



Service Manual

CBE

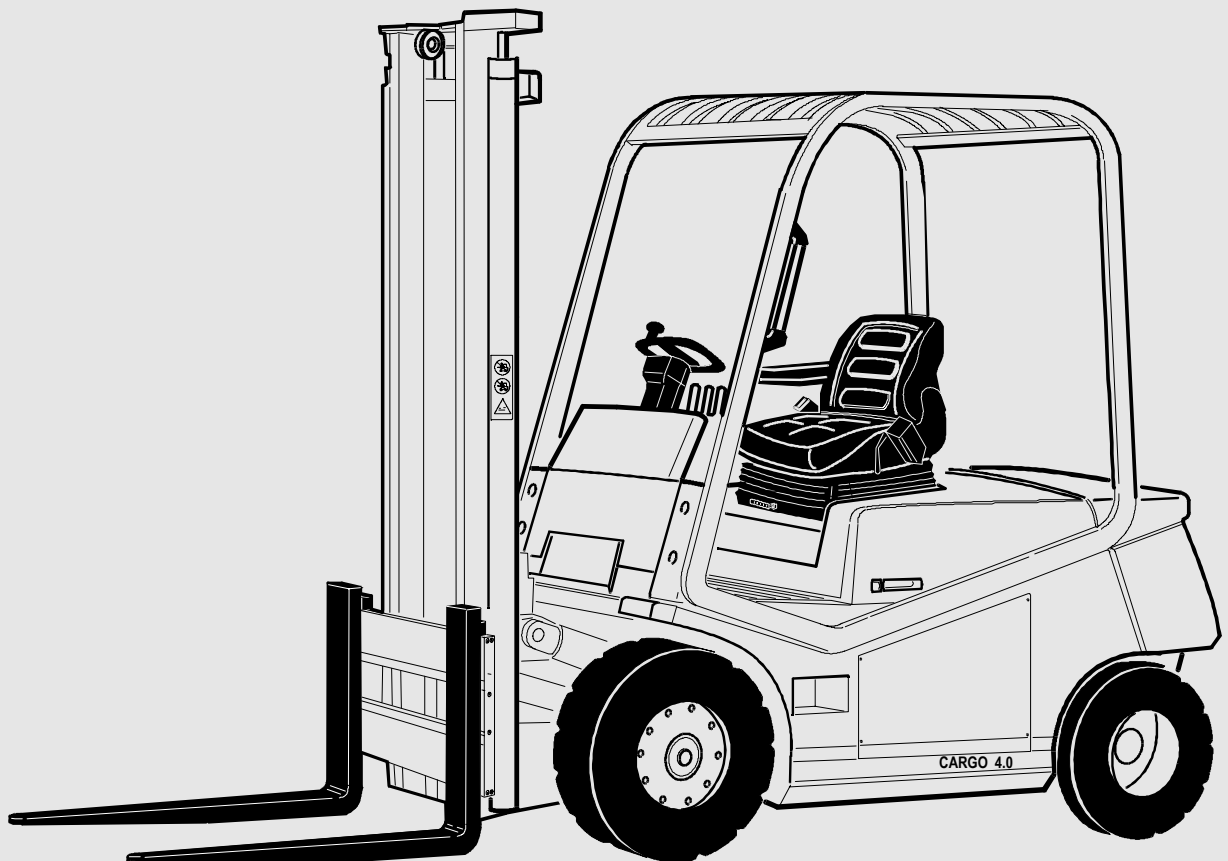
4.0

4.5

5.0

AC Power

Cargo Range



CESAB
CARRELLI ELEVATORI S. p. A.
reserves all rights of reproduction of this
handbook



The text and the numbering system may not be used in other printed matter, reprinted or translated, whether entirely or in part, without written authorization from



CESAB reserves the right to make any necessary modifications without obligation to promptly update this handbook.

Copyright by
CESAB
CARRELLI ELEVATORI S. p. A.

4,0 - 4,5 - 5,0 t A.C. VERSION	SERVICE MANUAL	Electric
page 4		

INDEX

DATA SHEET	page 6
DRIVER'S PLACE	page 8
Load handling commands	page 9
DASHBOARD	page 10
BATTERY COVER AND REAR COMPARTMENT	page 11
TRUCK LOAD CAPACITY	page 12
TRACTION UNIT	page 13
Disassemble the reduction unit	page 14
Oil change	page 15
BRAKES	page 16
Service brake system	page 16
Parking brake system	page 18
ELECTRIC MOTORS	page 19
WHEELS/TYRES	page 20
STEERING GROUP	page 21
Steering axle	page 22
Bearing adjustment	page 23
HYDRAULIC SYSTEM	page 24
Hydraulic system -lever control version	page 24
Hydraulic diagram -lever control version	page 25
Hydraulic control valves -lever control version	page 26
Lifting equipment oil and filter	page 27
MAST GROUP	page 28
Triplex mast section	page 29
Mast lubrication and settings	page 30
Description of the cylinder component parts	page 32
Checking the chains	page 34
Checking the forks - Mast tilting setting	page 35
ELECTRIC COMPONENTS DESCRIPTION	page 36
Battery and battery charger	page 37
TRUCK LIFTING	page 38

Electric	SERVICE MANUAL	4,0 - 4,5 - 5,0 t A.C. VERSION
		page 5

TABLES	page 39
Oil and grease specifications - Tyre pressure tightening torques	page 39
Running in maintenance table	page 40
Maintenance table	page 41

ELECTRICAL SECTION

TECHNICAL FEATURES	page 45
Electrical motor feature	page 45
OPERATIONAL FEATURES	page 46
Diagnosis	page 47
General precaution	page 47
Protection	page 48
GENERAL DESCRIPTION OF FUNCTION OF THE CONSOLE	page 49
Console description	page 50
ELECTRIC COMPONENTS LAY-OUT	page 51
Components panel description	page 52
ELECTRICAL CIRCUIT CONNECTION -traction unit AC3T and lifting unit AC3P	page 53
ELECTRIC MOTORS ENCODER	page 55
ACCELERATOR POTENTIOMETER CONFIGURATION	page 56
LIFTING POTENTIOMETER CONFIGURATION	page 57
PARAMETER CHANGE FUNCTION	page 58
Traction unit AC3T	page 58
Lifting unit AC3P	page 58
TESTER FUNCTION	page 59
Traction unit AC3T	page 59
Lifting unit AC3P	page 60
ALARMS FUNCTION	page 61
Traction unit AC3T	page 61
Lifting unit AC3P	page 62
PARAMETER SETTING TABLE	page 63
Traction unit AC3T	page 63
Lifting unit AC3P	page 64

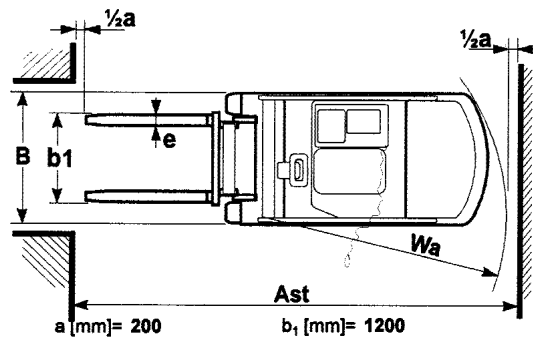
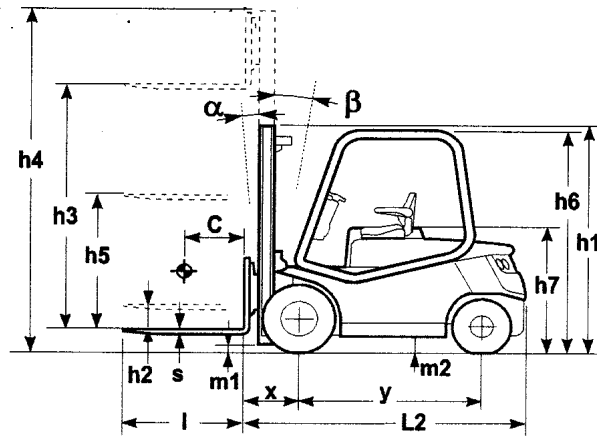
TECHNICAL DATA

		CESAB		CESAB		CESAB	
		MAK 400 - CBE 4.0		MAK 450 - CBE 4.5		MAK 500 - CBE 5.0	
1	Manufacturer	CESAB					
2	Model	Manufacture's designation					
3	Capacity	4,0		4,5		4,9	
4	Load center	500		500		500	
5	Power	Electric (battery)- Diesel - Petrol -LPG		Electric		Electric	
6	Control type	Standing/ seated/ pedestrian		Driver seated		Driver seated	
7	Tyres	C = Cushion - PN = Pneum. - SE = Superelastic. - TW = Twin		C / SE-PN / SE.TW / PN.TW		C / SE-PN / SE.TW / PN.TW	
8	Wheels (* = drive)	Number front / rear		2-4* / 2		2-4* / 2	
DIMENSIONS							
9	Lift	H3 Lift travel	[mm]	3970	3970	3150	
10	(2- stage upright)	h2 Standard free lift	[mm]	100	100	100	
11		h5 Full free lift height (travel)	[mm]	-	-	-	
12		Fork arm carriage	According to ISO - FEM		III B	III B	III B
13	Fork size	Height x width x length	[mm]	50x150x1000	50x150x1000	60x150x1000	
14	Upright tilt	Forward / backward	<°	2°30' / 10°	2°30' / 10°	2°30' / 10°	
15	Overall dimension	L2 length to front face of forks	[mm]	2750 - 2782 (sideshift)	2750 - 2782 (sideshift)	2770 - 2809 (sideshift)	
16		B Width	[mm]	1418 / 1360 / 1756	1520 / 1360 / 1756	1520 / - / 1756	a
17		H1 Height, mast closed	[mm]	2800	2800	2850	
18		H4 Height, mast open	[mm]	4775	4775		
19		H6 Height, overhead guard	[mm]	2350	2350	2350	
20		H7 Seat height	[mm]	1294	1294	1294	
21		Turning radius	Wa Outside	[mm]	2414	2414	2414
22	Front overhang	x distance from front axle	[mm]	509 - 541 (sideshift)	509 - 541 (sideshift)	529 - 568 (sideshift)	
23	Stacking at 90°	Forks with pallet 800x1200 / 1000x1200 width	[mm]	3923 / 4123 - 3955 / 4155 (sideshift)	3923 / 4123 - 3955 / 4155 (sideshift)	3923 / 4123 - 3982 / 4194 (sideshift)	
PERFORMANCES							
24	Speeds	Travel with / without load	[km/h]	15 / 17	15/17	14/17	c-d
25		Lift with / without load	[m/s]	0,27 / 0,47	0,26 / 0,47	0,23 / 0,44	
26		Lowering with / without load	[m/s]	< 0,6	< 0,6	< 0,6	
27	Nom. Draw-bar pull	With / without load	[N]	5238 / 5338	5188 / 5338	5138 / 5338	
28	Max. Draw-bar pull	With / without load	[N]	14460 / 15130	14330 / 15130	14300 / 15130	
29	Max gradeability	With / without load	[%]	7 / 11	6 / 10	5 / 9	
30	Gradeability	With / without load	[%]	13 / 23	12 / 22	11 / 21	
31	Acceleration time	Travel, with / without load	[sec]	-	-	-	
WEIGHT							
32	Service mass	Includig battery	[kg]	6800	7120	7670	
33	Load per axle	With load, front / rear	[kg]	9600 / 1200	10490 / 1130	11570/1100	
34		Without load, front / rear	[kg]	3500 / 3300	3490 / 3630	3800/3870	
CHASSIS							
35	Tyres	number, front / rear		2-4 / 2	2-4 / 2	2-4 / 2	
36		Size, front		28x10x22 / 250-15 / 7.00-15	28x12x22 / 250-15 / 7.00-15	28x12x22 / - / 7.00-15	e
37		Size, rear		22x8x16 / 23x9-10	22x8x16 / 23x9-10	22x8x16 / 23x9-10	b
38	Wheel-base	Wheel - base y	[mm]	1810	1810	1810	
39	Track	Centre of tyres, front / rear	[mm]	1164-1154 / 1132-1154 / 1330-1154	1215-1154 / 1132-1154 / 1330-1154	1215-1154 / - / 1330-1154	e
40	Ground clearance	m 1 with load at lowest point		150	150	150	
41		m 2 with load at center of wheelbase		160	160	160	
42	Service-brake	Mecanical / Hidraulic / Electric / Pneumatic		Hidraulic	Hidraulic	Hidraulic	
43	Parking brake	Footbreake / Handbreake / Deadman's brake		Foot	Foot	Foot	
POWER UNIT AND TRANSMISSION							
44	Battery	Type		Ironclad plates	Ironclad plates	Ironclad plates	
45		Voltage / Capacity	[V/Ah]	80 / 625-800	80 / 625-800	80 / 625-800	
46		Mass	[kg]	1872	1872	1872	
47	Electric motors	Traction, power	[kW]	17	17	17	
48		Lift, power	[kW]	18	18	18	
49		Hydrosteering, power	[kW]	-	-	-	
50	Control	Electric trucks		Asynchronous inverter	Asynchronous inverter	Asynchronous inverter	
51	Working pressure	For attachments	[bar]	-	-	-	
52	Noise level	Leq at driver's ear	dB(A)	-	-	-	

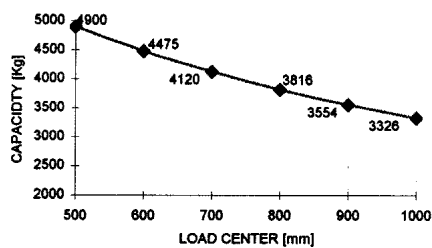
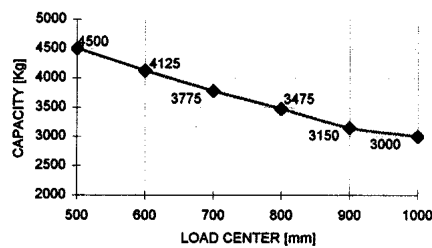
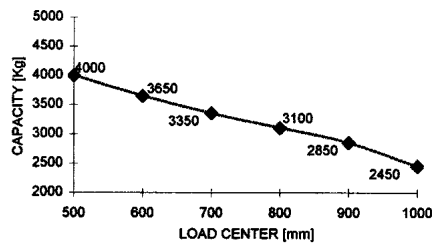
a) C / SE-PN / SE.TW-PN.TW
 b) C / SE-PN
 c) by cushion tyres max speed 16 km/h for all version

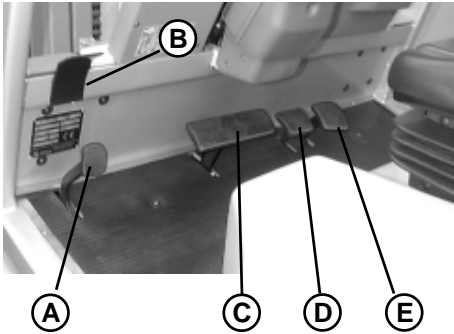
d) by single tyres speed 13/15 km/h
 e) C / - / SE.TW-PN.TW
 f)

*N.B. = Truck configuration
wheels S.E.S and mast 2M V.T. H=4000*



CAPACITY DIAGRAM (with tyres SE)

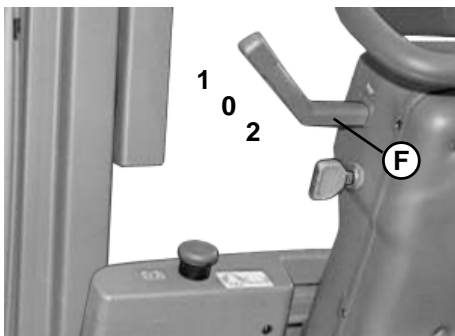




PEDALS

FOOT DRIVE DIRECTION (Standard version)

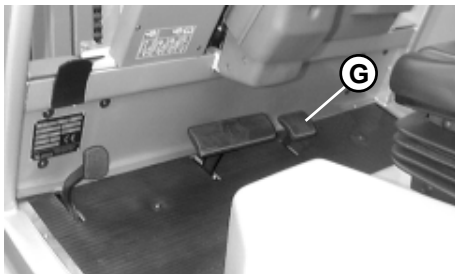
- Forward direction (D)
- Backward direction (E)
- Service brake pedal (C)
- Parking and emergency brake pedal (A)
- Parking brake release lever (B)



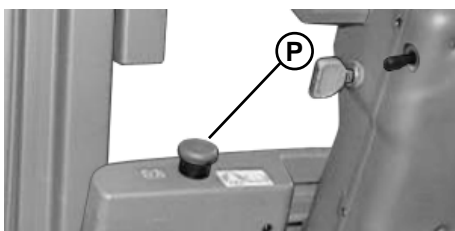
DRIVE DIRECTION LEVER ON STEERING COLUMN (Alternative version)

Direction selector lever (F)

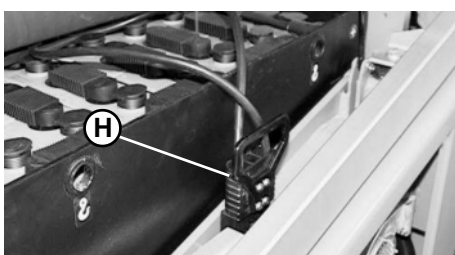
- ↑ 1 Forward direction
- 0 Neutral
- ↓ 2 Backward direction



Single drive pedal (G)



Emergency push button (P)

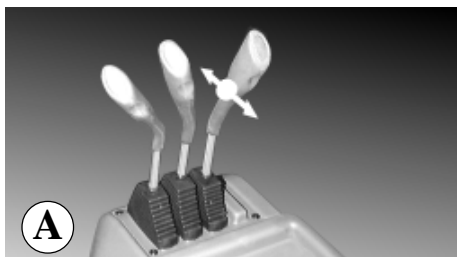
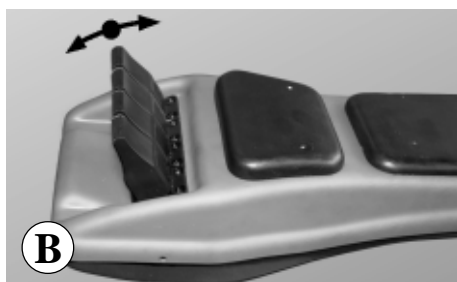
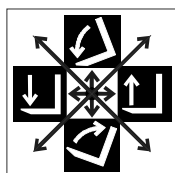


Battery connector (H)

Inside the battery cover

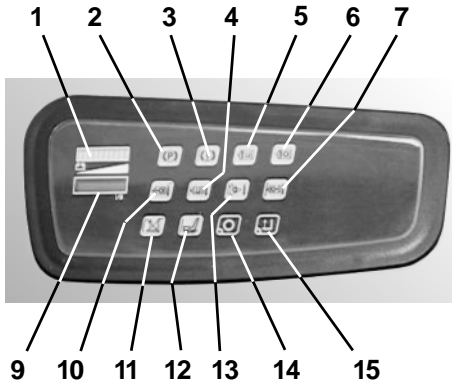
LOAD HANDLING COMMANDS

There can be three types of commands for load handling

**LEVER VERSION (A)****FINGERTIPS VERSION(B)**
FUTURE CONFIGURATION**MINI JOYSTICK VERSION (C)**
FUTURE CONFIGURATION

All the functions will be explained on the "LIFTING GROUP" paragraph

DASHBOARD



- 1) Battery charge indicator
- 2) Parking brake ON warning light
- 3) Low brake fluid level warning light
- 4) Lifting motor temperature warning light
- 5) Not used
- 6) Not used
- 7) Not used
- 9) Electronic hour meter
- 10) Drive motor temperature warning light
- 11) Not used
- 12) Dead man device warning light
- 13) Not used
- 14) Drive diagnostics
- 15) Lifting diagnostics

DASHBOARD CONTROLS



1

1) Battery charge indicator

This consists of 3 green LEDs, 4 orange LEDs and 3 red LEDs, With battery charged the right green LED becomes on and while the battery discharges, the LEDs will be separately on from right side to left side.

When the battery is 80% discharged, the first red LED on the left begins to flash showing that the battery must be recharged (reserve). At the same time, the warning light (11) comes ON.



2

2) Parking brake ON warning light



3

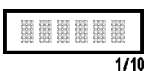
3) Brake fluid low warning light



4

4) Lifting motor temperature warning light

lights up when the temperature is 150°C



9

9) Electronic hour meter

It is activated by insertion of the ignition key.
It shows the hours and the tenth



10

10) Drive motor temperature warning light

lights up when the temperature is 150°C



12

12) "dead man device" pilot light

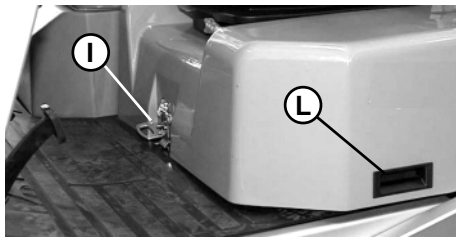
the pilot light comes ON, when the driver leaves the driving seat



14

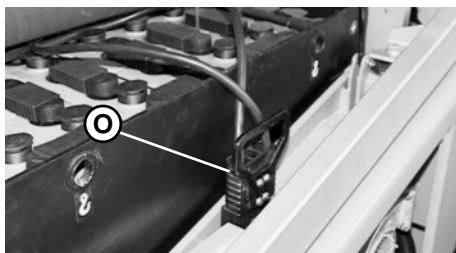
14) Drive diagnostics (see electrical selection)

15

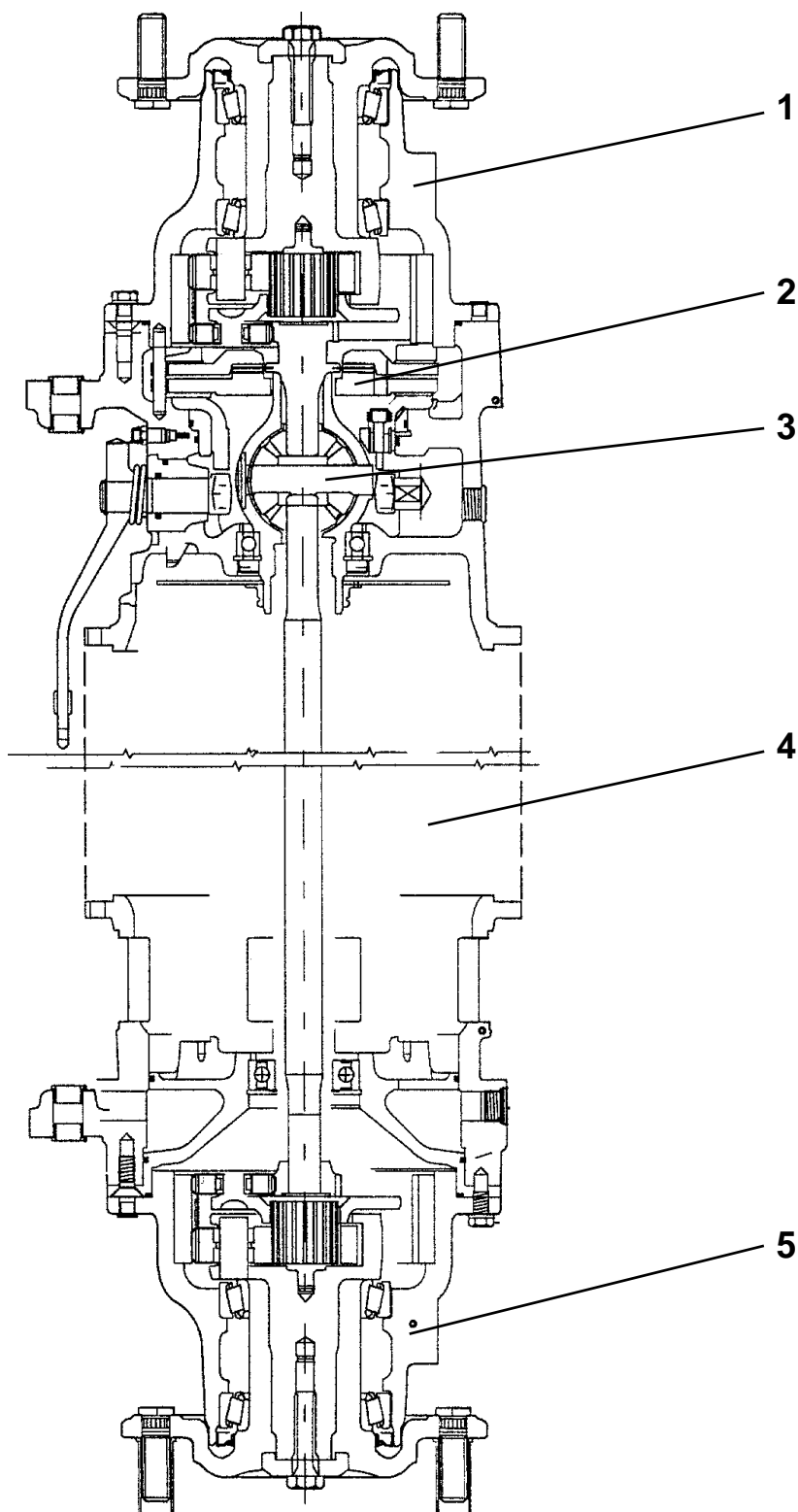
15) Lifting diagnostics (see electrical selection)**BATTERY COVER AND REAR COMPARTMENT COVER LIFTING**

Release the lock (I), then lift the battery cowl by the help of the special grip (L) and disconnect the plug-outlet (O)

An air spring (M) facilitates the complete lifting of the cowl.



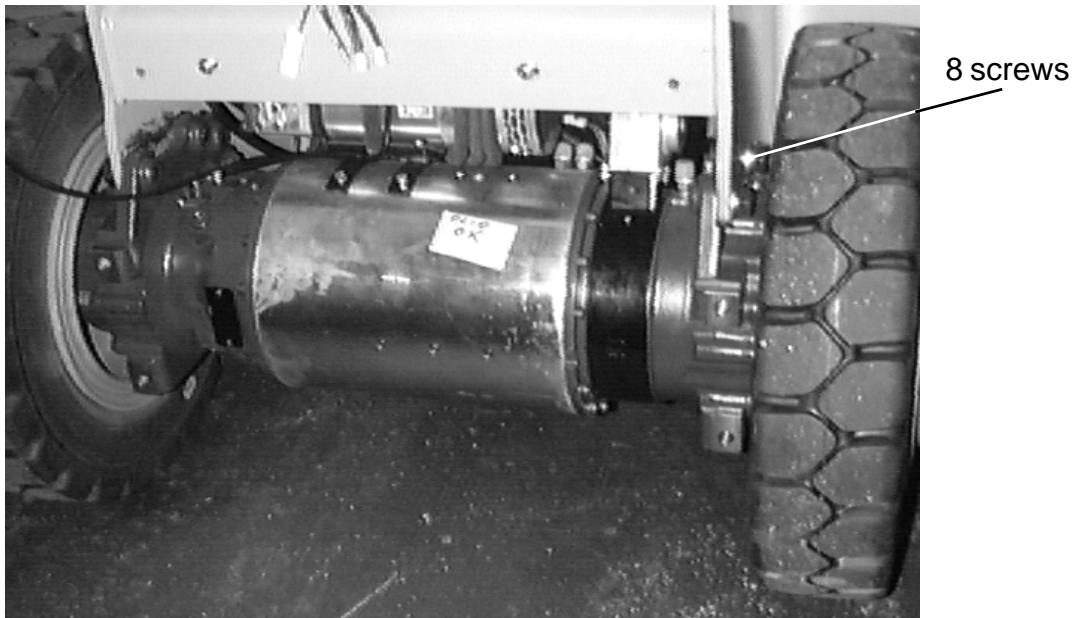
After opening the battery cover, it is possible to remove the rear compartment cover (N); before doing anything in the compartment, disconnect the battery connector (O).

TRACTION UNIT

The traction gear unit is consisted of:

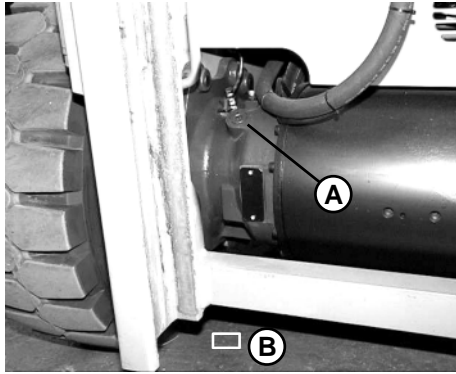
- 1) Right hand reduction gear
- 2) Oil bath brakes
- 3) Differential gear
- 4) Electrical motor
- 5) Left hand reduction gear

DISASSEMBLE THE REDUCTION UNIT



Disassemble the reduction unit

- Park the lift truck on a level ground. Engage the parking brake and disconnect the battery;
- Disassemble the mast;
- Lift the front part of the lift truck and set the special shims under the side panels of the chassis;
- Remove the front wheels;
- Disconnect the tie rods of the parking brake, the service brake oil pipe, the motor cables etc;
- Keep the reduction unit in lifted position;
- Remove the fastening screws located on the chassis (tightening torque setting of 55 daNm).

OIL CHANGE

Type of oil MOBIL-FLUID 422SAE 80W
or equivalent (see oil table).

After the first 50-100 hours

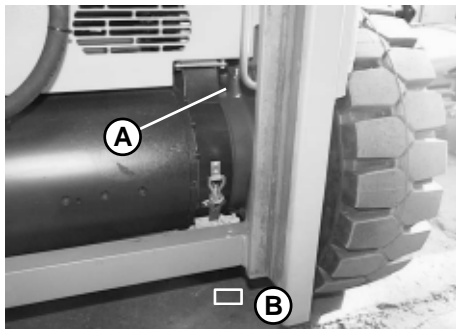
- Change the oil

Every 250 hours

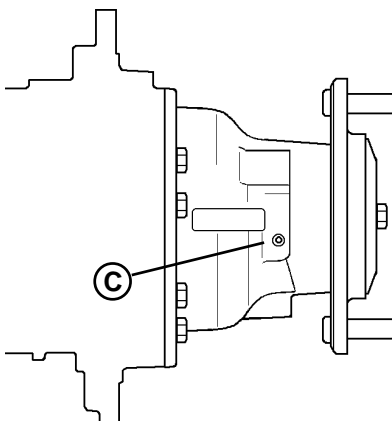
- Check the oil level, when it is cold.

Every 1.000 hours or 12 months

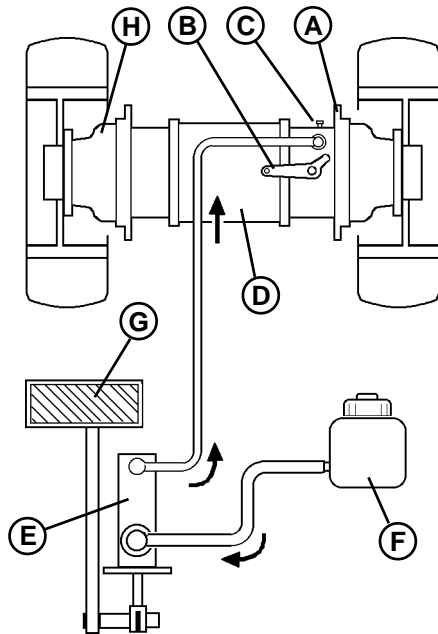
- Change the oil

OIL CHANGE INSTRUCTION

- Place the lift truck on a flat floor with the parking brake on.
 - Disconnect the battery connector.
 - Changing the oil in the reduction gears.
 - Carefully clean the area around the oil filling (A) and draining caps (B); place a suitable container below the drain cap and then remove both the filling and the draining caps and allow the oil to drain out completely.
 - Clean any ferrous residues from the magnetic cap (B) and replace it.
 - Pour fresh oil into the hole (A) until it starts overflowing from (C).
- After a short functioning period, check the oil level again.
- The oil quality for each reduction is approximately 1,5 L.



BRAKE

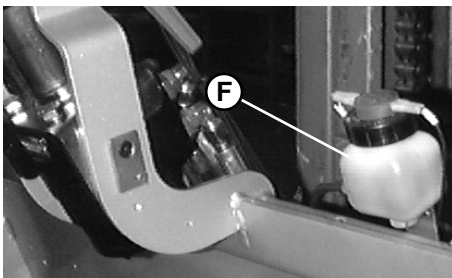


SERVICE BRAKE SYSTEM DIAGRAM

- A) Reduction gear (right) and braking unit
- B) Parking brake command
- C) Bleeding screw
- D) Electric drive motor
- E) Brake pump
- F) Tank
- G) Service brake pedal
- H) Reduction gear (left)

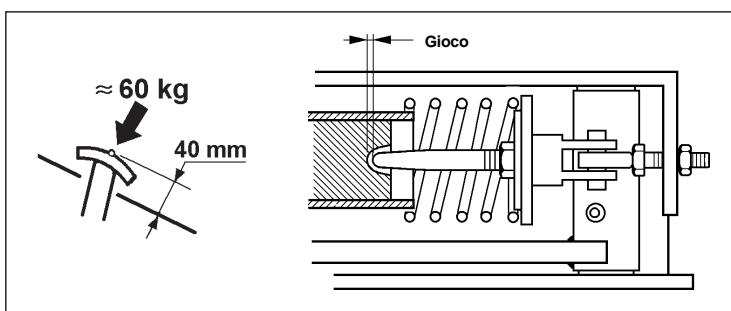
SERVICE BRAKE CONTROL

The disk brake is in an oil bath and it acts on both of the front wheels; the brake uses the same oil as the drive reduction unit.



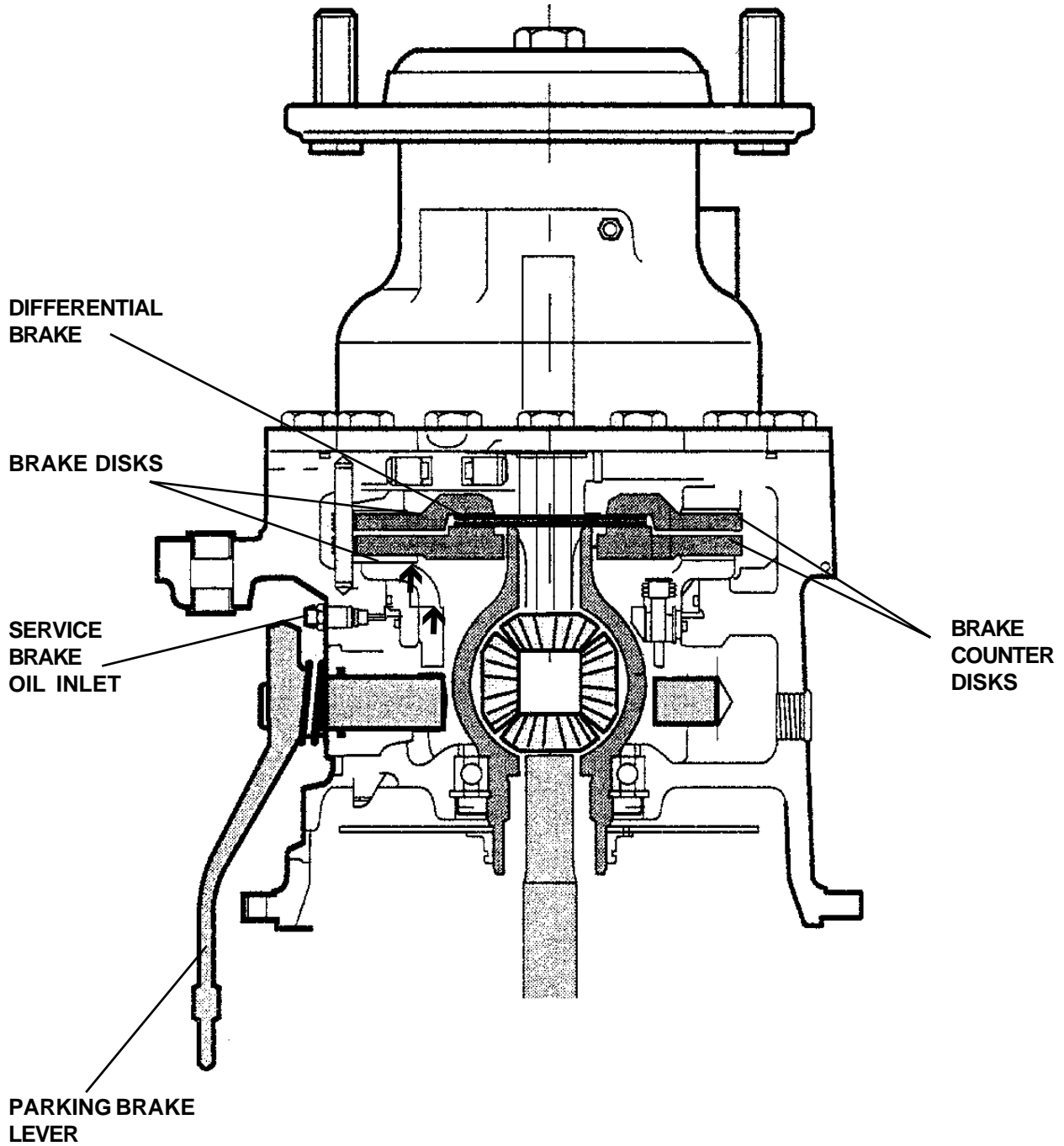
OIL BRAKE TANK (F)

OBS! Olja typ SAE 80W i bromssystemet!



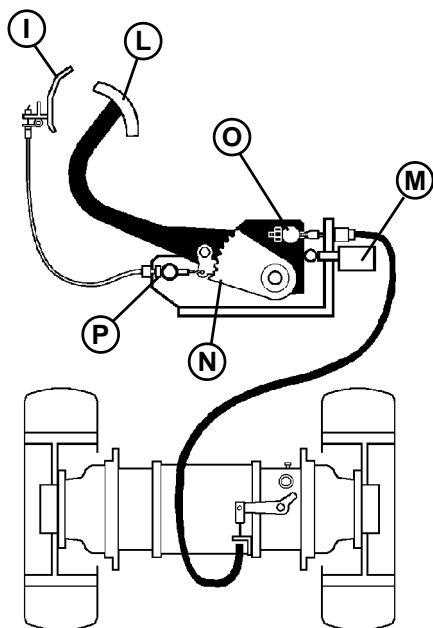
**CHECK SERVICE
BRAKE**

BRAKE



Brake disks thickness	3,8 mm (n° 2)
Max. wear	0,4 mm
Brake counter disk thickness	9 mm (n° 2)
Differential brake disk thickness	1,8 mm (n° 1)
Max wear	0,2 mm

PARKING BRAKE

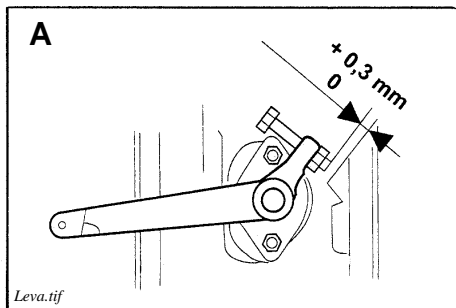


- I) Release lever
- L) Parking brake pedal
- M) Microswitch
- N) Brake block anchor
- O) Pedal adjusting screw
- P) Release adjusting screw

PARKING BRAKE CONTROL AND ADJUSTMENT

Every 500 hours

- Check the clearance shown on the drawing A with the parking brake pedal released
- Check the parking brake stroke which should correspond to 4 notches (L pedal). If it necessary, act on the adjusting screw (O)
- With the front wheels lifted adjust the cable so that the same ones at 1st notch are free, on the contrary, at the 2nd notch are blocked.

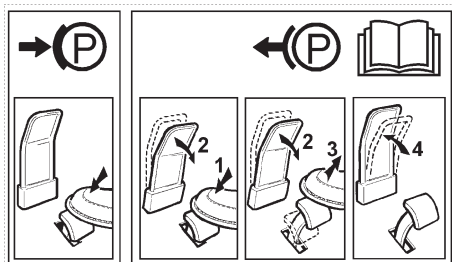


Rör ej justerskruven på armen!

Spel med nya lameller = 0,3mm

Vid ett spel av 5-6mm är lamellerna utslitna.

Press the parking brake pedal some times and check if the clearance is still the same.



PARKING BRAKE RELEASE INSTRUCTIONS

The dimension of the parking brake is sufficient to guarantee blocking of the truck, even with nominal load in the travelling position, on gradients of 22% as required by the ISO 6292-2 standards.

ELECTRIC MOTOR**TRACTION MOTOR**

V 54 (nominal)	Kw 17
Frequency	78 Hz
Rpm nominal max.	2260 (rpm/min)
Service S2	Classe IS F
N° poles 4	

**LIFTING MOTOR**

V 54 (nominal)	Kw 18,6
Frequency	73 Hz
Rpm nominal max.	2080 (rpm/min)
Service S3 30%	Classe IS F
N° poles 4	

Lifting pump

27LiT/min.

STANDARD TYRES

THE SAFETY OF RIMS AND WHEELS FOR FORKLIFT TRUCKS

“PNEUMATIC” tyres must be replaced when the tread is less than 1.6 mm. “SUPERELASTIC” tyres must be replaced when the tread reaches the “60J” indicator printed on the side. Replacement of “CUSHION” tyres is recommended when they reach a thickness of 20 or 30 mm.

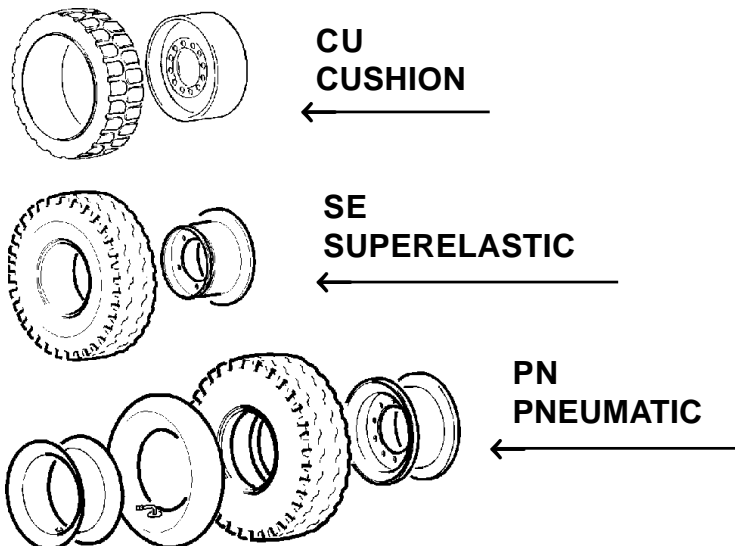
PNEUMATIC TYRES PRESSURES

Front 9,5 BAR
8,5 BAR (twin tyres)

Rear 10 BAR

TIGHTENING TORQUE

Driving tyres 50 daNm
Steering tyres 37 daNm



STEERING CONTROL

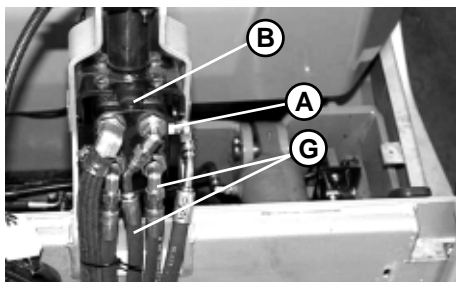
The steering uses the same oil as the lifting by means a priority valve, so that a sufficient oil flow to the power steering is always assured.

The oil capacity is checked by the Ls signal (load - sensing) coming from the steering unit and it occurs so that the oil capacity sent to the power steering is equal to its actual request.

The exceeding oil is sent to the control valve for other functions.

When the steering wheel is turned the steering unit "measures" a volume of oil proportional to the above rotation and sends it into the steering cylinder.

The steering unit returns automatically in it neutral position when the manoeuvre is finished (see hydraulic diagram page 25).

**POWER STEERING SEAL CONTROL AND CLEANING****Every 250 hours**

- check the entire system to identify any leak; any intervention must be carried out without pressure in the system.

Every 4 000 working hours

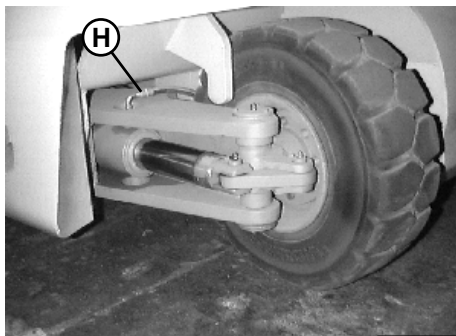
- replace hoses (G) and (H) connecting the orbitrol device to the steering jack.

Every 10 000 hours

- replace the hydraulic system tubing.

Power steering pressure setting

The max power steering pressure must be 110 Bar



In order to set the power steering pressure, the following operation are necessary:

- 1 - Fit a manometer on point (A) of the motor;
- 2 - In order reach the adjusting screw (B) remove the cap (by allen wrench) positioned in the upper side of the orbitrol (power steering unit);
 - screw in to increase the pressure
 - screw out to decrease the pressure



STEERING AXLE

Steering axle check

Every 500 hours

- lubricate the steering gear joints using the appropriate grease nipples (D), (E), (F) and (G);
- check the steering angles.

Every 2.000 hours

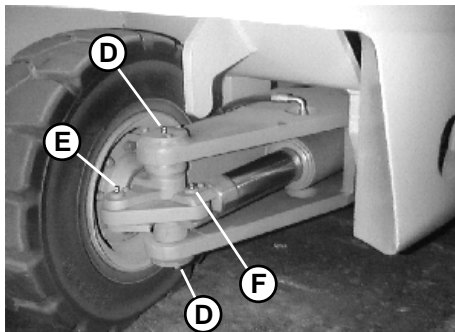
- check and if it is necessary, adjust the wheel hub bearings.

Every 500 ore check the angles

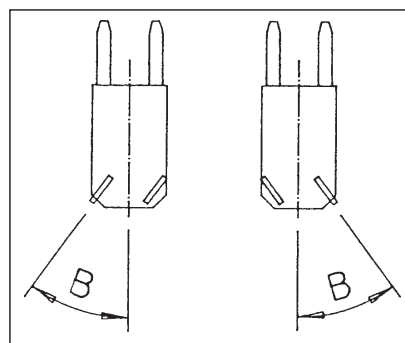
Max steering angle (internal wheel $\cong 78^\circ$)

If any abnormal consumption of the wheel tread is observed, the following controls should be made:

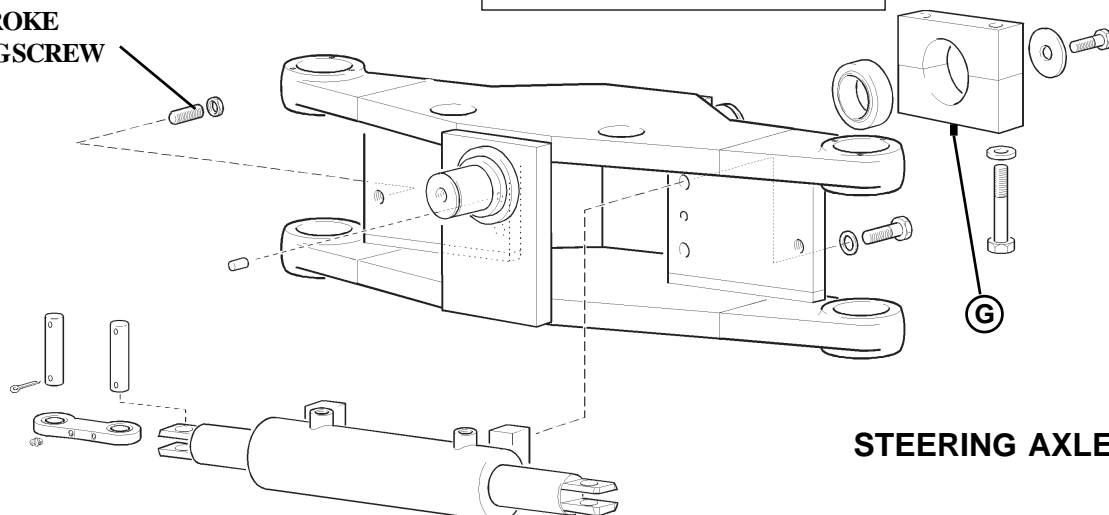
- check the parallelism of the steered wheels;
- check that the steering angle of the wheels is the same in both directions.



B = 78°
ANGLE MEASURED BY THE AXLE
FRAME TO THE INTERNAL WHEEL



ENDSTROKE
SETTINGSCREW



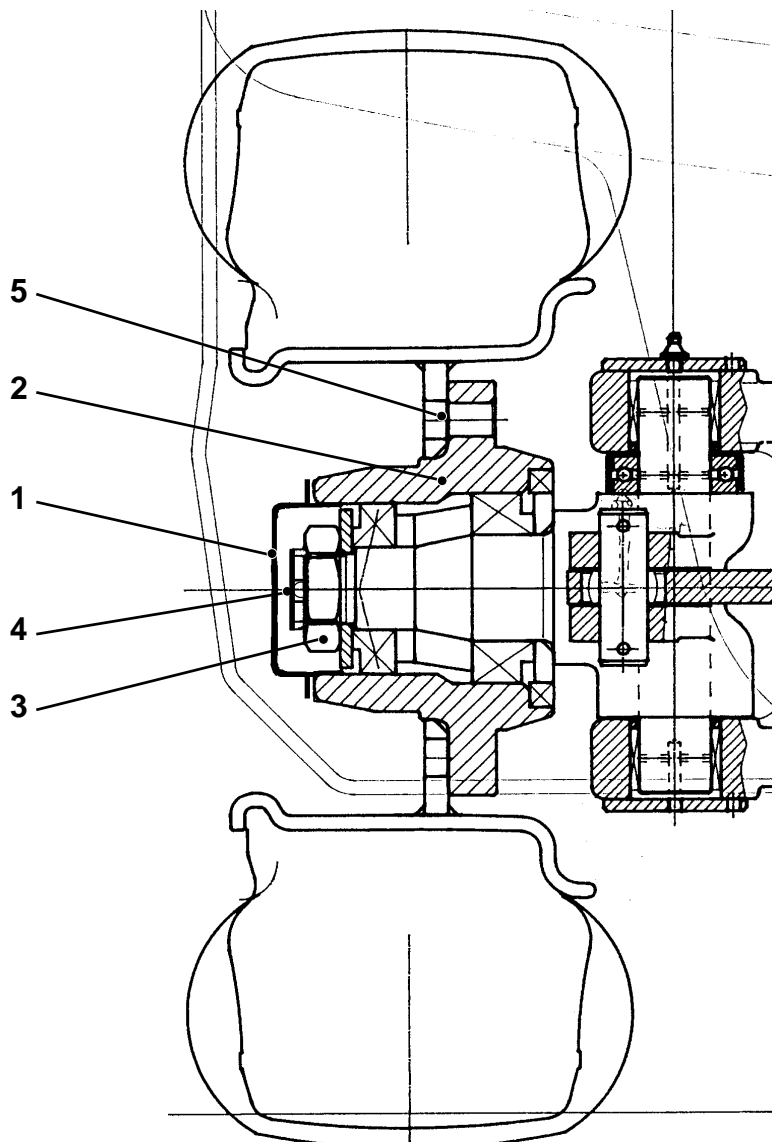
STEERING AXLE

BEARING ADJUSTMENT

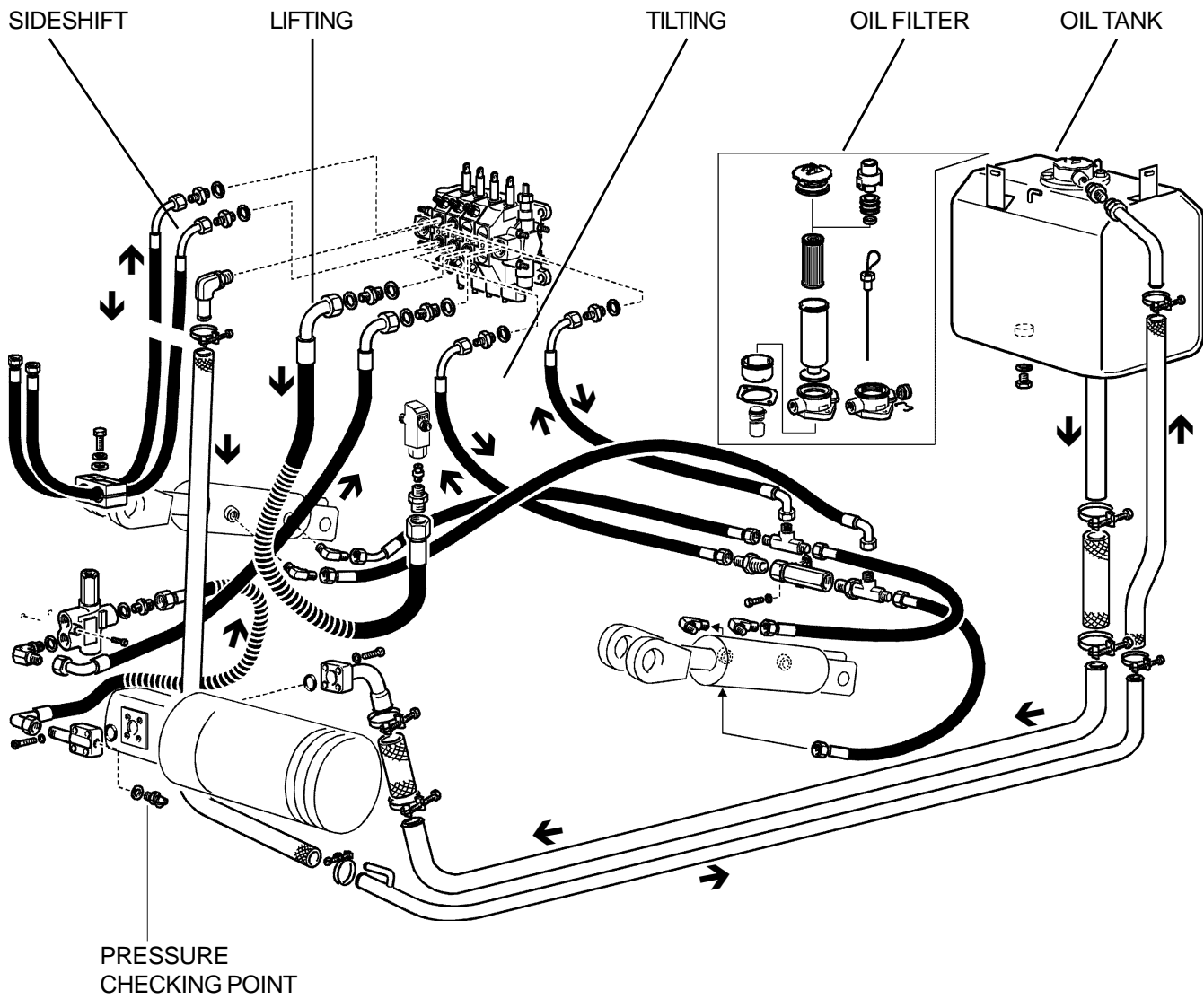
Steering wheel bearings require an adjustment once a year.

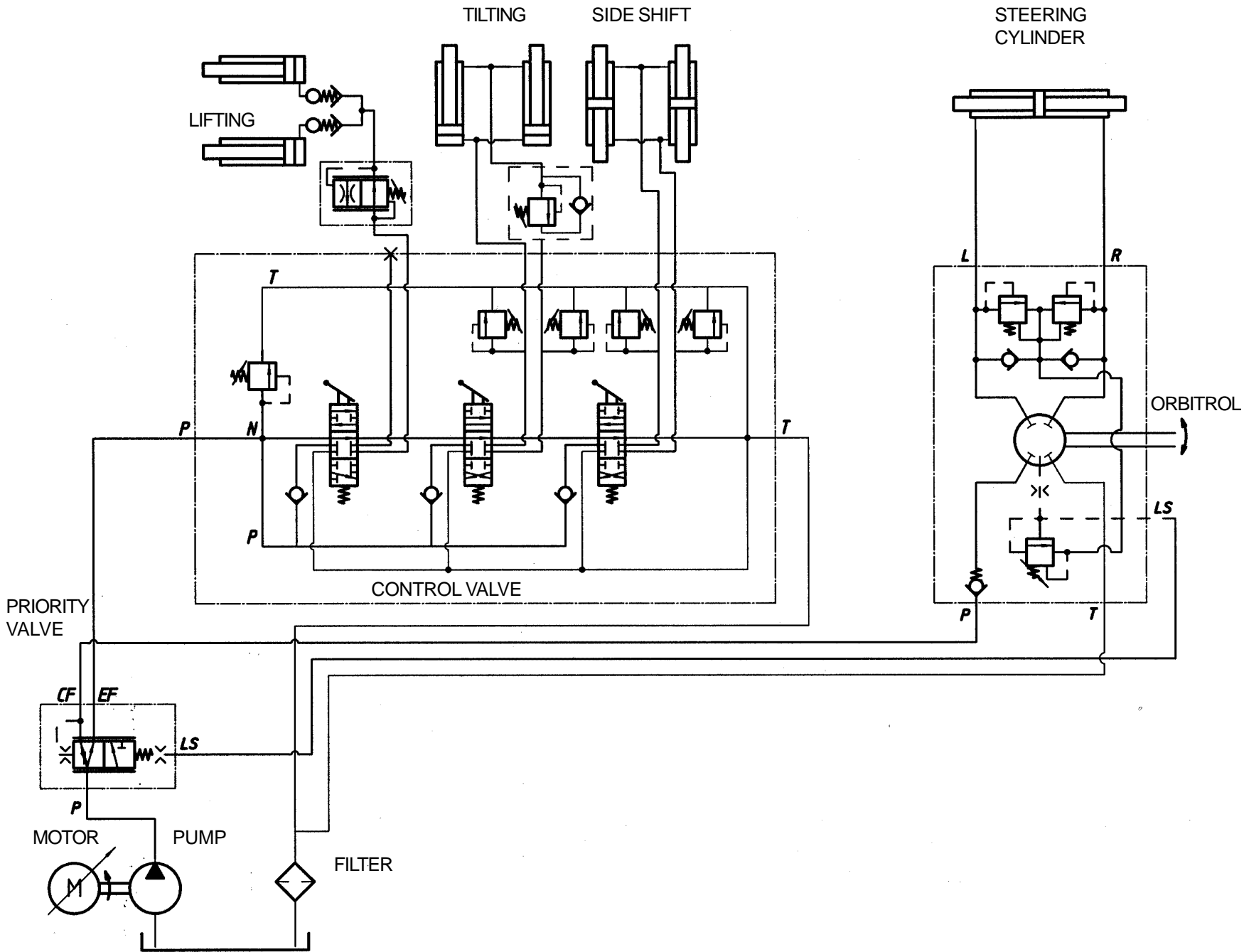
Steering wheels

- lift the steering wheels
- remove cap (1);
- remove check pin (4);
- fasten the nut with a torque setting of 6 dNm;
- turn the hub of 2-3 turns in both senses;
- unfasten nut (3) and retighten with a 2-1 daNm torque;
- check that the wheels slide correctly (max. rolling final torque: 0.2 dNm) and that there is no side play (maximum axial play of 0.05 mm);
- reassemble the check pin;
- reassemble the cap (1);
- lower the wheels again and check that all nuts fixing the wheel disk (5) to hub (2) are well tightened.



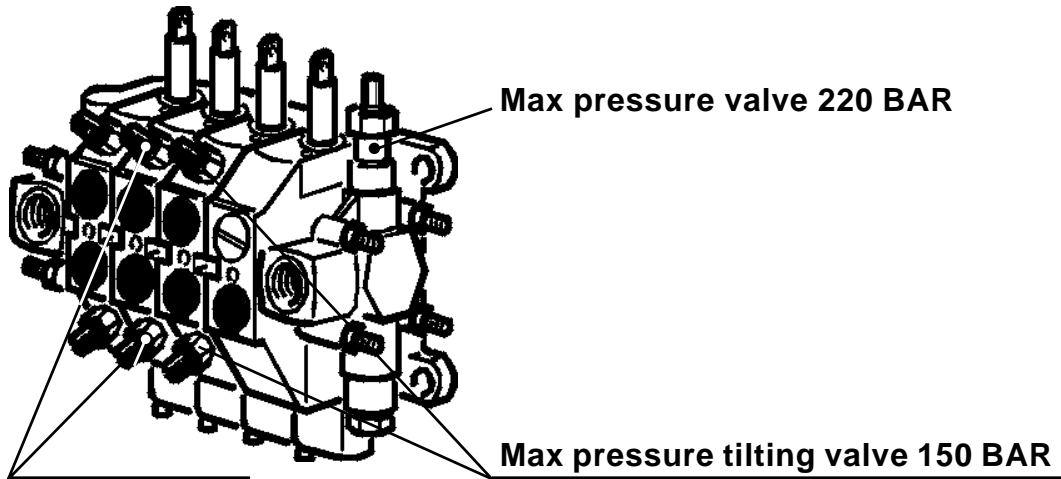
HYDRAULIC SYSTEM Lever control version





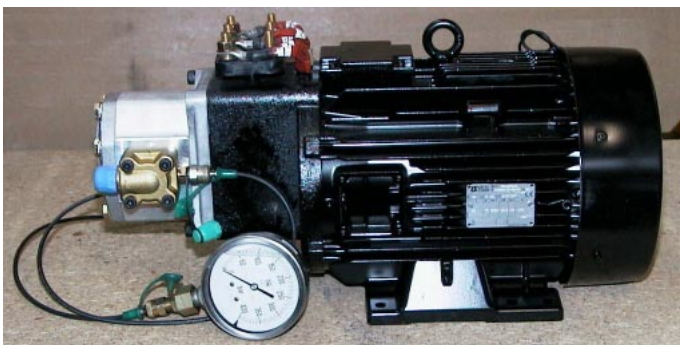
HYDRAULIC DIAGRAM
Lever control version

HYDRAULIC CONTROL VALVES *Lever control version*



Max pressure sideshift
valve 150 BAR

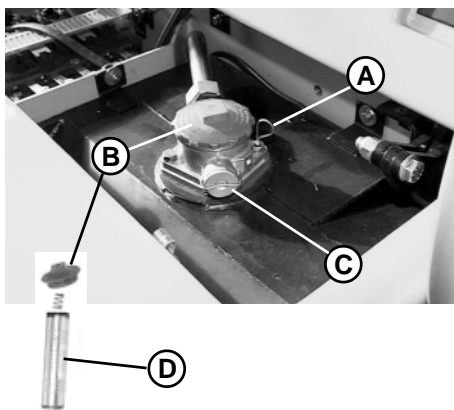
MANOMETER CONNECTION POINT FOR HYDRAULIC PRESSURE CONTROL



LIFTING EQUIPMENT OIL AND FILTER

The lifting and power steering oil tank is positioned inside the rear compartment

The filter cartridge (**D**) is beneath the screw cap (**B**).

**After the first 50 hours of work**

- first filter change

After the first 500 hours of work

- second filter change.

Every 250 hours

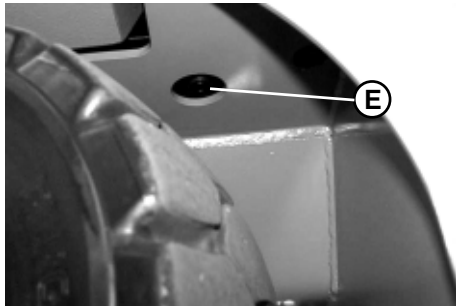
- check the level of oil in the tank using the dipstick (**A**);
- check and clean the tank breather valve filter (**C**).

Every 2 000 hours

- replace the oil and the filter.

To change the oil and the filter:

- remove the filling cap (**B**), extract the filter;
- turn the wheels completely to obtain access and remove the drain cap (**E**); drain out all the oil into an appropriate container then replace the drain cap and tighten firmly;
- fit a new filter (**D**) after checking the state of the seals;



- Fill the tank with approx. 35 liters oil through the filter until the dipstick notch (max level).

Min. level for triplex mast groups is 10-15 mm lower than the notch.

Min. level for duplex mast groups is 50 mm lower than the notch.

MAST GROUPS

The mast profile - CESAB design - with double stiffening flange is characterised by a high flexural and torsional strength.

It allows wide visibility thanks to the reduced dimensions of the profile itself.

Cylinders are single-acting type.

The sideshift system has been housed inside the profiles.

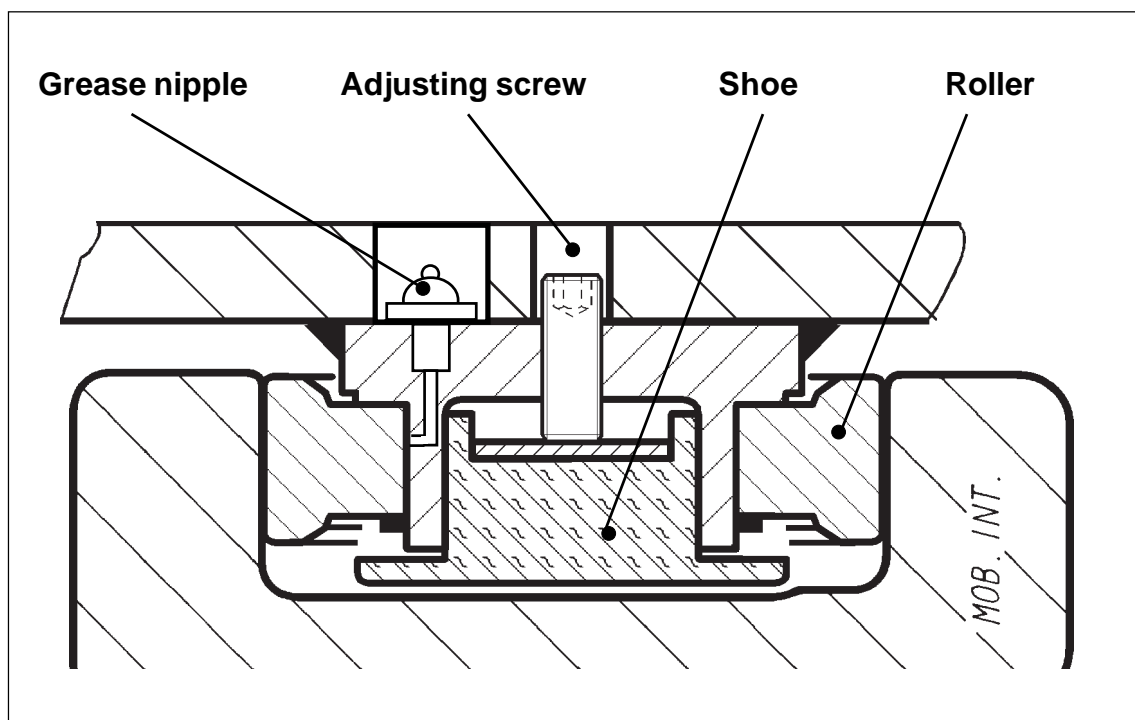
The mast group is a roller type with a variable centre distance (i.e. a fixed roller is fitted on the outer mast and a mobile one on the inner mast, instead of a number of mobile rollers only on the inner mast). This solution ensures better grip and stability on operation.

Other features: side plays adjustable from outside. Plastic guide shoes. Roller bearings with grease nipples, ball joints on axle couplings and tilt cylinders.

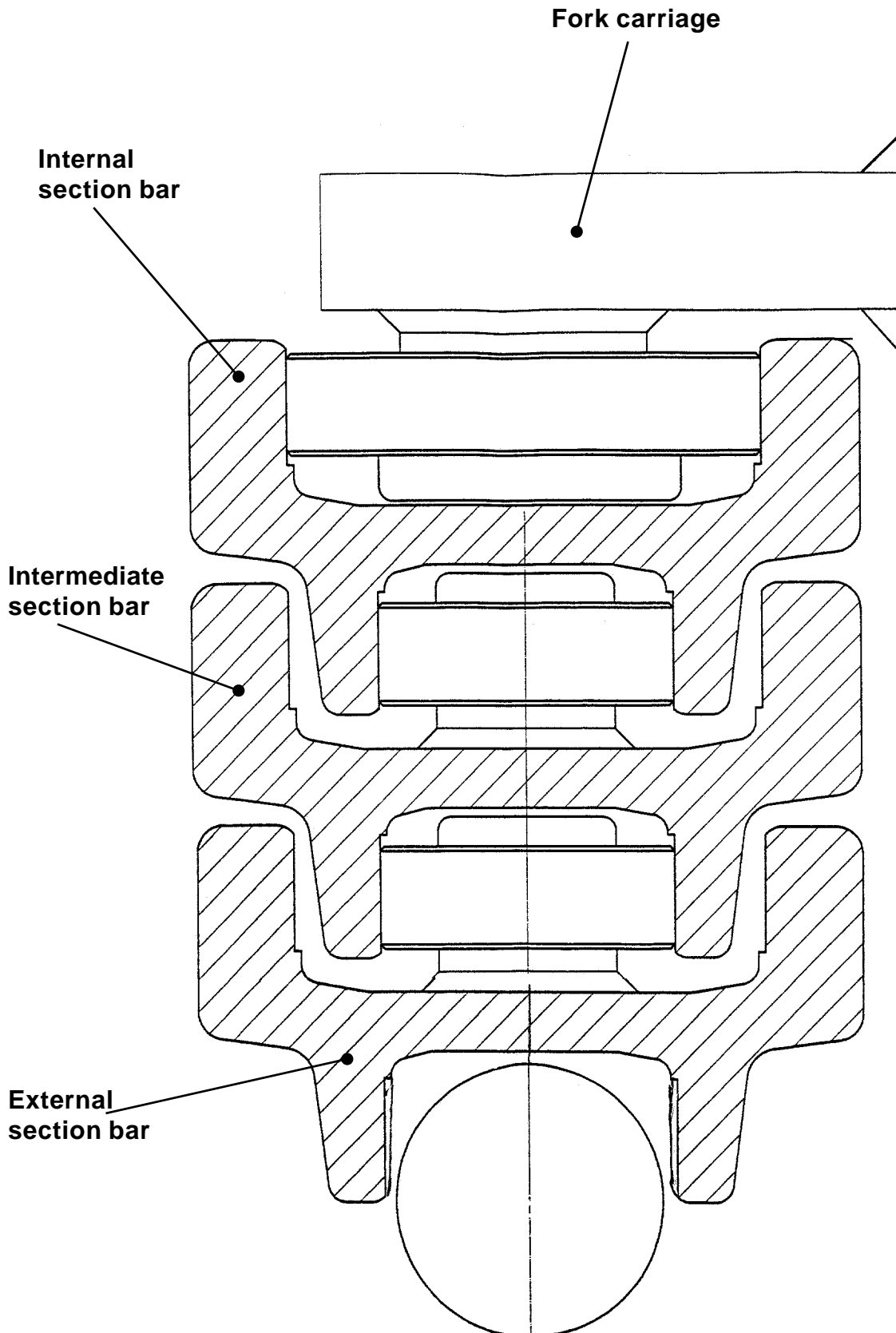
Lifting cylinders:

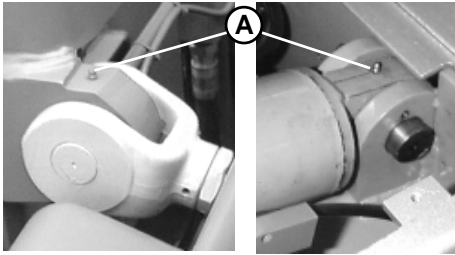
Duplex mast: VT 2 side cylinders
FFL 3 central cylinders
(two small FFL side cylinders, and a central lifting one)

Triplex mast VT 2 side cylinders
FFL 2 side cylinders
2 central cylinders



TRIPLE MAST SECTION



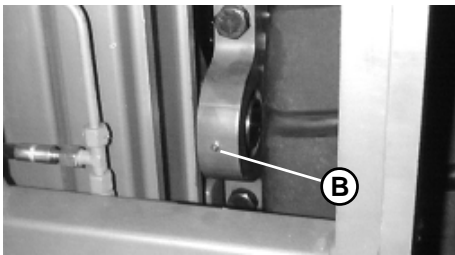


LUBRICATION OF LIFTING EQUIPMENT

Masts

Every 50-100 hours

- lubricate with grease the mast sliding guides
- lubricate the tilting jacks and the mast connections.

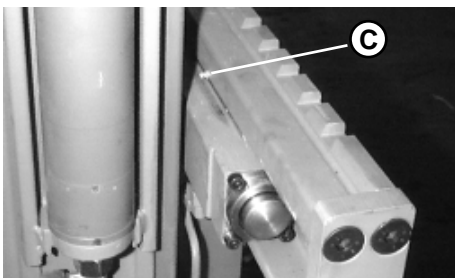


A) Tilting jacks

2+2 grease nipples

B) Mast connections

1+1 grease nipples



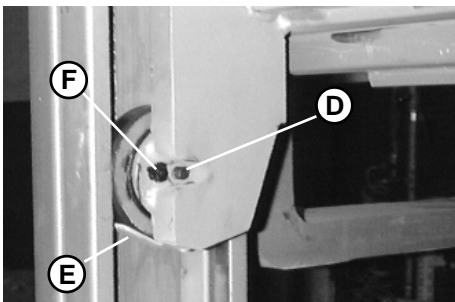
Fork carriage and sideshift unit

Every 50 hours

- lubricate the sideshift guides with grease through the grease nipples.

Every 250 hours

- lubricate the fork positioning pins and notches with grease.



C) Sideshift unit

(upper part)

3 grease nipples

(lower part)

without grease nipples

Fork carriage shoes and rollers:

After the first 50 hours

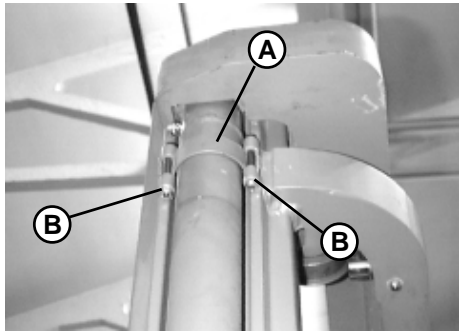
- adjust the guide shoes adjusting the Allen screw (D).
For the adjustment use a 0.2 - 0.5 mm thickness gauge, inserted from below and up to the centre of the Allen screw (D) passing behind the roller (E).

Every 250 hours

- adjust the guide shoes;
- grease the Fork carriage guide rollers (F).

Every 2 000 hours

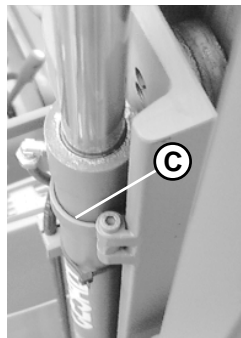
- check the condition of the guide rollers; they must turn freely without jamming and not show excessive wear.

Lifting side jack collars:**Every 500 hours**

- check that there is a clearance (C) of 0.5 to 3 mm between the collar and the external lifting jack cylinder.
- check that the self-locking nuts (B) are tight.

Locking torques:

- collar self-locking nuts 0.8-1.2 daNm

***Mast guide shoes and rollers:*****After the first 50 hours**

- adjust the guide shoes adjusting the Allen screw (D); For the adjustment use a 0.2 - 0.5 mm thickness gauge, inserted from below and up to the centre of the Allen screw (D), passing behind the roller (E) and rubbing against the external mast.

**Every 250 hours**

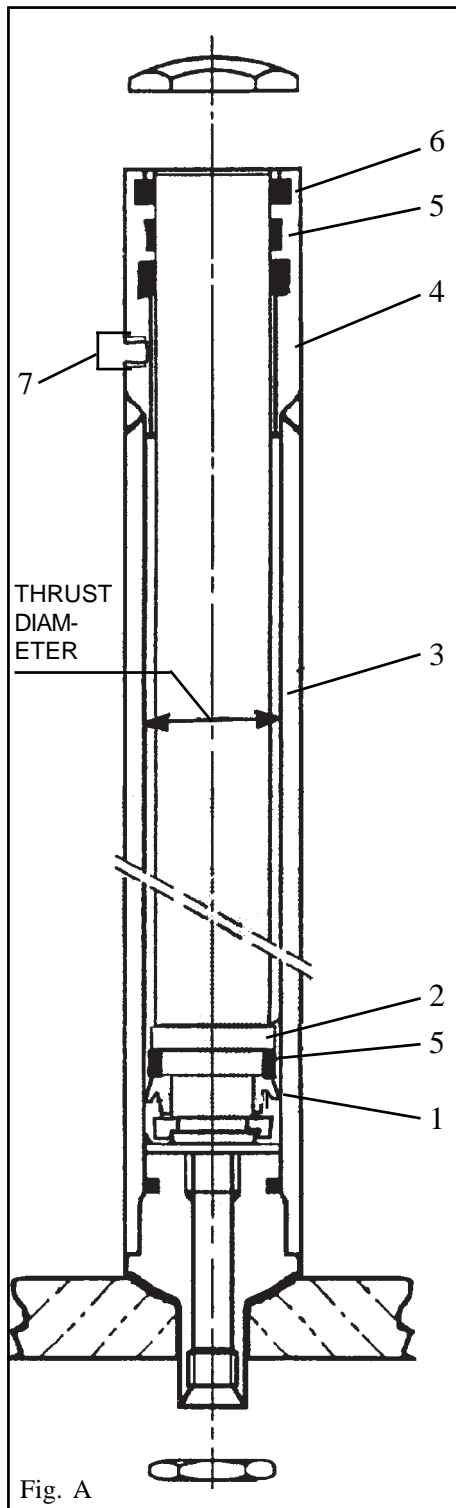
- adjust the guide shoes;
- grease the mast guide rollers (E).

Every 2 000 hours

- check the condition of the mast guide rollers (E); they must turn freely without jamming and not show excessive wear.

DESCRIPTION OF THE CYLINDER COMPONENTS

The cylinder pistons are single-acting types (fig. A).



In these cylinders a seal (1) has been fitted on the piston (2) that works on the inner surface of the cylinder liner (3).

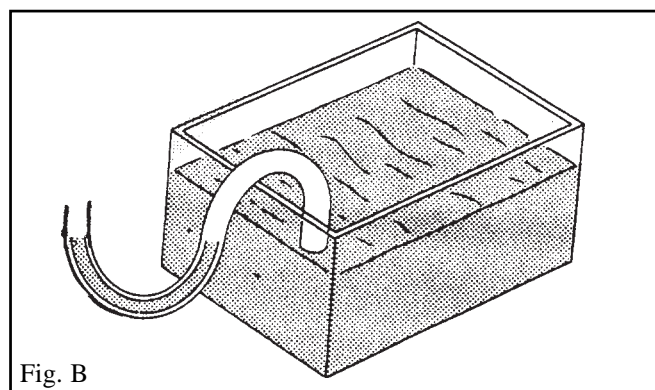
The rod guide is made by the plug (4) and by the piston through anti-friction rings (5).

The dust control ring (6) prevents any dirt and water from penetrating the cylinder.

Slight leakages that may occur are directed to the tank through the drain pipe connected to the pipe coupling (7).

The drain pipe shall reach the oil tank (fig. B)

A small quantity of oil will always remain in the loop formed by the pipe before connecting to the tank. It acts as a trap and constantly moisturizes the cylinder liner, when it is completely closed (fig. B).



CYLINDER CHECKING METHODS**1ST CHECK**

Remove the drain pipe from the cylinder (fig. C)

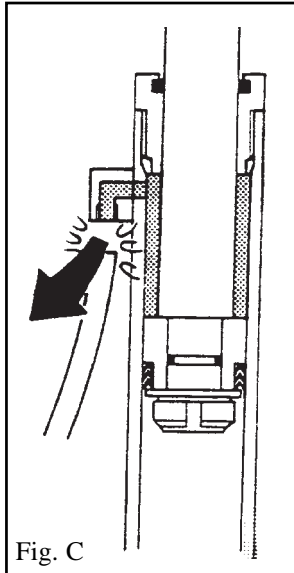


Fig. C

Lift the cylinder some times to end stroke, so as to discharge any oil residual.

Put a load on the forks and lift it by at least 200 mm.

After 10 minutes, measure the amount by which the load has lowered. A drop of a few millimetres is quite normal, as in the distributor there are always some leakages.

Now, lift the cylinder to its end stroke, if no oil leaks from the drain pipe coupling, it means that the load lowering is only due to the leakages on the distributor.

In the presence of leakages, it will be necessary to replace the seal. Should this be the case, inspect the cylinder liner.

2ND CHECK

(To be carried out if the 1st inspection has been successful and after seal replacement).

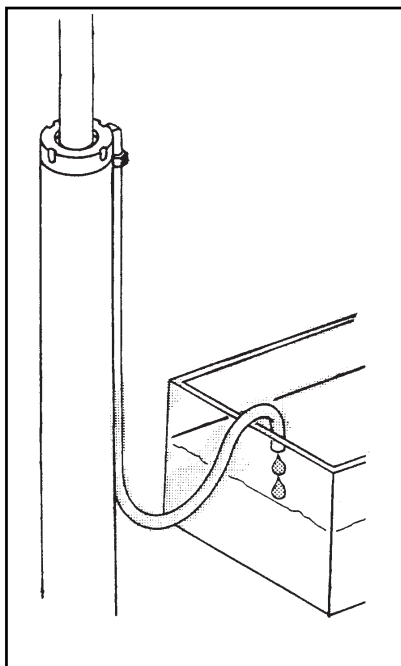
Remove the drain pipe from the cylinder.

Lift the cylinder some times to end stroke, so that all the possible remaining oil is discharged.

Put a load on the forks. Lift and lower it for 10 minutes, making sure that the limit stop is never reached.

Lift the cylinder to end stroke.

If any leakages should be still present, the cylinder is damaged and then it must be replaced.



CHECKING THE CHAINS:

Every 500 hours

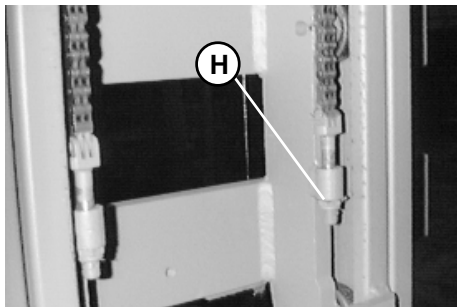
- check the condition of the chains which in any case must not be worn or damaged. To check the links for wear, use the appropriate gauge, paying attention that, **when 33 links are counted in a space corresponding to 34, the chains must be replaced.**

Every 1 000 hours

- remove the chains, clean them thoroughly, refit them inverting the original working position and lubricate them.

Every 10 000 hours

- replace the chains and the fixing tie rods



POSITIONING THE FORK MOUNTING CARRIAGE

Every 500 hours

- check the position of the fork mounting carriage. Position is correct when the carriage (with the mast upright) in its lowest position is at a distance of **203 mm** from the lower edge of the fixed mast.

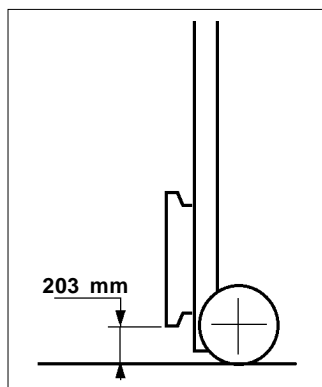
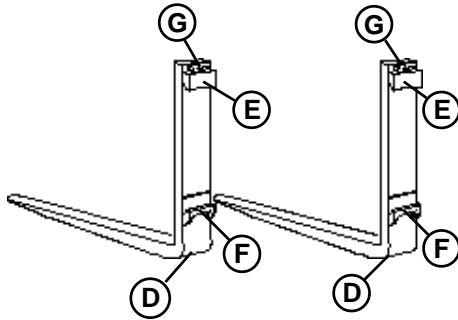


TABLE ISO 2328 - 1993

Rate	Lifting power (kg)		"X" (- 5)
I B	0	999	114 mm
II B	1 000	2 500	152 mm
III B	2 501	4 999	203 mm
IV B	5 000	8 000	254 mm
V B	8 001	10 999	257 mm

FORK INSPECTIONS*General criteria*

Fork arms in use must be **inspected at intervals of not more than 1 000 hours** and whenever a defect or permanent deformation is detected. If the truck is subject to intensive use, more frequent inspections may be required.

*Inspection*

Fork arm inspection must be carefully carried out by trained personnel to detect any damage, failure, deformation, etc., which may impair safety use.

Surface cracks

The fork arm must be thoroughly examined visually for cracks giving special attention to the heel (**D**) and top (**E**) and bottom (**F**) hooks.

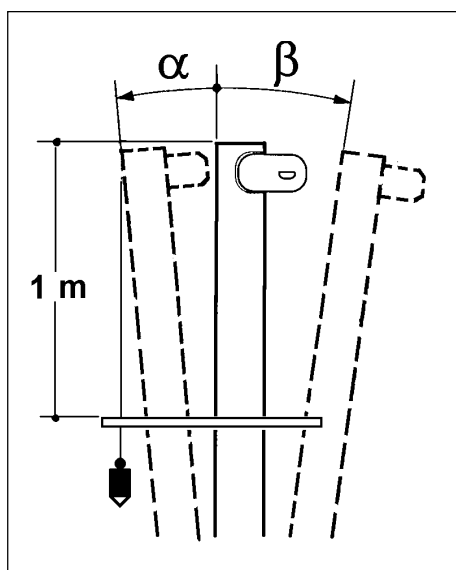
If necessary, the forks may be subjected to a non-destructive crack detection process,

Difference in height of fork tips

Check the difference in height between the blade tips on each pair of forks, this must not be more than 3% of blade length with the forks fitted on the fork plate.

Positioning lock

Check that the fork positioning lock (**G**) is in good working order.

**MAST GROUP TILTING SETTING**

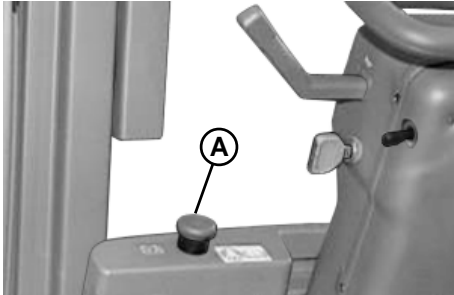
2°30' FORWARD

10° BACKWARD

Check to carry out every 500 h

N.B. 1 tilting degree corresponds to a 17.4 mm movement on 1 mt.

ELECTRIC COMPONENTS DESCRIPTION



A) Emergency Switch

B) Battery connector

C) Traction module

D) Lifting module

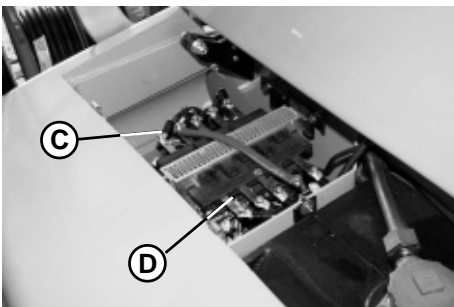
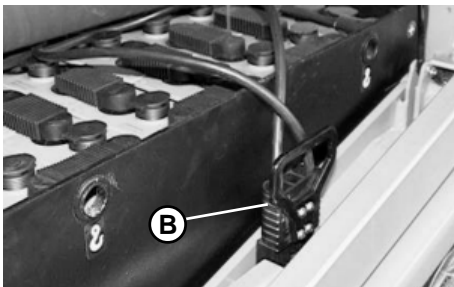
E) Contactors

F) Electric cooling fan

G) Timer electric fan

H) Converter DC/DC

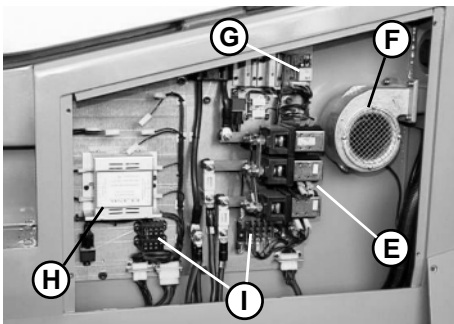
I) Fuses



Components panel

Every 500 hours

- Check and clean the electronic control space



**ELECTRONIC PANEL FUNCTION DESCRIPTION, TROUBLE SHOOTING,
CONSOLE USE: SEE "ELECTRIC SECTION"**

BATTERY AND BATTERY CHARGER**General indications for battery maintenance**

Every 50 working hours - measure electrolyte density.

Approximate density data

For a temperature of 15° C

- a density of 1.12 to 1.13 kg/dm³ indicates that the battery is flat;
- a density of 1.25 to 1.26 kg/dm³ indicates that the battery is charged (battery capacity increased: 1.29 to 1.30 kg/dm³).

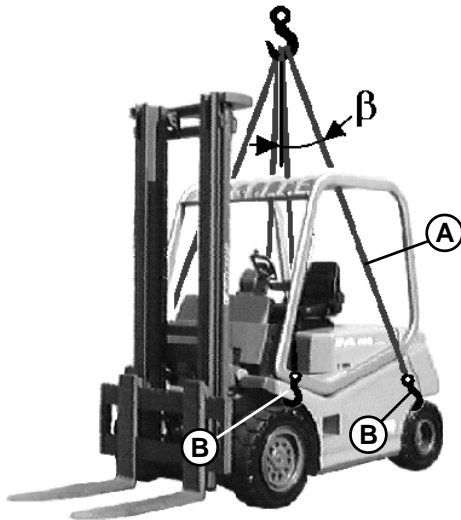
BATTERY CHARGING WARNINGS

Before charging the battery, verify that the room is well aerated. Open the battery compartment door.

Make sure that all electrical connections (electrical cable terminals, battery terminals, plugs-sockets, etc.) are well attached and in good condition.

- **Do not open either remove battery filling caps.**
- **Never top up before and while charging the battery.**
- **Do not smoke, do not stay close to naked flames and do not cause sparks next to batteries**
- **Do not use the battery while it is being charged**
- **Do not lean metal tools on the battery while under charge**
- **Never repair the battery while under charge**
- **Check that during the charging phase, the electrolyte temperature is kept below 50°C.**

TRUCK LIFTING

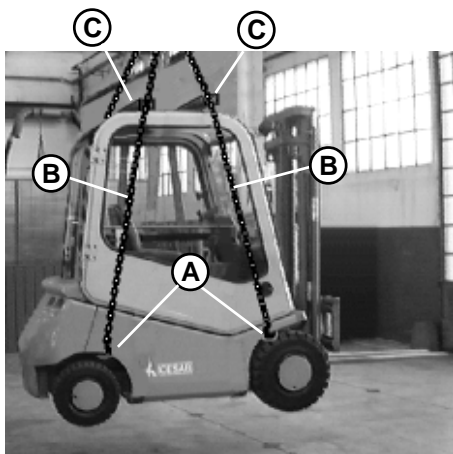


HOOKS ATTACHMENT POINTS FOR LIFTING THE TRUCK

To lift the truck the following equipment must be used:

A- CHAINS: dia. 13 mm - Degree T (8) - UNI 9425

B- HOOKS: for 5.4 t - UNI/ISO 7597

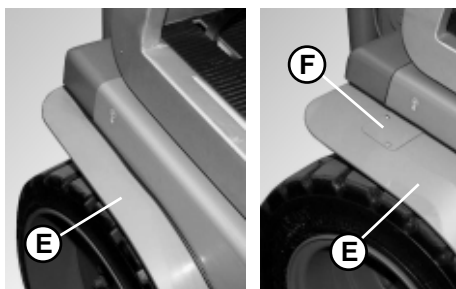


LIFTING OF THE FORKLIFT TRUCK WITH CABIN

A- CHAINS: dia. 13 mm - Degree T (8) - UNI 9425

B- HOOKS: for 5.4 t - UNI/ISO 7597

C- N° 2 upper brackets to hold the chains.



If the truck is equipped with mudguard extensions (E), chains can only be hooked by previously disassembling the extensions themselves or the cover (F).

OIL AND GREASE SPECIFICATIONS

TIPO USATO TYPE USED TYP	SPECIFICHE SPECIFICATIONS EIGENSCHAFTEN	Q.T. QTY. MENGE
AGIP ARNICA 46	ISO - L - HV Prove FZG fino a stadio 11 (*)	21 L
MOBIL-FLUID 422	API GL4 MIL-L-2105D +additivo per freni a bagno d'olio (***)	1 L + 1 L -
MOBILGREASE SPECIAL	Base LITIO ASTM 275 305 NLGI N.2 Gocciolamento 180 (**)	-

(*) ISO-L-HV FZG tests to stage 11 / ISO-L-HV FZG-Pr fung bis Stufe 11

(**) Lithium base ASTM 275-305 NLGI Nr.2 Dropping point 180

Lithiumbasis ASTM 275 305 NLGI Nr.2 Tropfpunkt 180

(***) add brake additive to oil bath / Zus tze f r lbad-Bremsen zuf gen

AGIP ARNICA 22	ISO - L - HV Prove FZG fino a stadio 10 (*)	21 L
MOBILTEMP SHC 100	Inspessente Infusibile ASTM 265 295 NLGI N.2 Gocciolamento>260 (**)	-

(*) ISO-L-HV FZG tests to stage 10 / ISO-L-HV FZG-Pr fung bis Stufe 10

(**) Thickening Infusibile ASTM 265-295 NLGI Nr.2 Dropping point >260

Verdickend nicht schmelzend ASTM 265 295 NLGI Nr.2 Tropfpunkt >260

FOR NORMAL ENVIRONMENTS

PARTS TO BE LUBRICATED
Hydraulic system, lifting and power steering
Transmission reduction gears
Hydraulic brake system tank
Mast securing joints - Sideshift unit - Steering joint - General lubrication with grease nipples - Mast guides

FOR COLD CLIMATES AND COLD
STORAGE CELLS

PARTS TO BE LUBRICATED
Hydraulic system, lifting and power steering
Mast securing joints - Sideshift unit - Steering joint - General lubrication with grease nipples - Mast guides

TYRE PRESSURES TIGHTENING TORQUES

PNEUMATIC TYRE PRESSURES

9,5 bar	FRONT Tyres
10 bar	REAR Tyres
8,25 bar	FRONT - Twin tyres

WHEEL TORQUE

37 daNm	Steered wheels
50 daNm	Driven wheels

DRIVE UNIT TORQUE

11 daNm	securing of electric motor to the reduction gears
55 daNm	securing of axles to the chassis
31 daNm	wheel hub central screw
11 daNm	reduction gear tank screws
8 daNm	Oil filling and draining cap

VARIOUS TORQUES

40 daNm	mast securing U-bolts
0,8 1,2 daNm	Jack collar self-locking nuts
40 daNm	Counterweight locking screws



RUNNING IN MAINTENANCE

50	500
7/-	-/3

after # hours FOR MEDIUM/INTENSE USE

after # days/months FOR OCCASIONAL USE

CHASSIS AND COMMANDS





	
	

bolts in general

wheel tightness (1)

(1) During the first 500 working hours, check tightness every 50 hours.


LIFTING UNIT - MASTS

mast guide pads


lifting oil filter


TRANSMISSION REDUCTION GEARS


	
---	--


transmission reduction gear oil

LEGENDA

 In the maintenance table indicating a visual control and cleaning of the parts indicated.

 In the maintenance table indicating the replacement of the parts indicated.

 In the maintenance table indicating lubrication of the parts indicated.

 In the maintenance table indicating tightening or adjustment of the parts indicated.

MAINTENANCE TIMES

8	50	250	500	1 000	2 000	4 000	10 000
1/-	7/-	-/1	-/3	-/6	-/12	-/24	-/60

					1000 h		
						-/12	

after # hours FOR MEDIUM/INTENSE USE

after # days/months FOR OCCASIONAL USE

LIFTING EQUIPMENT - MASTS

fork carriage position

forks

mast inclination

mast fixing to the frame

lifting chains

chain stay bolts

high pressure hydraulic tubing

hydraulic seals and connections

mast rollers, carriage rollers and chain rollers

tilting jacks supply tubes

fork positioning pins

lifting oil filter

lifting system oil

mast guides, mast and jack fixing

retaining collars

TRANSMISSION REDUCTION GEAR

system seal

transmission reduction gear oil - medium/intense use

transmission reduction gear oil - occasional use

transmission - entire unit

MAINTENANCE TIMES

8	50	250	500	1 000	2 000	4 000	10 000
1/-	7/-	-1	-3	-6	-12	-24	-60

after # hours FOR MEDIUM/INTENSE USE

after # days/months FOR OCCASIONAL USE

FRAME AND COMMANDS

frame - cleaning
bolts in general
driver's seat
wheels - hub bearings
tyre inspection
tyre pressure
wheel tightness
steering system seal and tubing
hoses from orbitrol to steering jack
swing axle and wheel hub bearings
steerage angles
pedals in general - linkage
parking brake pedal
service brake flexible hoses
service brake pedal
brake liquid

MAINTENANCE TIMES

8	50	250	500	1 000	2 000	4 000	10 000
1/-	7/-	-/1	-/3	-/6	-/12	-/24	-/60

after # hours FOR MEDIUM/INTENSE USE

after # days/months FOR OCCASIONAL USE

			☺				
				☺☒			
	☺						
			☺				
	☺						
						☺	
				☺☒			
				☺			
			☺				
			☺				

ELECTRICAL SYSTEM

pushbuttons - microswitches, pedals and valves

lead terminals - lead insulation

BATTERY - specific gravity and charge level

ELECTRIC MOTORS - external cleaning

electric fans

motor bearings

motor supports

electronic control

contactors

safety control circuit

Totaldokument

BT Cargo CBE 40-50 AC

Var 250:e timme

<u>Pos</u>	<u>Kontroll av:</u>	<u>Pos</u>	<u>Kontroll av:</u>	<u>Pos</u>	<u>Kontroll av:</u>
0:0	Grupp 0 Hel maskin	3:0	Grupp 3 Bromsar/hjul	5:9	Acc.pedal/fartreglage
0:1	Dörrar/luckor	3:1	Däck/hjul	5:10	Microbrytare
0:2	Motviktsinfästning	3:2	Luftryck däck	5:11	Kontaktorer/kontakter
0:3	Förarskydd/hytt	3:3	Hjulbultar/hjullager	5:12	Säkringar
0:4	Batterilåsning	3:4	Färdbroms, funktion/läckage	5:13	Batterivätskenivå
0:5	Skyltar/dekaler	3:5	Parkeringsbroms	5:14	Batteri, smuts/läckage
0:6	Förarmiljö	3:6	Bromsvätskenivå	5:15	Batterianslutningar
0:7	Stol/mattor	3:7	Pedallänkage/pedalspel	5:16	Batteripoler reng./infettning
0:8	Pedalgummin	4:0	Grupp 4 Styrning	5:17	Batterihandskar, kontroll
0:9	Torkare/spolare	4:1	Styrleder/Styrspindlar	5:18	Kylfläktar, kontroll
0:10	Provkörning test av samtliga funktioner	4:2	Styrcylinder, fastsättning	6:0	Grupp 6 Hydraulik
0:11	Smörjning enligt schema	4:3	Styrlagring/upphängning	6:1	Slangar/rör
1:0	Grupp 1 Motorer	5:0	Grupp 5 Elsystem	6:2	Ventilreglage/länkage
1:1	Missljud	5:1	Belysning/körriktningsvisare	6:3	Andningsfilter/ventilatorer
1:2	Fastsättning/infästning	5:2	Instrument/kontrollampor	6:4	Oljenivå
2:0	Grupp 2 Kraftöverföring	5:3	Signalhorn	7:0	Grupp 7 Arbetsfunktion
2:1	Oljenivå	5:4	P-broms-/Backalarm	7:1	Lyftstativ
2:2	Fastsättning	5:5	Timmätare, avläsning	7:2	Gafflar
		5:6	Färdväljare	7:3	Lyftkedjor
		5:7	Kablar/anslutningar	7:4	Laststöd
		5:8	Startfrekvens	7:5	Lyft-/tiltcylindrar

Var 500:e timme tillkommer:

0:0	Grupp 0 Hel maskin
0:12	Bultar/Muttrar, fastsättning
1:0	Grupp 1 Motorer
1:3	Drivmotor, renblåsning
1:4	Pumpmotor, renblåsning
1:5	Motorer, isolationsprov
5:0	Grupp 5 Elsystem
5:19	Batteri, isolationsprov

Var 1000:e timme tillkommer:

2:0	Grupp 2 Kraftöverföring
2:3	Drivaxel, oljebyte
3:0	Grupp 3 Bromsar/hjul
3:8	Hjullager infettning
3:9	Bromsvätska byte
6:0	Grupp 6 Hydraulik
6:5	Andningsfilter, reng./byte

Var 2000:e timme tillkommer:

0:0	Grupp 0 Hel maskin
0:13	Ram, kontroll av sprickor
4:0	Grupp 4 Styrning
4:4	Slangar, kontroll
4:5	Styrtryck, kontroll
5:0	Grupp 5 Elsystem
5:20	Batteribelastningsprov
5:21	Motorström, mätning
6:0	Grupp 6 Hydraulik
6:6	Hydraultryck, kontroll
6:7	Hydraulolja, byte
6:8	Sugfilter, rengöring/byte
7:0	Grupp 7 Arbetsfunktion
7:6	Gafflar, gaffeltest

SERVICE MANUAL

Electrical section

TECHNICAL FEATURES**ELECTRONIC PANEL**

Inverter for AC asynchronous 3-phase motors

Regenerative braking functions

Can-bus interface

Digital control based upon a microcontroller

Voltage

80V

80V

Maximum current

450A (RMS*)

450A (RMS*)

All the different versions have a booster of 50 Arms for some seconds

Operating frequency:

8kHz

8kHz

External temperature range:

-30°C ÷ 40°C

-30°C ÷ 40°C

Maximum inverter temperature (at full power):

75°C

75°C

RMS* (Root Mean Squared)

(0% motorström vid 85°)

Traction Unit**AC3T****Lifting Unit****AC3P****ELECTRICAL MOTOR FEATURE****TRACTION MOTOR**

V 54 (nominal)

Kw 17

Frequency

78 Hz

Rpm nominal max.

2260 (rpm/min)

Service S2

Classe IS F

N° poles 4

LIFTING MOTOR (Leroy)

V 54 (nominal)

Kw 18,6

Frequency

73 Hz

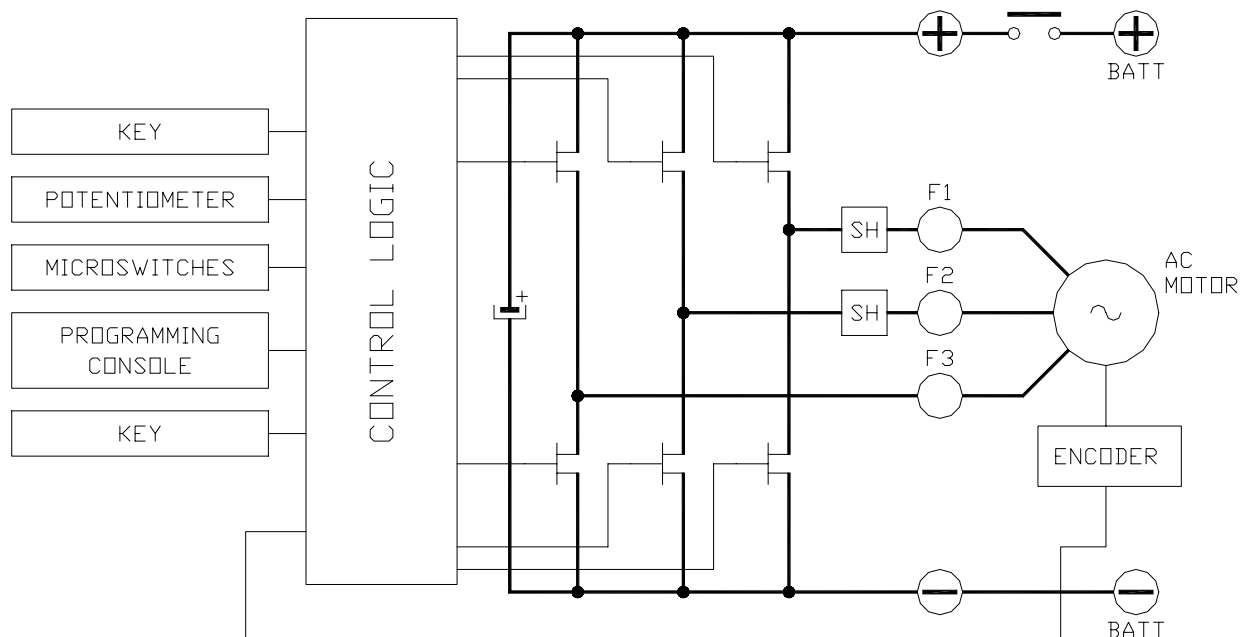
Rpm nominal max.

2080 (rpm/min)

Service S3 30%

Classe IS F

N° poles 4

ELECTRIC BLOCK DIAGRAM

4,0 - 4,5 - 5,0 t A.C. VERSION	<h1>SERVICE MANUAL</h1>	Electric
page 46		

OPERATIONAL FEATURES

- Speed control.
- Optimum behaviour on a slope due to the speed feedback:
 - the motor speed follows the accelerator, starting a regenerative braking if the speed overtakes the speed set point.
- Stable speed in every position of the accelerator.
- Regenerative release braking based upon deceleration ramps.
- Regenerative braking when the accelerator pedal is partially released (deceleration).
- Direction inversion with regenerative braking based upon deceleration ramp.
- Regenerative braking and direction inversion without contactors: only the two main contactors are present.
- The release braking ramp can be modulated by an analog input, so that a proportional brake feature is obtained.
- Optimum sensitivity at low speeds.
- Voltage boost at the start and with overload to obtain more torque (with current control).
- High efficiency of motor and battery due to high frequency commutations.
- Self diagnosis with indication of the fault shown by a flashing led.
- Modification of parameters through the programming console.
- Internal hour-meter with values that can be displayed on the console.
- Memory of the last five alarms with relative hour-meter and temperature displayed on the console.
- Test function within console for checking main parameters.
- Hydraulic steering function:
 - 1) traction inverter
 - the traction inverter sends a "hydraulic steering function" request to the pump inverter on the can-bus line
 - 2) pump inverter
 - the pump inverter manages a "hydraulic steering function". That is, it drives the pump motor at the programmed speed for the programmed time.

DIAGNOSIS

The microprocessor continually monitors the inverter and carries out a diagnostic procedure on the main functions. The diagnosis is made in 4 points

- 1) Diagnosis on key switch closing that checks: watchdog circuit, current sensor, capacitor charging, phase's voltages, contactor drives, can-bus interface, if the switch sequence for operation is correct and if the output of accelerator unit is correct.
- 2) Standby diagnosis at rest that checks: watchdog circuit, phase's voltages, contactor driver, current sensor, can-bus interface.
- 3) Diagnosis during operation that checks: watchdog circuits, contactor driver, current sensors, can-bus interface.
- 4) Continuous diagnosis that check: temperature of the inverter.

Diagnosis is provided in two ways.

- the diagnostic LED placed to the dashboard that will flash a certain number of times for a given alarm (see the chapters ALARMS).
- the digital console, which gives a more detailed information about the failure.

GENERAL PRECAUTIONS

- Never connect SCR low frequency chopper with ASYNCHRONOUS INVERTER because the ASYNCHRONOUS filter capacitors alter the SCR choppers' work. If it is necessary to use two or more control units (traction + lift. for ex.), they must belong to the ZAPIMOS family.
- Do not connect the inverter to a battery with a nominal value different from the value indicated on the chopper plate. If the battery value is greater, the MOS may fail; if it is lower, the control unit does not "power up".
- During battery charge, disconnect ASYNCHRONOUS from the battery.
- Supply the ASYNCHRONOUS only with battery for traction; do not use a power supply.
- When the chopper is installed, make tests with the wheels raised from the ground, in order to avoid dangerous situations due to connection errors.
- After the chopper is switched off (key off), the filter capacitor remains charged for some minutes; if you need to work on the inverter, discharge them using a 10W ÷ 100W resistance connected from the +Batt to the -Batt.
- Before carrying out any arc-welding on the trucks, disconnect the battery and short-circuit the unit between positive (+) and negative (-).

4,0 - 4,5 - 5,0 t A.C. VERSION	<h1>SERVICE MANUAL</h1>	Electric
page 48		

PROTECTIONS

- **Battery polarity inversion:**

A MAIN CONTACTOR is fitted to protect the inverter against reverse battery polarity and for safety reasons.

- **Connection Errors:**

All inputs are protected against connection errors.

- **Thermal protection:**

If the chopper temperature exceeds 75°C, the maximum current is reduced in proportion to the thermal increase. The temperature can never exceeds 85°C.

- **External agents:**

The inverter is protected against dust and the spray of liquid to a degree of protection meeting IP54.

- **Protection against uncontrolled movements:**

The main contactor will not close if:

- the Power unit is not functioning.
- the Logic is not functioning perfectly.
- the output voltage of the accelerator does not fall below the minimum voltage value stored, with 1 V added.
- running microswitch in closed position.

- **Low battery charge:**

when the battery charge is low, the maximum current is reduced to the half of the maximum current programmed.

- **Protection against accidental Start up**

A precise sequence of operations are necessary before the machine will start.
Operation cannot begin if these operations are not carried out correctly.
Requests for drive, must be made after closing the key switch

GENERAL DESCRIPTION OF FUNCTION OF THE CONSOLE**HOUR METER**

The hour meter appears in the second line of the display when the chopper is connected. It shows the real working hours.

PARAMETER CHANGE

The chopper parameters can be displayed and programmed via the keyboard, in real time and with operating machine, thereby making it possible to set the chopper easily.

TESTER

It makes it possible to display the state of the chopper analogue and digital values and thereby to have a useful tool for the analysis of chopper operation and external cables.

SAVE PARAMETER

It makes it possible to store all values relating to the parameters and the chopper hardware configuration into the console with a program which can be selected from the keyboard.

RESTORE PARAMETER

It makes it possible to program a chopper with the parameters contained in a program generated by a SAVE.

ALARMS

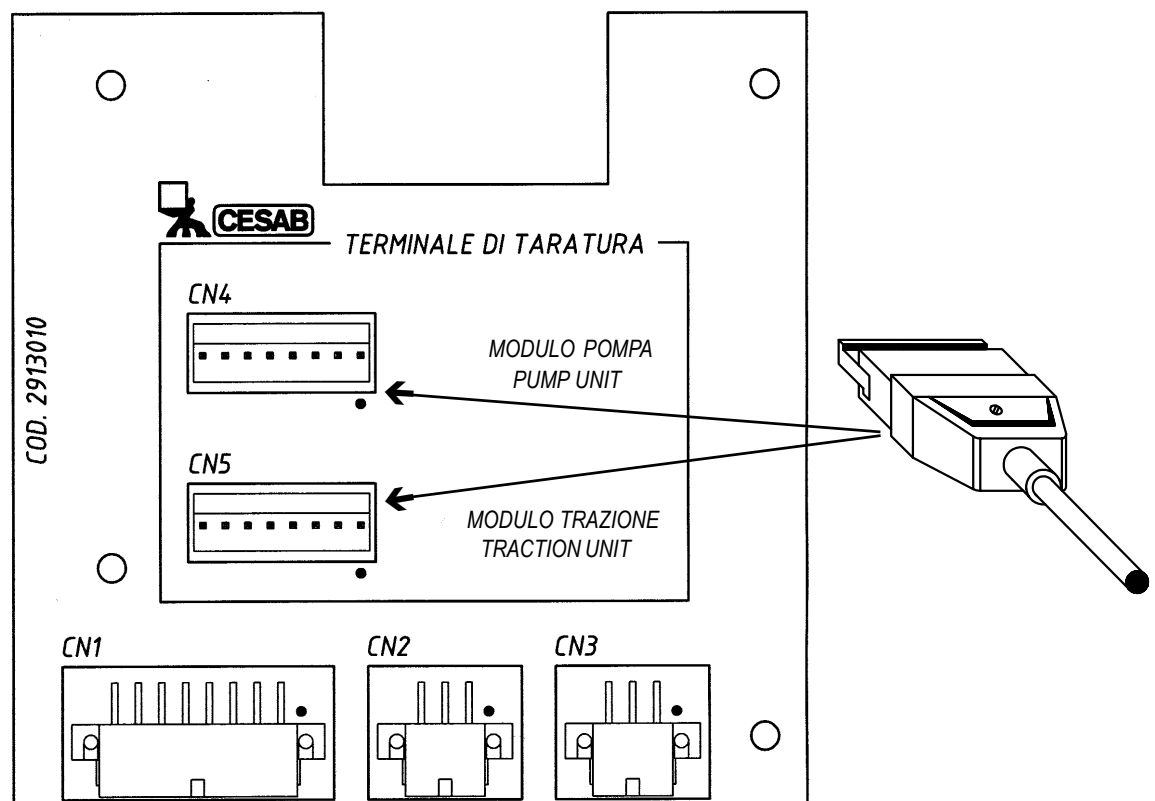
The console features the possibility to read the last five alarm messages stored in the chopper and displayed together with the time of occurrence, the number of times the alarm was sent and the temperature value at the time of the alarm.

PROGRAM VACC

It allows to program the accelerator max. stroke.

MOTOR DATA

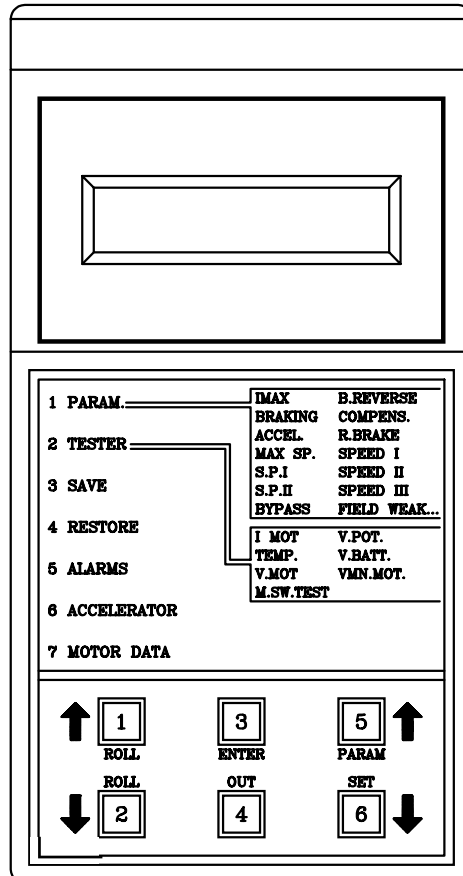
No activated

CONSOLE CONNECTION

The connection has to be made with resting machine.

CONSOLE DESCRIPTION KEYBOARD

Description of key functions:



ROLL 1 = Allows selection of an option or the next menu item

ROLL 2 = Allows select of an option or the previous menu item

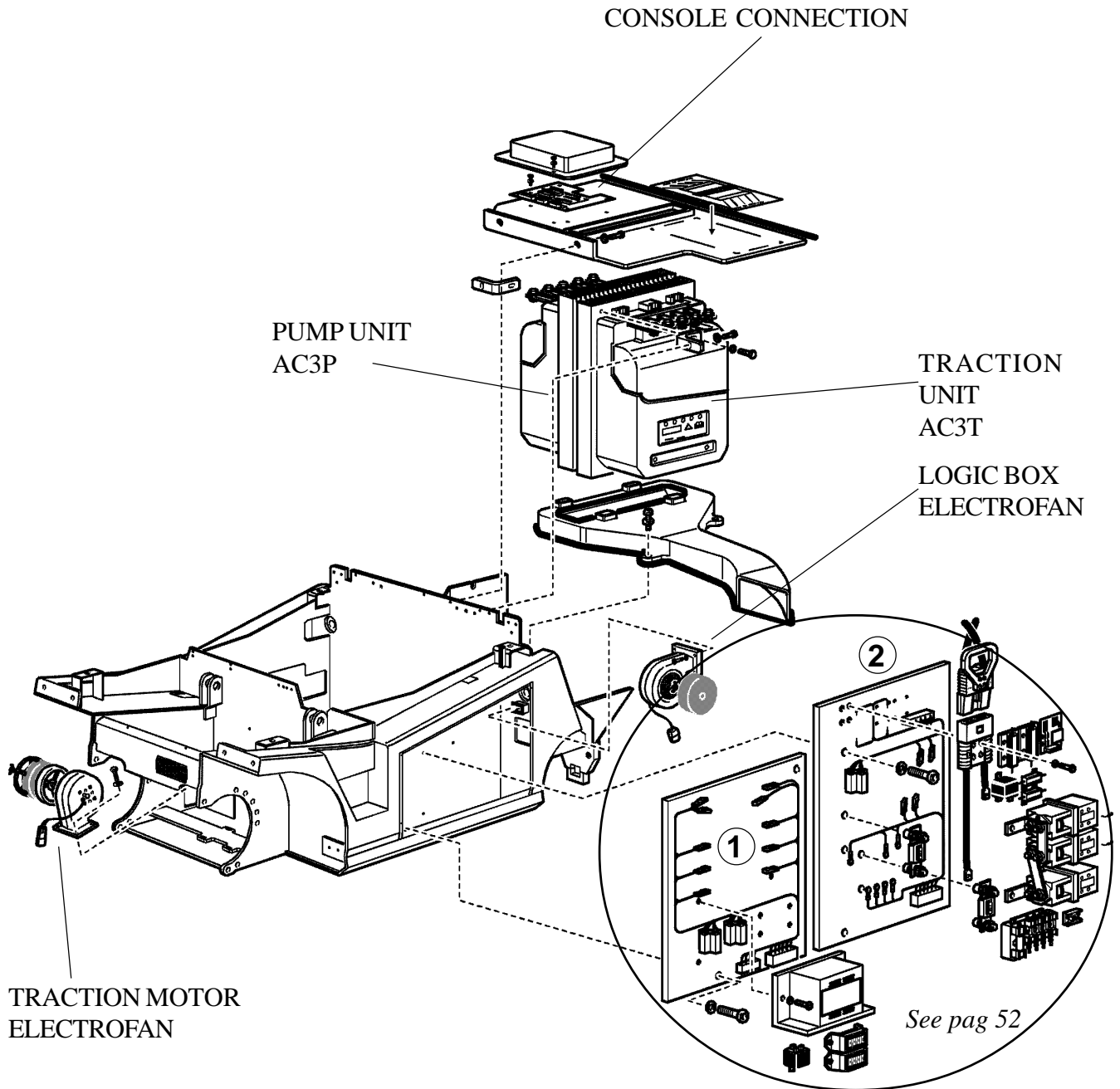
ENTER = Allow confirmation of selected options

OUT = Retains the current function

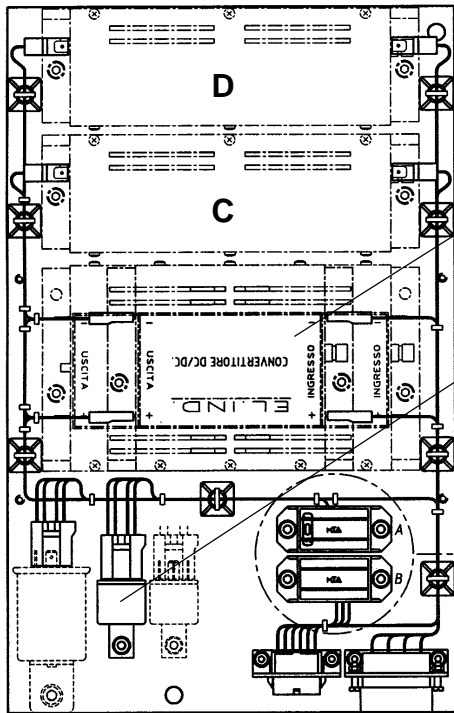
PARAM = Allows an increase in the parameters or selects the type of connected I/O

SET = Allows a reduction in the parameters or selects the type of connected I/O

ELECTRIC COMPONENT LAY-OUT



COMPONENTS PANEL DESCRIPTION



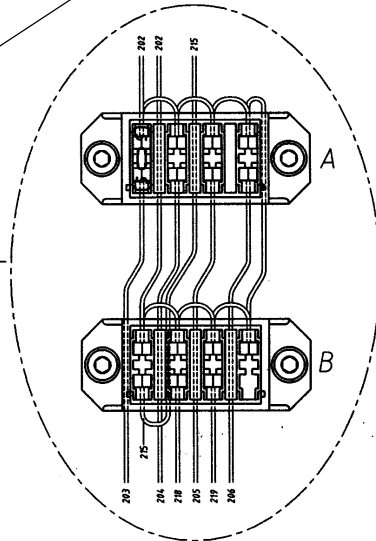
1

CONVERTER FOR BACK LIGHT (STANDARD 140W)

REVERSE LIGHT RELAY

A-B FUSE HOLDER FOR LIGHT EQUIPMENT (OPTIONAL)

C-D CONVERTER FOR LIGHT EQUIPMENT (OPTIONAL)



BATTERY CONNECTOR

R1-R2 ELECTROFAN RESISTOR

ELECTROFANS TIMER

R3 REVERSE RELAY RESISTOR

ELECTROFAN RELAY

R4 ELECTROFAN RELAY RESISTOR

MAIN CONTACTOR

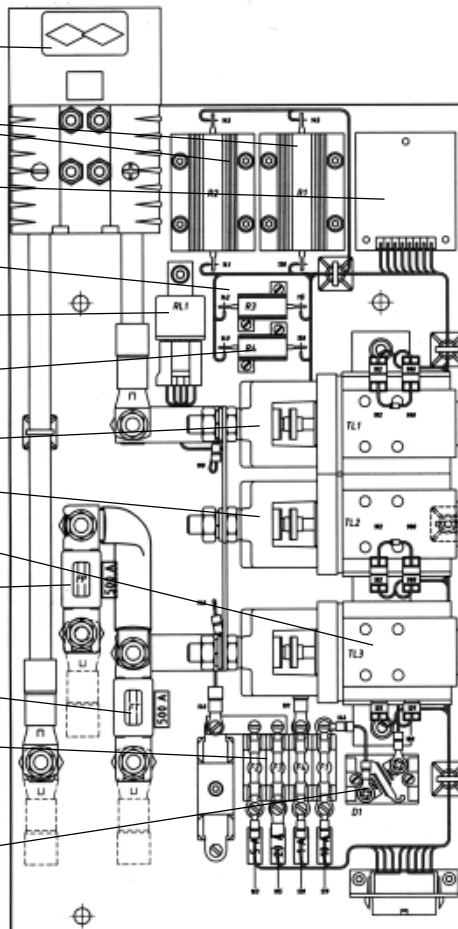
TRACTION LOGIC MAIN CONTACTOR

PUMP FUSE (500 A)

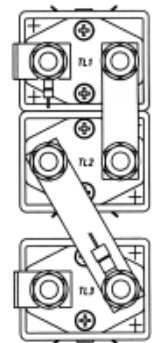
TRACTION FUSE (500 A)

FUSES F1 KEY FUSE (10 A)
F2 HORN FUSE (5 A)
F3 CONVERTER 80/24 FUSE
F4 TIMER FUSE (1 A)

PROTECTION DIODE

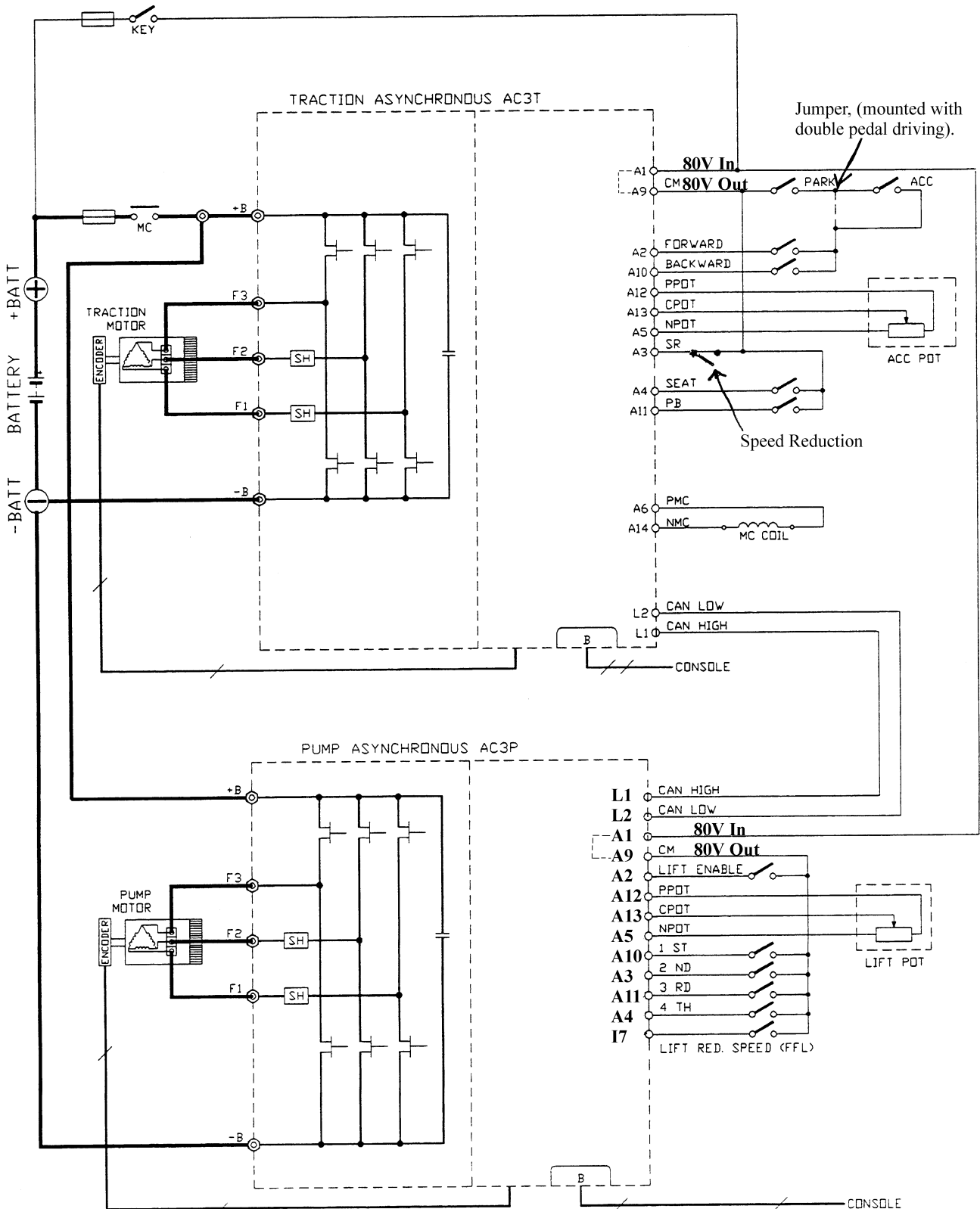


2



CONNECTION ELECTRICAL CIRCUIT

TRACTION UNIT AC3T AND LIFTING UNIT AC3P

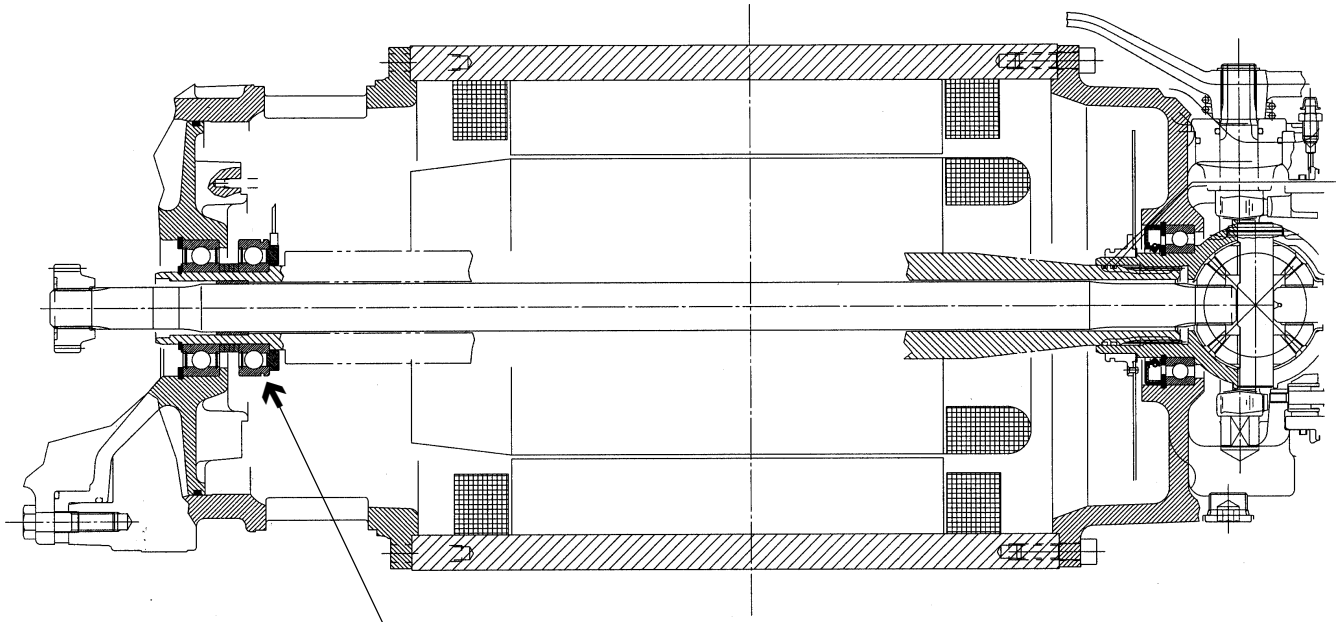


LEGEND

CM	=	Common of FORWARD/ BACKWARD/ SR / PB / SEAT microswiches
PARK	=	Parking brake swith
FORWARD	=	Forward direction request input.
BACKWARD	=	Backward direction request input.
PPOT	=	Acceleretor potentiometer positive.
CPOT	=	Acceleretor potentiometer wiper
NPOT	=	Acceleretor potentiomete negative .
SR	=	Speed reduction (hand brake) input.
SEAT	=	Seat microswich.
PB	=	Brake pedal swith.
PMC	=	Positive of main contactor.
NMC	=	Negative of main contactor.
CAN LOW	=	Low level CAN-BUS voltage I/O.
CAN HIGH	=	Higt level CAN-BUS voltage I/O.
LIFT ENABLE	=	Lifting switch.
PPOT	=	Lifting potentiometer positive.
CPOT	=	Lifting potentiometer wiper input.
NPOT	=	Lifting potentiometer negative.
1 ST	=	Tilting switch.
2 ND	=	Side-shift switch
3 RD	=	4 th way.
4 TH	=	5 th way.
LIFT RED.		
SPEED (FFL)	=	Speed lifting reduction input with Full Free Lift mast group

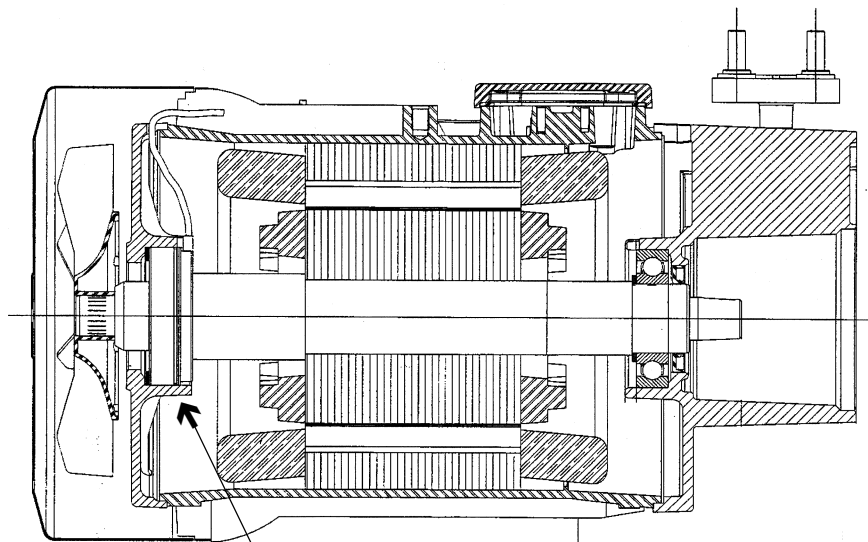
ELECTRIC MOTORS ENCODER

TRACTION MOTOR



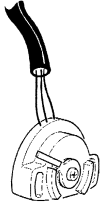
TRACTION BEARING ENCODER

LIFTING MOTOR

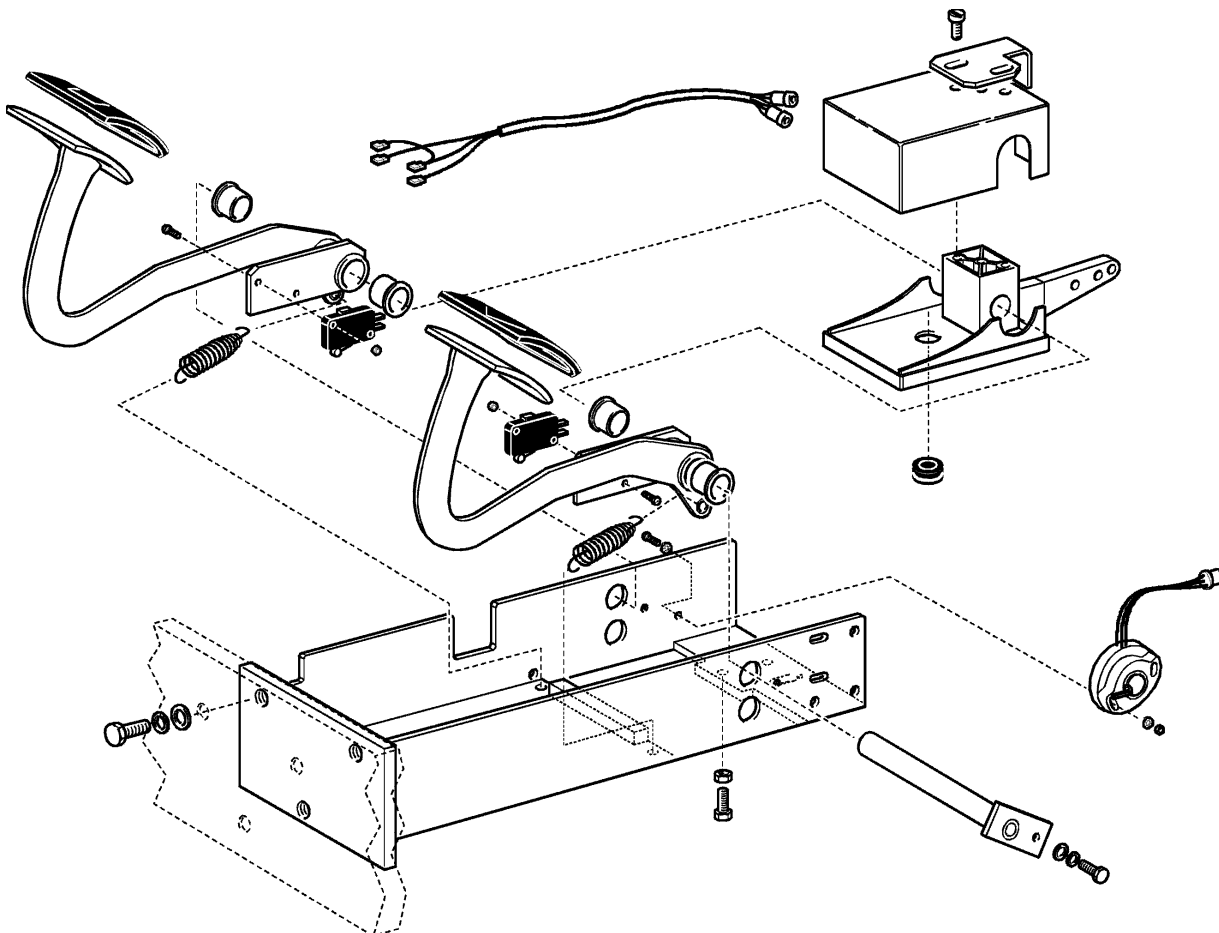
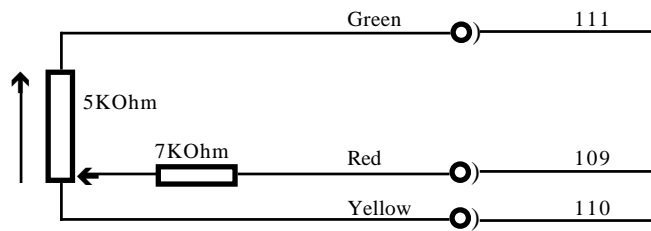


LIFTING BEARING ENCODER

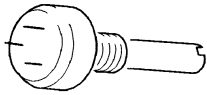
ACCELERATOR POTENTIOMETER CONFIGURATION



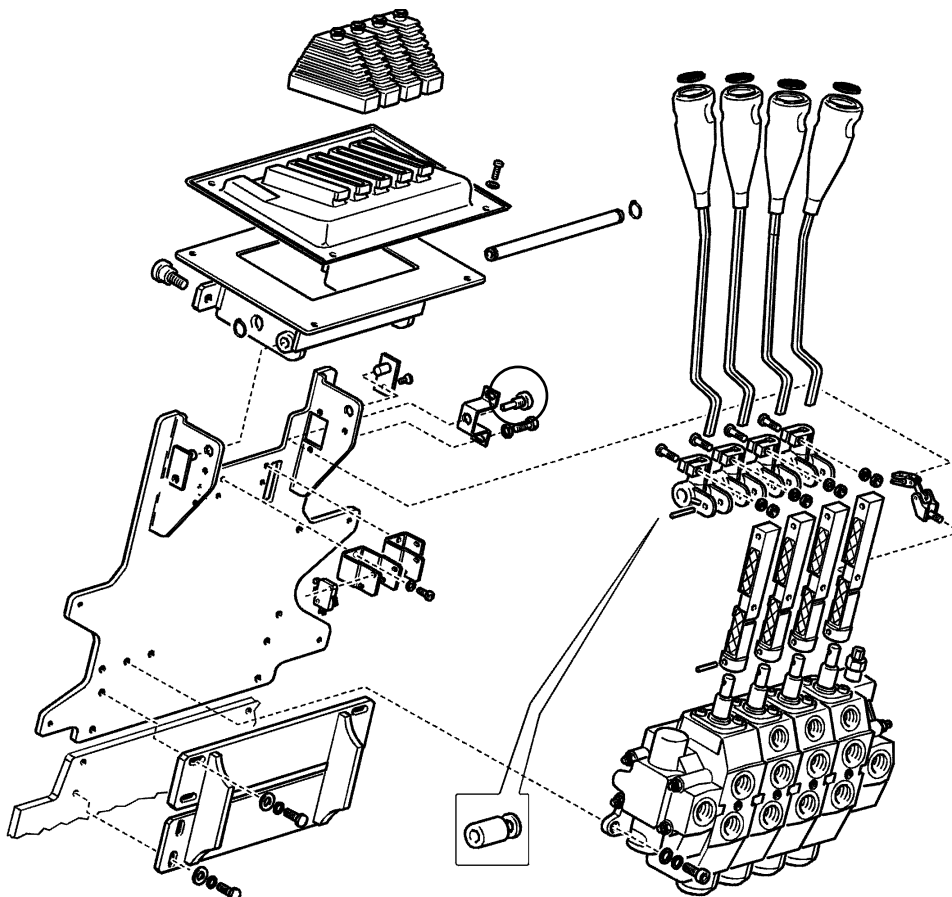
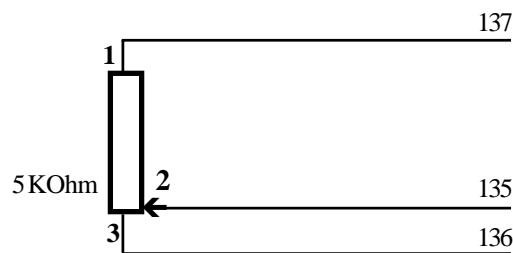
- 111 : 4,2 V
- 109 : 0 ÷ 4,2 V with pedal pressed
- 110 : 0 V



LIFTING POTENTIOMETER CONFIGURATION



- 137 : 4,9 V
- 135 : 0 ÷ 4,9 V with lifting lever pulled
- 136 : 0 V



4,0 - 4,5 - 5,0 t A.C. VERSION	<h1>SERVICE MANUAL</h1>	Electric
page 58		

PARAMETER CHANGE FUNCTION

TRACTION MODULE AC3T

ACCDELAY	determines the acceleration ramp.
RELEASE BRAKING	controls the deceleration ramp when the travel request is released.
INVERSION BRAKING	controls the deceleration ramp when the direction switch is inverted during travel.
PEDAL BRAKING	determines the deceleration ramp when the travel request is released and the brake pedal switch is closed.
SPEED LIMIT BRAKING	deceleration ramp when the pedal position is changed but not completely released.
BRAKE CUTBACK	determines the speed reduction when the brake switch input becomes active.
MAX SPEED FORWARD	determines the maximum speed in forward direction.
MAX SPEED BACKWARD	determines the maximum speed in backward direction.
CUTBACK SPEED	speed reduction when the cutback switch is active (Pin A3).
CUTBACK SPEED 2	Speed reduction when the brake switch is active
FREQUENCY CREEP	minimum speed when the forward or reverse switch is closed, but the accelerator is on a minimum position.
MAXIMUM CURRENT	this changes the maximum current of the inverter.
BACKING SPEED	not used
BACKING TIME	not used
AUXILIARY TIME	not used

LIFTING UNIT AC3P

PU.ACCELERDEL	acceleration ramp.
PU.DECCELERATIONDEL	deceleration ramp.
MAX SPEED UP	determines the maximum lifting speed with a potentiometer control.
MIN SPEED UP	determines the minimum lifting speed with a potentiometer control when the lifting enable switch is closed.
CUTBACK SPEED	Speed reduction when the cutback switch is active (Pin A9) Signal active low (switch open)
CUTBACK SPEED 2	Speed reduction when the cutback switch is active (Pin I3). Used only for FFL mast
1ST SPEED FINE	tilting speed, fine regulation.
2ND SPEED FINE	side-shift speed, fine regulation.
3RD SPEED FINE	4 th lever speed, fine regulation.
4TH SPEED FINE	5 th lever speed, fine regulation.
HYD SPEED FINE	hydro speed, fine regulation.
MAXIMUM CURRENT	the maximum current of the inverter.
AUXILIARY TIME	time delay when an hydraulic steering function request is switched off.

TESTER FUNCTIONS

TRACTION UNIT AC3T

MOTOR VOLTAGE: this is the voltage supplied to the motor by the inverter; it is expressed as a percentage of the full voltage (which depends of the battery voltage).

FREQUENCY: this is the frequency of the voltage and current supplied to the motor.

ENCODER: this is the speed of the motor, expressed in the same unit of the frequency; this information comes from the speed sensor.

SLIP VALUE: this is the difference of speed between the rotating field and the shaft of the motor, expressed in the same unit of the frequency.

CURRENT RMS: Root Mean Square value of the motor current.

TEMPERATURE: the temperature measured on the aluminum heat sink holding the MOSFET devices.

MOTOR TEMPERATURE: Not used (0°).

ACCELERATOR: the voltage of the accelerator potentiometer's wiper (CPOT). The voltage level and percentage value are shown.

FORWARD SWITCH: the level of the Forward direction digital entry FW.

ON / +VB = active entry of closed switch OFF / GND = non active entry of open switch.

BACKWARD SWITCH: the level of the Reverse direction digital entry BW.

ON / +VB = active entry of closed switch OFF / GND = non active entry of open switch.

BACKING FORW: Not used

BACKING BACK: Not used

CUTBACK SWITCH: the level of the Speed Reduction Microswitch (Not used Optional Pin A3)

ON / GND = active entry of speed reduction microswitch.

OFF / +VB = non active entry of microswitch.

BRAKE SWITCH: the level of the Pedal Brake Microswitch.

ON / +VB = active entry of Brake pedal Microswitch.

OFF / GND = non active entry of microswitch.

SEAT SWITCH: the level of the Seat Microswitch digital entry.

ON / +VB = active entry of closed seat switch.

OFF / GND = non active entry of open seat switch.

EXCLUSIVE HYDRO: Not used

HANDBRAKE: the level of the Handbrake Microswitch.

ON / GND = active entry of Handbrake Switch.

OFF / +VB = non active entry of microswitch.

VOLTAGE BOOSTER: this is the booster of the voltage supplied to the motor in load condition; it is expressed in a percentage of the full voltage.

BATTERY VOLTAGE: level of battery voltage measured at the input to the key switch.

COS FI: this is the $\cos \phi$ (real time calculated) of the motor.

BATTERY CURRENT: this is the battery current (not measured but calculated).

BATTERY CHARGE: the percentage Charge level of the battery.

4,0 - 4,5 - 5,0 t A.C. VERSION	SERVICE MANUAL	Electric
page 60		

LIFTING UNIT AC3T

MOTOR VOLTAGE: this is the voltage supplied to the motor by the inverter; it is expressed as a percentage of the full voltage (which depends of the battery voltage).

FREQUENCY: this is the frequency of the voltage and current supplied to the motor.

ENCODER: this is the speed of the motor, expressed in the same unit of the frequency; this information comes from the speed sensor.

SLIP VALUE: this is the difference of speed between the rotating field and the shaft of the motor, expressed in the same unit of the frequency.

CURRENT RMS: Root Mean Square value of the motor current.

TEMPERATURE: the temperature measured on the aluminum heat sink holding the MOSFET devices.

MOTOR TEMPERATURE: this is the temperature of the motor; if the option is programmed "None" (see chapter 4.4.b) it shows 0°.

ACCELERATOR: the voltage of the accelerator potentiometer's wiper (CPOT). The voltage level is shown on the Left Hand Side of the Console Display and the value in percentage is shown on the Right Hand Side.

LIFTING SWITCH: status of the lifting switch.

1ST SPEED SWITCH: status of the tilting switch of the pump.

2ND SPEED SWITCH: status of the side-shift switch of the pump.

3RD SPEED SWITCH: status of the 4th lever switch of the pump.

4TH SPEED SWITCH: status of the 5th speed switch of the pump.

HYDRO SPEED REQ.: status of the hydro speed request of the pump.

VOLTAGE BOOSTER: this is the booster of the voltage supplied to the motor in load condition; it is expressed in a percentage of the full voltage.

BATTERY VOLTAGE: level of battery voltage measured at the input to the key switch.

COS FI: this is the $\cos \phi$ (real time calculated) of the motor.

BATTERY CURRENT: this is the battery current (not measured but calculated).

BATTERY CHARGE: the percentage Charge level of the battery.

ALARMS FUNCTIONS**TRACTION UNIT AC3T**

- 1 FLASH =** Logic defect.(EEPROM DATA KO, EEPROM PAR KO, EEPROM CONF. KO, EEPROM OFF-LINE, CHOPPER NO CONF, WATCH- DOG) - Replace the Unit logic AC3T.
- 2 FLASHES =** Incorrect sequence by starting. (INCORRECT START, HANDBRAKE, FORW+BACK) check:
 - Microswitch for forward/Backward directions and relevant wires
 - Microswitch for parking brake and relevant wires
- 3 FLASHES =** Failure on the VMN test. (VMN LOW, VMN HIGH, CAPACITOR CHARGE) check:
 - Motor isolation and relevant cables
 - Unit logic AC3T.
- 4 FLASHES =** Failure on the acceleration potentiometer signal at rest (VACC NOT OK, PEDAL WIRE NOT OK) check:
 - Traction potentiometer (could be damaged or not correctly calibrated)
 - Traction potentiometer wiring.
- 5 FLASHES =** Failure on the current sensor (STBY I HIGH, I=0 EVER) replace the Unit logic AC3T.
- 6 FLASHES =** Failure on the contactor driver. (COIL SHORTED, DRIVER SHORTED, CONTACTOR DRIVER, CONTACTOR OPEN) check:
 - Main contactors coils and relevant wirings;
 AUX OUTPUT KO Replace the Unit logic AC3T
- 7 FLASHES =** The temperature of the Unit logic AC3T exceeds 75°C. The maximum current is reduced proportionally to the temperature increase. The chopper stops at 85°C. (HIGH TEMPERATURE, THERMIC SENSOR) If the alarm appears in cold conditions, replace Unit logic AC3T.
- 8 FLASHES =** failure detection from can-bus ("WAITING PUMP", "CAN-BUS KO"). check:
 - the wires connected between the two Units logic traction and lifting.
 - Replace the Unit logic AC3T
- LONG FLASHES =** Discharge battery ("LOW BATTERY")

4,0 - 4,5 - 5,0 t A.C. VERSION	<h1>SERVICE MANUAL</h1>	Electric
page 62		

LIFTING UNIT AC3P

- 1 FLASH =** Logic defect.(WATCH- DOG, EEPROM KO, LOGIC FAILURE # 1, LOGIC FAILURE # 2, LOGIC FAILURE # 3) - Replace the Unit logic AC3P.
- 2 FLASHES =** Incorrect sequence by starting. (INCORRECT START) check:
- Microswitches of the control valve and relevant wires
- 3 FLASHES =** Failure on the VMN test. (VMN LOW, VMN HIGH, CAPACITOR CHARGE) check:
- Motor isolation and relevant cables
- Unit logic AC3P.
- 4 FLASHES =** Failure on the lifting potentiometer signal at rest (VACC NOT OK, PEDAL WIRE NOT OK) check:
- Lifting potentiometer (could be damaged or not correctly calibrated)
- Lifting potentiometer wiring.
- 5 FLASHES =** Failure on the current sensor (STBY I HIGH, I= 0 EVER)
replace the Unit logic AC3P.
- 6 FLASHES =** Logic defect. (COIL SHORTED, DRIVER SHORTED, CONTACTOR DRIVER, CONTACTOR OPEN). Replace the Unit logic AC3P.
- 7 FLASHES =** The temperature of the Unit logic AC3P exceeds 75°C. The maximum current is reduced proportionally to the temperature increase. The chopper stops at 85°C. (HIGH TEMPERATURE, THERMIC SENSOR KO) If the alarm appears in cold conditions, replace Unit logic AC3P.
- 8 FLASHES =** failure detection from can-bus ("WAITING TRACTION", "CAN-BUS KO").
check:
- the wires connected between the two Units logic traction and lifting.
- Replace the Unit logic AC3P
- LONG FLASHES =** Discharge battery ("LOW BATTERY")

PARAMETER SETTING TABLE

TRACTION UNIT AC3T

PARAMETER	PROGRAMMED LEVEL										
	UNIT	0	1	2	3	4	5	6	7	8	9
ACCELERATION DELAY (*)	SEC	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
RELEASE BRAKING (**)	SEC	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
INVERS BRAKING (**)	SEC	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
PEDAL BRAKING (**)	SEC	5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
SPEED LIMIT BRAKING (**)	SEC	8.9	8.3	7.7	7.1	6.6	6.0	5.5	4.9	4.4	3.8
BRAKE CUTBACK (**)	SEC	8.9	8.3	7.7	7.1	6.6	6.0	5.5	4.9	4.4	3.8
MAX SPEED FW	HZ	45	50	55	60	65	70	75	80	85	90
MAX SPEED BW	HZ	45	50	55	60	65	70	75	80	85	90
CUTBACK SPEED	% MAX SPEED	10	20	30	40	50	60	70	80	90	100
FREQUENCY CREEP	HZ	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
MAXIMUM CURRENT	% I MAX	47	53	58	64	70	76	82	88	94	100
BACKING SPEED	HZ	0	2	4	6	8	10	12	14	16	18
BACKING TIME	SEC	0.2	0.5	1.0	1.4	1.8	2.3	2.7	3.1	3.6	4.0
AUXILIARY TIME	SEC	0	0.4	0.8	1.6	2.0	3.0	4.0	6.0	8.0	10.0

(*) The acceleration time shown is the time from 0 Hz to 100 Hz. This is the ideal ramp calculated by the software; the real ramp could change as a function of motor control parameter setting and, obviously, as a function of the load.

(**) The braking feature is based upon deceleration ramps. The value shown in the table is the time to decrease the speed from 100 Hz to 0 Hz. This is the ideal ramps calculated by the software; the real ramp could change as a function of motor control parameter setting and, obviously, as a function of the load.

LIFTING UNIT AC3P

PARAMETER	UNIT	PROGRAMMED LEVEL									
		0	1	2	3	4	5	6	7	8	9
ACCEL. DELAY (*)	Sec.	0.5	0.7	1.0	1.4	1.9	2.5	3.2	4.0	4.8	5.5
DECEL. DELAY (**)	Sec.	0.5	0.7	1.0	1.4	1.9	2.5	3.2	4.0	4.8	5.5
MAX SPEED UP	Hz	65	80	95	110	125	140	155	170	185	200
MIN SPEED UP	Hz	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5
SPEED FINE (ALL) (***)	Hz	-	-	-	-	-	-	-	-	-	-
MAX CURRENT	% IMAX	47	53	58	64	70	76	82	88	94	100
AUXILIARY TIME	Sec	0	0.2	0.4	0.8	1.0	1.5	2.0	3.0	4.0	5.0

- (*) The acceleration time shown is the time from 0 Hz to 100 Hz (maximum selectable speed). This is the ideal ramp calculated by the software; the real ramp could change as a function of motor control parameter setting and, obviously, as a function of the load.
- (**) The deceleration time shown in the table is the time from 100 Hz to 0 Hz. This is the ideal ramp calculated by the software; the real ramp could change as a function of motor control parameter setting and, obviously, as a function of the load.
- (***) Adjustable with a 1 Hz resolution in the 0 to 200 Hz range.



Cargo Range

CESAB S.p.A

via Persicetana Vecchia, 10 40132 Bologna -
Italy

Tel. (0039) 051.20 54 11

Fax (0039) 051.72 80 07

E-mail: cesab@cesab.it



CONSOLE MAP



DIAGRAM FOR USING THE CONSOLE FOR UNIT AC3P

1-CONNECT THE CONSOLE TO MODULE AC3P
2-TURN THE KEY ON

CBE 4.0-5.0 LIFTING AC Power

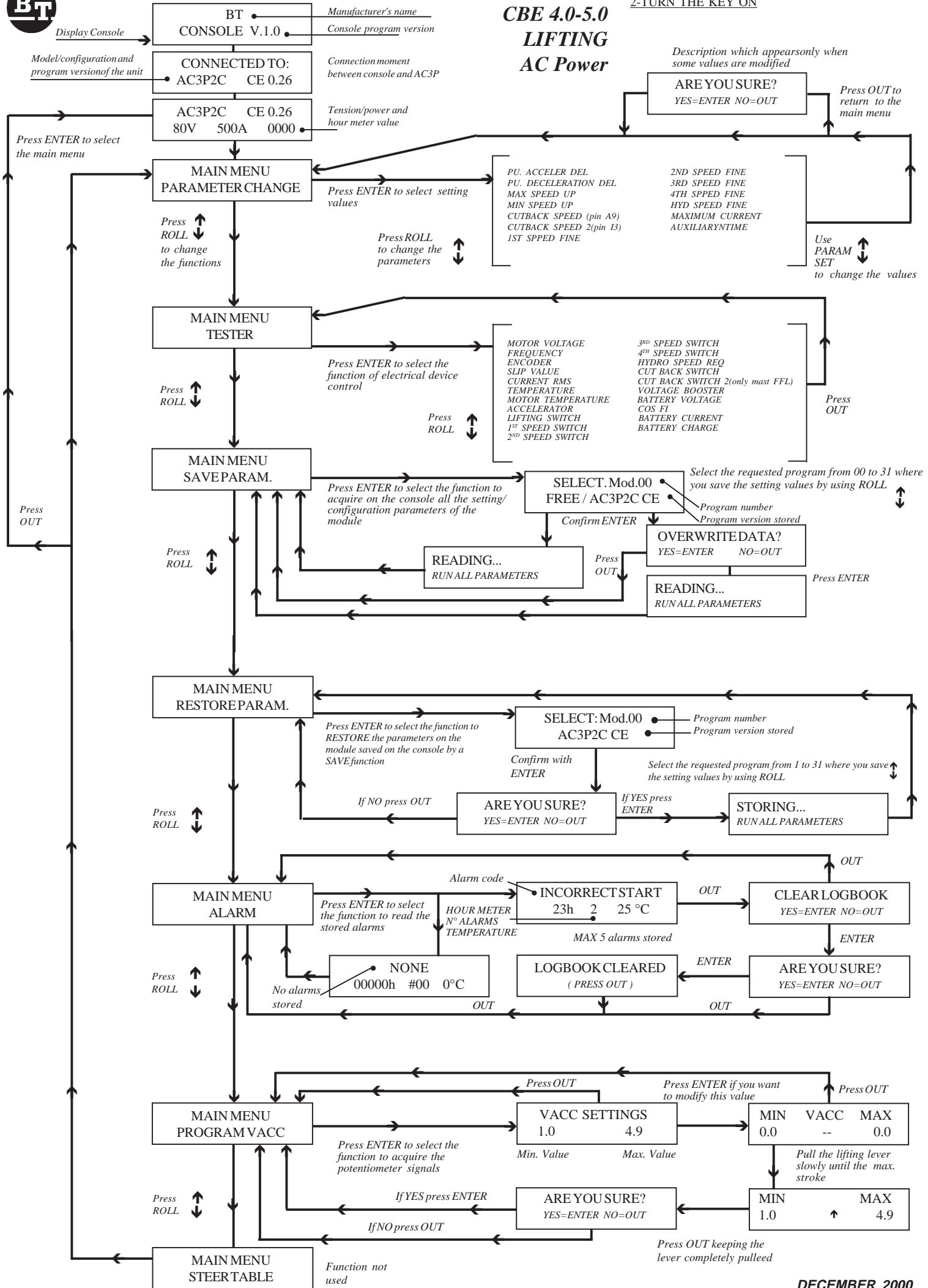
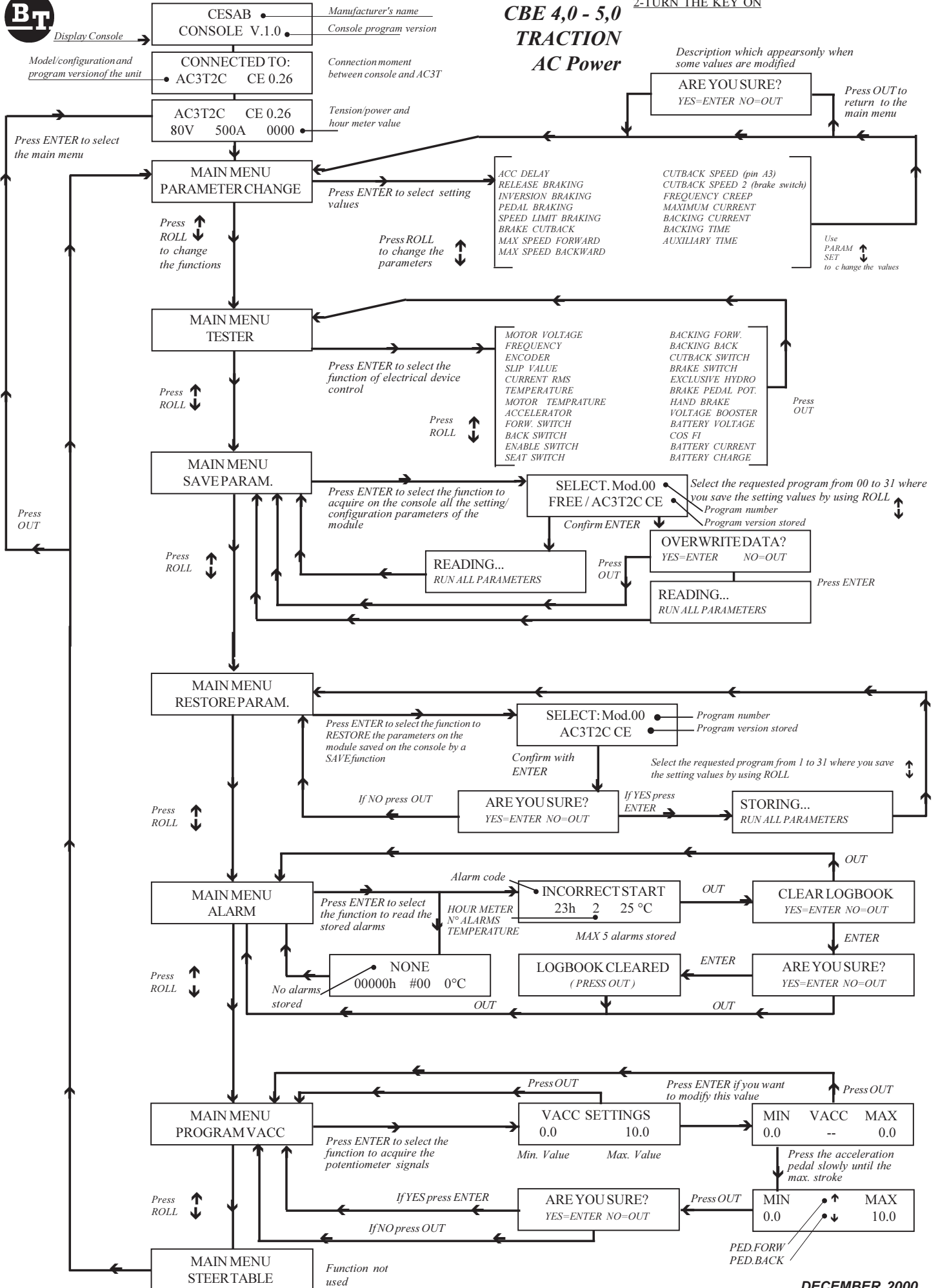




DIAGRAM FOR USING THE CONSOLE FOR UNIT AC3T

1-CONNECT THE CONSOLE TO MODULE AC3T
2-TURN THE KEY ON





PARAMETER



CBE 4,0 - 5,0

AC Power

SETTING VALUE

LIFTING MODULE AC3P

<i>PARAMETERS</i>	<i>DESCRIPTION</i>	<i>VALUE</i>		
		<i>min.</i>	<i>max</i>	<i>std</i>
PU.ACCELERDEL	determines the acceleration ramp	3	3	3
PU.DECCELERATIONDEL	determines the deceleration ramp	0	0	0
MAX SPEED UP	determines the maximum lifting speed with a potentiometer control	18Hz	95Hz	95Hz
MIN SPEED UP	determines the minimum lifting speed with a potentiometer control when the lifting enable switch is closed	18Hz	18Hz	18Hz
CUTBACKSPEED	speed reduction when the cutback switch is active (Pin A9) Signal active low (switch open)	18Hz	100Hz	100Hz
CUTBACKSPEED 2	speed reduction when the cutback switch is active (Pin I7) used for FFL mast	18Hz	50Hz	30Hz
1ST SPEED FINE	tilting speed, fine regulation	18Hz	42Hz	34Hz
2ND SPEED FINE	side-shift speed, fine regulation	18Hz	-	24Hz
3RD SPEED FINE	4 th lever speed, fine regulation	18Hz	-	18Hz
4TH SPEED FINE	5 th lever speed, fine regulation	18Hz	-	24Hz
HYD SPEED FINE	hydro speed, fine regulation	18Hz	27Hz	22Hz
MAXIMUM CURRENT	the maximum current of the inverter	0	9	9
AUXILIARY TIME	time delay when an hydraulic steering function request is switched off	3,0	5,0	3,0



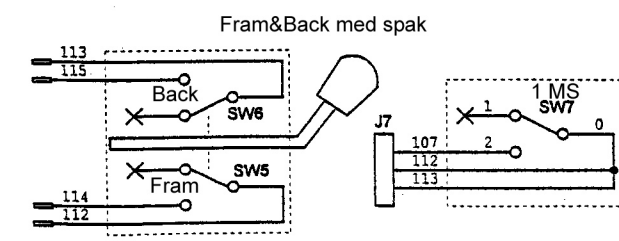
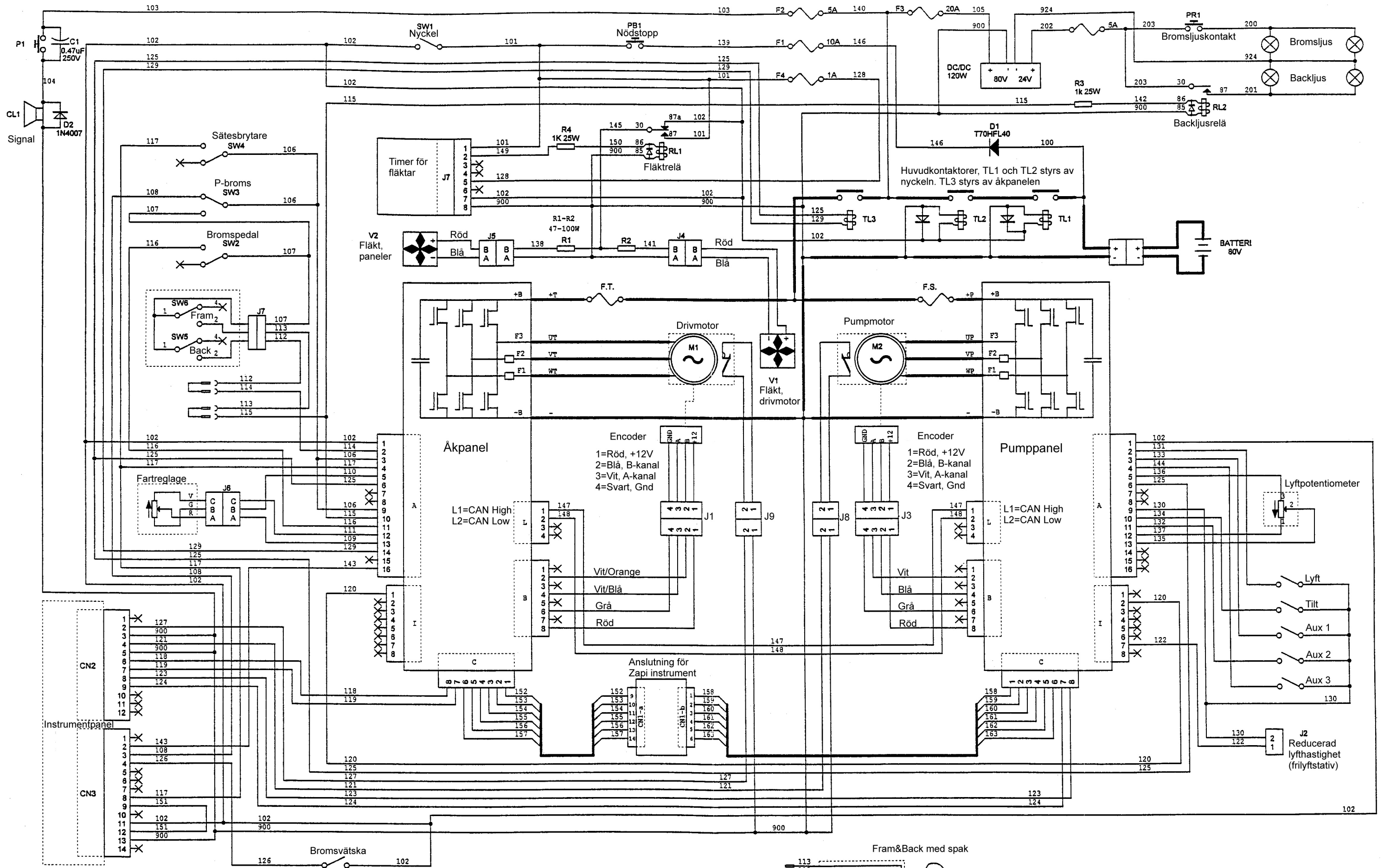
CBE 4,0 - 5,0

AC Power

SETTING VALUE

TRACTION MODULE AC3T

<i>PARAMETERS</i>	<i>DESCRIPTION</i>	<i>VALUE</i>		
		<i>min.</i>	<i>max</i>	<i>std</i>
ACCDELAY	determines the acceleration ramp	6	9	8
RELEASE BRAKING	controls the deceleration ramp when the travel request is released	3	8	5
INVERSION BRAKING	controls the deceleration ramp when the direction switch is inverted during travel	3	8	5
PEDAL BRAKING	determines the deceleration ramp when the travel request is released and the brake pedal switch is closed	3	8	4
SPEED LIMIT BRAKING	deceleration ramp when the pedal position is changed but not completely released	1	5	1
BRAKE CUTBACK	determines the speed reduction when the brake switch input becomes active.	0	9	5
MAX SPEED FORWARD	determines the maximum speed in forward direction	0,60Hz	80Hz	80Hz
MAX SPEED BACKWARD	determines the maximum speed in backward direction	0,60Hz	80Hz	80Hz
CUTBACK SPEED	speed reduction when the cutback switch is active (Pin A3)	10%	100%	100%
CUTBACK SPEED 2	speed reduction when the brake switch is active	10%	50%	20%
FREQUENCY CREEP	minimum speed when the forward or reverse switch is closed, but the accelerator is on a minimum position	0,60Hz	0,60Hz	0,60Hz
MAXIMUM CURRENT	this changes the maximum current of the inverter	0	9	9
BACKING SPEED	not used			
BACKING TIME	not used			
AUXILIARY TIME	not used			



CBE 40-50 AC

LEGEND

DESCRIPTION	ENGLISH	DEUTSCH	FRANCAIS	ESPAÑOL
4' via	4th valve	4.Steuerkreis	4.ème levier	4a.leva
5' via	5th valve	5.Steuerkreis	5.ème levier	5a.leva
abilitazione attiva	enable on	Freigabe ein	abilitation activée	habilitación activada
abilitazione freni	brakes enable	Bremsenfreigabe	abilitation des freins	habilitación de los frenos
abilitazione parcheggio	parking enable	Festellfreigabe	abilitation de stationnement	habilitación de aparcamiento
acceleratore	accelerator pedal	Fahrpedal	pédale accélérateur	pedal acelerador
alternatore	alternator	Lichtmaschine	alternateur	alternador
anomalia centralina	logic unit defect	Logikeinheitdefekt	anomalie d'unité logique	anomalía unidad lógica
attuatore	actuator	Aktuator	actionneur	actuador
arresto motore	motor stop	Motorstop	arrêt du moteur	parada del motor
batteria	battery	Batterie	batterie	batería
bobina	coil	Spule	bobine	bobina
brandeggio	tilting	Neigung	inclinaison	inclinación
candele	spark plugs	Zündkerzen	bougies d'allumage	bujías
candeleto	glow plugs	Glühkerzen	bougies de chauffage	bu jías incandescente
chiave	key	Schlüssel	clé	llave
chiave avviamento	start key	Anlaßschlüssel	clé de démarrage	llave de arranque
clacson	horn	Hupe	klaxon	claxon
comandi luci supplem.	additional lights controls	Zusatzbeleuchtungssteuerung	commandes lumières suppl.	mandos luces adicionales
comando elettroventola	electric fan control	Elektroflügelsteuerung	commande électro-ventilateur	mando electroventilador
comando fanali stop	stop lights control	Stoplichtsteuerung	commande feus de stop	mando faroles de stop
conn.batteria	battery connector	Batteriestecker	connecteur batterie	enchufe batería
cruscotto	dashboard	Armaturenbrett	panneau de commande	salpicadero
dispositivo candeleto	glow plugs device	Glühkerzevorrichtung	dispositif bougie de chauffage	dispositivo bujia incandescente
elettrovalvole marcia	speed electrovalves	Gangelektroventile	electrovannes de marche	electroválvulas de marcha
elettroventola	electric fan	Elektroflügelrad	électro-ventilateur	electroventilador
emergenza	emergency	Notstand	urgence	emergencia
fanali retromarcia	reversing lights	Rückfahrcheinwerfer	feus de marche arrière	faroles de marcha atras
fanali stop	stop lights	Stoplichte	feus de stop	faroles de stop
freno	brake	Bremse	frein	freno
freno pedale	pedal brake	Bremspedal	frein pédale	freno pedal
freno stazionamento	parking brake	Festellbremse	frein de stationnement	freno de aparcamiento
indicatore riserva gas	LPG reserve indicator	GPL Reserveanzeiger	indicateur réserve GPL	indicador reserva GPL

LEGEND

DESCRIPTION	ENGLISH	DEUTSCH	FRANCAIS	ESPAÑOL
indicatore temperatura ac	water temperature indicator	Wassertemperaturanzeiger	indicateur temperature de l'ea	indicador temperatura del agua
intas.filtro aria	air filter clogging	Luftfilterverstopfung	encrassement filtre à air	obstrucción filtro aire
intas.filtro olio	oil filter clogging	Ölfilterverstopfung	encrassement filtre huile	obstrucció filtro aceite
intas.filtro olio idraul.	hydraulic oil filter clogging	Hydraulikölfilterverstopfung	encrassement filtre huile hydr.	obstrucción filtro aceite hidr.
inversore	inversor lever	Umschaltung	inverseur de direction	palanca de inversión
inversore manuale	drive direction lever	Handumschaltung	inverseur de direction	palanca de inversión
livello carburante	fuel level	Treibstoffstand	niveau carburant	nivel carburante
liv.liquido freni	brake fluid level	Bremsflüssigkeitsstand	jauge d'huile de freins	nivel aceite frenos
luci posteriori	back lights	Rücklichte	lumières arrières	luces traseras
luci retromarcia	reversing lamps	Rückfahrlampen	ampoule marche arrière	lampara de marcha atrás
marcia avanti	forward speed	Vorwärtsgang	marche avant	marcha adelante
marcia indietro	backward speed	Rückwärtsgang	marche arrière	marcha atrás
marcia lenta	slow speed	langsamer Gang	marche lente	marcha lenta
mot.trazione	traction motor	Fahrmotor	moteur de traction	motor de tracción
motore avviamento	starter motor	Anlaßmotor	démarrreur	motor de arranque
motore idroguida	power steering motor	Hydrolenkungsmotor	moteur direction assistée	motor servodirección
motore pompa	pump motor	Pumpenmotor	moteur pompe	motor bomba
pedale freno	brake pedal	Bremsepedal	pédale du frein	pedal del freno
pedaliera	pedals	Pedale	jeu de pédales	juego de pedales
pedaliera doppia	double pedals	Doppelpedal	pédales double	pedales doble
pompa	pump	Pumpe	pompe	bomba
pompa iniezione	injection pump	Einspritzungspumpe	pompe d'injection	bomba inyección
post combustione	afterburning	Nachverbrennung	postcombustion	postcombustión
potenziometro sollev.	lifting potentiometer	Hubpotentiometer	potentiomètre d'élévation	potenciómetro levantamiento
pressione olio motore	motor oil pressure	Ölmotordruck	pression d'huile moteur	presión aceite motor
pressostato freni	brakes press.switch	Bremsdruckschalter	pressostat freins	presóstato frenos
pulsante clacson	horn push button	Hupeknopf	poussoir klaxon	pulsador de claxon
pulsante emergenza	emergency.pushbutton	Notdruckknopf	poussoir d'urgence	pulsador de emergencia
relè avviamento	starter relay	Anlaßrelais	relais démarrage	relé arranque
riserva gas	LPG reserve	GPL Reserve	réserve GPL	reserva GPL
scatola acc.	speed box	Fahrschalter	boitier du vitesse	caja aceleradores
sensore velocità'	speed sensor	Geschwindigkeitssensor	senseur de vitesse	sensor de velocidad
sollevamento	lifting	Hub	élévation	levantamiento
spia candele	glow plugs warning light	Glühkerzenwarnlampe	voyant bougies de chauffage	luz testigo bujías incandescen.

LEGEND

DESCRIPTION

SW cofano
temp.olio trasmis.
temperatura acqua
termico
traslatore
uomo presente
ventola motore
ventole
vista posteriore

ENGLISH

bonnet switch
oil temperature transmission
water temperature
thermal sensor
sideshift
deadman device
motor fan
fan
rear view

DEUTSCH

Schutzhaubeschalter
Öltemperaturgetriebe
Wassertemperatur
Wärmesensor
Seitenschieber
Totmann-schalter
Motorflügel
Flügelräder
Rücksicht

FRANCAIS

interrupteur coffre
temperature d'huile transmis.
temperature d'eau
senseur thermique
déplacement lateral
Homme mort
ventilateur moteur
ventilateur
vue arrière

ESPAÑOL

interruptor cofre
temperatura aceite transmisión
temperatura agua
sensor térmico
desplazador lateral
conductor presente
motor ventilador
ventilador
vista rasera

COLORI

arancio
azzurro
bianco
blu
giallo
grigio
marrone
nero
rosa
rosso
verde
viola

COLOURS

orange
blue
white
dark blue
yellow
grey
brown
black
pink
red
green
purple

FARBEN

Orange
Hellblau
Weiß
Blau
Gelb
Grau
Braun
Schwarz
Rose
Rot
Grün
Violett

COULEURS

orange
bleu
blanc
bleu
jaune
gris
marron
noir
rose
rouge
vert
violet

COLORES

anaranjado
azul
blanco
azul
amarillo
gris
marron
negro
rosa
rojo
verde
violeta