is correctly installed.
- With every revolution of the pump, clearly visible quantity of grease must be seen to be leaving the pump outlet

Fig. I

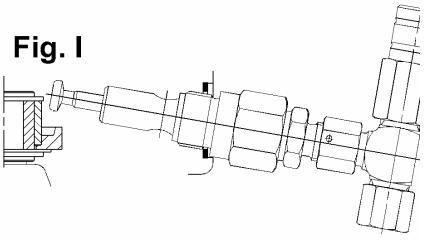
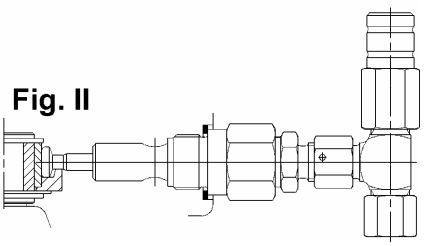


Fig. II



3 Integrated electronic control unit S-EP 4 with data memory for pump type EP-1 and OC-1:

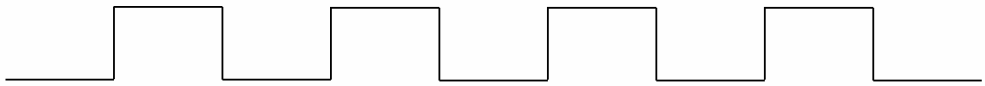
The electronic control unit S-EP 4 is used for control of a central lubrication system, governed according to operating times, both for progressive systems (EP-1 pumps) and for multi-line systems (OC-1 pumps).

Sequence of steps of operation:
(Time of lubrication; inoperative periods): After ignition has been turned ON, the yellow LED will be lighted for approx. 2,5 sec., this signalling that the system is ready for operation. If a function test is to be performed, an intermediate lubrication cycle has to be started by means of a push button at the engine housing or in the dashboard.
When that push button in the dashboard or at the engine housing is actuated, the time of lubrication is started and the pump is turned ON. After the time lubrication is completed, the pump motor will be turned OFF and the inoperative time begins. All subsequent steps of lubrication will be started automatically in accordance to the rhythm of the pre-selected inoperative times.

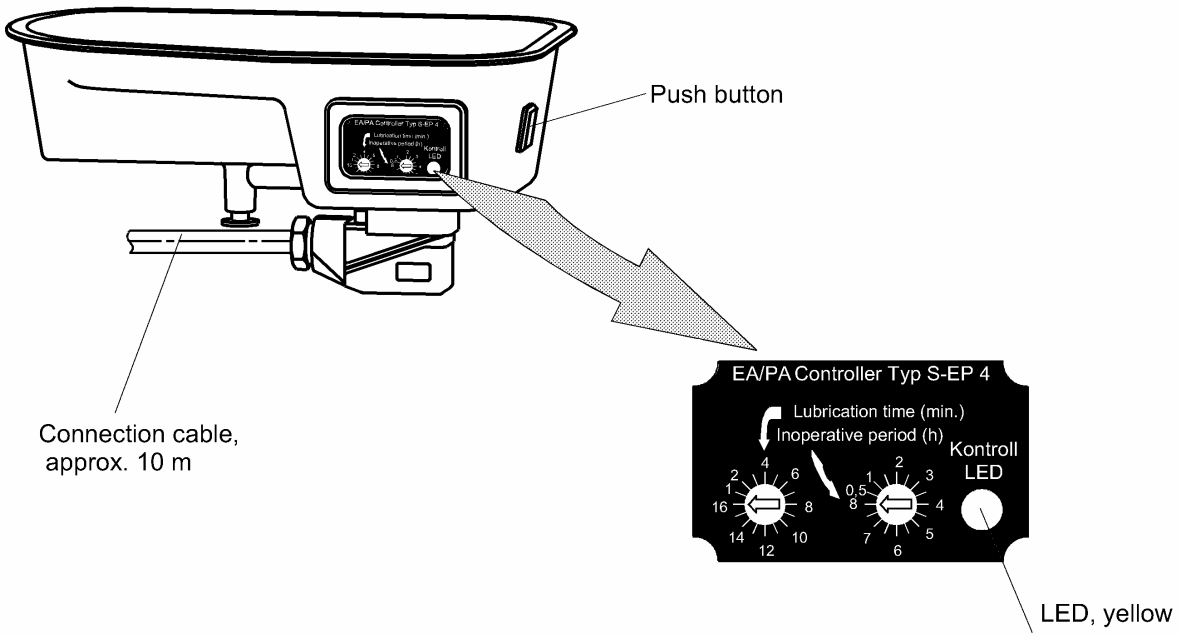
If the ignition is turned off while an inoperative time or a lubrication cycle is going on, the time will be interrupted and stored in the memory. When the ignition is turned on again, the dates stored in the memory will be re-activated and the sequence of operations will be continued at that point where it was interrupted before.
When the ignition is turned ON, an intermediate lubrication cycle can be started at any time by means of the push button at the engine housing or in the dashboard.
Whenever the control unit is connected for the first time, a lubrication cycle will be started.
Each control unit is equipped with a yellow LED, indicating the following functions:

Ignition ON: > Diode is lighted for approx. 2,5 sec.

Lubrication cycle: > Diode is flashing



The functions of the LED may be shown also at an external point, by a pilot lamp in the dashboard of the driver's cab.

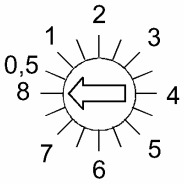


Technical details:

Supply voltage:	10 30 Volts
Max. current load:	I = 6,0 A
Fuse (not supplied with the unit)	F 6,3 A (5x20) medium inertia
Output for signal lamp:	I = 0,4 A
Temperature range:	from-35°C up to +75°C
Enclosure:	IP 65

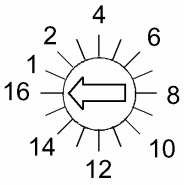
Inoperative period:

0,5 h - 8 h

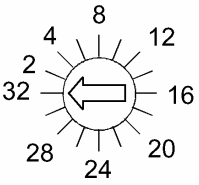


Time of lubrication:

Time range I: 1 min. - 16 min.



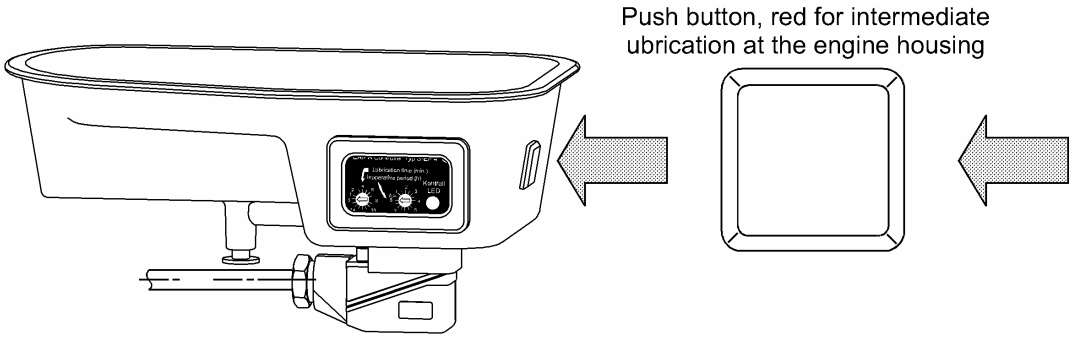
Time range II: 2 min. - 32 min.



To enable setting of the time, remove the red frame, using a flat screwdriver, and detach the 4 crosshead screws. After that, the transparent cover can be removed, if the cover should not be closed in the correct way, water may penetrate the system which then may be destroyed. In any such case, warranty claims cannot be accepted. When ordering part, please state the range of lubrication times required by you.

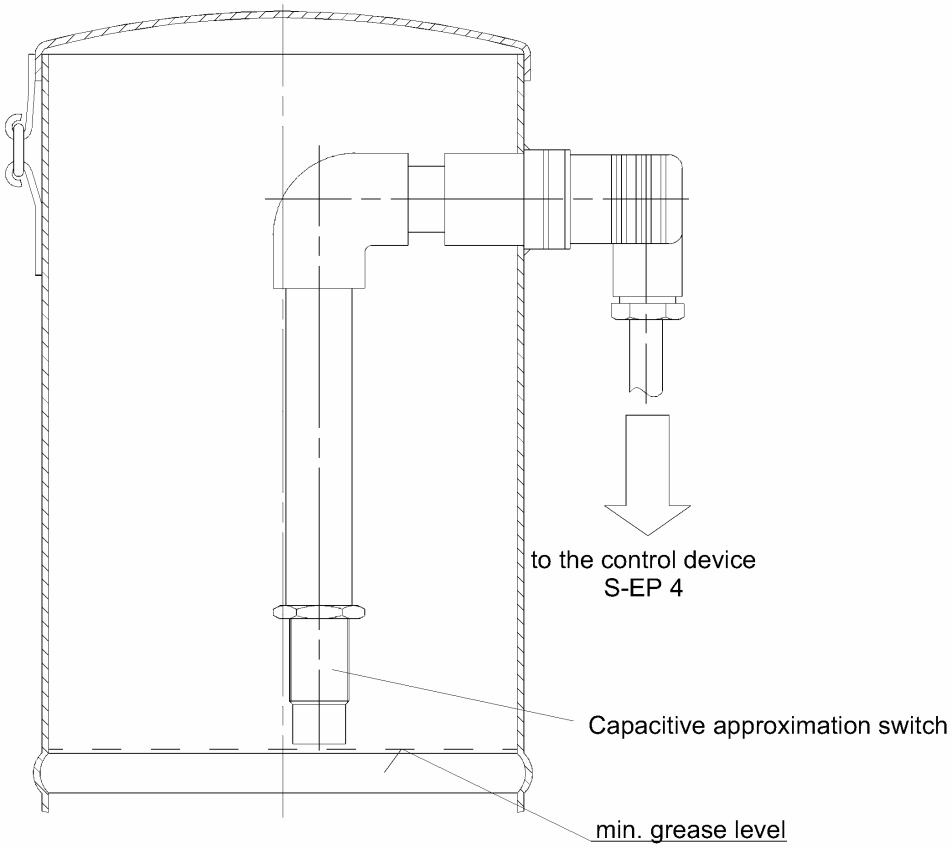
Intermediate lubrication cycle:

An intermediate lubrication cycle can be started by means of the push button at the engine housing or in the dashboard of the vehicle.



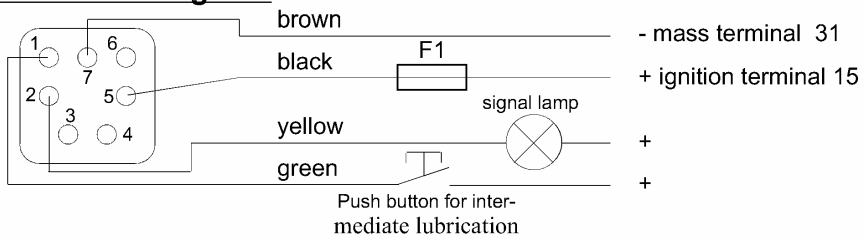
Special execution electric grease level control

Optional grease pumps can be equipped with an electric grease level control. In this case, there is assembled in the pump container an capacitive approximation switch which sends at high level of grease a signal to the electronic control S-EP 4 which is evaluated by the control device.

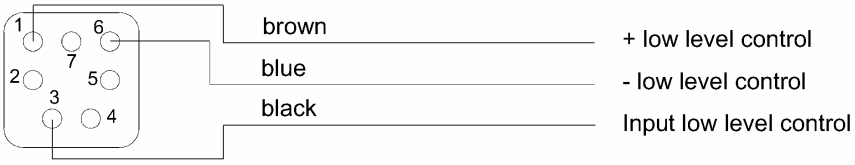


The control device evaluates the signal and the yellow LED slowly blinks (1 sec. on, 2 sec. off).
To prevent any air from being pumped into the system, the pump shuts down. Once the container has been filled, a lubricate signal can be triggered through the centralised lubrication system.

Terminals diagram:

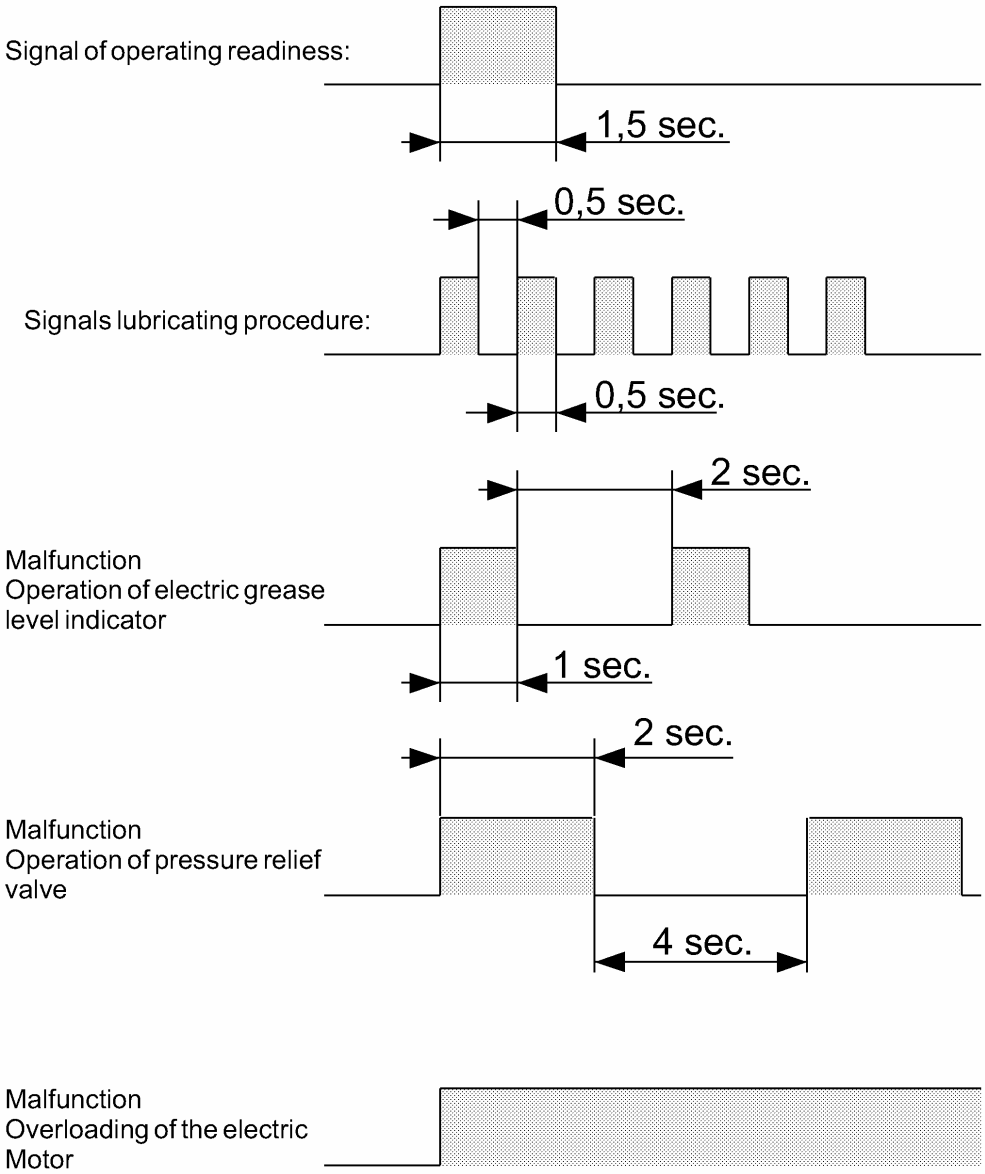


view of plug-incontacts no.1

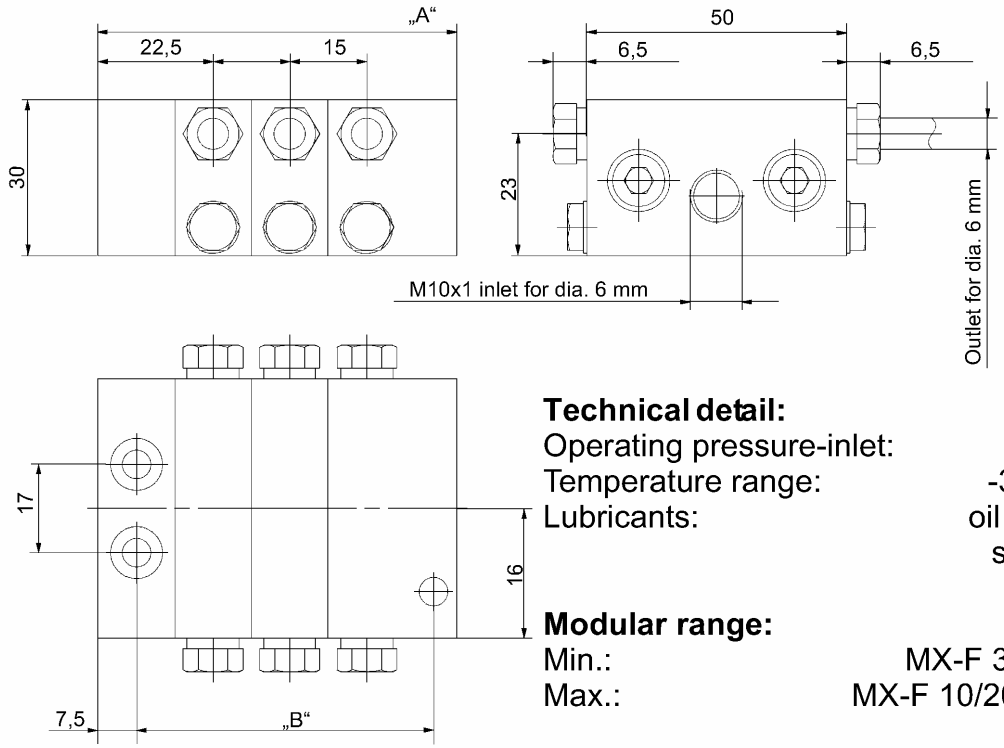


view of plug-incontacts no.2

Signals of the LED and the external signal lamp:



4 Method of operation of progressive distributors MX-F:



Technical detail:

Operating pressure-inlet:	300 bar
Temperature range:	-35°C to +100°C
Lubricants:	oil , soft grease or standard grease

Modular range:

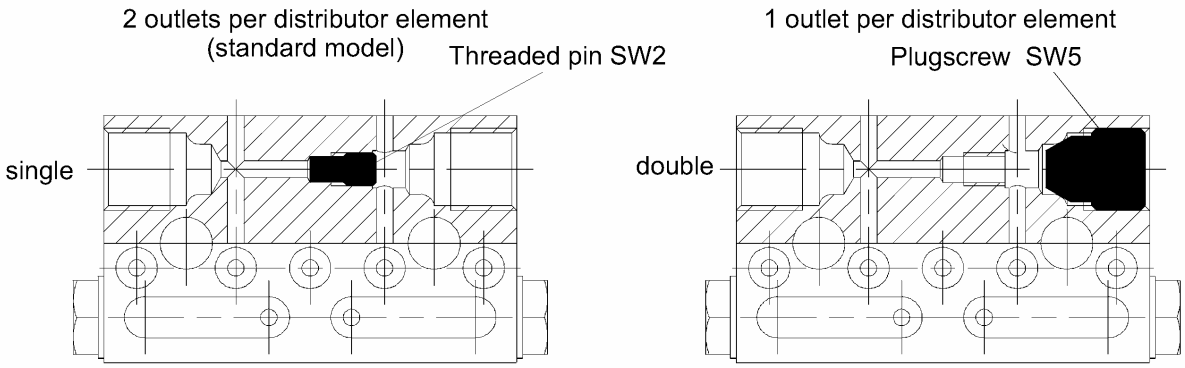
Min.:	MX-F 3/6 (3 elements)
Max.:	MX-F 10/20 (10 elements)

Elements code	Output per outlet	Output per element	Piston dia.
MX-F 25	25 mm^3	50 mm^3	3 mm
MX-F 45	45 mm^3	90 mm^3	4 mm
MX-F 75	75 mm^3	150 mm^3	5 mm
MX-F 105	105 mm^3	210 mm^3	6 mm

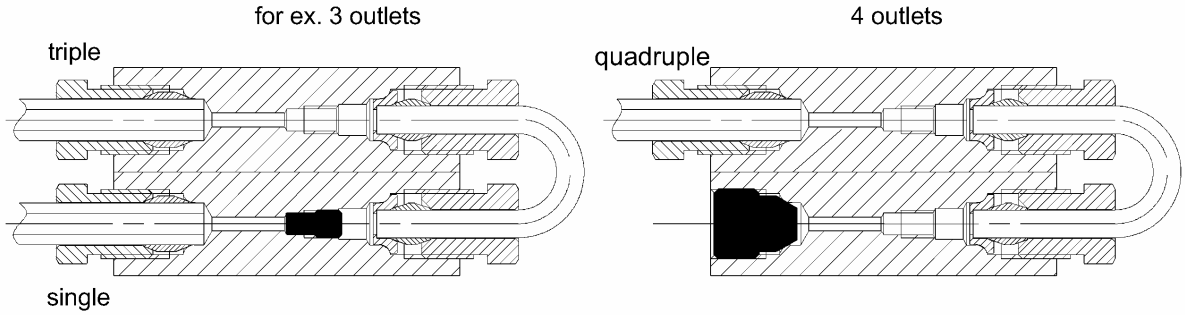
Outlets	2	4	6	8	10	12	14	16	18	20
dimension “A"	70	70	70	85	100	115	130	145	160	175
dimension “B"	58	58	58	73	88	103	118	133	148	163

Progressive distributors are defined as assemblies containing a series of pistons, whose function is to deliver lubricant to bearings; the lubricant itself provides an hydraulic force to operate these pistons in a progressive sequence: thus, each bearing connected to a piston receives a measured supply of lubricant, one after the other.
Should there be an obstacle to the flow of lubricant, e.g. crushing of the lubricant delivery pipe or excessive back pressure in the bearing, the progressive distributor block will be unable to proceed with this cycle. This blockage can be used to monitor the operation of a distributor assembly. On automatic pumps, e.g. EP-1 electric pump, lubricant will escape from the pressure limiting valve.
The progressive distributors are assembled in modular form and can suit the relevant number of lubrication points by extension or reduction in the number of individual elements. This modular design allows for combinations of various element with differing rates of lubricant delivery.
Delivery outputs per piston stroke are achieved by the use of different piston diameters. In order to achieve a complete and correct cycle of operation, a progressive distributor assembly must always comprise a minimum of three operating elements.

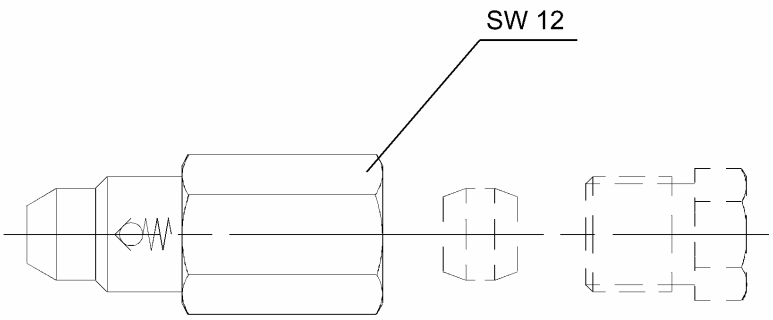
Combination of outlets:



Combination of several outlets:



Check valve for progressive distributor MX-F:

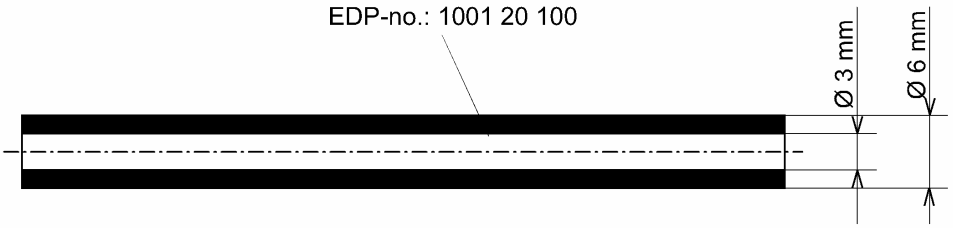


This check valve is used in conjunction with primary distributors and has the purpose of counteracting high back pressure.

5 Installation of pipework:

Types of pipings:

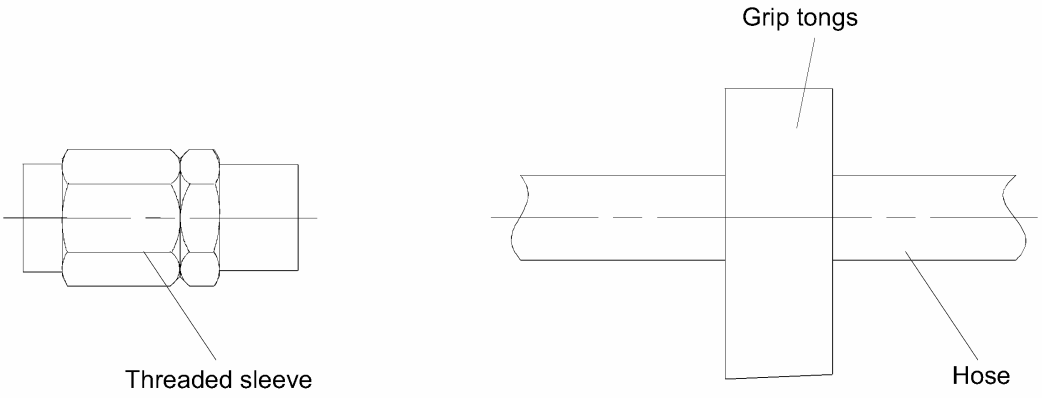
From the progressive distributor to the lubricant point, a nylon pipe of Polyamide PA 12 is recommended. In the progressive system, the standard diameter of tail pipes is 6 mm. The wall thickness of this tube is 1,5 mm, so tube inserts are not necessary.



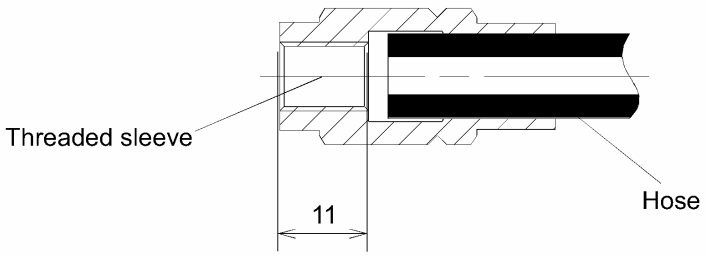
From the pump to the main distributor, and from the main distributor to the secondary distributor, or where movement is expected, a high pressure hose of nominal 4 mm bore is used. This hose has an outside diameter of 8.3 mm and is used with re-usable ferrules and inserts.

Fitting of the hose ferrel:

Grip the hose, using tube pliers. Lubricate the end of the hose with either oil or grease

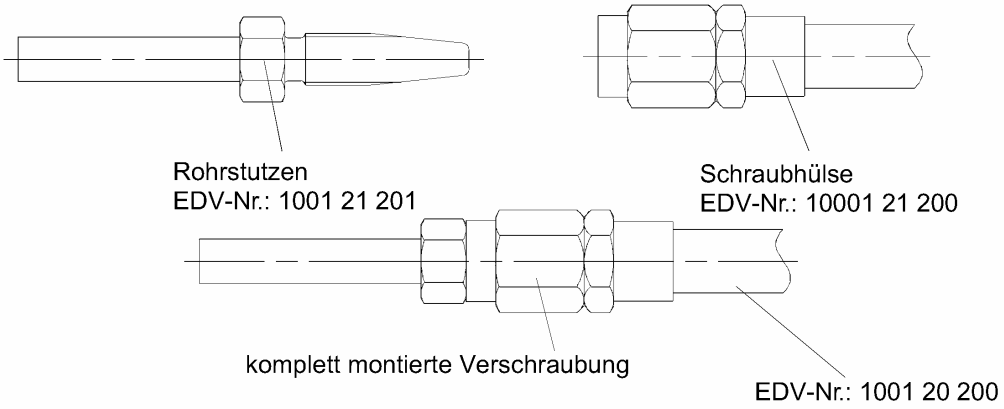


Place the threaded sleeve on to the hose and turn in an anti-clockwise direction until the dimension shown in the drawing (11 mm) is attained.



Fitting the hose insert:

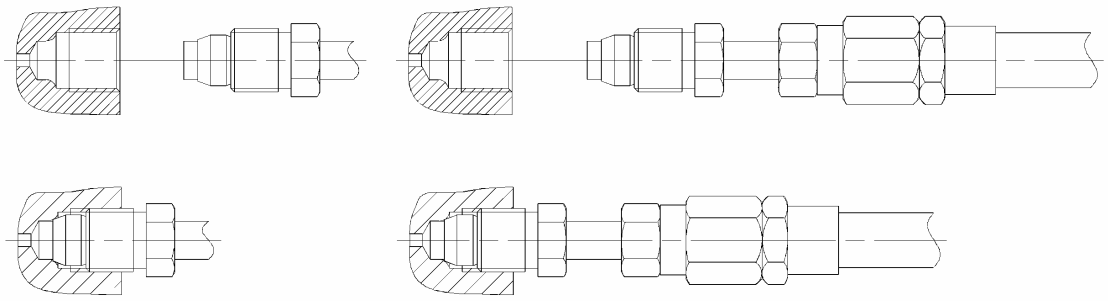
The threaded portion, as well as the cone-shaped should be oiled carefully. The insert is then screwed into the ferrule up to the stop position.



Important note:

From time to time, the outside diameter of the hose can vary slightly, because of manufacturing tolerances. When required to assemble hose at the bottom end of the permissible tolerance, with a hose ferrule at the top end of its tolerance scale, a successful joint can be made by flattening the ferrule (at the point where the hose enters) by 1 or 2 mm into an oval shape.

Joints are made at the distributor by means of a sleeve nut and cone fitting.



Polyamidrohr mit Doppelkegelring und Überwurfschraube

Hochdruckschlauch mit Doppelkegelring, Überwurfschraube, Rohrstutzen und Schraubhülse.

Notes concerning installation:

- Avoids points where chafe can occur against other parts of the vehicle.
- Install pipes with adequate clearance from heat sources (such as exhaust, engine etc.): where necessary, use steel pipe 6 mm x 1 mm.
- When fitting lubrication pipes to moving components, such as part of axles, tail lifts, cranes, hoists etc., particular care must be taken to avoid damage or chafing.

Memo:

Part G2

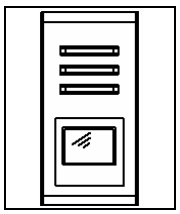
Annex

Superstructure

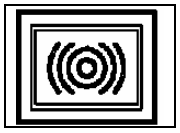
Load Moment Limiter (AML)

AML

Actuate the rocker tip switch **40** "tele indication". The display on the monitor (chap. B-2-2, item 39) changes between the tele indication and the telescope selection mode (refer to the Operating Manual of the Automatic Safe Load Indicator Part G2, superstructure).



The warning buzzer **4** "AML" sounds (intermittently) if the AML's load ratio reaches 90%.
If the load ratio reaches 100%, the buzzer sounds continuously.



Memo:

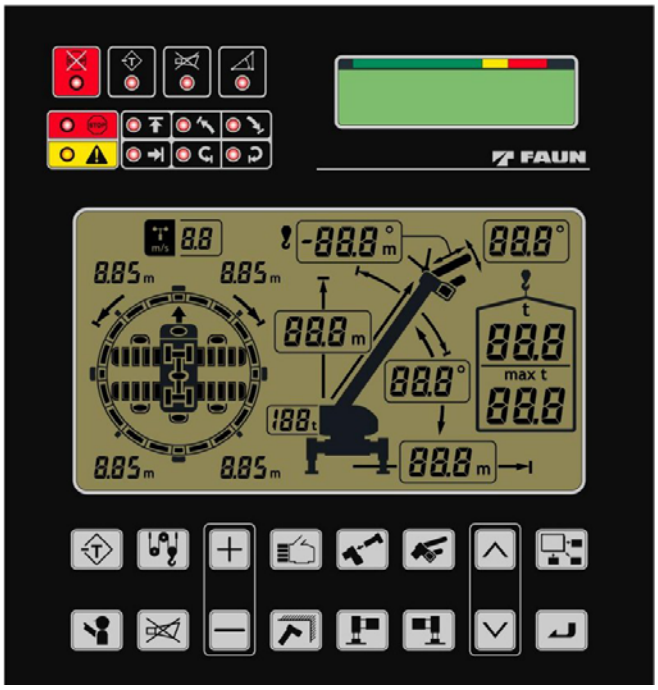
AML-B Operation Manual for FAUN ATF 220G-5

FAUN GmbH

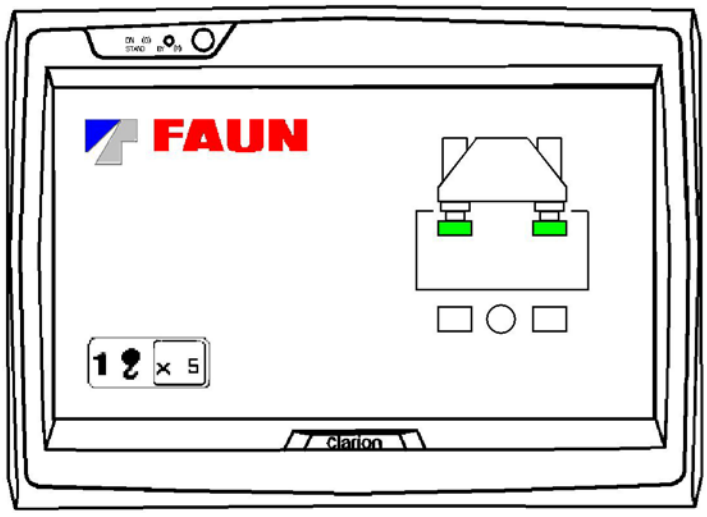
AML-B Operation Manual for FAUN ATF 220G-5
Table of Contents

1 Function keys and displays

Fig. 1 shows the AML control panel and graphic display.



AML control panel



Graphic display

Fig.1 AML control panel and graphic display

1.1 Function Keys

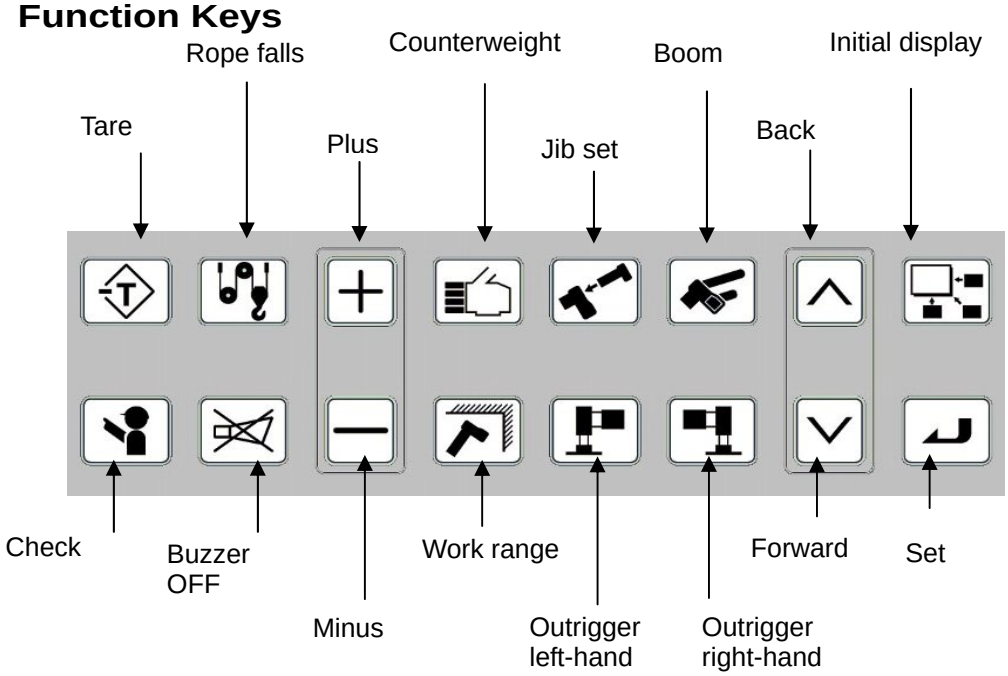


Fig. 1.1 Function keys

<Initial display>:
Use this key to quit or cancel the current function or condition. If this key is pushed, the AML goes to initial (basic) display mode.

<Set>:
Use this key to register or determine the selected condition.

<Back>:
Use this key for menu selection. When this key is used for menu selection, the menu cursor moves upwards or left.

<Forward>:
Use this key for menu selection. When this key is used for menu selection, the menu cursor moves down or right.

<Boom>:
Use this key for boom or jib operation selection.

<Jib set>:
Use this key for jib set operation.

<Outrigger left>:
Use this key for left-hand outrigger condition selection.

<Outrigger right>:
Use this key for right-hand outrigger condition selection.

<Counterweight>:
Use this key for counterweight condition selection.

<Work range>:
Use this key to activate or cancel the “work range limit function”.

(cont'd) 1.1 Function Keys

<Plus>:
Use this key to increase the numerical value.

<Minus>:
Use this key to decrease the numerical value.

<Rope fall>:
Use this key to select the rope falls (number of part-lines).

<Buzzer off>:
Use this key to interrupt the buzzer alarm temporarily.

<Tare>:
Use this key to activate or deactivate the "TARE function". When this key is pressed, the TARE function is activated and the load display value is reset to zero. Moreover, the load values are saved before this key is pressed. While the TARE function is activated, the saved values are subtracted from the load display. When this key is pressed again, the TARE function is deactivate.

<Check>:
Use this key to start the AML check function or to display "Speed pre-selection and maintenance" menu.

Note: In the following description < > means the function key.

1.2 Displays

1.2.1 LED

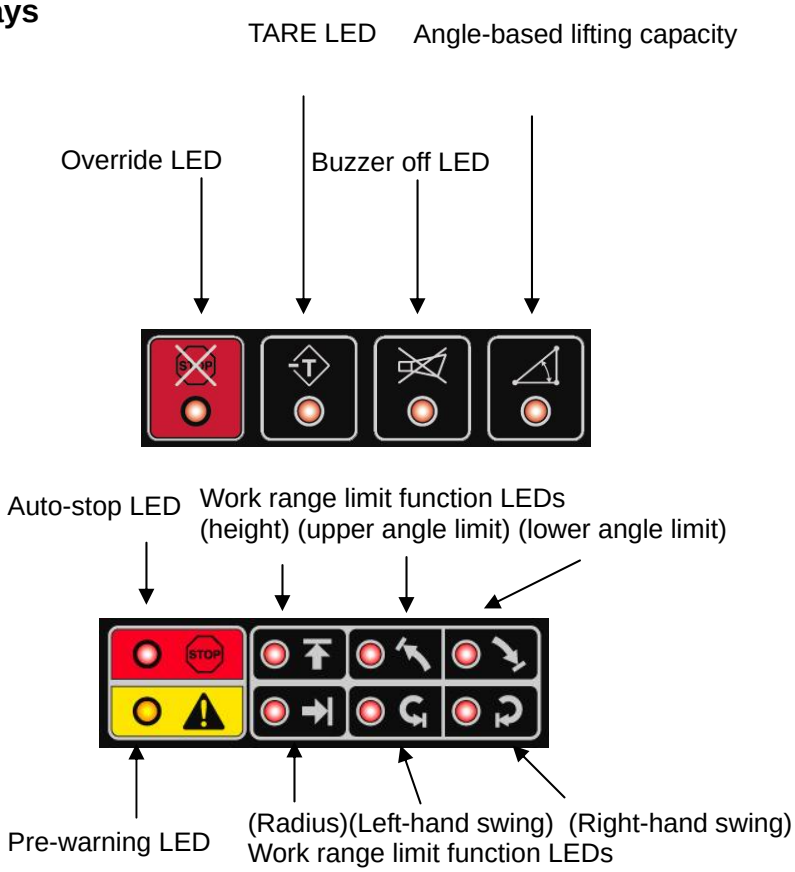


Fig.1.2.1. LED display

Override LED: If the override key or the overwind cancel key is ON, this LED goes on to indicate that the auto-stop function is deactivated.

Tare LED: This LED lights up if the TARE function is activated.

Buzzer off LED: This LED lights up if the buzzer off function is activated.

Angle-based lifting capacity LED: This LED goes on if the angle-based lifting capacity control is performed (ex: jib operation).

Auto-stop LED: This LED is lit while an auto-stop condition is present. It is also lit if the override key or the overwind cancel key is ON.

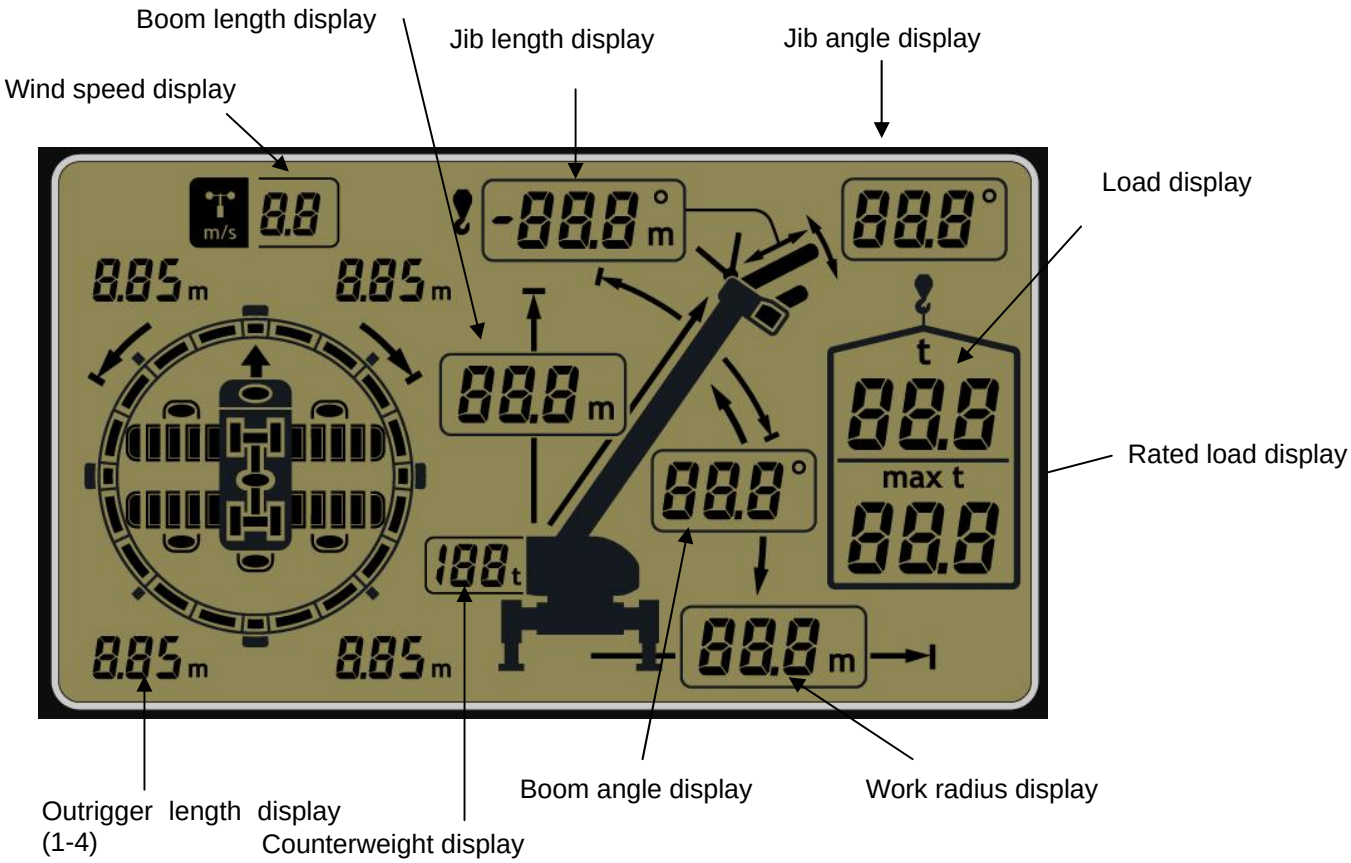
Pre-warning LED: This LED goes on if the load ratio enters the pre-warning range (90-102.5%).

Work range limit function LEDs: These 6 LEDs indicate the current work range function status in question.

LED status	**Meaning**
OFF	The work range function is deactivated.
ON	The work range function is activated.
Flashing	The work range function is activated and auto-stop control is being performed.

1.2.2 LCD panel

1.2.2.1 Numerical Displays



Load Display: Normally displays the load. In some display modes (ex: jib set operation), "- - -" appears.

Rated Load Display: Normally displays the rated load. In some display modes (ex: jib set operation), "- - -" appears.

Boom Angle Display: Normally displays the boom angle. While registering or canceling the work range limit function, it displays registered lower boom angle limit information.

Boom Length Display: Normally displays the boom length. While the work range limit function is being registered or cancelled, it displays the registered height limit information.

Work Radius Display: Normally displays the work radius. In some display modes (ex: jib set operation), "- - -" appears. While the work range limit function is registered or cancelled, it displays the registered work radius limit information.

Jib Angle Display: Displays the jib offset angle if jib operation is selected. Otherwise, nothing is displayed.

(cont'd) **1.2.2.1 *Numerical Displays***

Jib Length Display: Displays the following information.
While selecting the jib, the jib length is displayed.
If the **<Rope fall>** key is pressed, "Pxx" is displayed. (xx indicates the number of rope falls)
If the hook displacement switch is on, the hook displacement is displayed.
While the work range limit function is registered or cancelled, it displays the registered boom upper angle limit information.

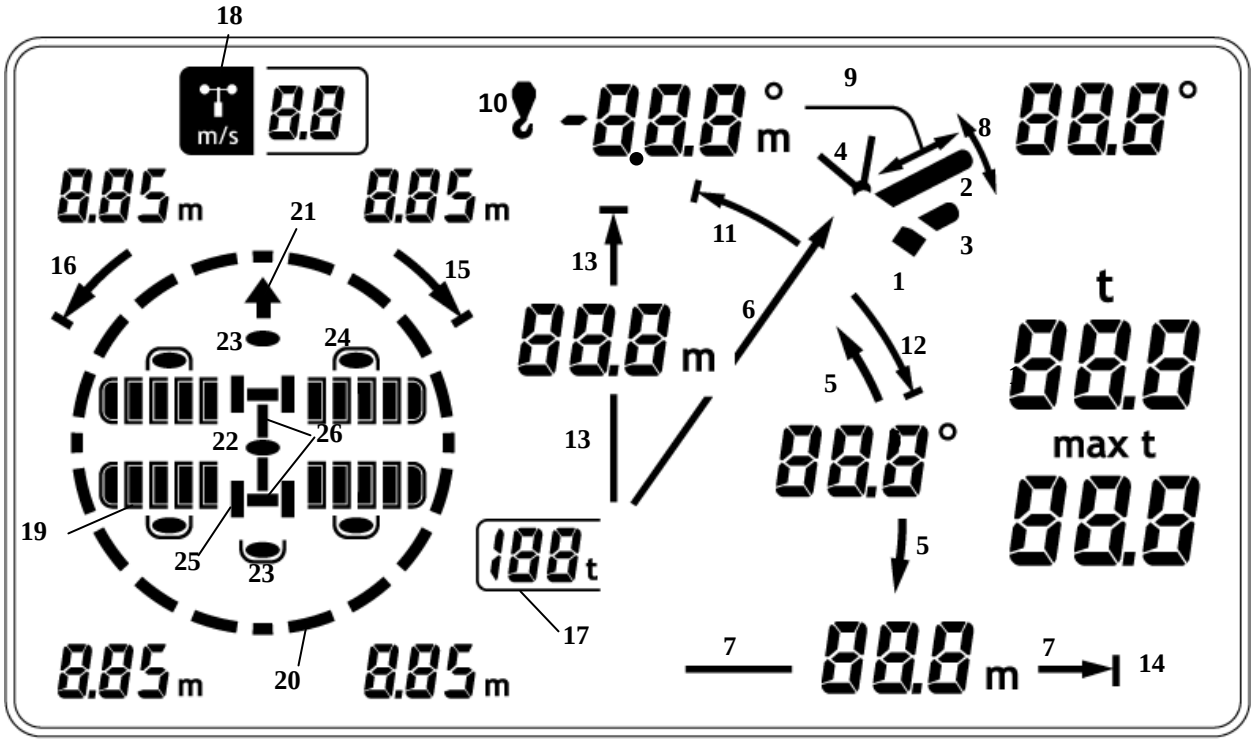
Counterweight Display: Displays counterweight information.

Wind speed display: Displays the wind speed.

Outrigger Length Display (1-4): no use for ATF 220G-5

Note: The numerical units are changed according to the information displayed.

1.2.2.2 Segment Symbols



(1) Boom/Jib Symbols

1- Boom symbol: This symbol appears if boom operation is selected.
2- Jib symbol: This symbol appears if jib operation is selected.
3- Single top symbol: This symbol appears if single top operation is selected.
4- : not assigned in case of the ATF 220-5

(2) Indicating Symbols

5- Boom angle symbol: Shows that the boom angle is displayed on the boom angle display.
6- Boom length symbol: Shows that the boom length is displayed on the boom length display.
7- Work radius symbol: Shows that the work radius is displayed on the work radius display.
8- Jib angle symbol: Shows that the jib angle is displayed on the jib angle display.
9- Jib length symbol: Shows that the jib length is displayed on the jib length display.
10- Hook symbol: This symbol appears if the rope falls or the hook displacement appears on the jib length display.
11- Upper angle limit symbol: This symbol shows that the boom upper limit angle is displayed on the jib length display.
12- Lower angle limit symbol: This symbol shows that the boom lower limit angle is displayed on the boom angle display.
13- Height limit symbol: This symbol shows that the boom height limit is displayed on the boom length display.

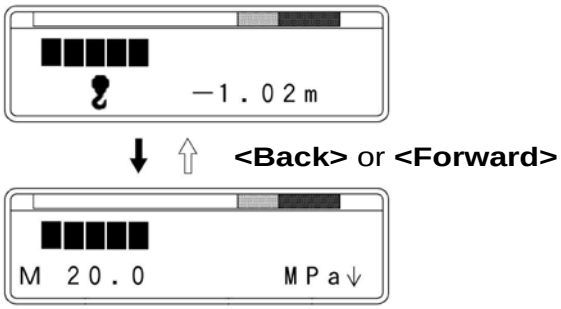
(cont'd) **1.2.2.2 *Segment Symbols***

14- Work radius limit symbol: This symbol appears if the work radius limit is registered or cancelled.
15- Right swing limit symbol: This symbol appears if the right swing limit area is registered or cancelled.
16- Left swing limit symbol: This symbol appears if the left swing limit area is registered or cancelled.
17- Counterweight symbol: This symbol appears if the counterweight is selected.
18- Wind speed symbol: This symbol appears if the wind speed is displayed.

(3) Other Symbols
19- Outrigger state symbols: Shows the outrigger condition. The outer symbol designates the maximum outrigger length, and the inner symbol shows the selected outrigger status.
20- Swing position symbol: Shows the swing position by 20 segments.
21-26 : no use for ATF 220-5

1.2.3 Character Display

The character display shows 16 characters x 2 lines. Normally, the load ratio bar graph appears in the first line, and hook displacement, or pump pressure appear in the 2nd line. The keys **<Back>** or **<Forward>** are used to switch over the display. The error code is displayed if an error occurs.



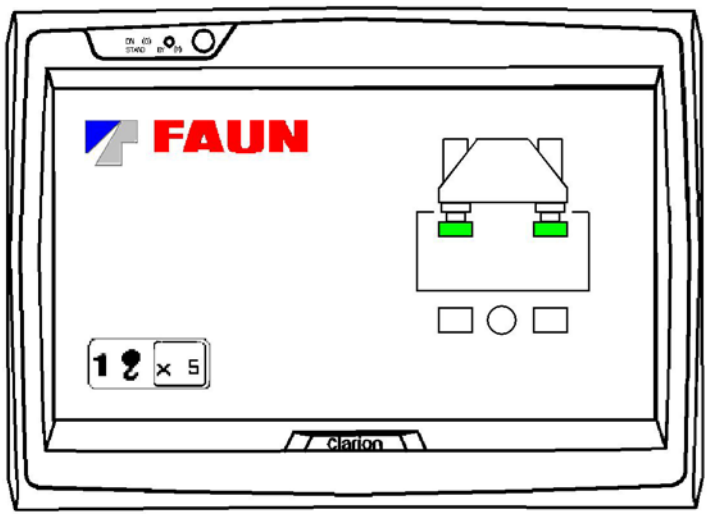
Warning message (ex. over wind, over load, etc.) appears in the 2nd line. Warning messages are W----. If system error occurs, error message appears in 1st line. Warning and error messages are described in the appendix.

Example of warning and error messages

1.2.4 Graphic Display

Graphic display shows the number of rope fall. If an auxiliary winch is installed, information of auxiliary winch also appears on the graphic display.
And it shows the information of counterweight on the right side. This information shows mounted / dismounted condition of counterweight, and permission / prohibition state of operation.

Graphic display is used for telescoping, speed pre-selection and maintenance. These operations are instructed in other chapters.



2 Registration of crane-operating conditions

The basic function of the AML is to calculate the load ratio during crane operation, then to give the information to the crane operator and to stop the crane motion when overloading is detected. Before starting crane operation, the crane-operating condition must be registered correctly.

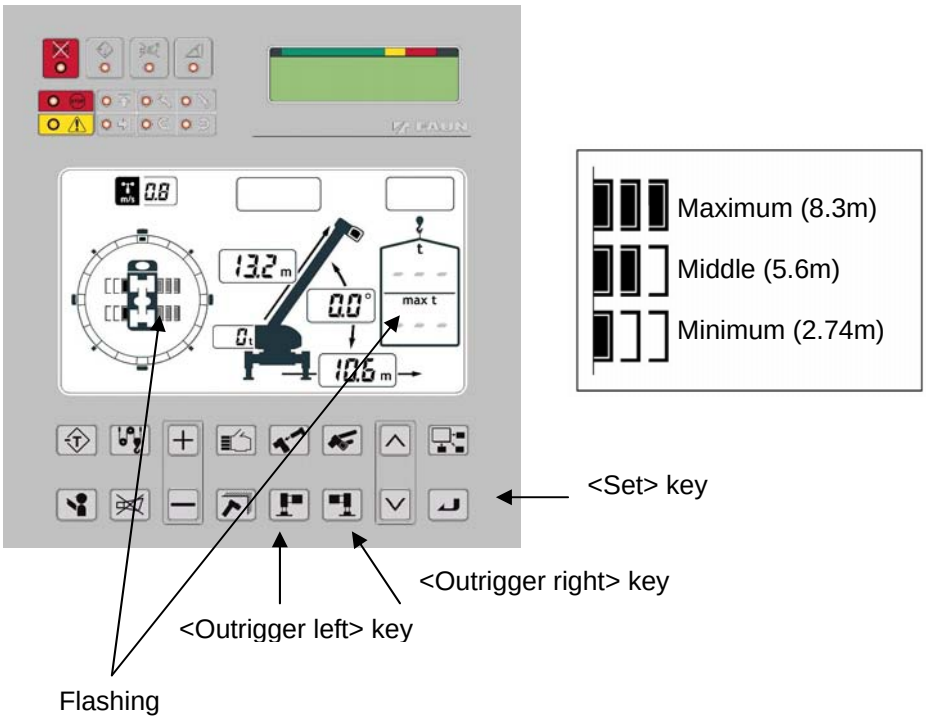
In this system, operator must input following actual crane conditions.

- ◆ right and left side outrigger condition
- ◆ counterweight condition
- ◆ boom or jib condition

Notice
It is only possible to register the crane-operating conditions with fully retracted boom.

2.1 Registration of outrigger conditions

With the AML in normal display state, press **<Outrigger right>** or **<Outrigger left>**; then the AML goes to the outrigger registration state and shows the LCD panel as follows:



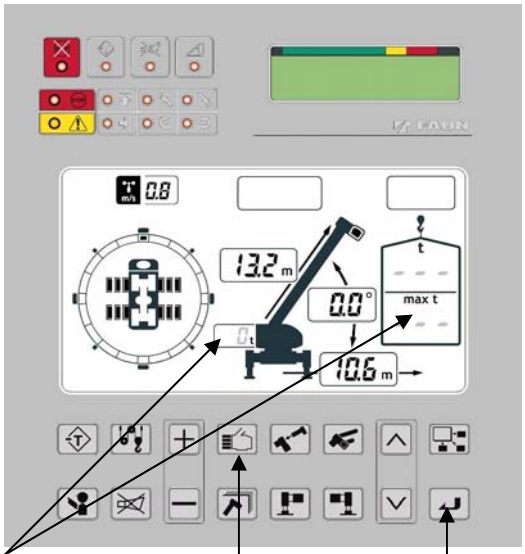
If the **<Outrigger right>** key is pressed, the right-hand outrigger state symbols start to flash. For each actuation of **<Outrigger right>**, **<Back>** or **<Forward>,** the state of the right-hand outrigger changes to the next condition. Then press **<Set>** to register the selected outrigger condition.

If the **<Outrigger left>** key is pressed, the left-hand outrigger state symbols start to flash. For each actuation of **<Outrigger left>**, **<Back>** or **<Forward>,** the state of the left-hand outrigger changes to the next condition. Then press **<Set>** to register the selected outrigger condition.

If **<Initial display>** is pressed, the AML exits the outrigger registration state.

2.2 Registration of counterweight conditions

With the AML in normal display state, press **<Counterweight>**; then the AML goes to the counterweight registration state and shows the LCD panel as follows:

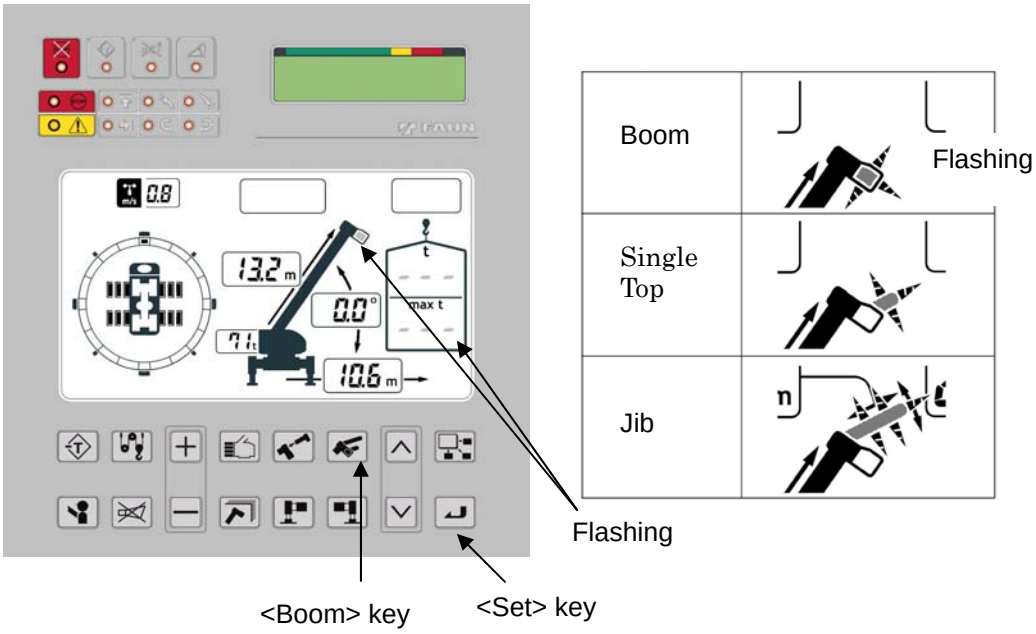


Whenever the keys **<Counterweight>**, **<Back>** or **<Forward>** are pressed, the counterweight value changes to the next condition. If the desired condition is reached, press **<Set>** to register the counterweight condition.

If **<Initial display>** is pressed, the AML exits the counterweight registration state.

2.3 Registration of boom / jib state

2.3.1 Registration of boom / jib state

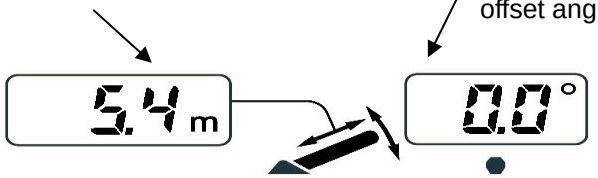


If the **<Boom>** key is pressed with the AML in normal display state, the AML goes to boom/ jib registration status and shows the LCD panel as follows.

Boom/ Single top /Jib Symbols: Flash to display the boom symbol. Whenever the **<Boom>** or **<Forward>** key is pressed, the flashing symbol position changes cyclically. Use **<Back>** to initiate a reverse direction movement.

Jib length display:
As long as the jib symbol appears, the jib length condition is displayed by flashing.

Jib angle display:
As long as the jib symbol appears, the jib offset angle condition is displayed by flashing.



While “jib” is selected, the jib condition appears in the following sequence of operations. First the jib length and the offset angle condition appears (e.g. 5.4 m, 0.0 degrees). As **<Boom>** (or **<Forward**>) is pressed, the next offset angle condition appears (e.g. 5.4m, 20.0 degrees). After all offset angle conditions have appeared, then next jib length condition with first offset angle condition appears.

Load Display: Flashes to display “- - -“.
Rated Load Display: Flashes to display “- - -“.
Work Radius Display: Flashes to display “- - -“.

Press **<Set>** to register the selected boom/ jib condition in the AML. If **<Initial display>** is pressed, the AML exits the boom/ jib registration state.

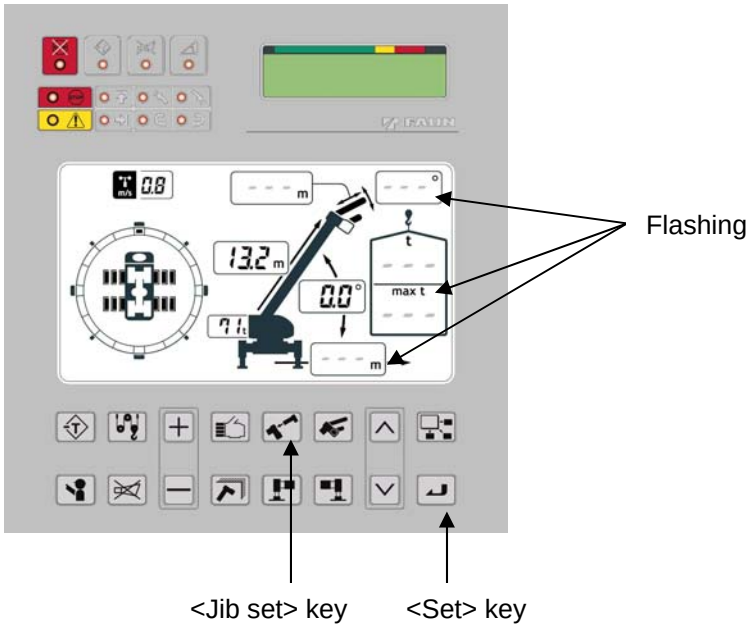
For the single-telescope cylinder system, the crane operator has to select the boom telescopic conditions after registration of the boom/ jib. For the selection of the boom telescopic conditions, see chapter 3.

2.3.2 Registration of jib set

Jib set state is special condition for jib installed. This mode has useful function as follows.

- Boom complete down
- Over wind stop cancel
- Without inputting the telescoping code which appears on LCD graphic screen, 6th boom can be extended by control lever.

With the AML in normal display state, pressing of **<Jib set>** sets the AML to the jib-set registration state. The display state of LCD panel changes as follows.



Boom/ Jib Symbols: Flashes to display the jib symbol. Whenever **<Jib set>, <Forward>** or **<Back>** are pressed, the jib set condition appears on character display**.**

Jib Length Display: While the jib symbol appears, this indicator flashes to display the jib length condition.
Jib Angle Display: While the jib symbol is appearing, it flashes to display the jib angle condition.
Load Display: Flashes to display "- - -".
Rated Load Display: Flashes to display "- - -".
Work Radius Display: Flashes to display "- - -".

If the **<Set>** key is pressed, the selected jib-set condition is registered in the AML. If the **<Initial display>** key is pressed, the AML exits the jib-set registration state. After jib-set crane capacity registration, the LCD panel display changes as follows.

Jib symbol: turns on.
Jib Length Display: flashes to display the jib length condition.
Jib Angle Display: flashes to display the jib angle condition.
Load Display: Displays "- - -".
Rated Load Display: Displays "- - -".
Work Radius Display: Displays "- - -".

2.4 Registration of the rope falls and hook displacement display

(1) Registration of Rope Falls
With the AML in normal display state, if the **<Rope falls>** key is pressed, the AML goes to the rope fall registration state. The hook symbol appears on the LCD panel and the default or previously registered rope fall number (number of part lines) appears on jib length display. Whenever **<Plus>** or **<Minus>** is pressed, the rope fall number changes.
When **<Set>** or **<Initial display>** is pressed, the number of rope falls is registered in the AML.

Jib length display during rope fall registration. 'P' indicates that the displayed value is the rope fall.

Caution:
The AML saves the registered number of rope falls after power-off. You always have to register the rope fall number even if you don't use the hook displacement function. The registered rope fall number is also used for capacity control for wire cut protection.

(2) Hook Displacement Display
If the hook displacement switch is on, the AML displays the main-hook or sub-hook displacement height from their reset position. The main or sub hook information can be changed using the hook select switch.
During boom or single-top operation, the displacement value is displayed on the jib-length display.
During jib or jib-set operation, the displacement value is displayed on the character display.

(3) Displacement Reset
If the displacement reset switch (located outside of AML) is used, the AML clears the displacement value. After the displacement reset, the AML displays the relative hook position (height) from reset. Plus means that the hook moves upwards, and minus means that it moves down.

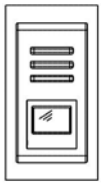
Jib length display during hook displacement indication. The hook symbol indicates that the displayed value is displacement.

3 Telescopic boom operation and LCD graphics

This chapter explains telescopic boom operation and its LCD graphic display.

3.1 Telescopic boom selection and operation

When boom operation is registered from the control panel, the telescopic boom conditions must be selected by the following steps.

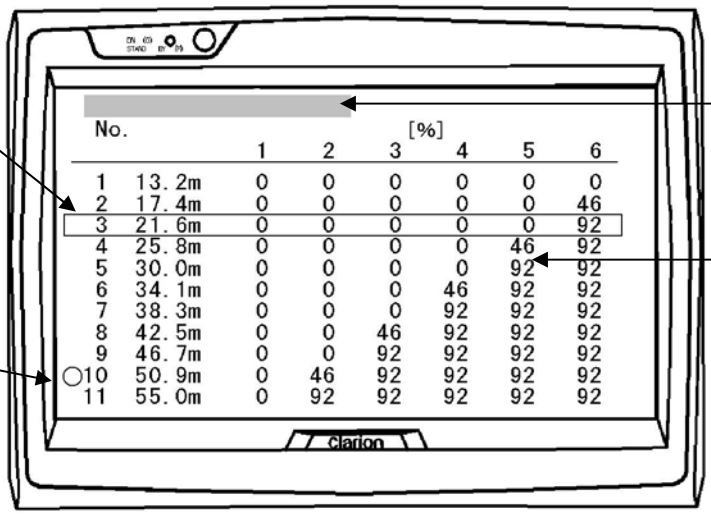


1) Press (turn on) telescope display on/off switch. Then telescopic boom condition menu appears on the LCD graphic screen.

2) Move cursor upwards or down by actuating **<Forward>** or **<Back>** and the select boom condition. Actuating **<Plus>** or **<Minus>** changes the menu page.

Box cursor to select boom condition. Cursor moves by <**Forward**> or <**Back**>. If cursor reaches bottom, then the next menu page appears. Pressing <**Plus**> or <**Minus**> changes the menu page.

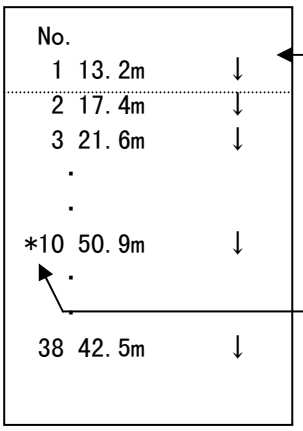
The mark appears on the currently registered boom condition.



Guide messages or error messages appear in this area.

The telescopic ratio is displayed for each boom section.

If the boom condition menu is displayed on the graphic, the character display also shows the boom condition menu.



Only 2 lines are displayed.
To select other conditions, actuate **<Forward>** or **<Back>**, then the displayed condition scrolls.

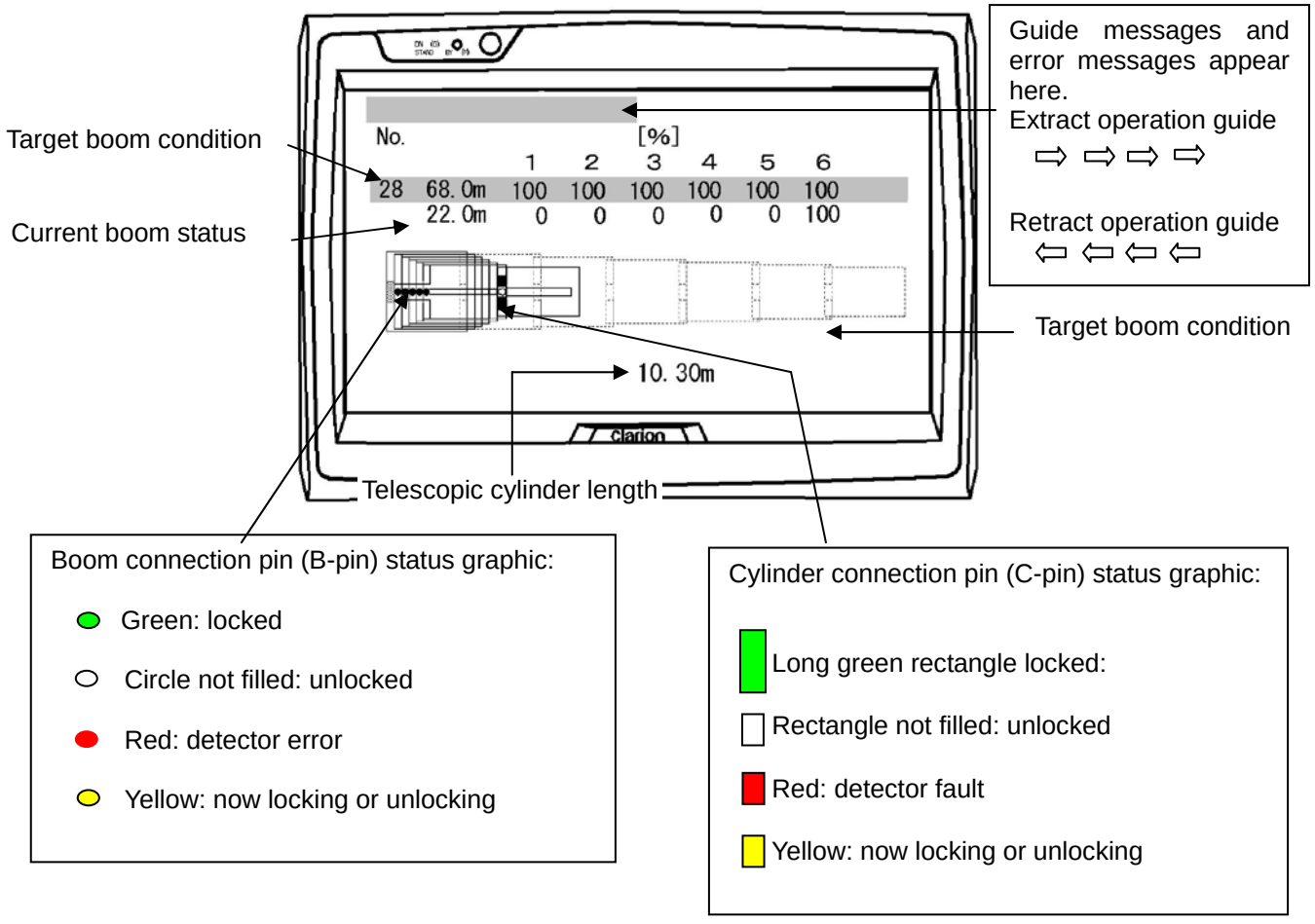
Mark appears on the currently registered boom condition.

(cont'd) **3.1 Telescopic boom selection and operation**

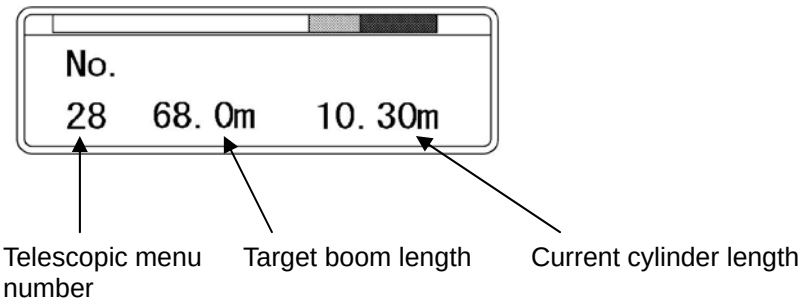
3) After selection has been accomplished, press **<Set>**. Then the selected boom condition is registered and the boom status graphic appears on the graphic screen.
If the telescopic control lever is operated prior to pressing **<Set>**, the boom status graphic appears. Press **<Initial display>** to make the boom condition menu appear again.

4) If the boom status graphic appears, operate telescopic control lever according to the graphic operator guidance.

5) Telescopic operation finished, press the telescope display on/off switch. Now the graphic turns off. If the telescope display on/off switch is not actuated, the graphic remains visible.



If the boom status graphic is displayed on the graphic LCD, the character display also shows the boom length.



(cont'd) **3.1 Telescopic boom selection and operation**

Table Selectable boom condition

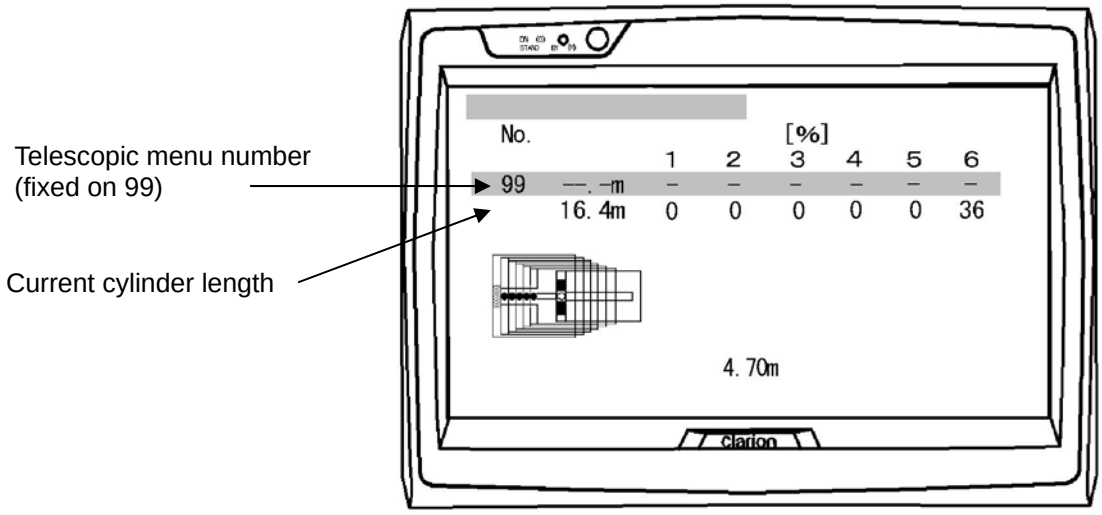
No.	Boom	Tele.1	Tele.2	Tele.3	Tele.4	Tele.5	Tele.6
1	13.2m	0	0	0	0	0	0
2	17.4m	0	0	0	0	0	46
3	21.6m	0	0	0	0	0	92
4	25.8m	0	0	0	0	46	92
5	30.0m	0	0	0	0	92	92
6	34.1m	0	0	0	46	92	92
7	38.3m	0	0	0	92	92	92
8	42.5m	0	0	46	92	92	92
9	46.7m	0	0	92	92	92	92
10	50.9m	0	46	92	92	92	92
11	55.0m	0	92	92	92	92	92
12	59.2m	46	92	92	92	92	92
13	63.4m	92	92	92	92	92	92
14	21.6m	0	0	0	0	46	46
15	25.8m	0	0	0	46	46	46
16	30.0m	0	0	46	46	46	46
17	34.1m	0	46	46	46	46	46
18	38.3m	46	46	46	46	46	46
19	42.5m	92	46	46	46	46	46
20	42.5m	46	46	46	46	46	92
21	46.7m	46	46	46	46	92	92
22	50.9m	92	46	46	46	92	92
23	46.7m	92	92	46	46	46	46
24	50.9m	92	92	92	46	46	46
25	55.0m	92	92	92	92	46	46
26	55.0m	46	92	92	92	92	46
27	59.2m	92	92	92	92	92	46
28	68.0m	100	100	100	100	100	100
29	17.4m	0	46	0	0	0	0
30	21.6m	46	46	0	0	0	0
31	25.8m	92	46	0	0	0	0
32	25.8m	46	46	46	0	0	0
33	30.0m	92	46	46	0	0	0
34	30.0m	46	46	46	46	0	0
35	34.1m	92	46	46	46	0	0
36	34.1m	46	46	46	46	46	0
37	38.3m	92	46	46	46	46	0
38	42.5m	92	92	46	46	46	0

Table Selectable Jib condition

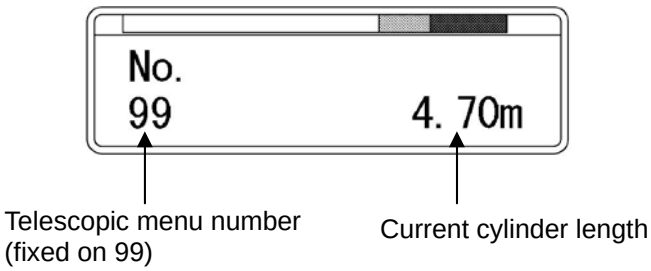
No.	Boom	Tele.1	Tele.2	Tele.3	Tele.4	Tele.5	Tele.6
1	13.2m	0	0	0	0	0	0
13	63.4m	92	92	92	92	92	92
28	68.0m	100	100	100	100	100	100
39	34.1m	92	92	46	0	0	0

3.2 Jib-set operation

When jib-set operation is registered from the control panel, without inputting the telescoping code that appears on LCD graphic screen, Top boom can be extended by control lever. During telescopic operation, the boom status graphic also appears.



Graphic display

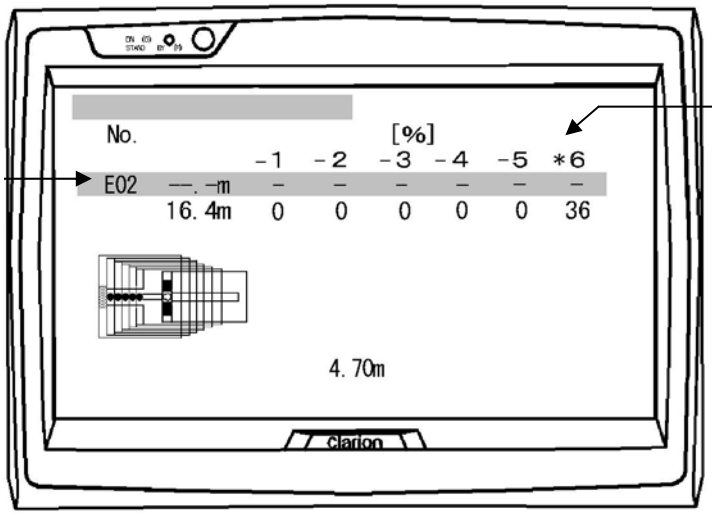


Character display

3.3 Emergency mode operation

When emergency control switch is on, the display may differ in some cases from the normal boom telescope.

“E02” indicates emergency mode.



✻ indicates cylinder position.

In emergency mode, B-pin and C-pin operation should be effected while ✻ symbol is displayed.

4 Work range limit function

If the work range limit area is registered in the AML and if the crane enters the limited area, the AML performs an auto-stop.
The AML has the following work range limit items.

Height
Boom upper angle limit
Boom lower angle limit
Work radius
Left-hand swing
Right-hand swing

Note: When the AML override switch is on, work range limit function is canceled.
When slow stop function is canceled, swing work limit is canceled.
When swing free is selected, swing sometimes does not stop.

4.1 Item selection, registration and cancellation

With the AML in normal display state, if **<Work range>** is pressed, the AML goes to the work range limit registration and cancellation state.
Whenever **<Work range >** or **<Forward>** is pressed, the AML changes the selected limiting items cyclically in the following sequence of operations. Pressing **<Back >** moves the selected item backward.

Height => Boom upper angle limit => Boom lower angle limit => Work radius => Left-hand swing => Right-hand swing => Height=>....

During item selection, the AML flashes to display the selected limit symbol while the other limit symbols (not selected) are turned on. If the key <**Set**> is pressed, the AML registers (if already registered, it cancels) the current position as the selected limit function value and terminates the work range limit registration and cancellation mode. Pressing **<Set>** inverts the item registration states**.**
If the key **<Initial display>** is pressed, the AML exits the work range limit registration and cancellation state**.**

4.2 Work range limit function display

(1) Numerical Display
During work range limit registration and cancellation state, the following numerical display shows limiting values.

Boom Length Display: shows height limiting information.
Jib Length Display: shows boom upper angle limit information.
Boom Angle Display: shows boom lower angle limit information.
Work Radius Display: shows work radius limit information.

For the numerical displays, the displayed state changes according to the selection and registered state.

Numerical Display States

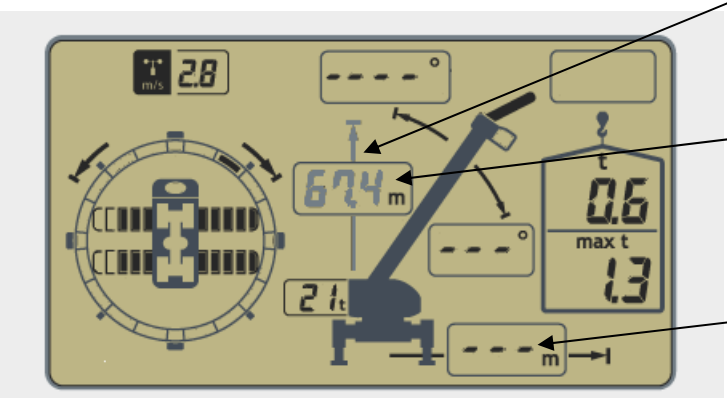
Not selected (not registered)	Shows '---'
Not selected (already registered)	Shows the registered value.
Selected (not registered)	Flashes to show the current value
Selected (already registered)	Shows the registered value.

(cont'd) **4.2 Work range limit function display**

(2) Swing Angle Limit Area Display
The limited values of the swing angle do not appear on the numerical displays. The registered status of swing limit must be judged from the work range limit LEDs. (See 1.2.1.)

4.3 Display example

Example-1
Fig. 4.3.1. (A) Shows a display example of the LCD panel when the height limit function is selected.

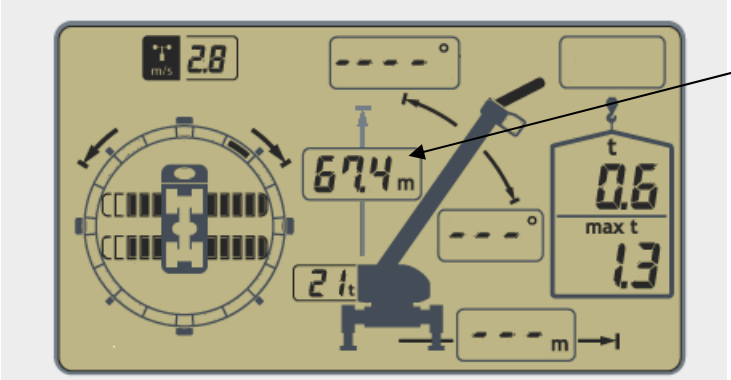


The boom height symbol flashes, thus indicating that the height limit is selected.

The boom length display flashes while showing the current boom height. Flashing means that the value is not registered.

The other parts of the numerical display show '- - -', as no other items are selected and registered.

Fig. 4.3.1. (A) Display example of LCD panel when height limit function is selected. The height value is not yet registered.



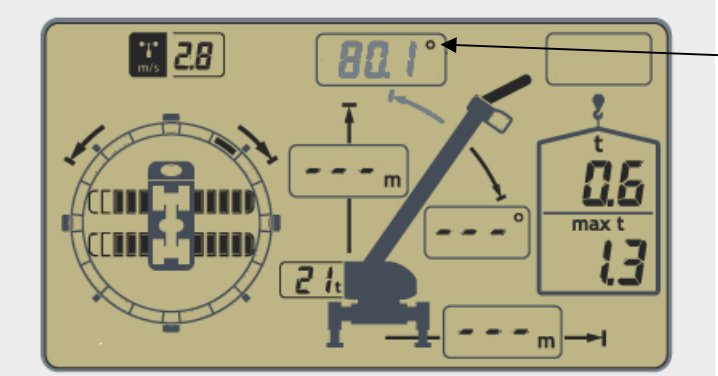
The boom length display shows the registered boom height.
Registration will be cancelled by pressing the <**Set**> key.

Fig. 4.3.1. (B) Display example of LCD panel when height limit function is selected. The height value is already registered.

(cont'd) **4.3 Display example**

Example-2

Fig. 4.3.2. (A) Displays an example of the LCD panel when the boom upper angle limit function is selected.



The jib length display shows the boom upper angle limit information. When the limit function is not registered, the current boom angle is displayed.

Fig. 4.3.2. (A) Display example of the LCD panel when boom upper angle limit function is selected

Example-3

Fig. 4.3.3. (A) Displays an example of the LCD panel when the left-hand swing angle limit function is selected. In this example, the right-hand swing limit is not yet registered.
When the left-hand swing angle limit function is selected, the AML regards the left-hand of 90° (degree) range from the current swing position as limited range. Moreover, the swing position symbols in this area flashes.

The left-hand swing limit symbol flashes and indicates that the left-hand swing angle limit function is selected.

If the right-hand swing limit is not yet registered, the AML regards the left-hand side of the 90° (degree) range from the current swing position as limited range.

Current swing position

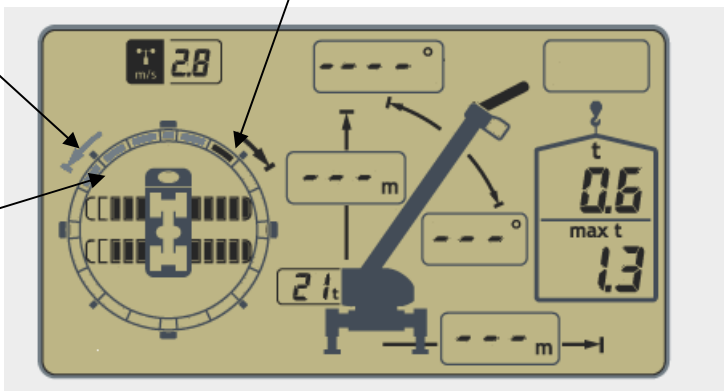


Fig. 4.3.3. (A) Display example of an LCD panel when the left-hand swing angle limit function is selected.
In this example, the right-hand swing limit is not yet registered.

(cont'd) **4.3 Display example**

Fig. 4.3.3. (B) Displays an example of the LCD panel when the left-hand swing angle limit function is selected. In this example, only the left-hand swing limit is registered and the right-hand swing limit is not yet registered.

If only the left-hand swing limit is registered, if the crane enters this area by left-hand swing, the AML's auto-stop function is applied.
However, if the crane enters this area by right-hand swing, the AML's auto-stop function is not applied.

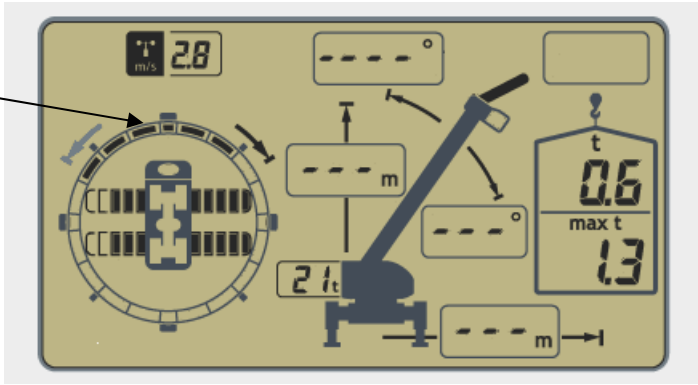


Fig. 4.3.3. (B) Display example of LCD panel when the left-hand swing angle limit function is selected.
In this example, only the left-hand swing limit is registered and the right-hand swing limit is not yet registered.

Fig. 4.3.3. (C) Displays an example of the LCD panel when the right-hand swing angle limit function is selected. In this example, the left-hand swing limit is already registered and the right-hand swing limit is not yet registered.

Swing position when right-hand swing limit is registered

The swing area between the current position and the registered right-hand swing limit position is regarded as limit area.

Current swing position

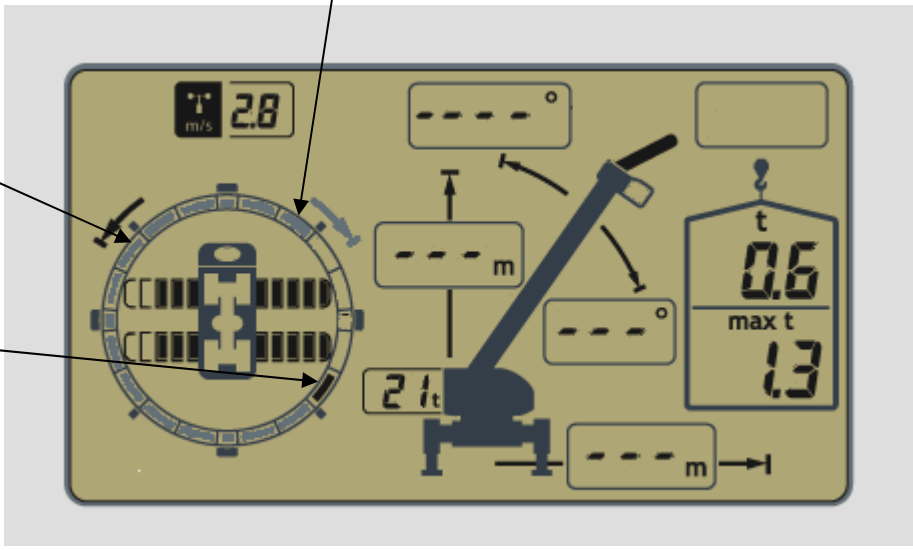


Fig. 4.3.3. (C) Display example of LCD panel when the right-hand swing angle limit function is selected.
In this example, the left-hand swing limit is already registered.

(cont'd) **4.3 Display example**

Function Summary
(1) Main function
<Work range>: Activates the work range limit function. Moves item.
<Forward>: Moves item.
<Back>: Moves item backward.
<Set>: Registration, cancellation of work range limit function, ends work range limit registration and cancellation mode.
<Initial display>: Exits work range limit registration and cancellation state.

(2) Limit symbols
Flashing: Item is now selected.
On: Item is not selected.

(3) LEDs
Off: The work range function has been cancelled.
On: The work range function is activated.
Flashing: The work range function is activated and auto-stop control is being performed.

(4) Numerical Displays
Value turned on: The work range function is registered.
Value flashing: The work range function is cancelled and the current position value is flashing.
'---': The work range function is cancelled and the item is not selected.

4.4 Saving the values for the work range limit function

The AML saves the registered work range limit function after power-off.

5 Check function

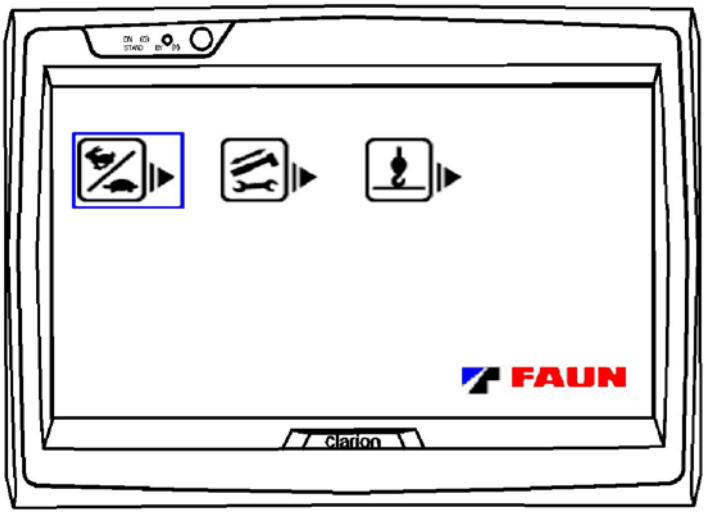
When the **<Check>** key is pressed, the AML display goes to check state. The following items can be checked.

- **LCD panel:** All the LCD segments turn on
- **Character Display:** All segments turn on.
- **LEDs:** All LEDs turn on.
- **Buzzer:** Buzzer alarm sounds.
- **Crane Operation:** The winch wind-up, boom lowering and extending operations are deactivated.

If the key **<Initial display>** is pressed, the AML display returns to normal display state.

6 Speed pre-selection and maintenance

When the **<Check>** key is pressed for more than 3 seconds, icons for “Speed pre-selection”, “Boom maintenance” and “Hook position initialize” are displayed on the graphic display



 **Speed pre-selection icon**

 **Boom maintenance Icon**

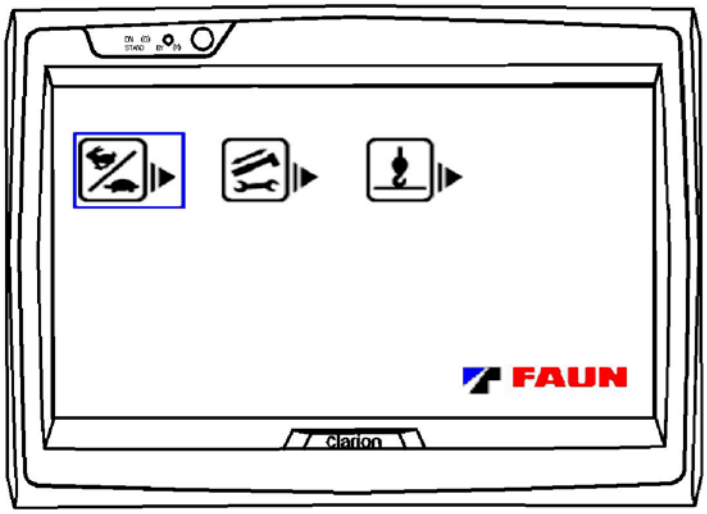
 **Hook position initialize Icon**

For cursor movements, use **<Forward>** or **<Back> and** use **<Set>** to select menu**.** Press **<Initial display>** to exit the menu.

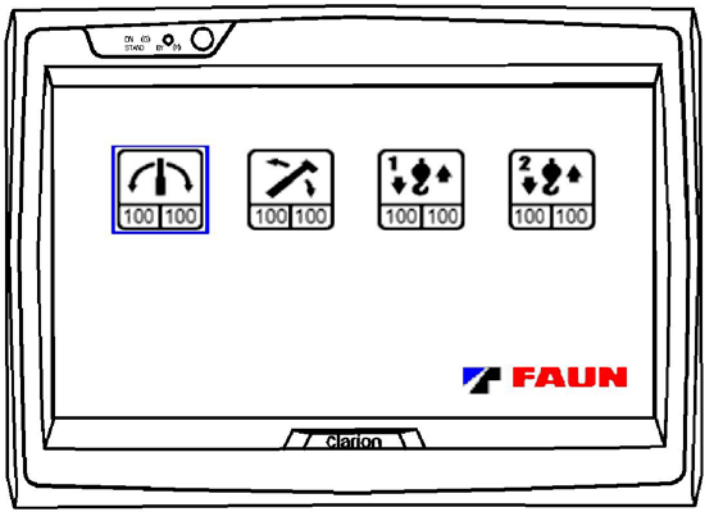
6.1 Speed pre-selection

The following actuator's maximum speeds are adjustable in steps of 10% from the control panel.

- Swing (right-hand, left-hand can be adjusted independently)
- Boom elevation (elevating up, lowering can be adjusted independently)
- Main winch (up, down can be adjusted independently)
- Aux. winch (up, down can be adjusted independently)



When the 'Speed pre-selection' menu is selected, the adjustable actuator menu appears on the graphic display. Move cursor by **<Forward>** or **<Back>** to select actuator for speed pre-selection.



Swing
speed pre-selection icon

Elevation
speed pre-selection icon

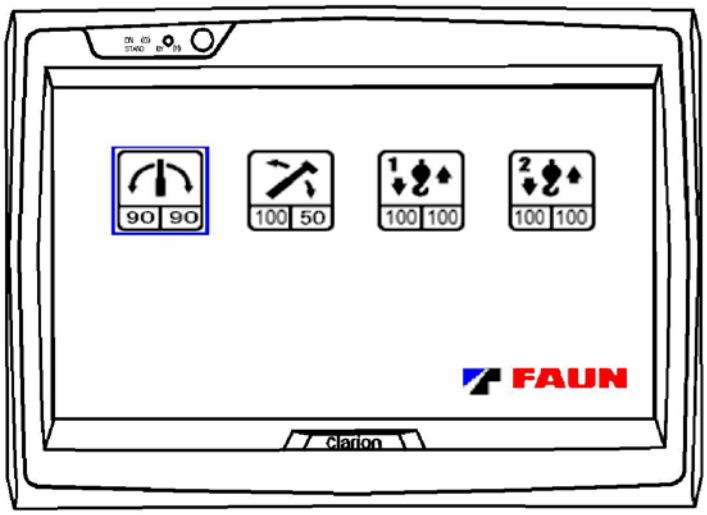
Main winch
speed pre-selection icon

Aux. winch
speed pre-selection icon

(cont'd) **6.1 Speed pre-selection**

While the "Speed pre-selection" menu is displayed, press **<Plus>** or **<Minus>**, then both speeds (up, down) change at the same time.

To adjust the speed (up, down) independently, press **<Plus>** or **<Minus>** while operating the actuator lever.
For example, pressing **<Plus>** or **<Minus>** during right-swing operation, only the right-swing speed changes. Pressing **<Plus>** or **<Minus>** during left-swing operation, the left-swing speed changes. Other actuators are same.



<Forward> Select the actuator (Move the cursor)

<Back> Select the actuator (Move the cursor)

<Plus>: Increase value of speed pre-selection (max. 100%)

<Minus> Decrease value of speed pre-selection (min. 10%)

<Set> Register the pre-selection value.

Return to normal mode

If the key **<Set>** is pressed, the adjusted speed is registered.
If **<Initial display>** is pressed, AML display is exited from the "Speed pre-selection" menu

6.2 Boom maintenance

When you need to check or grease the boom, select the “Boom maintenance”.
When the "Boom maintenance" icon is selected, a special telescopic configuration menu appears on the graphic display. The displayed special telescopic configuration are all intended for maintenance purpose only, and not for lifting the load.

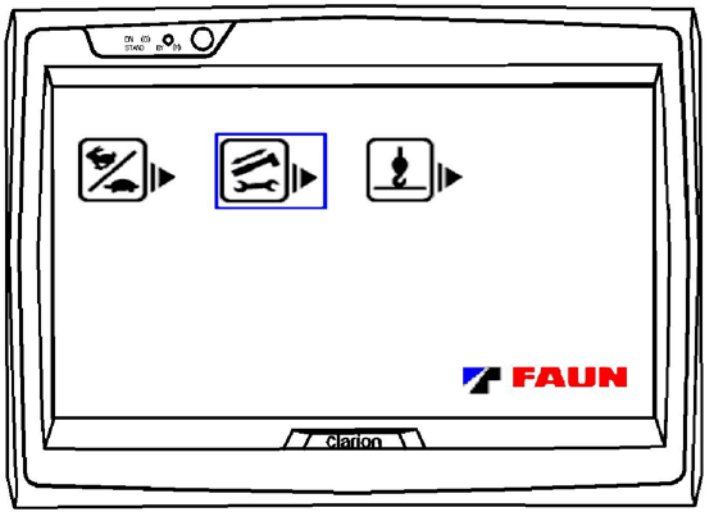


Table Boom condition of maintenance mode

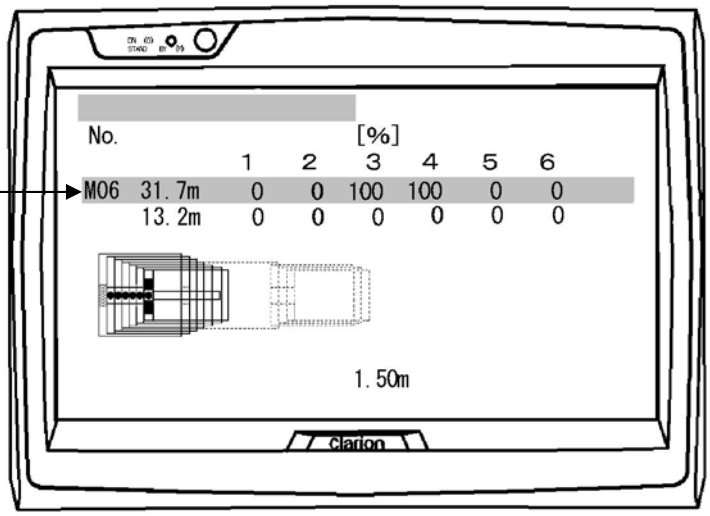
No.	Boom	Tele.1	Tele.2	Tele.3	Tele.4	Tele.5	Tele.6
M00	13.2m	0	0	0	0	0	0
M01	22.0m	0	0	0	0	0	100
M02	31.3m	100	0	0	0	0	100
M03	22.3m	0	0	0	0	100	0
M04	31.6m	0	100	0	0	100	0
M05	22.5m	0	0	0	100	0	0
M06	31.7m	0	0	100	100	0	0
M07	22.5m	0	0	100	0	0	0
M08	22.5m	0	100	0	0	0	0
M09	22.5m	100	0	0	0	0	0

(cont'd) **6.2 Boom maintenance**

Boom telescope operation of the "Boom maintenance" is basically same as normal boom operation.
Boom Status Graphic: The character "M" appears on target boom configuration number.

To exit the "Boom maintenance", use **telescope display on/off switch.**

"M" indicates maintenance telescope.



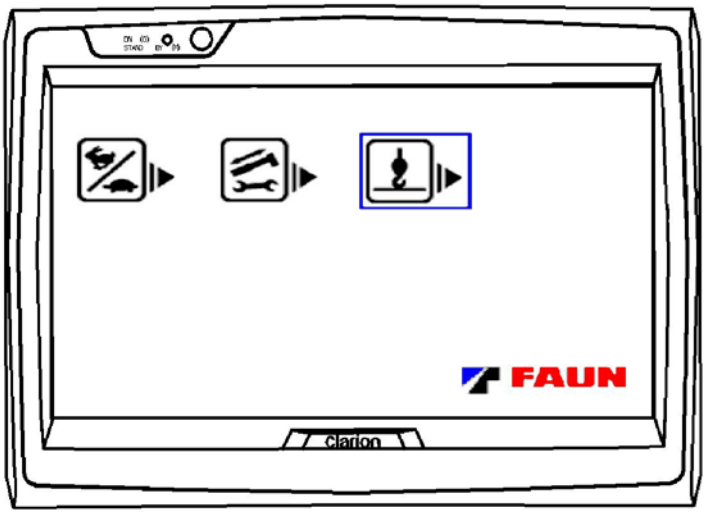
Use the "Boom maintenance" only when maintaining the booms.
Actual load and rated load display are showing "---" in this mode.
Do not lift anything other than hook block.
Overload prevention system is not functioning in this state.

6.3 Hook position initialization

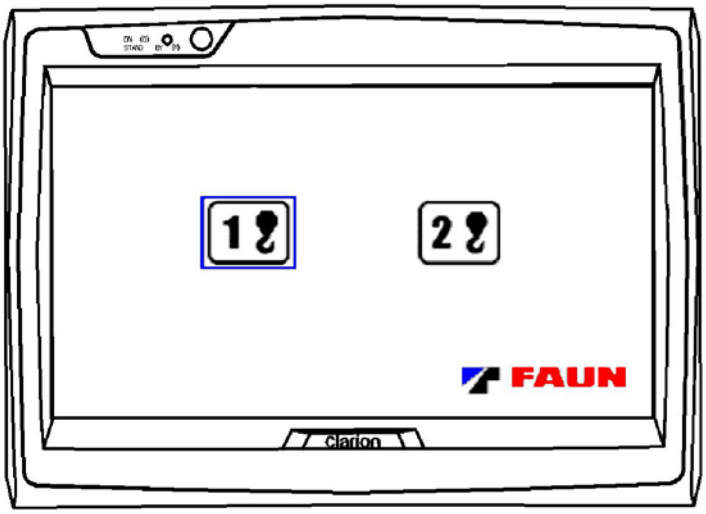
When the accuracy of a hook displacement display deteriorates, this adjustment should be performed.

(1) Procedure

- Make sure “rope fall” setting and “Boom configuration” setting of AML at normal display state.
- Lowering the hook until it slightly touches the ground. (The boom angle and boom length conditions are freely selectable.)



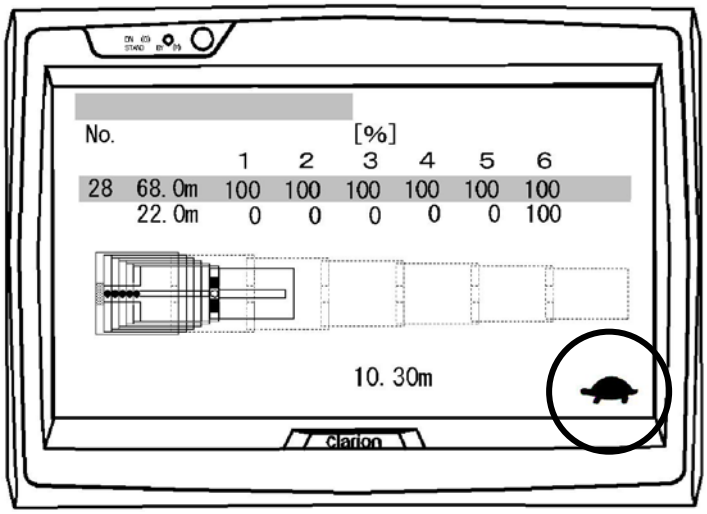
- Select the “Hook position initialization” icon. The following display appears.



- Press the **<Set>**, the initialization is performed and exit menu.
- To exit the menu, press **<Initial display>**.

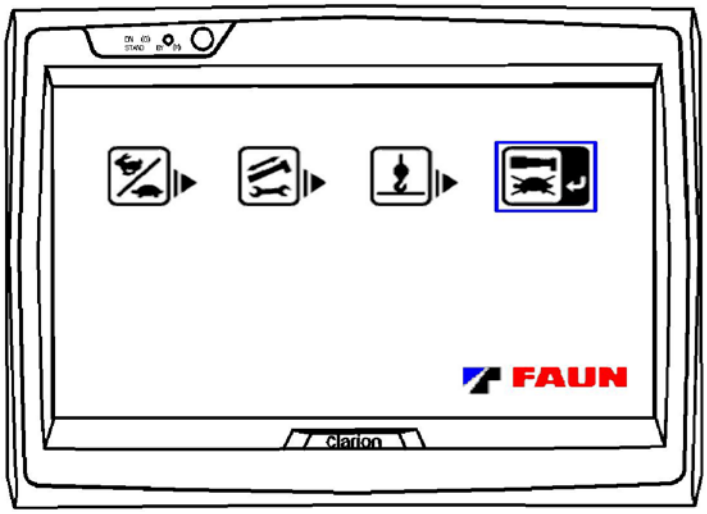
6.4 Slow telescoping mode cancel

Slow telescoping mode
In some condition, tortoise symbol appears on the graphic display during boom telescoping operation.
When tortoise symbol appears, B-pin and C-pin movements become slow.
Usually, this symbol appears only when ambient temperature become under –10 degrees centigrade or during telescoping operation after long interval from the boom extended.
In this condition, telescopic speed becomes slowly for correct telescoping. Such the condition is called slow telescoping mode.



When tortoise symbol appearing with the temperature more than 0 degree centigrade, you can cancel slow telescoping mode.

In slow telescoping mode, one icon is added on “Speed pre-selection and maintenance” menu.



Slow telescoping cancel icon

Select the cursor on “Slow telescoping cancel” icon as above figure.
Press **<Set>** to cancel the slow telescoping mode. Then, display is returned to normal display state.

7 Lift Adjuster

When a load is lifted, the boom will deflect downward, increasing the load radius. Therefore, it is usually necessary to adjust boom angle together with the winch operation.

Lift Adjuster can be help to minimize the change of the load radius when lifted load clears the ground, by using single control lever (winch up only).

Note: If the load is too light, effect of Lift Adjuster is low.
Do not use Lift adjuster when the rated load is less than 1.5 ton, or object has big deflection, boom head and hook block sway considerably due to the wind, etc.

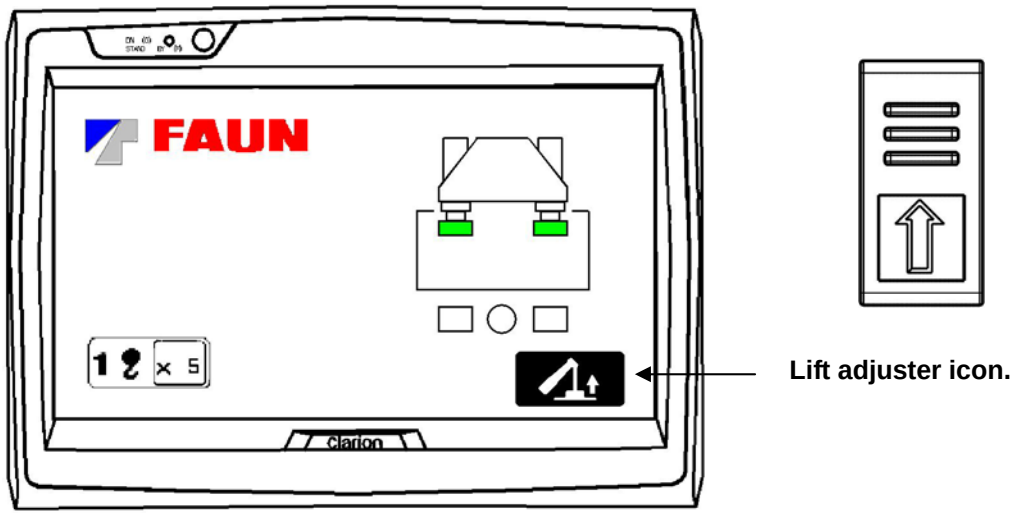
"Lift Adjuster" operation

1) Center of hook block should be set at center of gravity of the load.
   Add the tension slightly to the sling wire of the load.
   Setting the number of part line is very important for accurate control of Lift Adjuster. Check the condition of number of part line and confirm for other setting of AML.

   Note: If the hook block is not set at the center of gravity of the load properly, sway of the load is large.

   Note: Do not add too much tension to sling wire of the load. Excessive tension (more than 0.2 ton) may cause more sway of the load.

2) Press switch "Lift adjuster" button on the control panel.
   "Lift adjuster" appears on the graphic display, buzzer sound continues intermittently and engine speed increases automatically.



Note: During Lift Adjuster operation, engine speed automatically is controlled by AML. Accelerator pedal does not function.

3) Operate the hoisting up lever.
AML controls 2 different movement, hoisting up and elevating up the elevating cylinder automatically.
When “Lift Adjuster” operation is finished, the “Lift Adjuster Icon” disappears on the display, buzzer sound is shut off, and engine speed is reduced to normal idled speed.

Note: In case of emergency, return the winch lever to neutral position immediately to stop the operation.

Note: If following conditions occur, “Lift Adjuster” operation is automatically shut off.

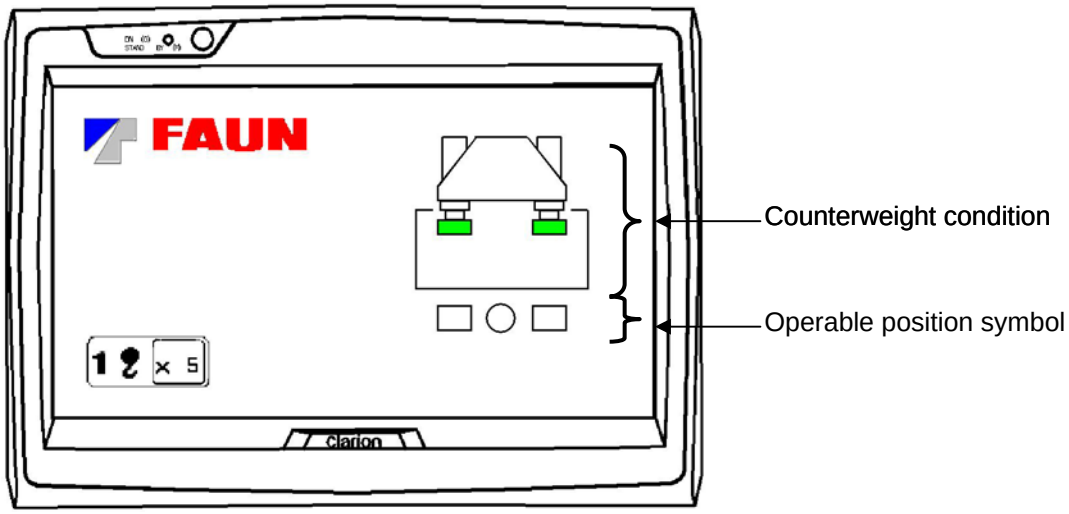
- **Overloaded**
- **Over winding the winch**
- **Press the “Lift adjuster” switch**
- **Elevating cylinder is reached to the end of the stroke**
- **Operate other control (except hoisting or swing) levers**

Note: If winch lever is returned to the neutral position before the Lift Adjuster operation finishes, hoisting up and elevating up movement stop.
In this case, “Lift Adjuster” operation shall be started again with winching up operation.

Note: If “Lift Adjuster” operation is automatically shut off due to the listed conditions above, lift the load from the ground by manual operation.

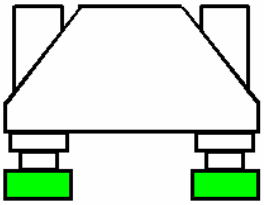
8 Counterweight status

Graphic display shows the counterweight status. This information shows mounted / dismounted condition of counterweight, and permission / prohibition state of operation.



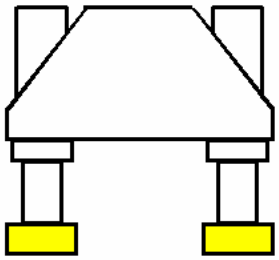
8.1 Counterweight condition

According to condition of counterweight, graphic changes as follows.



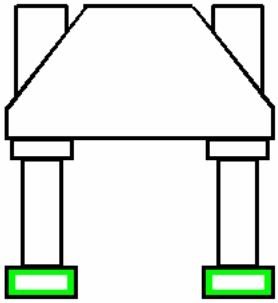
Green:
Counterweight cylinders are retracted fully.
(Without counterweight)

Graphics of cylinders retract fully.



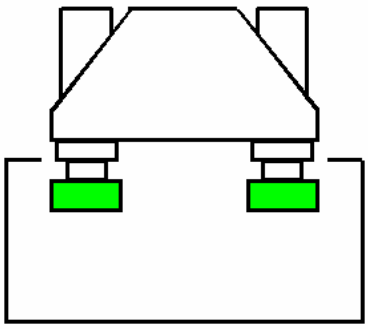
Yellow:
Counterweight cylinders are middle position.
(Without counterweight)

Graphics of cylinders extend according to actual length.



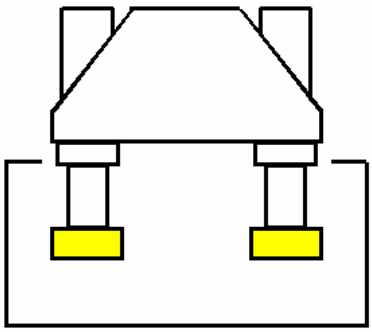
Green (only outline):
Counterweight cylinders are extended fully.
(Counterweight-independent)

Graphics of cylinders extend fully.



Green:
Counterweight cylinders are retracted fully.
(With counterweight)

Graphics of cylinders retract fully.



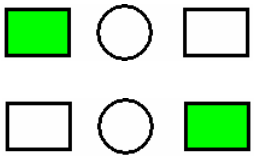
Yellow:
Counterweight cylinders are middle position.
(With counterweight)

Graphics of cylinders extend according to actual length.

8.2 Operable position symbol

Operation of the counterweight cylinder in arbitrary swing positions causes danger, such as cylinder damage. Therefore, operation of a counter weight cylinder is possible only in a specific position.

The following symbols show the swing positions of counterweight cylinders that can operate.



Left side symbol, right side symbol
Green: Swing positions that can extend/retract cylinders
(Extension is possible only without counterweight.)
Not filled: Swing positions than cannot extend cylinders

Circle symbol (Superstructure locking pin condition)
Green: Swing positions that can extend/retract cylinders
(Over rear with superstructure locking pin engaged.)
Not filled: Swing positions than cannot extend cylinders
(Without superstructure locking pin engaged.)

Memo:

AML Warning and Error Codes
for FAUN ATF 220G - 5

FAUN GmbH

"W----" shows information of crane state in correct condition.

Message	Description	Remedy
W0015	Overwind. When overwind cancel switch is on.	Wind down hook.
W0016	Crane capacity is not in defined condition.	Register the operating condition correctly. Change crane condition to correct condition.
W0017	Crane capacity is not in defined condition.	Register the operating condition correctly. Change crane condition to correct condition.
W0023	Stopped due to overload.	Make crane to safe posture (ex: elevating „up" boom)
W0024	Stopped due to overwind.	Wind down hook.
W0025	Stopped due to insufficient backward stability condition. This message appears only in undefined crane capacity condition.	Operate to increase backward stability (ex. lower boom), and change to correct counter-weight and outrigger combination.
W0026	Stopped due to working area limit (upper boom angle limit).	Cancel work range function, or lower the boom.
W0027	Stopped due to working area limit (lower boom angle limit).	Cancel work range function, or elevation „up" the boom.
W0028	Stopped due to working area limit (height limit).	Cancel work range function, or lower the boom.
W0029	Stopped due to working area limit (work radius limit).	Cancel work range function, or elevate the boom ("up").
W0034	Stopped due to main winch rope reserve condition.	Wind up main winch rope
W0035	Stopped due to sub winch rope reserve condition.	Wind up sub winch rope
W0039	Arm rest is up.	Arm rest is lowered.
W0040	Emergency operation mode (Emergency telescopic switch is on).	It is necessary to operate carefully.
W0042	Stopped due to working area limit (right swing limit).	Cancel work range function, or swing to left.
W0043	Stopped due to working area limit (left swing limit).	Cancel work range function, or swing to right.
W0045	During telescopic operation in manual mode, telescopic cylinder reaches its limit.	Retract telescopic cylinder.
W0054	Stopped due to elevating cylinder lower stroke end	Elevate the boom ("up").

Message	Description	Remedy
W0055	Stopped due to elevating cylinder upper stroke end	Elevate the boom (”down”).
W0057	Front-right outrigger is retracted.	Extend outrigger again
W0058	Rear-right outrigger is retracted.	Extend outrigger again
W0059	Front-left outrigger is retracted.	Extend outrigger again
W0060	Rear-left outrigger is retracted.	Extend outrigger again
W0093	Boom connection pin (B-pin) is uncontrollable.	Return the lever to neutral at once. Then retry. Boom angle should be over 70 degree in boom condition. In jib condition, boom angle should be over 75 degree.
W0094	Telescope cylinder connection pin (C-pin) is uncontrollable.	Return the lever to neutral at once. Then retry. Boom angle should be over 70 degree in boom condition. In jib condition, boom angle should be over 75 degree.
W0095	Automatic telescope is impossible, because the boom connection pin (B-pin) speed is very slow.	Retry again with full lever and full engine revolution. If the temperature is more than 0 degree centigrade, it is possible to use “Slow telescoping mode cancel” function (see operation manual chapter 6.4).
W0102	This message appears when “Slow telescoping mode cancel” is selected.	
W0106	Elevating speed is reduced due to slow stop function.	
W0108	Swing motion speed is reduced due to slow stop function.	
W0113	Crane posture is in elevating capacity limit	Elevating “up”, or retract boom.
W0121	Stopped due to elevating cylinder stroke end.	
W0173	Counterweight cylinder extends but swing operation is selected.	Set counterweight correctly.
W0179	AML detects superstructure lock at not rear side of swing angle sensor.	Check superstructure lock pin and swing angle sensor.
W0180	Hook block may touch a boom.	Elevate the boom (”down”).
W0999	AML back-up battery power is low. This message only appears at power on.	Replace back-up battery by a new one.

“E1---“ shows communication error between display unit or transmitter and control unit.
If this group error occurs, crane operation stops. But crane operation is possible via the AML override key.

Code	Description	Remedy
E1004	AML cannot receive information from Outrigger state transmitter.	Communication line between Transmitter and AML is interrupted. Outrigger state transmitter fault. AML circuit fault
E1006	Outrigger state transmitter internal error.	Wire fault Outrigger state transmitter fault.
E1010	AML detects data error in data received from Outrigger state transmitter.	Communication line between Transmitter and AML is interrupted or connected incorrectly. AML receive circuit fault. Transmitter's transmit circuit fault.
E1012	Outrigger state transmitter type in data received is wrong.	Outrigger state transmitter fault Wrong connection of communication line.
E1021	AML detects data error in data received from Display Unit	Display Unit fault Wrong connection of communication line.
E1022	Display Unit cannot receive information from main unit.	Main Unit is not working. Main Unit fault. Wrong connection of communication line.
E1023	Display Unit type error	Display Unit fault Wrong connection of communication line.
E1024	Display Unit internal error	Display Unit fault
E1025	Main Unit cannot receive information from Display Unit.	Display Unit is not working. Wrong connection of communication line.

"E2---" shows detectors, operating levers, or hydraulic valve error.
If this group error occurs, crane operation stops. Crane operation is basically possible via AML override key. But in case of some errors, crane operation is not possible via AML override key before the correct condition exists.

Code	Description	Remedy
E2003	Boom length detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit AML circuit fault
E2004	Boom angle detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit AML circuit fault
E2009	Front right outrigger length detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of transmitter convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit. Outrigger state transmitter circuit fault
E2010	Rear right outrigger length detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of transmitter convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit. Outrigger state transmitter circuit fault
E2011	Front left outrigger length detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of transmitter convert voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit. Outrigger state transmitter circuit fault
E2012	Rear left outrigger length detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit. Outrigger state transmitter circuit fault
E2022	Telescopic cylinder length detector error. The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Detector fault Detector wire interrupted or short-circuit AML circuit fault
E2023	Moment Error. Calculated load (weight) becomes negative ("minus"). **Note: Crane operation which reduces load moment is possible. Error log is not recorded**.	Pressure sensor of elevation cylinder fault Detector wire interrupted or short-circuit Adjustment is effected incorrectly AML circuit fault

Code	Description	Remedy
E2030	Elevating cylinder's rod pressure detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Pressure sensor of elevation cylinder fault Detector wire interrupted or short-circuit Adjustment is effected incorrectly AML circuit fault
E2031	Elevating cylinder's tube pressure detector error The input value from detector is out of normal range. Normal range is 1.1-21mA (Inside of AML convert to voltage 0.25-4.75V).	Pressure sensor of elevation cylinder fault Detector wire interrupted or short-circuit Adjustment is effected incorrectly AML circuit fault
E2041	Crane control lever 1 error (analogue) The input value from lever 1 is out of normal range. Normal range is 0.25-4.75V. **Note: Lever 1 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2042	Crane control lever 2 error (analogue) The input value from lever 2 is out of normal range. Normal range is 0.25-4.75V. **Note: Lever 2 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2043	Crane control lever 3 error (analogue) The input value from lever 3 is out of normal range. Normal range is 0.25-4.75V. **Note: Lever 3 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2044	Crane control lever 4 error (analogue) The input value from lever 4 is out of normal range. Normal range is 0.25-4.75V. **Note: Lever 4 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault

Code	Description	Remedy
E2048	Crane control lever 1 error (mismatch) When operation detect switch of lever 1 is off, analog input value from crane control lever 1 is not in neutral range. **Note: Lever 1 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2049	Crane control lever 2 error (mismatch) When operation detect switch of lever 2 is off, analog input value from crane control lever 2 is not in neutral range. **Note: Lever 2 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2050	Crane control lever 3 error (mismatch) When operation detect switch of lever 3 is off, analog input value from crane control lever 3 is not in neutral range. **Note: Lever 3 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2051	Crane control lever 4 error (mismatch) When operation detect switch of lever 4 is off, analog input value from crane control lever 4 is not in neutral range. **Note: Lever 1 operation is not possible. Another operation is possible via AML override key.**	Lever fault, Wire-fault (interrupted or short-circuit) AML circuit fault
E2061	Swing control output error AML detect the swing control current flow, when controlled current output is off. **Note: Swing operation is not possible. Another operation is possible via AML override key.**	Wire-fault AML circuit fault
E2062	Main winch control output error AML detects current flow when controlled current output is off. **Note: All operations are not possible.**	Wire-fault AML circuit fault
E2063	Sub winch control output error AML detects current flow when controlled current output is off. **Note: All operations are not possible.**	Wire-fault AML circuit fault

Code	Description	Remedy
E2064	Telescopic cylinder control output error AML detects current flow when controlled current output is off. **Note: All operations are not possible.**	Wire-fault AML circuit fault
E2065	Elevating cylinder control output error AML detects current flow when controlled current output is off. **Note: All operations are not possible.**	Wire-fault AML circuit fault
E2067	Pump1 control output error AML detects current flow when controlled current output is off. **Note: All operations are not possible.**	Wire-fault AML circuit fault
E2068	Pump2 control output error AML detects current flow when controlled current output is off.	Wire-fault AML circuit fault
E2081	Swing motion error When AML does not activate the swing valve, swing motion (to right) is detected. **Note: Swing right operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Swing angle detector fault. AML circuit fault.
E2082	Main winch motion error When AML does not activate the main winch valve, but winch motion (up) is detected. **Note: Main winch up operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Main winch position sensor fault. AML circuit fault.
E2083	Sub winch motion error When AML does not activate the sub winch valve, but winch motion (up) is detected. **Note: Sub winch up operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Sub winch position sensor fault. AML circuit fault.
E2084	Telescope motion error When AML does not activate the telescopic valve, but telescopic motion is detected. **Note: Telescope cylinder extension operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Telescopic cylinder length detector fault. AML circuit fault.

Code	Description	Remedy
E2085	Elevating motion error When AML does not activate the elevating valve, but elevating „up“ motion is detected. **Note: Elevation „down“ operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Boom angle detector fault. AML circuit fault.
E2087	Boom section detector error Plural boom section detectors are turned on at the same time. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Boom section detector fault. Wire fault. AML circuit fault.
E2088	Tele section 2 detector (ID-sensor) does not work. Tele section 3(1) detector (ID-sensor) works after tele 1(3) without tele 2. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Tele section 1 or 2 or 3 detector fault. Wire fault. AML circuit fault.
E2089	Boom section detector error. While telescopic cylinder is not connected to the boom, telescopic cylinder length value exceeds the normal range when boom section detector becomes on. Cylinder length and boom section detector status does not match. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Cylinder length detector fault or incorrect adjustment. Boom section detector fault or incorrect adjustment. Wire fault. AML circuit fault or wrong memorization of boom status.
E2090	B-pin Error. Cannot lock or unlock B-pin B-pin lock status detector and unlock status detector are both turned on. **Note: Telescope operation is not possible. Another operation is possible.**	B-pin lock/unlock detector fault, Wire fault, AML circuit fault.
E2091	C-pin Error. Cannot lock or unlock C-pin C-pin lock status detector and unlock status detector are both turned on. **Note: Telescope operation is not possible. Another operation is possible.**	C-pin lock/unlock detector fault, Wire fault, AML circuit fault.

Code	Description	Remedy
E2092	B,C pin error B-pin and C-pin detectors are both unlocked state. **Note: Telescope operation is not possible. Another operation is possible.**	B-pin, C-pin lock/unlock detector fault Wire fault AML circuit fault.
E2093	Boom section detector and C-pin status error C-pin unlock detector goes off when boom section detector is not turned on. If this state continues more than 1 sec, AML issues this error. **Note: Telescope operation is not possible. Another operation is possible.**	Boom section detector or C-pin lock/unlock detector fault Wire fault AML circuit fault.
E2094	Tele-reset is necessary. This error appears after AML exchange or battery inside AML is at low power. **Note: Telescope operation is not possible. Another operation is possible.**	Execute tele-reset menu.
E2095	Lever-1 operation detect switches are both turned on. **Note: Lever 1 operation is not possible. Another operation is possible.**	Lever-1 fault Wire fault AML circuit fault.
E2096	Lever-2 operation detect switches are both turned on. **Note: Lever 2 operation is not possible. Another operation is possible.**	Lever-2 fault Wire fault AML circuit fault.
E2097	Lever-3 operation detect switches are both turned on. **Note: Lever 3 operation is not possible. Another operation is possible.**	Lever-3 fault Wire fault AML circuit fault.
E2098	Lever-4 operation detect switches are both turned on. **Note: Lever 4 operation is not possible. Another operation is possible.**	Lever-4 fault Wire fault AML circuit fault.
E2103	Swing motion error When AML does not activate the swing valve, swing motion (to the left) is detected. **Note: Swing left operation is not possible. Another operation is possible. via AML override key**	Hydraulic circuit fault Wire fault Swing angle detector fault. AML circuit fault

Code	Description	Remedy
E2104	Main winch motion error When AML does not activate the main winch valve, but winch motion (down) is detected. **Note: Main winch down operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Main winch position sensor fault. AML circuit fault.
E2105	Sub winch motion error When AML does not activate the sub winch valve, but winch motion (down) is detected. **Note: Sub winch down operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Sub winch position sensor fault. AML circuit fault.
E2106	Telescope motion error When AML does not activate the telescopic valve, but retract motion is detected. **Note: Telescope cylinder retract operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Telescopic cylinder length detector fault. AML circuit fault.
E2107	Elevating motion error When AML does not activate the elevating valve, but elevating down motion is detected. **Note: Elevation „down“ operation is not possible. Another operation is possible via AML override key.**	Hydraulic circuit fault. Solenoid fault. Boom angle detector fault. AML circuit fault.
E2110	Swing angle detector A Error. Input current from swing angle detector is out of normal range (1.1-21.6mA)	Swing angle detector fault Wire fault AML circuit fault
E2111	Swing angle detector B Error. Input current from swing angle detector is out of normal range (1.1-21.6mA)	Swing angle detector fault Wire fault AML circuit fault
E2112	Swing angle detectors' offset Error. Input current difference between swing angle detector A and B is out of range.	Swing angle detector fault Wire fault AML circuit fault
E2113	Input current from overwind detector is out of normal range (1.14-21.6mA)	Overwind detector fault Overwind connector is not rigged. Wire fault AML circuit fault.

Code	Description	Remedy
E2115	Tele section 3 detector (ID-sensor) does not work. Tele section 4(2) detector (ID-sensor) works after tele 2(4) without tele 3. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Tele section 2 or 3 or 4 detector fault Wire fault AML circuit fault.
E2116	Tele section 4 detector (ID-sensor) does not work. Tele section 5(3) detector (ID-sensor) works after tele 3(5) without tele 4. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Tele section 3 or 4 or 5 detector fault Wire fault AML circuit fault.
E2117	Tele section 5 detector (ID-sensor) does not work. Tele section 6(4) detector (ID-sensor) works after tele 4(6) without tele 5. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Tele section 4 or 5 or 6 detector fault Wire fault AML circuit fault.
E2119	Boom section detector and B-pin status error B-pin lock detector goes off when C-pin is not locked. When this state continues more than 1 sec, AML issues this error. **Note: Telescope operation is not possible. Another operation is possible via AML override key.**	Boom section detector or B-pin lock/unlock detector fault Wire fault AML circuit fault.

"E3---" shows inside of AML error.
If this group error occurs, crane operation stop. Crane operation is basically possible, but only in emergency mode

Code	Description	Remedy
-	During ROM sum check, error is detected.	Re-write program and data AML circuit fault
E3002	During RAM check, error is detected.	Hardware fault due to external noise. AML circuit fault
E3003	CPU or DMAC address error	Hardware fault due to external noise. Re-write program and data AML circuit fault
E3004	Illegal instruction	
E3005	Undefined exception is called.	
E3006	Applied voltage to analog detector (5V) is out of range.	Wire fault Circuit fault
E3007	Adjustment data in flash memory is not correct.	Hardware fault due to external noise. AML circuit fault **Note:** **Erase error log.** **This message remains until erase error log operation. Re-write program and data, or do re-adjustment**
E3008	Input output handling program(s) do(es) not run correctly.	Hardware fault due to external noise. AML circuit fault

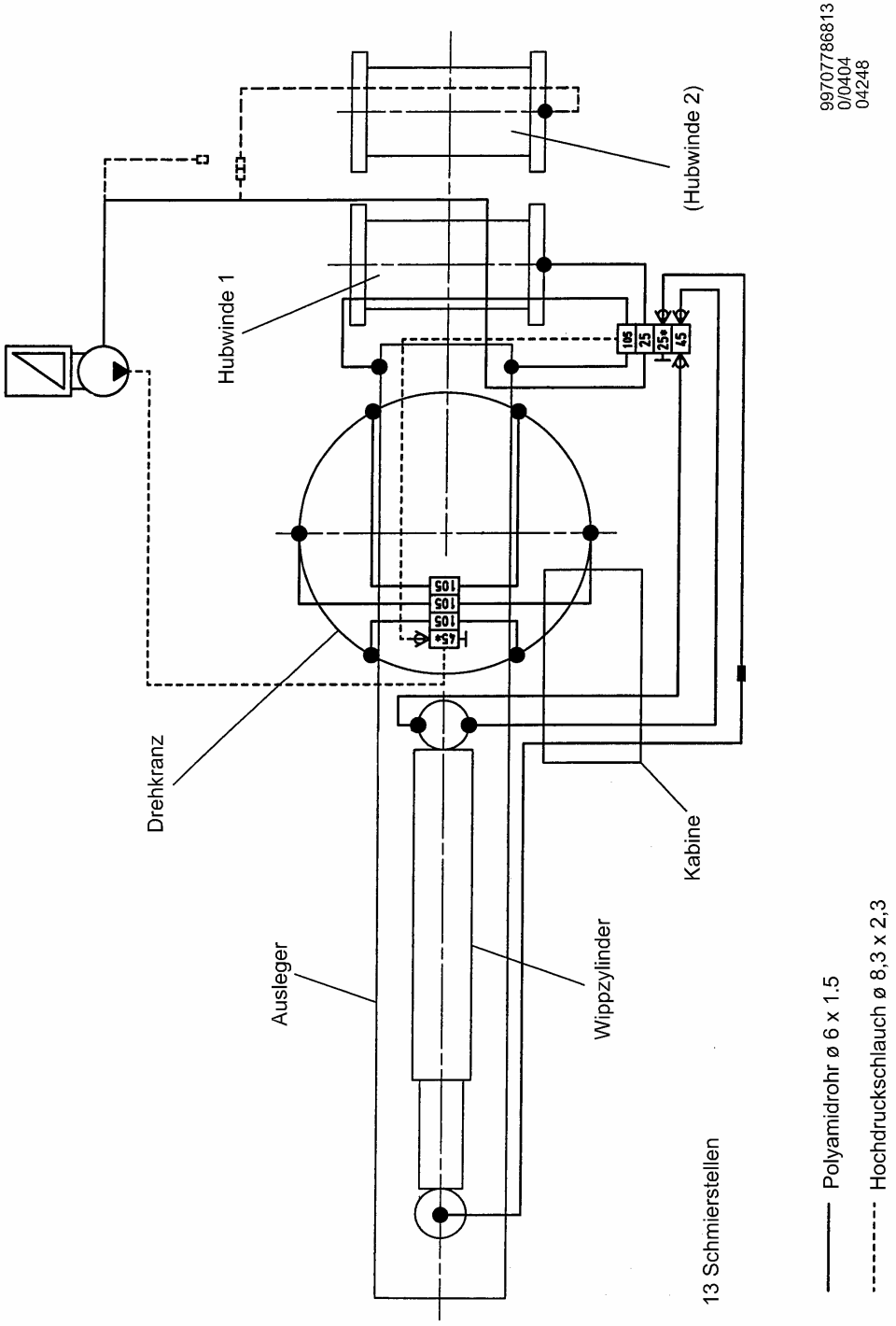
“E4---“ shows Display Unit error.
If this group error occurs, crane operation stops. Crane operation is basically possible via AML override key.

Code	Description	Remedy
E4001	During ROM sum check, error is detected.	Memory fault. Re-write program and data Display unit circuit fault
E4002	During RAM check , error is detected.	Memory fault. Hardware fault due to external noise. Display unit circuit fault.
E4003	CPU or DMAC address error	Memory fault. Re-write program and data Hardware fault due to external noise. Display unit circuit fault
E4004	Illegal instruction	
E4005	Undefined exception is called.	
E4010	Receive timeout error Cannot receive data from Main Unit	Wire fault Main Unit is updating flash Display unit or Main unit circuit fault
E4011	Receive data error Cannot receive data from Main Unit.	Wire fault Display unit or Main unit circuit fault

Centralized lubrication system

Overview of lubricating points

Ausleger	Boom
Drehkranz	Ring gear
Hochdruckschlauch	High pressure hose
Hubwinde 1	Hoist winch 1
Hubwinde 2	Hoist winch 2
Kabine	Cabin
Polyamidrohr	Polyamid tube
Schmierstellen	Lubricating points
Wippzylinder	Cylinder



Memo:

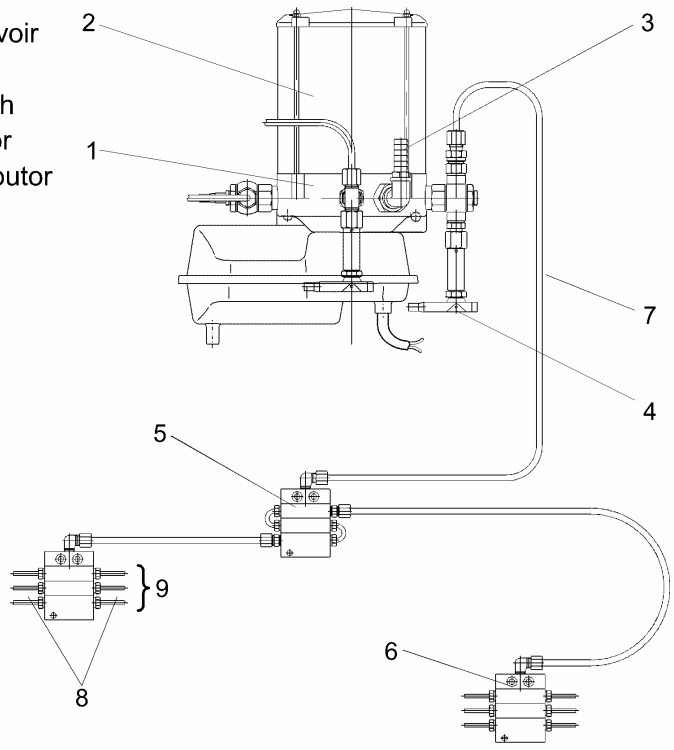
1 Method of operation of the BEKA-MAX central grease lubrication system:

The BEKA-MAX central grease lubrication system operates on a progressive basis and is capable of using grease to NLGI Class 2. "Progressive" signifies that the bearings are lubricated in a progressive sequence, i.e. one after the other. This design principle permits easy monitoring of the system by means of an in-built pressure relief valve in the pump element. If any lubrication point cannot be lubricated from the distributor, a back pressure of up to 280 bar will be built up in system and at that point, a controlled discharge will be effected by the pressure relief valve. A micro switch on the relief valve of the pump element send a warning signal to a pilot light in the driver's cabin.
Normally, progressive systems are operated using commercially available standard greases to NLGI Class 2.

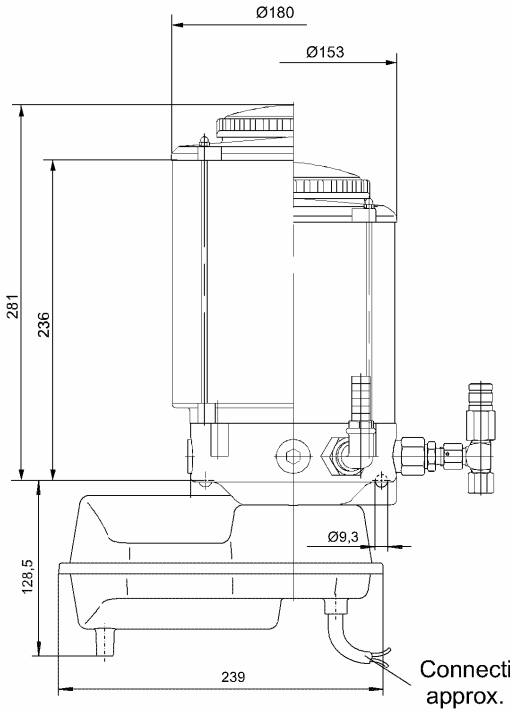
Design of the BEKA-MAX central grease lubrication system:

An electrically actuated piston pump, with up to three pump elements, supplies lubricant to the main progressive distributor (if installed) which, in turn, distributes grease to the secondary distributors in the correct ratio. These secondary distributors then supply the lubricant to the various bearings on the vehicle. If there are less than twenty lubrication points on the vehicle, only one distributor will be required. An electronic control module will trigger lubricating and "off" times of the pump and hence the total quantity of lubricant supplied.

1 central grease pump EP-1
2 transparent lubricant reservoir
3 filling nipple
4 relief valve with micro switch
5 main progressive distributor
6 auxiliary progressive distributor
7 main pipe
8 lubricant pipes
9 lubrication points



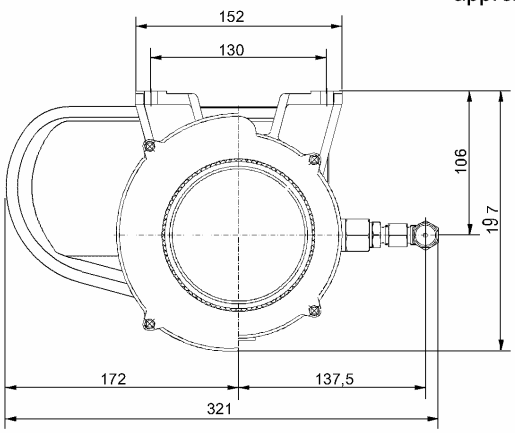
2 Function description, central lubricating pump EP-1:

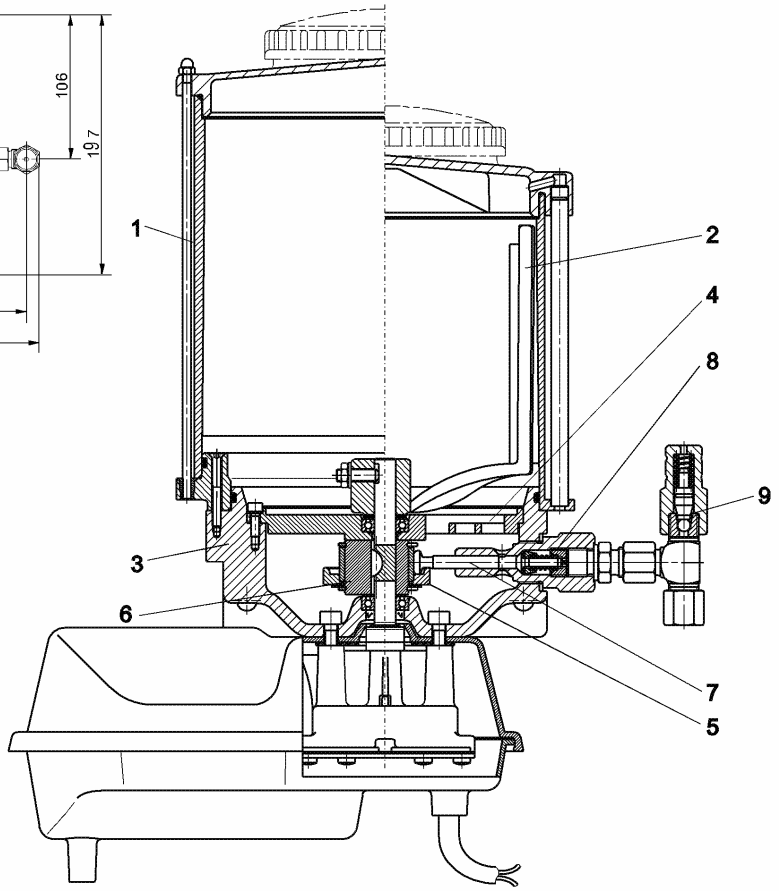


Method of Operation:

The DC motor (10) provides a continuos drive to the eccentric (5) with thrust ring (6). This cam arrangement produces the suction and pressure stroke of the primary piston (7) and the integrated check value (8) prevents return of lubricant.

The rotating charging arm (2) forces lubricant from the reservoir (1) via the perforated base plate (4) into the pump housing at the bottom end of the pump body. The combination of charging arm and perforated plate serves to reduce air bubbles to insignificant dimensions. A rubber wiper blade on the charging arm (2).





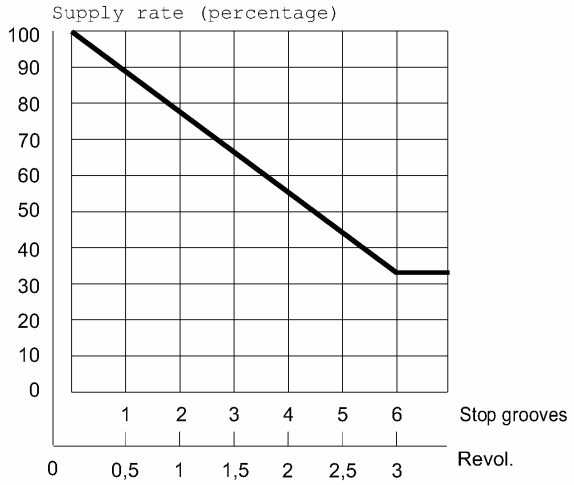
Permits visual check of grease level in the transparent reservoir (1).

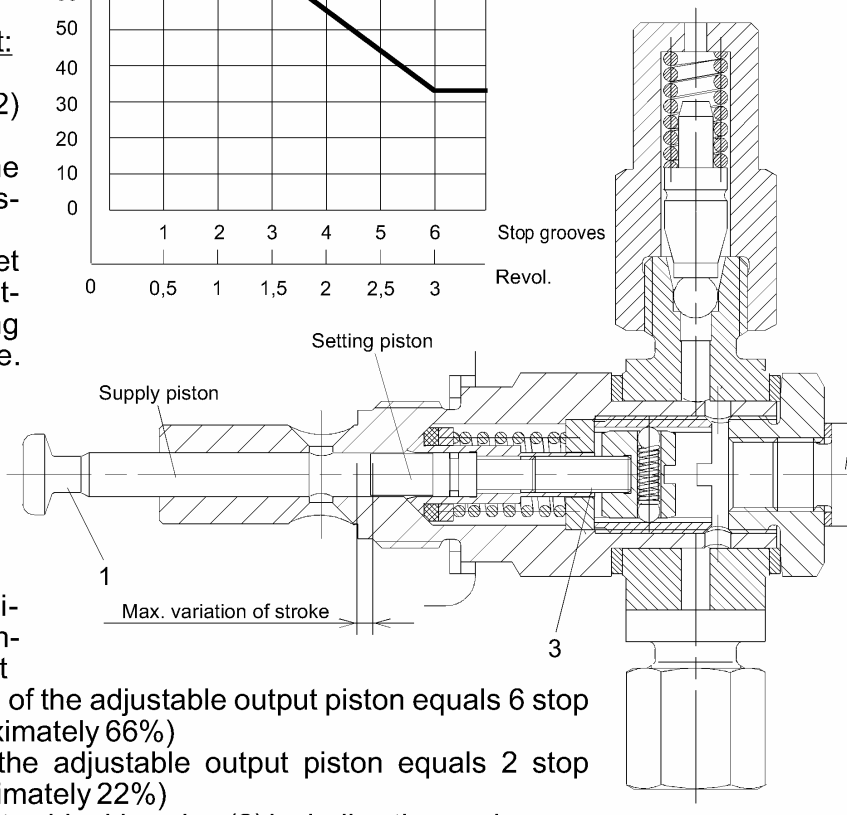
Filling of the reservoir is effected via the hydraulic grease nipple.

The pressure relief valve (9), is pre-set to 280 bar operating pressure, to provide protection for the pump and piping system.

Adjusting output of the pump element PE-120 V:

Adjustability of the output allows use of this pump element for supplying lubrication systems of different sizes.





Adjusting pump unit:

- Remove plug (2) using Allen key.
- Adjustment of the va´riable rate piston
- The piston is set at maximum output, when leaving the factory, i.e. stop groove 0.
- Clockwise rotation decreases the output (1 stop groove equals approx. 11 % of output)
- Counter-clockwise rotation will increase the output
- Maximum stroke of the adjustable output piston equals 6 stop grooves (approximately 66%)
- 1 revolution of the adjustable output piston equals 2 stop grooves (approximately 22%)
- Replace and tighten blanking plug (2) including the washer.

Installation of pump elements into the electric pump EP-1:

- Removal and installation of pump unit must be carried out when the pump is not working.
- Remove blanking plug.
- Install pump element with piston partially extended.
- Insert with pump piston angled upwards.
- When the piston head touches thrust ring, move to horizontal position (Fig. 11).
- Tighten pump element in place.
- Removal is effected by a reserve sequence of operations.
- During removal of the pump element, ensure that the piston (1) is not left behind within the housing.
- When installing pump element, carry out pump rotation test to establish that the unit is correctly installed.
- With every revolution of the pump, clearly visible quantity of grease must be seen to be leaving the pump outlet

Fig. I

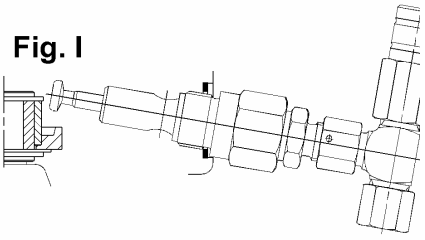
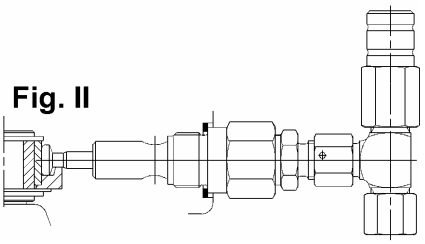


Fig. II



3 Integrated electronic control unit S-EP 4 with data memory for pump type EP-1 and OC-1:

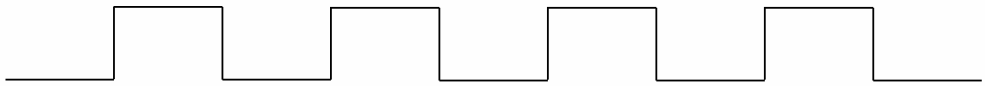
The electronic control unit S-EP 4 is used for control of a central lubrication system, governed according to operating times, both for progressive systems (EP-1 pumps) and for multi-line systems (OC-1 pumps).

Sequence of steps of operation:
(Time of lubrication; inoperative periods): After ignition has been turned ON, the yellow LED will be lighted for approx. 2,5 sec., this signalling that the system is ready for operation. If a function test is to be performed, an intermediate lubrication cycle has to be started by means of a push button at the engine housing or in the dashboard.
When that push button in the dashboard or at the engine housing is actuated, the time of lubrication is started and the pump is turned ON. After the time lubrication is completed, the pump motor will be turned OFF and the inoperative time begins. All subsequent steps of lubrication will be started automatically in accordance to the rhythm of the pre-selected inoperative times.

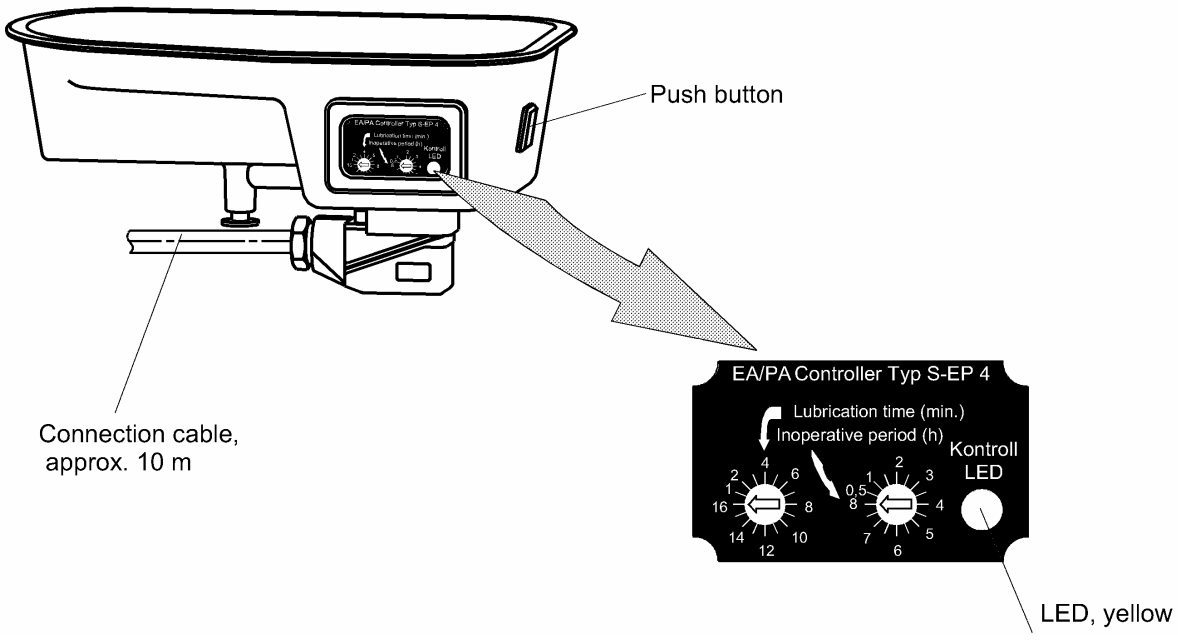
If the ignition is turned off while an inoperative time or a lubrication cycle is going on, the time will be interrupted and stored in the memory. When the ignition is turned on again, the dates stored in the memory will be re-activated and the sequence of operations will be continued at that point where it was interrupted before.
When the ignition is turned ON, an intermediate lubrication cycle can be started at any time by means of the push button at the engine housing or in the dashboard.
Whenever the control unit is connected for the first time, a lubrication cycle will be started.
Each control unit is equipped with a yellow LED, indicating the following functions:

Ignition ON: > Diode is lighted for approx. 2,5 sec.

Lubrication cycle: > Diode is flashing



The functions of the LED may be shown also at an external point, by a pilot lamp in the dashboard of the driver's cab.

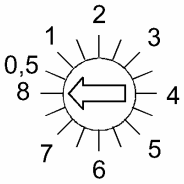


Technical details:

Supply voltage:	10 30 Volts
Max. current load:	I = 6,0 A
Fuse (not supplied with the unit)	F 6,3 A (5x20) medium inertia
Output for signal lamp:	I = 0,4 A
Temperature range:	from-35°C up to +75°C
Enclosure:	IP 65

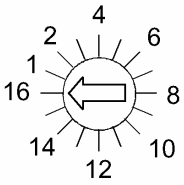
Inoperative period:

0,5 h - 8 h

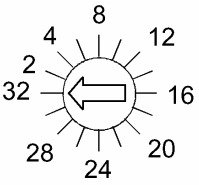


Time of lubrication:

Time range I: 1 min. - 16 min.



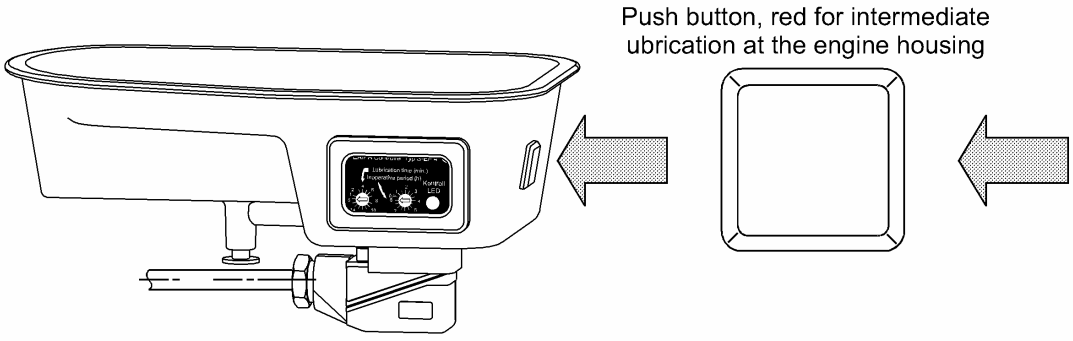
Time range II: 2 min. - 32 min.



To enable setting of the time, remove the red frame, using a flat screwdriver, and detach the 4 crosshead screws. After that, the transparent cover can be removed, if the cover should not be closed in the correct way, water may penetrate the system which then may be destroyed. In any such case, warranty claims cannot be accepted. When ordering part, please state the range of lubrication times required by you.

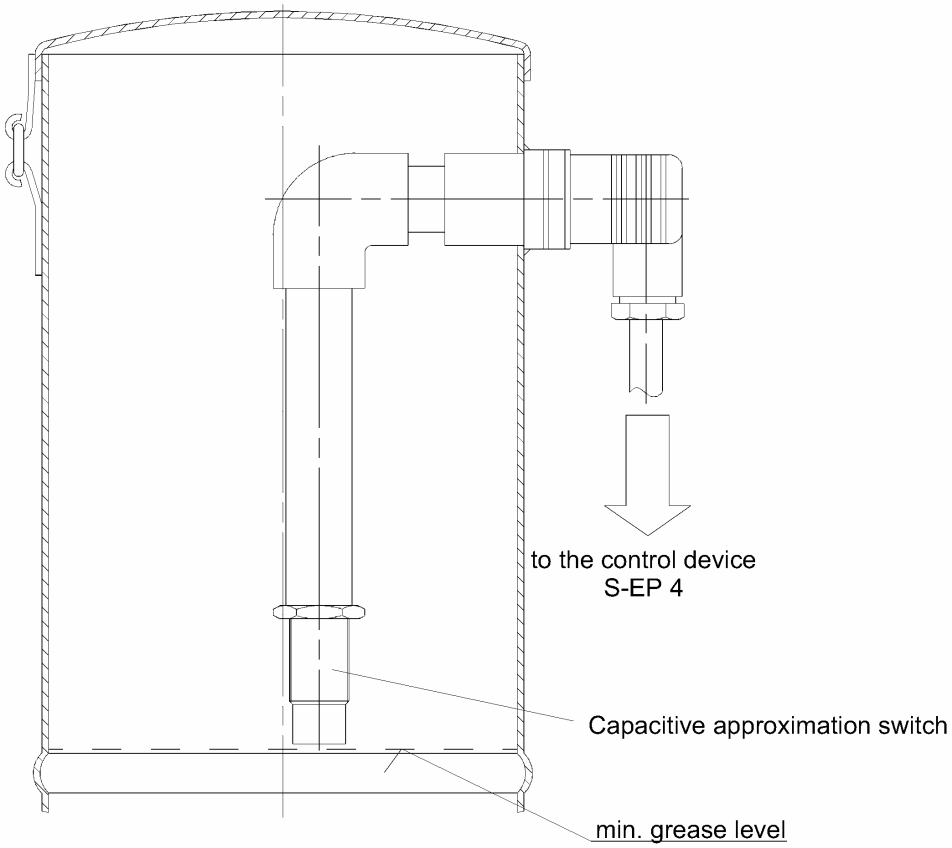
Intermediate lubrication cycle:

An intermediate lubrication cycle can be started by means of the push button at the engine housing or in the dashboard of the vehicle.



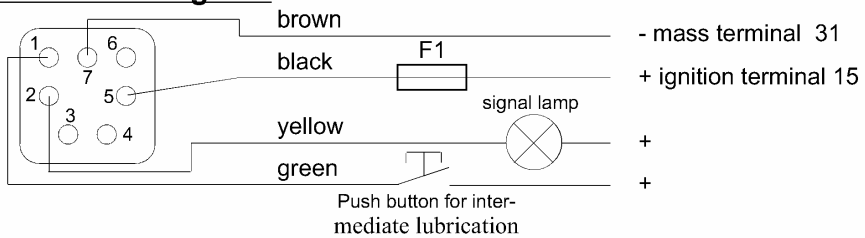
Special execution electric grease level control

Optional grease pumps can be equipped with an electric grease level control. In this case, there is assembled in the pump container an capacitive approximation switch which sends at high level of grease a signal to the electronic control S-EP 4 which is evaluated by the control device.

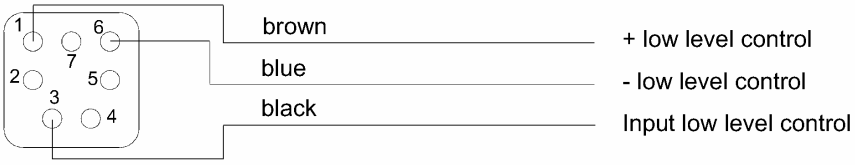


The control device evaluates the signal and the yellow LED slowly blinks (1 sec. on, 2 sec. off).
To prevent any air from being pumped into the system, the pump shuts down. Once the container has been filled, a lubricate signal can be triggered through the centralised lubrication system.

Terminals diagram:

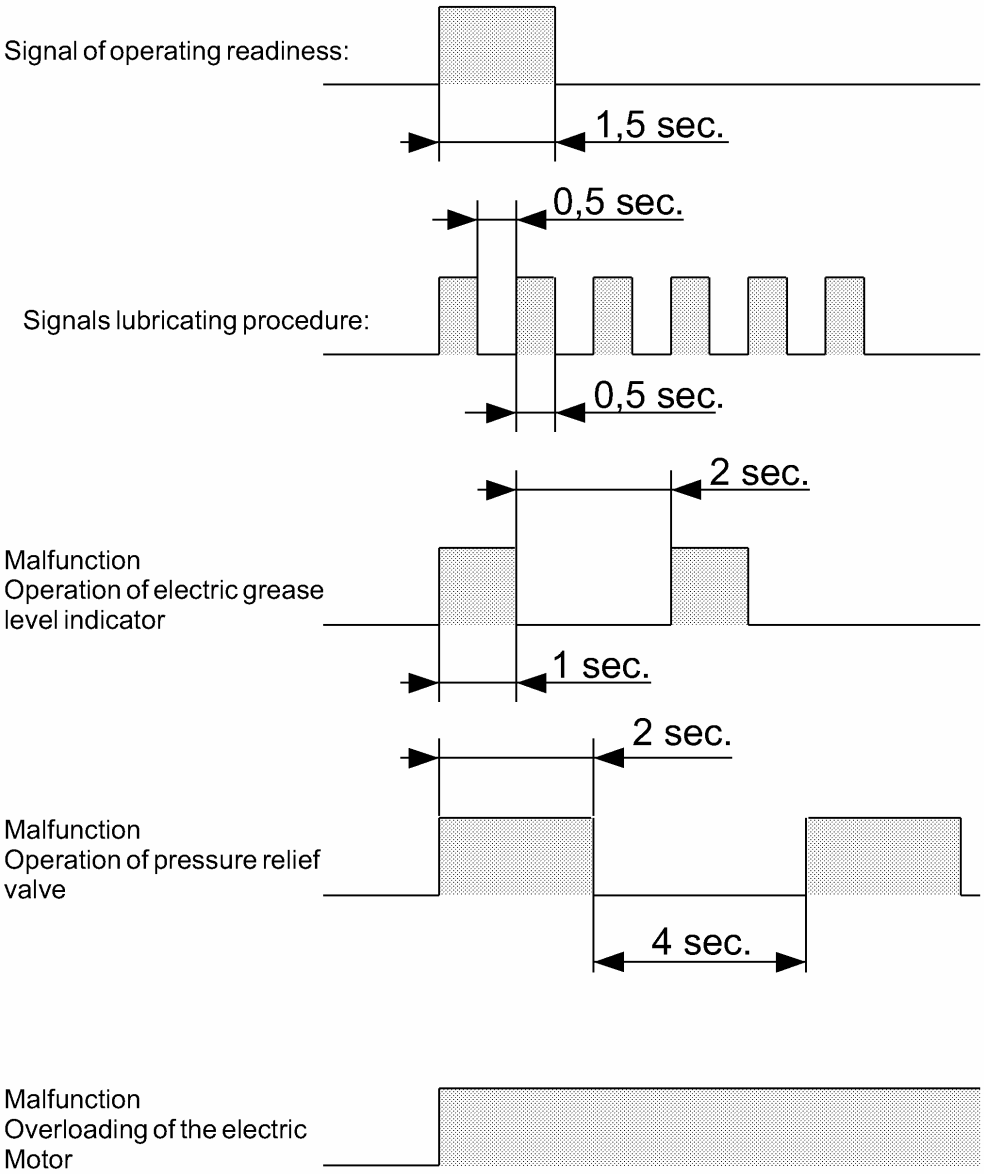


view of plug-incontacts no.1

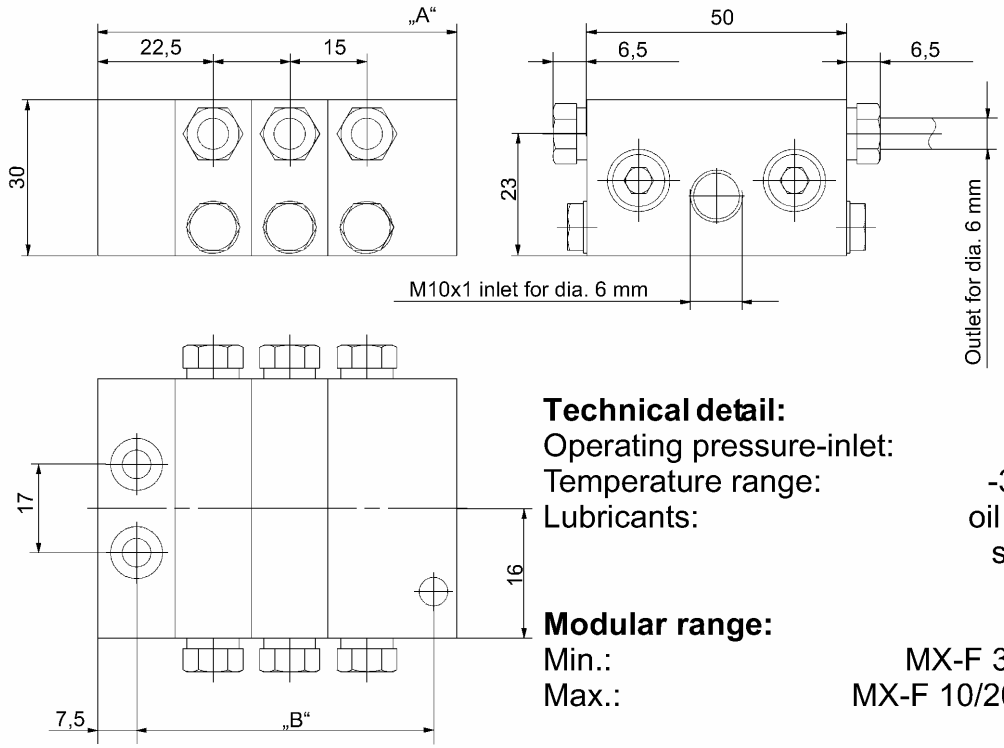


view of plug-incontacts no.2

Signals of the LED and the external signal lamp:



4 Method of operation of progressive distributors MX-F:



Technical detail:

Operating pressure-inlet:	300 bar
Temperature range:	-35°C to +100°C
Lubricants:	oil , soft grease or standard grease

Modular range:

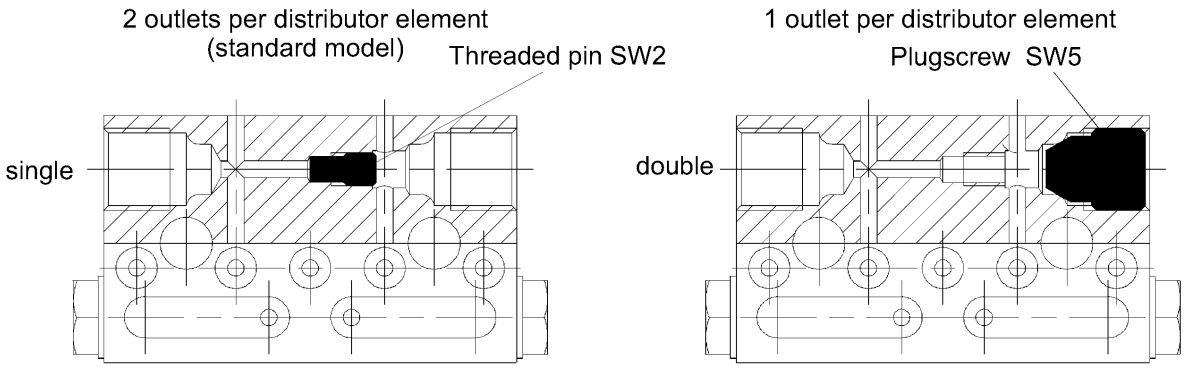
Min.:	MX-F 3/6 (3 elements)
Max.:	MX-F 10/20 (10 elements)

Elements code	Output per outlet	Output per element	Piston dia.
MX-F 25	25 mm^3	50 mm^3	3 mm
MX-F 45	45 mm^3	90 mm^3	4 mm
MX-F 75	75 mm^3	150 mm^3	5 mm
MX-F 105	105 mm^3	210 mm^3	6 mm

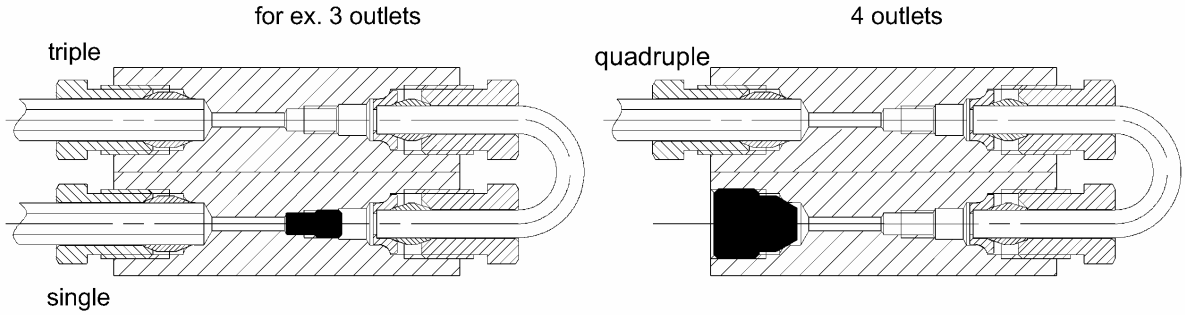
Outlets	2	4	6	8	10	12	14	16	18	20
dimension “A"	70	70	70	85	100	115	130	145	160	175
dimension “B"	58	58	58	73	88	103	118	133	148	163

Progressive distributors are defined as assemblies containing a series of pistons, whose function is to deliver lubricant to bearings; the lubricant itself provides an hydraulic force to operate these pistons in a progressive sequence: thus, each bearing connected to a piston receives a measured supply of lubricant, one after the other.
Should there be an obstacle to the flow of lubricant, e.g. crushing of the lubricant delivery pipe or excessive back pressure in the bearing, the progressive distributor block will be unable to proceed with this cycle. This blockage can be used to monitor the operation of a distributor assembly. On automatic pumps, e.g. EP-1 electric pump, lubricant will escape from the pressure limiting valve.
The progressive distributors are assembled in modular form and can suit the relevant number of lubrication points by extension or reduction in the number of individual elements. This modular design allows for combinations of various element with differing rates of lubricant delivery.
Delivery outputs per piston stroke are achieved by the use of different piston diameters. In order to achieve a complete and correct cycle of operation, a progressive distributor assembly must always comprise a minimum of three operating elements.

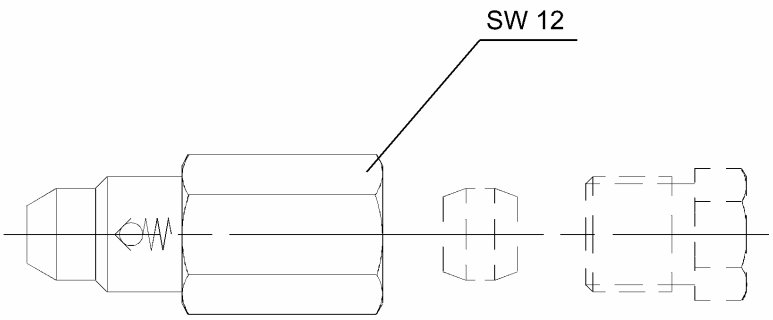
Combination of outlets:



Combination of several outlets:



Check valve for progressive distributor MX-F:

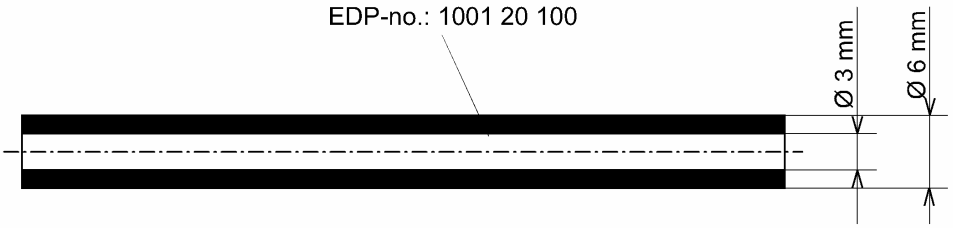


This check valve is used in conjunction with primary distributors and has the purpose of counteracting high back pressure.

5 Installation of pipework:

Types of pipings:

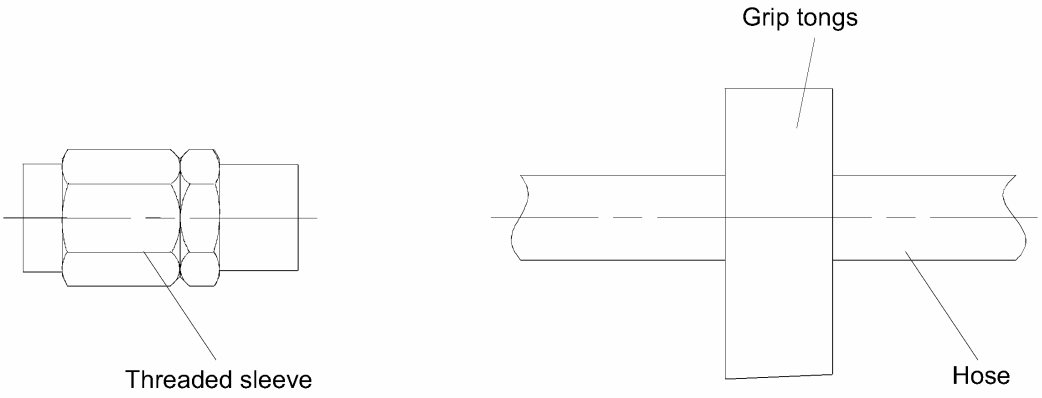
From the progressive distributor to the lubricant point, a nylon pipe of Polyamide PA 12 is recommended. In the progressive system, the standard diameter of tail pipes is 6 mm. The wall thickness of this tube is 1,5 mm, so tube inserts are not necessary.



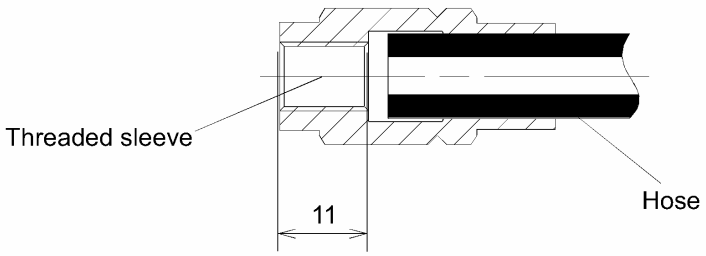
From the pump to the main distributor, and from the main distributor to the secondary distributor, or where movement is expected, a high pressure hose of nominal 4 mm bore is used. This hose has an outside diameter of 8.3 mm and is used with re-usable ferrules and inserts.

Fitting of the hose ferrel:

Grip the hose, using tube pliers. Lubricate the end of the hose with either oil or grease

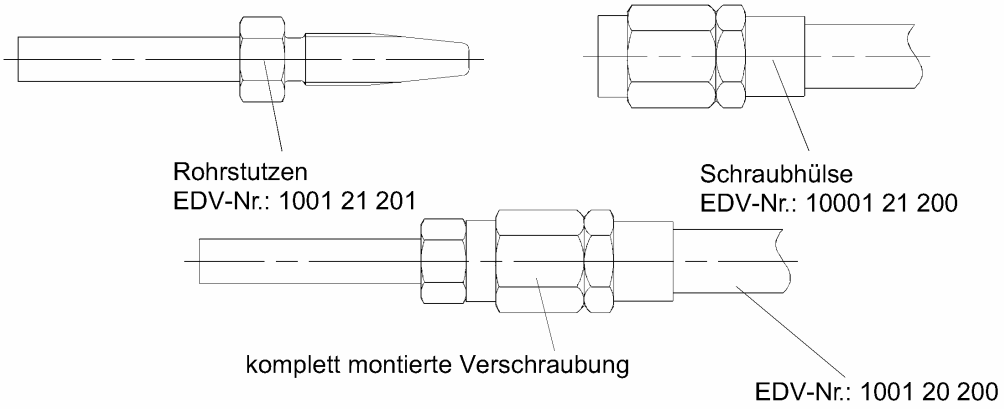


Place the threaded sleeve on to the hose and turn in an anti-clockwise direction until the dimension shown in the drawing (11 mm) is attained.



Fitting the hose insert:

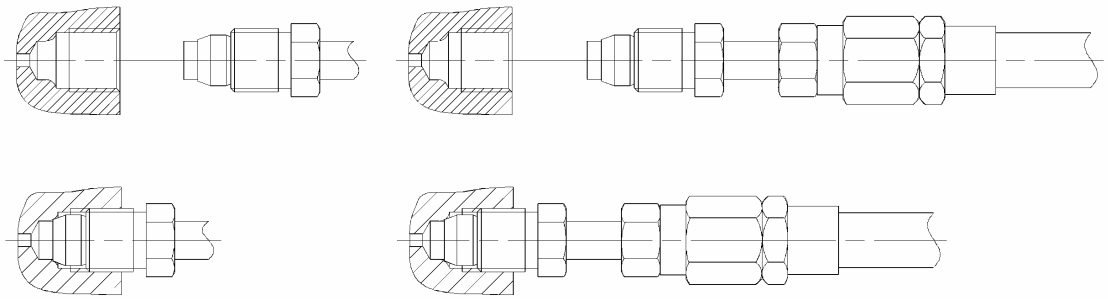
The threaded portion, as well as the cone-shaped should be oiled carefully. The insert is then screwed into the ferrule up to the stop position.



Important note:

From time to time, the outside diameter of the hose can vary slightly, because of manufacturing tolerances. When required to assemble hose at the bottom end of the permissible tolerance, with a hose ferrule at the top end of its tolerance scale, a successful joint can be made by flattening the ferrule (at the point where the hose enters) by 1 or 2 mm into an oval shape.

Joints are made at the distributor by means of a sleeve nut and cone fitting.



Polyamidrohr mit Doppelkegelring und Überwurfschraube

Hochdruckschlauch mit Doppelkegelring, Überwurfschraube, Rohrstutzen und Schraubhülse.

Notes concerning installation:

- Avoids points where chafe can occur against other parts of the vehicle.
- Install pipes with adequate clearance from heat sources (such as exhaust, engine etc.): where necessary, use steel pipe 6 mm x 1 mm.
- When fitting lubrication pipes to moving components, such as part of axles, tail lifts, cranes, hoists etc., particular care must be taken to avoid damage or chafing.

Memo:

Documents regarding heating, ventilation and the air conditioning system**) - superstructure cabin

**) Optional equipment

Air conditioning system

Application

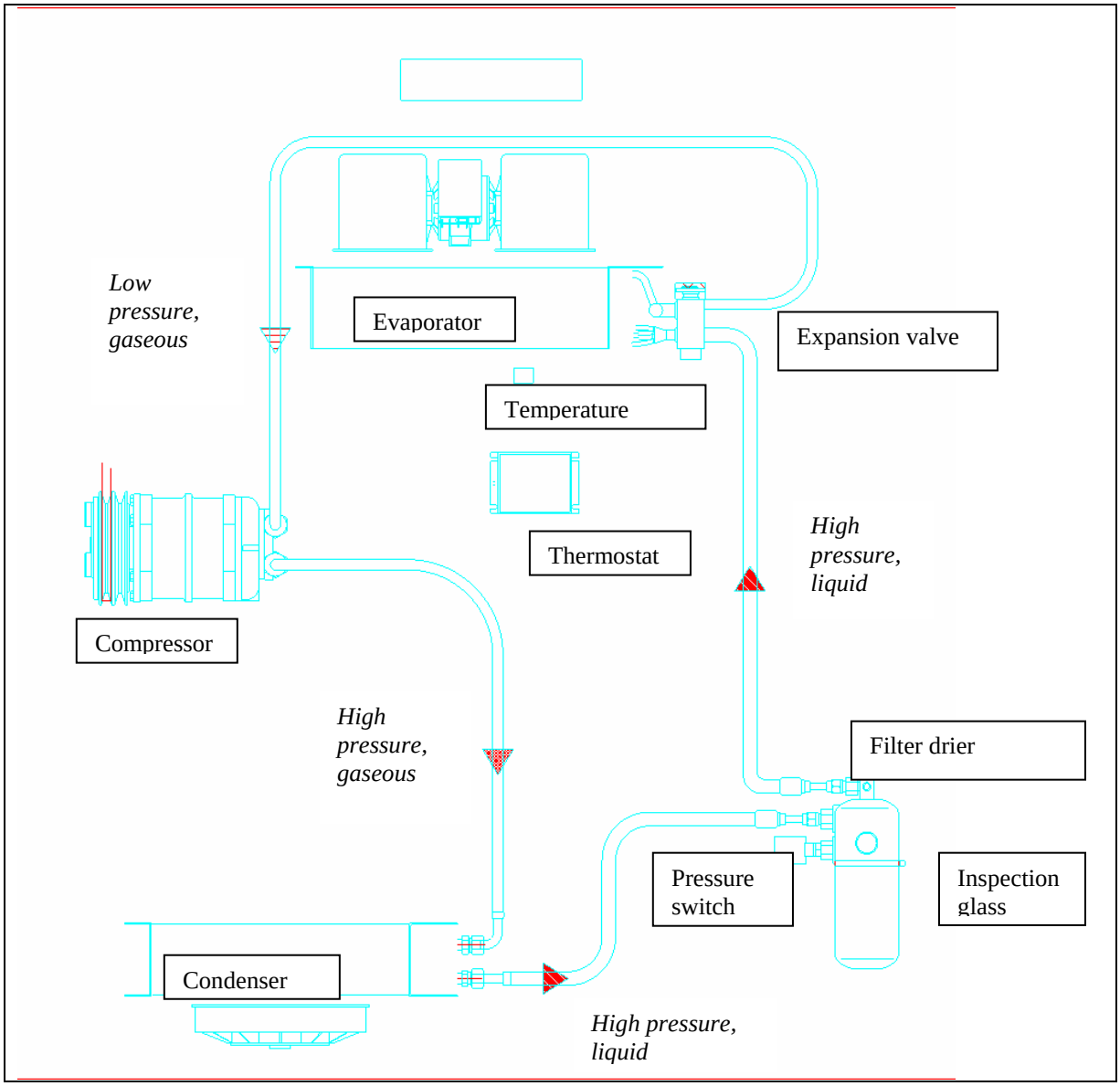
The Wölfle **air conditioning system 965212** is a useful extension of our basic heater unit 910154 and is used to condition the superstructure cabin of TADANO FAUN automobile cranes. Thus, please read first of all the enclosed operating instructions for the Wölfle heater unit 910154.

Technical Details

Air conditioning system cpl.	
Manufacturer	Wölfle GmbH
Model	R134a/ Air
Rated voltage	24 V
Refrigerant	R134a (filling capacity 1600 g)
Refrigerating oil	PAG
Air conditioning expansion kit	
Rated voltage	- -
Cooling capacity (in connection with heater unit 910154)	4.5 kW (± 10%)
Condenser unit	**(964081)**
Rated voltage	24 V
Max. air throughput	2100 m³/h
Thermal output	approx. 13 kW
Fan stages	1
Max. power consumption	11 A
Weight	approx. 9.7 kg
Compressor	**(359213)**
Model	Seltec TM - 15HD
Rated voltage	24 V
Max. speed	6000 rpm
Delivery	147 cm³
Sense of rotation	right-hand or left-hand
Refrigerant	R134a
Oil	ZXL100PG (PAG oil)
- Filling capacity	150 cm³
Weight	7 kg
Max. electr. power consumption	48 W
Filter drier	**(427009)**
Capacity	0.7 l
Filtering effect	up to particle size > 6 µm
Water absorption of dry-type filter cartridge	16 g
Refrigerant	R134a
Weight	1 kg

These data are partially given without being established by measurements and thus should only be considered as approximate values!

Refrigerating cycle



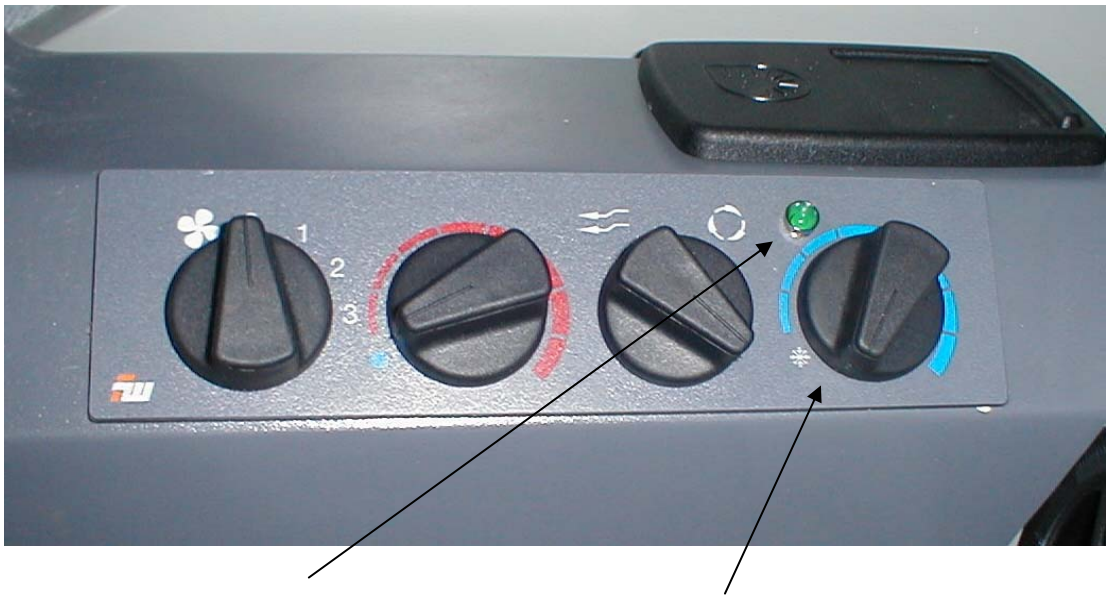
The components of the refrigerating cycle are located as follows:

Evaporator	: Retrofit evaporator on the heater housing
Expansion valve	: on the evaporator
Temperature sensor	: on the heater housing, in the air flow towards the evaporator
Thermostat	: in the electric case next to the MB engine control unit
Compressor	: on the engine or, in case of a hydraulic drive, in the hydraulic drive unit
Filter drier	: on the condenser unit
Pressure switch	: on the filter drier
Inspection glass	: on the filter drier
Condenser unit	: on the ballast

Operation of the air conditioning system

Switching ON

For operation of your Wölfle air conditioning system, an additional knob for adjustment of the thermostat with ON/OFF switch for air conditioner operation is located in the control element.



LED indicator "air condition ON"

ON/OFF switch for air conditioning unit with temperature selector function

Operation

The air conditioning only operates if the fan switch is set at least to stage 1.
The LED indicator "air condition ON" is lit. The condenser fan is running.
For maximum cooling effect:

- turn thermostatic switch to the right to its stop;
- turn the temperature switch to the left to its stop ("OFF" position);
- set fan to stage 3;
- set flap to "circulating air"
- close the door and the windows;
- open all air vents.

An individual conditioning comfort range can be adjusted for each crane operator via the air vents which can be varied independently of one another, the thermostat control and the fan control.

You can also operate your air conditioning system in the cold season. Switched on together with your heating, it keeps the air in the driver's cab dry and stops the window panes misting up. To do so, it is sufficient to set the air condition's thermostatic switch to low capacity.

Switching OFF

To switch off operation of the air conditioning system, turn the thermostatic control to the left to its final stop in position "OFF".

Maintenance

The air conditioning system must be switched on briefly at least once per month. This operation is required to ensure lubrication of the compressor.

The following maintenance work must be performed at the beginning, in the middle and at the end of a cooling period:

- Check Vee belt tension and fastening of the compressor
- Check refrigerant filling
  - · To this effect, the refrigerant must pass the inspection glass of the liquid tank free of bubbles when the engine is running and the air conditioning system is operating at maximum capacity.
- Cleaning the condenser:
  - . The discs of the condenser must be cleaned gently without using high pressure, as they would otherwise get bent.

The system should be checked in your workshop every year at the beginning of a refrigerating period.

Error diagnosis

To this effect, refer also to "Electric circuit diagram, air conditioning system in superstructure 99707770980, page 32“

This list only mentions the most frequent fault hazards. Only specialist staff should be allowed to work on the air conditioner !!!

Malfunction	Cause	Fault detection	Remedy
System's cooling effect insufficient	Insufficient air throughput in the cabin	Check filter	Replace filter
		Leakage in air guide system	Eliminate leakage
		Temperature sensor faulty (evaporator iced)	Replace sensor
	Condenser soiled	Visual inspection	Clean condenser, (do not bend discs)
	Vee belt loosened	Hissing sounds	Check Vee belt tension
	Condenser fan is not running	Visual inspection	Check fuse (F843)
			Check electrical connections
			if necessary, replace fan
	Compressor damage	Abnormal sounds	Replace compressor
		Increased compressor temp.	Replace compressor
		Lubricant has soiled belt pulley	Clean
	Insufficient refrigerant	Bubbles in the inspection glass during air conditioner operation	
	Filter drier soiled	Vessel is sensibly cooler than supply line	Replace component
	Expansion valve faulty	Excessive high and low pressure	Replace component
		Pressure compensation	Replace component
System does not operate	Fuse faulty	F823 / F843	Replace component

	Relay faulty		Replace component
	Thermostat faulty		Replace component
	Pressure switch faulty		Replace component
	Thermostatic switch faulty		Replace component
	No refrigerant		Repair leakage and fill system again

1. Application

The Wölfle heater unit 910154 has been developed specifically for heating the superstructure cabins of TADANO FAUN automobile cranes.
Moreover, the unit is used for defrosting the vehicle's window panes.

2. Technical Details

Design : Air heater unit with water heat exchanger

Thermal output : (so far, no measured data)

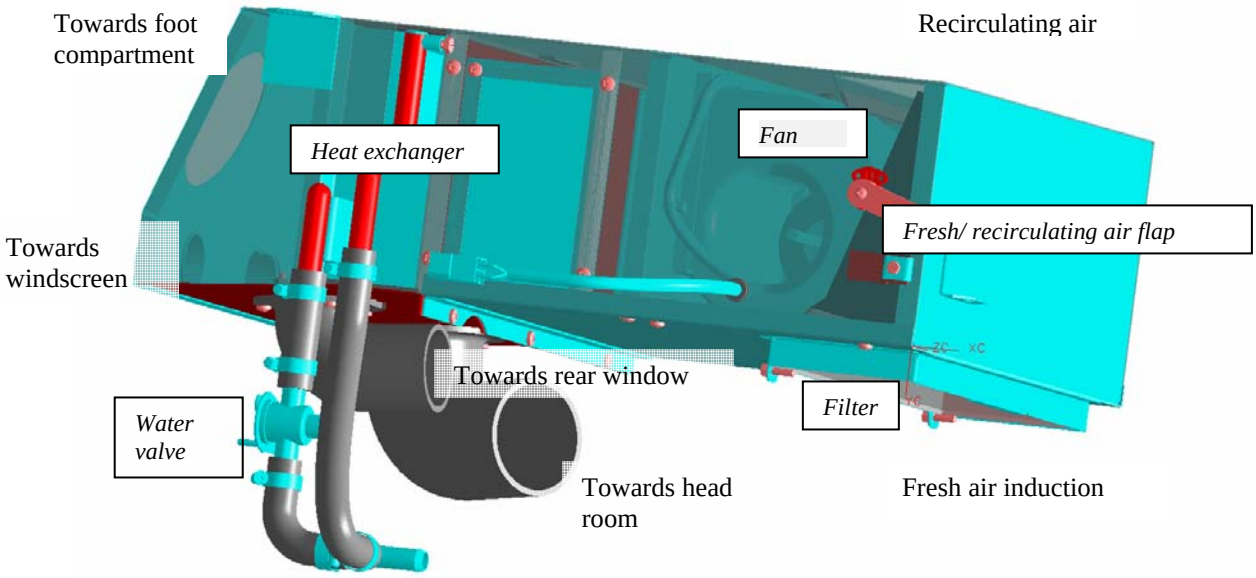
Rated voltage : 24 V
Service voltage : 20....28V

Service overpressure : 1 bar

Blower fan : - 1060 m^3/h (blowing free)
: - 3-stage
: - Long Life Motor

Heater unit

The heater unit is installed below the seat bracket.



Control element

The control element is located to the right of the foot compartment. >

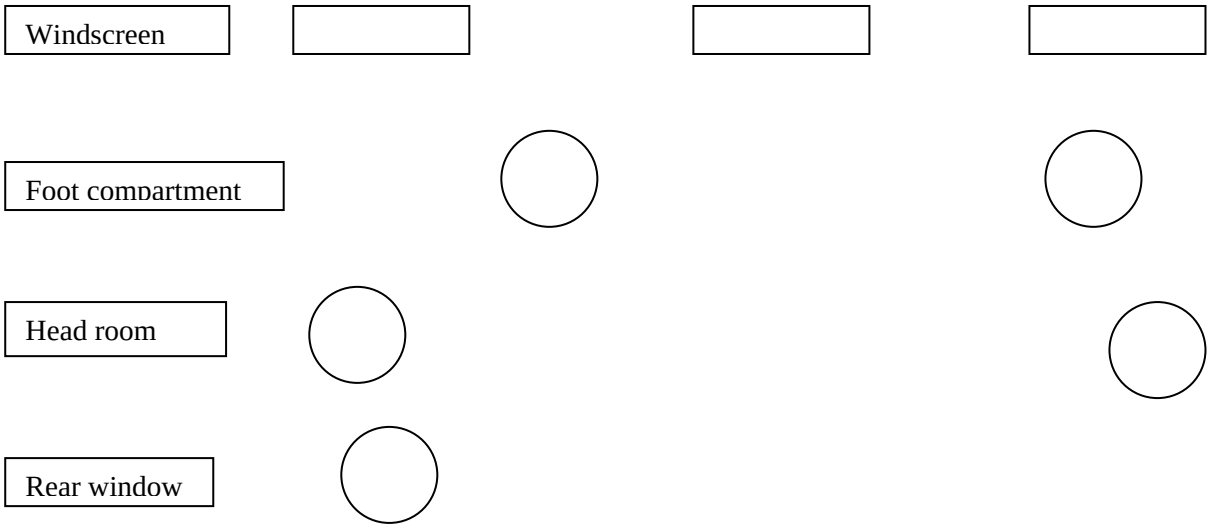
3-stage fan switch

Actuation of fresh /recirculating air flap

Actuation of water valve

The water valve and the flap are actuated via Bowden cables.

Schematic view of air vent distribution:



Operation of the heater unit

Switching ON

To switch the heater unit ON, turn the temperature controller clockwise. At the same time, turn the fan switch ON to propel the heated air into the cabin.

Operation

The heater unit can be supplied at choice with fresh air or recirculating air by actuation of the fresh / recirculating air selector switch.
The temperature controller in conjunction with the 3-stage fan switch enables individual variation of the inside cabin temperature.
For maximum heating effect:

- turn temperature switch to the right to its stop;
- set fan to stage 3;
- set flap to "recirculating air";
- close the door and the windows;
- open all air vents.

Defrosting of window panes as above, however:

- only open the air vents concerned (example: for windscreen only the windscreen air vents)

Switching OFF

The heater unit is switched OFF by turning the temperature controller and the fan switch to "0".

Ventilation operation

For simple ventilation operation, the temperature controller remains set to "0"; the fan switch is set to the desired position at stage 1, 2 or 3. Open the required air vents.

Other components

The heater unit has been equipped as standard with a filter, category F7. In case of a considerable reduction of the capacity during fresh air operation, the filter must be replaced.

Malfunctions

Malfunction	Error location / elimination
Reduced air throughput	Replace filter
Fan inoperative	Check fuse F823
	Check fan switch
	Check fan *

* This kind of work may only be performed by specialists.

Part G3

Annex

Documents on various optional equipments of the vehicle