KOBELCO

ACERA GEOSPEC

SERVICEMAN HANDBOOK

SK140LC-8	YP09-05001~
SK200-8	YN11-45001~
SK210LC-8	YQ11-06001~
SK250-8	LQ12-06001~
SK260LC-8	LL12-05001~
SK330-8	LC10-07001~
SK350LC-8	YC10-03501~
SK460-8	LS10-02001~
SK480LC-8	YS10-01501~

KOBELCO CONSTRUCTION MACHINERY CO., LTD.

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1. MACHINE SPECIFICATIONS

2. MAINTENANCE

4. MECHATRO CONTROL SYSTEM

5. ATTACHMENT DIMENSIONS

6. DIFFERENTIAL MATERIAL

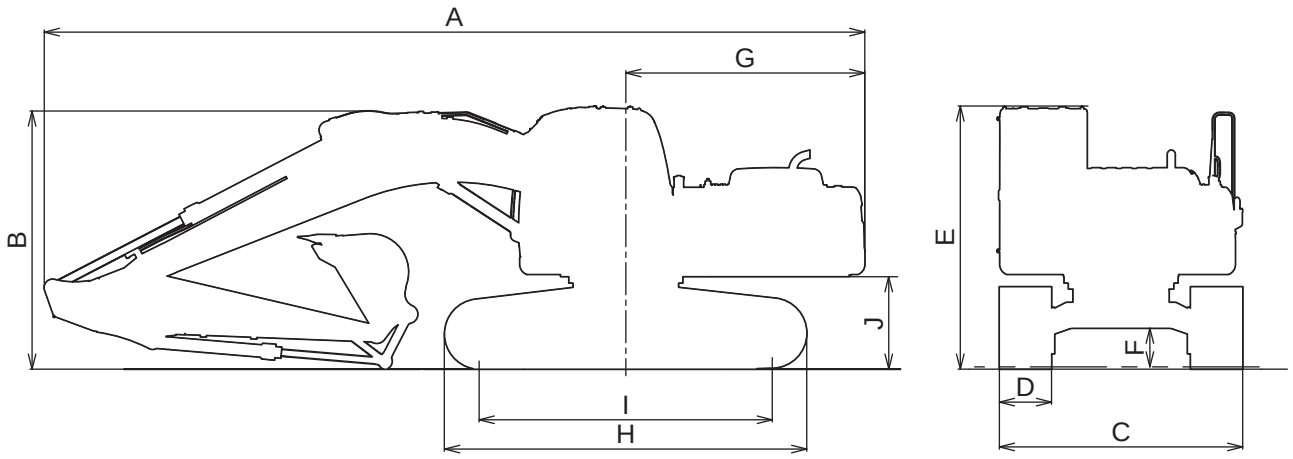
1. MACHINE SPECIFICATIONS

1.1 GENERAL DIMENSIONS

Unit: mm(ft-in)

Item / Model	A	B	C	D	E	F	G	H	I	J
SK140LC-8	7,790 (25'7")	2,710 (8'11")	2,490 (8'2")	500 (19.7")	2,870 (9'5")	440* (17.5")	2,180 (7'2")	3,750 (12'4")	3,040 (10')	910* (35.8")
SK200-8	9,450 (31')	2,980 (9'9.3")	2,800 (9'2.2")	600 (23.6")	3,030 (9'11.3")	450* (17.7")	2,750 (9'0.3")	4,170 (13'8.2")	3,370 (11'0.7")	1,060* (3'5.7")
SK210LC-8			2,990 (9'9.7")					4,450 (14'7.2")	3,660 (12'0.1")	
SK250-8	10,120 (33'2.4")	3,200 (10'6")	2,990 (9'9.7")	600 (23.6")	3,060 (10'0.5")	460* (18.1")	3,020 (9'10.9")	4,260 (13'11.7")	3,470 (11'4.6")	1,090* (3'6.9")
SK260LC-8			3,190 (10'5.6")					4,640 (15'2.7")	3,850 (12'7.6")	
SK330-8	11,200 (36'8.9")	3,420 (11'2.6")	3,200 (10'6")	600 (23.6")	3,160 (10'4.4")	500* (19.7")	3,500 (11'5.8")	4,650 (15'3.1")	3,730 (12'2.9")	1,190* (3'10.9")
SK350LC-8								4,980 (16'4.1")	4,050 (13'3.4")	
SK460-8	12,030 (39'6")	3,570 (11'9")	3,350 (10'12")	600 (23.6")	3,310 (10'10")	510* (20.1")	3,670 (12'0.5")	5,110 (16'9")	4,460 (13'3.8")	1,340* (4'5")
SK480LC-8								5,450 (17'11")	4,400 (14'5.2")	

* Marked dimensions are not included height of shoe lug.



IMPORTANT

The "GENERAL DIMENSIONS" are described the standard machine that the boom and the arm are installed.

1.2 SPECIFICATIONS AND PERFORMANCE

SK140LC-8

SPEED AND CLIMBING CAPABILITY

Item \ Model		SK140LC-8
Swing speed	min^{-1} {rpm}	11 {11}
Travel speed (1-speed/2-speed)	km/h (mile/h)	3.4 / 5.6 (2.1 / 3.5)
Gradeability	% (degree)	70 (35)

ENGINE

Engine model	MITSUBISHI D04FR-74kW
Type	Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger
Number of cylinders—Bore×Stroke	4 -ø102 mm × 130 mm (4.02 in × 5.12 in)
Total displacement	4.249 L (259.27 cu•in)
Rated output / Engine speed	69.2 kW (94 PS) / 2,000 min^{-1}
Maximum torque / Engine speed	375 N•m (277 lbf•ft)/ 1,600 min^{-1}
Starter	24 V / 5.0kW
Alternator	24 V / 50A

HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston pump × 2 + gear pump × 1
Hydraulic motor (swing)	Axial piston motor × 1
Hydraulic motor (travel)	Variable displacement axial piston motor × 2 (with counterbalance valve)
Control valve	8-spool control valve × 1
Cylinder (Boom, Arm, Bucket)	Double action cylinder
Oil cooler	Air-cooled type

WEIGHT

Unit : kg (lbs)

Fully equipped weight	13,000 (28,665)
Upper structure	6,550 (14,440)
Lower machinery (500mm grouser shoe)	4,275 (9,430)
Attachment [STD] 4.68m (15 ft-4in) Boom+2.38m (7ft-10in) Arm +0.50m^3 (0.65cu•yd) Bucket	2,347 (5,175)
Attachment 4.68m (15 ft-4in) Boom+2.38m (7ft-10in) Arm +0.57m^3 (0.75cu•yd) Bucket	2,367 (5,220)

SK200-8

SPEED AND CLIMBING CAPABILITY

Item \ Area & Model		SK200 - 8	SK210LC - 8
Swing speed	min^{-1}	12.5	
Travel speed (1-speed/2-speed)	km/h (mile/h)	3.6 / 6.0 (2.2 / 3.7)	
Gradeability	% (degree)	70 (35)	

ENGINE

Engine model	HINO J05E-TA
Type	Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger
Number of cylinders—Bore×Stroke	4 -ø112 mm × 130 mm (4.41 in × 5.12 in)
Total displacement	5.123 L (312.61 cu•in)
Rated output / Engine speed	114 kW (155 PS) / 2,000 min^{-1}
Maximum torque / Engine speed	572 N•m (422 lbf•ft)/ 1,600 min^{-1}
Starter	24 V / 5.0kW
Alternator	24 V / 50A

HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston pump × 2 + gear pump × 1
Hydraulic motor (swing)	Axial piston motor × 1
Hydraulic motor (travel)	Variable displacement axial piston motor × 2 (with counterbalance valve)
Control valve	8-spool control valve × 1
Cylinder (Boom, Arm, Bucket)	Double action cylinder
Oil cooler	Air-cooled type

WEIGHT

Unit : kg (lbs)

Fully equipped weight	20,200 (44,500)	20,600 (45,400)
Upper structure	9,500 (21,000)	←
Lower machinery (600mm grouser shoe)	6,730 (14,840)	7,130 (15,720)
Attachment 5.65m (18 ft-6in) Boom+2.94m (9ft-8in) Arm +0.80m^3 (1.05cu•yd) Bucket	3,420 (7,540)	←

SK250-8

SPEED AND CLIMBING CAPABILITY

Item \ Area & Model		SK250 - 8	SK260LC - 8
Swing speed	min^{-1}	11.0	
Travel speed (1-speed/2-speed)	km/h (mile/h)	3.6 / 5.8 (2.2 / 3.6)	
Gradeability	% (degree)	70 (35)	

ENGINE

Engine model	HINO J05E-TB
Type	Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger
Number of cylinders—Bore×Stroke	4 -ø112 mm × 130 mm (4.41 in × 5.12 in)
Total displacement	5.123 L (312.61 cu•in)
Rated output / Engine speed	131 kW (178 PS) / 2,100 min^{-1}
Maximum torque / Engine speed	654 N•m (482 lbf•ft)/ 1,600 min^{-1}
Starter	24 V / 5.0kW
Alternator	24 V / 50A

HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston pump × 2 + gear pump × 1
Hydraulic motor (swing)	Axial piston motor × 1
Hydraulic motor (travel)	Variable displacement axial piston motor × 2 (with counterbalance valve)
Control valve	8-spool control valve × 1
Cylinder (Boom, Arm, Bucket)	Double action cylinder
Oil cooler	Air-cooled type

WEIGHT

Unit : kg (lbs)

Fully equipped weight	24,400 (53,800)	24,900 (54,900)
Upper structure	11,380 (25,100)	←
Lower machinery (600mm grouser shoe)	7,900 (17,420)	8,400 (18,520)
Attachment 6.02m (19 ft-9in) Boom+2.98m (9ft-9in) Arm +1.0m^3 (1.3cu•yd) Bucket	5,120 (11,300)	←

SK330-8

SPEED AND CLIMBING CAPABILITY

Item \ Area & Model		SK330-8	SK350LC-8
Swing speed	min^{-1}	10.0	
Travel speed (1-speed/2-speed)	km/h (mile/h)	3.3 / 5.6 (2.05 / 3.5)	
Gradeability	% (degree)	70 (35)	

ENGINE

Engine model	HINO J08E-TM
Type	Water-cooled, 4-cycle direct injection type engine with inter cooler turbo charger
Number of cylinders—Bore×Stroke	6 -ø112 mm × 130 mm (4.41 in × 5.12 in)
Total displacement	7.684 L (468.9 cu•in)
Rated output / Engine speed	197 kW (268 PS) / 2,100 min^{-1}
Maximum torque / Engine speed	998 N•m (736 lbf•ft)/ 1,600 min^{-1}
Starter	24 V / 5.0kW
Alternator	24 V / 60A

HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston pump × 2 + gear pump × 1
Hydraulic motor (swing)	Axial piston motor × 1
Hydraulic motor (travel)	Variable displacement axial piston motor × 2 (with counterbalance valve)
Control valve	8-spool control valve × 1
Cylinder (Boom, Arm, Bucket)	Double action cylinder
Oil cooler	Air-cooled type

WEIGHT

Unit : kg (lbs)

	SK330-8	SK350LC-8
Fully equipped weight	33,800 (74,500)	34,600 (76,300)
Upper structure	15,800 (34,840)	←
Lower machinery	11,300 (24,900)	12,000 (26,460)
Attachment 6.50m (21ft-4in) Boom+3.30m (10ft-10in) Arm +1.40m^3 (1.83cu•yd) Bucket	6,590 (14,530)	←

SK460-8

SPEED AND CLIMBING CAPABILITY

Item \ Area & Model		SK460-8	SK480LC-8
Swing speed	min^{-1} {rpm}	7.8 {7.8}	
Travel speed (1-speed/2-speed)	km/h (mile/h)	3.4 / 5.4 (2.1 / 3.4)	
Gradeability	% (degree)	70 (35)	

ENGINE

Engine model	HINO P11C-UP
Type	Water-cooled, 4 cycle 6 cylinder direct injection type diesel engine with inter cooler turbo-charger
Number of cylinders—Bore×Stroke	6 -ø122 mm × 150 mm (4.80 in × 5.91 in)
Total displacement	10.520 L (641.93 cu•in)
Rated output / Engine speed	243 kW (330 PS) / 1,850 min^{-1}
Maximum torque / Engine speed	1,400 N•m (1,033 lbf•ft)/ 1,400 min^{-1}
Starter	24 V / 6.0kW
Alternator	24 V / 60 A

HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston pump × 2 + gear pump × 1
Hydraulic motor (swing)	Axial piston motor × 1
Hydraulic motor (travel)	Variable displacement axial piston motor × 2 (with counterbalance valve)
Control valve	6-spool control valve × 1
Cylinder (Boom, Arm, Bucket)	Double action cylinder
Oil cooler	Air-cooled type

WEIGHT

Unit : kg (lbs)

Fully equipped weight	46,400 (102,310)	47,300 (104,300)
Upper structure	20,230 (44,607)	←
Lower machinery (600mm grouser shoe)	16,500 (36,382)	17,200 (37,926)
Attachment 7.00m (23 ft-0in) Boom+3.45m (11ft-4in) Arm +1.9m^3 (2.48cu•yd) Bucket	9,820 (21,653)	←

1.3 ENGINE SPECIFICATIONS

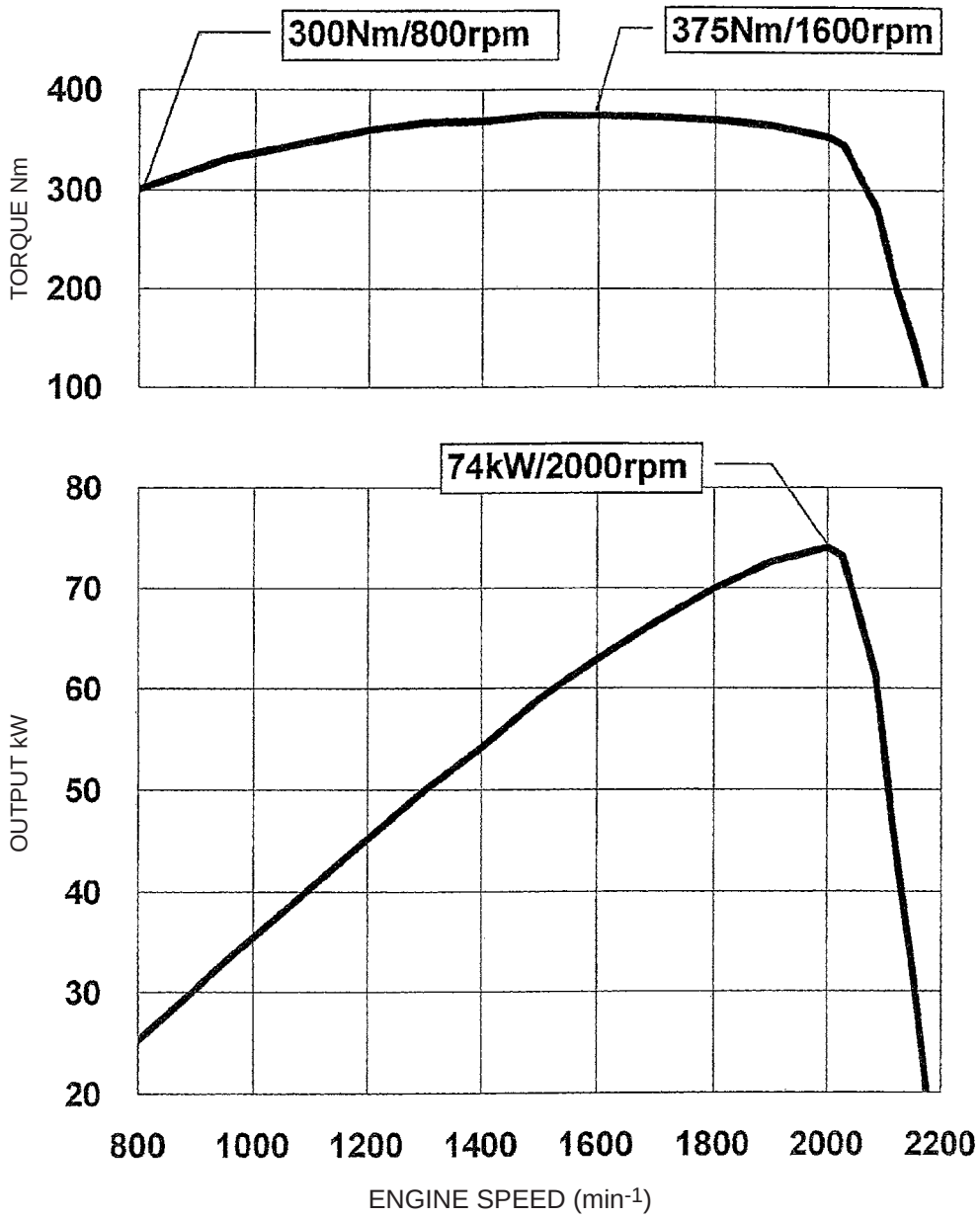
SK140LC-8

SPECIFICATIONS

Applicable machine		SK140LC-8
Engine model		MITSUBISHI D04FR-74kW
Type		Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger
Number of cylinder×Bore×Stroke	mm (in)	4 × 102 × 130 (4.02 × 5.12)
Total displacement	cc (cu•in)	4,249 (259.27)
Compression ratio		17.8
Rated output	kW (PS) at min^{-1}	69.2 (94) at 2,000
Maximum torque	N•m (lb•ft) at min^{-1}	375 (277) at 1,600
High idling	min^{-1}	2,240 ± 20
Low idling	min^{-1}	1,015 ± 20
Injection starting pressure	MPa (psi)	—
Thermostat action	Start/Full open K (°F)	344 (160) / 358 (185)
Firing order		1 - 3 - 4 - 2
Starter capacity	V × kW	24 × 5.0
Generator capacity (Alternator)	V × A	24 × 50
Cooling fan drive method		ø600 (23.6") × suction type 6 fans, V-belt drive, pulley ratio Crank / Fan= 1.0
Engine oil quantity	L (gal)	Full level 17.5 (4.62) Low level 14.5 (3.83) Total 18.5 (4.89)
Dry weight	kg (lbs)	395 (871)
Fuel consumption ratio (At rated output)	g/kW•h (g/ps•h)	233 (171)
Allowable inclination		Front / Rear and Right / Left : 35°
Dimension (L×W×H)	mm (in)	911 × 719 × 940 (35.9in × 28.3in × 37.0in)
Rotating direction		Counterclockwise seeing from flywheel side

ENGINE CHARACTERISTIC CURVE

Condition to be measured: The net value is indicated, measuring without cooling fan.



Fuel consumption volume

$$= \frac{\text{Fuel consumption rate}}{0.835 \times 1000} \times \text{kW} \times \text{Load factor } (\alpha)$$

$$= \frac{233\text{g/kW·h}}{0.835 \times 1000} \times 74\text{kW} \times \alpha$$

$$= 20.65\,\alpha \cdot \text{L/h}$$

α : Standard load factor (0.70~0.80)

Fuel consumption in regular operation (load factor 0.70~0.80)

14.5 L/h~16.5 L/h

SK200-8

SPECIFICATIONS

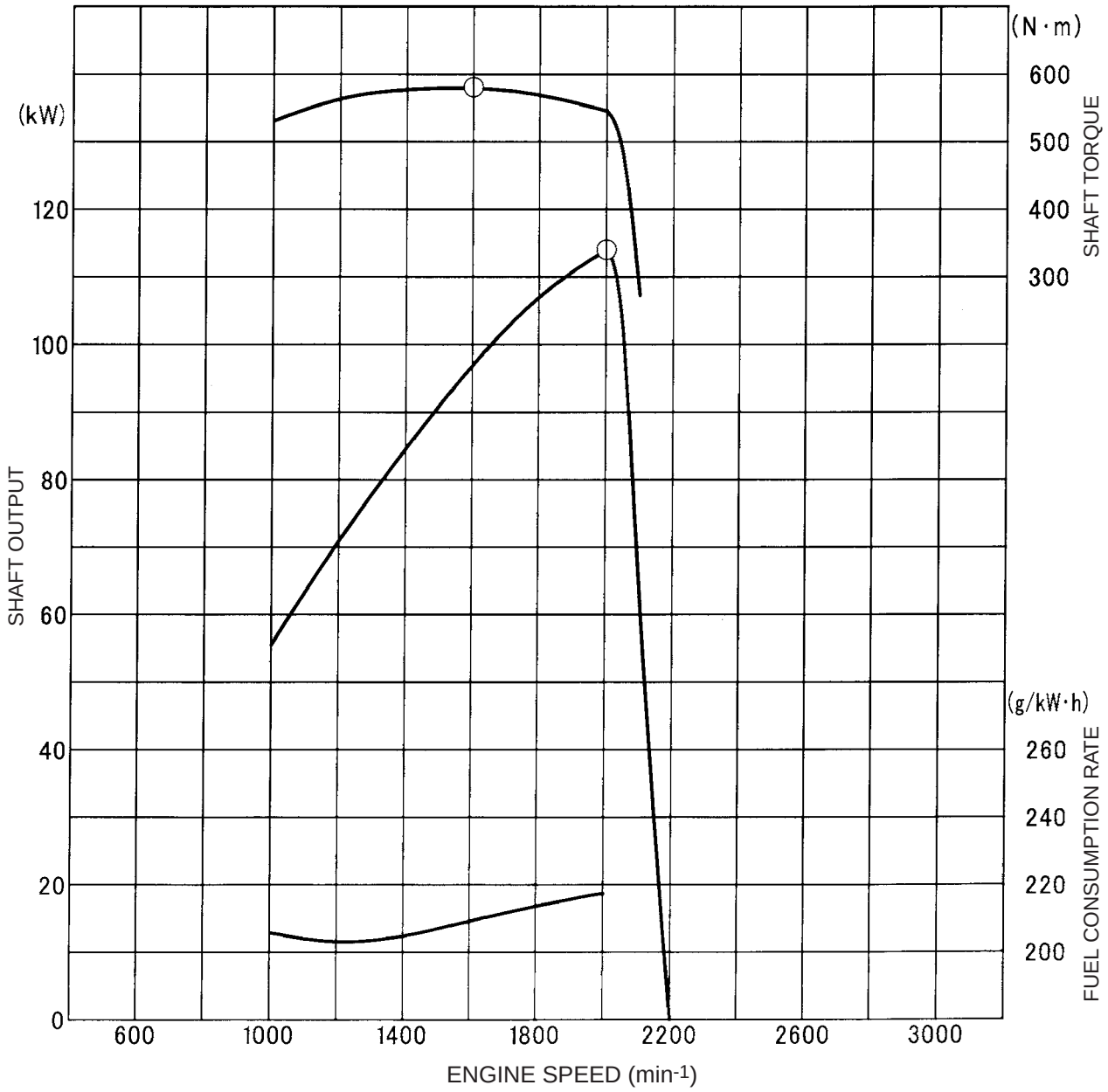
Applicable machine		SK200 - 8, SK210LC - 8		
Engine model		HINO J05E-TA		
Type		Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger		
Number of cylinder×Bore×Stroke	mm (in)	4 × 112 × 130 (4.41 × 5.12)		
Total displacement	cc (cu•in)	5,123 (313)		
Compression ratio		18.0		
Rated output	kW (PS) at min^{-1}	114 (155) at 2,000		
Maximum torque	N•m (lb•ft) at min^{-1}	572 (422) at 1,600		
High idling	min^{-1}	2,000 ± 30		
Low idling	min^{-1}	1,000 ± 30		
Injection starting pressure	MPa (psi)	3.2 (464)		
Thermostat action	Start/Full open K <°C> (°F)	350 <76.5> (170) / 363 <90> (194)		
Firing order		1 - 3 - 4 - 2		
Compression pressure	MPa (psi) at min^{-1}	3.4~3.7 (493~537) at 280		
Fuel injection timing		0° before top dead point.		
Valve clearance		Valve clearance	Open	Close
	Intake valve	0.3 mm at cool	14°before top dead point	30°after bottom dead point
	Exhaust valve	0.45 mm at cool	54°before bottom dead point	13°after top dead point
Starter capacity	V × kW	24 × 5.0		
Generator capacity (Alternator)	V × A	24 × 50		
Cooling fan drive method		ø650 (25.6") × suction type 7 fans, V-belt drive, pulley ratio Crank / Fan= 0.89		
Engine oil quantity	L (gal)	Full level 18.0 (4.76) Low level 15.0 (3.96) Total 20.5 (5.42)		
Dry weight	kg (lbs)	580 (1,280)		
Fuel consumption ratio	g/kW•h (g/ps•h)	217 (160)		
Allowable inclination (Limited by E/G lubrication)		Front / Rear and Right / Left : 35°		
Dimension (L×W×H)	mm (in)	1,063 × 725 × 995 (3ft-5.86in × 28.5in × 39.2in)		
Rotating direction		Counterclockwise seeing from flywheel side		

ENGINE CHARACTERISTIC CURVE (HINO J05E-TA)

Condition to be measured:

The net value is indicated, measuring with cooling fan; ø650 (25.6") × suction type, pulley ratio Crank/Fan = 0.89

○ marks show the rated point



Fuel consumption volume

$$= \frac{\text{Fuel consumption rate}}{0.835 \times 1000} \times \text{kW} \times \text{Load factor } (\alpha)$$

$$= \frac{217\text{g/kW·h}}{0.835 \times 1000} \times 114\text{kW} \times \alpha$$

$$= 29.6\,\alpha \cdot \text{L/h}$$

α : Standard load factor (0.70~0.80)

Fuel consumption in regular operation (load factor 0.70~0.80)

20.7 L/h~23.7 L/h

SK250-8

SPECIFICATIONS

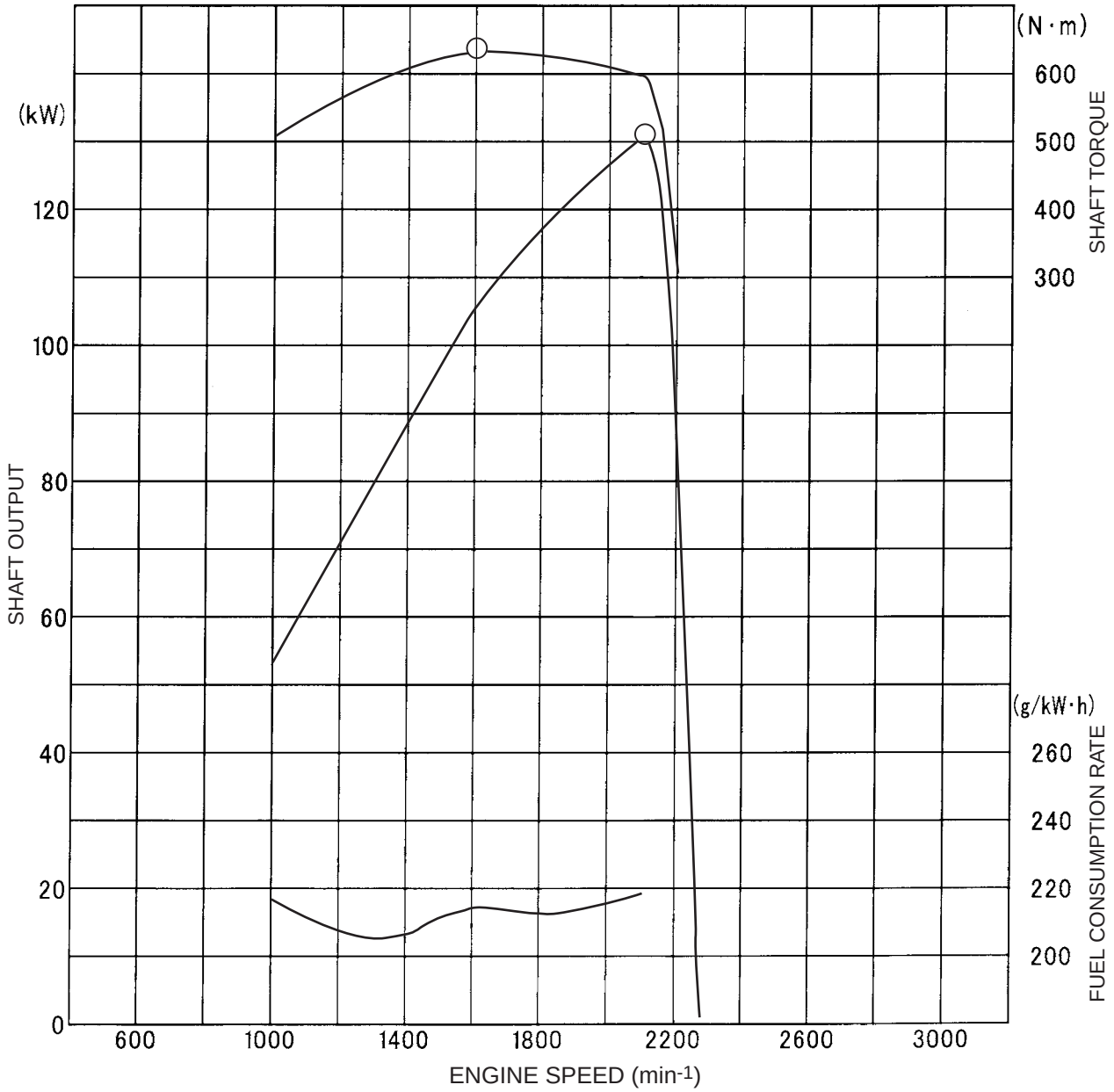
Applicable machine		SK250 - 8, SK260LC - 8		
Engine model		HINO J05E-TB		
Type		Water-cooled, 4 cycle 4 cylinder direct injection type diesel engine with inter cooler turbo-charger		
Number of cylinder×Bore×Stroke	mm (in)	4 × 112 × 130 (4.41 × 5.12)		
Total displacement	cc (cu•in)	5,123 (313)		
Compression ratio		18.0		
Rated output	kW (PS) at min^{-1}	131 (178) at 2,100		
Maximum torque	N•m (lb•ft) at min^{-1}	654 (482) at 1,600		
High idling	min^{-1}	2,100 ± 30		
Low idling	min^{-1}	1,000 ± 30		
Injection starting pressure	MPa (psi)	3.2 (464)		
Thermostat action	Start/Full open K <°C> (°F)	350 <76.5> (170) / 363 <90> (194)		
Firing order		1 - 3 - 4 - 2		
Compression pressure	MPa (psi) at min^{-1}	3.4~3.7 (493~537) at 280		
Fuel injection timing		0° before top dead point.		
Valve clearance		Valve clearance	Open	Close
	Intake valve	0.3 mm at cool	14°before top dead point	30°after bottom dead point
	Exhaust valve	0.45 mm at cool	54°before bottom dead point	13°after top dead point
Starter capacity	V × kW	24 × 5.0		
Generator capacity (Alternator)	V × A	24 × 50		
Cooling fan drive method		ø650 (25.6") × suction type 7 fans, V-belt drive, pulley ratio Crank / Fan= 0.93		
Engine oil quantity	L (gal)	Full level 18.0 (4.76) Low level 15.0 (3.96) Total 20.5 (5.42)		
Dry weight	kg (lbs)	580 (1,280)		
Fuel consumption ratio	g/kW•h (g/ps•h)	211 (156)		
Allowable inclination (Limited by E/G lubrication)		Front / Rear and Right / Left : 35°		
Dimension (L×W×H)	mm (in)	1,063 × 737 × 1,045 (3ft-5.86in × 29.0in × 3ft-5in)		
Rotating direction		Counterclockwise seeing from flywheel side		

ENGINE CHARACTERISTIC CURVE (HINO J05E-TB)

Condition to be measured:

The net value is indicated, measuring with cooling fan; ø650 (25.6") × suction type, pulley ratio Crank/Fan = 0.93

○ marks show the rated point



Fuel consumption volume

$$= \frac{\text{Fuel consumption rate X kW X Load factor } (\alpha)}{0.835 \text{ X } 1000}$$

$$= \frac{211\text{g/kW·h}}{0.835 \text{ X } 1000} \text{ X } 131\text{kW X } \alpha$$

$$= 33.1\ \alpha \cdot \text{L/h}$$

α : Standard load factor (0.70~0.80)

Fuel consumption in regular operation (load factor 0.70~0.80)

23.2 L/h~26.5 L/h

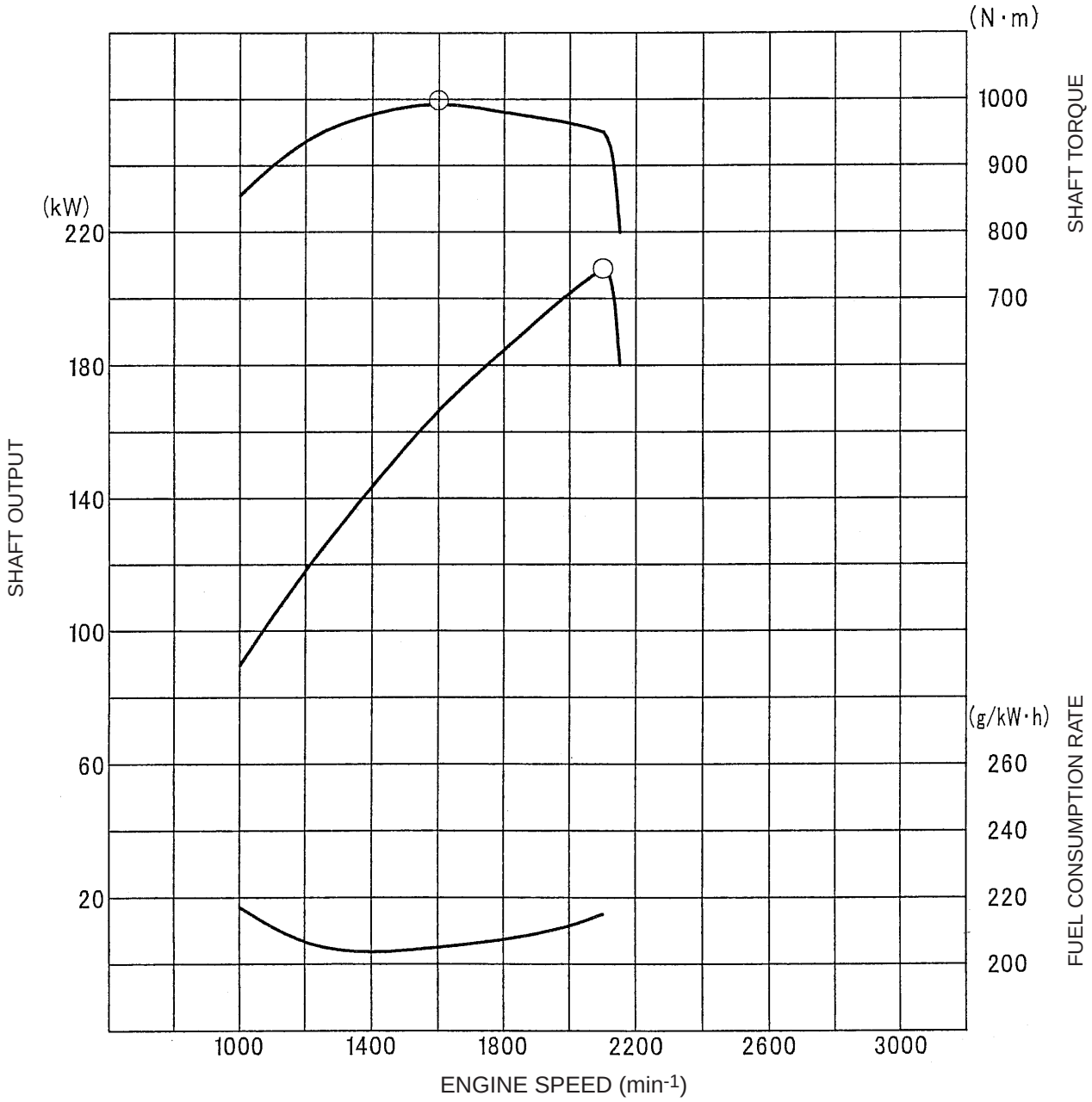
SK330-8

SPECIFICATIONS

Applicable machine		SK330-8, SK350LC-8		
Engine model		HINO J08E-TM		
Type		Water-cooled, 4 cycle 6 cylinder direct injection type diesel engine with intercooler turbo-charger		
Number of cylinder×Bore×Stroke	mm (in)	6 × 112 × 130 (4.41 × 5.12)		
Total displacement	cc (cu•in)	7,684 (469)		
Compression ratio		18.0		
Rated output	kW (PS) at min^{-1}	197 (268) at 2,100		
Maximum torque	N•m (lb•ft) at min^{-1}	998 (736) at 1,600		
High idling	min^{-1}	2,100 ± 30		
Low idling	min^{-1}	1,000 ± 30		
Injection starting pressure	MPa (psi)	3.2 (464)		
Thermostat action	Start/Full open K <°C> (°F)	350 <76.5> (170) / 363 <90> (194)		
Firing order		1 - 4 - 2 - 6 - 3 - 5		
Compression pressure	MPa (psi)at min^{-1}	3.4~3.7 (493~537) at 280		
Fuel injection timing		0° before top dead point		
Valve clearance		Valve clearance	Open	Close
	Intake valve	0.3 mm at cool	14° before top dead point	30° after bottom dead point
	Exhaust valve	0.45 mm at cool	54° before bottom dead point	13° after top dead point
Starter capacity	V × kW	24 × 5.0		
Generator capacity (Alternator)	V × A	24 × 60		
Cooling fan drive method		ø850 (33.5") × suction type 6 fans, V-belt drive, pulley ratio Crank / Fan= 0.80		
Engine oil quantity	L (gal)	Full level 26.0 (6.87) Low level 20.0 (5.28) Total 28.5 (7.53)		
Dry weight	kg (lbs)	680 (1,500)		
Fuel consumption ratio	g/kW•h (g/ps•h)	225 (165)		
Allowable inclination (Limited by E/G lubrication)		Front / Rear and Right / Left : 35°		
Dimension (L×W×H) {without fan}	mm (in)	1,294 × 868 × 987 (4ft-2.95in × 34.2in × 38.9in)		
Rotating direction		Counterclockwise seeing from flywheel side		

ENGINE CHARACTERISTIC CURVE (HINO J08E-TM)

Condition to be measured: The net value is indicated, measuring it without cooling fan.
○ marks show the rated point



Fuel consumption volume

$$= \frac{\text{Fuel consumption rate}}{0.835 \times 1000} \times \text{kW} \times \text{Load factor } (\alpha)$$

$$= \frac{225\text{g/kW·h}}{0.835 \times 1000} \times 209\text{kW} \times \alpha$$

$$= 56.3\,\alpha \cdot \text{L/h}$$

α : Standard load factor (0.70~0.80)

Fuel consumption in regular operation (load factor 0.70~0.80)
39.4 L/h~45.1 L/h

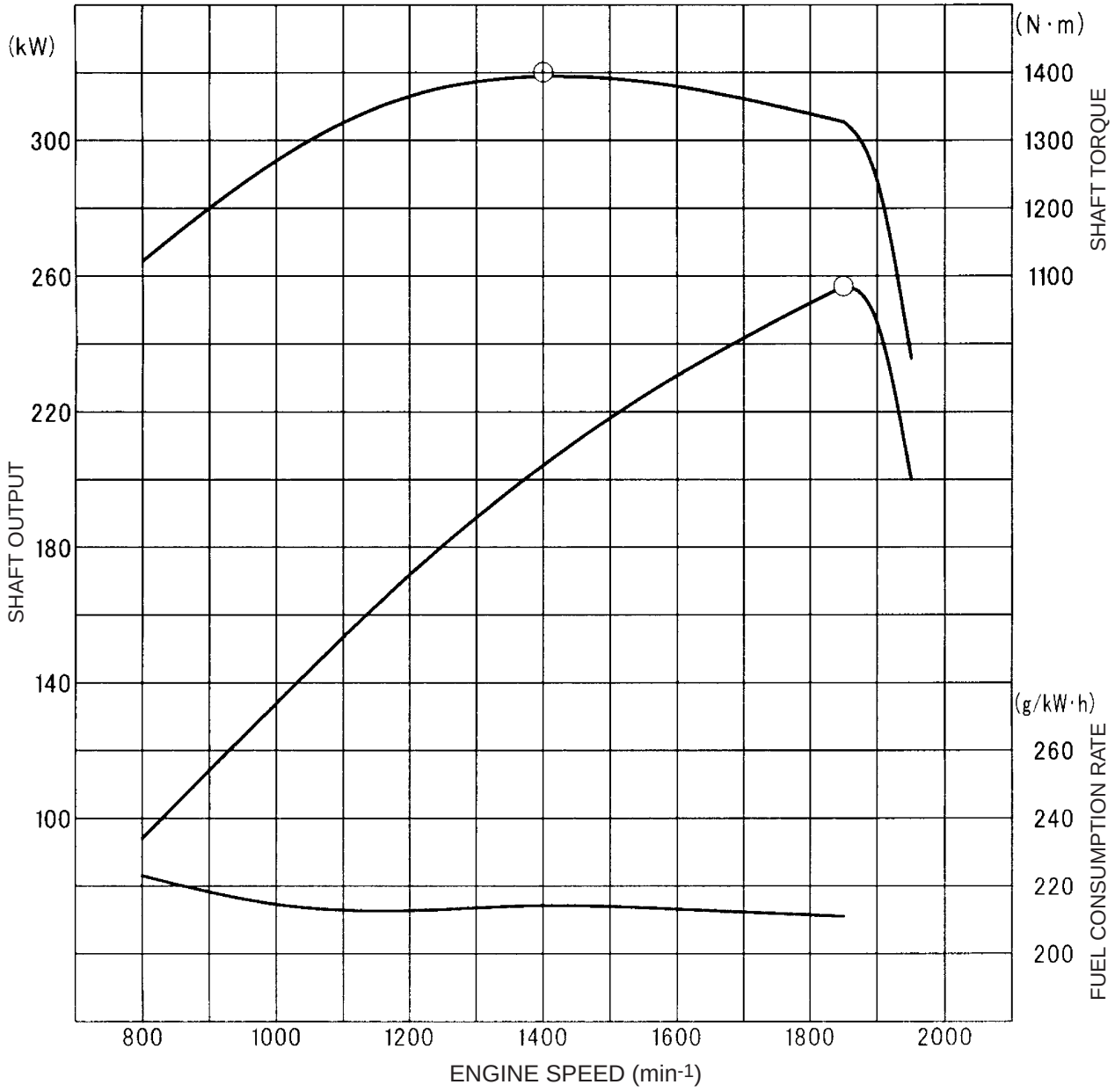
SK460-8

SPECIFICATIONS

Applicable machine		SK460-8, SK480LC-8		
Engine model		HINO P11C-UP		
Type		Water-cooled, 4 cycle 6 cylinder direct injection type diesel engine with inter cooler turbo-charger		
Number of cylinder×Bore×Stroke	mm (in)	6 × 122 × 150 (4.80 × 5.91)		
Total displacement	cc (cu•in)	10,520 (642)		
Compression ratio		17.0		
Rated output	kW (PS) at min^{-1}	243 (330) at 1,850		
Maximum torque	N•m (lb•ft) at min^{-1}	1,400 (1,033) at 1,400		
High idling	min^{-1}	2,050 ± 30		
Low idling	min^{-1}	800		
Injection starting pressure	MPa (psi)	3.2 (464)		
Thermostat action	Start/Full open K (°F)	350 (170) / 363 (194)		
Firing order		1 - 4 - 2 - 6 - 3 - 5		
Compression pressure	MPa (psi) at min^{-1}	2.8~3.0 (406~435) at 200		
Fuel injection timing		0°		
Valve clearance		Valve clearance	Open	Close
	Intake valve	0.45 mm at cool	11°before top dead point	22°after bottom dead point
	Exhaust valve	0.60 mm at cool	59°before bottom dead point	13°after top dead point
Starter capacity	V × kW	24 × 6.0		
Generator capacity (Alternator)	V × A	24 × 60		
Cooling fan drive method		ø850 (33.5") × suction type 6 fans, V-belt drive, pulley ratio Crank / Fan= 0.95		
Engine oil quantity	L (gal)	Full level 35.0 (9.25) Low level 27.0 (7.13) Total 42.5 (11.2)		
Dry weight	kg (lbs)	1,150 (2,536)		
Fuel consumption ratio	g/kW•h (g/ps•h)	213 (157)		
Allowable inclination (Limited by E/G lubrication)		Front / Rear and Right / Left : 35°		
Dimension (L×W×H)	mm (in)	1,440 × 921 × 1,154 (4ft-8.7in × 36.3in × 3ft-9.4in)		
Rotating direction		Counterclockwise seeing from flywheel side		

ENGINE CHARACTERISTIC CURVE (HINO P11C-UP)

Condition to be measured: The net value is indicated, measuring without cooling fan.
○ marks show the rated point



Fuel consumption volume

$$= \frac{\text{Fuel consumption rate X kW X Load factor } (\alpha)}{0.835 \text{ X } 1000}$$

$$= \frac{213\text{g/kW·h}}{0.835 \text{ X } 1000} \text{ X } 243\text{kW X } \alpha$$

$$= 62.0\ \alpha \cdot \text{L/h}$$

α : Standard load factor (0.70~0.80)

Fuel consumption in regular operation (load factor 0.70~0.80)
43.4 L/h~49.6 L/h

1.4 HYDRAULIC COMPONENTS

1.4.1 SPECIFICATIONS

SK140LC-8

HYDRAULIC PUMP

Item			Main pump	Gear pump
Parts No.		Pump assy	YY10V00009F1	—
		Single Pump	YY10V00014F1	YY10V00015F1
Pump model		Without PTO	K7V63DTP179R-0E13-V	ZX10L7RZ2-07G
		With PTO	K7V63DTP174R-0E13-V	
Max.displacement capacity		cm^3	65.2 X 2	10
Revolution	Rated	min-1(Clockwise seen from shaft end)	2000	←
Pressure	Rated	MPa (psi)	34.3 (4980)	5.0 (725)
	ATT boost pressure		—	
Max. flow		L/min (gal/min)	130 (34) X 2 at 7.8MPa (1130 psi)	20 (5.3)
Max. input horse power		kW (PS)	64.9 (88.3)	3.1 (4.2)
Max. input torque		N·m (lbf·ft)	310 (229)	14.7 (10.8)
Regulator		Part No.	YM10V01002F2, YM10V01002F1	
		Model	KR76-0E13-V, KR76-0E13PV	
		Control function	Electric flow control, positive flow control	
		Others	With solenoid proportional reducing valve (KDRDE5K-31/30C50-123)	
Weight		kg (lb)	82 (181)	

CONTROL VALVE

Item	Specifications
Model	KMX13YD/B44004
Maximum flow rate [L/min (gal/min)]	130 (34)×2
Maximum set pressure [MPa (psi)]	37.8 (5480) (Pump port)/ 39.7 (5760) (Actuator port)
Main relief valve set pressure [MPa (psi)]	Std 34.3 (4970) [at 30×2L/min (8×2gal/min)]
Overload relief valve set pressure [MPa (psi)]	37.8 (5480) [at 30L/min (8gal/min)]

TRAVEL MOTOR

Item	Part No.		YY15V00015F1
	Type		GM21VA-A-45/76-2
Reduction unit	Revolution	min^{-1}	51.4/31.3
	Lubricant oil		Gear oil SAE#90 GL4
	Lubricant oil valume	L (gal)	2.1 (0.55)
Hydraulic motor	Max. displacement	cc (cu•in)/rev	44.9/75.5 (2.74/4.61)
	Max. speed	min^{-1}	2777/1688 (2nd/1st)
	System pressure	MPa (psi)	34.32 (4976)
	2 speed change- over pressure	MPa (psi)	1.96~6.86 (284~995)
Parking brake	Brake torque	N•m (lbf•ft)	206 (152)
	Release pressure	MPa (psi)	0.76 (110)
Weight		kg (lbs)	145 (320)

SWING MOTOR

Swing motor unit part No.			YY15V00016F1
Hydraulic motor	Type		M2X63CHB-13A-36/285-60
	Part No.		YY15V00018F1
	Displacement	cm^3 (in^3) / rev	60 (3.66)
	Rated pressure	MPa (psi)	28.0 (4060)
	Braking torque	N•m (lbf•ft)	314 (232)
	Release pressure	MPa (psi)	2.3 (334)
	Relief set pressure	MPa (psi)	28.0 (4060) at 110L/min (29 gal/min)
	Weight	kg (lbs)	29 (64)
Reduction unit	Type		RG06D19J2
	Part No.		YY32W00004F1
	Lubicate oil		Gear oil SAE#90~#140 (API class GL-3~4 grade)
	Lubicate oil volume	L (gal)	1.65 (0.44)
	Grease		Extreme pressure lithum base #2 grease
	Grease volume	cm^3 (in^3)	500 (30.5)
	Weight	kg (lbs)	79 (174)
Total weight		kg (lbs)	113 (249)

SK200-8

HYDRAULIC PUMP

Item			Main pump		Gear pump
			SE. Asia	Oceania	
Parts No.		Pump assy	YN10V00036F1	YN10V00040F1	—
		Single Pump	YN10V00043F1		YN10V00014F3
Pump model			K3V112DTP1K9R-YT0K-HV		ZX10LGRZ2-07G
Max.displacement capacity		cm^3	110 X 2		10
Revolution	Rated	min^{-1}(Clockwise seen from shaft end)	2000		←
Pressure	Rated	MPa (psi)	34.3 (4980)		5.0 (725)
	ATT boost pressure		37.8 (5480)		
Max. flow		L/min (gal/min)	220 (58) X 2 at 7.8MPa (1130 psi)		21 (5.5)
Max. input horse power		kW (PS)	114 (155)		3.4 (4.6)
Max. input torque		N·m (lbf·ft)	544 (401)		14.7 (10.8)
Regulator		Part No.	YN10V01009F1		
		Model	KR3G-YTOK-HV		
		Control function	Electric flow control, positive flow control, total power control at emergency mode and power shift control		
		Others	With solenoid proportional reducing valve (KDRDE5K-31/30C50)		
Weight		kg (lb)	141 (310)	143 (315)	

CONTROL VALVE

Item	Specifications
Model	KMX15YD/B44001
Maximum flow rate [L/min (gal/min)]	220 (58)×2
Maximum set pressure [MPa (psi)]	37.8 (5480) (Pump port)/ 39.7 (5760) (Actuator port)
Main relief valve set pressure [MPa (psi)] When power boost pressure	Std 34.3 (4970) [at 70×2L/min (18.5×2gal/min)] 37.8 (5480) [at 60×2L/min (15.9×2gal/min)]
Overload relief valve set pressure (Boom head, Bucket head, Arm rod) [MPa (psi)]	39.7 (5760) [at 30L/min (8gal/min)]
Overload relief valve set pressure (Boom rod, Bucket rod, Arm head) [MPa (psi)]	37.8 (5480) [at 30L/min (8gal/min)]

TRAVEL MOTOR

Item		Model	GM38VB
Rated output torque		N·m (lbf·ft)	20100 / 34200 (14800 / 25200)
Working revolution		min^{-1}	48.2 / 29.6
Reduction ratio			1 / 55.617
Hydraulic motor	Max. displacement	cm^3/rev. (cu·in/rev)	78.8 / 130.8 (4.81 / 7.98)
	Max. revolution	min^{-1}	2680 / 1648
	Max. pressure	MPa (psi)	34.3 (4970)
	2 speed chamber pilot pressure	MPa (psi)	2.94~5.88 (426~853)
Parking brake	Breke torque	N·m (lbf·ft)	470 (347)
	Release pressure	MPa (psi)	1.49 (216)

SWING MOTOR

Swing motor unit part No.			YN15V00036F1
Hydraulic motor	Type		M5X130CHB-10A-41C/295
	Part No.		YN15V00035F1
	Displacement	cm^3 (in^3)	129.2 (7.88)
	Working pressure	MPa (psi)	32.4 (4700)
	Max. flow	L/min (gal/min)	220 (58)
	Braking torque	N•m (lbf•ft)	655 (483)
	Release pressure	MPa (psi)	2.5~5.0 (362~725)
	Relief set pressure	MPa (psi)	29 (4205)
	Weight	kg (lbs)	49 (108)
Anti-reaction valve block	Type		2KAR6P72/240-712
	Weight	kg (lbs)	2.5 (5.5)
Hydraulic motor assy weight		kg (lbs)	51.5 (114)
Reduction unit	Part No.		YN32W00019F1
	Speed reduction type		Planetary 2-stage
	Reduction ratio		15.38
	Lubicate oil		Gear oil SAE90 (API class GL-4 grade)
	Lubicate oil volume	L (gal)	3 (0.8)
	Grease		Extreme pressure lithum base #2 grease
	Grease volume	kg (lbs)	Approx. 1 (2.2)
	Weight	kg (lbs)	145 (320)
Total weight		kg (lbs)	Approx. 197 (434)

SK250-8

HYDRAULIC PUMP

Item			Main pump		Gear pump
			SE. Asia	Oceania	
Parts No.		Pump assy	LQ10V00018F1	LQ10V00019F1	—
		Single Pump	LQ10V00021F1		YN10V00014F3
Pump model			K3V112DTP1L9R-YT1K-HV		ZX10LGRZ2-07G
Max.displacement capacity		cm^3	117 X 2		10
Revolution	Rated	min^{-1}(Clockwise seen from shaft end)	2100		←
Pressure	Rated	MPa (psi)	34.3 (4980)		5.0 (725)
	ATT boost pressure		37.8 (5480)		
Max. flow		L/min (gal/min)	246 (65) X 2 at 7.8MPa (1130 psi)		21 (5.5)
Max. input horse power		kW (PS)	136 (185)		3.4 (4.6)
Max. input torque		N·m (lbf·ft)	618 (456)		14.7 (10.8)
Regulator		Part No.	LQ10V01005F1		
		Model	KR3G-YT1K-HV		
		Control function	Electric flow control, positive flow control, total power control at emergency mode and power shift control		
		Others	With solenoid proportional reducing valve (KDRDE5K-31/30C50)		
Weight		kg (lb)	141 (310)	147 (324)	

CONTROL VALVE

Item	Specifications
Model	KMX15YD/B44011
Maximum flow rate [L/min (gal/min)]	246 (65)×2
Maximum set pressure [MPa (psi)]	37.8 (5480) (Pump port)/ 39.7 (5760) (Actuator port)
Main relief valve set pressure [MPa (psi)] When power boost pressure	Std 34.3 (4970) [at 85×2L/min (22.5×2gal/min)] 37.8 (5480) [at 75×2L/min (19.8×2gal/min)]
Overload relief valve set pressure (Boom head, Bucket head, Arm rod) [MPa (psi)]	39.7 (5760) [at 30L/min (8gal/min)]
Overload relief valve set pressure (Boom rod, Bucket rod, Arm head) [MPa (psi)]	37.8 (5480) [at 30L/min (8gal/min)]

TRAVEL MOTOR

ITEM	PARTS NO.		LQ15V00020F1
	TYPE		MAG-170VP-3800G-K1
Reduction unit	Reduction rate	rpm	1/43.246
	Lube oil		Gear oil SAE #90 GL4
	Oil level	L (gal)	5.0 (1.3)
Hydraulic motor	Max. displacement	cc/rev (cu·in/rev)	181.3/112.6 (11.06/6.87)
	System. pressure	MPa (psi)	34.3 (4,980)
	2-speed changeover pressure	MPa (psi)	4.9 (710)
	Auto 1st-speed return pressure	MPa (psi)	27.3 (3,980)
Parking brake	Braking torque	N·m (lbf·ft)	25.1 (18,520)
	Release pressure	MPa (psi)	1.1 (160)
Total weight		kg (lbs)	262 (577)

SWING MOTOR

Swing motor unit part No.			LQ15V00021F1
Hydraulic motor	Type		MFC160-065
	Part No.		LQ15V00015F2
	Displacement	cm^3 (in^3)	151 (9.2)
	Working pressure	MPa (psi)	28.5 (4,130)
	Max. flow	L/min (gal/min)	253 (66.8)
	Braking torque	N•m (lbf•ft)	685~891 (505~657)
	Release pressure	MPa (psi)	3.1 (450)
	Relief set pressure	MPa (psi)	25.8 (3,741)
	Weight	kg (lbs)	53 (117)
Reduction unit	Part No.		LQ32W00011F1
	Speed reduction type		Planetary 2-stage
	Reduction ratio		16.81
	Lubicate oil		Gear oil SAE90 (API class GL-4 grade)
	Lubicate oil volume	L (gal)	7.0 (1.8)
	Grease		Extreme pressure lithum base #2 grease
	Grease volume	kg (lbs)	Approx. 1.4 (3.1)
	Weight	kg (lbs)	221 (487)
Total weight		kg (lbs)	Approx. 274 (604)

SK330-8

HYDRAULIC PUMP

Item			Main pump		Gear pump
			SE. Asia	Oceania	
Parts No.		Pump assy	LC10V00014F1	LC10V00015F1	—
		Single Pump	LC10V00020F1		YN10V00014F3
Pump model			K5V140DTP1K9R-YT0K-HV		ZX10LGRZ2-07G
Max.displacement capacity		cm^3	140 X 2		10
Revolution	Rated	min^{-1}(Clockwise seen from shaft end)	2100		←
Pressure	Rated	MPa (psi)	34.3 (4980)		5.0 (725)
	ATT boost pressure		37.8 (5480)		
Max. flow		L/min (gal/min)	294 (78) X 2 at 7.8MPa (1130 psi)		21 (5.5)
Max. input horse power		kW (PS)	195 (265)		3.4 (4.6)
Max. input torque		N·m (lbf·ft)	886 (653)		14.7 (10.8)
Regulator		Part No.	LC10V01005F1		
		Model	KR3S-YTOK-HV		
		Control function	Electric flow control, positive flow control, total power control at emergency mode and power shift control		
		Others	With solenoid proportional reducing valve (KDRDE5K-31/30C50)		
Weight		kg (lb)	141 (310)	143 (315)	

CONTROL VALVE

Item		Specifications
Model		KMX15YD/B44031
Maximum flow rate [L/min (gal/min)]	[L/min (gal/min)]	294 (78) × 2
Maximum set pressure [MPa (psi)]	[MPa (psi)]	37.8 (5481) (Pump port)/ 39.7 (5757) (Actuator port)
Main relief valve set pressure [MPa (psi)] When power boost pressure	[MPa (psi)]	Std 34.3 (4970) [at 135×2 L/min (at 36×2 gal/min)] 37.8 (5480) [at 125×2 L/min (at 33×2 gal/min)]
Overload relief valve set pressure (Boom head, Bucket head, Arm rod) [MPa (psi)]	[MPa (psi)]	39.7 (5757) [at 30 L/min (at 8 gal/min)]
Overload relief valve set pressure (Boom rod, Bucket rod, Arm head) [MPa (psi)]	[MPa (psi)]	37.8 (5481) [at 30 L/min (at 8 gal/min)]

TRAVEL MOTOR

TRAVEL MOTOR UNIT			Part No.		LC15V00023F1
			Type		M4V290 / 170F-RG6.5F
Reduction unit	Part No.				—
	Type				—
	Reduction ratio				40.467
	Number of reduction stages				2
	Lube oil capacity		L (gal)		9.5 (2.5)
	Lube oil capacity specification				Gear oil SAE90API GL4 or GL5
	Weight		kg (lbs)		—
Travel motor	Part No.				LC15V00026F1
	Type				M4V290 / 170F
	Max. displacement		cc/rev (cu•in/rev)		290.7 (17.7)
	Min. displacement		cc/rev (cu•in/rev)		170.1 (10.4)
	Relief valve set pressure		MPa (psi)		35.0 (5075)
	2 peed changeover pilot pressure		MPa (psi)		5.0 (725)
	Parking brake torque		N•m (lbf•ft)		902 or more (665)
	Parking brake release pressure		MPa (psi)		Less than 1.54 (223)
	Allowable drain pressure		MPa (psi)	Working	0.2 (29)
				Surge	0.98 (142)
	Weight		kg (lb)		—
Unit weight (with oil)			kg (lb)		399 (880)

SWING MOTOR

Swing motor unit part No.				LC15V00025F1
Hydraulic motor	Part No.			LC15V00022F1
	Type			M5X180CHB-10A-60B/295
	Displacement		cm^3 (in^3)	180.1 (11.0)
	Working pressure		MPa (psi)	32.4 (4700)
	Max. pressure		MPa (psi)	39.2 (5680)
	Working flow		L/min (gal/min)	294 (77.7)
	Braking torque		N•m (lbf•ft)	860~1121 (634~827)
	Brake release pressure		MPa (psi)	2.4~5.0 (348~725)
	Relief set pressure		MPa (psi)	29.0 (4205)
	Weight		kg (lbs)	72.5 (160)
	Anti-reaction valve block	Part No.		YN22V00014F4
		Type		2KAR6P72/240-712
		Weight	kg (lbs)	2.5 (5.5)
	Hydraulic motor assy weight		kg (lbs)	75 (165)

Reduction unit	Part No.		LC32W00007F1
	Speed reduction type		Planetary 2-stage
	Reduction ratio		27.143
	Lubricate oil		Gear oil SAE90 (API class GL-4 grade)
	Lubricate oil volume		7.4 L (1.96 gal)
	Grease		Extreme pressure lithum base #2 grease
	Grease volume	kg (lbs)	Approx. 1.7 (3.7)
	Weight	kg (lbs)	371 (818)
Total weight		kg (lbs)	446 (983)

SK460-8

HYDRAULIC PUMP

Item			Main pump		Gear pump
Parts No.		Pump assy	SE. Asia	Oceania	—
			LS10V00014F1	LS10V00016F1 (With PTO unit)	
		Single pump	LS10V00017F1		LS10V00018F1
Pump model			K5V200DPH1KLR-YT0K-HV		ZX15LDLZ2-07G
Max. displacement capacity		cm^3	200X2		15
Revolution	Rated	min^{-1} (Clockwise seen from shaft end)	1850		←
Pressure	Rated	MPa (psi)	31.4 (4553)		5.0 (725)
	ATT boost pressure		34.3 (4980)		
Max. flow		L/min (gal/min)	370 (98)X2 at 7.8MPa (1130 psi)		27.8 (7.3)
Max. input horse power		kW (PS)	235.4 (320)		2.85 (3.9)
Max. input torque		N･m (lbt･ft)	1153 (850)		14.7 (10.8)
Regulator		Part No.	LS10V01006F1		
		Model	KR3D-YT0K-HV		
		Control function	Electric flow control, positive flow control, total power control at emergency mode and power shift control		
		Others	With solenoid proportional reducing valve(KDRDE5K-31/30C50-123)		
Weight (Include the Gear pump)		kg (lbs)	240 (529)	260 (573)	—

CONTROL VALVE

ITEM	SPECIFICATIONS
Part no.	LS30V00009F1
Model	UY36-114
Rated flow	370×2 L/min (98×2 gal/min)
Main relief valve set pressure	31.4 MPa at 380L/min (4550 psi at 100gal/min) When power boost 34.3 MPa at 340L/min (4980 psi at 90gal/min)
Overload relief valve set pressure Boom H, Bucket H, Arm R Boom R, Bucket R, Arm H	 36.3 MPa at 30L/min (5260 psi at 7.9gal/min) 34.8 MPa at 30L/min (5050 psi at 7.9gal/min)

TRAVEL MOTOR

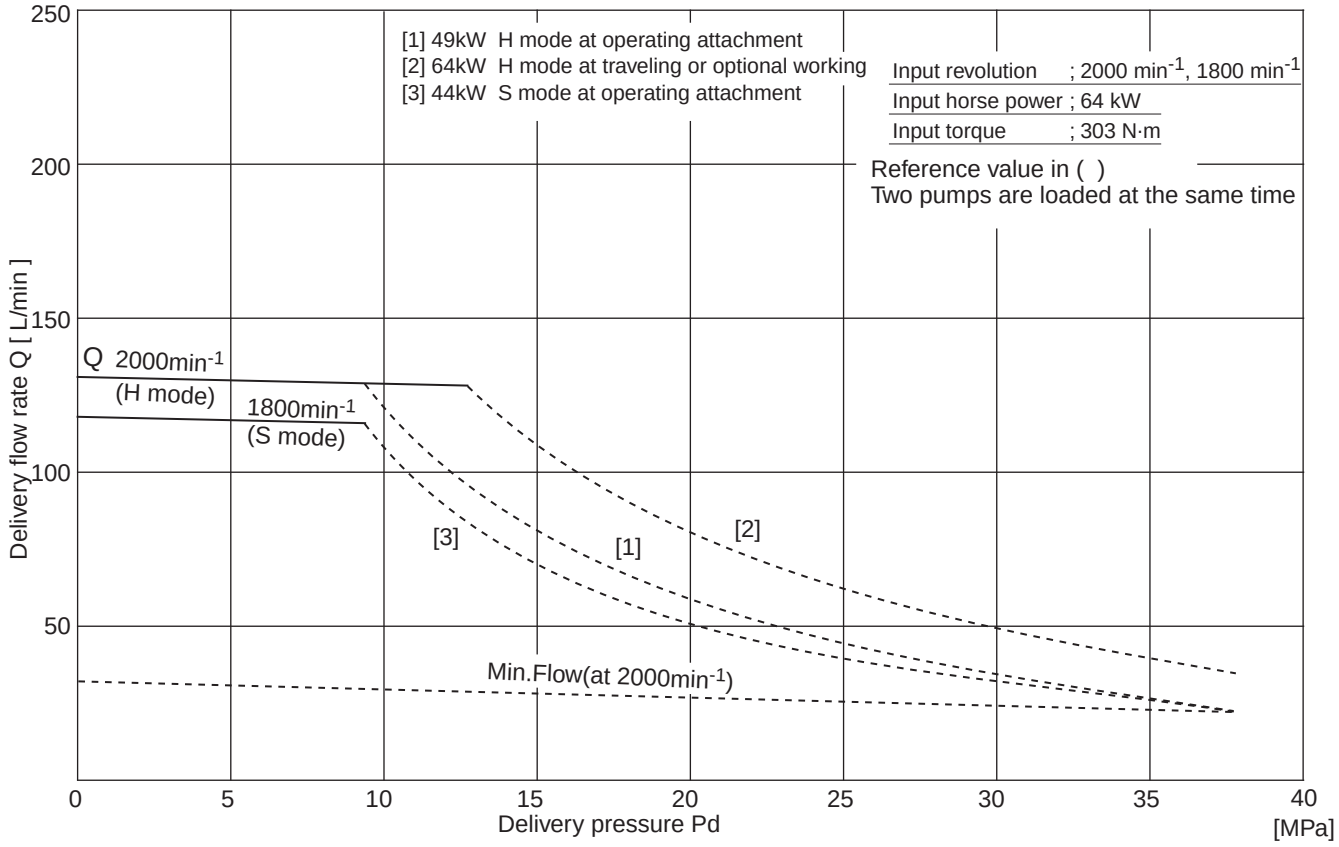
TRAVEL MOTOR UNIT			Part No.	LS15V00020F1
			Type	M4V290 / 170A-RG10T
Reduction unit	Part No.			LS53D00007F1
	Type			RG10T
	Reduction ratio			60.652
	Number of reduction stages			2
	Lube oil capacity	L (gal)		15.0 (4.0)
	Lube oil capacity specification			Gear oil SAE90API GL4 or GL5
	Weight	kg (lbs)		—
Travel motor	Part No.			LS15V00022F1
	Type			M4V290 / 170A
	Max. displacement	cc/rev (cu•in/rev)		290.7 (17.7)
	Min. displacement	cc/rev (cu•in/rev)		170.1 (10.4)
	Relief valve set pressure	MPa (psi)		34.3 (4974)
	2 peed changeover pilot pressure	MPa (psi)		5.0 (725)
	Parking brake torque	N•m (lbf•ft)		902 or more (665)
	Parking brake release pressure	MPa (psi)		Less than 1.54 (223)
	Allowable drain pressure	MPa (psi)	Working	0.2 (29)
			Surge	0.98 (142)
	Weight	kg (lb)		—
Unit weight (with oil)		kg (lb)		650 (1433)

SWING MOTOR

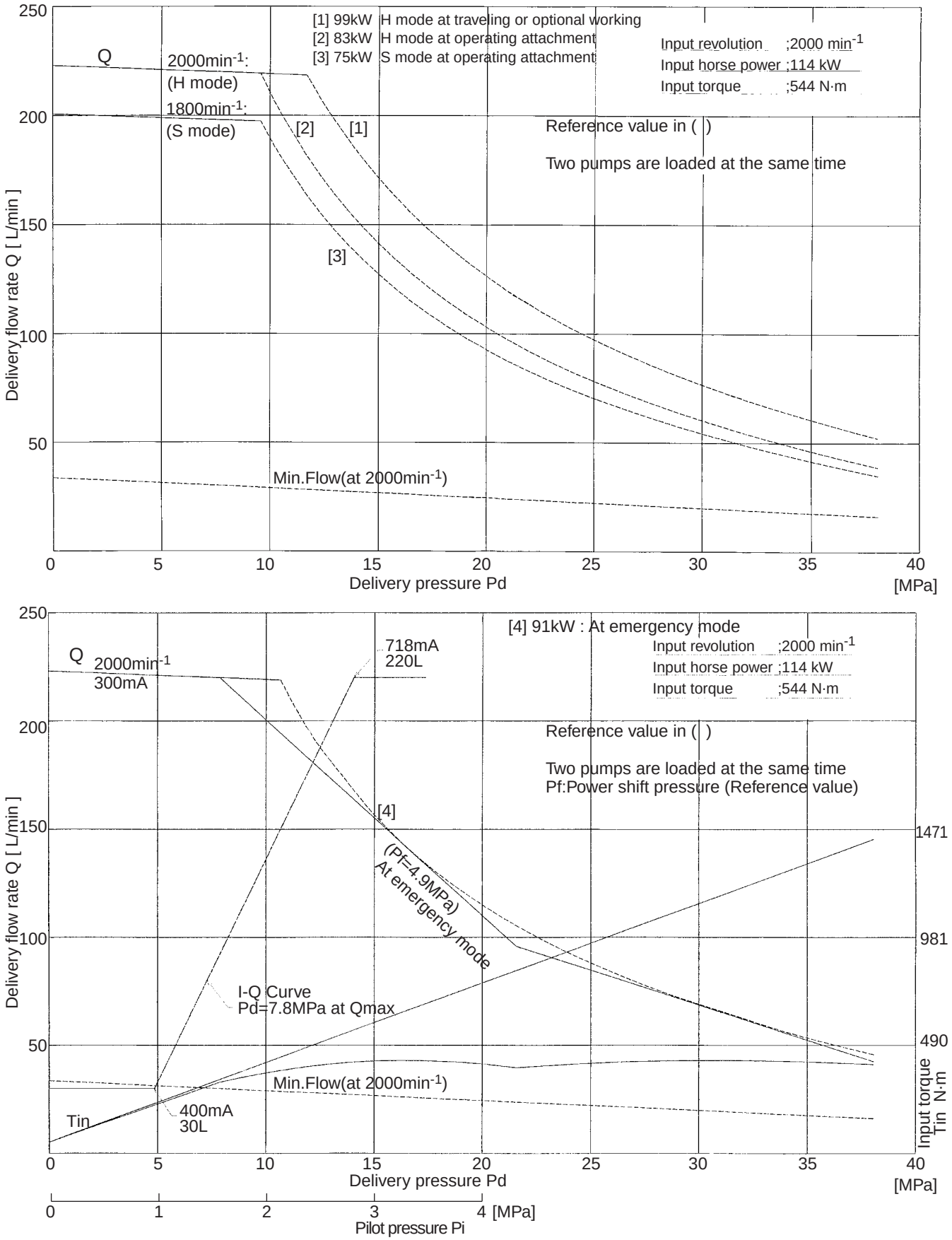
Swing motor unit part No.			LS15V00023F1, LS15V00024F1
Hydraulic motor	Type		MFC160-065A, MFC160-079
	Part No.		LS15V00018F1, LS15V00019F1
	Displacement	cm^3 (in^3)	151 (9.2)
	Working pressure	MPa (psi)	25.0 (3,625)
	Max. flow	L/min (gal/min)	253 (66.8)
	Braking torque	N•m (lbf•ft)	685~891 (505~657)
	Release pressure	MPa (psi)	3.1 (450)
	Relief set pressure	MPa (psi)	25.2 (3,654)
	Weight	kg (lbs)	53 (117)
Reduction unit	Part No.		LS32W00012F1
	Speed reduction type		Planetary 2-stage
	Reduction ratio		16.81
	Lubicate oil		Gear oil SAE90 (API class GL-4 grade)
	Lubicate oil volume	L (gal)	7.0 (1.8)
	Grease		Extreme pressure lithum base #2 grease
	Grease volume	kg (lbs)	Approx. 1.4 (3.1)
	Weight	kg (lbs)	222 (490)
Total weight		kg (lbs)	Approx. 275 (606)

1.4.2 CONTROL CURVE OF PUMP

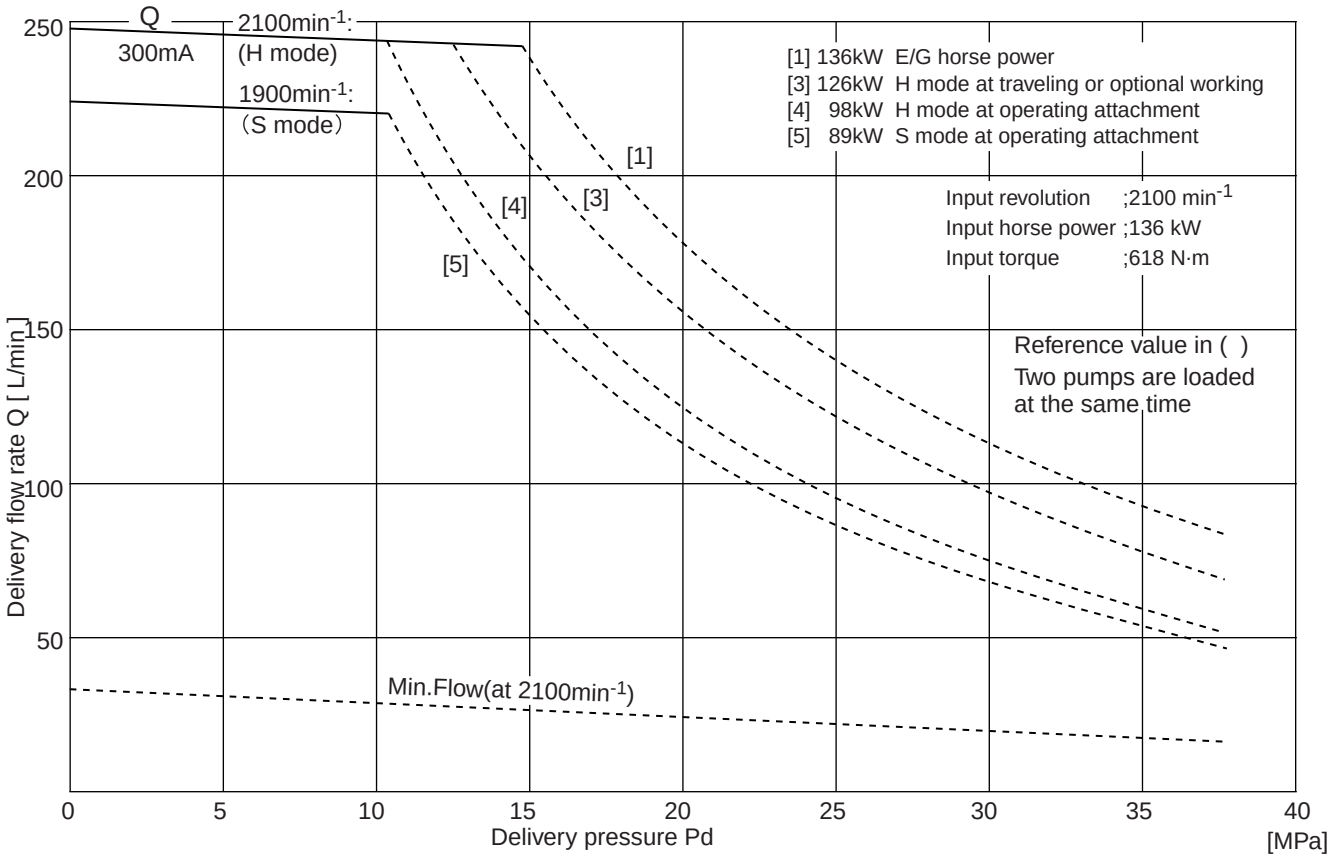
SK140LC-8

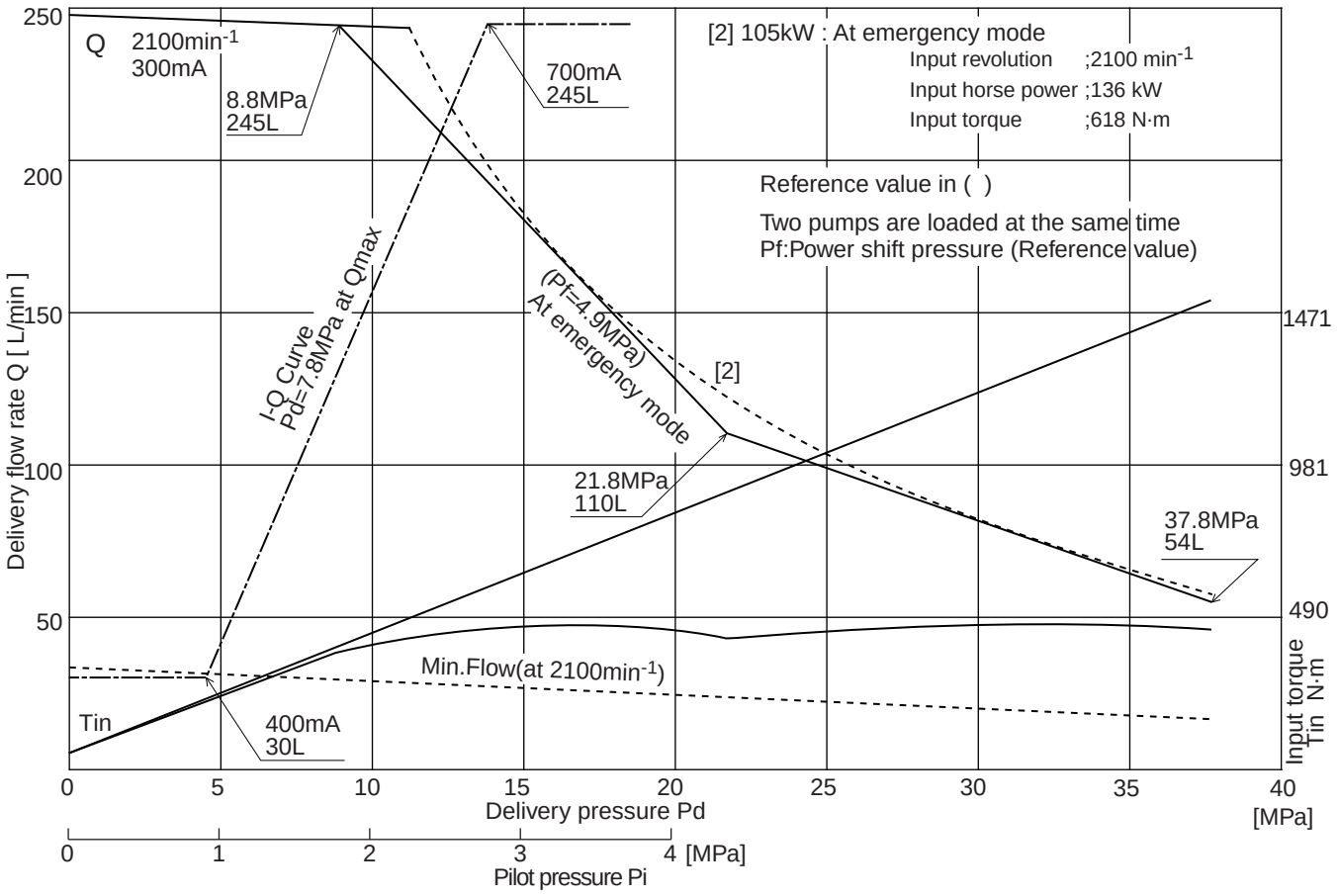


SK200-8

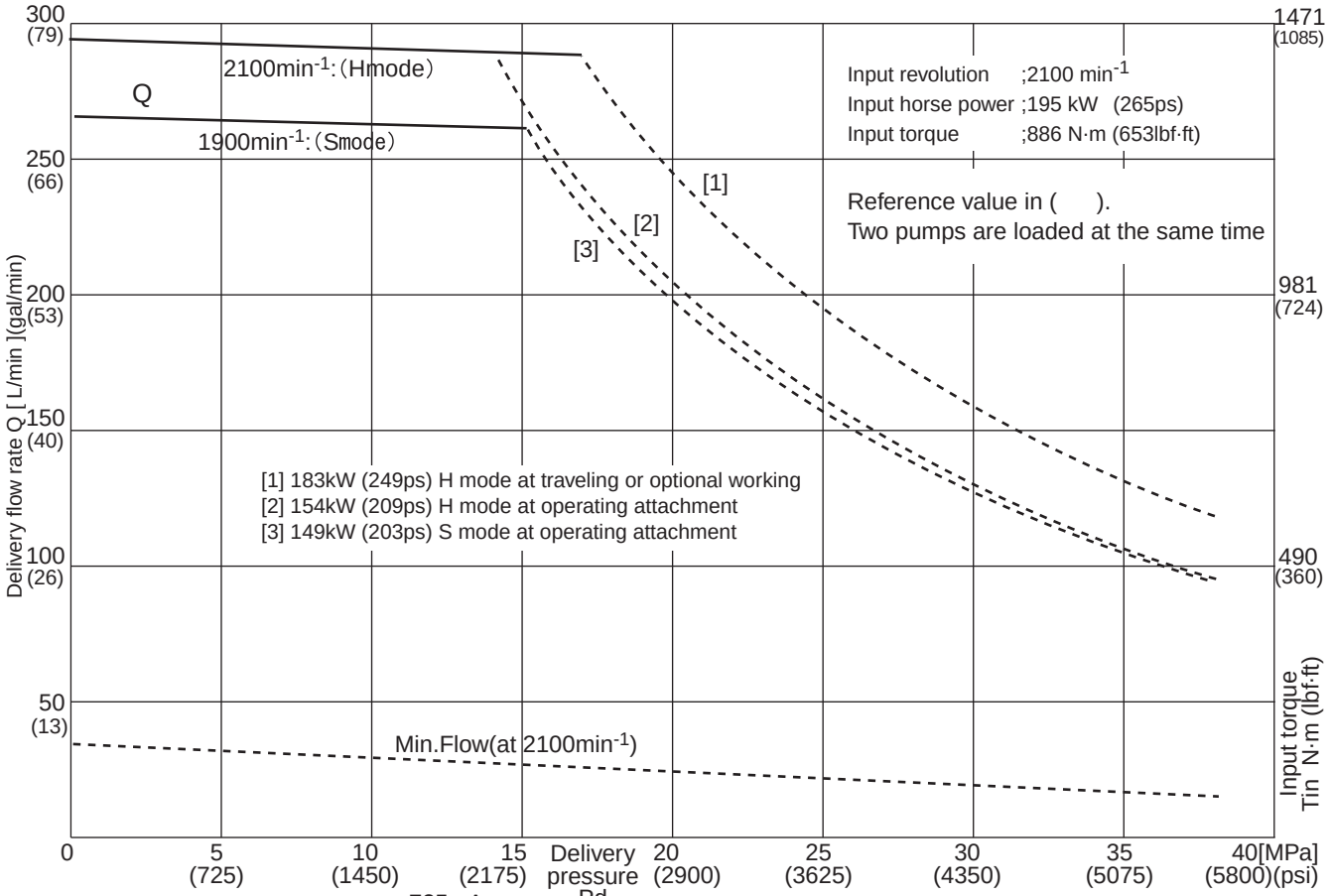


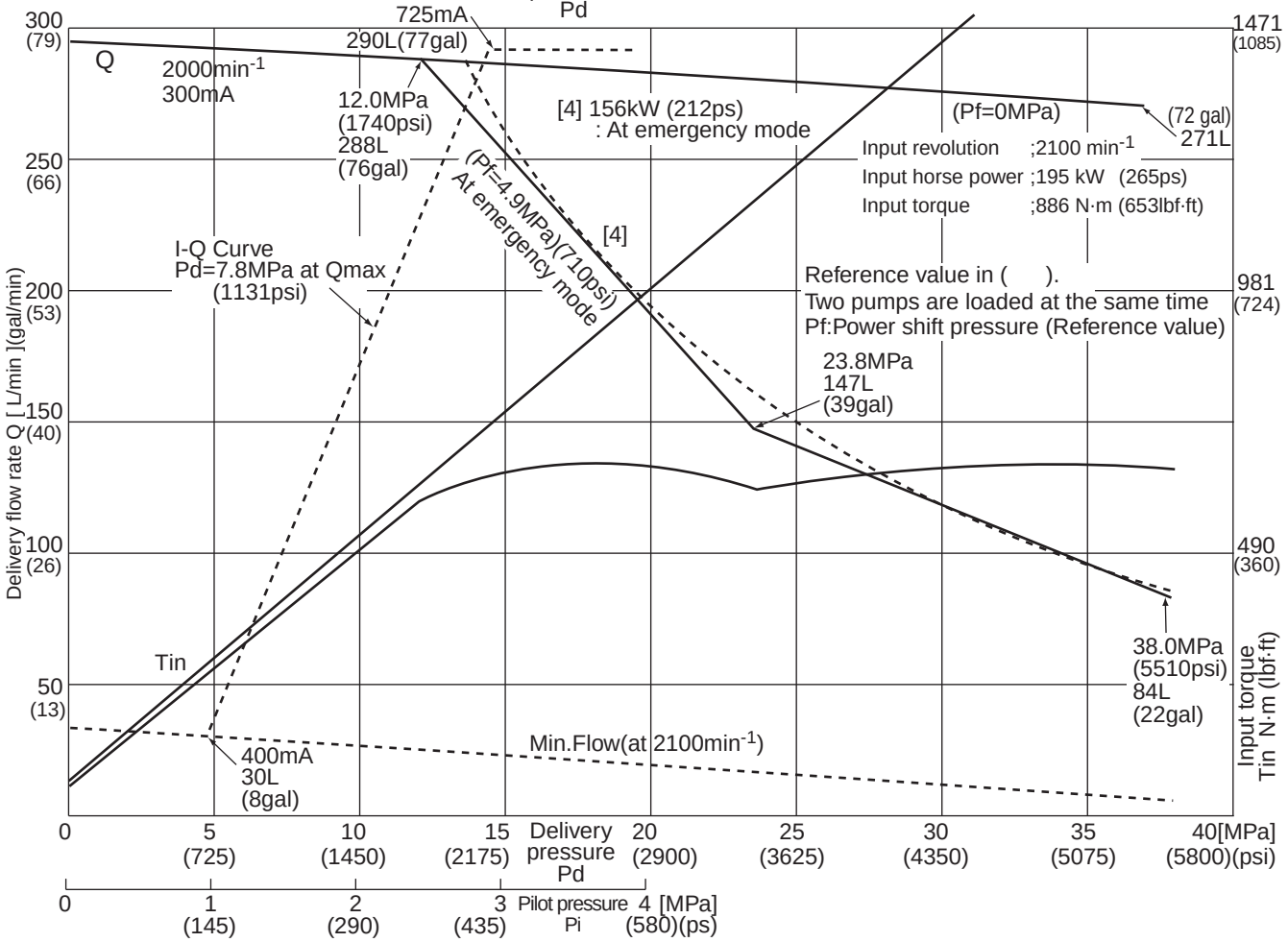
SK250-8



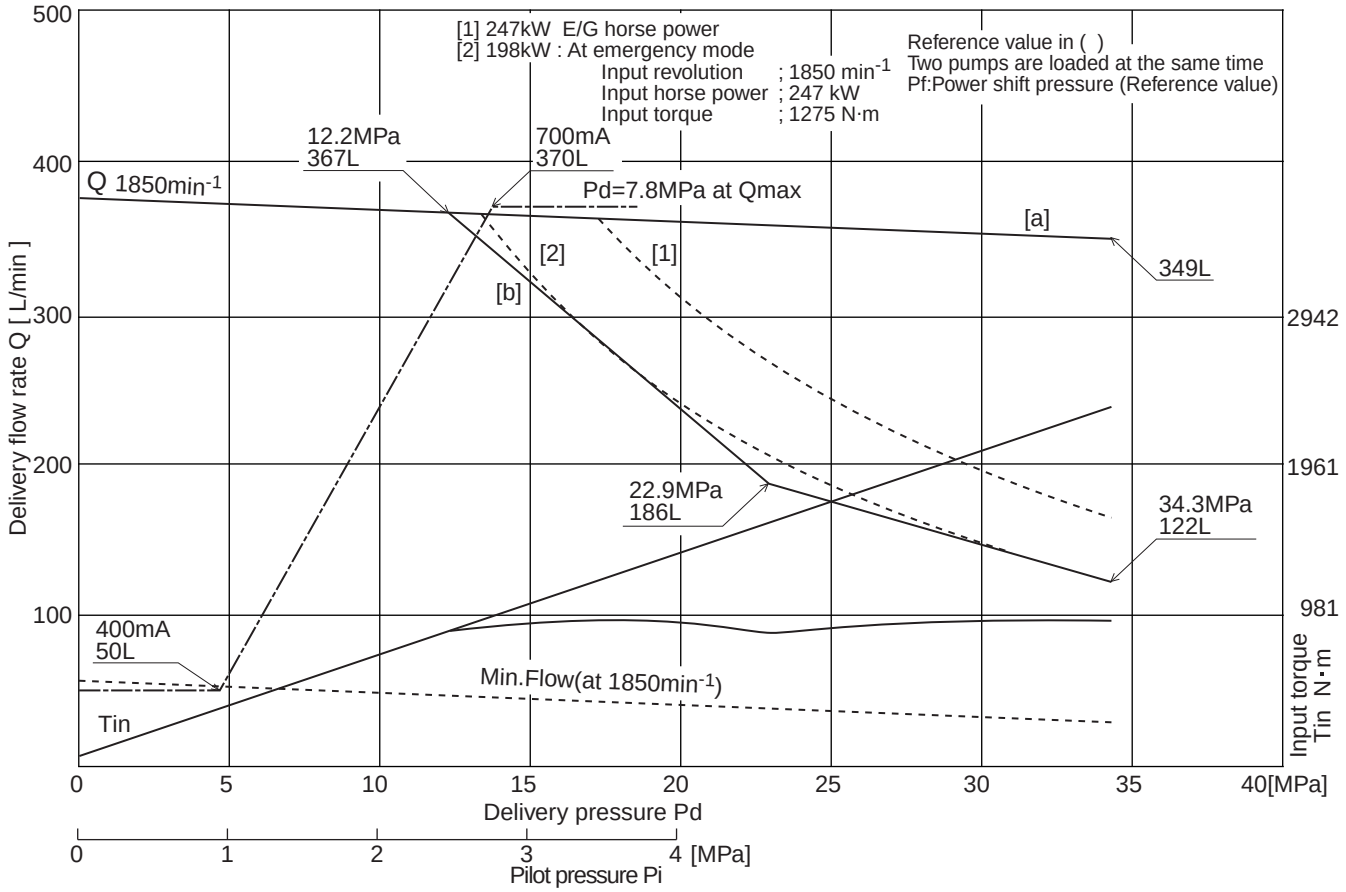


SK330-8





SK460-8

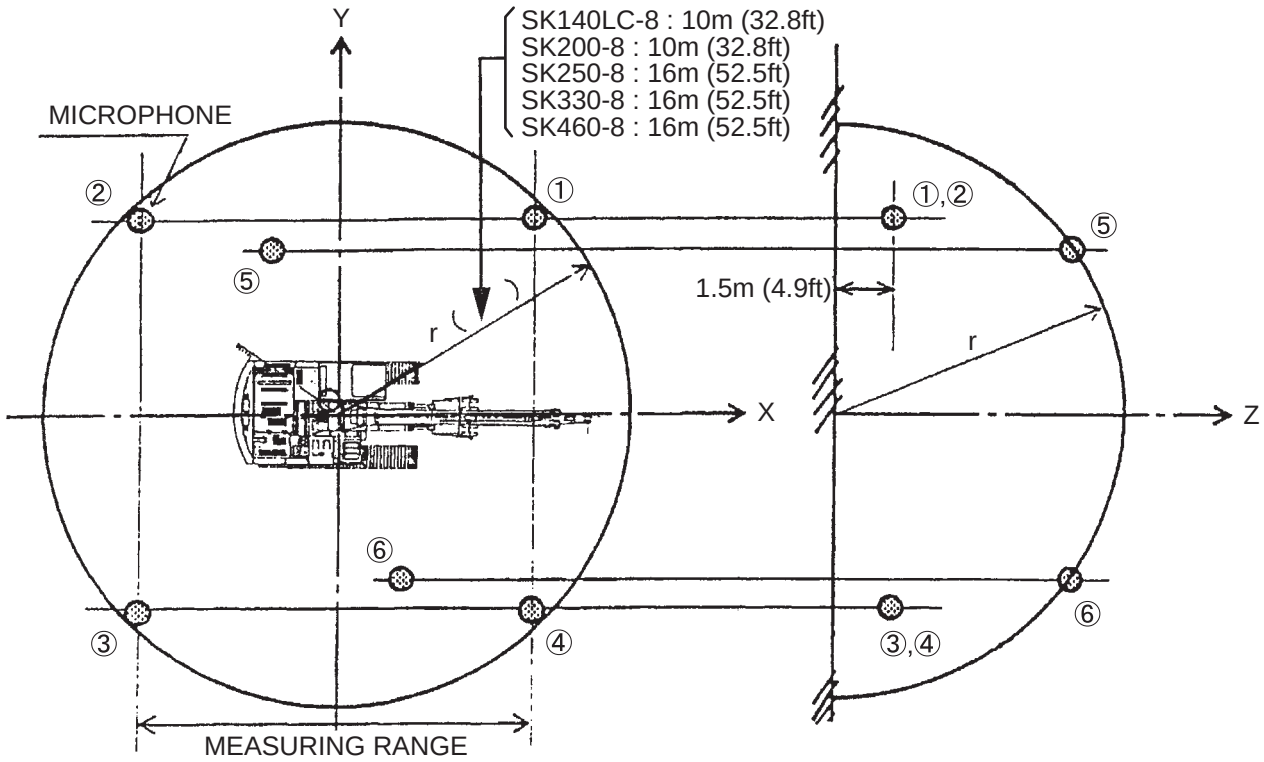


1.5 PERFORMANCE TABLE

1.5.1 PERFORMANCE TABLE

ITEM / MODEL	SWING SPEED min^{-1}	TRAVEL SPEED km/h	DRAW BAR PULL kN {kgf}	GRADE ABILLITY %(dig)	ATT DIGGING FORCE kN {kgf} (ISO)			FUEL CONSUMPTION L / h		WORK LOAD m^3 / h		CYCLE TIME 90° SWING sec	
					ARM (ARM LENGTH)		BUCKET	S	H	S	H	S	H
SK140LC-8	11	3.4 / 5.6	139 {14,200}	70 (35)	64.4 {6,600}	(2.38m) (7'10")	90.1 {9,200} (0.50m^3)	11.6	13.7	117.1	129.1	15.4	13.9
SK200-8	12.5	3.6 / 6.0	229 {23,400}	70 (35)	102 {10,400} (112 {11,400} at boost)	(2.94m) (9'8")	143 {14,600} (157 {16,000} at boost) (0.80m^3)	18.3	22.7	222	238	13.0	12.1
					121 {12,300} (133 {13,600} at boost)	(2.4m) (7'10")	143 {14,600} (157 {16,000} at boost) (0.93m^3)						
					91.8 {9,400} (101 {10,300} at boost)	(3.5m) (11'48")	143 {14,600} (157 {16,000} at boost) (0.70m^3)						
SK250-8	11	3.6 / 5.8	244 {24,900}	70 (35)	119 {12,100} (131 {13,400} at boost)	(2.98m) (9'9")	170 {17,300} (187 {19,100} at boost) (1.00m^3)	23.6	28	275	291	13.1	12.4
					142 {14,500} (156 {15,900} at boost)	(2.5m) (8'2")	170 {17,300} (187 {19,100} at boost) (1.20m^3)						
					104 {10,600}	(3.66m) (12'0")	170 {17,300} (0.81m^3)						
SK330-8	10	3.3 / 5.6	259 {26,400}	70 (35)	227 {23,200} (244 {24,900} at boost)	(3.30m) (10'10")	221 {22,600} (244 {24,900} at boost) (1.40m^3)	33.9	38.1	385	388	13.1	13.0
					205 {20,900} (225 {23,000} at boost)	(2.60m) (8'6")	221 {22,600} (244 {24,900} at boost) (1.60m^3)						
					140 {14,300} (154 {15,700} at boost)	(4.15m) (13'7")	140 {14,300} (154 {15,700} at boost) (1.20m^3)						
SK460-8	7.8	3.4 / 5.6	346 {35,300}	70 (35)	203 {20,700} (222 {22,600} at boost)	(3.45m) (11'4")	267 {27,200} (292 {29,800} at boost) (1.90m^3)	46.7	52.2	449	463	15.3	14.8
					223 {22,700} (244 {24,900} at boost)	(3.0m) (9'10")	266 {27,100} (291 {29,700} at boost) (2.10m^3)						
					157 {16,000} (172 {17,500} at boost)	(4.90m) (16'1")	263 {26,800} (288 {29,400} at boost) (1.35m^3)						

1.5.2 MEASURING PROCEDURE



MEASURING POSITION(POSITION OF MICROPHONE)

MEASURING PROCEDURE

ITEM / MODEL	CIRCUMFERENCE NOISE VALUE (DYNAMIC) SOUND POWER LEVEL	CLOSE TO OPERATOR'S EAR IN THE CAB (ISO) CLOSE CAB DOOR
SK140LC-8	99 dB	70 dB
SK200-8	99 dB	71 dB
SK250-8	99.3 dB	70 dB
SK330-8	103 dB	74 dB
SK460-8	105 dB	72.5 dB

EVALUATED VALUE	A SOUND POWER LEVEL WHICH IS CALUCULATED BY THE SOUND LEVEL OF 6 DIRECTIONS
OPERATION	SIMULATED OPERATION (DIGGING)
MEASURING ROAD SURFACE	SURFACE OF THE CONCRETE

1.6 WEIGHT OF COMPONENTS

Unit ; kg (lb)

Item \ Model	SK140LC - 8
Machine complete	13,000 (28,600)
1. Upper frame assy (Assembly of following :)	6,550 (14,440)
1.1 Upper frame	1,420 (3,130)
1.2 Counter weight	2,400 (5,290)
1.3 Cab	297 (655)
1.4 Engine	* 395 (871)
1.5 Hydraulic oil tank	* 107 (236)
1.6 Fuel tank	* 104 (229)
1.7 Slewing motor (including reduction unit)	* 106 (234)
1.8 Control valve	* 158 (348)
1.9 Boom cylinder	* 96 (212) X 2
1.10 Pin (for mounting boom)	61 (134)
1.11 Pump	* 85 (187)
1.12 Radiator (including intercooler)	* 77 (170)
2. Lower frame assy (Assembly of following :)	4,275 (9,430)
2.1 Lower frame	1,520 (3,350)
2.2 Slewing bearing	150 (330)
2.3 Travel motor (including reduction unit)	* 145 (320) X 2
2.4 Upper roller	9 (20) X 2
2.5 Lower roller	25 (55) X 14
2.6 Front idler	74 (163) X 2
2.7 Idler adjuster	58 (128) X 2
2.8 Sprocket	40 (88) X 2
2.9 Swivel joint	* 24 (53)
2.10 Track link with 500mm (19.7in) shoes assy (LC)	760 (1,675) X 2
Track link with 600mm (23.6in) shoes assy	912 (2,012) X 2
Track link with 700mm (27.6in) shoes assy	1,013(2,234) X 2
3. Attachment (Assembly of following :)	
{4.68m (15ft-4in) Boom + 2.38m (7ft-10in) Arm + 0.50m³ (0.65cu•yd) Bucket}	2,347 (5,175)
{4.68m (15ft-4in) Boom + 2.38m (7ft-10in) Arm + 0.57m³ (0.75cu•yd) Bucket}	[2,367 (5,220)]
{4.68m (15ft-4in) Boom + 2.38m (7ft-10in) Arm + 0.45m³ (0.59cu•yd) Bucket}	[2,322 (5,120)]
3.1 Bucket assy (STD)	400 (882)
3.2 STD Arm assy (Assembly of following :)	659 (1,453)
3.2.1 STD Arm	435 (960)
3.2.2 Bucket cylinder	82 (180)
3.2.3 Idler link	30 (66)
3.2.4 Bucket link	42 (93)
3.2.5 Pin (2pcs. for mounting bucket cylinder / 2pcs. for mounting bucket)	46 (101)
3.3 Boom assy (Assembly of following :)	1,324 (2,920)
3.3.1 Boom	893 (1,970)
3.3.2 Arm cylinder	138 (304)
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	29 (64)

Unit ; kg (lb)

Item \ Model	SK140LC - 8
4. Lubricant and water (Assembly of following :)	422 (930)
4.1 Hydraulic oil	151 (333)
4.2 Engine oil	16 (35)
4.3 Fuel	241 (531)
4.4 Water	14 (31)

Note

Marks * show dry weight.

Unit ; kg (lb)

Item \ Model	SK200 - 8	SK210LC - 8
Machine complete	20,200 (44,500)	20,600 (45,400)
1. Upper frame assy (Assembly of following :)	9,500 (21,000)	←
1.1 Upper frame	1,770 (3,900)	←
1.2 Counter weight (Semi-weighted)	4,640 (10,230)	←
1.3 Cab	260 (570)	←
1.4 Engine	*540 (1,190)	←
1.5 Hydraulic oil tank	*150 (330)	←
1.6 Fuel tank	*110 (240)	←
1.7 Slewing motor (including reduction unit)	*210 (460)	←
1.8 Control valve	*230 (510)	←
1.9 Boom cylinder	*170 (375) × 2	←
1.10 Pin (for mounting boom)	70 (150)	←
1.11 Pump	*130 (290)	←
1.12 Radiator (including intercooler)	*90 (200)	←
2. Lower frame assy (Assembly of following :)	6,730 (14,840)	7,130 (15,720)
2.1 Lower frame	2,260 (4,980)	2,420 (5,340)
2.2 Slewing bearing	250 (550)	←
2.3 Travel motor (including reduction unit)	260 (570) × 2	←
2.4 Upper roller	20 (44) × 2	←
2.5 Lower roller	30 (66) × 14	30 (66) × 16
2.6 Front idler	110 (240) × 2	←
2.7 Idler adjuster	100 (220) × 2	←
2.8 Sprocket	50 (110) × 2	←
2.9 Swivel joint	*30 (66)	←
2.10 Track link with 600mm (23.6in) shoes assy	1,260 (2,780) × 2	1,350 (2,980) × 2
Track link with 700mm (27.6in) shoes assy	1,470 (3,240) × 2	1,560 (3,440) × 2
Track link with 800mm (31.5in) shoes assy	1,600 (3,530) × 2	1,700 (3,750) × 2
2.10.1 Track link assy	510 (1,120) × 2	540 (1,190) × 2
3. Attachment (Assembly of following / STD :) {5.65m (18ft-6in) Boom + 2.94m (9ft-8in) Arm + 0.80m³ (1cu•yd) Bucket}	3,420 (7,540)	←
3.1 Bucket assy (STD)	640 (1,410)	←
3.2 STD Arm assy (Assembly of following :)	1,050 (2,315)	←
3.2.1 STD Arm	660 (1,455)	←
3.2.2 Bucket cylinder	*140 (310)	←
3.2.3 Idler link	20 (44) × 2	←
3.2.4 Bucket link	90 (198)	←
3.2.5 Pin (2pcs. for mounting bucket cylinder / 2pcs. for mounting bucket)	100 (220)	←
3.3 Boom assy (Assembly of following :)	1,730 (3,815)	←
3.3.1 Boom	1,310 (2,890)	←
3.3.2 Arm cylinder	*255 (560)	←
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	80 (180)	←

Unit ; kg (lb)

Item \ Model	SK200 - 8	SK210LC - 8
4. Lubricant and water (Assembly of following :)	550 (1,210)	←
4.1 Hydraulic oil	200 (440)	←
4.2 Engine oil	20 (44)	←
4.3 Fuel	310 (680)	←
4.4 Water	20 (44)	←

Note

Marks * show dry weight.

Unit ; kg (lb)

Item \ Model	SK250 - 8	SK260LC - 8
Machine complete	24,400 (53,800)	24,900 (54,900)
1. Upper frame assy (Assembly of following :)	11,380 (25,100)	←
1.1 Upper frame	2,200 (4,850)	←
1.2 Counter weight (Semi-weighted)	5,820 (12,830)	←
1.3 Cab	270 (595)	←
1.4 Engine	*520 (1,150)	←
1.5 Hydraulic oil tank	*170 (375)	←
1.6 Fuel tank	*160 (350)	←
1.7 Slewing motor (including reduction unit)	*280 (620)	←
1.8 Control valve	*240 (530)	←
1.9 Boom cylinder	*240 (530) × 2	←
1.10 Pin (for mounting boom)	130 (290)	←
1.11 Pump	*120 (260)	←
1.12 Radiator (including intercooler)	*90 (200)	←
2. Lower frame assy (Assembly of following :)	7,900 (17,420)	8,400 (18,520)
2.1 Lower frame	2,880 (6,350)	3,100 (6,840)
2.2 Slewing bearing	400 (880)	←
2.3 Travel motor (including reduction unit)	520 (1,150) × 2	←
2.4 Upper roller	50 (110) × 2	←
2.5 Lower roller	30 (66) × 16	30 (66) × 18
2.6 Front idler	250 (550) × 2	←
2.7 Idler adjuster	150 (330) × 2	←
2.8 Sprocket	50 (110) × 2	←
2.9 Swivel joint	*25 (55)	←
2.10 Track link with 600mm (23.6in) shoes assy	1,370 (3,020) × 2	1,490 (3,290) × 2
Track link with 700mm (27.6in) shoes assy	1,500 (3,310) × 2	1,630 (3,590) × 2
Track link with 800mm (31.5in) shoes assy	1,630 (3,590) × 2	1,770 (3,900) × 2
2.10.1 Track link assy	520 (1,150) × 2	570 (1,260) × 2
3. Attachment (Assembly of following / STD :)	5,120 (11,300)	←
{6.02m(19ft-9in) Boom + 2.98m(9ft-9in) Arm + 1.0m³ (1.3cu•yd) Bucket}		
3.1 Bucket assy (STD)	810 (1,790)	←
3.2 STD Arm assy (Assembly of following :)	1,030 (2,270)	←
3.2.1 STD Arm	850 (1,870)	←
3.2.2 Bucket cylinder	*210 (460)	←
3.2.3 Idler link	60 (132) × 2	←
3.2.4 Bucket link	100 (220)	←
3.2.5 Pin (2pcs. for mounting bucket cylinder / 2pcs. for mounting bucket)	90 (200)	←
3.3 Boom assy (Assembly of following :)	2,040 (4,500)	←
3.3.1 Boom	1,890 (4,170)	←
3.3.2 Arm cylinder	*370 (815)	←
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	60 (132)	←

Unit ; kg (lb)

Item \ Model	SK250 - 8	SK260LC - 8
4. Lubricant and water (Assembly of following :)	590 (1,300)	←
4.1 Hydraulic oil	160 (350)	←
4.2 Engine oil	20 (44)	←
4.3 Fuel	380 (840)	←
4.4 Water	30 (66)	←

Note

Marks * show dry weight.

Unit ; kg (lb)

Item \ Model	SK330 - 8	SK350LC - 8
Machine complete	33,800 (74,500)	34,600 (76,300)
1. Upper frame assy (Assembly of following :)	15,800 (34,840)	←
1.1 Upper frame	2,950 (6,500)	←
1.2 Counter weight		
Counter weight (Semi-weighted)	8,130 (17,920)	←
Counter weight (weighted)	9,700 (21,380)	←
1.3 Cab	235 (520)	←
1.4 Engine	*699 (1,540)	←
1.5 Hydraulic oil tank	*189 (420)	←
1.6 Fuel tank	*199 (440)	←
1.7 Slewing motor (including reduction unit)	*456 (1,000)	←
1.8 Control valve	*231 (510)	←
1.9 Boom cylinder	*266 (590) × 2	←
1.10 Pin (for mounting boom)	83 (180)	←
1.11 Pump	*155 (340)	←
1.12 Radiator (including intercooler)	*206 (450)	←
2. Lower frame assy (Assembly of following :)	11,300 (24,900)	12,000 (26,460)
2.1 Lower frame	4,070 (8,970)	4,300 (9,480)
2.2 Slewing bearing	545 (1,200)	←
2.3 Travel motor (including reduction unit)	397 (880) × 2	←
2.4 Upper roller	40 (90) × 2	←
2.5 Lower roller	57 (125) × 14	57 (125) × 18
2.6 Front idler	176 (390) × 2	←
2.7 Idler adjuster	186 (410) × 2	←
2.8 Sprocket	75 (165) × 2	←
2.9 Swivel joint	*24 (50)	←
2.10 Track guide	39 (86) × 2	39 (86) × 6
2.11 Track link with 600mm (23.6in) shoes assy	1,870 (4,120) × 2	2,000 (4,410) × 2
Track link with 800mm (31.5in) shoes assy	2,450 (5,400) × 2	2,610 (5,760) × 2
2.11.1 Track link assy	840 (1,850) × 2	900 (1,980) × 2
3. Attachment (Assembly of following / STD :) {6.50m (21ft-4in) Boom + 3.30m (10ft-10in) Arm + 1.40m³ (1.83cu•yd) Bucket}	6,590 (14,530)	←
3.1 Bucket assy (STD)	1,080 (2,380)	←
3.2 STD Arm assy (Assembly of following :)	1,900 (4,190)	←
3.2.1 STD Arm	1,250 (2,760)	←
3.2.2 Bucket cylinder	*266 (590)	←
3.2.3 Idler link	33 (73) × 2	←
3.2.4 Bucket link	142 (313)	←
3.2.5 Pin (2pcs. for mounting bucket cylinder / 2pcs. for mounting bucket)	102 (225)	←
3.3 Boom assy (Assembly of following :)	3,610 (7,960)	←
3.3.1 Boom	2,670 (5,890)	←
3.3.2 Arm cylinder	*539 (1,190)	←
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	75 (165)	←

Unit ; kg (lb)

Item \ Model	SK330 - 8	SK350LC - 8
4. Lubricant and water (Assembly of following :)	862 (1,900)	←
4.1 Hydraulic oil	310 (684)	←
4.2 Engine oil	28 (62)	←
4.3 Fuel	484 (1,070)	←
4.4 Water	44 (97)	←

Note

Marks * show dry weight.

Unit ; kg (lb)

Item \ Model	SK460-8	SK480LC-8
Machine complete	46,400 (102,310)	47,300 (104,300)
1. Upper frame assy (Assembly of following :)	20,230 (44,607)	←
1.1 Upper frame	4,409 (9,722)	←
1.2 Counter weight	9,700 (21,390)	←
1.2.1 Counter weight (Add on)	2,800 (6,174)	←
1.3 Cab	295 (650)	←
1.4 Engine	*1115 (2,460)	←
1.5 Hydraulic oil tank	*297 (655)	←
1.6 Fuel tank (Main)	*155 (342)	←
1.6.1 Fuel tank (Sub)	*111 (245)	←
1.7 Slewing motor (including reduction unit)	*286 (630) × 2	←
1.8 Control valve	*380 (838)	←
1.9 Boom cylinder	*396 (873) × 2	←
1.10 Pin (for mounting boom)	110 (243)	←
1.11 Pump	*240 (530)	←
1.12 Radiator (including intercooler)	*192 (423)	←
2. Lower frame assy (Assembly of following :)	16,500 (36,380)	17,200 (37,930)
2.1 Lower frame	5,690 (12,546)	6,140 (13,540)
2.2 Slewing bearing	667 (1,470)	←
2.3 Travel motor (including reduction unit)	650 (1,433) × 2	←
2.4 Upper roller	30 (66) × 4	←
2.5 Lower roller	98 (216) × 16	98 (216) × 18
2.6 Front idler	270 (595) × 2	←
2.7 Idler adjuster	307 (677) × 2	←
2.8 Sprocket	101 (223) × 2	←
2.9 Swivel joint	*53 (117)	←
2.10 Track guide	50 (110) × 4	←
2.11 Track link with 600mm (23.6in) shoes assy	2,532 (5,583) × 2	2,693 (5,938) × 2
Track link with 800mm (31.5in) shoes assy	3,232 (7,127) × 2	3,438 (7,581) × 2
2.11.1 Track link assy	1,090 (2,403) × 2	1,160 (2,558) × 2
3. Attachment (Assembly of following / STD :) {7.00m(23ft-0in) Boom + 3.45m(11ft-4in) Arm + 1.9m³ (2.48cu•yd) Bucket}	9,820 (21,653)	←
3.1 Bucket assy (STD)	1,510 (3,330)	←
3.2 STD Arm assy (Assembly of following :)	2,575 (5,678)	←
3.2.1 STD Arm	1,646 (3,629)	←
3.2.2 Bucket cylinder	364 (803)	←
3.2.3 Idler link	60 (132) × 2	←
3.2.4 Bucket link	161 (355)	←
3.2.5 Pin (2pcs. for mounting bucket cylinder / 2pcs. for mounting bucket)	159 (351)	←
3.3 Boom assy (Assembly of following :)	4,630 (10,209)	←
3.3.1 Boom	3,640 (8,026)	←
3.3.2 Arm cylinder	591 (1,303)	←
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	128 (282)	←

Unit ; kg (lb)

Item \ Model	SK460-8	SK480LC-8
4. Lubricant and water (Assembly of following :)	934 (2,060)	←
4.1 Hydraulic oil	311 (686)	←
4.2 Engine oil	41 (90)	←
4.3 Fuel	541 (1,193)	←
4.4 Water	41 (90)	←

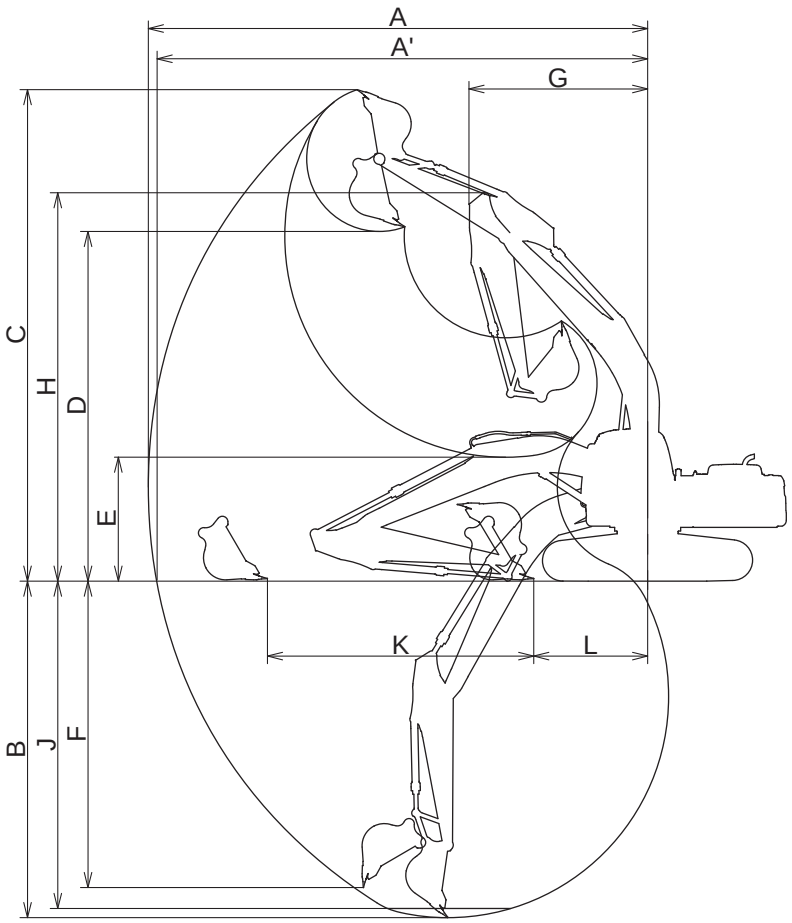
Note

Marks * show dry weight.

1.7 WORKING RANGES

SK140LC-8

A. Backhoe Attachment



LP11Z00132P1
LP11Z00149P1
LP11Z00151P1

Unit : mm(ft-in)

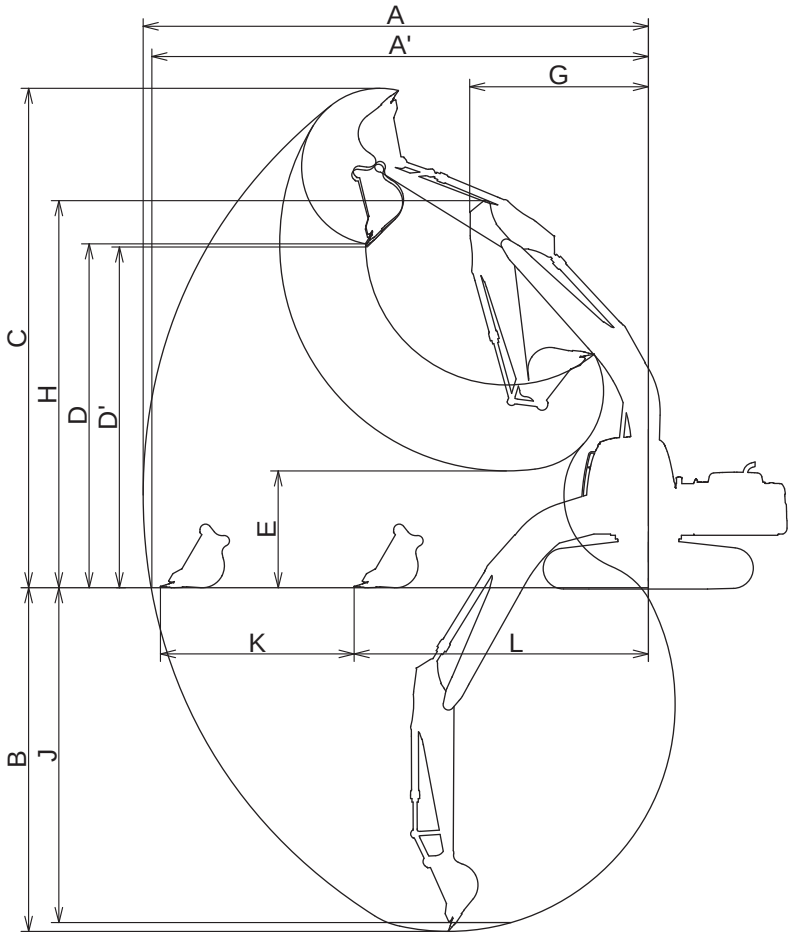
Item			Attachment: 2.09 m (6'-10") Arm + 0.57 m³ (0.75 cu•yd) Bucket	2.38 m(7'-10") Arm + 0.50 m³ (0.65 cu•yd) Bucket	2.84 m (9'-4") Arm + 0.38 m³ (0.50 cu•yd) Bucket
A	Maximum digging reach		8,040 (26'-5")	8,340 (27'-4")	8,780 (28'-10")
A'	Maximum digging reach at ground level		7,890 (25'-11")	8,190 (26'-10")	8,640 (28'-4")
* B	Maximum digging depth		5,230 (17'-2")	5,520 (18'-1")	5,980 (19'-7")
* C	Maximum digging height		8,270 (27'-2")	8,500 (21'-11")	8,810 (28'-11")
* D	Maximum damping clearance		5,850 (19'-2")	6,090 (20'-0")	6,390 (21'-0")
* E	Minimum damping clearance		2,530 (8'-4")	2,230 (7'-4")	1,790 (5'-10")
* F	Max. vertical wall digging depth		4,680 (15'-4")	4,880 (16'-0")	5,550 (18'-3")
G	Minimum swing radius		2,610 (8'-7")	2,620 (8'-7")	2,750 (9'-0")
* H	Height at min. swing radius		6,540 (21'-5")	6,520 (21'-5")	6,540 (21'-5")
* J	8 feet level digging depth		4,970 (16'-4")	5,290 (17'-4")	5,790 (19'-0")
K	Horizontal digging stroke at ground level	Stroke	3,590 (11'-9")	4,210 (13'-9")	4,700 (15'-5")
L		Minimum	2,450 (8'-0")	2,140 (7'-0")	2,080 (6'-10")

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK140LC-8

B. Face Shovel Attachment



LP11Z00148P1
LP11Z00150P1
LP11Z00152P1

Unit : mm(ft-in)

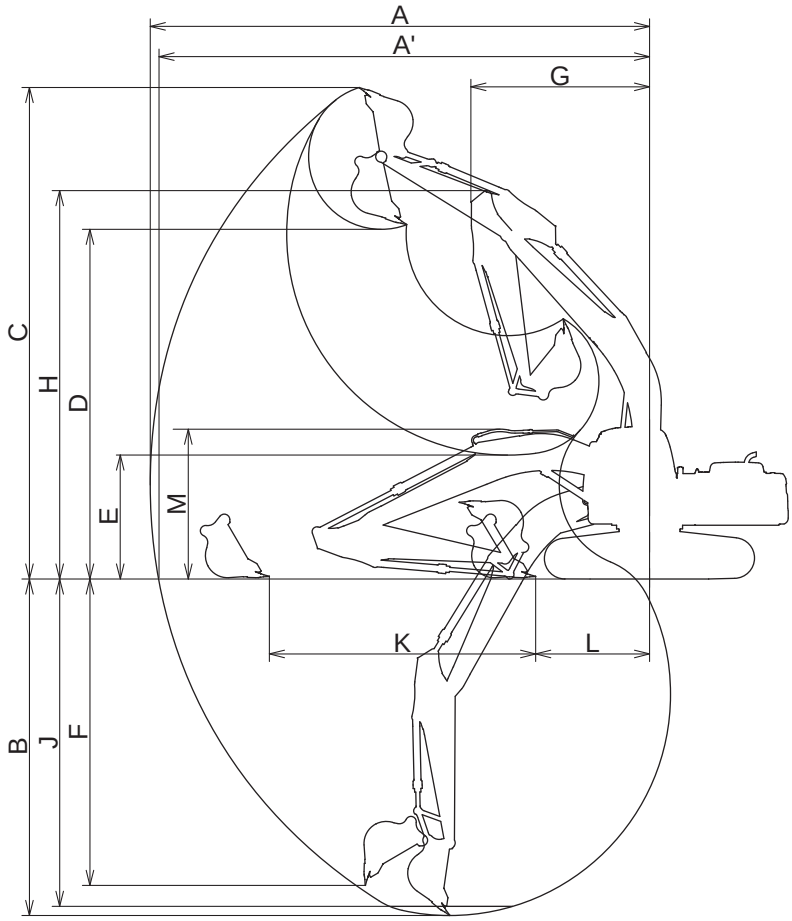
Item			Attachment	2.09 m (6'-10") Arm + 0.57 m³ (0.75 cu•yd) Bucket	2.38 m(7'-10") Arm + 0.50 m³ (0.65 cu•yd) Bucket	2.84 m (9'-4") Arm + 0.38 m³ (0.50 cu•yd) Bucket
A	Maximum digging reach			8,170 (26'-10")	8,480 (27'-10")	8,910 (29'-3")
A'	Maximum digging reach at ground level			8,020 (26'-4")	8,330 (27'-4")	8,780 (28'-10")
* B	Maximum digging depth			5,360 (17'-7")	5,660 (18'-7")	6,110 (20'-1")
* C	Maximum digging height			8,430 (27'-8")	8,680 (28'-6")	8,970 (29'-5")
* D	Maximum damping clearance			5,830 (19'-2")	6,120 (20'-1")	6,400 (21'-0")
* D'	Maximum damping clearance (45°)			5,270 (17'-3")	5,230 (17'-2")	5,510 (18'-1")
* E	Minimum damping clearance			2,400 (7'-10")	2,100 (6'-11")	1,670 (5'-6")
G	Minimum swing radius			2,610 (8'-7")	2,620 (8'-7")	2,750 (9'-0")
* H	Max. height at min. slewing radius			6,540 (21'-5")	6,520 (21'-5")	6,540 (21'-5")
* J	8 feet level digging depth			5,110 (16'-9")	5,440 (17'-10")	5,930 (19'-5")
K	Horizontal digging stroke at ground level	Stroke		2,930 (9'-7")	3,430 (11'-3")	4,240 (13'-11")
L		Minimum		4,940 (16'-2")	4,740 (15'-7")	4,370 (14'-4")

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK200-8

A. Backhoe Attachment



Unit : mm

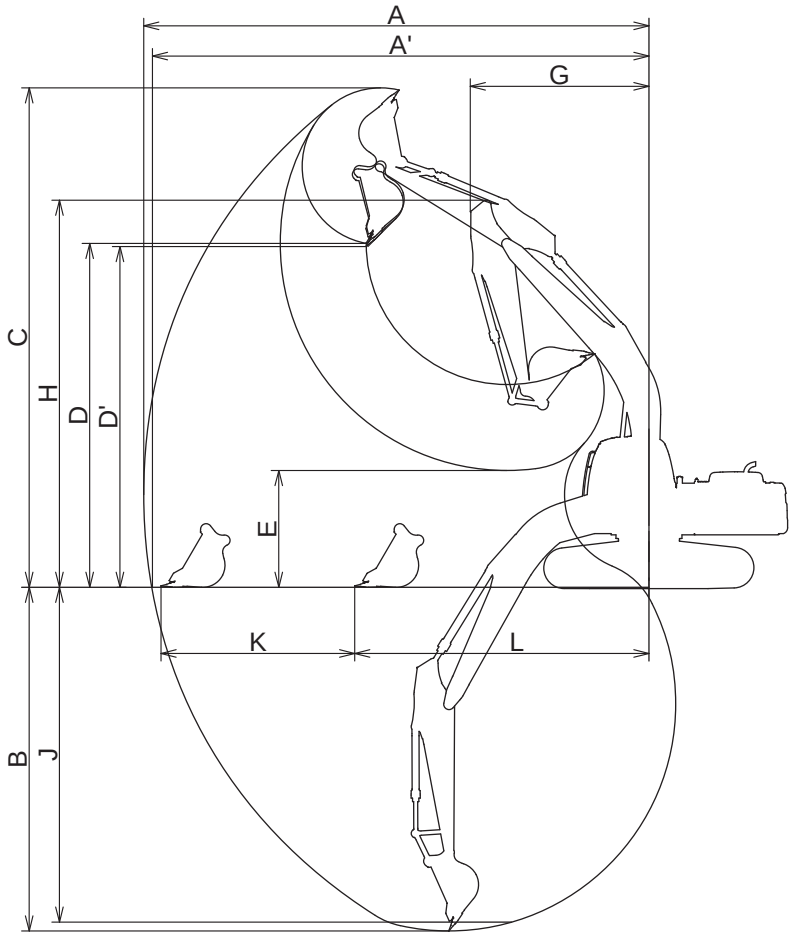
Item	Attachment	2.4 m (7'-10") Arm + 0.93 m³ (1.22 cu•yd) Bucket	2.94 m (9'-8") Arm + 0.80 m³ (1.05 cu•yd) Bucket	3.5 m (11'-6") Arm + 0.70 m³ (0.92 cu•yd) Bucket
A	Maximum digging reach	9,420	9,900	10,340
A'	Maximum digging reach at ground level	9,240	9,730	10,170
* B	Maximum digging depth	6,160	6,700	7,260
* C	Maximum digging height	9,510	9,720	9,750
* D	Maximum damping clearance	6,680	6,910	6,970
* E	Minimum damping clearance	2,980	2,430	1,870
* F	Max. vertical wall digging depth	5,570	6,100	6,470
G	Minimum swing radius	3,560	3,540	3,480
* H	Height at min. swing radius	7,750	7,680	7,720
* J	8 feet level digging depth	5,950	6,520	7,080
K	Horizontal digging stroke at ground level — Stroke	4,080	5,270	6,080
L	Horizontal digging stroke at ground level — Minimum	2,980	2,270	1,900

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK200-8

B. Face Shovel Attachment



Unit : mm

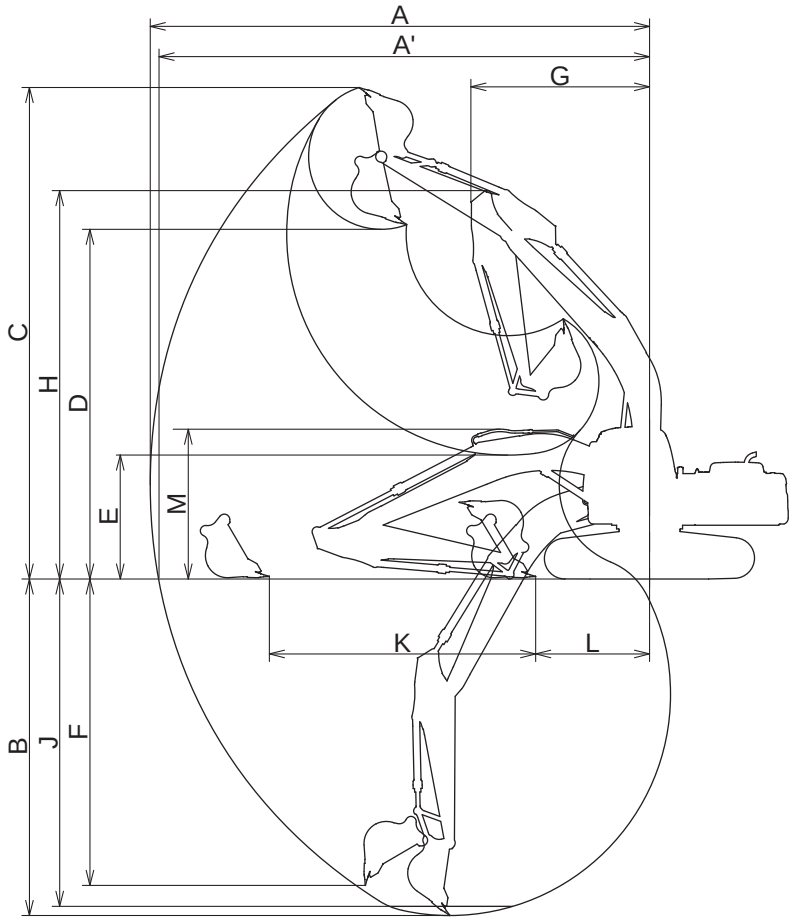
Item			Attachment	2.4 m (7'-10") Arm + 0.93 m³ (1.22 cu•yd) Bucket	2.94 m (9'-8") Arm + 0.80 m³ (1.05 cu•yd) Bucket	3.5 m (11'-6") Arm + 0.70 m³ (0.92 cu•yd) Bucket
A	Maximum digging reach			9,540	10,020	10,460
A'	Maximum digging reach at ground level			9,360	9,850	10,290
* B	Maximum digging depth			6,280	6,820	7,380
* C	Maximum digging height			9,680	9,910	9,970
* D	Maximum damping clearance			6,600	6,820	6,870
* D'	Maximum damping clearance (45°)			6,480	6,760	6,880
* E	Minimum damping clearance			2,860	2,320	1,760
G	Minimum swing radius			3,560	3,540	3,480
* H	Max. height at min. slewing radius			7,750	7,680	7,720
* J	8 feet level digging depth			6,080	6,640	7,210
K	Horizontal digging stroke at ground level	Stroke		3,040	3,840	4,670
L		Minimum		6,150	5,840	5,450

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK250-8

A. Backhoe Attachment



Unit : mm

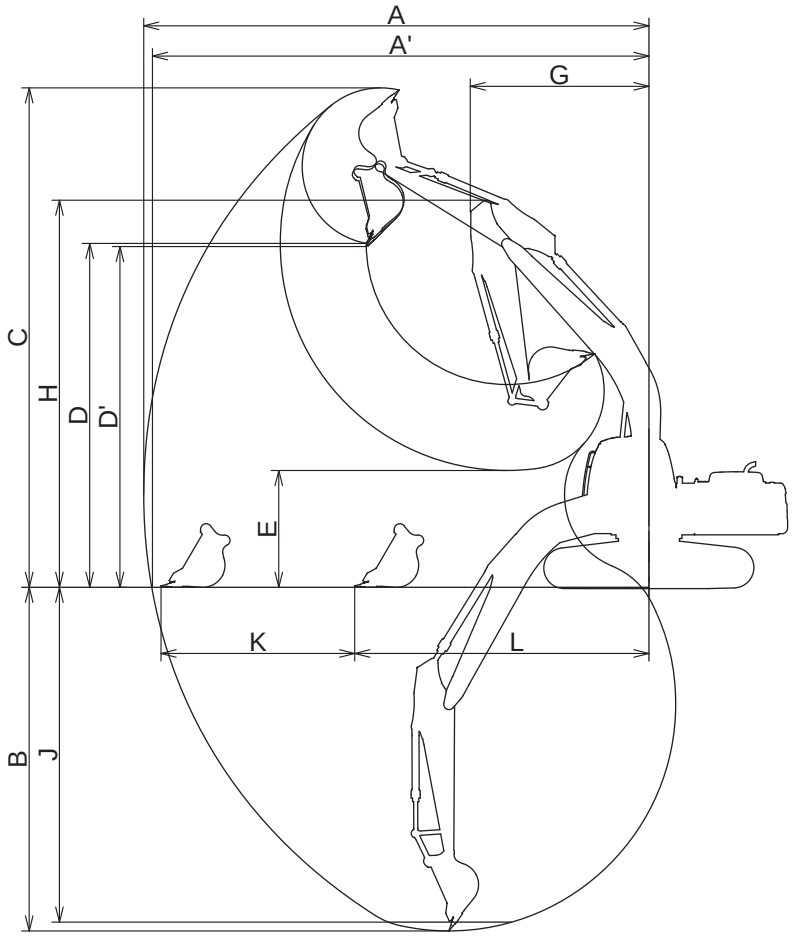
Item	Attachment	2.5 m (8'-2") Arm + 1.2 m³ (1.57 cu•yd) Bucket	2.98 m (9'-9") Arm + 1.0 m³ (1.31 cu•yd) Bucket	3.66 m (12'-0") Arm + 0.81 m³ (1.06 cu•yd) Bucket
A	Maximum digging reach	9,890	10,310	10,980
A'	Maximum digging reach at ground level	9,720	10,140	10,820
* B	Maximum digging depth	6,520	7,000	7,680
* C	Maximum digging height	9,650	9,800	1,0220
* D	Maximum damping clearance	6,720	6,880	7,280
* E	Minimum damping clearance	3,030	2,550	1,870
* F	Max. vertical wall digging depth	5,820	6,150	6,970
G	Minimum swing radius	3,910	3,910	3,920
* H	Height at min. swing radius	8,040	7,970	7,950
* J	8 feet level digging depth	6,320	6,820	7,530
K	Horizontal digging stroke at ground level — Stroke	4,200	5,260	6,480
L	Horizontal digging stroke at ground level — Minimum	3,260	2,610	2,070

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK250-8

B. Face Shovel Attachment



Unit : mm

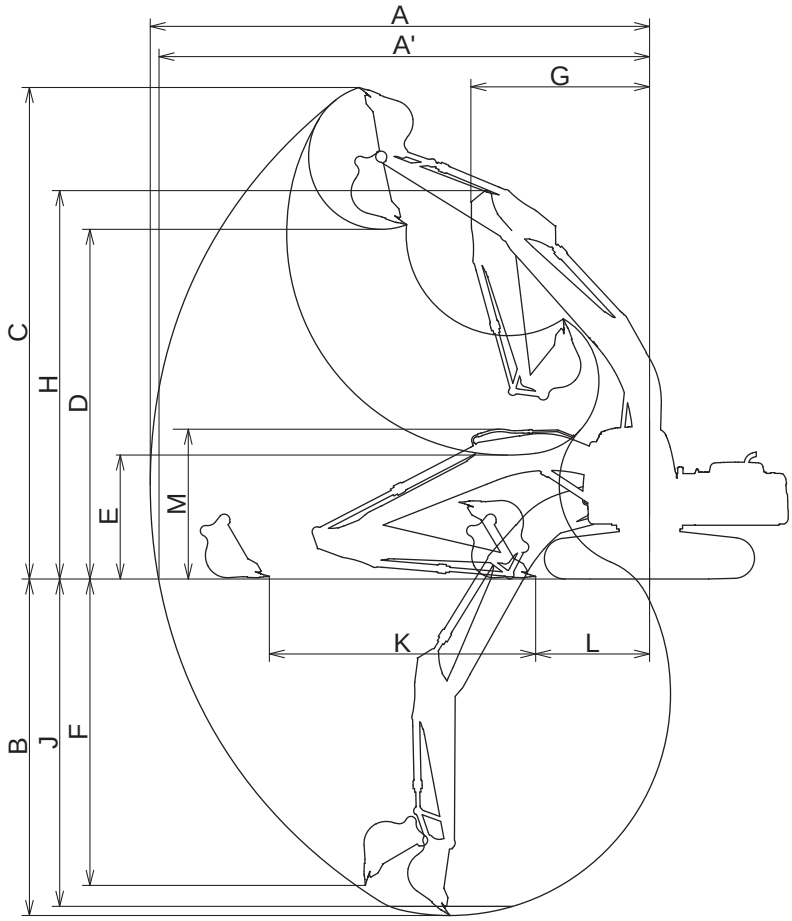
Item			Attachment	2.5 m (8'-2") Arm + 1.2 m³ (1.57 cu•yd) Bucket	2.98 m (9'-9") Arm + 1.0 m³ (1.31 cu•yd) Bucket	3.66 m (12'-0") Arm + 0.81 m³ (1.06 cu•yd) Bucket
A	Maximum digging reach			10,040	10,460	11,130
A'	Maximum digging reach at ground level			9,870	10,300	10,980
* B	Maximum digging depth			6,680	7,160	7,840
* C	Maximum digging height			9,900	10,060	10,470
* D	Maximum damping clearance			6,690	6,830	7,250
* D'	Maximum damping clearance (45°)			6,040	6,150	6,330
* E	Minimum damping clearance			2,870	2,400	1,710
G	Minimum swing radius			3,910	3,910	3,920
* H	Max. height at min. slewing radius			8,040	7,970	7,950
* J	8 feet level digging depth			6,480	6,980	7,690
K	Horizontal digging stroke at ground level	Stroke		3,350	4,100	5,280
L		Minimum		6,320	5,980	5,490

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK330-8

A. Backhoe Attachment



Unit : mm

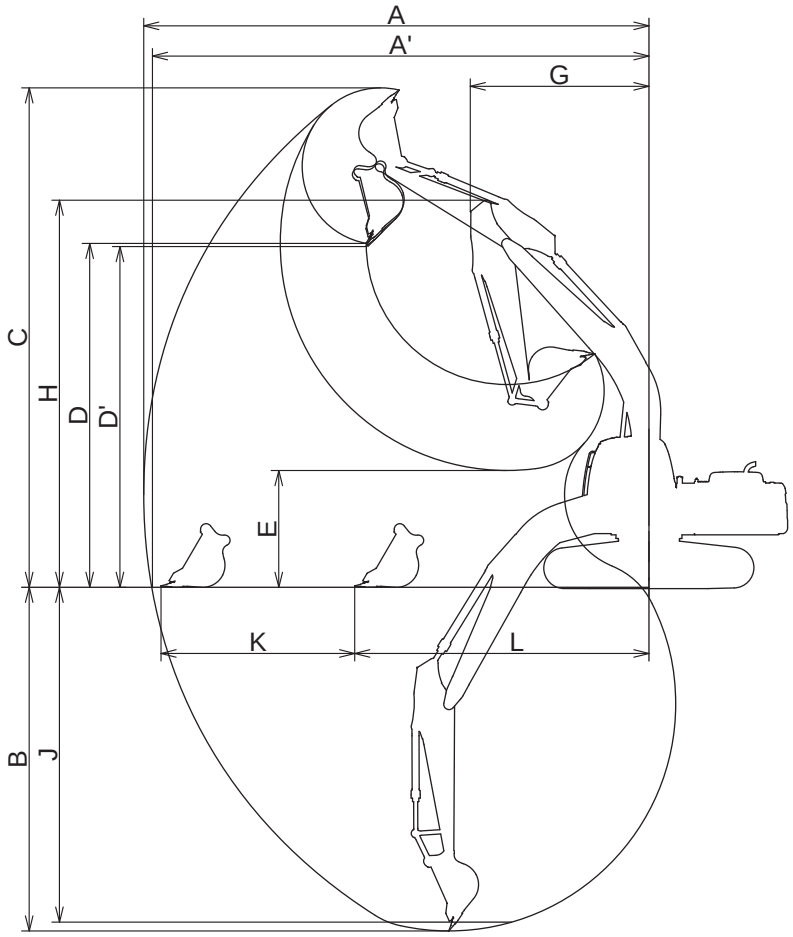
Item	Attachment	2.25 m Arm + 2.30 m³ (3.0 cu•yd) Bucket	2.60 m Arm + 1.60 m³ (2.09 cu•yd) Bucket	3.30 m Arm + 1.40 m³ (1.83 cu•yd) Bucket	4.15 m Arm + 1.20 m³ (1.57 cu•yd) Bucket
A	Maximum digging reach	10,350	10,610	11,260	11,970
A'	Maximum digging reach at ground level	10,140	10,400	11.060	11,790
* B	Maximum digging depth	6,510	6,860	7,560	8,410
* C	Maximum digging height	10,280	10,260	10,580	10,700
* D	Maximum damping clearance	7,050	7,000	7,370	7,530
* E	Minimum damping clearance	3,730	3,320	2,620	1,770
* F	Max. vertical wall digging depth	5,280	5,840	6,610	7,150
G	Minimum swing radius	4,480	4,450	4,370	4,430
* H	Height at min. swing radius	8,810	8,750	8,640	8,650
* J	8 feet level digging depth	6,310	6,670	7,400	8,270
K	Horizontal digging stroke at ground level	Stroke	3,400	4,210	5,820	7,210
L		Minimum	4,290	3,660	2,700	2,020

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK330-8

B. Face Shovel Attachment



Unit : mm

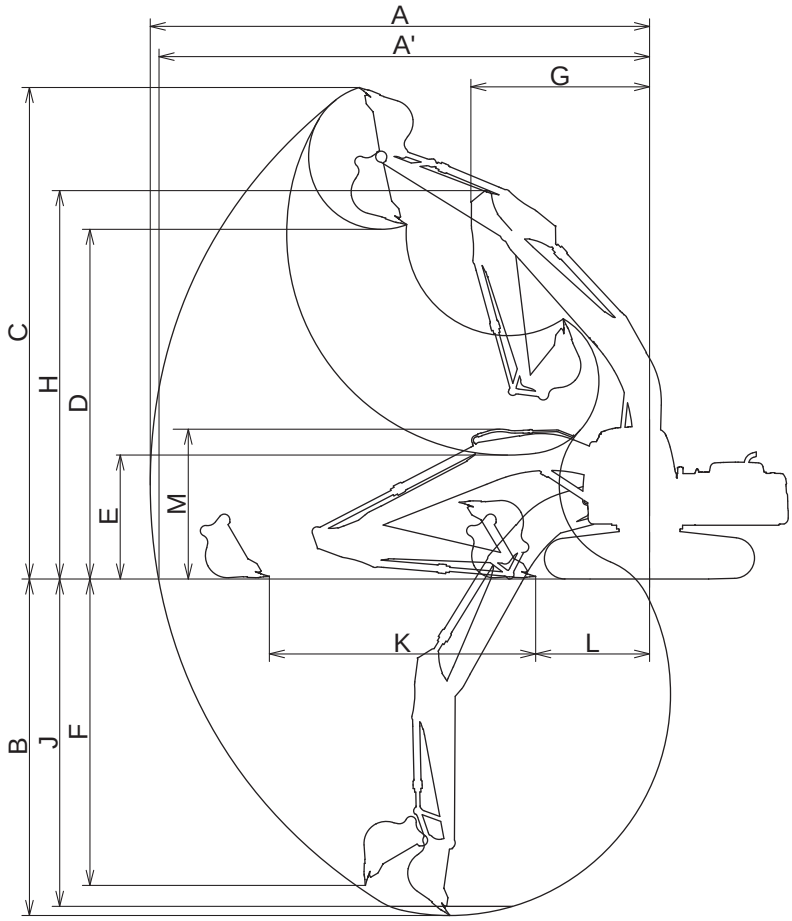
Item			Attachment	2.60 m Arm + 1.60 m³ (2.09 cu•yd) Bucket	3.30 m Arm + 1.40 m³ (1.83 cu•yd) Bucket	4.15 m Arm + 1.20 m³ (1.57 cu•yd) Bucket
	A	Maximum digging reach		10,750	11,400	12,110
	A'	Maximum digging reach at ground level		10,550	11,210	11,930
*	B	Maximum digging depth		7,000	7,700	8,550
*	C	Maximum digging height		10,580	10,880	11,050
*	D	Maximum damping clearance		6,950	7,260	7,400
*	D'	Maximum damping clearance (45°)		6,810	6,940	7,400
*	E	Minimum damping clearance		3,180	2,470	1,620
	G	Minimum swing radius		4,450	4,370	4,430
*	H	Max. height at min. slewing radius		8,750	8,640	8,650
*	J	8 feet level digging depth		6,820	7,550	8,420
	K	Horizontal digging stroke at ground level	Stroke	3,150	4,240	5,550
	L		Minimum	7,190	6,750	6,150

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK460-8

A. Backhoe Attachment



Unit : mm

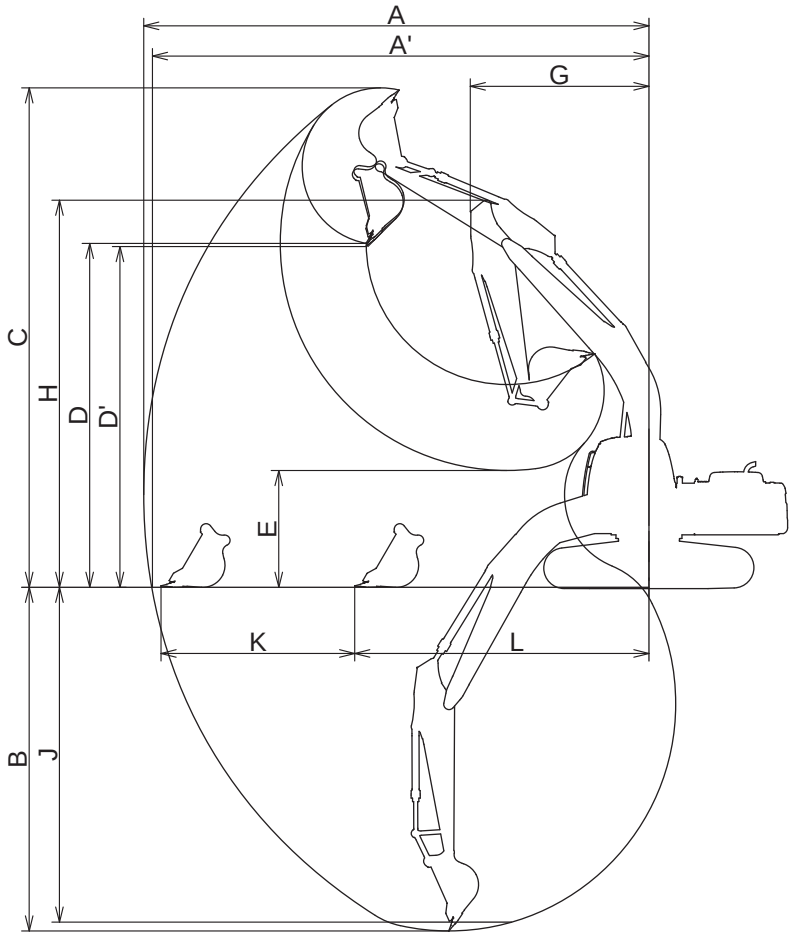
Item			Attachment: 7.0 m Boom + 3.0 m, Short arm + 2.1m³ (2.75 cu•yd) Bucket	7.0 m Boom + 3.45 m, Stundard arm + 1.9m³ (2.48 cu•yd) Bucket	7.0 m Boom + 4.9 m, Long arm + 1.35m³ (1.77 cu•yd) Bucket
A	Maximum digging reach		11,770	12,070	13,480
A'	Maximum digging reach at ground level		11,540	11,840	13,280
* B	Maximum digging depth		7,360	7,810	9,260
* C	Maximum digging height		11,160	10,930	11,700
* D	Maximum damping clearance		7,720	7,580	8,290
* E	Minimum damping clearance		3,220	2,770	1,320
* F	Max. vertical wall digging depth		6,680	7,120	8,410
G	Minimum swing radius		5,270	5,140	5,300
* H	Height at min. swing radius		9,030	9,040	9,040
* J	8 feet level digging depth		7,210	7,670	9,150
K	Horizontal digging stroke at ground level	Stroke	5,210	6,100	8,280
L		Minimum	3,590	3,000	2,340

IMPORTANT

Marked * dimensions do not include height of shoe lug

SK460-8

B. Face Shovel Attachment



Unit : mm

Item			Attachment: 7.0 m Boom + 4.9 m Long arm + 1.35m³(1.77 cu•yd) Bucket
	A Maximum digging reach		13,690
	A' Maximum digging reach at ground level		13,500
*	B Maximum digging depth		9,480
*	C Maximum digging height		12,070
*	D Maximum damping clearance		8,150
*	D' Maximum damping clearance (45°)		7,690
*	E Minimum damping clearance		1,110
	G Minimum swing radius		5,300
*	H Height at min. swing radius		9,040
*	J 8 feet level digging depth		9,370
	K	Horizontal digging stroke at ground level — Stroke	7,380
	L	Horizontal digging stroke at ground level — Minimum	5,890

IMPORTANT

Marked * dimensions do not include height of shoe lug

1.8 LIFTING DIAGRAM

(1) Conditions of calculation

1) The lifting load shows the lower value either 87% of hydraulic lifting capacity or 75% of tipping load.
2) The load point is on the bucket supporting point, and the bucket position is a closed position.
3) The values in the upper rows show the lifting capacity of a machine facing sideways, and values in the lower rows show a machine facing longitudinally.
4) Unit : ton, Crawler : 600mm (24in), iron crawler
5) Set hydraulic pressure 34.3 MPa

(2) Reference No. list of lifting diagram

SK140LC-8

Arm		2.38m (7'10") STD Arm	2.09 m (6'10") Short Arm	2.84 m (9'4") Long Arm
Bucket		0.50 m^3 (0.65 cuyd) bucket	0.57 m^3 (0.75 cuyd) bucket	0.38 m^3 (0.50 cuyd) bucket
No.	Long crawler	(1)	(2)	(3)

SK200-8

Arm		2.94m (9'8") STD Arm	2.4 m (7'10") Short Arm	3.5 m (11'6") Long Arm
Bucket		0.80 m^3 (1.05 cuyd) bucket	0.93 m^3 (1.22 cuyd) bucket	0.68 m^3 (0.89 cuyd) bucket
No.	STD crawler	(1)	(3)	(5)
	Long crawler	(2)	(4)	(6)

SK250-8

Arm		2.98 m (9'9") STD Arm	2.5 m (8'2") Short Arm	3.66 m (12'0") Long Arm
Bucket		1.0 m^3 (1.31 cuyd) bucket	1.20 m^3 (1.57 cuyd) bucket	0.81 m^3 (1.06 cuyd) bucket
No.	STD crawler	(7)	(9)	—
	Long crawler	(8)	(10)	—

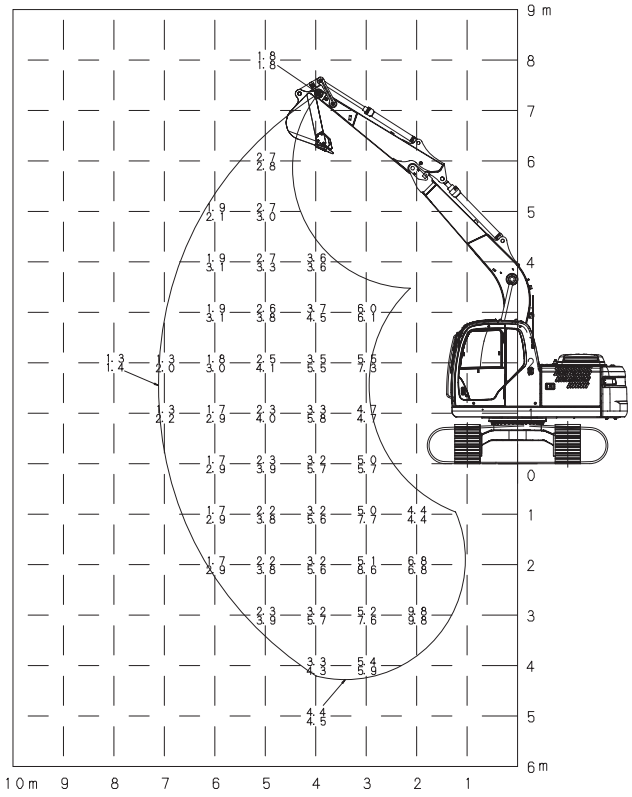
SK330-8

Arm		3.30 m (10'10") STD Arm	2.60 m (8'6") Short Arm	4.15 m (13'7") Long Arm
Bucket		1.40 m^3 (1.83 cuyd) bucket	1.60 m^3 (2.09 cuyd) bucket	1.20 m^3 (1.57 cuyd) bucket
No.	STD crawler	(11)	(13)	(15)
	Long crawler	(12)	(14)	(16)

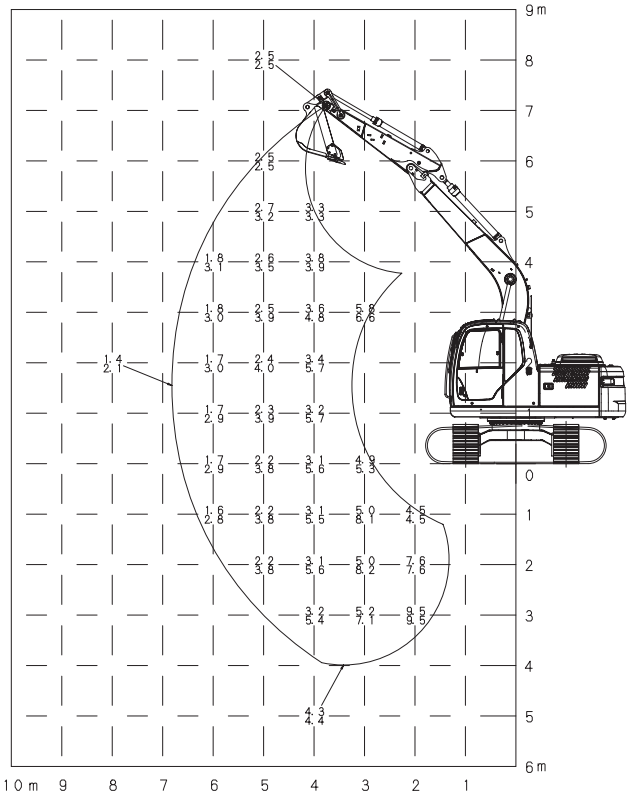
SK460-8

Arm		3.15 m (11'4") STD Arm	3.0 m (9'10") Short Arm	4.90 m (16'1") Long Arm
Bucket		1.90 m^3 (2.48 cuyd) bucket	2.10 m^3 (2.75 cuyd) bucket	1.35 m^3 (1.77 cuyd) bucket
No.	STD crawler	(17)	(19)	(21)
	Long crawler	(18)	(20)	(22)

(1) Unit:TON



(2) Unit:TON



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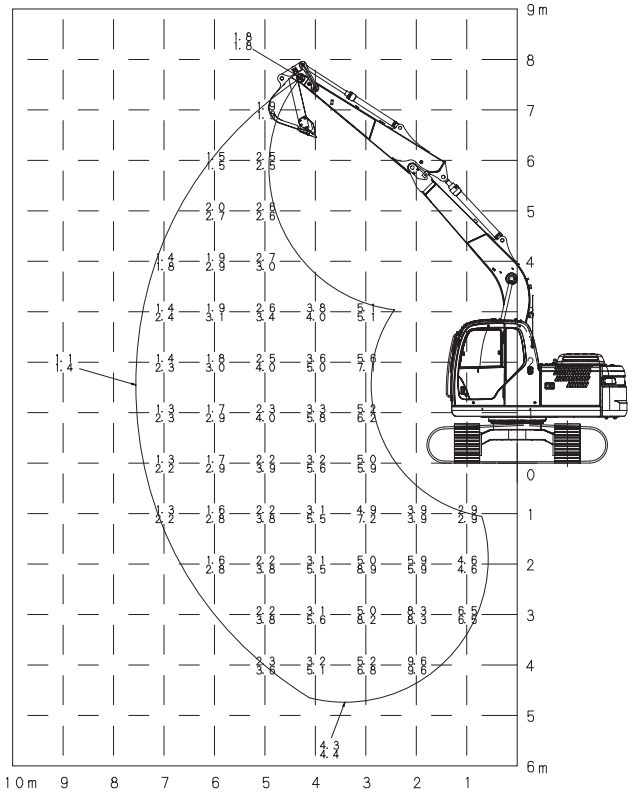

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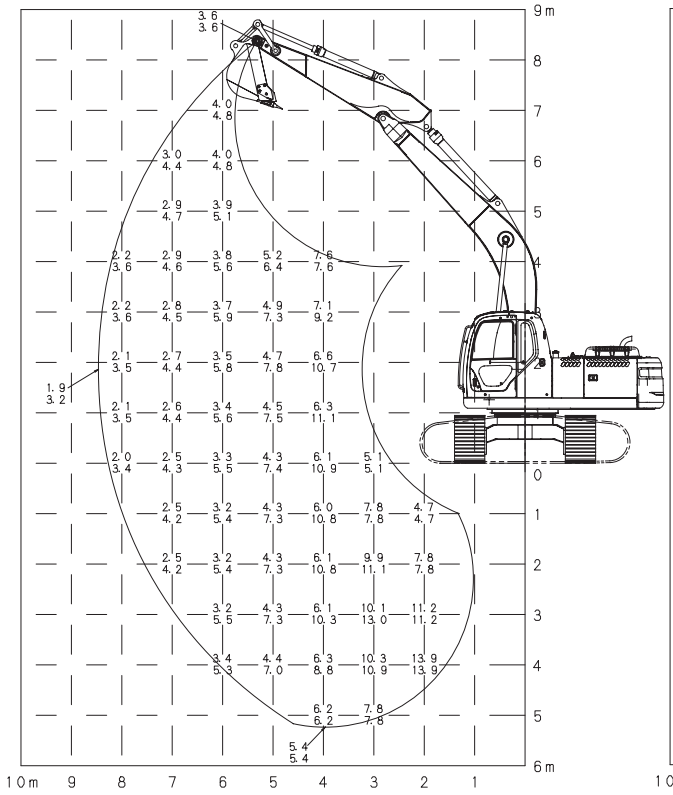

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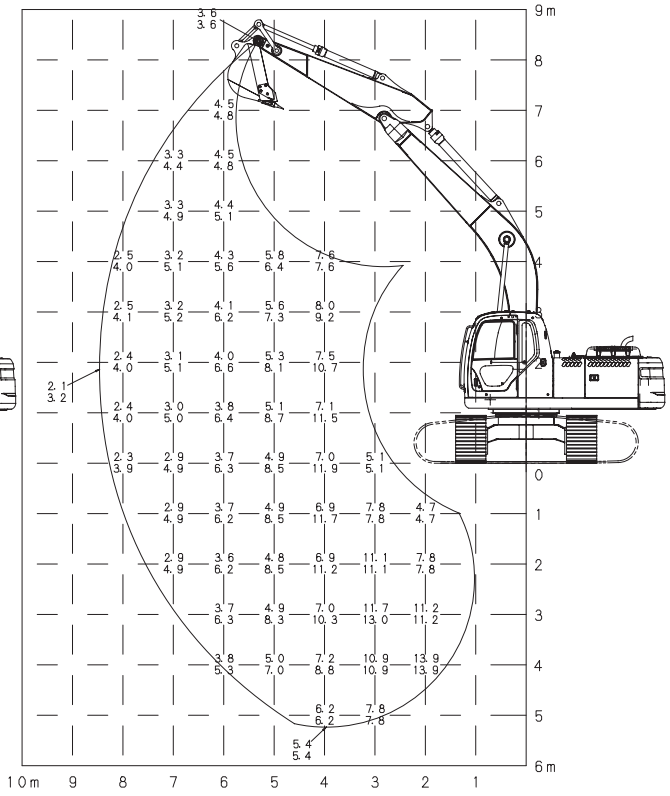

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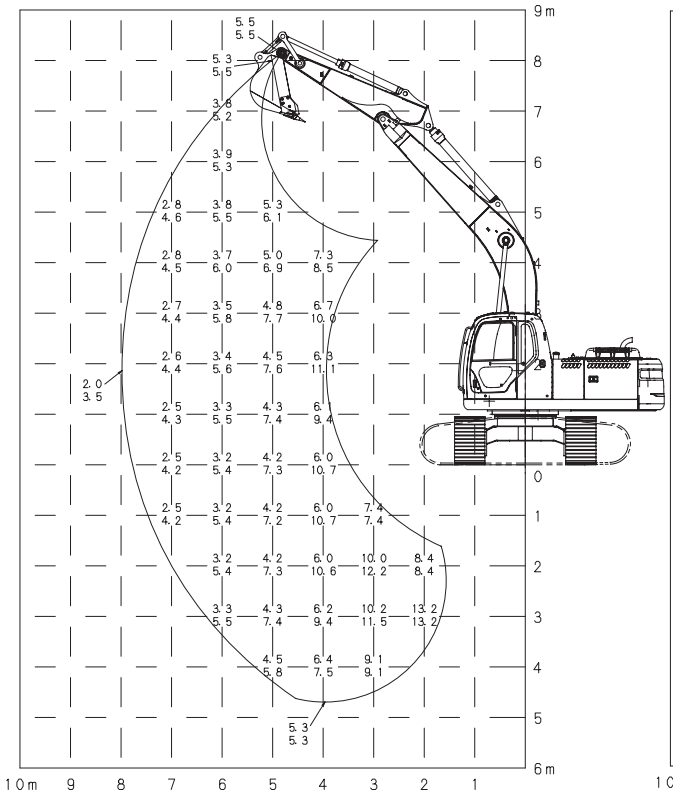

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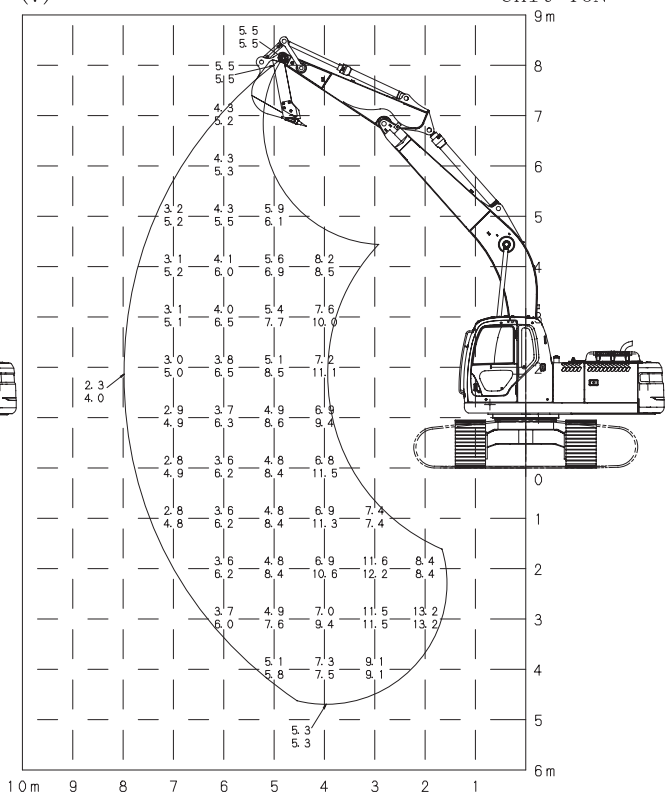

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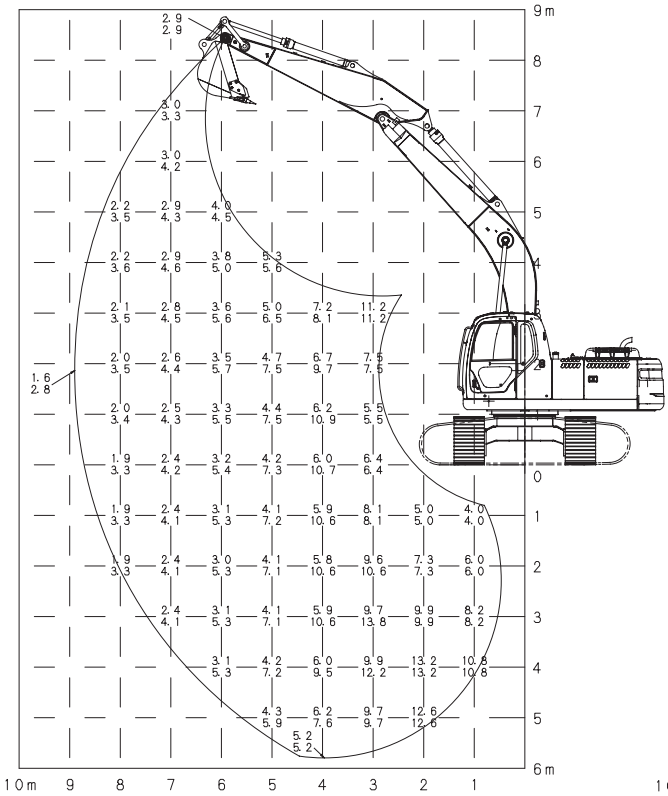

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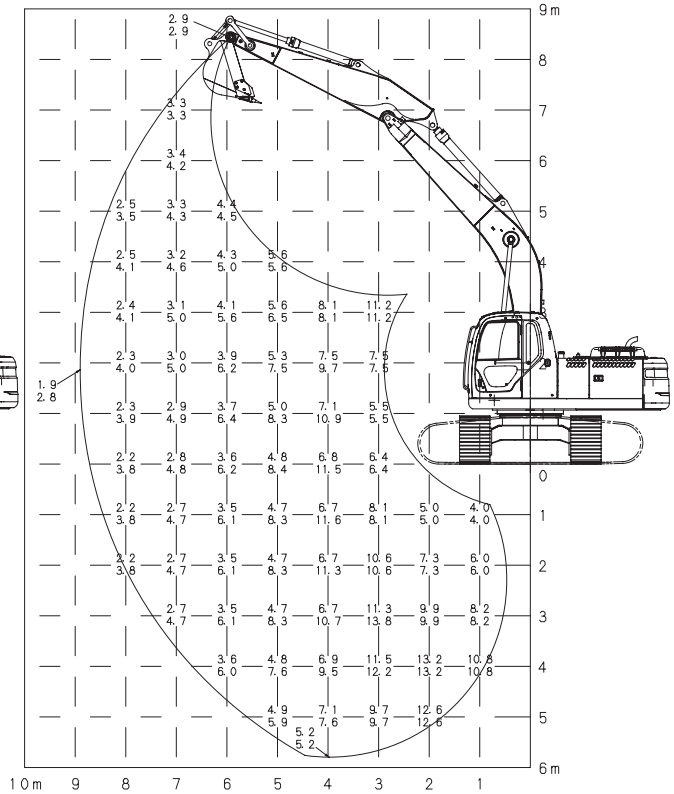

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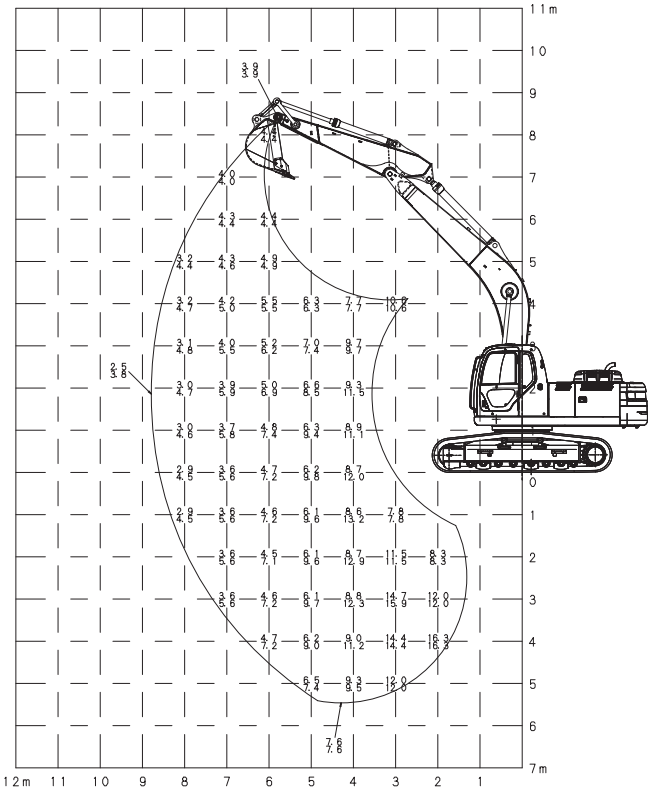

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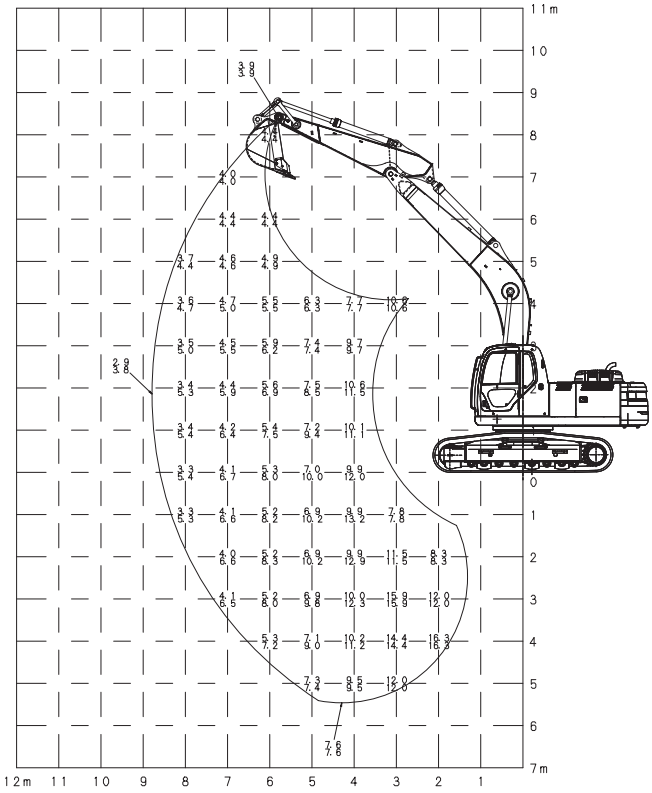
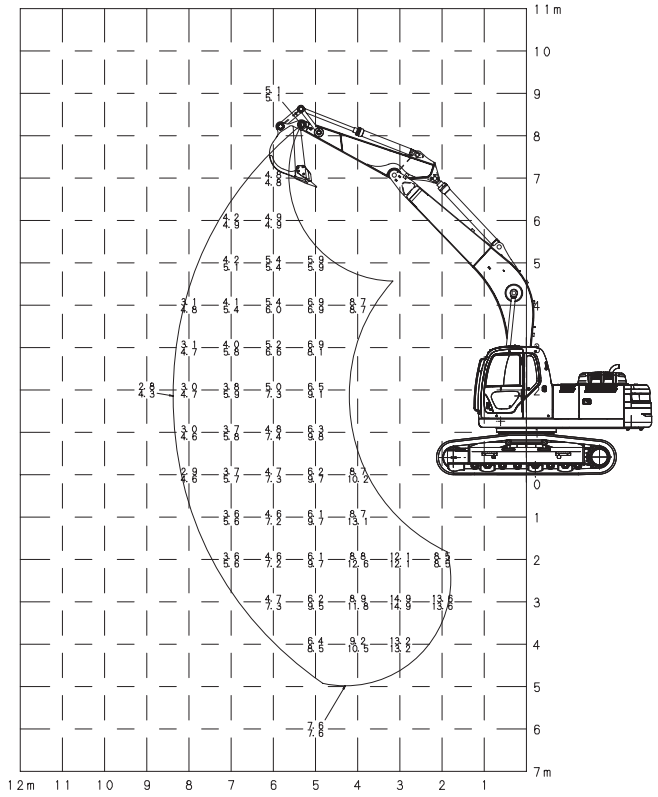


(12) Unit:TON



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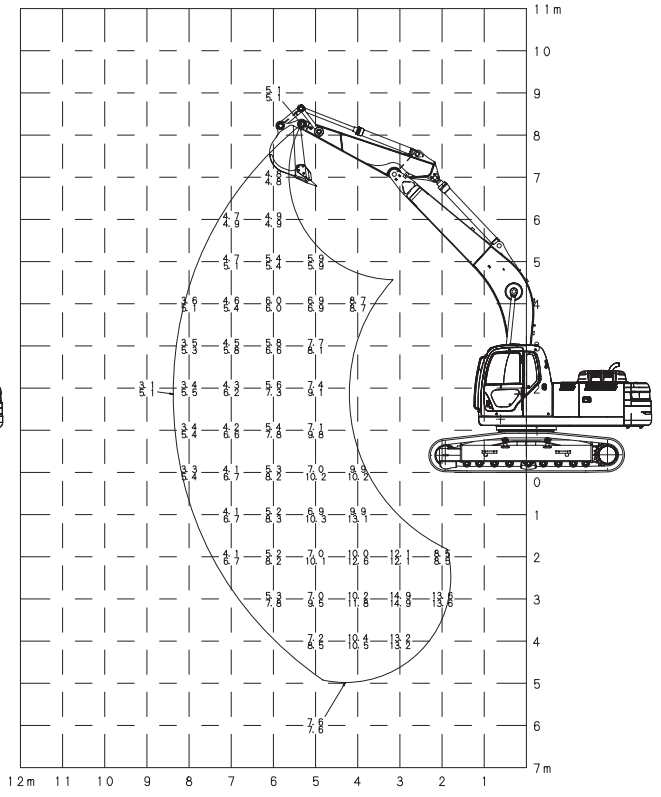

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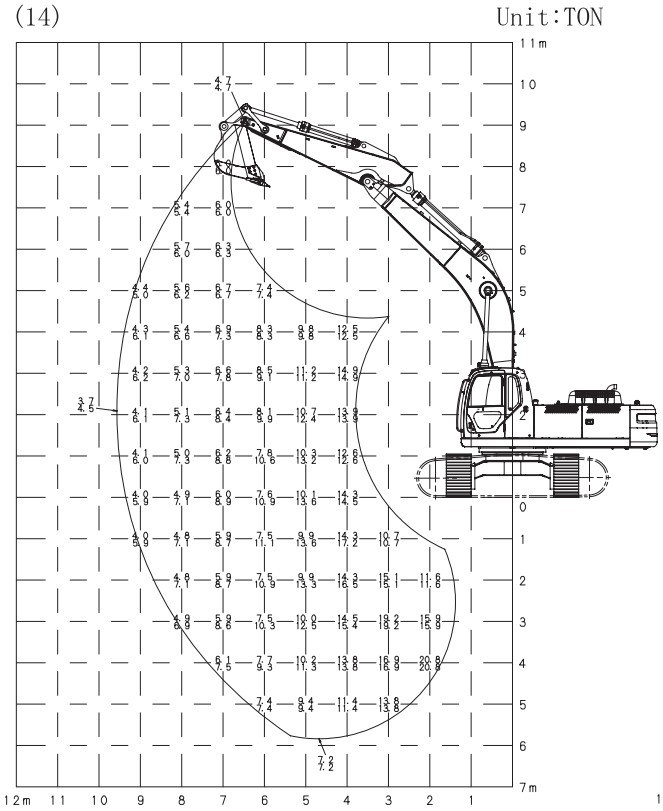
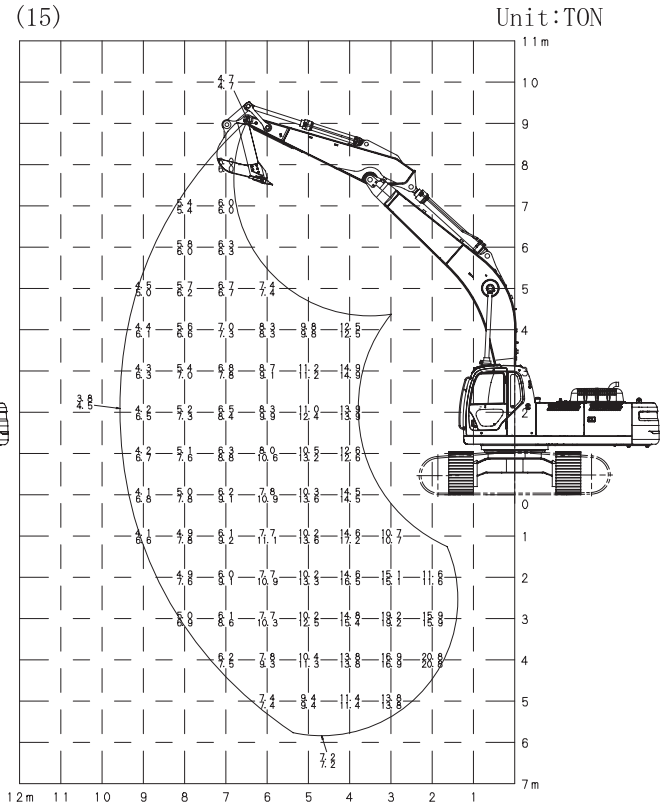


(15) Unit:TON



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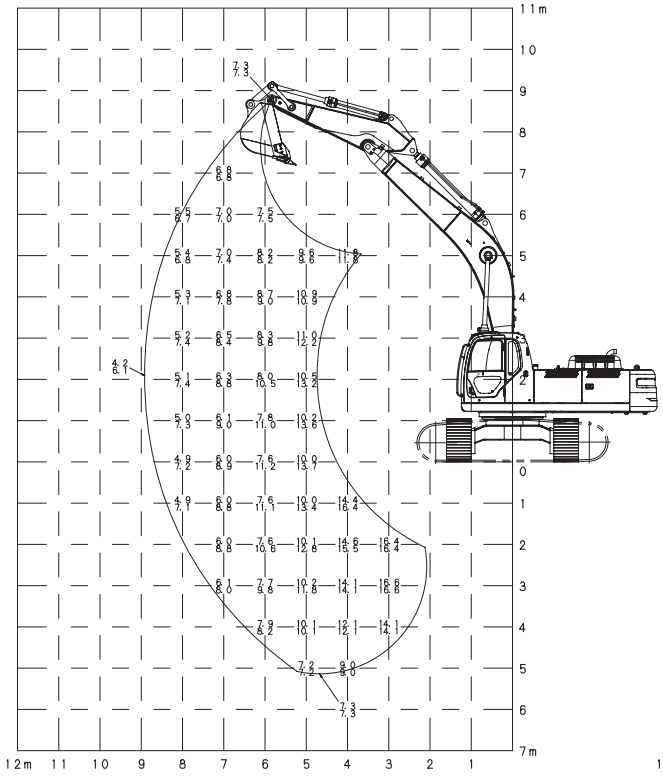

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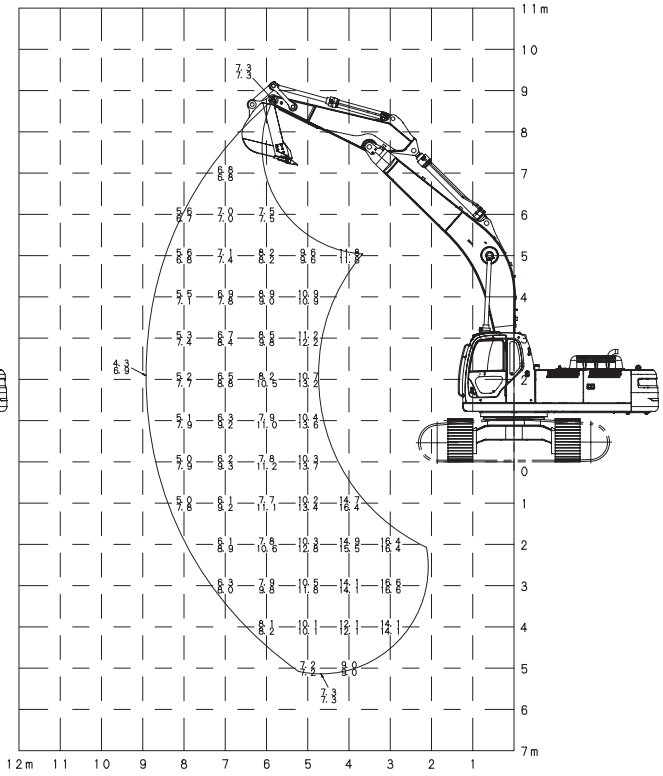
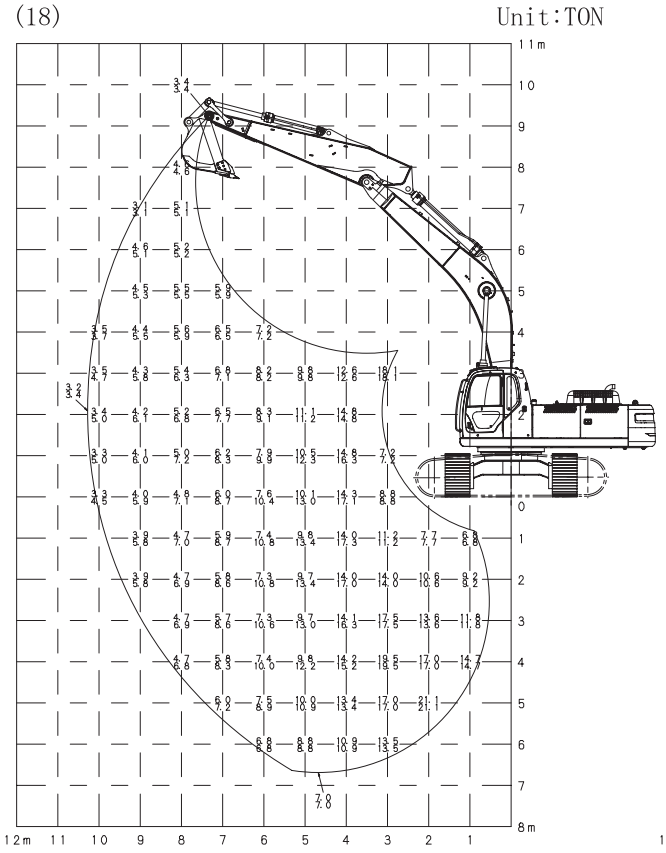


(18) Unit:TON



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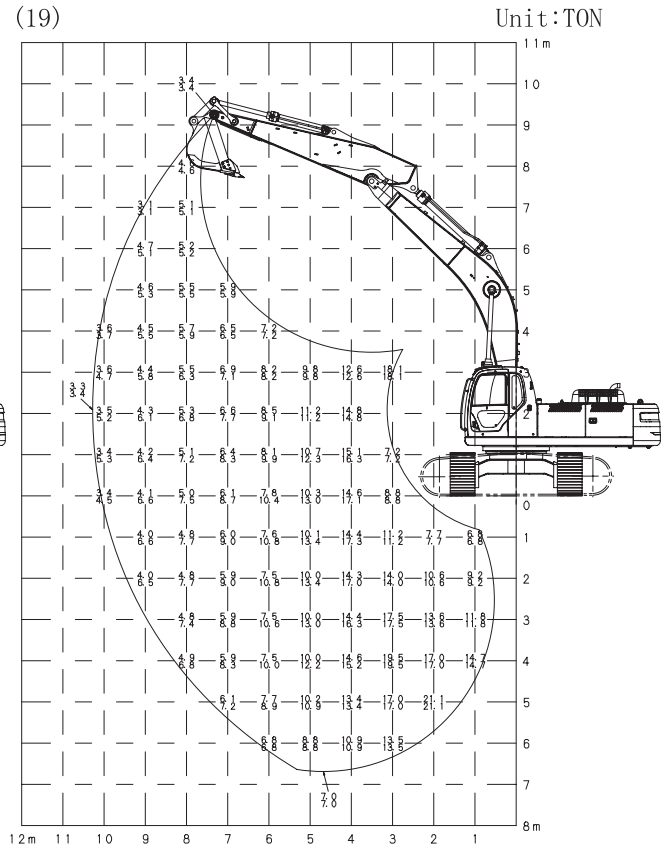
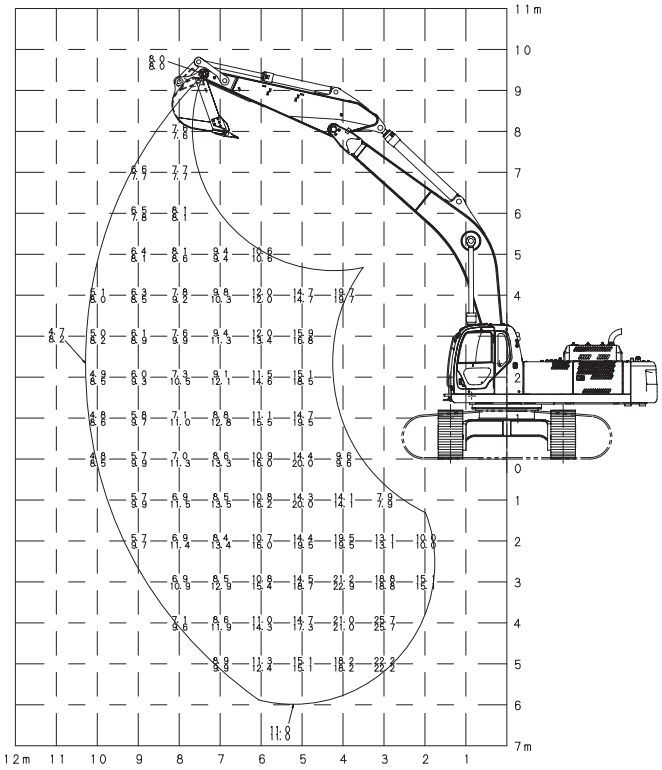


(20) Unit:TON



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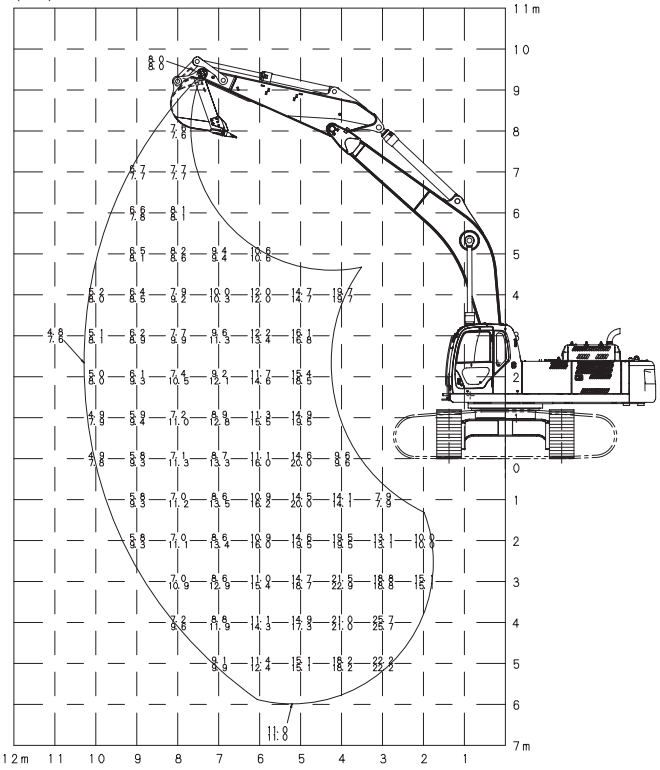

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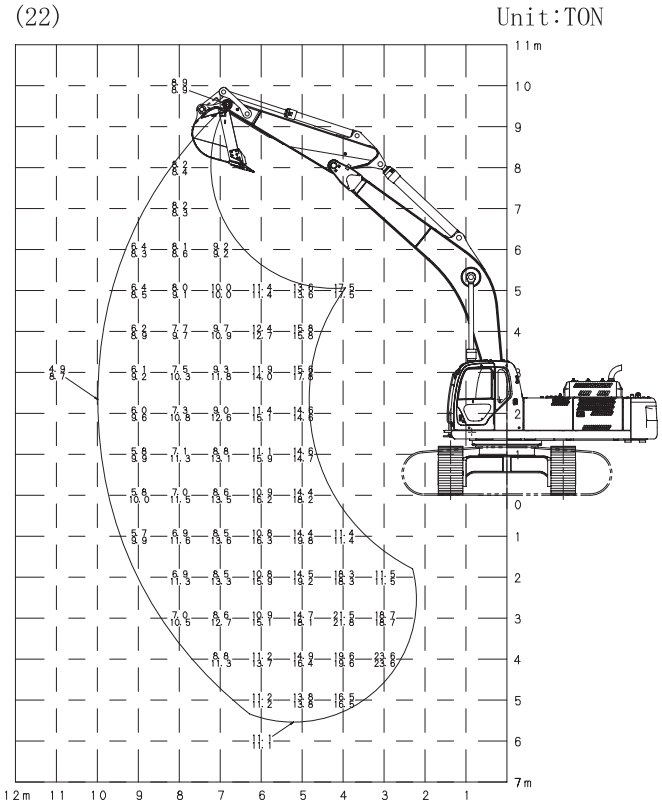

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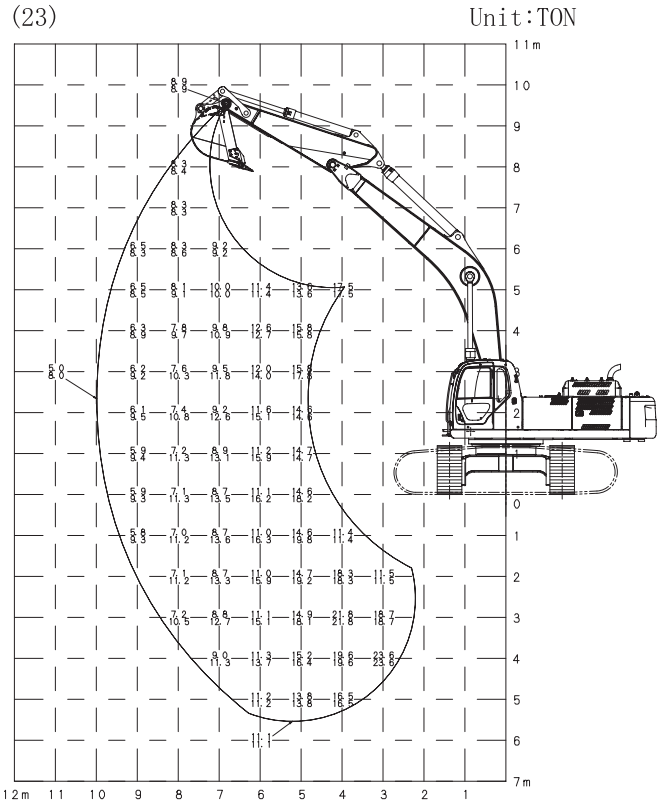

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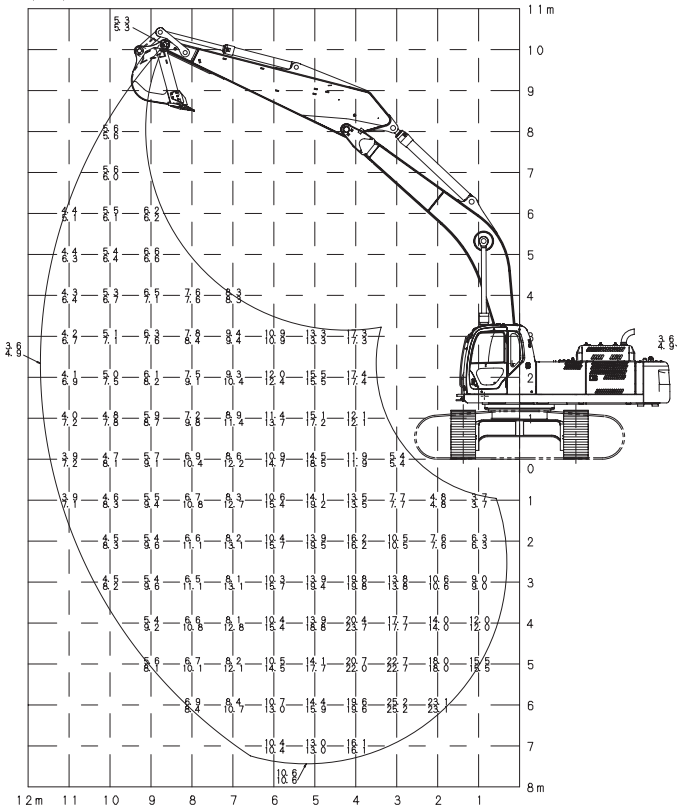
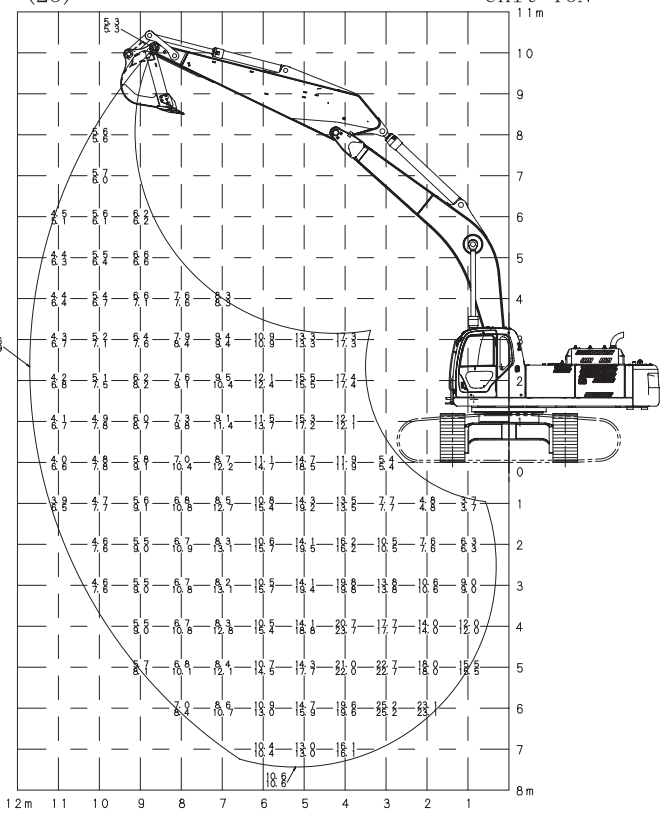


(25) Unit:TON



2. MAINTENANCE

2.1 DESIGNATED OIL AND GREASE, AND FILTER ELEMENT

2.1.1 GREASE AND OIL LIST

The following chart provides information on the specification of oils, grease, fuel and coolant to be in various climates and working conditions.

Components	Type of lubricant	Refill capacities			Specified lubricant
		SK140LC-8	**SK200-8**	**SK250-8**	
Hydraulic oil tank	Hydraulic oil	101 Liters (27 Gal) 172 Liters (45 Gal) (Hydraulic system)	146 Liters (39 Gal) 246 Liters (65 Gal) (Hydraulic system)	170 Liters (45 Gal) 280 Liters (74 Gal) (Hydraulic system)	(KOBELCO BRAND) KW68
					(KOBELCO BRAND) KW5046 (20 L) P/No.KAP3532R157D5
					(KOBELCO BRAND) KW32 (20 L) P/No.KAP2421Z201D1
Engine oil pan	Engine oil (JASO DH-1)	[Total volume] 18.5 Liters (4.9 Gal) [H level] 17.5 Liters (4.6 Gal) [L level] 14.5 Liters (3.8 Gal)	[Total volume] 20.5 Liters (5.4 Gal) [H level] 18 Liters (4.8 Gal) [L level] 15 Liters (4.0 Gal)	[Total volume] 20.5 Liters (5.4 Gal) [H level] 18 Liters (4.8 Gal) [L level] 15 Liters (4.0 Gal)	(KOBELCO BRAND) JASO DH-1 (20 L) P/No.KAPYN01T01053D1
					SAE 15W-40
Slewing motor reduction unit	Gear oil	1.65 Liters (0.44 Gal)	3.0 Liters (0.8 Gal)	7.0 Liters (1.8 Gal)	(KOBELCO BRAND) A.P.I clssification for "service GL-4" P/No.KAPSP90020
Travel motor reduction unit		2.1 Liters×2 (0.55 Gal×2)	5.3 Liters×2 (1.4 Gal×2)	5.0 Liters×2 (1.3 Gal×2)	
Slewing motor reduction unit (Housing)	EP grease	400 g	1.0 kg	1.4 kg	(KOBELCO BRAND) Extreme pressure multipurpose grease No.2[*2]
Attachment pins		16 places	16 places	16 places	
Slewing ring gear		1 place	1 place	1 place	
Track tension adjustment		2 places	2 places	2 places	
Operating lever (Pilot valve)		As required	As required	As required	
Swing gear	MoS2 grease	8.2 kg (18 lbs)	8.6 kg (19 lbs)	11.3 kg (25 lbs)	(KOBELCO BRAND) Pail can P/No.KAPG1601D3
Fuel tank	Diesel fuel	275 Liters (73 Gal)	370 Liters (98 Gal)	460 Liters (122 Gal)	ASTM D-975 Grade 2-D
					ASTM D-975 Grade 1-D
Radiator (Reserve tank)	Engine coolant (Antifreeze)	6.5 L (Total volume 14 L)	6.5 L (Total volume 22 L)	8.6 L (Total volume 20.3 L)	(KOBELCO BRAND) (If commercial coolant is used, the mixing rate should conform with the specified.[*1]) P/No.KAPLLC95-20 (20 L)

Notice

*1 : L.L.C means "Long Life Coolant"

*2 : Cartridge part number KAPG0420D1 (400g×20). Pail can part number KAPG1601D1.

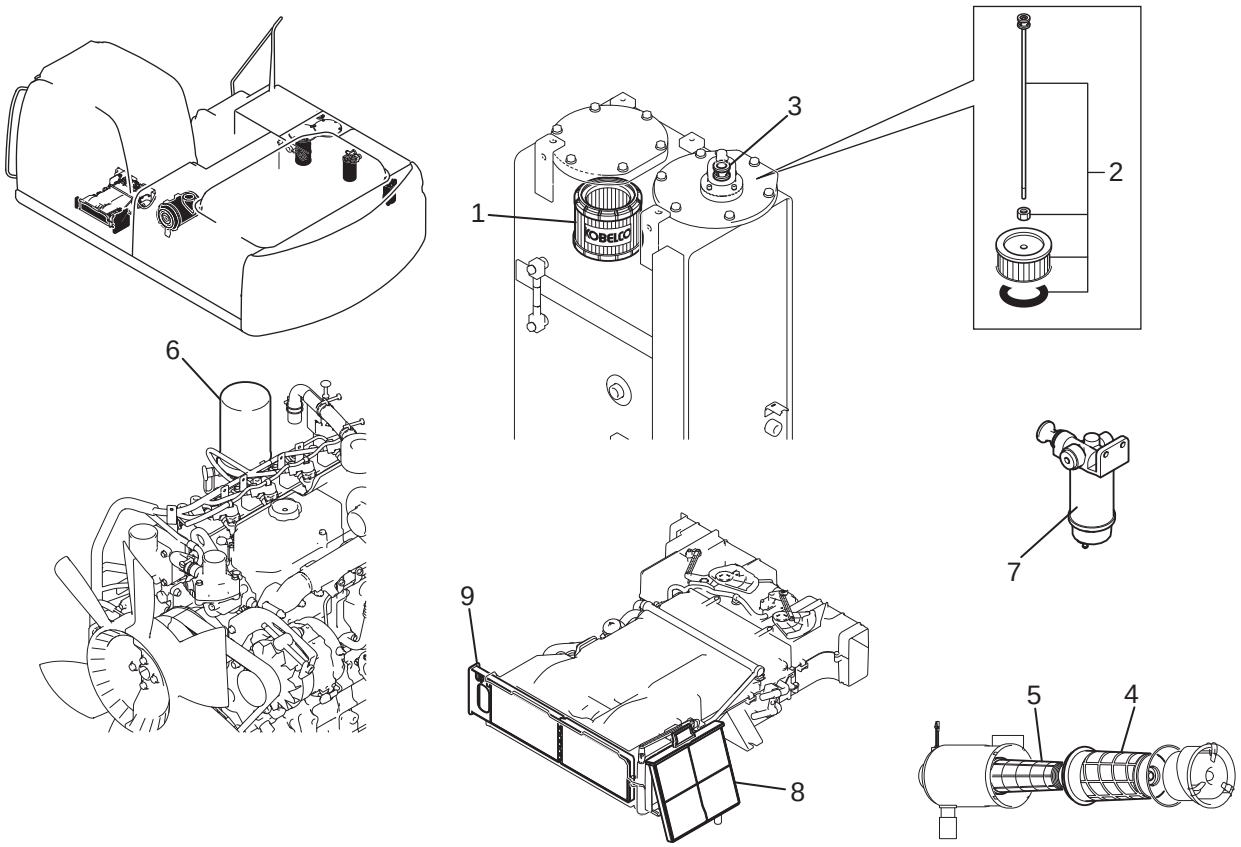
Components	Type of lubricant	Refill capacities		Specified lubricant
		SK330-8	**460-8**	
Hydraulic oil tank	Hydraulic oil	186 Liters (49 Gal) 353 Liters (93 Gal) (Hydraulic system)	300 Liters (79 Gal) 555 Liters (147 Gal) (Hydraulic system)	(KOBELCO BRAND) KW68
				(KOBELCO BRAND) KW5046 (20 L) P/No.KAP3532R157D5
				(KOBELCO BRAND) KW32 (20 L) P/No.KAP2421Z201D1
Engine oil pan	Engine oil (JASO DH-1)	[Total volume] 28.5 Liters (7.5 Gal) [H level] 26 Liters (6.9 Gal) [L level] 20 Liters (5.3 Gal)	[Total volume] 42.5 Liters (11 Gal) [H level] 35 Liters (9.2 Gal) [L level] 27 Liters (7.1 Gal)	(KOBELCO BRAND) JASO DH-1 (20 L) P/No.KAPYN01T01053D1
				SAE 15W-40
Slewing motor reduction unit	Gear oil	7.4 Liters (2.0 Gal)	7.0 Liters (1.8 Gal)	(KOBELCO BRAND) A.P.I clssification for "service GL-4" P/No.KAPSP90020
Travel motor reduction unit		9.5 Liters×2 (2.5 Gal×2)	15 Liters×2 (4.0 Gal×2)	
Slewing motor reduction unit (Housing)	EP grease	1.7 kg	1.4 kg	(KOBELCO BRAND) Extreme pressure multipurpose grease No.2*2
Attachment pins		16 places	17 places	
Slewing ring gear		1 place	1 place	
Track tension adjustment		2 places	2 places	
Operating lever (Pilot valve)		As required	As required	
Swing gear	MoS2 grease	28.7 kg (63.2 lbs)	22 kg (48.5 lbs)	(KOBELCO BRAND) Pail can P/No.KAPG1601D3
Fuel tank	Diesel fuel	580 Liters (153 Gal)	650 Liters (171 Gal)	ASTM D-975 Grade 2-D
				ASTM D-975 Grade 1-D
Radiator (Reserve tank)	Engine coolant (Antifreeze)	13.5 L (Total volume 30 L)	18.5 L (Total volume 41 L)	(KOBELCO BRAND) (If commercial coolant is used, the mixing rate should conform with the specified.*1) P/No.KAPLLC95-20 (20 L)

Notice

*1 : L.L.C means "Long Life Coolant"

*2 : Cartridge part number KAPG0420D1 (400g×20). Pail can part number KAPG1601D1.

2.1.2 FILTERS & ELEMENTS LIST (SK140LC-8)

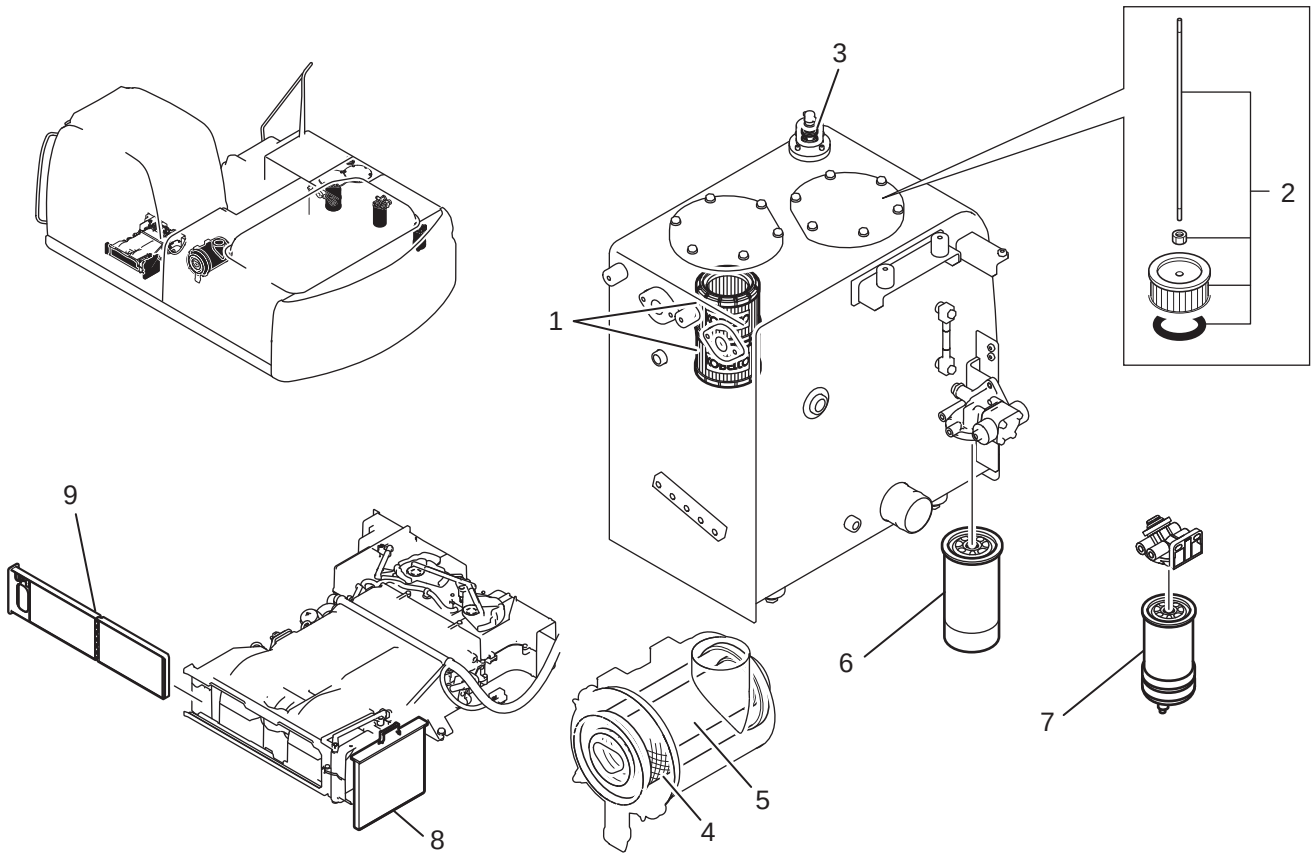


No.	SYSTEM	PART NUMBER	PART NAME	Q'YT	REPLACEMENT INTERVAL
1	Hydraulic oil tank	YN52V01016R600	Return filter element kit (STD, Breaker)	1	After 50 hours (first change) Every 1000 hours (from 2nd change) (Breaker specification : Every 250 hours)
		(ZD11G19000)	(O-ring)	1	
2		YN50V00025F1	Suction strainer	1	Every 2000 hours
		(ZD11G20000)	(O-ring)	1	
3		YN57V00004S002	Filter element (Breezer)	1	
4	Air cleaner	YY11P00008S003	Element (Outer)	1	After 6 times of cleaning or one year whichever comes first
5		YY11P00008S002	Element (Inner)	1	For machines eqipped with W (double) element the inner element must be replaced together with the outer element. Replace the inner element with new one.
6	Engine oil filter	VA34240-11101	Cartridge	1	After 50 hours (first change) For SE Asia : Every 250 hours For NA/Oceania : Every 500 hours
7	Fuel filter	VA32G62-00100	Cartridge	1	Every 500 hours
8	Air conditioner	YN50V01015P3	Air-con filter (Outer)	1	Every 10 times cleanings When heavy clogging of filter occurs, clean or replace
9		YN50V01014P1	Air-con filter (Inner)	1	

Notice

Items enclosed in parenthesis ( ) are the parts to be changed at the same time.

2.1.3 FILTERS & ELEMENTS LIST (SK200-8)

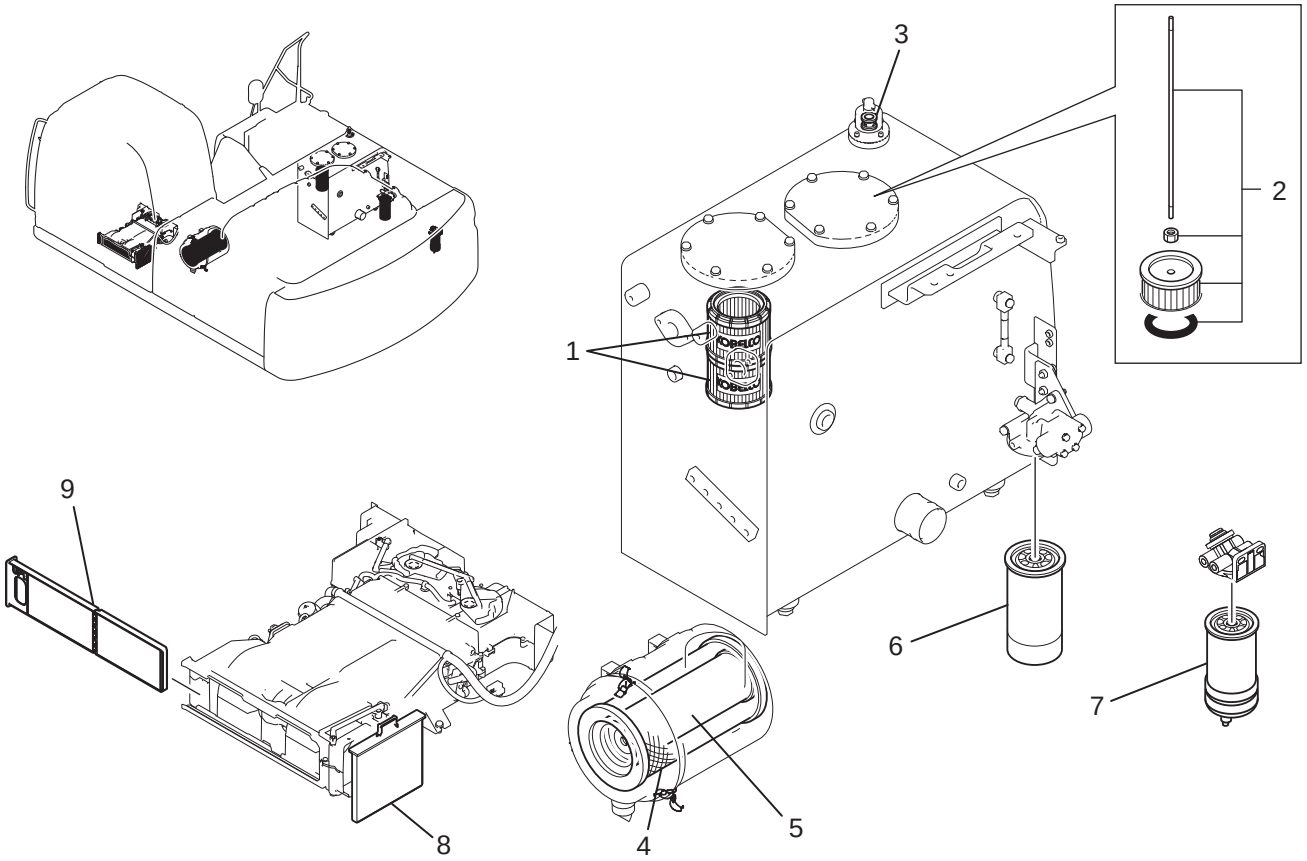


No.	SYSTEM		PART NUMBER	PART NAME	Q'YT	REPLACEMENT INTERVAL
1	Hydraulic oil tank		YN52V01008R600	Return filter element kit (STD. Breaker)	1	After 50 hours (first change) Every 1000 hours (from 2nd change) (Breaker specification : Every 250 hours)
			(ZD11G19000)	(O-ring)	1	
2			YW50V00004F7	Suction strainer	1	Every 2000 hours
			(ZD11G19000)	(O-ring)	1	
3			YN57V00004S002	Filter element (Breezer)	1	
4	Air cleaner	Asia	YN11P00029S003	Element (Outer)	1	After 6 times of cleaning or one year whichever comes first
		Oce	LC11P00018S003		1	
5		Asia	YN11P00029S002	Element (Inner)	1	For machines equipped with W (double) element the inner element must be replaced together with the outer element. Replace the inner element with new one.
		Oce	LC11P00018S002		1	
6	Engine oil filter		YN30T01001P1	Cartridge	1	After 50 hours (first change) Every 250 hours
7	Fuel filter		YN30T01002P1	Cartridge	1	Every 500 hours
8	Air conditioner		YN50V01015P3	Air-con filter (Outer)	1	Every 10 times cleanings
9			YN50V01014P1	Air-con filter (Inner)	1	When heavy clogging of filter occurs, clean or replace

Notice

Items enclosed in parenthesis ( ) are the parts to be changed at the same time.

2.1.4 FILTERS & ELEMENTS LIST (SK250-8)

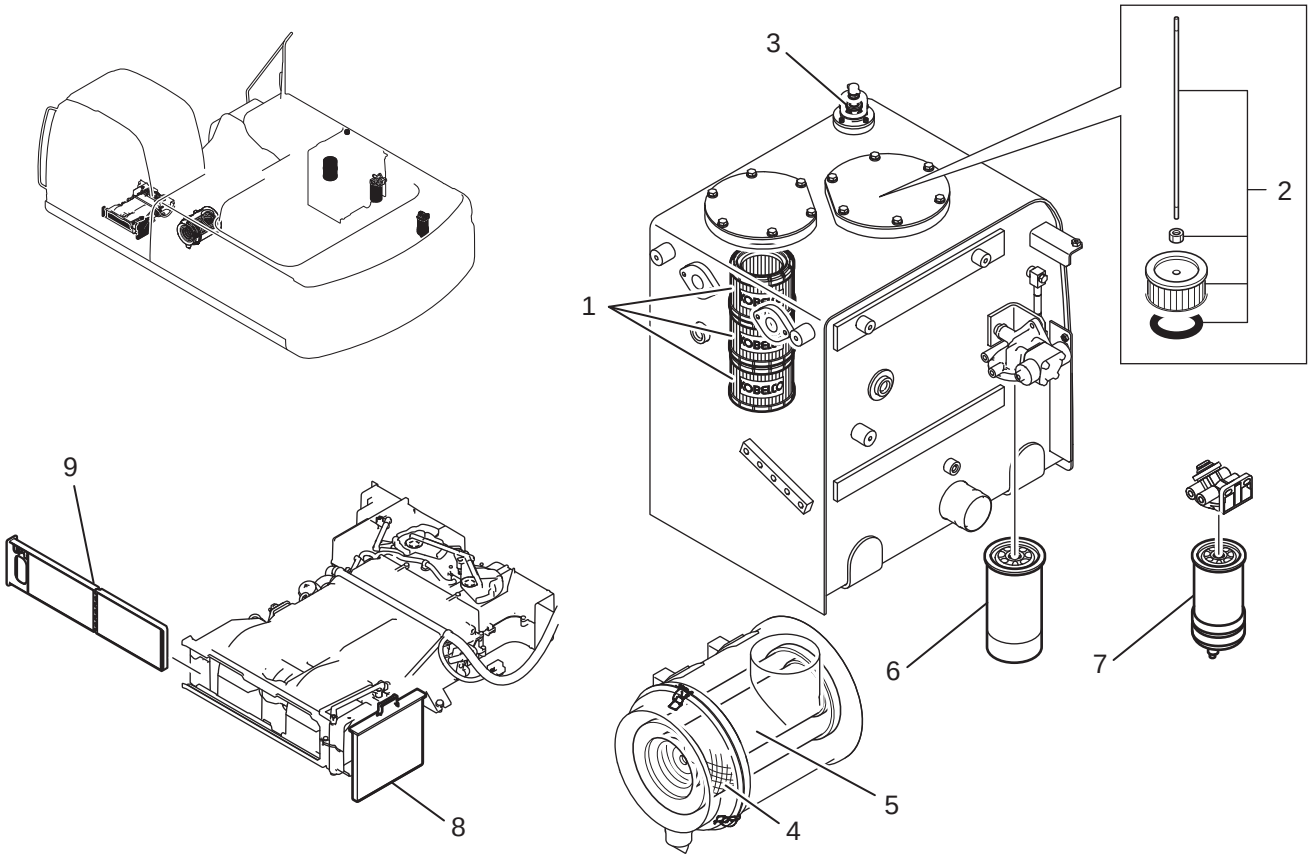


No.	SYSTEM	PART NUMBER	PART NAME	Q'YT	REPLACEMENT INTERVAL
1	Hydraulic oil tank	YN52V01008R600	Return filter element kit (STD, Breaker)	1	After 50 hours (first change) Every 1000 hours (from 2nd change) (Breaker specification : Every 250 hours)
		(ZD11G19000)	(O-ring)	1	
2		YW50V00004F7	Suction strainer	1	Every 2000 hours
		(ZD11G19000)	(O-ring)	1	
3		YN57V00004S002	Filter element (Breezer)	1	
4	Air cleaner	LC11P00018S003	Element (Outer)	1	After 6 times of cleaning or one year whichever comes first
5		LC11P00018S002	Element (Inner)	1	For machines eqipped with W (double) element the inner element must be replaced together with the outer element. Replace the inner element with new one.
6	Engine oil filter	YN30T01001P1	Cartridge	1	After 50 hours (first change) Every 500 hours
7	Fuel filter	YN30T01002P1	Cartridge	1	Every 500 hours
8	Air conditioner	YN50V01015P3	Air-con filter (Outer)	1	Every 10 times cleanings When heavy clogging of filter occurs, clean or replace
9		YN50V01014P1	Air-con filter (Inner)	1	

Notice

Items enclosed in parenthesis ( ) are the parts to be changed at the same time.

2.1.5 FILTERS & ELEMENTS LIST (SK330-8)

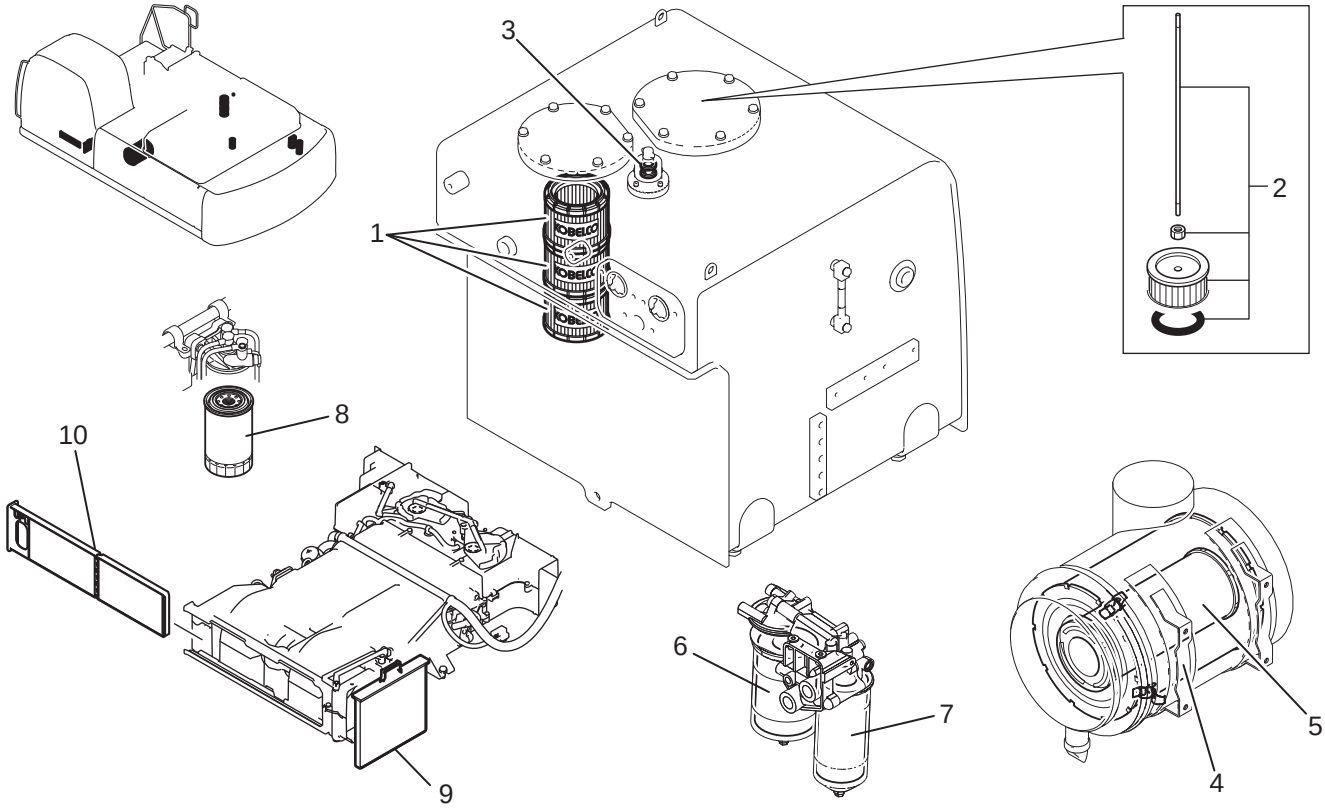


No.	SYSTEM	PART NUMBER	PART NAME	Q'YT	REPLACEMENT INTERVAL
1	Hydraulic oil tank	LS52V01001R300	Return filter element kit (STD, Breaker)	1	After 50 hours (first change) Every 1000 hours (from 2nd change) (Breaker specification : Every 250 hours)
		(ZD11G19000)	(O-ring)	1	
2		LC50V00004F1	Suction strainer	1	Every 2000 hours
		(ZD11G22000)	(O-ring)	1	
3		YN57V00004S002	Filter element (Breezer)	1	
4	Air cleaner	LC11P00018S003	Element (Outer)	1	After 6 times of cleaning or one year whichever comes first
5		LC11P00018S002	Element (Inner)	1	For machines eqipped with W (double) element the inner element must be replaced together with the outer element. Replace the inner element with new one.
6	Engine oil filter	YN30T01001P1	Cartridge	1	After 50 hours (first change) Every 500 hours
7	Fuel filter	YN30T01002P1	Cartridge	1	Every 500 hours
8	Air conditioner	YN50V01015P3	Air-con filter (Outer)	1	Every 10 times cleanings When heavy clogging of filter occurs, clean or replace
9		YN50V01014P1	Air-con filter (Inner)	1	

Notice

Items enclosed in parenthesis ( ) are the parts to be changed at the same time.

2.1.6 FILTERS & ELEMENTS LIST (SK460-8)



No.	SYSTEM	PART NUMBER	PART NAME	Q'YT	REPLACEMENT INTERVAL
1	Hydraulic oil tank	LS52V01001R300	Return filter element kit (STD, Breaker)	1	After 50 hours (first change) Every 1000 hours (from 2nd change) (Breaker specification : Every 250 hours)
		(ZD11G19000)	(O-ring)	1	
2		LS50V00005F1	Suction strainer	1	Every 2000 hours
		(ZD11G22000)	(O-ring)	1	
3		YN57V00004S002	Filter element (Breezer)	1	
4	Air cleaner	LS11P00014S003	Element (Outer)	1	After 6 times of cleaning or one year whichever comes first
5		LS11P00014S002	Element (Inner)	1	For machines eqipped with W (double) element the inner element must be replaced together with the outer element. Replace the inner element with new one.
6	Engine oil filter (Bypass)	VH156072150A	Cartridge	1	After 50 hours (first change) Every 500 hours
7	Engine oil filter (Full flow)	VH156072270A	Cartridge	1	After 50 hours (first change) Every 500 hours
8	Fuel filter	VH234011640A	Cartridge	1	Every 500 hours
9	Air conditioner	YN50V01015P3	Air-con filter (Outer)	1	Every 10 times cleanings When heavy clogging of filter occurs, clean or replace
10		YN50V01014P1	Air-con filter (Inner)	1	

Notice

Items enclosed in parenthesis ( ) are the parts to be changed at the same time.

2.2 MAINTENANCE STANDARDS AND TEST PROCEDURES

2.2.1 STANDARD VALUE TABLE (SK140LC-8)

Note

Unless otherwise specified, measure it on "H" mode.

Table2-1

Inspection Item					Measuring Position			Standard value	Tolerance		Unit	Adjusting Point	Measuring condition
					Position	Size	Port		Hi	Lo			
Standard Measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 9 or less	—	—	Class	—	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+ 5 (41)	- 5 (23)	°C (°F)	—	Atmospheric temp 50°C~-10°C (122°F~14°F)
	Water temperature				Radiator surface			75 (167)	+ 15 (59)	- 15 (5)		—	
	Engine speed	H mode Lo idle			Measure the engine speed at multi display on the gauge cluster, or measure with diesel speed meter.			1000	+ 30	- 30	min^{-1}	Adjustment not required	LOW throttle
		H mode Hi idle						2000	+ 30	- 30			Full throttle (HI idle)
		B mode Hi idle						2000	+ 30	- 30			Perform all measurement with the air-conditioner "OFF".
		A mode Hi idle						2000	+ 30	- 30			
		Decel						1050	+ 30	- 30			
		S mode Hi idle						1800	+ 30	- 30			
Pilot primary pressure circuit					G pump	PF1/4	a3	5.0 (725)	+ 0.5 (+73)	0	MPa (psi)	PR1	HI idle
High pressure circuit	Main relief valve pressure	ATT		P1	Main pump		a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
		Boost		P1			a1	—	—	—		—	—
				P2			a2						
	Over load relief valve pressure	Boom		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR4	Boom down
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR3	Boom up
		Arm		R			a2	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR8	Arm out
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR7	Arm in
		Bucket		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR2	Bucket dump
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR1	Bucket digging
		Swing		RH			a2	28.0 (4060)	+ 3.4 (+493)	+ 0.5 (+73)		OR6	Swing RH
				LH				28.0 (4060)	+ 3.4 (+493)	+ 0.5 (+73)		OR5	Swing LH
		Travel	RH	FW			a1	34.3 (4970)	+ 1.7 (+240)	- 0.5 (-73)		—	Simultaneous operation of travel RH and LH
				RV								—	
			LH	FW			a2	34.3 (4970)	+ 1.7 (+240)	- 0.5 (-73)		—	
				RV								—	

Inspection Item				Standard value	Unit	
Operating speed	Sprocket revolution (RH, LH)	1st speed		30.4 ~ 33.6	min^{-1}	(At no load)
		2nd speed		50.6 ~ 56.0		
	Operating time of cylinder	Boom	Up	2.7 ~ 3.3	sec	
			Down	2.4 ~ 3.0		
		Arm	In	2.8 ~ 3.4		
			Out	2.4 ~ 3.0		
		Bucket	Digging	2.7 ~ 3.4		
			Dumping	2.1 ~ 2.7		
	Swing speed	RH		5.0 ~ 6.2	sec / 1 rev	
		LH				
	Travel speed	1st speed	Iron shoe	20.6 ~ 22.8	sec / 20 m	
		2nd speed	Iron shoe	12.8 ~ 14.0		
Performance	Amount of travel deviation	2nd speed		0 ~ 240	mm / 20 m	
	Parking brake drift	15 degree gradient		0	mm / 5 min	
	Performance of swing brake	Neutral position after 180° full speed swing		55 ~ 75	degree	
	Performance of swing parking brake	15 degree gradient		0	mm	
	ATT amount of drift	Tip of the bucket tooth		90	mm / 5 min	(At no load)
		Boom cylinder		3		
		Arm cylinder		4		
	Amount of horizontal play at the bucket tooth			30 ~ 50	mm	

2.2.2 STANDARD VALUE TABLE (SK200-8)

Note

Unless otherwise specified, measure it on "H" mode.

Table2-2

Inspection Item					Measuring Position: Position	Measuring Position: Size	Measuring Position: Port	Standard value	Tolerance: Hi	Tolerance: Lo	Unit	Adjusting Point	Measuring condition
Standard Measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 9 or less	—	—	Class	—	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+ 5 (41)	- 5 (23)	°C (°F)	—	Atmospheric temp 50°C~-10°C (122°F~14°F)
	Water temperature				Radiator surface			75 (167)	+ 15 (59)	- 15 (5)		—	
	Engine speed	H mode Lo idle			Measure the engine speed at multi display on the gauge cluster.			1000	+ 30	- 30	min^{-1}	Adjustment not required	LOW throttle
		H mode Hi idle						2000	+ 30	- 30			Full throttle (HI idle)
		B mode Hi idle						2000	+ 30	- 30			Perform all measurement with the air-conditioner "OFF".
		A mode Hi idle						2000	+ 30	- 30			
		Decel						1050	+ 30	- 30			
		S mode Hi idle						1800	+ 30	- 30			
Pilot primary pressure circuit					G pump	PF1/4	a4	5.0 (725)	+ 0.5 (+73)	0	MPa (psi)	PR1	HI idle
High pressure circuit	Main relief valve pressure	ATT		P1	Main pump		a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
		Boost		P1			a1	37.8 (5480)	+ 1.0 (+145)	- 0.5 (-73)		MR1	
				P2			a2						
	Over load relief valve pressure	Boom		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR4	Boom down
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR3	Boom up
		Arm		R			a2	39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR8	Arm out
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR7	Arm in
		Bucket		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR2	Bucket dump
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR1	Bucket digging
		Swing		RH			a2	29.0 (4205)	+ 6.0 (+870)	0		OR6	Swing RH
				LH				29.0 (4205)	+ 6.0 (+870)	0		OR5	Swing LH
		Travel	RH	FW			a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		—	Simultaneous operation of travel RH and LH
				RV								—	
			LH	FW			a2	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		—	
				RV								—	

Inspection Item				Standard value	Unit	
Operating speed	Sprocket revolution (RH, LH)	1st speed		30.5 ~ 27.5	min^{-1}	(At no load)
		2nd speed		50.4 ~ 45.6		
	Operating time of cylinder	Boom	Up	2.5 ~ 3.1	sec	
			Down	2.2 ~ 2.8		
		Arm	In	3.0 ~ 3.6		
			Out	2.3 ~ 2.9		
		Bucket	Digging	2.2 ~ 2.8		
			Dumping	1.7 ~ 2.3		
	Swing speed	RH		4.2 ~ 5.4	sec / 1 rev	
		LH				
	Travel speed	1st speed	Iron shoe	19.5 ~ 21.5	sec / 20 m	
		2nd speed	Iron shoe	11.9 ~ 13.1		
Performance	Amount of travel deviation	2nd speed		0 ~ 240	mm / 20 m	
	Parking brake drift	15 degree gradient		0	mm / 5 min	
	Performance of swing brake	Neutral position after 180° full speed swing		55 ~ 75	degree	
	Performance of swing parking brake	15 degree gradient		0	mm	
	ATT amount of drift	Bucket tooth		160	mm / 10 min	(At no load)
		Boom cylinder		14		
		Arm cylinder		11		
	Amount of horizontal play at the bucket tooth			30 ~ 50	mm	

2.2.3 STANDARD VALUE TABLE (SK250-8)

Note

Unless otherwise specified, measure it on "H" mode.

Table2-3

Inspection Item					Measuring Position: Position	Measuring Position: Size	Measuring Position: Port	Standard value	Tolerance: Hi	Tolerance: Lo	Unit	Adjusting Point	Measuring condition
Standard Measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 9 or less	—	—	Class	—	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+ 5 (41)	- 5 (23)	°C (°F)	—	Atmospheric temp 50°C~-10°C (122°F~14°F)
	Water temperature				Radiator surface			75 (167)	+ 15 (59)	- 15 (5)		—	
	Engine speed	H mode Lo idle			Measure the engine speed at multi display on the gauge cluster.			1000	+ 30	- 30	min^{-1}	Adjustment not required	LOW throttle
		H mode Hi idle						2100	+ 30	- 30			Full throttle (HI idle)
		B mode Hi idle						2100	+ 30	- 30			Perform all measurement with the air-conditioner "OFF".
		A mode Hi idle						2100	+ 30	- 30			
		Decel						1050	+ 30	- 30			
		S mode Hi idle						1900	+ 30	- 30			
Pilot primary pressure circuit					G pump	PF1/4	a4	5.0 (725)	+ 0.5 (+73)	0	MPa (psi)	PR1	HI idle
High pressure circuit	Main relief valve pressure	ATT		P1	Main pump		a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
		Boost		P1			a1	37.8 (5480)	+ 1.0 (+145)	- 0.5 (-73)		MR1	
				P2			a2						
	Over load relief valve pressure	Boom		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR4	Boom down
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR3	Boom up
		Arm		R			a2	39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR8	Arm out
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR7	Arm in
		Bucket		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR2	Bucket dump
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR1	Bucket digging
		Swing		RH			a2	28.5 (4130)	+ 4.0 (+580)	+ 1.0 (+145)		OR6	Swing RH
				LH				28.5 (4130)	+ 4.0 (+580)	+ 1.0 (+145)		OR5	Swing LH
		Travel	RH	FW			a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		—	Simultaneous operation of travel RH and LH
				RV								—	
			LH	FW			a2	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		—	
				RV								—	

Inspection Item				Standard value	Unit	
Operating speed	Sprocket revolution (RH, LH)	1st speed		32.7 ~ 29.5	min^{-1}	(At no load)
		2nd speed		52.9 ~ 47.9		
	Operating time of cylinder	Boom	Up	2.8 ~ 3.4	sec	
			Down	2.3 ~ 2.9		
		Arm	In	3.2 ~ 3.8		
			Out	2.6 ~ 3.2		
		Bucket	Digging	2.5 ~ 3.1		
			Dumping	2.0 ~ 2.6		
	Swing speed	RH		5.0 ~ 6.2	sec / 1 rev	
		LH				
	Travel speed	1st speed	Iron shoe	19.5 ~ 21.5	sec / 20 m	
		2nd speed	Iron shoe	12.3 ~ 13.5		
Performance	Amount of travel deviation	2nd speed		0 ~ 240	mm / 20 m	
	Parking brake drift	15 degree gradient		0	mm / 5 min	
	Performance of swing brake	Neutral position after 180° full speed swing		55 ~ 75	degree	
	Performance of swing parking brake	15 degree gradient		0	mm	
	ATT amount of drift	Bucket tooth		95	mm / 5min	(At no load)
		Boom cylinder		7		
		Arm cylinder		6		
	Amount of horizontal play at the bucket tooth			30 ~ 50	mm	

2.2.4 STANDARD VALUE TABLE (SK330-8)

Note

Unless otherwise specified, measure it on "H" mode.

Table2-4

Inspection Item					Measuring Position: Position	Size	Port	Standard value	Tolerance: Hi	Lo	Unit	Adjusting Point	Measuring condition
Standard Measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 9 or less	—	—	Class	—	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+ 5 (41)	- 5 (23)	˚C	—	Atmospheric temp 50˚C~-10˚C (122˚F~14˚F)
	Water temperature				Radiator surface			75 (167)	+ 15 (59)	- 15 (5)	(˚F)	—	
	Engine speed	H mode Lo idle			Measure the engine speed at multi display on the gauge cluster.			1000	+ 25	- 25	min^{-1}	Adjustment not required	LOW throttle
		H mode Hi idle						2100	+ 30	- 70			Full throttle (HI idle)
		B mode Hi idle						2100	+ 30	- 70			Perform all measurement with the air-conditioner "OFF".
		A mode Hi idle						2100	+ 30	- 70			
		Decel						1050	+ 25	- 25			
		S mode Hi idle						1900	+ 30	- 70			
Pilot primary pressure circuit					G pump	PF1/4	a4	5.0 (725)	+ 0.5 (+73)	0	MPa (psi)	PR1	HI idle
High pressure circuit	Main relief valve pressure	ATT		P1	Main pump		a1	34.3 (4970)	+ 0.7 (+100)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
		Boost		P1			a1	37.8 (5480)	+ 1.0 (+145)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
	Over load relief valve pressure	Boom		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR4	Boom down
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR3	Boom up
		Arm		R			a2	39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR8	Arm out
				H				37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR7	Arm in
		Bucket		R			a1	37.8 (5480)	+ 0.5 (+73)	- 0.5 (-73)		OR2	Bucket dump
				H				39.7 (5760)	+ 0.5 (+73)	- 0.5 (-73)		OR1	Bucket digging
		Swing		RH			a2	29.0 (4205)	+ 6.0 (+870)	0		OR6	Swing RH
				LH				29.0 (4205)	+ 6.0 (+870)	0		OR5	Swing LH
		Travel	RH	FW			a1	35.8 (5190)	0	- 2.0 (-290)		—	Simultaneous operation of travel RH and LH
				RV								—	
			LH	FW			a2	35.8 (5190)	0	- 2.0 (-290)		—	
				RV								—	

Inspection Item				Standard value	Unit	
Operating speed	Track link revolution (RH, LH) (H mode)	H mode (STD)	1st speed	34.3 ~ 31.1	sec / 3 rev	(At no load)
			2nd speed	20.4 ~ 18.4		
		H mode (LC)	1st speed	36.4 ~ 33.2		
			2nd speed	21.7 ~ 19.9		
	Operating time of cylinder (At no load)	Boom	Up	2.7 ~ 3.3	sec	
			Down	2.1 ~ 2.7		
		Arm	In	3.4 ~ 4.0		
			Out	2.9 ~ 3.5		
		Bucket	Digging	2.7 ~ 3.3		
			Dumping	1.9 ~ 2.5		
	Swing speed	RH		17.1 ~ 19.1	sec / 3 rev	
		LH				
	Travel speed	1st speed	Iron shoe	19.6 ~ 24.6	sec / 20 m	
		2nd speed	Iron shoe	12.3 ~ 14.3		
Performance	Amount of travel deviation	2nd speed		0 ~ 240	mm / 20 m	
	Parking brake drift	15 degree gradient		0	mm / 5 min	
	Performance of swing brake	Neutral position after 180° full speed swing		58 ~ 98	degree	
	Performance of swing parking brake	15 degree gradient		0	mm	
	ATT amount of drift	Tip of bucket tooth		120	mm / 5 min	(At no load)
		Boom cylinder		4.2		
		Arm cylinder		6		
	Amount of horizontal play at the bucket tooth			27 ~ 53	mm	

2.2.5 STANDARD VALUE TABLE (SK460-8)

Note

Unless otherwise specified, measure it on "H" mode.

Table2-5

Inspection Item					Measuring Position: Position	Size	Port	Standard value	Tolerance: Hi	Lo	Unit	Adjusting Point	Measuring condition
Standard Measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 9 or less	—	—	Class	—	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+ 5 (41)	- 5 (23)	˚C	—	Atmospheric temp 50˚C~-10˚C (122˚F~14˚F)
	Water temperature				Radiator surface			75 (167)	+ 15 (59)	- 15 (5)	(˚F)	—	
	Engine speed	H mode Lo idle			Measure the engine speed at multi display on the gauge cluster.			800	+ 25	- 25	min^{-1}	Adjustment not required	LOW throttle
		H mode Hi idle						1850	+ 30	- 70			Full throttle (HI idle)
		B mode Hi idle						1850	+ 30	- 70			Perform all measurement with the air-conditioner "OFF".
		A mode Hi idle						1850	+ 30	- 70			
		Decel						850	+ 25	- 25			
		S mode Hi idle						1750	+ 30	- 70			
Pilot primary pressure circuit					G pump	PF1/4	a3	5.0 (725)	+ 0.5 (+73)	0	MPa (psi)	PR1	HI idle
High pressure circuit	Main relief valve pressure	ATT		P1	Main pump		a1	31.4 (4550)	+ 0.7 (+100)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
		Boost		P1			a1	34.3 (4970)	+ 1.0 (+145)	- 0.5 (-73)		MR1	Boom up
				P2			a2						
	Over load relief valve pressure	Boom		R			a1	34.8 (5050)	+ 0.5 (+73)	0		OR4	Boom down
				H				36.3 (5260)	+ 0.5 (+73)	0		OR3	Boom up
		Arm		R			a2	36.3 (5260)	+ 0.5 (+73)	0		OR8	Arm out
				H				34.8 (5050)	+ 0.5 (+73)	0		OR7	Arm in
		Bucket		R			a1	34.8 (5050)	+ 0.5 (+73)	0		OR2	Bucket dump
				H				36.3 (5260)	+ 0.5 (+73)	0		OR1	Bucket digging
		Swing		RH			a2	25.0 (3625)	+ 6.0 (+870)	0		OR6	Swing RH
				LH				25.0 (3625)	+ 6.0 (+870)	0		OR5	Swing LH
		Travel	RH	FW			a1	35.8 (5190)	0	- 2.0 (-290)		—	Simultaneous operation of travel RH and LH
				RV								—	
			LH	FW			a2	35.8 (5190)	0	- 2.0 (-290)		—	
				RV								—	

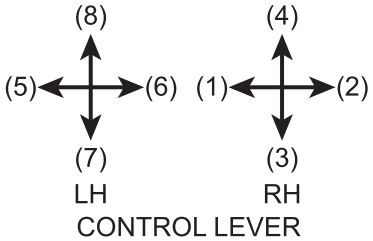
Inspection item				Standard value	Unit	
Operating speed	Track link revolution (RH,LH) (H mode)	STD	1st speed	37.8 ~ 34.6	sec / 3 rev	(At no load)
			2nd speed	22.7 ~ 20.7		
		LC	1st speed	40.1 ~ 36.9		
			2nd speed	24.1 ~ 22.1		
	Operating time of cylinder (At no load)	Boom	Up	3.3 ~ 3.9	sec	
			Down	2.0 ~ 2.6		
		Arm	In	3.5 ~ 4.1		
			Out	2.9 ~ 3.5		
		Bucket	Digging	2.3 ~ 2.9		
			Dumping	2.2 ~ 2.8		
	Swing speed	RH		23.1 ~ 25.1	sec / 3 rev	
		LH				
	Travel speed	1st speed	Iron shoe	20 ~ 25	sec / 20 m	
		2nd speed	Iron shoe	12.7 ~ 14.7		
Performance	Amount of travel deviation	2nd speed		0 ~ 240	mm / 20 m	
	Parking brake drift	15 degree gradient		0	mm / 5 min	
	Performance of Swing brake	Neutral position after 180° full speed swing		37 ~ 77	degree	
	Performance of Swing parking brake	15 degree gradient		0	mm	
	ATT amount of drift	Tip of the bucket tooth		180	mm / 5min	(At no load)
		Boom cylinder		6.0		
		Arm cylinder		12		
	Amount of horizontal play at the bucket tooth			40 ~ 80	mm	

Note

The port relief valves No.OR1~OR8 on the control section are adjusted to the following operation numbers in advance.

(1) Bucket digging, (2) Bucket dump, (3) Boom up, (4) Boom down

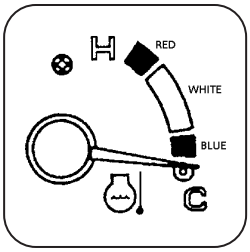
(5) Swing left, (6) Swing right, (7) Arm in, (8) Arm out



2.2.6 MEASUREMENT OF ENGINE SPEED

2.2.6.1 MEASUREMENT OF ENGINE SPEED

(1) Warming up of engine
Start engine to raise the coolant temperature of engine to 60 to 90°C (140 to 194°F) at surface of radiator upper tank.
The E/G coolant tem-perature gauge is used to measure. The range in white color shows the temperature of approx. 65 to 105°C (149 to 221°F), so confirm that the pointer indicates the temperature within the white range.



(2) Engine speed measured value through service diagnosis (See Fig. 2-2)
1) Turn "ON" the starter switch with the buzzer stop switch pressed.
2) A program No. and an actual engine revolution are displayed as the No.2 Item.
3) The screen advances like No.2, No.3....each time the "Wiper switch" on the gauge cluster is pushed.
4) The screen returns like No.45, No.44....each time the "Washer switch" is pushed.
5) The display does not disappear unless the starter switch is turned to"OFF".

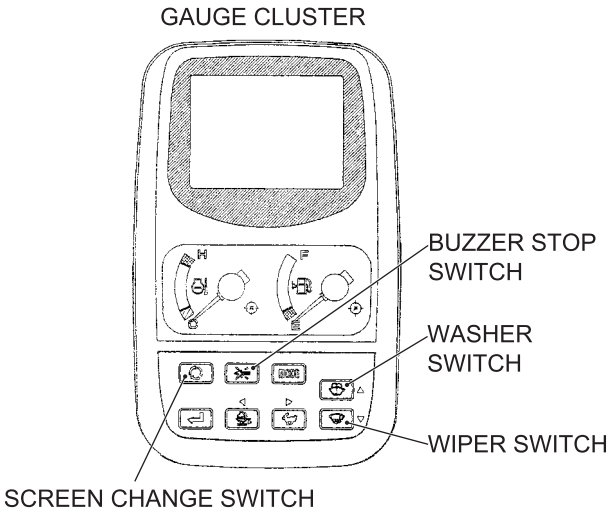


Fig. 2-1 Switch for E/G speed indication

NO.2	ENG	
G-3	SPEED SET	2205
	MEAS 1	2201
	MEAS 2	2201
G-5	ENG OIL PRS.	LIVE
	WATER TEMP.	100℃ OF
F		
	MODE	HM
H-1	ACCEL. VOLT.	4.2V
	POS	100%
	ECU OUTPUT	0.5V

Fig. 2-2 Service diagnosis for E/G speed measuring (Example)

2.2.7 MEASUREMENT OF HYDRAULIC PRESSURE

2.2.7.1 PREPARING TO MEASURE HYDRAULIC PRESSURE

(1) Hydraulic equipment
6.9 MPa (1000psi) pressure gauge : 1unit
49 MPa (7100psi) pressure gauge : 2 units
Pressure measuring equipment and instrument for analysis : 1 set

(2) Measuring cleanliness of hydraulic oil

WARNING

After releasing air in the hydraulic oil tank, open the cover and sample oil in the hydraulic tank, and measure with the instrument for analysis. If the measured value is higher than the standard value, replace the return filter or change the hydraulic oil.

2.2.7.2 PLACE TO INSTALL PRESSURE GAUGE

(SK140LC-8)

(1) Main circuit
After releasing the pressure in hydraulic oil tank and system, replace plugs PF1/4 of main pump gauge ports **(a1) (a2)** with plugs for pressure measurement, and attach pressure gauge 49 MPa (7100 psi).

(2) Pilot circuit
Replace pilot gauge plug **(a3)** with plug PF1/4 for pressure measurement, and attach pressure gauge 6.9 MPa (1000 psi).

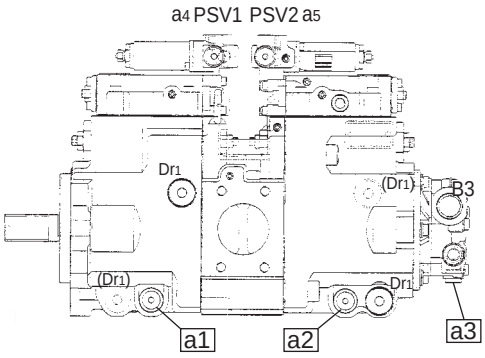


Fig. 2-3 Gauge port on main pump

(SK200-8,SK250-8,SK330-8,SK460-8)

1) Main circuit
After releasing the pressure in hydraulic oil tank and system, replace plugs PF1/4 of main pump gauge ports **(a1) (a2)** with plugs for pressure measurement, and attach pressure gauge 49 MPa (7100 psi).

(2) Pilot circuit
Replace pilot gauge plug **(a5)** with plug PF1/4 for pressure measurement, and attach pressure gauge 6.9 MPa (1000 psi).

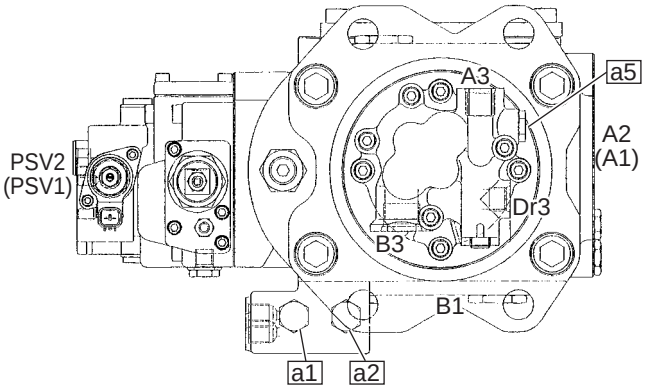
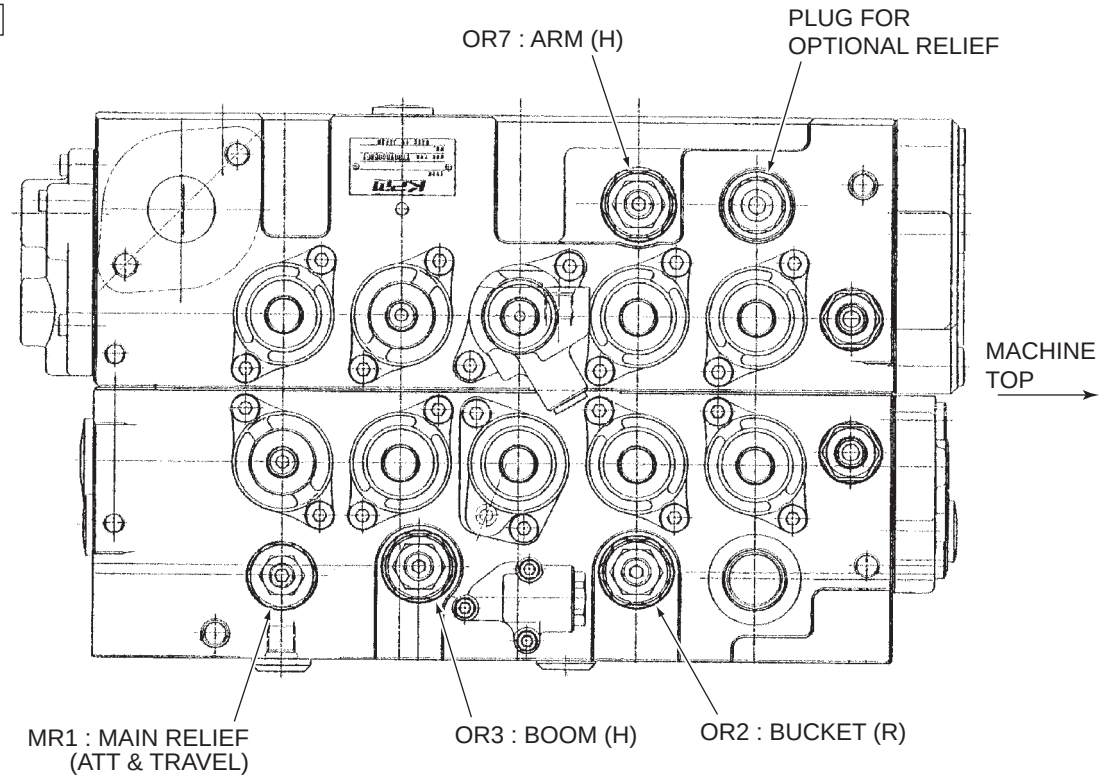


Fig. 2-4 Gauge port on main pump

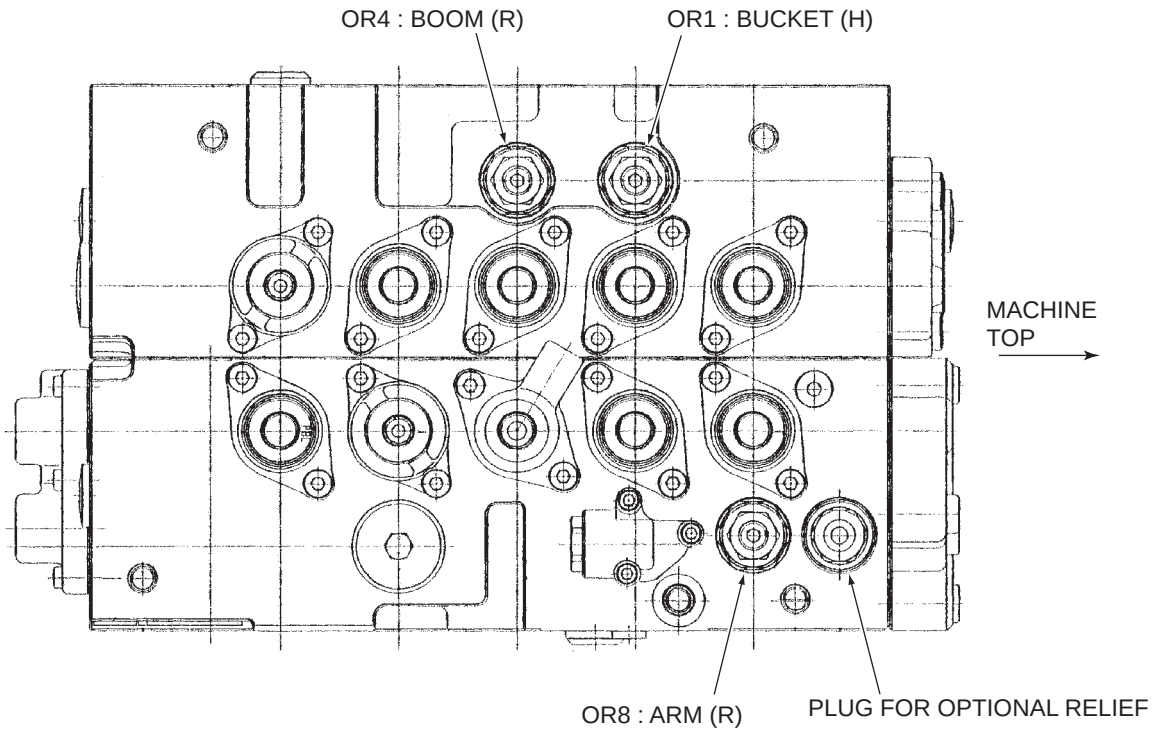
2.2.7.3 PRESSURE ADJUSTMENT POSITION

(1) Main control valve

SK140LC-8



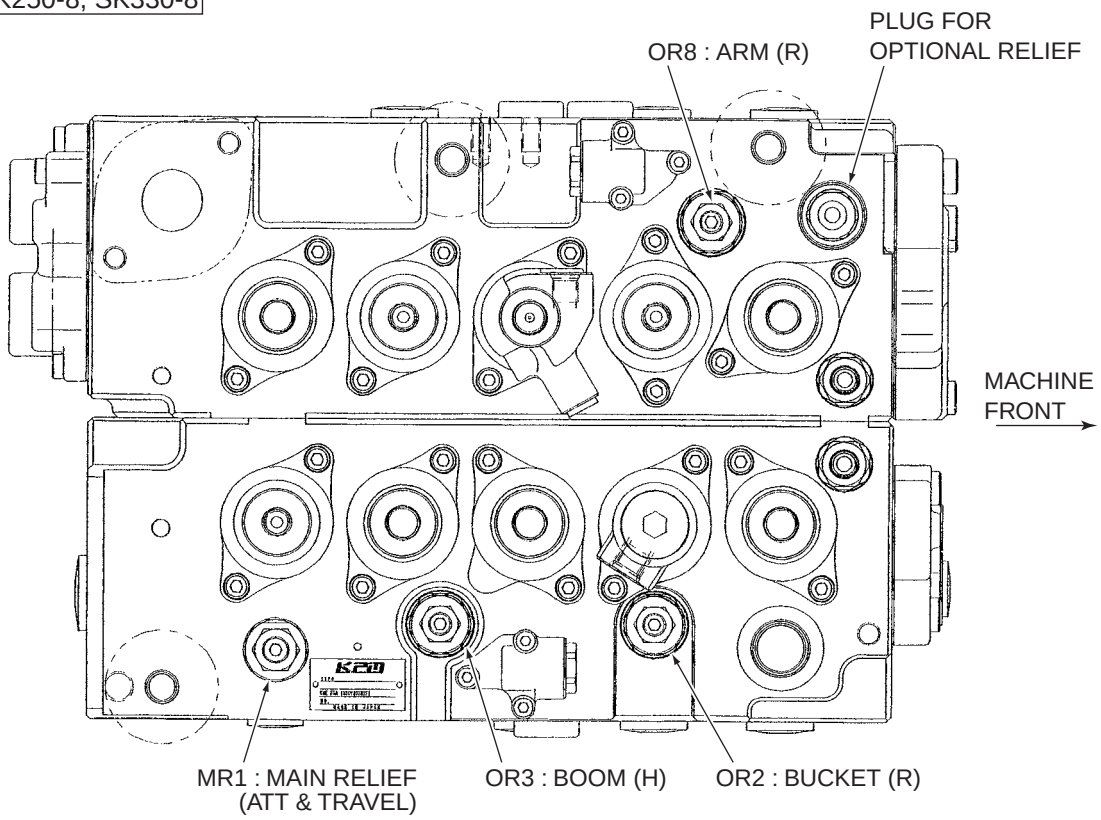
VIEW FROM RIGHT FRONT OF MACHINE



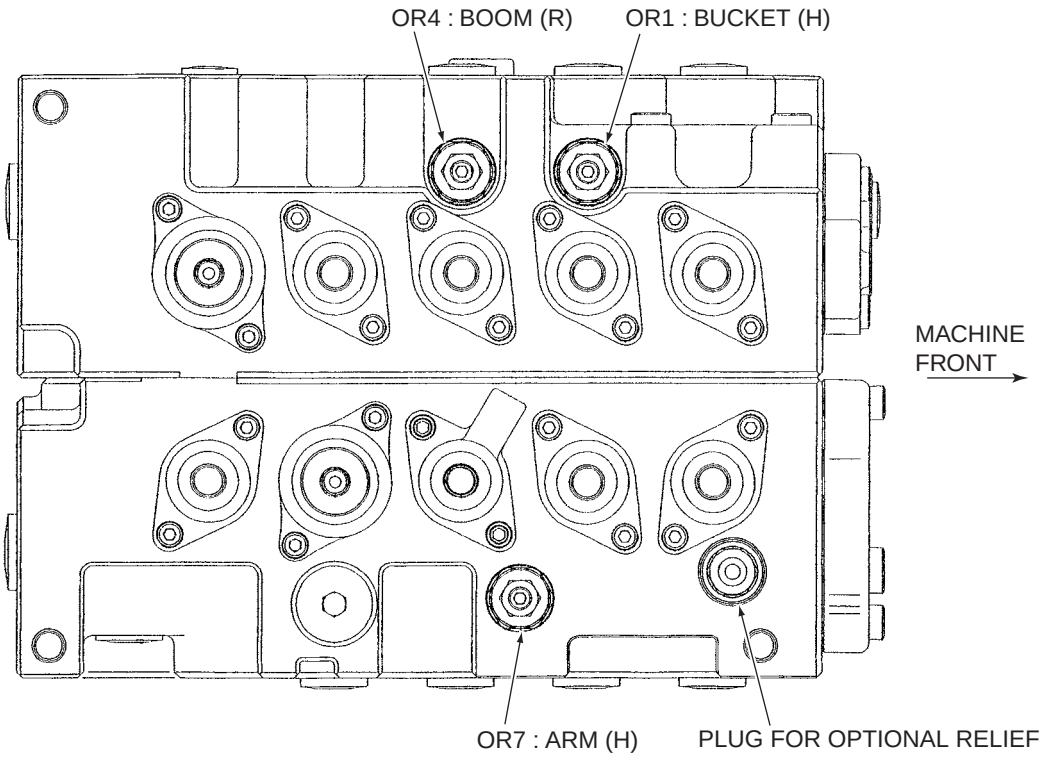
VIEW FROM LEFT REAR OF MACHINE

Fig. 2-5 Relief valve position on main control valve

SK200-8, SK250-8, SK330-8



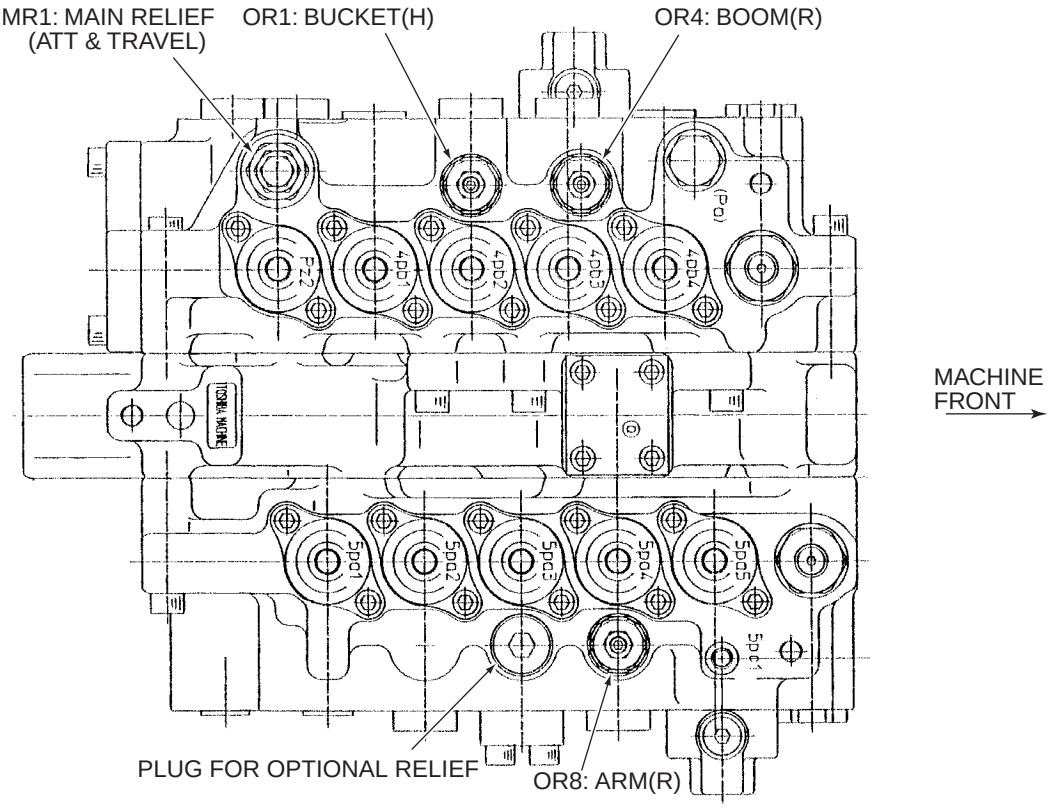
VIEW FROM THE TOP OF THE MACHINE



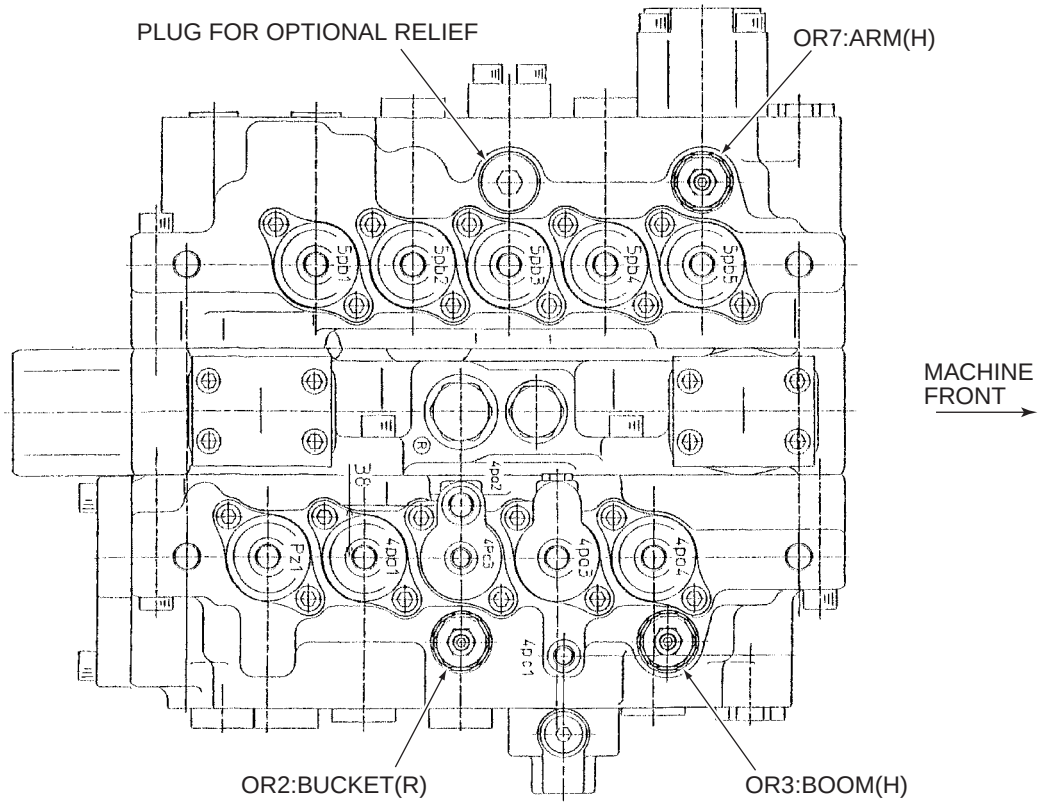
VIEW FROM THE BOTTOM OF THE MACHINE

Fig. 2-6 Relief valve position on main control valve

SK460-8



VIEW FROM THE TOP OF THE MACHINE



VIEW FROM THE BOTTOM OF THE MACHINE

Fig. 2-7 Relief valve position on main control valve

(2) Pilot relief valve

The pilot relief valve PR1 is located on the gear pump that is attached to the main pump.

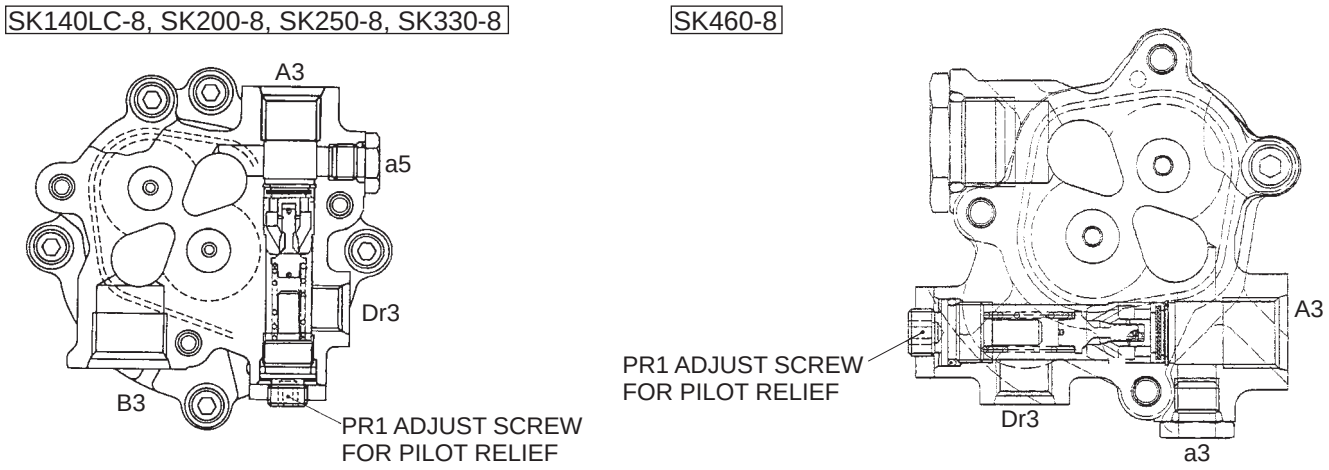


Fig. 2-8 Pilot relief valve position

(3) Swing over load relief

The swing motor is equipped with plugs PA,PB (GA,GB) for pressure measurement, but the measurement is carried out using gauge ports **(a1)** and **(a2)**. (See Fig. 2-3)

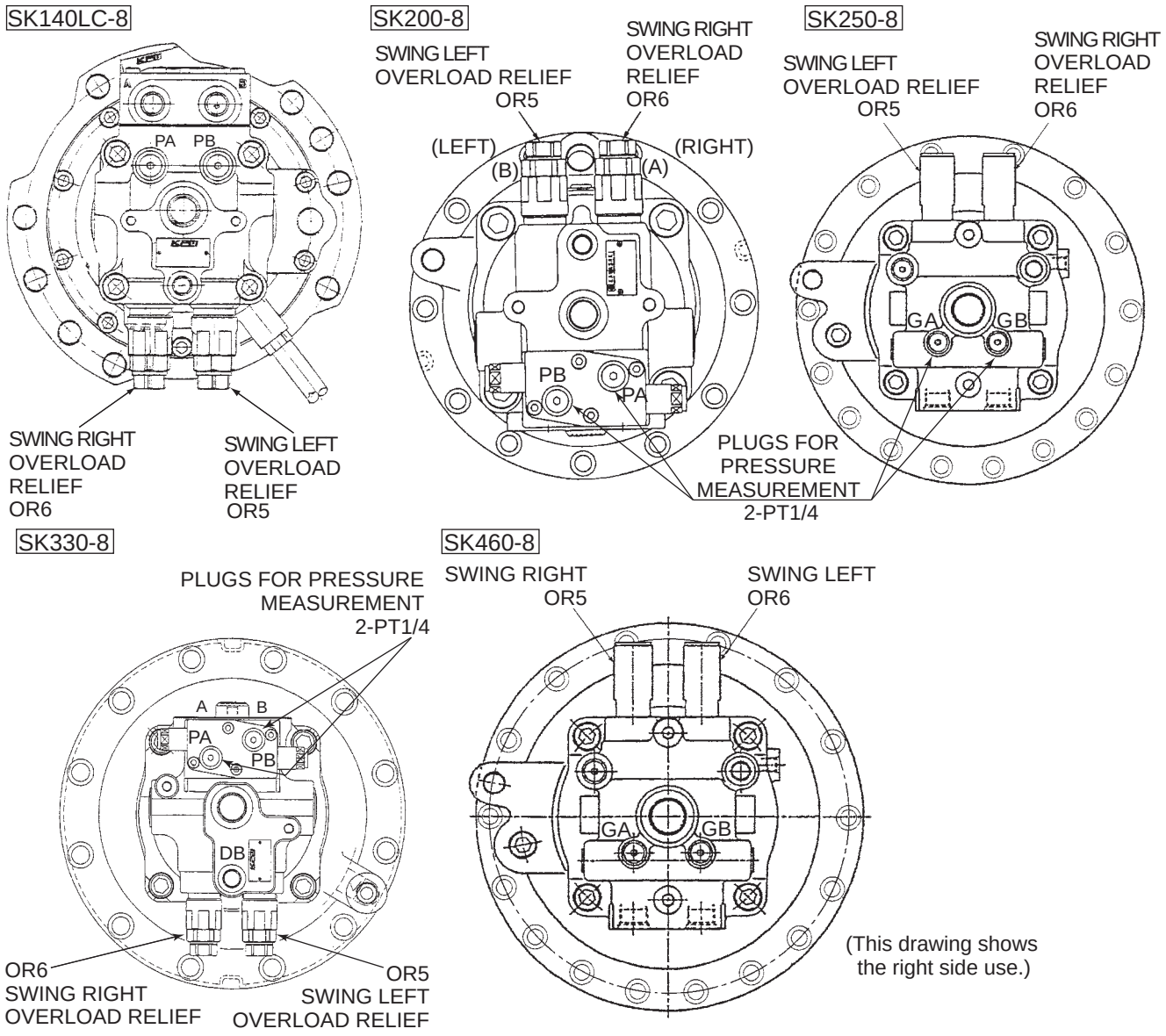


Fig. 2-9 Swing over load relief position

2.2.7.4 PROCEDURE FOR ADJUSTING RELIEF VALVE

(1) Pilot relief valve
Adjust it with adjust screw (311).

: 24 mm,
Tightening torque : 29.4 N•m (22 lbf•ft)

: 6 mm

No. of turns of adjust screw	Pressure change MPa (psi)
1 turn	Approx. 2.1 (305)

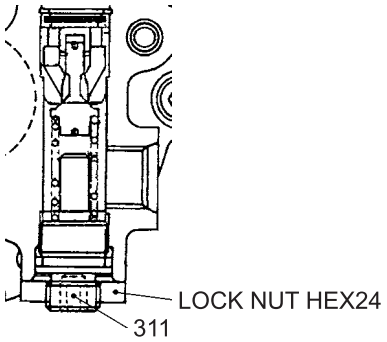


Fig. 2-10 Pilot relief valve

(2) Main relief valve
(Common for travel and ATT sections)
Loosen lock nut (7) and adjust the pressure with adjust screw (6).
Tightening torque : 27~31 N•m (20~23 lbf•ft)

: 19 mm, Adjust screw

: 4 mm

No. of turns of adjust screw	Pressure change MPa (psi)
1 turn	Approx. 17.7 (2560)

SK140LC-8

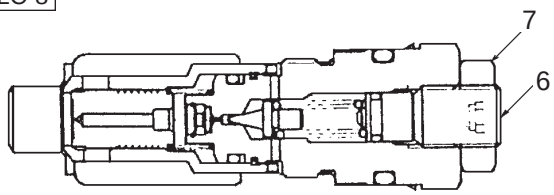


Fig. 2-11 Main relief valve
(Travel section, ATT common section)

(3) 2-stage main relief valve
(Commom for travel and ATT sections)
Start from the boosting side, first. Loosen nut (1), adjust the pressure with adjusting screw (2) and tighten nut (1) after completion of the adjustment on the boosting side.
Then, loosen nut (3), adjust the pressure on the standard side with adjusting screw (4) and tighten nut (3) after completion of the adjustment.
SK200-8, SK250-8, SK330-8

: 32 mm,
Tightening torque : 27.4~31.4 N•m (20~23 lbf•ft)

: 22 mm,
Tightening torque : 27.4~31.4 N•m (20~23 lbf•ft)

: 19 mm, Adjust screw

: 6 mm

No. of turns of adjust screw	Pressure change MPa (psi)
Boosting side 1 turn	Approx. 17.6 (2560)
STD side 1 turn	Approx. 17.6 (2560)

SK200-8 SK250-8
SK330-8

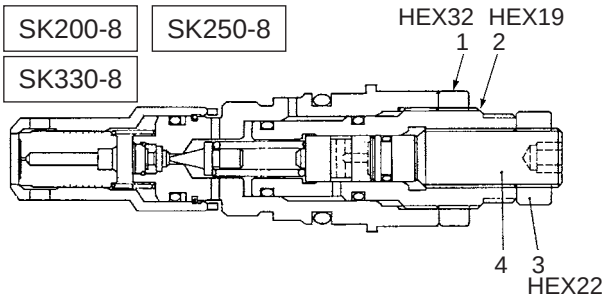


Fig. 2-12 Main relief valve
(Travel section, ATT common section)

SK460-8

: 41 mm,
Tightening torque : 98 N•m (72.3 lbf•ft)

: 30 mm,
Tightening torque : 59 N•m (43.5 lbf•ft)

: 22, 27 mm, Adjust screw

No. of turns of adjust screw	Pressure change MPa (psi)
Boosting side 1 turn	Approx. 18.0 (2610)
STD side 1 turn	Approx. 18.0 (2610)

(4) Over load relief valve
(Boom, bucket, arm sections)
Loosen lock nut (1) and adjust it with adjust screw (2).
SK140LC-8, SK200-8, SK250-8, SK330-8

: 22 mm,
Tightening torque : 27.4~31.4 N•m (20~23 lbf•ft)

: 6 mm

No. of turns of adjust screw	Pressure change MPa (psi)
1 turn	Approx. 17.7 (2560)

SK460-8

: 13 mm,
Tightening torque : 3.0 N•m (2.2 lbf•ft)

: 4 mm

No. of turns of adjust screw	Pressure change MPa (psi)
1 turn	Approx. 30 (4350)

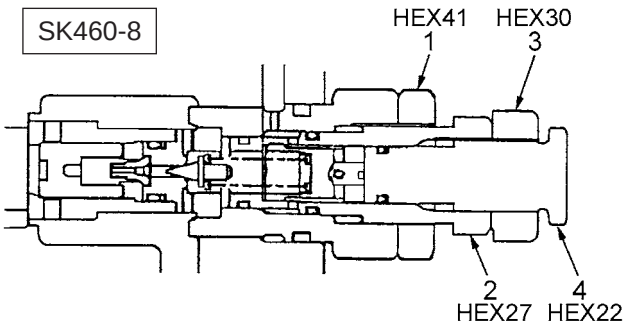


Fig. 2-13 Main relief valve (Travel section, ATT common section)

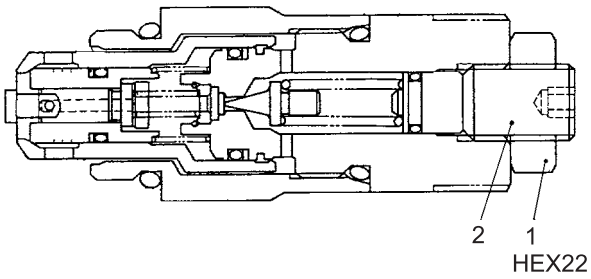


Fig. 2-14 Over load relief valve (Boom, bucket, arm sections)

(5 Swing over load relief valve (SK140LC-8, SK200-8, SK330-8)
When the adjustment of pressure is required, loosen lock nut (1) and adjust the pressure with cap (2).

: 30, 38 mm,
Tightening torque : 118 N•m (87 lbf•ft)

: 12 mm

No. of turns of adjust screw	Pressure change MPa (psi)
1 turn	Approx. 10 (1450)

(6) Swing over load relief valve (SK250-8, SK460-8)
This valve was adjusted by valve maker. If adjustment is required, adjust with shim thickness. When you cannot perform a check of setting pressure, do not adjust pressure by any means.

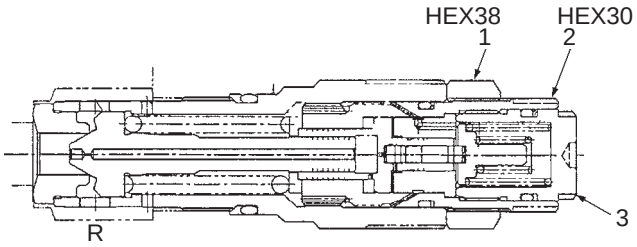
Pressure change [by SIMM 0.1 mm] :
about 0.5 MPa (73 psi)

: 14 mm
Tightening torque : 157 N•m (116 lbf•ft)

(7) Travel over load relief valve (SK140LC-8)
This valve was adjusted by manufacturer and shipped. Do not replace the parts except O-ring. Loosen cap (205) and adjust the pressure with shim (213).

: 10 mm

SK140LC-8 SK330-8 SK330-8



SK250-8 SK460-8

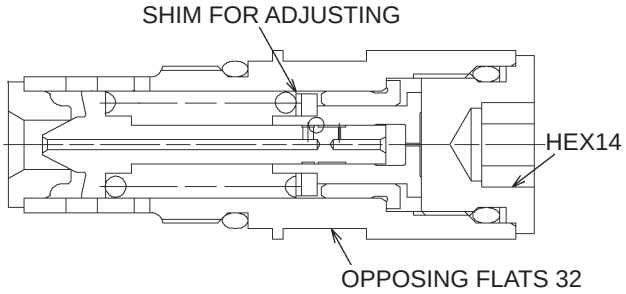


Fig. 2-15 Swing over load relief valve

SK140LC-8

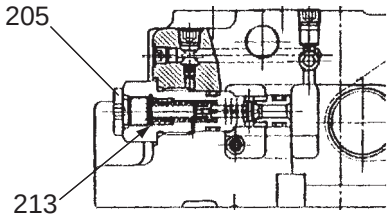
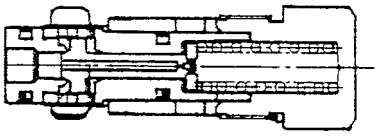


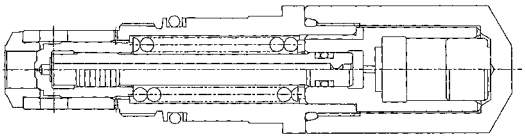
Fig. 2-16 Travel over load relief valve

(8) Travel over load relief valve
(SK200-8, SK330-8, SK460-8)
This valve was adjusted by valve maker. Do not replace any inner parts except for O-ring.

SK200-8



SK330-8 SK460-8



(9) Travel over load relief valve (SK250-8)
The adjustment is done by manufacturer before shipment. When adjustment is required, loosen nut (1) and adjust the pressure with adjusting screw (2).

: 19 mm

: 6 mm

SK250-8

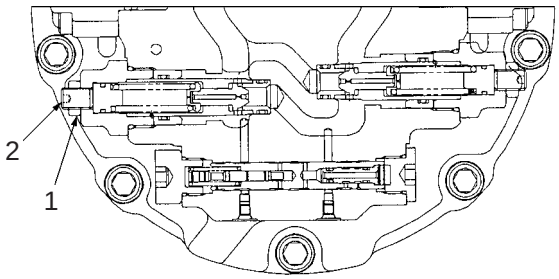


Fig. 2-17 Travel over load relief valve

2.2.8 MEASURING TRAVEL PERFORMANCES

2.2.8.1 TRAVEL SPEED

SK140LC-8, SK200-8, SK250-8

(1) Purposes
Measure the travel sprocket revolution and confirm the performances between the hydraulic pump and the travel motor of the travel drive system.

(2) Conditions
Hydraulic oil temperature ; 45~55°C (113~131°F)
Crawler on the right and left sides are tensioned evenly.

(3) Preparation
Attach the reflection panel with a magnet to the travel motor cover.
Swing the swing frame through 90°as shown in Fig. 2-14 and make the crawler on one side take off the ground, using the attachment.

(4) Measurement
Engine revolution; Hi idle
2-speed travel switch; 1st speed and 2nd speed
Measuring points ; Right and left
Method, example 1 ;
Measure revolution with a stroboscope
Method, example 2 ;
Measure the revolutions per minute visually.

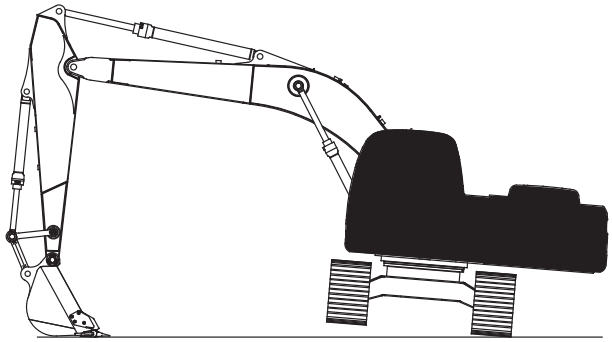
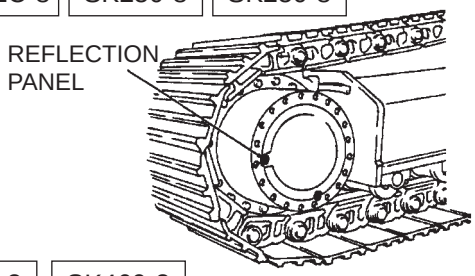


Fig. 2-18 One side lifted position

SK140LC-8 | SK250-8 | SK250-8



SK330-8 | SK460-8

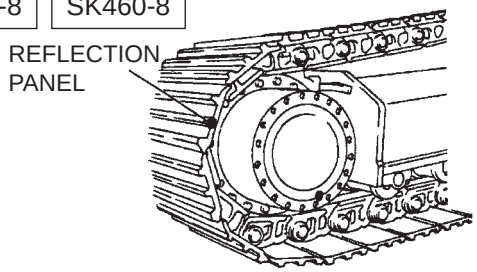


Fig. 2-19 Adhering position of reflection panel

SK330-8, SK460-8

(1) Purposes
Measure the travel sprocket revolution and confirm the performances between the hydraulic pump and the travel motor of the travel drive system.

(2) Conditions
Hydraulic oil temperature ; 45~55°C (113~131°F)
Crawler on the right and left sides are tensioned evenly.

(3) Preparation
Attach the reflection panel shoe plate.
Swing the swing frame through 90°as shown in Fig. 2-14 and make the crawler on one side take off the ground, using the attachment.

(4) Measurement
Engine revolution; Hi idle
2-speed travel switch; 1st-speed and 2nd-speed
Measuring points ; Right and left
Method, example
Measure the revolutions visually.

Sprocket revolution

SK140LC-8 — Unit : min^{-1}

Measurement item		Standard value	Reference value for remedy	Service limit
RH & LH	H mode 1st speed	30.4~33.6	23.7~26.2	21.4 or less
	H mode 2nd speed	50.6~56.0	39.5~43.7	35.7 or less

SK200-8 — Unit : min^{-1}

Measurement item		Standard value	Reference value for remedy	Service limit
RH & LH	H mode 1st speed	30.5~27.5	23.8~21.5	19.4 or less
	H mode 2nd speed	50.4~45.6	39.3~35.6	32.2 or less

SK250-8

Measurement item		Standard value	Reference value for remedy	Service limit
RH & LH	H mode 1st speed	32.7~29.5	25.5~23.0	20.8 or less
	H mode 2nd speed	52.9~47.9	41.3~37.4	33.8 or less

Track link revolution

SK330-8 — Unit : sec / 3 rev.

Measurement item		Standard value	Reference value for remedy	Service limit
STD	H mode 1st speed	31.1~34.3	39.8~43.9	49.1~
	H mode 2nd speed	18.4~20.4	23.6~26.1	29.1~
LC	H mode 1st speed	33.2~36.4	42.5~46.6	57.2~
	H mode 2nd speed	19.7~21.7	25.2~27.8	31.1~

Track link revolution

SK460-8 Unit : sec / 3 rev.

Measurement item		Standard value	Reference value for remedy	Service limit
STD	H mode 1st speed	34.6~37.8	44.3~48.4	54.3~
	H mode 2nd speed	20.7~22.7	26.5~29.1	32.6~
LC	H mode 1st speed	36.9~40.1	47.2~51.3	57.8~
	H mode 2nd speed	22.1~24.1	28.3~30.8	34.7~

2.2.8.2 DEVIATION OF TRAVEL

(1) Purpose
Measure the amount of deviation at 20m (66ft) travel and confirm the horizontal balance between the hydraulic pump and the travel motor of the travel drive system.

(2) Condition
Hydraulic oil temperature ;
45~55°C (113~131°F)
RH and LH crawler are tensioned evenly.
Firm, level ground
Engine revolution; Hi idle

(3) Preparation
1) Straight course more than 30m (108ft)
2) Travel position in which the bottom of the bucket is lifted by about 30cm (1ft).

(4) Measurement
1) Measure the max. deviation distance of the circular arc in the 20m (66ft) length, excluding the preliminary run of 3~5m (10~16ft).
2) Operate the travel lever at the same time.

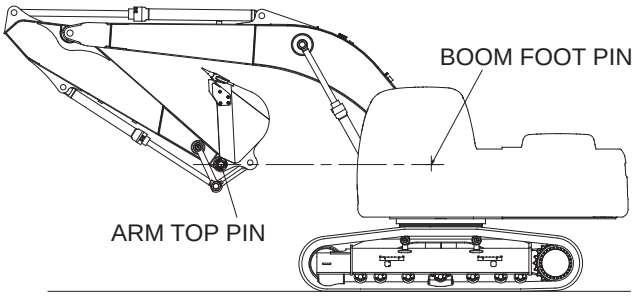


Fig. 2-20 Travel position

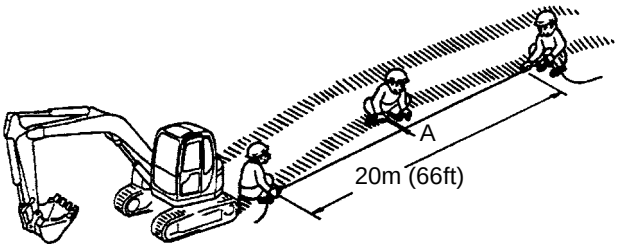


Fig. 2-21 Measuring method

Travel deviation Unit : mm (in) / 20m (66ft)

Measuring position	Standard value	Reference value for remedy	Service limit
A	240 (9.45) or less	480 (18.9)	720 (28.4)

2.2.8.3 PERFORMANCES OF PARKING BRAKE

(1) Purpose
Confirm that the parking brake holds a stopped condition of the machine in a no-load travel position and on a 15 degree slope.

(2) Condition
A slope with (Approx. 15 deg) gradient and a stopped condition in a no-load travel position

(3) Preparation
Place an angle meter on the shoe plate and confirm that it makes an angle more than 15 degree.
Hang a perpendicular in parallel with the guide frame rib on the track frame and put a mark (matching mark) on the shoe plate.

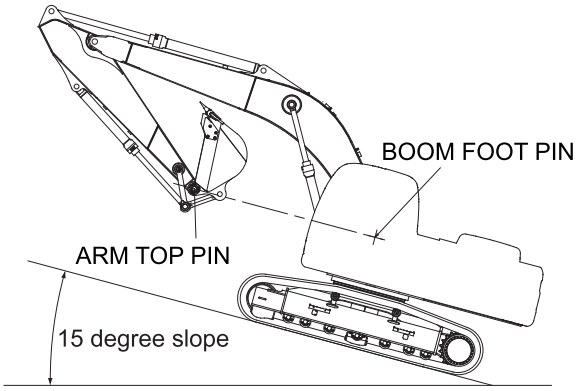


Fig. 2-22 Parking brake operating position

(4) Measurement
Five minutes after the engine stops, measure the movement distance of the matching mark.

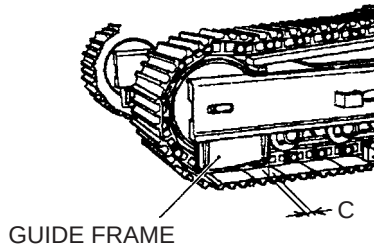


Fig. 2-23 Method of measurement

Parking brake — Unit : mm(in)/5min

Measuring position	Standard value	Reference value for remedy	Service limit
C	0	1 (0.04)	2 (0.08)

2.2.8.4 DRAIN RATE OF TRAVEL MOTOR

(1) Purpose
To measure the drain rate of the travel motor and to confirm the performances of the travel motor.

(2) Conditions
Hydraulic oil temperature ;
45~55°C (113~131°F)
Engine revolution; Hi idle

(3) Preparation

1) Place a stopper under the RH and LH travel sprockets.

2) Stop the engine and release pressure from the hydraulic circuit.

3) Connect a hose with the drain port of the travel motor and take drain in a container.

(4) Measurement ; at Travel Lock

WARNING

Unless you observe the rotary force direction at travel lock, rib "A" may be broken by stopper "B" in some cases. (See Fig. 2-24)

1) Start the engine and relieve pressure at the full stroke of the travel lever.

2) Measure the drain rate for 30 seconds of relieving.

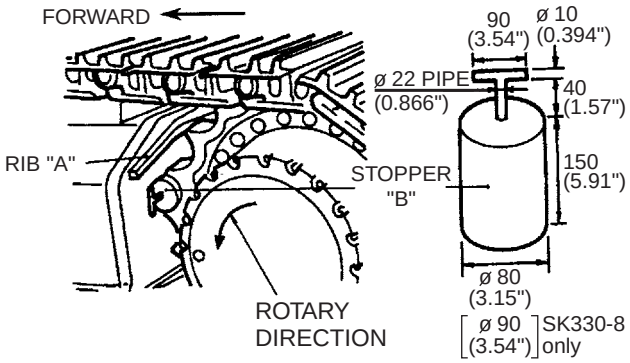


Fig. 2-24 Location of stopper applied to travel sprocket

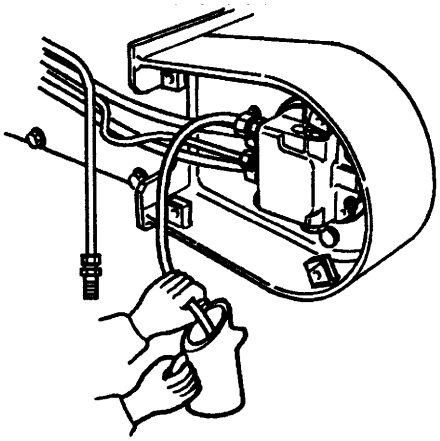


Fig. 2-25 Method of measuring the drain rate of travel motor

Travel deviation — Unit : L(gal)/30sec

	Standard value	Reference value for remedy	Service limit
SK140LC-8	5 (1.3)	13 (3.4)	15~ (4.0~)
SK200-8	9 (2.4)	16 (4.2)	23 (6.1)
SK250-8	7 (1.8)	14 (3.7)	21 (5.5)
SK330-8	7 (1.8)	14 (3.7)	21 (5.5)
SK460-8	7 (1.8)	14 (3.7)	21 (5.5)

2.2.9 MEASURING SWING PERFORMANCES

2.2.9.1 SWING SPEED

(1) Purpose
Measure the swing time and confirm the performances between the hydraulic pump and the swing motor of the swing drive system.

(2) Conditions
Hydraulic oil temperature ; 45~55°C (113~131°F)

Firm, level ground
Engine revolution; Hi idle

(3) Preparation
Put the bucket empty and extend the boom, arm and bucket cylinder fully.
And the machine becomes a position of minimum reach.

(4) Measurement (SK140LC-8, SK200-8, SK250-8)
Swing the machine by bringing the swing lever to its full stroke. Measure the time required to make two turns after one turn of preliminary run and calculate the time required for one turn.

(5) Measurement (SK330-8)
Swing the machine by bringing the swing lever to its full stroke. Measure the time required to make three turns after one turn of preliminary run.

(6) Measurement (SK460-8)
Swing the machine by bringing the swing lever to its full stroke. Measure the time required to make three turns after one turn of preliminary run.

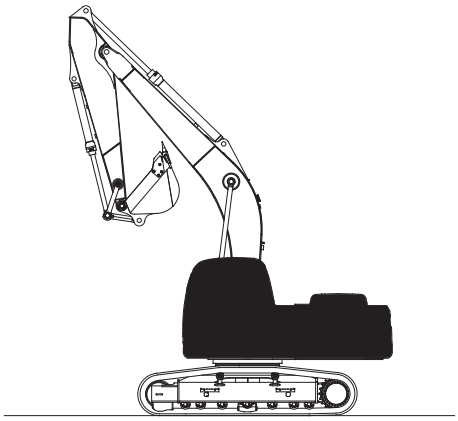


Fig. 2-26 Swing speed measuring position (at the min. reach)

Swing speed (At the min. reach) Unit : sec/rev

	Standard value	Reference value for remedy	Service limit
SK140LC-8	4.7~5.9	6.0~7.6	8.0~
SK200-8	4.2~5.4	5.4~6.9	7.2~
SK250-8	5.0~6.2	6.4~7.9	8.4~

Swing speed (At the min. reach) Unit : sec/3rev

SK300-8	Standard value	Reference value for remedy	Service limit
Right	17.9~20.0	21.9~24.4	27.2~
Left	17.9~20.0	21.9~24.4	27.2~

Swing speed (At the min. reach) Unit : sec/3 rev

Measuring position	Standard value	Reference value for remedy	Service limit
Right	23.1~25.1	29.6~32.1	36.2~
Left	23.1~25.1	29.6~32.1	36.2~

2.2.9.2 PERFORMANCE OF SWING BRAKE

(1) Purpose
Confirm the braking torque performances by the swing relief valve.

(2) Conditions
Hydraulic oil temperature ; 45~55°C (113~131°F)
Firm, level ground
Engine revolution; Hi idle

(3) Preparation (SK140LC-8, SK200-8, SK250-8)
1) Put the bucket empty, retract the arm cylinder fully and extend the bucket cylinders fully. And move the boom so that the arm top pin is positioned at same height with boom foot pin.
2) Put a matching mark on the outer circumference of the swing bearing of the upper frame side and of the track frame side. Place two poles (flags) on the front and back of the extended line of the matching mark.

(4) Preparation (SK330-8, SK460-8)
1) Put the bucket empty, retract the arm cylinder fully and extend the bucket cylinders fully. And move the boom so that the arm top pin is positioned at same height with boom foot pin.
2) Put a matching mark on the outer circumference of the swing bearing of the upper frame side and of the track frame side. Place two poles (flags) on the front and back of the extended line of the matching mark.

(5) Measurement
1) When operating in regular swing speed, by shifting lever to neutral position at pole position the swing operation stops.
2) Calculate the swing drift angle by the following equation, after the upper swing body stops, using the amount of deflection (m) of the matching marks on the swing race and the length (m) of the circumference of the swing race :

$$\text{Swing drift angle (°)} = \frac{\text{Amount of deflection of matching marks [m (ft-in)]}}{\text{Circumferential length of swing race [m (ft-in)]}} \times 360°$$

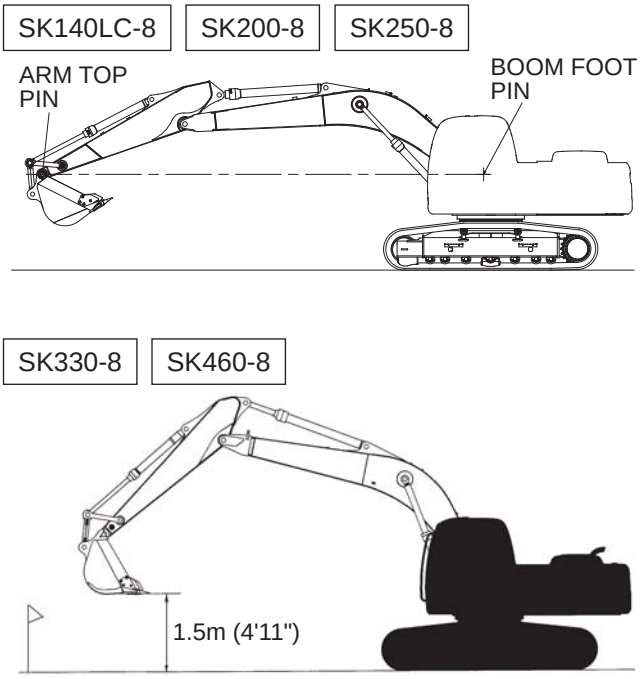


Fig. 2-27 Swing brake performance measuring position

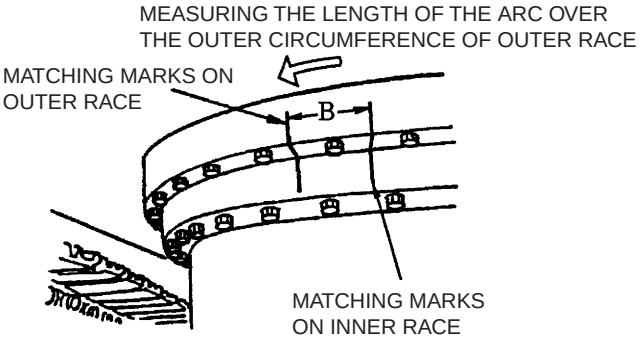


Fig. 2-28 Measuring position of swing brake performances

Swing brake performance (Swing 180°) Unit : degree

	Standard value	Reference value for remedy	Service limit
SK140LC-8	75°	83°	90°
SK200-8	75°	85°	90°
SK250-8	75°	85°	90°
SK330-8	98° or less	108°	118°
SK460-8	77° or less	85°	93°

2.2.9.3 PERFORMANCE OF SWING PARKING BRAKE

(1) Purpose
To confirm the mechanical performances of the swing parking brake that is fitted to the inside of the swing motor.

(2) Conditions
On a slope of 15 degree incline.
Stop the machine at right angles with the slope. Put the bucket empty, retract the arm cylinder fully and extend the bucket cylinder fully. And move the boom so that the arm top pin is positioned at same height with boom foot pin.

(3) Preparation
Put the angle meter on the shoe plate and make sure that the angle is more than 15 degree.
Put a matching mark on the outer race side and on the inner race side.

(4) Measurement
When five minutes has passed after the engine stops, measure the length of the movement of the matching marks.

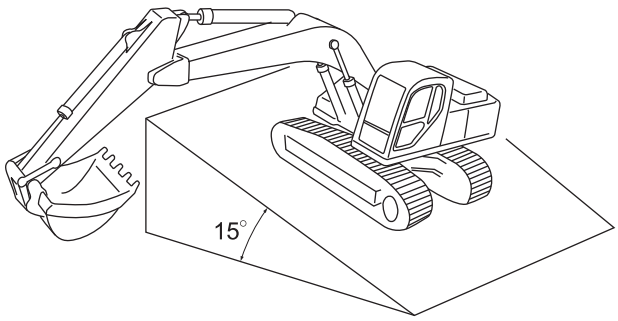


Fig. 2-29 Swing parking brake performance measuring position

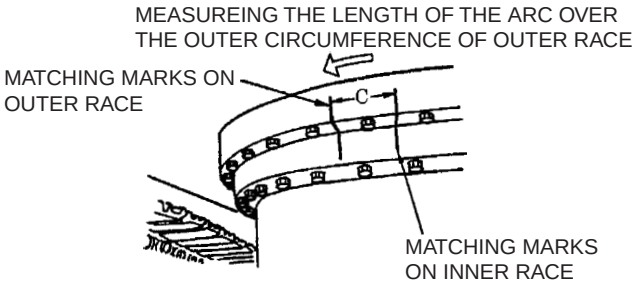


Fig. 2-30 Measuring position of swing parking brake performances

Performance of swing parking brake Unit : mm(in)/5min

Measuring position	Standard value	Reference value for remedy	Service limit
C	0	1 (0.04)	2 (0.08)

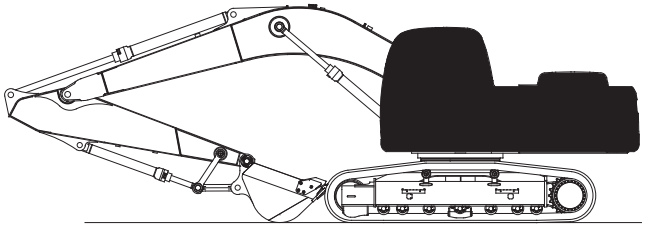
2.2.9.4 DRAIN RATE OF SWING MOTOR

(1) Purpose
Measure the drain rate of the swing motor and confirm the performances of the swing motor.

(2) Conditions
Hydraulic oil temperature ; 45~55°C (113~131°F)
Firm, level ground
Engine revolution; Hi idle

(3) Preparation
1) Stop the engine.
2) Release pressure from inside the hydraulic circuit.
3) Disconnect the swing motor drain hose from its end returning to the hydraulic oil tank and take oil in a container.
4) Put a plug to the tank side.

(4) Measurement ; at Swing Lock
1) Start the engine and put the side faces of bucket against the inside of the right or left shoe plates.
2) Relieve the swing motor at full stroke of the swing motion.
3) Collect the amount of drained oil in a container for 30 seconds.



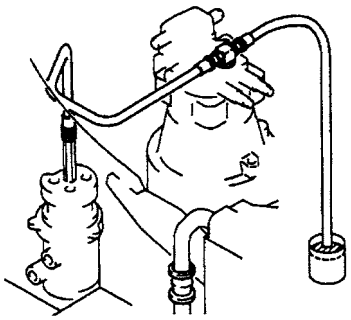


Fig. 2-31

Travel deviation Unit : L (gal) / 30sec

	Standard value	Reference value for remedy	Service limit
SK140LC-8	5.0 (1.3)	8.0 (2.1)	11~ (2.9~)
SK200-8	2.1 (0.55)	5.2 (1.4)	6.2 (1.6)
SK250-8	1.5 (0.4)	3.0 (0.8)	4.2 (1.1)
SK330-8	2.1 (0.55)	5.2 (1.4)	6.2 (1.6)
SK460-8	1.5 (0.4)	3.0 (0.8)	4.5 (1.2)

2.2.10 MEASURING ATTACHMENT OPERATING PERFORMANCES

2.2.10.1 OPERATING TIME OF CYLINDERS

(1) Purpose
Measure the operating time of the boom, arm and bucket and confirm the performances between the hydraulic pump and the cylinder of the attachment drive system.

(2) Condition
Hydraulic oil temperature ; 45~55°C (113~131°F)
Engine revolution; Hi idle
Operating time excluding the cushion stroke

(3) Preparation
Firm level ground with the bucket empty

(4) Measurement 1 ; Boom up and down
With the boom operating lever at full stroke, measure the required operating time of the bucket between the ground surface and its highest position.

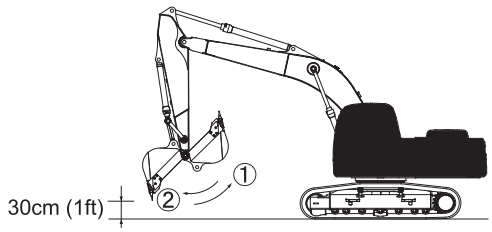


Fig. 2-32 Measuring position for bucket digging and dump

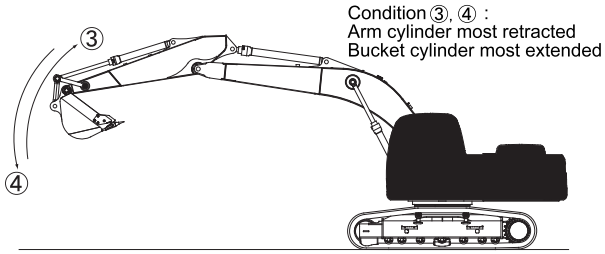


Fig. 2-33 Measuring position for boom up and down motions

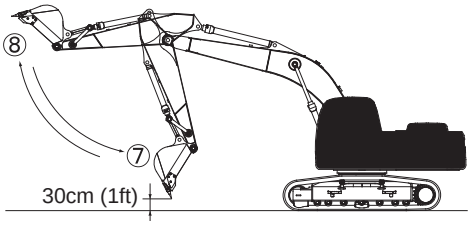


Fig. 2-34 Measuring position for arm in and out motions

WARNING

When lowering the boom, allow the bucket onto a soft ground or cushioning such as rubber tires ; never put the bucket against concrete or other solid material.

Measurement 2 ; Arm in and out, bucket digging and dump
In a position in which the tooth of the bucket rises to a level of about 30cm (1ft) above ground, measure the full stroke operating time required with the arm and bucket operating levers at full stroke.

Cylinder Operating time — Unit : sec

MODEL	SK140LC-8			SK200-8			SK250-8		
Measuring position	Standard value	Reference value for remedy	Service limit	Standard value	Reference value for remedy	Service limit	Standard value	Reference value for remedy	Service limit
①	2.7~3.4	3.5~4.4	5.3~	2.2~2.8	2.8~3.6	3.8~	2.5~3.1	3.2~4.0	4.2~
②	2.1~2.7	2.7~3.5	3.6~	1.7~2.3	2.2~2.9	3.0~	2.0~2.6	2.6~3.3	3.5~
③	2.7~3.3	3.5~4.2	4.5~	2.5~3.1	3.2~4.0	4.2~	2.8~3.4	3.6~4.4	4.7~
④	2.4~3.0	3.1~3.8	4.1~	2.2~2.8	2.8~3.6	3.8~	2.3~2.9	2.9~3.7	3.9~
⑦	2.8~3.4	3.6~4.4	4.7~	3.0~3.6	3.8~4.6	5.0~	3.2~3.8	4.1~4.9	5.3~
⑧	2.4~3.0	3.1~3.8	4.1~	2.3~2.9	2.9~3.7	3.9~	2.6~3.2	3.3~4.1	4.4~

MODEL	SK330-8			SK460-8		
Measuring position	Standard value	Reference value for remedy	Service limit	Standard value	Reference value for remedy	Service limit
①	2.7~3.3	3.5~4.2	4.5~	2.3~2.9	2.9~3.7	3.9~
②	1.9~2.5	2.4~3.2	3.3~	2.2~2.8	2.8~3.6	3.8~
③	2.7~3.3	3.5~4.2	4.5~	3.3~3.9	4.2~5.0	5.4~
④	2.1~2.7	2.7~3.5	3.6~	2.0~2.6	2.6~3.3	3.5~
⑦	3.4~4.0	4.4~5.1	5.6~	3.5~4.1	4.5~5.2	5.7~
⑧	2.9~3.5	3.7~4.5	4.8~	2.9~3.5	3.7~4.5	4.8~

2.2.10.2 OIL TIGHTNESS OF CYLINDERS

(1) Purpose
Confirm that the cylinder oil tight by checking the moving length of the cylinder rods.

(2) Condition
Hydraulic oil temperature ; 45~55°C (113~131°F)
Firm, level ground
After cylinders are replaced, bleed off air from the cylinders, before checking for oil tightness.
Retract the arm cylinder rod 50mm (2in) from stroke end so that the piston does not match a same range of the cushioning mechanism.

(3) Preparation
Put the bucket empty. Extend the arm cylinder rod 50mm (2in) from the most retracted position. And extend the bucket cylinders fully. Then hold the boom so that the arm top pin is positioned at same height with boom foot pin.

(4) Measurement
Measure the items five minutes after the engine is turned off.

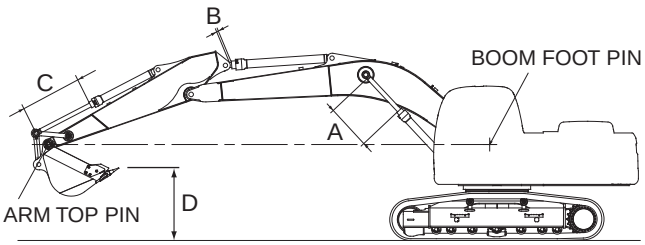


Fig. 2-35

Oil tightness of cylinder

SK140LC-8 Unit : mm(in)/5min

Measuring position	Standard value	Reference value for remedy	Service limit
A	3 (0.12)	6 (0.24)	9~ (0.35~)
B	4 (0.16)	8 (0.32)	12~ (0.47~)
C	–	–	–
D	90 (3.54)	115 (4.53)	150~ (5.91~)

SK200-8 Unit : mm(in)/5min

Measuring position	Standard value	Reference value for remedy	Service limit
A	7 (0.28)	11 (0.43)	14 (0.55)
B	6 (0.24)	9 (0.35)	11 (0.43)
C	–	–	–
D	80 (3.1)	120 (4.7)	160 (6.3)

SK250-8

Measuring position	Standard value	Reference value for remedy	Service limit
A	7 (0.28)	9 (0.35)	12 (047)
B	6 (0.24)	7 (0.28)	9 (0.35)
C	–	–	–
D	95 (3.7)	120 (4.7)	160 (6.3)

SK330-8

Measuring position	Standard value	Reference value for remedy	Service limit
A	4 (0.16)	5 (0.2)	7 (0.28)
B	6 (0.24)	7.5 (0.3)	10 (0.4)
C	–	–	–
D	120 (4.7)	150 (5.9)	200 (7.9)

SK460-8

Measuring position	Standard value	Reference value for remedy	Service limit
A	6 (0.24 in)	7.5 (0.3 in)	10 (0.4 in)
B	12 (0.47 in)	15 (0.59 in)	20 (0.79 in)
C	–	–	–
D	180 (7.1 in)	225 (8.9 in)	300 (11.8 in)

2.2.11 MEASURING PERFORMANCES OF SWING BEARING

(1) Purpose
Measure the gap between the lower frame and the bottom face of the swing bearing and estimate the degree of wear of the swing bearing.

(2) Condition
Firm, level ground
The swing bearing mounting bolts are not loosened.
The swing bearing is lubricated well, not making abnormal sound during turning.

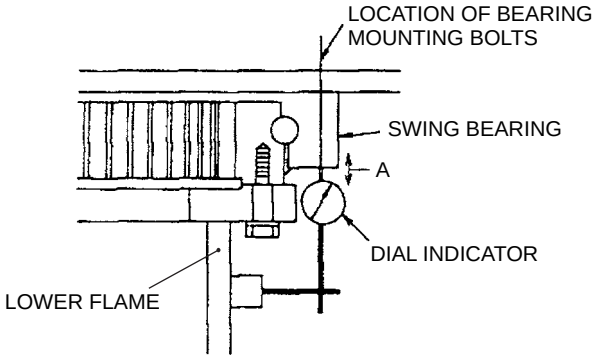


Fig. 2-36 How to measure the axial play of swing bearing

(3) Preparation
1) Install a dial indicator to the magnetic base and fix it to the lower frame.
2) Direct the upper swing body and the lower frame toward the travel direction, bring the probe of the dial indicator in contact with the bottom surface of the outer race on the swing body side and set the reading at zero.

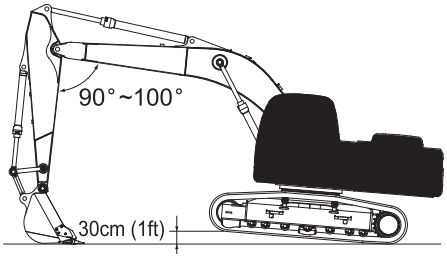


Fig. 2-37 Measuring position 1

(4) Measurement 1 (Measuring position 1 and 2)
1) Measure the displacement of the outer race in the axial direction in position 1 [The arm at 90°~110° and the crawler front is lifted by attachment about 30cm (1ft)] and in position 2, using a dial indicator.

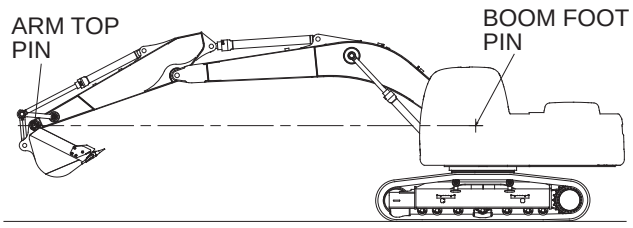


Fig. 2-38 Measuring position 2

Axial play of swing bearing

SK140LC-8

Unit : mm (in)

Measuring position	Standard value	Reference value for remedy	Service limit
A	0.5~1.5 (0.02~0.06)	1.9~2.9 (0.08~0.11)	3.0~ (0.12~)

SK200-8 SK250-8 SK330-8 SK460-8

Unit : mm (in)

Measuring position	Standard value	Reference value for remedy	Service limit
A	0.8~1.8 (0.03~0.07)	2.3~3.3 (0.09~0.13)	3.6~ (0.14~)

(5) Measurement 2 (Measuring position 3)
1) Retract the arm cylinder fully and extend the bucket cylinder fully. And move the boom so that the arm top pin is positioned at same height with boom foot pin. Then swing the bucket right and left by man power.
But in this case, the gap of the attachment is included.

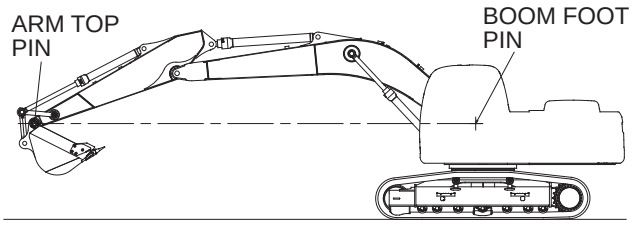


Fig. 2-39 Measuring position 3

Right and left movement of the tip of bucket

Unit : mm (in)

MODEL	SK140LC-8, SK200-8, SK250-8			SK330-8			SK460-8		
Measuring position	Standard value	Reference value for remedy	Service limit	Standard value	Reference value for remedy	Service limit	Standard value	Reference value for remedy	Service limit
Bucket	30~50 (1.18~1.97)	80 (3.15)	120 (4.72)	30~50 (1.18~1.97)	100 (3.94)	120 (4.72)	80 or less (3.15)	160 (6.3)	180 (7.1)

2.3 ATTACHMENT MAINTENANCE STANDARD

2.3.1 CLEARANCE OF PIN AND BUSHING

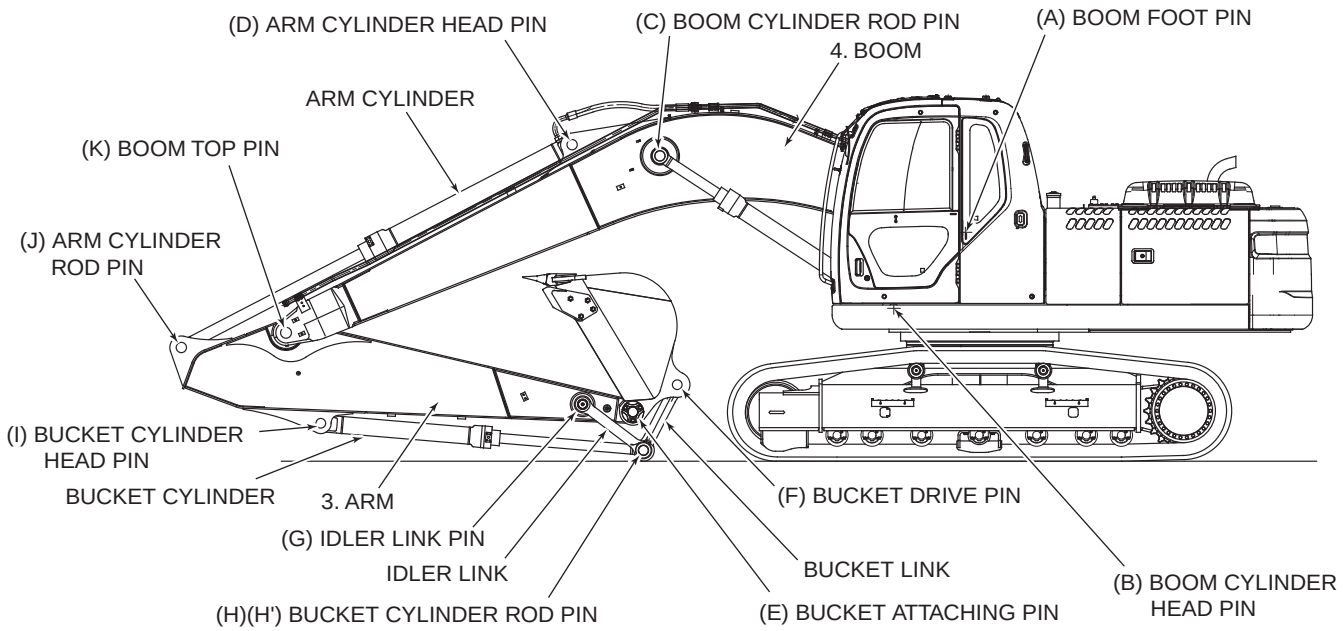


Fig. 2-40 Pin position (Shown in SK200-8)

SK140LC-8

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	YY02B01590P1	ø 70 (2.7559)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.223 (+0.0088) + 0.081 (+0.0032)	+ 0.243 (+0.0096) + 0.061 (+0.0024)	More than 1.2 (0.047)	2.0 (0.079)	Replace bushing or pin
B	Boom cylinder (Head side)	LP02B01113P1			+ 0.237 (+0.0093) + 0.101 (+0.0040)	+ 0.257 (0.0101) + 0.081 (+0.0032)			
C	Boom cylinder (Rod side)	YY02B01177P2	ø 80 (3.1496)		+ 0.229 (+0.0090) + 0.089 (+0.0035)	+ 0.249 (+0.0098) + 0.069 (+0.0027)			
D	Arm cylinder (Head side)	YY12B01435P1	ø 70 (2.7559)		+ 0.231 (+0.0091) + 0.091 (+0.0036)	+ 0.251 (+0.0099) + 0.071 (+0.0028)			
E	Arm point	YY12B01427P2	ø65 (2.5591)	–0.020 (-0.0008) –0.060 (-0.0024)	+0.267 (+0.0105) +0.090 (+0.0035)	+0.327 (+0.0129) +0.110 (+0.0043)	1.2 (0.05)	2.0 (0.008)	Replace bushing or pin
F	Bucket link (Bucket side)				+0.225 (+0.0089) +0.089 (+0.0035)	+0.258 (+0.0102) +0.105 (+0.0041)			
G	Idler link (Connected part of arm)	YY12B01428P3	ø60 (2.3622)	0 (0) –0.040 (-0.0016)	+0.203 (+0.0080) +0.093 (+0.0037)	+0.243 (+0.0096) +0.093 (+0.0037)			
H	Bucket link (Idler link side)	YY12B01429P3	ø65 (2.5591)		+0.198 (+0.0078) +0.085 (+0.0033)	+0.238 (+0.0094) +0.085 (+0.0033)			
H'	Bucket cylinder (Rod side)				+0.198 (+0.0078) +0.085 (+0.0033)	+0.238 (+0.0094) +0.085 (+0.0033)			
I	Bucket cylinder (Head side)	YY12B01436P1	ø60 (2.3622)	+0.020 (+0.0008) –0.020 (-0.0008)	+0.195 (+0.0077) +0.081 (+0.0032)	+0.215 (+0.0085) +0.061 (+0.0024)			
J	Arm cylinder (Rod side)	YY12B01435P1	ø70 (2.7559)		+0.231 (+0.0091) +0.091 (+0.0036)	+0.251 (+0.0085) +0.071 (+0.0024)			
K	Arm foot (Connected part of boom)	YY12B01922P1			+0.226 (+0.0089) +0.085 (+0.0033)	+0.246 (+0.0097) +0.065 (+0.0026)			

SK200-8

ASIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	YN02B01719P1	ø 90 (3.5433)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.217 (+0.0085) + 0.071 (+0.0028)	+ 0.237 (+0.0093) + 0.051 (+0.0020)	More than 2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	YN02B01720P1	ø 85 (3.3465)	0 (0) - 0.040 (-0.0016)	+ 0.243 (+0.010) + 0.085 (+0.0033)	+ 0.283 (0.011) + 0.085 (+0.0033)			
C	Boom cylinder (Rod side)	YN02B01721P1	ø 85 (3.3465)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.247 (+0.0097) + 0.093 (+0.0037)	+ 0.267 (+0.0105) + 0.073 (+0.0097)			
D	Arm cylinder (Head side)	YN02B01839P1		+ 0.030 (+0.0012) - 0.030 (-0.0012)	+ 0.252 (+0.0099) - 0.099 (-0.0039)	+ 0.282 (+0.0111) + 0.069 (+0.0027)			
E	Arm point	YN12B02407P1	ø80 (3.1496)	–0.020 (-0.0008) –0.080 (-0.0031)	+0.253 (+0.0100) +0.080 (+0.0031)	+0.333 (+0.0131) +0.100 (+0.0039)			
F	Bucket link (Bucket side)				+0.284 (+0.0112) +0.156 (+0.0061)	+0.364 (+0.0143) +0.176 (+0.0069)			
G	Idler link (Connected part of arm)	YN12B02408P1	ø70 (2.7559)	0 (0) –0.060 (-0.0024)	+0.253 (+0.0100) +0.194 (+0.0076)	+0.313 (+0.0123) +0.194 (+0.0076)			
H	Bucket link (Idler link side)	YN12B02412P1	ø80 (3.1496)		+0.232 (+0.009) +0.161 (+0.0063)	+0.292 (+0.0115) +0.161 (+0.0063)			
H'	Bucket cylinder (Rod side)				+0.278 (+0.0109) +0.141 (+0.0056)	+0.338 (+0.0133) +0.141 (+0.0056)			
I	Bucket cylinder (Head side)	YN12B02413P1		+0.030 (+0.0012) –0.030 (-0.0012)		+0.308 (+0.0121) +0.111 (+0.0044)			
J	Arm cylinder (Rod side)	YN02B01839P1	ø85 (3.3465)		+0.252 (+0.0099) +0.079 (+0.0031)	+0.282 (+0.0111) +0.049 (+0.0019)			
K	Arm foot (Connected part of boom)	YN12B02415P1	ø90 (3.5433)	+0.020 (+0.0008) –0.020 (-0.0008)	+0.292 (+0.0115) +0.195 (+0.0077)	+0.312 (+0.0123) +0.175 (+0.0069)			

SK200-8

OCEANIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	YN02B01719P1	ø 90 (3.5433)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.217 (+0.0085) + 0.071 (+0.0028)	+ 0.237 (+0.0093) + 0.051 (+0.0020)	More than 2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	YN02B01720P1	ø 85 (3.3465)	0 (0) - 0.040 (-0.0016)	+ 0.243 (+0.010) + 0.085 (+0.0033)	+ 0.283 (0.011) + 0.085 (+0.0033)			
C	Boom cylinder (Rod side)	YN02B01721P1		+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.247 (+0.0097) + 0.093 (+0.0037)	+ 0.267 (+0.0105) + 0.073 (+0.0097)			
D	Arm cylinder (Head side)	YN02B01722P1			+ 0.230 (+0.009) + 0.065 (+0.003)	+ 0.250 (+0.010) + 0.045 (+0.002)			
E	Arm point	YN12B02215P1	ø80 (3.1496)	–0.020 (-0.0008) –0.060 (-0.0024)	+0.253 (+0.0100) +0.080 (+0.0031)	+0.313 (+0.0123) +0.100 (+0.0039)			
F	Bucket link (Bucket side)				+0.220 (+0.009) +0.076 (+0.0030)	+0.280 (+0.0110) +0.096 (+0.0038)			
G	Idler link (Connected part of arm)	YN12B02216P1	ø70 (2.7559)	0 (0) –0.040 (-0.0016)	+0.285 (+0.0112) +0.128 (+0.0050)	+0.325 (+0.0128) +0.128 (+0.0050)			
H	Bucket link (Idler link side)	YN12B02217P1	ø80 (3.1496)		+0.225 (+0.009) +0.043 (+0.002)	+0.265 (+0.0100) +0.043 (+0.0020)			
H'	Bucket cylinder (Rod side)				+0.245 (+0.010) +0.089 (+0.004)	+0.285 (+0.0110) +0.089 (+0.0040)			
I	Bucket cylinder (Head side)	YN12B02218P1		+0.020 (+0.0008) –0.020 (-0.0008)		+0.265 (+0.0100) +0.069 (+0.0030)			
J	Arm cylinder (Rod side)	YN02B01722P1	ø85 (3.3465)		+0.230 (+0.009) +0.065 (+0.003)	+0.250 (+0.0100) +0.045 (+0.0020)			
K	Arm foot (Connected part of boom)	LC12B02094P1	ø90 (3.5433)		+0.214 (+0.008) +0.067 (+0.003)	+0.234 (+0.0090) +0.047 (+0.0020)			

SK250-8

ASIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	LQ02B01395P1	ø 100 (3.9370)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.213 (+0.0084) + 0.065 (+0.0026)	+ 0.233 (+0.0092) + 0.045 (+0.0018)	More than 2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	LQ02B01390P1	ø 90 (3.5433)		+ 0.238 (+0.094) + 0.077 (+0.003)	+ 0.258 (0.0102) + 0.057 (+0.0022)			
C	Boom cylinder (Rod side)	LQ02B01373P1							
D	Arm cylinder (Head side)	LQ02B01482P1		+ 0.030 (+0.0012) - 0.030 (-0.0012)	+ 0.250 (+0.0098) + 0.050 (+0.0020)	+ 0.280 (+0.0110) + 0.020 (+0.0008)			
E	Arm point	LQ12B01567P1		–0.020 (-0.0008) –0.080 (-0.0031)	+0.252 (+0.0099) +0.077 (+0.0030)	+0.332 (+0.0131) +0.097 (+0.0038)			
F	Bucket link (Bucket side)				+0.282 (+0.0111) +0.154 (+0.0061)	+0.362 (+0.0143) +0.174 (+0.0069)			
G	Idler link (Connected part of arm)	LQ12B01568P1	ø70 (2.7559)	+0.020 (+0.0008) –0.040 (-0.0016)	+0.241 (+0.0095) +0.175 (+0.0069)	+0.281 (+0.0111) +0.155 (+0.0061)			
H	Bucket link (Idler link side)	LQ12B01569P1	ø80 (3.1496)	0 (0) –0.060 (-0.0024)	+0.228 (+0.0090) +0.158 (+0.0062)	+0.288 (+0.0113) +0.158 (+0.0062)			
H'	Bucket cylinder (Rod side)			+0.020 (+0.0008) –0.040 (-0.0016)	+0.250 (+0.0098) +0.050 (+0.0020)	+0.290 (+0.0114) +0.030 (+0.0012)			
I	Bucket cylinder (Head side)	LQ12B01570P1		+0.030 (+0.0012) –0.030 (-0.0012)		+0.280 (+0.0110) +0.020 (+0.0008)			
J	Arm cylinder (Rod side)	LQ02B01482P1	ø90 (3.5433)						
K	Arm foot (Connected part of boom)	LQ12B01487P1		+0.020 (+0.0008) –0.020 (-0.0008)	+0.278 (+0.0109) +0.148 (+0.0058)	+0.298 (+0.0117) +0.128 (+0.0050)			

SK250-8

OCEANIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	LQ02B01395P1	ø 100 (3.9370)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.213 (+0.0084) + 0.065 (+0.0026)	+ 0.233 (+0.0092) + 0.045 (+0.0018)	More than 2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	LQ02B01390P1	ø 90 (3.5433)		+ 0.238 (+0.0094) + 0.077 (+0.0030)	+ 0.258 (+0.0102) + 0.057 (+0.0022)			
C	Boom cylinder (Rod side)	LQ02B01373P1							
D	Arm cylinder (Head side)	LQ02B01380P1			+ 0.235 (+0.0093) + 0.074 (+0.0029)	+ 0.255 (+0.0089) + 0.054 (+0.0021)			
E	Arm point	LQ12B01439P1		–0.020 (-0.0008) –0.060 (-0.0024)	+0.252 (+0.0099) +0.077 (+0.0030)	+0.312 (+0.0123) +0.097 (+0.0038)			
F	Bucket link (Bucket side)				+0.219 (+0.0086) +0.074 (+0.0029)	+0.279 (+0.0110) +0.094 (+0.0037)			
G	Idler link (Connected part of arm)	LQ12B01440P1	ø70 (2.7559)	0 (0) –0.040 (-0.0016)	+0.237 (+0.0093) +0.101 (+0.0040)	+0.277 (+0.0109) +0.101 (+0.0040)			
H	Bucket link (Idler link side)	LQ12B01441P1	ø80 (3.1496)		+0.222 (+0.0087) +0.079 (+0.0031)	+0.262 (+0.0103) +0.079 (+0.0031)			
H'	Bucket cylinder (Rod side)				+0.237 (+0.0093) +0.077 (+0.0030)	+0.277 (+0.0109) +0.077 (+0.0030)			
I	Bucket cylinder (Head side)	LQ12B01563P1				+0.257 (+0.0101) +0.057 (+0.0022)			
J	Arm cylinder (Rod side)	LQ02B01380P1	ø90 (3.5433)	+0.020 (+0.0008) –0.020 (-0.0008)	+0.235 (+0.0093) +0.074 (+0.0029)	+0.255 (+0.0100) +0.054 (+0.0021)			
K	Arm foot (Connected part of boom)	LQ12B01487P1			+0.215 (+0.0085) +0.069 (+0.0027)	+0.235 (+0.0093) +0.049 (+0.0019)			

SK330-8

ASIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	LC02B01373P1	ø 110 (4.331)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.226 (+0.0089) + 0.098 (+0.0039)	+ 0.246 (+0.0097) + 0.078 (+0.0031)	More than 2.5 (0.10)	3.0 (0.12)	Replace bushing or pin
B	Boom cylinder (Head side)	LC02B01344P1	ø 100 (3.937)	0 (0) –0.040 (-0.0016)	+ 0.222 (+0.087) + 0.105 (+0.0041)	+ 0.262 (0.0103) + 0.0105 (+0.0041)			
C	Boom cylinder (Rod side)	LC02B01345P1	ø 110 (4.331)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.230 (+0.0091) + 0.105 (+0.0041)	+ 0.250 (+0.0098) + 0.085 (+0.0033)			
D	Arm cylinder (Head side)	LC02B01444P1		+ 0.030 (+0.0012) - 0.030 (-0.0012)	+ 0.250 (+0.0098) + 0.050 (+0.0020)	+ 0.280 (+0.0110) + 0.020 (+0.0008)			
E	Arm point	LC12B01783P1	ø90 (3.5433)	–0.020 (-0.0008) –0.060 (-0.0024)	+0.272 (+0.0107) +0.095 (+0.0037)	+0.332 (+0.0131) +0.115 (+0.0045)			
F	Bucket link (Bucket side)				+0.298 (+0.0117) +0.168 (+0.0066)	+0.358 (+0.0141) +0.188 (+0.0074)			
G	Idler link (Connected part of arm)	LC12B01784P1	ø80 (3.1496)	0 (0) –0.040 (-0.0016)	+0.229 (+0.0090) +0.158 (+0.0062)	+0.269 (+0.0106) +0.158 (+0.0062)			
H	Bucket link (Idler link side)	LC12B01789P1	ø90 (3.5433)	0 (0) –0.060 (-0.0024)	+0.299 (+0.0118) +0.170 (+0.0067)	+0.359 (+0.0141) +0.170 (+0.0067)			
H'	Bucket cylinder (Rod side)				+0.250 (+0.0098) +0.050 (+0.0020)	+0.310 (+0.0122) +0.050 (+0.0020)			
I	Bucket cylinder (Head side)	LC12B01790P1		+0.030 (+0.0012) –0.030 (-0.0012)		+0.280 (+0.0110) +0.020 (+0.0008)			
J	Arm cylinder (Rod side)	LC02B01444P1	ø110 (4.331)						
K	Arm foot (Connected part of boom)	LC12B01468P1		+0.020 (+0.0008) –0.020 (-0.0008)	+0.288 (+0.0113) +0.190 (+0.0075)	+0.308 (+0.0121) +0.170 (+0.0067)			

SK330-8

OCEANIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	LC02B01373P1	ø 110 (4.331)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.226 (+0.0089) + 0.098 (+0.0039)	+ 0.246 (+0.0097) + 0.078 (+0.0031)	More than 2.5 (0.10)	3.0 (0.12)	Replace bushing or pin
B	Boom cylinder (Head side)	LC02B01344P1	ø 100 (3.937)	0 (0) –0.040 (-0.0016)	+ 0.222 (+0.087) + 0.105 (+0.0041)	+ 0.262 (0.0103) + 0.0105 (+0.0041)			
C	Boom cylinder (Rod side)	LC02B01345P1	ø 110 (4.331)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.230 (+0.0091) + 0.105 (+0.0041)	+ 0.250 (+0.0098) + 0.085 (+0.0033)			
D	Arm cylinder (Head side)	LC02B01337P1			+ 0.226 (+0.0089) + 0.098 (+0.0039)	+ 0.246 (+0.0097) + 0.078 (+0.00031)			
E	Arm point	LC12B01657P1	ø90 (3.5433)	–0.020 (-0.0008) –0.060 (-0.0024)	+0.272 (+0.0107) +0.095 (+0.0037)	+0.332 (+0.0131) +0.115 (+0.0045)			
F	Bucket link (Bucket side)				+0.217 (+0.0085) +0.071 (+0.0028)	+0.277 (+0.0109) +0.091 (+0.0036)			
G	Idler link (Connected part of arm)	LC12B01613P1	ø80 (3.1496)	0 (0) –0.040 (-0.0016)	+0.222 (+0.0087) +0.079 (+0.0031)	+0.262 (+0.0103) +0.079 (+0.0031)			
H	Bucket link (Idler link side)	LC12B01614P1	ø90 (3.5433)		+0.219 (+0.0086) +0.034 (+0.0013)	+0.259 (+0.0102) +0.034 (+0.0013)			
H'	Bucket cylinder (Rod side)				+0.235 (+0.0093) +0.074 (+0.0029)	+0.275 (+0.0108) +0.074 (+0.0029)			
I	Bucket cylinder (Head side)	LC12B01461P1		+0.020 (+0.0008) –0.020 (-0.0008)	+0.238 (+0.0094) +0.077 (+0.0030)	+0.258 (+0.0102) +0.057 (+0.0022)			
J	Arm cylinder (Rod side)	LC02B01337P1	ø110 (4.331)		+0.226 (+0.0089) +0.098 (+0.0039)	+0.246 (+0.0097) +0.078 (+0.0031)			
K	Arm foot (Connected part of boom)	LC12B01468P1			+0.200 (+0.0079) +0.099 (+0.0039)	+0.220 (+0.0087) +0.079 (+0.0031)			

SK460-8

ASIA, OCEANIA

Unit : mm (in)

Sym-bol	Item	Pin part No.	Standard value			Clearance			Remedy
			Pin dia.	Pin dia. tolerance	Bushing i.d. tolerance	Standard value	Repairable level	Service limit	
A	Boom foot	LS02B01341P1	ø 120 (4.7244)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.205 (+0.0081) + 0.098 (+0.0039)	+ 0.225 (+0.0089) + 0.078 (+0.0031)	More than 2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	LS02B01344P1	ø 110 (4.3307)	0 (0) - 0.04 (-0.0016)	+ 0.229 (+0.0090) + 0.103 (+0.0041)	+ 0.269 (0.0106) + 0.103 (+0.0041)			
C	Boom cylinder (Rod side)	LS02B01345P1	ø 120 (4.7244)	+ 0.020 (+0.0008) - 0.020 (-0.0008)	+ 0.230 (+0.0091) + 0.105 (+0.0041)	+ 0.250 (+0.0098) + 0.085 (+0.0033)			
D	Arm cylinder (Head side)	LS02B01473P1							
E	Arm point	LS12B01507P1	ø100 (3.9370)	–0.020 (-0.0008) –0.060 (-0.0024)	+0.256 (+0.0101) +0.084 (+0.0033)	+0.316 (+0.0124) +0.104 (+0.0041)	2.0 (0.08)	2.5 (0.01)	Replace bushing or pin
F	Bucket link (Bucket side)				+0.216 (+0.0085) +0.070 (+0.0028)	+0.276 (+0.0109) +0.090 (+0.0035)			
G	Idler link (Connected part of arm)	LS12B01508P1		0 (0) –0.04 (-0.0016)	+0.233 (+0.0092) +0.081 (+0.0032)	+0.273 (+0.0107) +0.081 (+0.0032)			
H	Bucket link (Idler link side)	LS12B01509P1			+0.220 (+0.0087) +0.076 (+0.0030)	+0.260 (+0.0102) +0.076 (+0.0030)			
H'	Bucket cylinder (Rod side)				+0.231 (+0.0091) +0.066 (+0.0026)	+0.271 (+0.0107) +0.066 (+0.0026)			
I	Bucket cylinder (Head side)	LS12B01510P1		+0.02 (+0.0008) –0.02 (-0.0008)	+0.233 (+0.0092) +0.070 (+0.0028)	+0.253 (+0.0100) +0.050 (+0.0020)			
J	Arm cylinder (Rod side)	LS02B01347P1	ø120 (4.7244)		+0.230 (+0.0091) +0.105 (+0.0041)	+0.250 (+0.0098) +0.085 (+0.0033)			
K	Arm foot (Connected part of boom)	LS12B01511P1			+0.206 (+0.0081) +0.099 (+0.0039)	+0.226 (+0.0089) +0.079 (+0.0031)			

2.3.2 CLEARANCE IN THRUST DIRECTION ON THE BOOM CYLINDER INSTALLATION SECTION

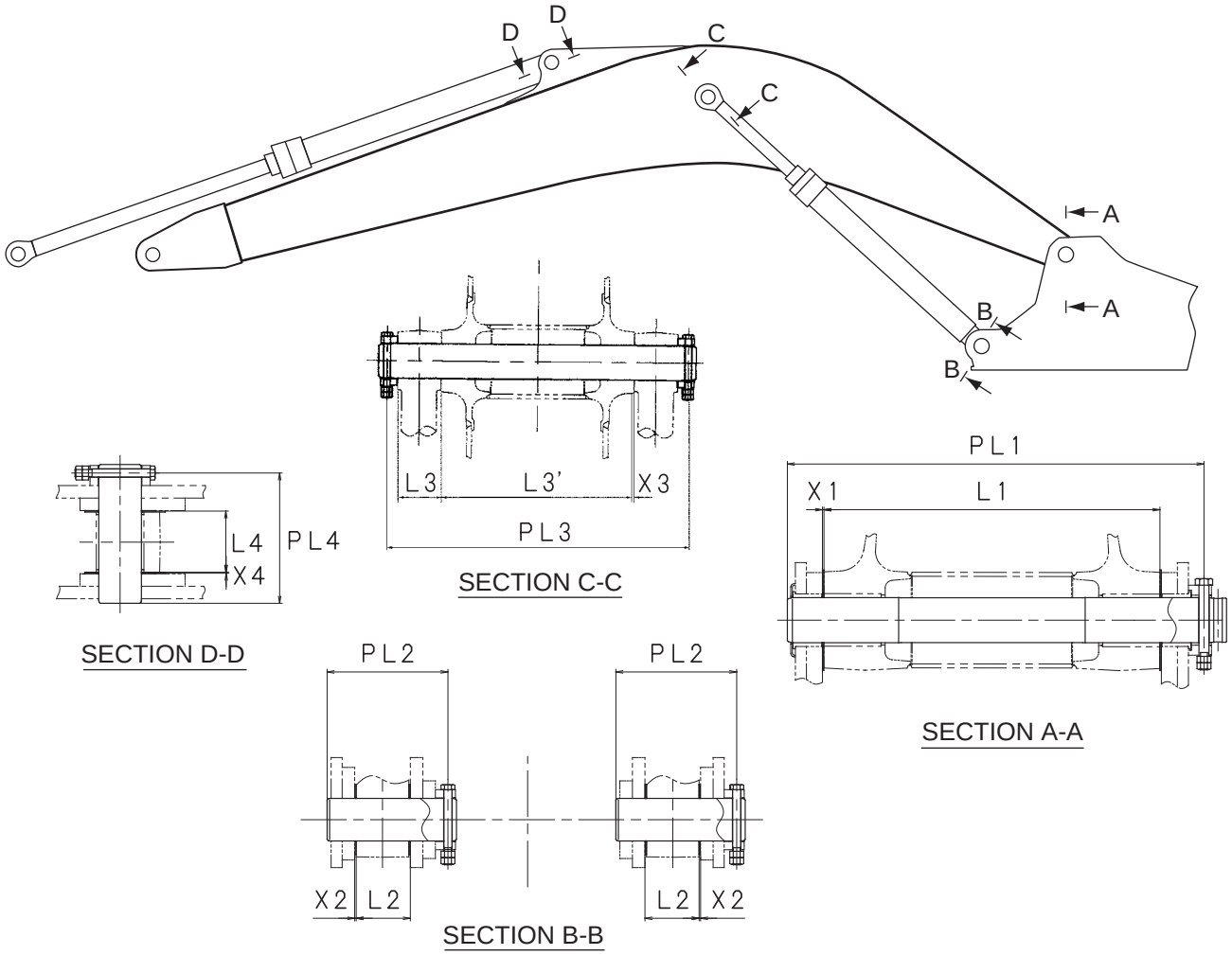


Fig. 2-41 Clearance in thrust direction on the boom cylinder installation section

SK140LC-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Boom foot	Boom	L1	575 (22.6)	0.5 (0.02) or less	1.0 (0.04)	1.5 (0.06)	PL1	732 (28.8)	Shim adjustment
		Upper frame		581 (22.9)						
B-B	Boom cylinder (Head side)	Boom cylinder	L2	90 (3.54)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL2	194 (7.63)	
		Upper frame		96 (3.78)						
C-C	Boom cylinder (Rod side)	Boom cylinder	L3	80 (3.15)	0.6~2.0 (0.02~0.08)	2.5 (0.10)	3.0 (0.10)	PL3	597 (23.5)	
		Boom	L3'	399 (15.7)						
D-D	Arm cylinder (Head side)	Arm cylinder	L4	105 (4.13)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL4	222 (8.74)	
		Boom		111 (4.37)						

SK200-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Boom foot	Boom	L1	670 (26.4)	0.5 (0.02) or less	2.0 (0.08)	2.5 (0.10)	PL1	831 (32.7)	Shim adjustment
		Upper frame		676 (26.6)						
B-B	Boom cylinder (Head side)	Boom cylinder	L2	105 (4.13)	0.6~1.0 (0.02~0.04)			PL2	241 (9.49)	
		Upper frame		111 (4.37)						
C-C	Boom cylinder (Rod side)	Boom cylinder	L3	105 (4.13)	0.6~2.0 (0.02~0.08)	3.0 (0.12)	4.0 (0.16)	PL3	736 (29.0)	
		Boom	L3'	468 (18.4)						
D-D	Arm cylinder (Head side)	Arm cylinder	L4	120 (4.72)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL4	260 (10.2)	
		Boom		126 (4.96)						

SK250-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Boom foot	Boom	L1	752 (29.6)	0.5 (0.02) or less	2.0 (0.08)	2.5 (0.10)	PL1	921 (36.3)	Shim adjustment
		Upper frame		758 (29.8)						
B-B	Boom cylinder (Head side)	Boom cylinder	L2	120 (4.7)	0.6~1.0 (0.02~0.04)			PL2	284 (11.2)	
		Upper frame		126 (5.0)						
C-C	Boom cylinder (Rod side)	Boom cylinder	L3	120 (4.7)	0.6~2.0 (0.02~0.08)	3.0 (0.12)	4.0 (0.16)	PL3	810 (31.9)	
		Boom	L3'	522 (20.6)						
D-D	Arm cylinder (Head side)	Arm cylinder	L4	130 (5.12)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL4	274 (10.8)	
		Boom		136 (5.35)						

SK330-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Boom foot	Boom	L1	826 (32.5)	0.5 (0.02) or less	1.0 (0.04)	1.5 (0.06)	PL1	1,026 (3'4.4")	Shim adjustment
		Upper frame		832 (32.8)						
B-B	Boom cylinder (Head side)	Boom cylinder	L2	130 (5.12)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL2	286 (11.26)	
		Upper frame		136 (5.35)						
C-C	Boom cylinder (Rod side)	Boom cylinder	L3	130 (5.12)	0.6~2.0 (0.02~0.08)	3.0 (0.12)	4.0 (0.16)	PL3	877 (34.5)	
		Boom	L3'	564 (22.2)						
D-D	Arm cylinder (Head side)	Arm cylinder	L4	140 (5.51)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL4	309 (12.2)	
		Boom		146 (5.75)						

SK460-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Boom foot	Boom	L1	926 (36.5)	0.5 (0.02) or less	2.0 (0.08)	2.5 (0.10)	PL1	921 (36.3)	Shim adjustment
		Upper frame		932^{+2}_{0} ($36.69^{+0.08}_{0}$)						
B-B	Boom cylinder (Head side)	Boom cylinder	L2	150 (5.91)	0.6~1.0 (0.02~0.04)			PL2	284 (11.2)	
		Upper frame		156±1 (6.15±0.04)						
C-C	Boom cylinder (Rod side)	Boom cylinder	L3	140 (5.51)	0.6~2.0 (0.02~0.08)	3.0 (0.12)	4.0 (0.16)	PL3	810 (31.9)	
		Boom	L3'	638 (25.1)						
D-D	Arm cylinder (Head side)	Arm cylinder	L4	160 (6.30)	0.6~1.0 (0.02~0.04)	2.0 (0.08)	2.5 (0.10)	PL4	274 (10.8)	
		Boom		166 (6.54)						

2.3.3 CLEARANCE OF ARM AND CYLINDER INSTALLING SECTIONS IN THRUST DIRECTION

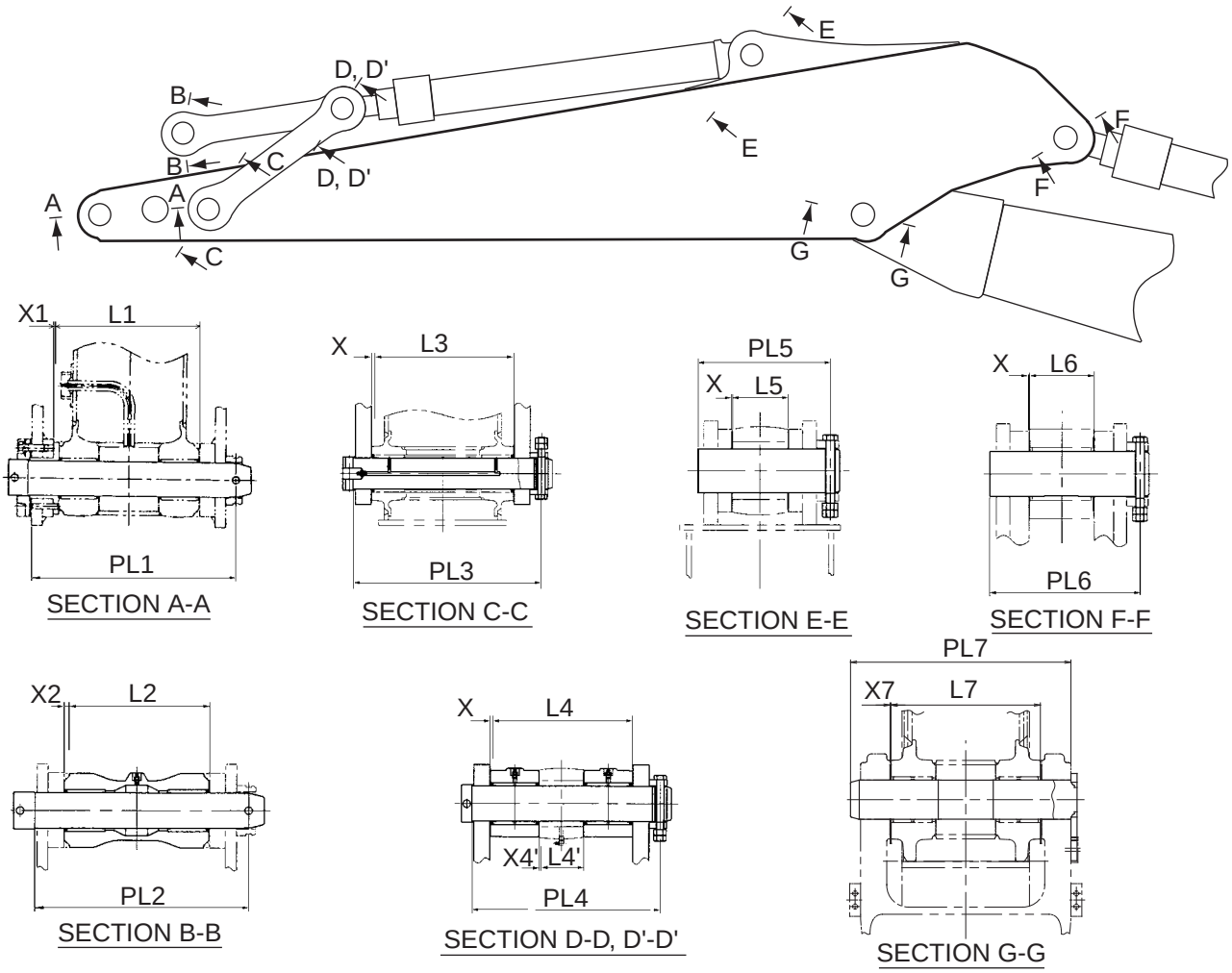


Fig. 2-42 Clearance of arm and cylinder installing sections in thrust direction

SK140LC-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Arm point	Arm	L1	250 (9.84)	0.6~1.0 (0.024~0.04)	1.2 (0.05)	2.0 (0.08)	PL1	391 (15.4)	Shim adjust -ment
		Bucket		251 (9.88)						
B-B	Bucket link	Link side	L2	250 (9.84)				PL2		
		Bucket		252 (9.92)						
C-C	Idler link (Arm connection)	Arm	L3	254 (10.0)	0.5 (0.02) or less	1.0 (0.04)		PL3	336 (13.2)	
		Link side		-						
D-D	Bucket link (Idler link connection)	Rod side	L4	-	0.6~1.0 (0.024~0.04)	1.2 (0.05)		PL4		
		Link side		254 (10.0)						
D'-D'	Bucket link (Rod side)	Rod side	L4'	85 (3.35)						
		Link side		90 (3.54)						
E-E	Bucket cylinder (Head side)	Head side	L5	85 (3.35)	0.6~2.0 (0.024~0.08)	2.0 (0.08)	2.5 (0.10)	PL5	190 (7.48)	
		Arm		91 (3.58)						
F-F	Arm cylinder (Rod side)	Rod side	L6	105 (4.13)				PL6	222 (8.74)	
		Arm		111 (4.37)						
G-G	Arm foot	Arm	L7	269 (10.59)	0.5 (0.02) or less	1.0 (0.04)	2.0 (0.08)	PL7	399 (15.7)	
		Boom		274 (10.79)						

SK200-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Arm point	Arm	L1	325 (12.79)	1.0 (0.04) or less	2.0 (0.08)	2.5 (0.10)	PL1	481 (18.9)	Shim adjust -ment
		Bucket		326 (12.83)						
B-B	Bucket link	Link side	L2	325 (12.79)	—	—		PL2		
		Bucket		327 (12.87)						
C-C	Idler link (Arm connection)	Arm	L3	323 (12.72)	0.5 (0.02)	1.0 (0.04)		PL3	427 (16.8)	
		Link side		-						
D-D	Bucket link (Idler link connection)	Rod side	L4	-	0.6~1.0 (0.024~0.04)	2.0 (0.08)		PL4		
		Link side		323 (12.72)						
D'-D'	Bucket link (Rod side)	Rod side	L4'	105 (4.13)						
		Link side		111 (4.37)						
E-E	Bucket cylinder (Head side)	Head side	L5	105 (4.13)	0.6~2.0 (0.024~0.08)	3.0 (0.12)	4.0 (0.16)	PL5	235 (9.25)	
		Arm		111 (4.37)						
F-F	Arm cylinder (Rod side)	Rod side	L6	120 (9.72)				PL6	260 (10.2)	
		Arm		126 (4.96)						
G-G	Arm foot	Arm	L7	342 (13.46)	0.5 (0.02)	1.0 (0.04)	2.5 (0.10)	PL7	505 (19.9)	
		Boom		347 (13.66)						

SK250-8 Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Arm point	Arm	L1	325 (12.79)	1.0 (0.04) or less	2.0 (0.08)	2.5 (0.10)	PL1	472 (18.6)	Shim adjust -ment
		Bucket		326 (12.83)						
B-B	Bucket link	Link side	L2	325 (12.79)	—	—		PL2		
		Bucket		327 (12.87)						
C-C	Idler link (Arm connection)	Arm	L3	332 (13.07)	0.5 (0.02)	1.0 (0.04)		PL3	454 (17.9)	
		Link side		-						
D-D	Bucket link (Idler link connection)	Rod side	L4	-	0.6~1.0 (0.024~0.04)	2.0 (0.08)		PL4		
		Link side		332 (13.07)						
D'-D'	Bucket link (Rod side)	Rod side	L4'	107 (4.21)						
		Link side		113 (4.45)						
E-E	Bucket cylinder (Head side)	Head side	L5	107 (4.21)	0.6~2.0 (0.024~0.08)	3.0 (0.12)	4.0 (0.16)	PL5	247 (9.72)	
		Arm		113 (4.45)						
F-F	Arm cylinder (Rod side)	Rod side	L6	130 (5.12)				PL6	274 (10.8)	
		Arm		136 (5.35)						
G-G	Arm foot	Arm	L7	375 (14.76)	0.5 (0.02)	1.0 (0.04)	2.5 (0.10)	PL7	552 (21.7)	
		Boom		380 (14.96)						

SK330-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Arm point	Arm	L1	380 (14.96)	1.0 (0.04) or less	2.0 (0.08)	2.5 (0.10)	PL1	576 (22.7)	Shim adjust -ment
		Bucket		381 (15.10)						
B-B	Bucket link	Link side	L2	380 (14.96)	—	—		PL2		
		Bucket		382 (15.04)						
C-C	Idler link (Arm connection)	Arm	L3	390 (15.35)	With in 0.5 (0.02)	1.0 (0.04)		PL3	505 (19.9)	
		Link side		—						
D-D	Bucket link (Idler link connection)	Rod side	L4	—	0.6~1.0 (0.024~0.04)	2.0 (0.08)		PL4		
		Link side		390 (15.35)						
D'-D'	Bucket link (Rod side)	Rod side	L4'	130 (5.12)						
		Link side		136 (5.35)						
E-E	Bucket cylinder (Head side)	Head side	L5	130 (5.12)	0.6~2.0 (0.024~0.08)	3.0 (0.12)	4.0 (0.16)	PL5	299 (11.8)	
		Arm		136 (5.35)						
F-F	Arm cylinder (Rod side)	Rod side	L6	140 (5.51)				PL6	309 (12.2)	
		Arm		146 (5.75)						
G-G	Arm foot	Arm	L7	400 (15.75)	With in 0.5 (0.02)	1.0 (0.04)	2.5 (0.10)	PL7	577 (22.7)	
		Boom		405.8 (15.98)						

SK460-8

Unit : mm (in)

Sec.	Item		Basic size		Clearance X adjusted with shim (total of both sides)			Pin length		Remedy
			No.	Size	Standard value	Repairable level	Service limit	No.	Length	
A-A	Arm point	Arm	L1	450 (17.71)	1.0 (0.04) or less	2.0 (0.08)	2.5 (0.10)	PL1	702 (27.6)	Shim adjust -ment
		Bucket		452 (17.80)						
B-B	Bucket link	Link side	L2	450 (17.71)	—	—		PL2		
		Bucket		453 (17.83)						
C-C	Idler link (Arm connection)	Arm	L3	446 (17.56)	With in 0.5 (0.02)	1.0 (0.04)		PL3	578 (22.8)	
		Link side		-						
D-D	Bucket link (Idler link connection)	Rod side	L4	-	0.6~1.0 (0.024~0.04)	2.0 (0.08)		PL4		
		Link side		446 (17.56)						
D'-D'	Bucket link (Rod side)	Rod side	L4'	160 (6.30)						
		Link side		166 (6.54)						
E-E	Bucket cylinder (Head side)	Head side	L5	160 (6.30)	0.6~2.0 (0.024~0.08)	3.0 (0.12)	4.0 (0.16)	PL5	332 (13.1)	
		Arm		166 (6.54)						
F-F	Arm cylinder (Rod side)	Rod side	L6	160 (6.30)				PL6	367.5 (14.5)	
		Arm		166 (6.54)						
G-G	Arm foot	Arm	L7	444 (17.48)	With in 0.5 (0.02)	1.0 (0.04)	2.5 (0.10)	PL7	665 (26.2)	
		Boom		449.8 (17.71)						

2.4 UNDERCARRIAGE

2.4.1 CRAWLER (SK140LC-8)

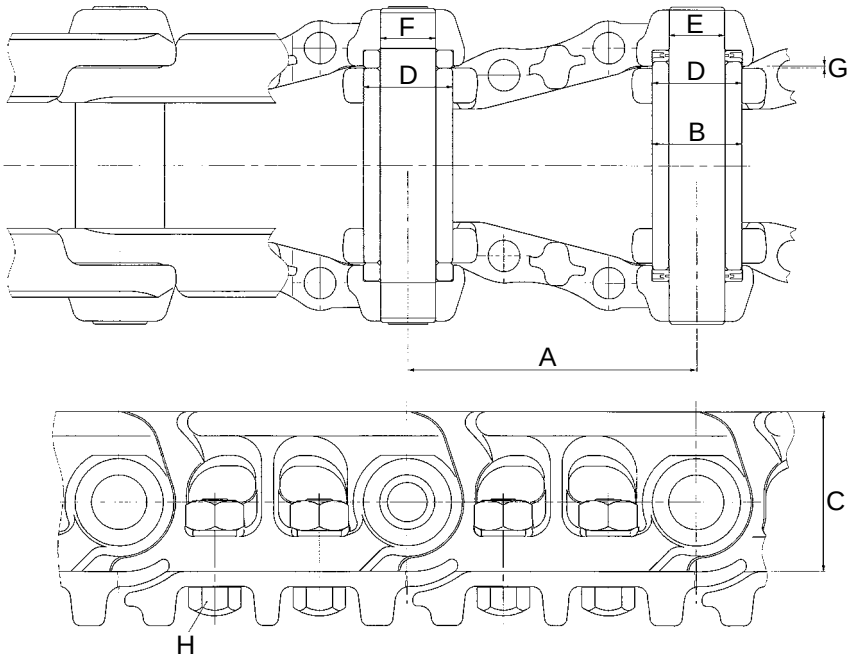


Fig. 2-43 Crawler shoe

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Link pitch	171.45 ± 0.1 (6.750 ± 0.0039)			175 (6.89)	179 (7.05)	Replace the link assy if the service limit is exceeded
B	O.D. of bushing	ø 50.65 ± 0.05 (1.994 ± 0.002)			ø 47 (1.85)	ø 45 (1.77)	
C	Height of link	89 ± 0.3 (3.504 ± 0.012)			84 (3.31)	82 (3.23)	
D	Interference between bushing and link	Basic dimension	Tolerance		Fit	Fit	Replace
		ø 50.67 (1.995)	Shaft	+ 0.11 (+0.004) + 0.05 (+0.002)	Interference 0.05 (0.0020)	Interference 0	
E	Interference between track pin and link	ø 33.50 (1.319)	Shaft	+ 0.1 (+0.004) - 0.05 (-0.002)	Interference 0.05 (0.0020)	Interference 0	
F	Interference between master pin and link	ø 33.30 (1.311)	Shaft	+ 0.03 (+0.001) + 0.088 (+0.003)	Interference 0.05 (0.0020)	Interference 0	Replace Link
G	Clearance between links	1.5 (0.06) (both side)			8 (0.32) (both side)	10 (0.39) (both side)	Replace
H	Tightening torque of shoe bolt	412 ± 39 N•m (304 ± 28.8 lbf•ft)					Reassembly

2.4.2 CRAWLER (SK200-8, SK250-8)

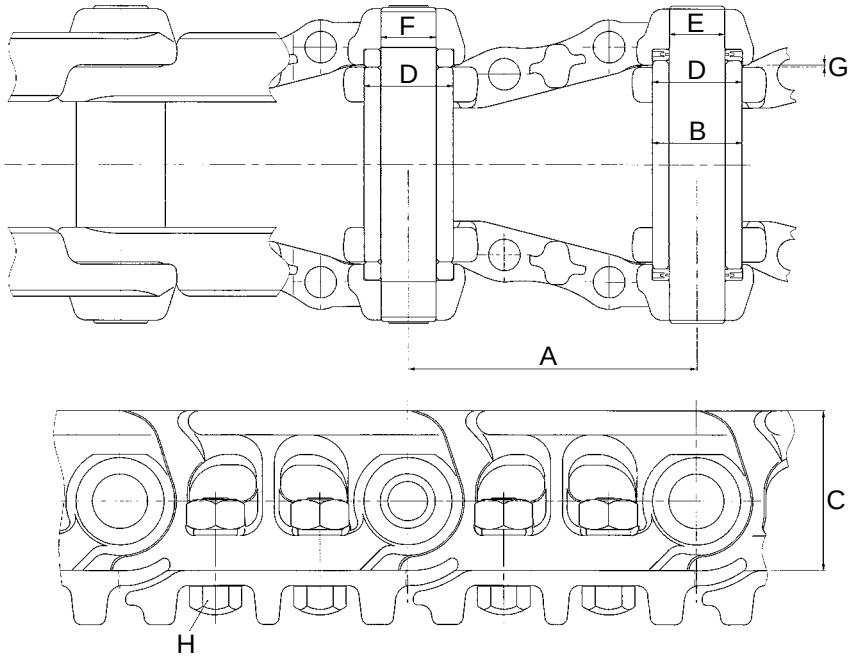


Fig. 2-44 Crawler shoe

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Link pitch	190 ± 0.1 (7.4803 ± 0.0039)			194 (7.64)	198 (7.80)	Replace the link assy if the service limit is exceeded
B	O.D. of bushing	ø 58.78 $^{+0.11}_{-0.05}$ (2.3142 $^{+0.0043}_{-0.0020}$)			ø 55 (2.17)	ø 54 (2.13)	
C	Height of link	106 ± 0.3 (4.1732 ± 0.0118)			100 (3.94)	98 (3.86)	
D	Interference between bushing and link	Basic dimension	Tolerance		Fit	Fit	Replace
		ø 58.78 (2.3142)	Shaft	+ 0.11 (+0.0043) - 0.05 (-0.0020)	Interference 0.05 (0.0020)	Interference 0	
E	Interference between track pin and link	ø 36.63 (1.4421)	Shaft	+ 0.1 (+0.0039) - 0.05 (-0.0020)	Interference 0.05 (0.0020)	Interference 0	
F	Interference between master pin and link	ø 36.50 (1.43701)	Shaft	- 0.03 (-0.00118) - 0.088 (-0.00315)	Interference 0.05 (0.0020)	Interference 0	Replace Link
G	Clearance between links	1.5 (0.06) (both side)			8 (0.32) (both side)	10 (0.39) (both side)	Replace
H	Tightening torque of shoe bolt	853 N•m (629 lbf•ft)					Reassembly

2.4.3 CRAWLER (SK330-8)

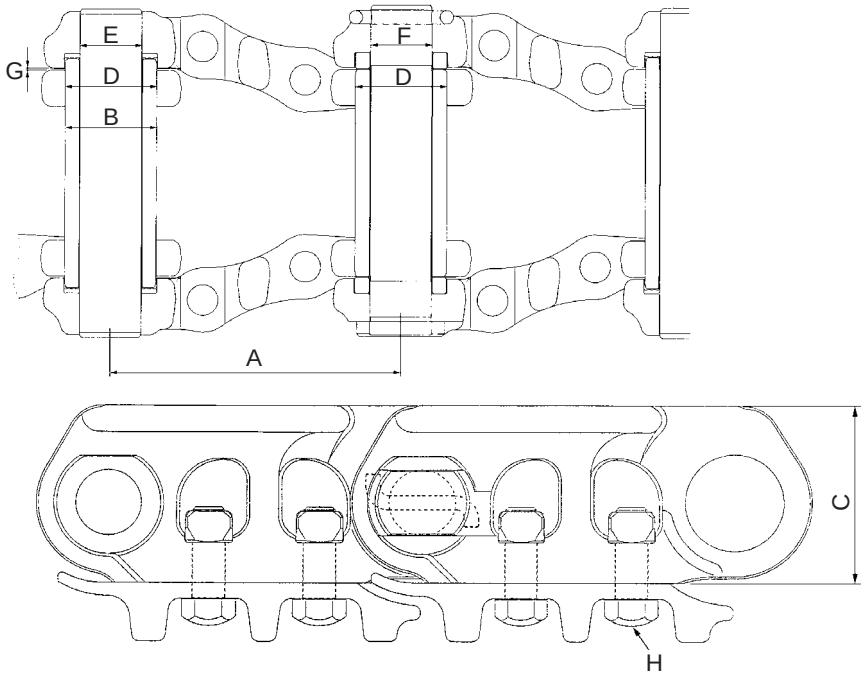


Fig. 2-45 Crawler shoe

Unit : mm (in)

No.	Item	Standard value			Repairable level	Service limit	Remedy
A	Link pitch	215.9±0.15 (8.5000±0.0059)			220 (8.66)	224 (8.82)	Replace the link assy if the service limit is exceeded
B	O.D. of bushing	ø 68.0 $^{+0.05}_{0}$ (2.6772 $^{+0.0020}_{0}$)			ø 64 (2.52)	ø 63 (2.48)	
C	Height of link	124±0.25 (4.8819±0.0098)			118 (4.65)	116 (4.57)	
D	Interference between bushing and link	Basic dimension	Tolerance		Fit	Fit	Replace
		ø 68.0 (2.6772)	Shaft	+ 0.05 (+0.0020) 0	Interference 0.05 (0.0020)	Interference 0	
E	Interference between track pin and link	ø 46.0 (1.8110)	Shaft	+ 0.05 (+0.0020) 0	Interference 0.05 (0.0020)	Interference 0	
F	Interference between master pin and link	ø 45.63 (1.7965)	Shaft	+ 0.05 (+0.0020) 0	Interference 0.05 (0.0020)	Interference 0	Replace Link
G	Clearance between links	1.5 (0.06) (both side)			8 (0.32) (both side)	10 (0.39) (both side)	Replace
H	Tightening torque of shoe bolt	1180 N•m (870 ft•lbs)					Reassembly

2.4.4 CRAWLER (SK460-8)

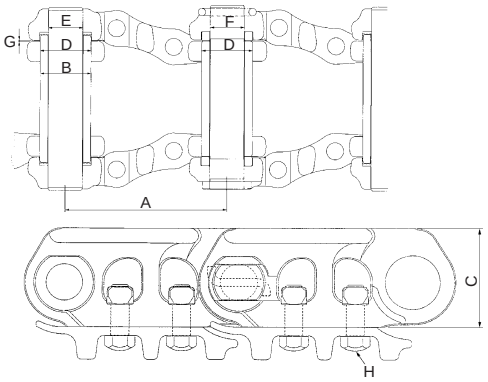


Fig. 2-46

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Link pitch	228.6 (9.0)			232 (9.13)	234 (9.21)	Replace the link assy if the service limit is exceeded
B	O.D. of bushing	ø 73.33 (2.887)			ø 69 (2.717)	ø 68 (2.677)	
C	Height of link	129 (5.08)			123 (4.84)	121 (4.76)	
D	Interference between bushing and link	Basic dimension	Tolerance		Fit	Fit	Replace
		ø 73.33 (2.887)	Shaft	+ 0.1 (+0.0039) 0 (0)	Interference 0.30 (0.012)	Interference 0.26 (0.010)	
E	Interference between track pin and link	ø 48.83 (1.922)	Shaft	+ 0.1 (+0.0039) 0 (0)	Interference 0.30 (0.012)	Interference 0.26 (0.010)	
F	Interference between master pin and link	ø 48.58 (1.913)	Shaft	+ 0.03 (+0.00118) 0 (0)	Interference 0.05 (0.0020)	Interference 0.03 (0.0012)	Replace Link
G	Clearance between links	1.5 (0.06) (both side)			8 (0.32) (both side)	10 (0.39) (both side)	Replace
H	Tightening torque of shoe bolt	1370 N•m (1010 lbf•ft)					Reassembly

2.4.5 UPPER ROLLER (SK140LC-8)

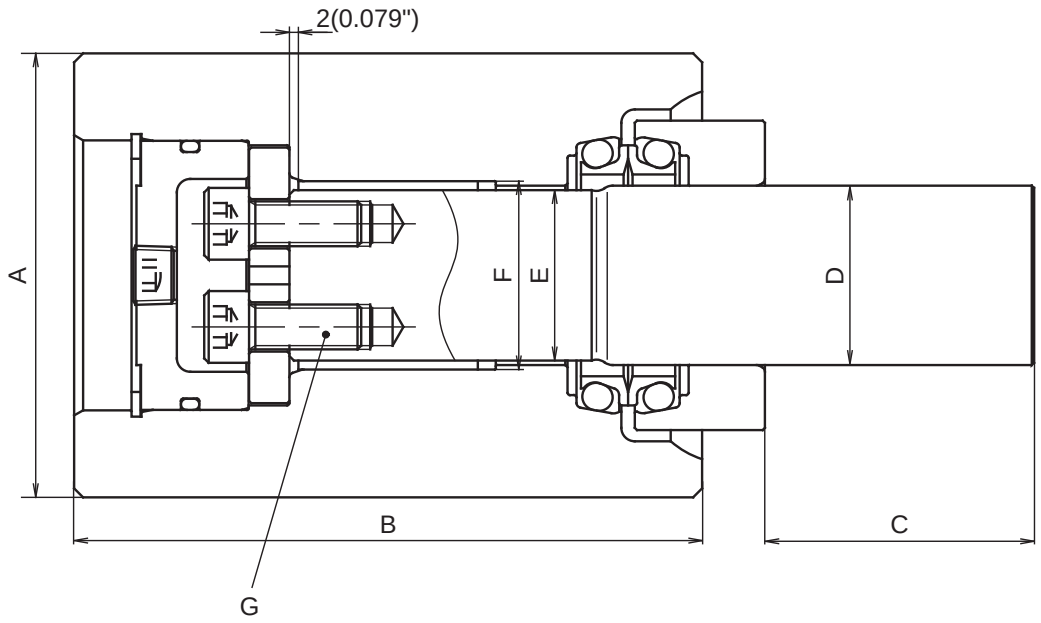


Fig. 2-47 Upper roller

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Dia.	ø 99 (3.9)			ø 94 (3.7)	ø 90.5 (3.56)	Replace
B	Width	140 (5.51)			—	—	
C	Installing length	60 (2.36)			—	—	
D	Shaft dia.	ø $40^{+0.08}_{+0.06}$ ($1.576^{+0.003}_{+0.002}$)			—	—	
E	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing
		ø 38 (1.496)	Shaft	- 0.025 (-0.00098) - 0.050 (-0.0020)	Clearance 0.7 (0.028)	Clearance 1.0 (0.039)	
F	Interference between roller and bushing	ø 42 (1.654)	Hole	+ 0.025 (+0.00098) 0	Interference 0	Clearance 0.01 (0.0004)	
G	Tightening torque of socket bolt	65.7 N•m (48 lbf•ft)					
	Oil	Engine oil API grade CD #30, 20cc (1.22cu•in)					Refill
	Roller rotation	Roller rotates smoothly by hand.					Reassembly

2.4.6 UPPER ROLLER (SK200-8, SK250-8)

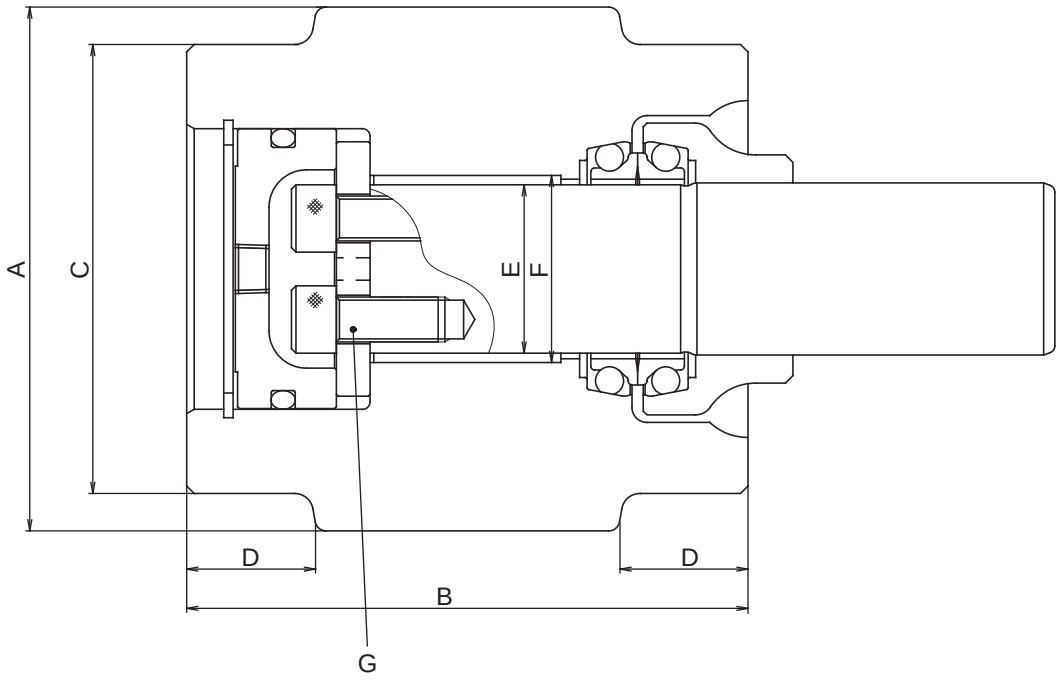


Fig. 2-48 Upper roller

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Dia.	ø 140 (6.30)			—	—	Replace
B	Width	150 (5.91)			—	—	
C	Tread dia.	ø 120 (4.72)			ø 107 (4.21)	ø 105 (4.13)	
D	Tread width	33 (1.30)			—	—	
E	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing
		ø 45 (1.772)	Shaft	- 0.025 (-0.00098) - 0.040 (-0.00157)	Clearance 0.7 (0.028)	Clearance 1.0 (0.039)	
F	Interference between roller and bushing	ø 50 (1.969)	Hole	+ 0.030 (+0.00118) 0	Interference 0	Clearance 0.01 (0.0004)	
G	Tightening torque of socket bolt	115 N•m (85 lbf•ft)					
	Oil	Engine oil API grade CD #30, 30cc (1.83cu•in)					Refill
	Roller rotation	Roller rotates smoothly by hand.					Reassembly

2.4.7 UPPER ROLLER (SK330-8)

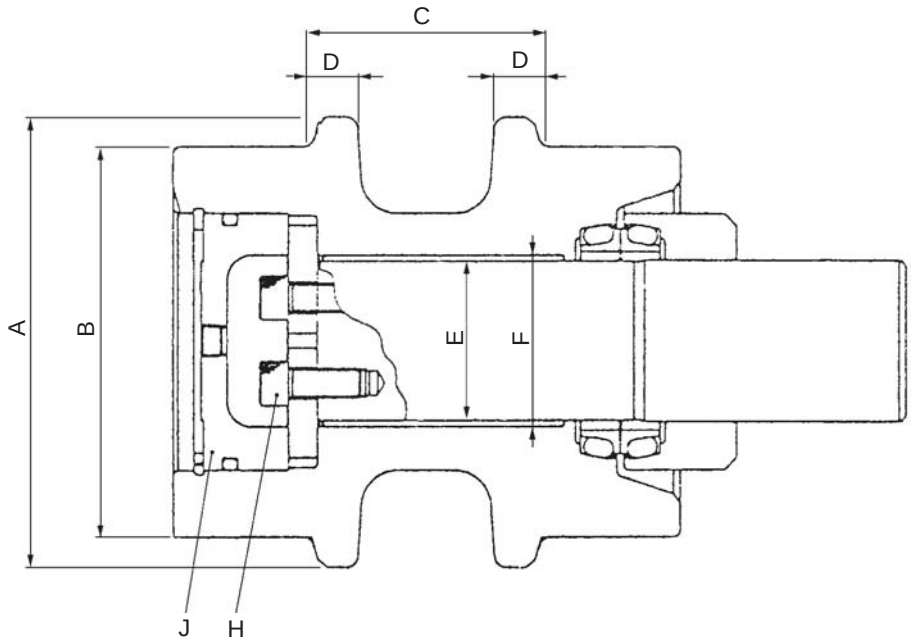


Fig. 2-49 Upper roller

Unit : mm (in)

No.	Item	Standard value				Service limit	Remedy
A	Dia.	ø 185 (7.28)				ø 175 (6.89)	Reinforcement weld, repair or replace
B	Tread dia.	ø 160 (6.30)				ø 150 (5.91)	
C	Width	95 (3.74)				85 (3.35)	
D	Flange width	19 (0.748)				15 (0.591)	
E	Clearance between shaft and bushing	Basic dimension	Tolerance		Standard	Limit	Replace bushing.
		ø 65 (2.5591)	Shaft	-0.025 (-0.0010) -0.040 (-0.0016)	Clearance —	Clearance 0.8 (0.0315)	
F	Interference between roller and bushing	ø 70 (2.7559)	Hole	+ 0.030 (+0.0012) 0	Interference —	Clearance 0	
H	Tightening torque of socket bolt	114.7 N•m (85 lbf•ft)					Apply loctite #262
J	Oil	Engine oil API grade CD #30, 100cc (6.1cu•in)					Refill or replace
	Roller rotation	Roller rotates smoothly by hand.					

2.4.8 UPPER ROLLER (SK460-8)

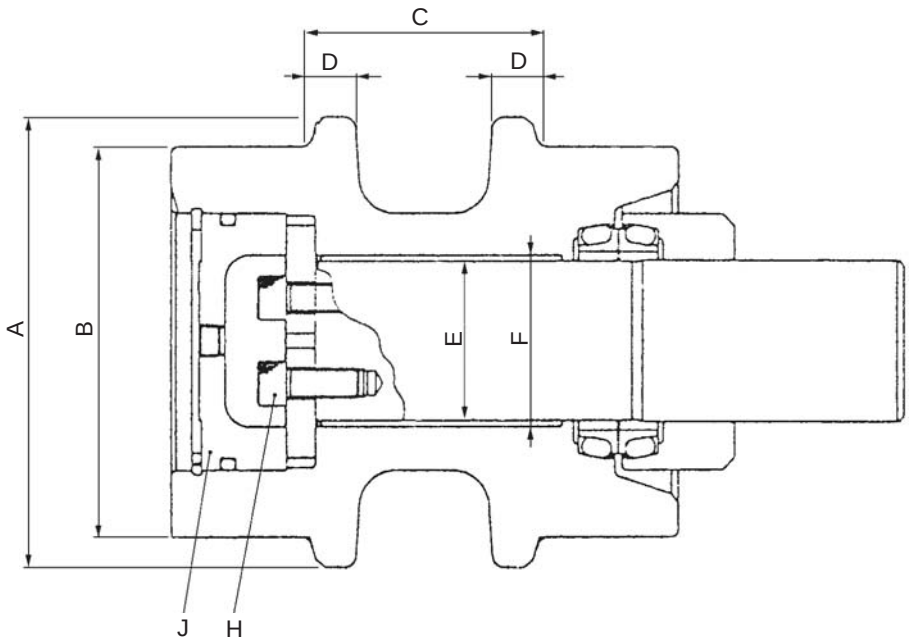


Fig. 2-50 Upper roller

Unit : mm (in)

No.	Item	Standard value			Repairable level	Service limit	Remedy
A	Dia.	ø 185 (7.28)			ø 177 (6.97)	ø 174 (6.85)	Reinforcement weld, repair or replace
B	Tread dia.	ø 160 (6.30)			ø 152 (5.98)	ø 149 (5.87)	
C	Width	95 (3.74)			90 (3.54)	85 (3.35)	
D	Flange width	19 (0.748)			17 (0.669)	15 (0.591)	
E	Clearance between shaft and bushing	Basic dimension	Tolerance		Standard	Limit	Replace bushing.
		ø 65 (2.5591)	Shaft	-0.025 (-0.0010) -0.040 (-0.0016)	Clearance —	Clearance 0.8 (0.0315)	
F	Interference between roller and bushing	ø 70 (2.7559)	Hole	+ 0.030 (+0.0012) 0	Interference —	Clearance 0	
H	Tightening torque of socket bolt	114.7 N•m (85 lbf•ft)					Apply loctite #262
J	Oil	Engine oil API grade CD #30, 100cc (6.1cu•in)					Refill or replace
	Roller rotation	Roller rotates smoothly by hand.					

2.4.9 LOWER ROLLER (SK140LC-8)

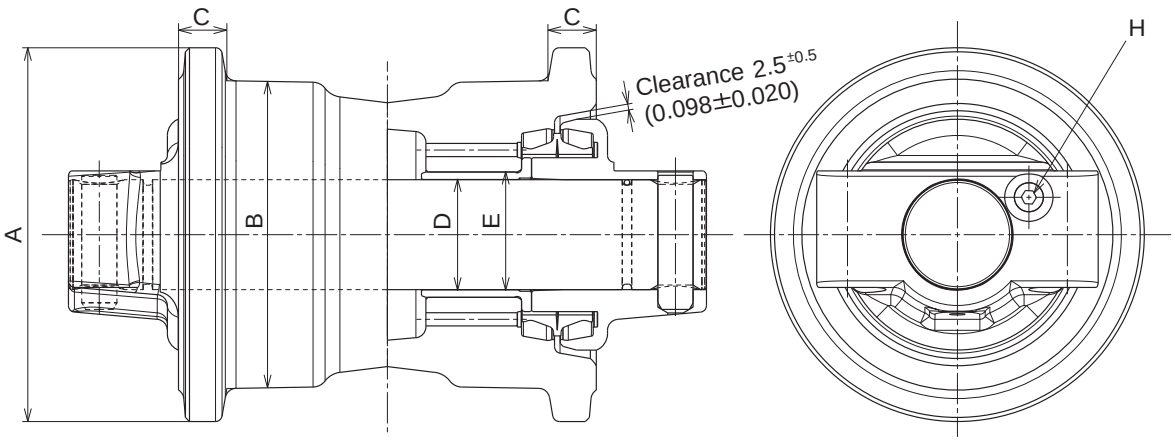


Fig. 2-51 Lower roller (Track roller)

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	O.D. of flange	ø 170 (6.70)			—	—	Reinforcement weld, repair or replace
B	Tread dia.	ø 140 (5.51)			ø 132 (5.20)	ø 126 (4.96)	
C	Flange width	19 (0.748)			14 (0.551)	11 (0.433)	Replace bushing
D	Clearance between shaft and bushing (Wrapped bushing)	Basic dimension	Tolerance		Fit	Fit	
		ø 50 (1.96850)	Shaft	- 0.060 (-0.00236) - 0.090 (-0.00354)	Clearance 0.7 (0.276)	Clearance 1.0 (0.394)	
E	Interference between roller and bushing	ø 57 (2.24409)	Hole	+ 0.030 (+0.00118) 0	Interference 0	Clearance 0.01 (0.0004)	
F	Oil	Engine oil API grade CD #30, 150cc (9.2 cu•in)					Refill
H	Plug (8)	Execute air leak test at 0.2MPa (28psi) before tightening the plug.					
	Roller rotation	Rotates smoothly by hand.					Reassembly

2.4.10 LOWER ROLLER (SK200-8, SK250-8)

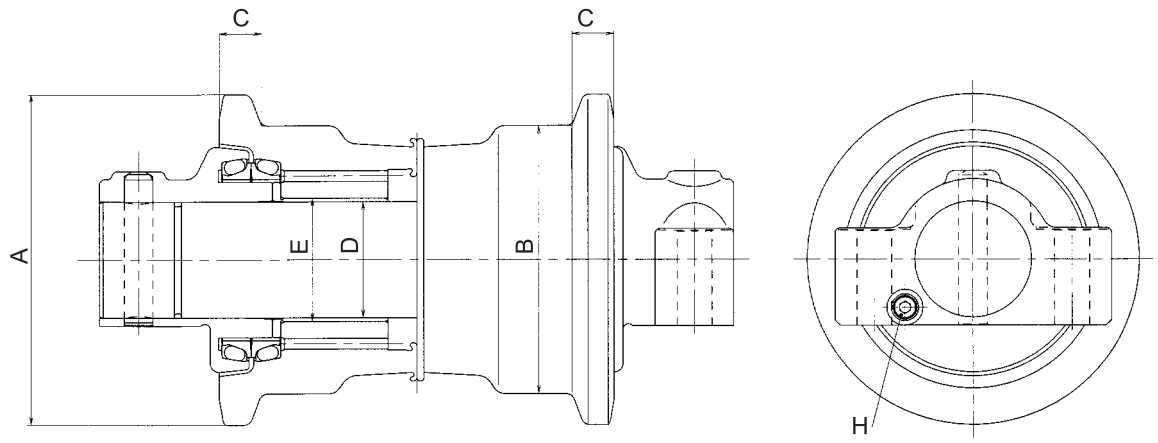


Fig. 2-52 Lower roller

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	O.D. of flange	ø 185 (7.28)			—	—	Reinforcement weld, repair or replace
B	Tread dia.	ø 150 (5.91)			ø 134 (5.28)	ø 128 (5.04)	
C	Flange width	23.5 (0.925)			18 (0.709)	16.5 (0.65)	Replace bushing
D	Clearance between shaft and bushing (Wrapped bushing)	Basic dimension	Tolerance		Fit	Fit	
		ø 65 (2.55905)	Shaft	- 0.060 (-0.00236) - 0.090 (-0.00354)	Clearance 0.7 (0.276)	Clearance 1.0 (0.394)	
E	Interference between roller and bushing	ø 69 (2.71653)	Hole	+ 0.030 (+0.00118) - 0.020 (-0.00079)	Interference 0	Clearance 0.01 (0.0004)	
F	Oil	Engine oil API grade CD #30, 160cc (9.8 cu•in)					Refill
H	Plug (8)	Execute air leak test at 0.2MPa (28psi) before tightening the plug.					
	Roller rotation	Rotates smoothly by hand.					Reassembly

2.4.11 LOWER ROLLER (SK330-8)

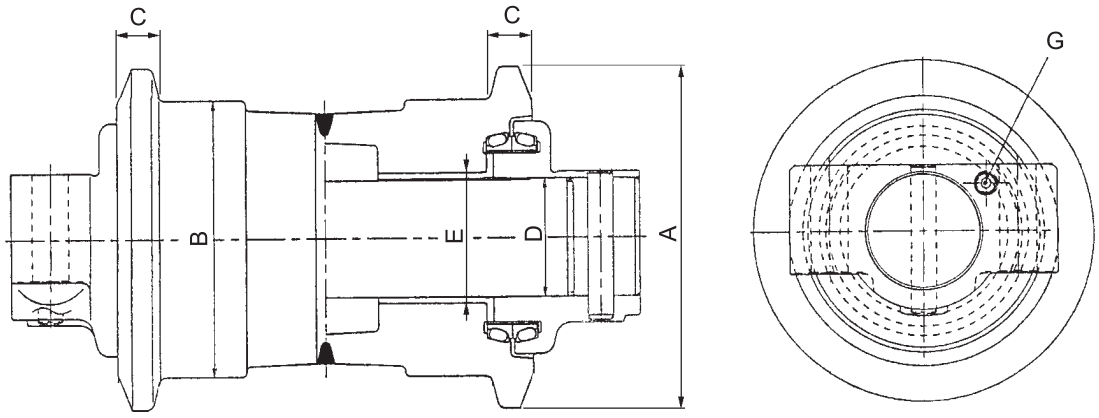


Fig. 2-53 Lower roller

Unit : mm (in)

No.	Item	Standard value			Repairable level	Service limit	Remedy
A	O.D. of flange	ø 216 (8.50)			—	—	Reinforcementweld, repair or replace
B	Tread dia.	ø 175 (6.89)			ø 160 (6.30)	ø 154 (6.06)	
C	Flange width	27 (1.06)			—	—	Replace bushing.
D	Clearance between shaft and bushing (Wrapped bushing)	Basic dimension	Tolerance		Fit	Fit	
		ø 75 (2.9528)	Shaft	-0.060 (-0.0024) -0.090 (-0.0035)	Clearance 0.7 (0.276)	Clearance 1.0 (0.394)	
E	Interference between roller and bushing	ø 83 (3.2677)	Hole	±0.030 (±0.0012)	Interference 0.01 (0.0004)	Clearance 0	
F	Oil	Engine oil API grade CD #30, 430cc (26.14cu•in)					Refill
G	Plug (8)	Execute air leak test at 0.2MPa (28psi) before tightening the plug.					
	Roller rotation	Rotates smoothly by hand.					Reassembly

2.4.12 LOWER ROLLER (SK460-8)

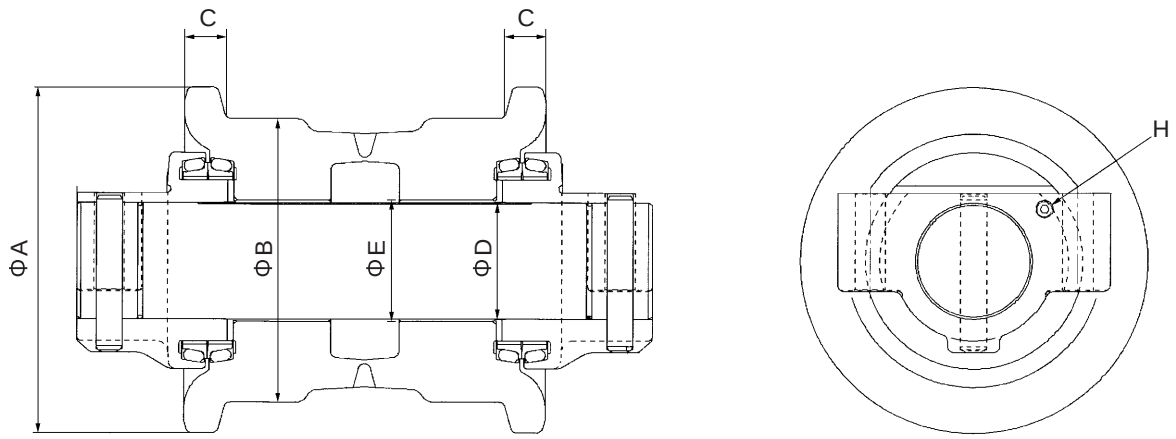


Fig. 2-54 Lower roller (Track roller)

Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	O.D. of flange	ø 268 (10.6)			—	—	Reinforcement weld, repair or replace
B	Tread dia.	ø 220 (8.66)			ø 205 (8.07)	ø 204 (8.03)	
C	Flange width	23.5 (0.925)			—	—	Replace bushing
D	Clearance between shaft and bushing (Wrapped bushing)	Basic dimension	Tolerance		Fit	Fit	
		ø 89.94 (3.5409)	Shaft	- 0.060 (-0.00236) - 0.090 (-0.00354)	Clearance 0.7 (0.276)	Clearance 1.0 (0.394)	
E	Interference between roller and bushing	ø 93.94 (3.6984)	Hole	+ 0.035 (+0.0014) 0 (0)	Interference 0.18 (0.0071)	Interference 0.16 (0.0063)	
F	Oil	Engine oil API grade CD #30, 500cc (30.5 cu•in)					Refill
H	Plug (9)	Execute air leak test at 0.2MPa (28psi) before tightening the plug.					
	Roller rotation	Rotates smoothly by hand.					Reassembly

2.4.13 FRONT IDLER

SK140LC-8

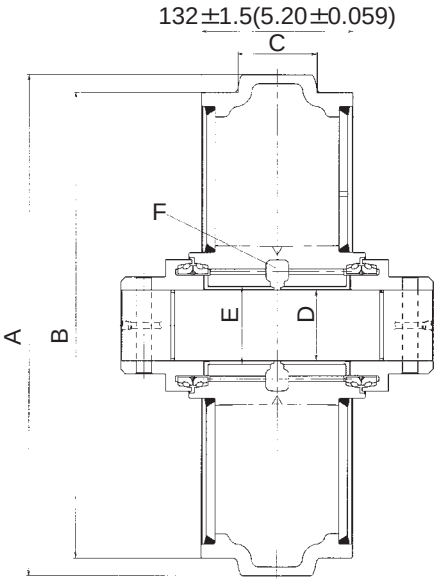
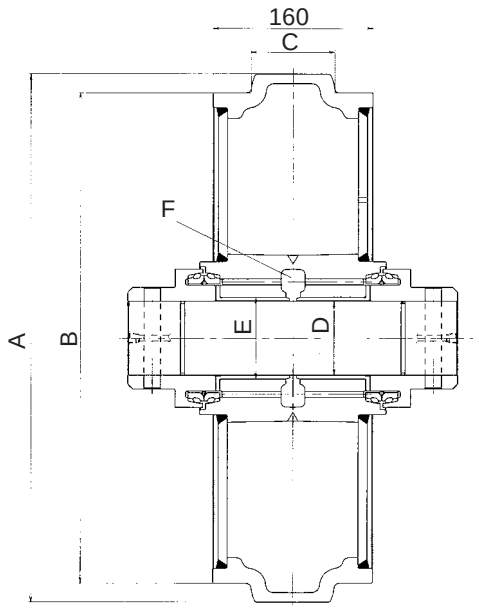


Fig. 2-55 Front idler

SK140LC-8 Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Dia. of idler projection	ø 496 (19.5)			—	—	Replace
B	Tread dia.	ø 456 (18.0)			ø 450 (17.7)	ø 448 (17.6)	
C	Flange width	68 ± 1 (2.677±0.04)			63 (2.48)	60 (2.36)	
D	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing
		ø 60 (2.36220)	Shaft	- 0.03 (-0.00118) - 0.06 (-0.00236)	Clearance 1.5 (0.059)	Clearance 2.0 (0.079)	
E	Interference between idler and bushing	ø 64 (2.51969)	Hole	- 0.03 (-0.00118) 0	Interference 0	Clearance 0.01 (0.0004)	
F	Oil	Engine oil API grade CD #30, 200cc (12.2cu•in)					Refill
	Idler rotation	Rotates smoothly by hand					Reassemble

SK200-8
SK250-8



SK330-8

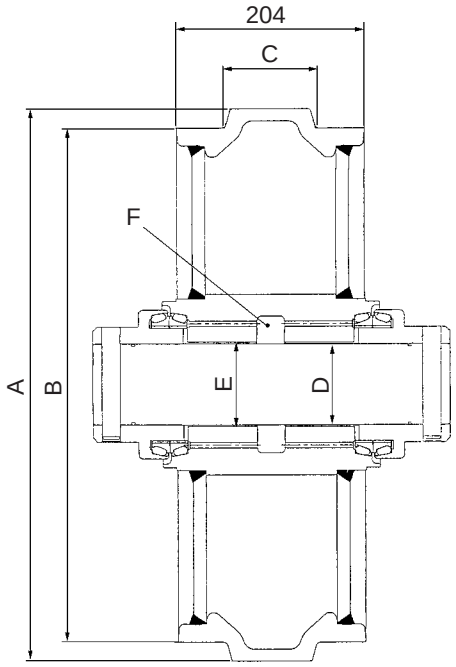


Fig. 2-56 Front idler

SK200-8, SK250-8 Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Dia. of idler projection	ø 535 (21.1)			—	—	Replace
B	Tread dia.	ø 497 (19.6)			ø 490 (19.3)	ø 487 (19.2)	
C	Flange width	84 ± 0.5 (3.307±0.020)			78 (3.07)	76 (2.99)	
D	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing
		ø 75 (2.95275)	Shaft	- 0.03 (-0.00118) - 0.06 (-0.00236)	Clearance 1.5 (0.059)	Clearance 2.0 (0.079)	
E	Interference between idler and bushing	ø 83 (3.26771)	Hole	+ 0.035 (+0.00138) 0	Interference 0	Clearance 0.01 (0.0004)	
F	Oil	Engine oil API grade CD #30, 200cc (12.2cu•in)					Refill
	Idler rotation	Rotates smoothly by hand					Reassemble

SK330-8 Unit : mm (in)

No.	Item	Standard value			Repairable level	Service limit	Remedy
A	Dia. Of idler projection	ø 609 (24.0)			—	—	Replace
B	Tread dia.	ø 564 (22.2)			ø 557 (21.9)	ø 554 (21.8)	
C	Flange width	102 (4.02)			96 (3.78)	94 (3.70)	
D	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing.
		ø 85 (3.3465)	Shaft	– 0.072 (-0.0028) –0.126 (-0.0050)	Clearance 1.5 (0.059)	Clearance 2.0 (0.079)	
E	Interference between idler and bushing	ø 89 (3.504)	Hole	+ 0.035 (+0.0014) 0 (0)	Interference 0.01 (0.0004)	Clearance 0	
F	Oil	Engine oil API grade CD#30, 350cc (21.4cu•in)					Refill
	Idler rotation	Rotates smoothly by hand.					Reassemble

SK460-8

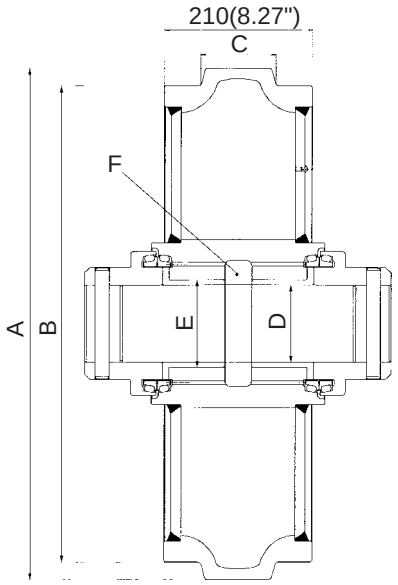


Fig. 2-57 Front idler

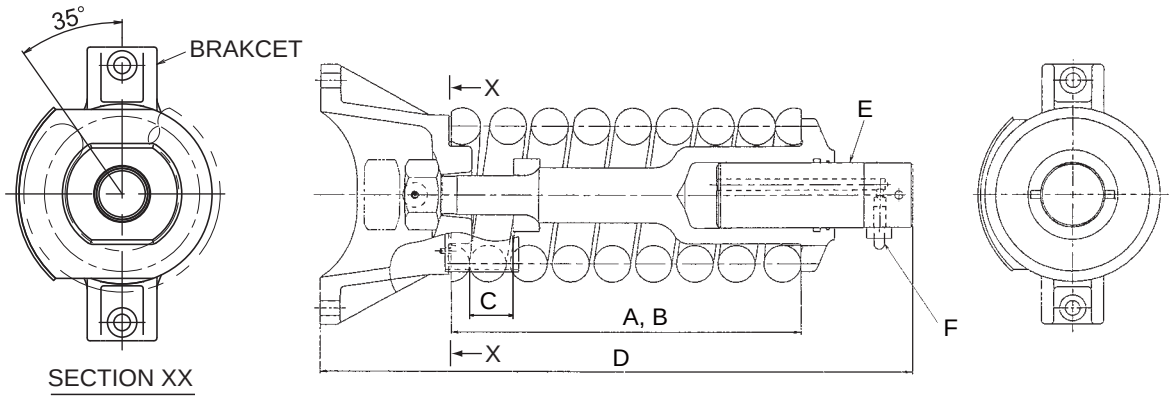
SK460-8 Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Dia. of idler projection	ø 726 (28.6)			—	—	Replace
B	Tread dia.	ø 676 (26.6)			ø 665 (26.2)	ø 662 (26.1)	
C	Flange width	107 (4.21)			101 (3.98)	99 (3.90)	
D	Clearance between shaft and bushing	Basic dimension	Tolerance		Fit	Fit	Replace bushing
		ø 110 (4.3307)	Shaft	- 0.03 (-0.00118) - 0.06 (-0.00236)	Clearance 1.5 (0.059)	Clearance 2.0 (0.079)	
E	Interference between idler and bushing	ø 125 (4.9212)	Hole	+ 0.035 (+0.00138) 0	Interference 0	Clearance 0.01 (0.0004)	
F	Oil	Engine oil API grade CD #30, 400cc (24.4cu•in)					Refill
	Idler rotation	Rotates smoothly by hand					Reassemble

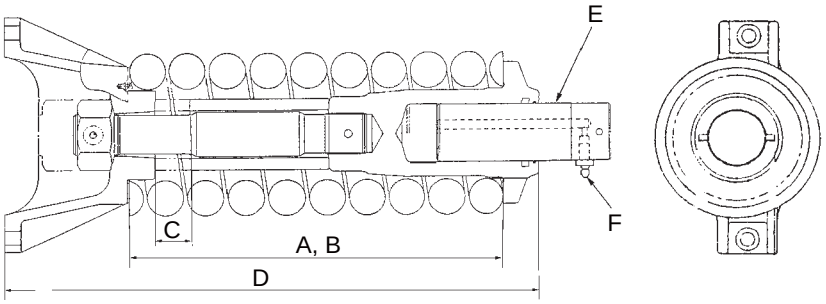
2.4.14 IDLER ADJUSTER

SK140LC-8
SK200-8
SK250-8

INSTALL A SPRING WHOSE STARTING POINT
AT BRACKET SIDE TO BE 35 DEGREE.



SK330-8



SK460-8

Install a herical spling,
whose starting point at
bracket side to be 35±10°.

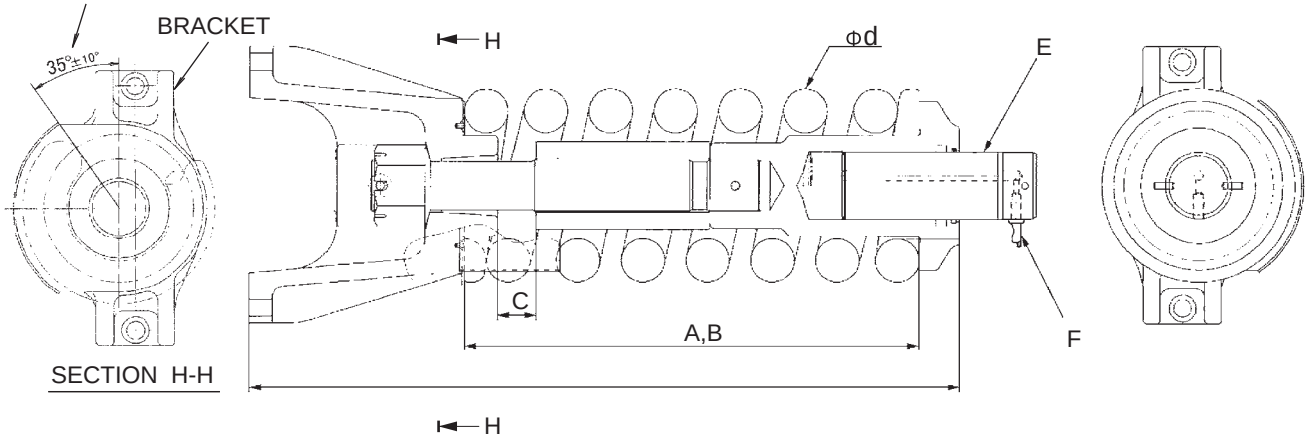


Fig. 2-58 Idler adjuster

MODEL		SK140LC-8	SK200-8	SK250-8	SK330-8	SK460-8
No.	ITEM	Standard value	Standard value	Standard value	Standard value	Standard value
A	Installed length of spring	354.8mm (14.0 in)	429mm (16.9 in)	437mm (17.2 in)	554mm (21.8in)	680mm (26.8 in)
B	Free length of spring	Approx. 427mm (16.8 in)	Approx. 540.1mm (21.3 in)	Approx. 517.6mm (20.4 in)	About. 685mm (27.0in)	Approx. 809.4mm (31.9 in)
C	Stroke	39.4mm (1.55in)	51.8mm (2.04in)	49.0mm (1.93in)	53mm (2.09in)	57.0mm (2.24in)
D	Set length	686mm (27.0in)	716mm (28.2in)	768mm (30.2in)	797mm (31.4in)	1175mm (46.3in)
ød	Spring diameter	—	—	—	—	ø64 (2.52in)
E	Outside view of piston	Nor scoring and rusting	Nor scoring and rusting	Nor scoring and rusting	Nor scoring and rusting	Nor scoring and rusting
F	Tightening torque of grease nipple	59N•m (43 lbf•ft)	59N•m (43 lbf•ft)	59N•m (43 lbf•ft)	59N•m (43 lbf•ft)	59N•m (43 lbf•ft)

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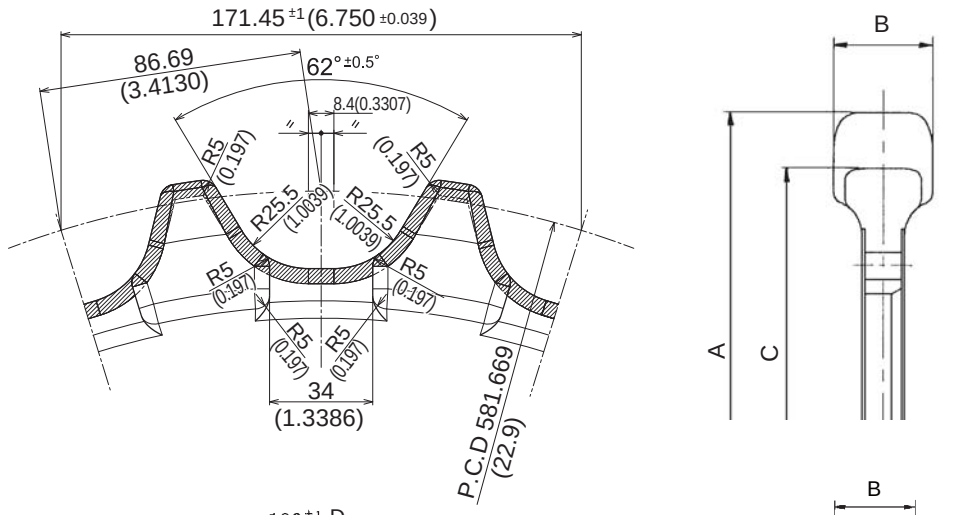
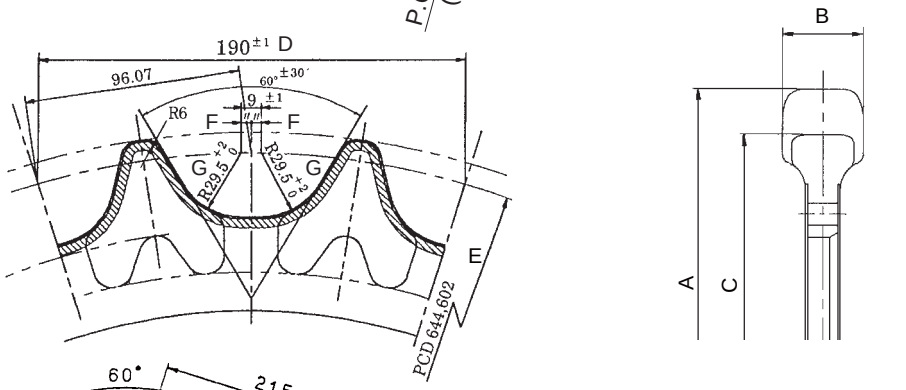
2.4.15 SPROCKET

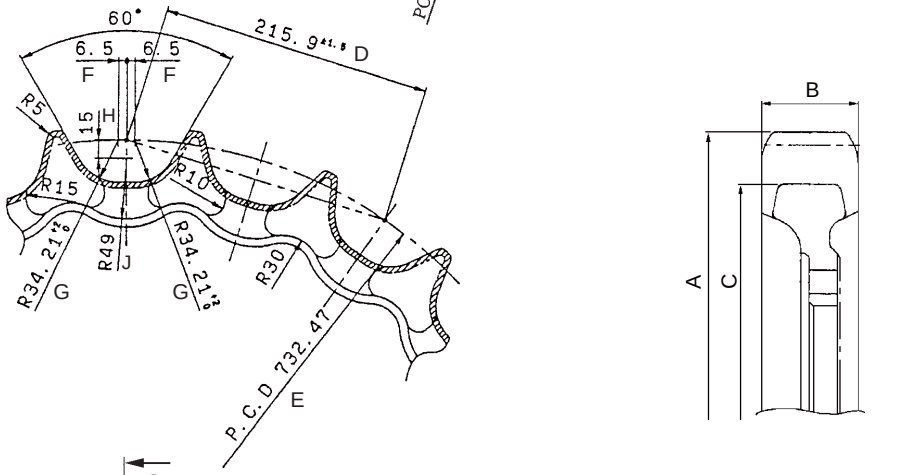
SK140LC-8



SK200-8
SK250-8



SK330-8



SK460-8

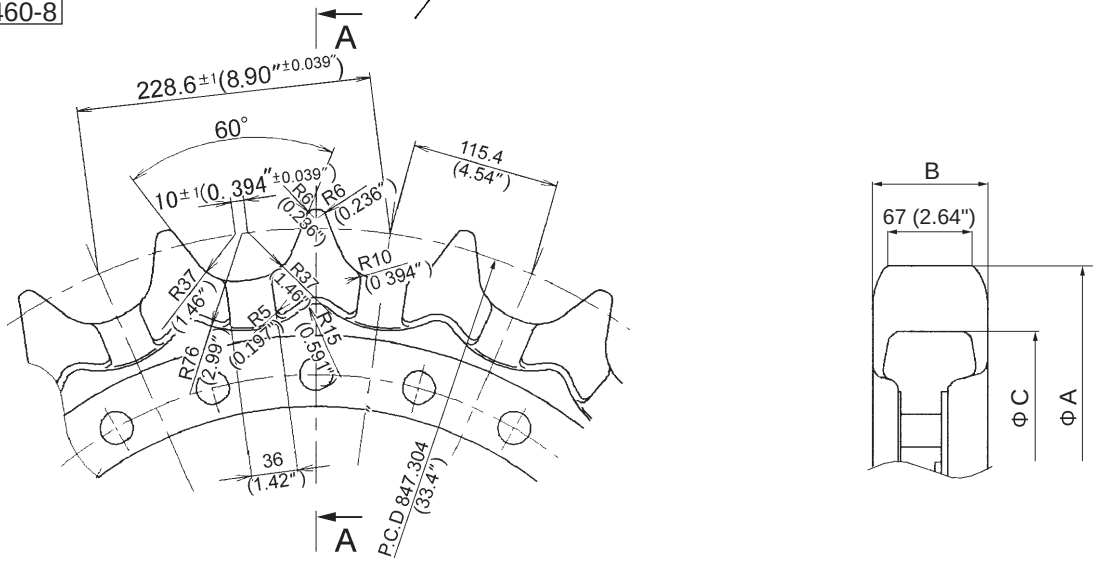


Fig. 2-59 Sprocketss

Unit : mm (in)

No.	NAME		SK140LC-8	SK200-8 SK250-8	REMEDY
A	O.d. of sprocket	Standard value	ø 594±3 (23.4±0.118)	ø 659 (25.9)	Reinforcement weld, repair or replace.
		Repairable level	ø 586 (23.1)	ø 651 (25.6)	
		Service limit	ø 584 (23.0)	ø 649 (25.6)	
B	Width of sprocket teeth	Standard value	$60\ ^{0}_{-3}$ ($2.36\ ^{0}_{-0.118}$)	66±2 (2.520±0.079)	Replace
		RepairableStandard value	54 (2.13)	60 (2.36)	
		Service limit	52 (2.05)	58 (2.28)	
C	O.d. of sprocket bottom	Standard value	ø 510 (20.1)	ø 586 (23.1)	Reinforcement weld, repair or replace.
		RepairableStandard value	ø 502 (19.8)	ø 578 (22.8)	
		Service limit	ø 500 (19.7)	ø 576 (22.7)	
D	Standard dimensions	Link pitch	171.45±1 (6.750±0.039)	190±1 (7.480±0.039)	
		Number of teeth	21	21	
E		P.C.D	ø 581.669 (22.9)	ø 644.602 (25.333)	
F		Tooth profile	8.4 (0.33)	4.5 (0.177)	
G			R25.5 (1.004)	R29.5 $^{+0.2}_{0}$ (1.161 $^{+0.079}_{0}$)	
H			—	—	
J			—	—	

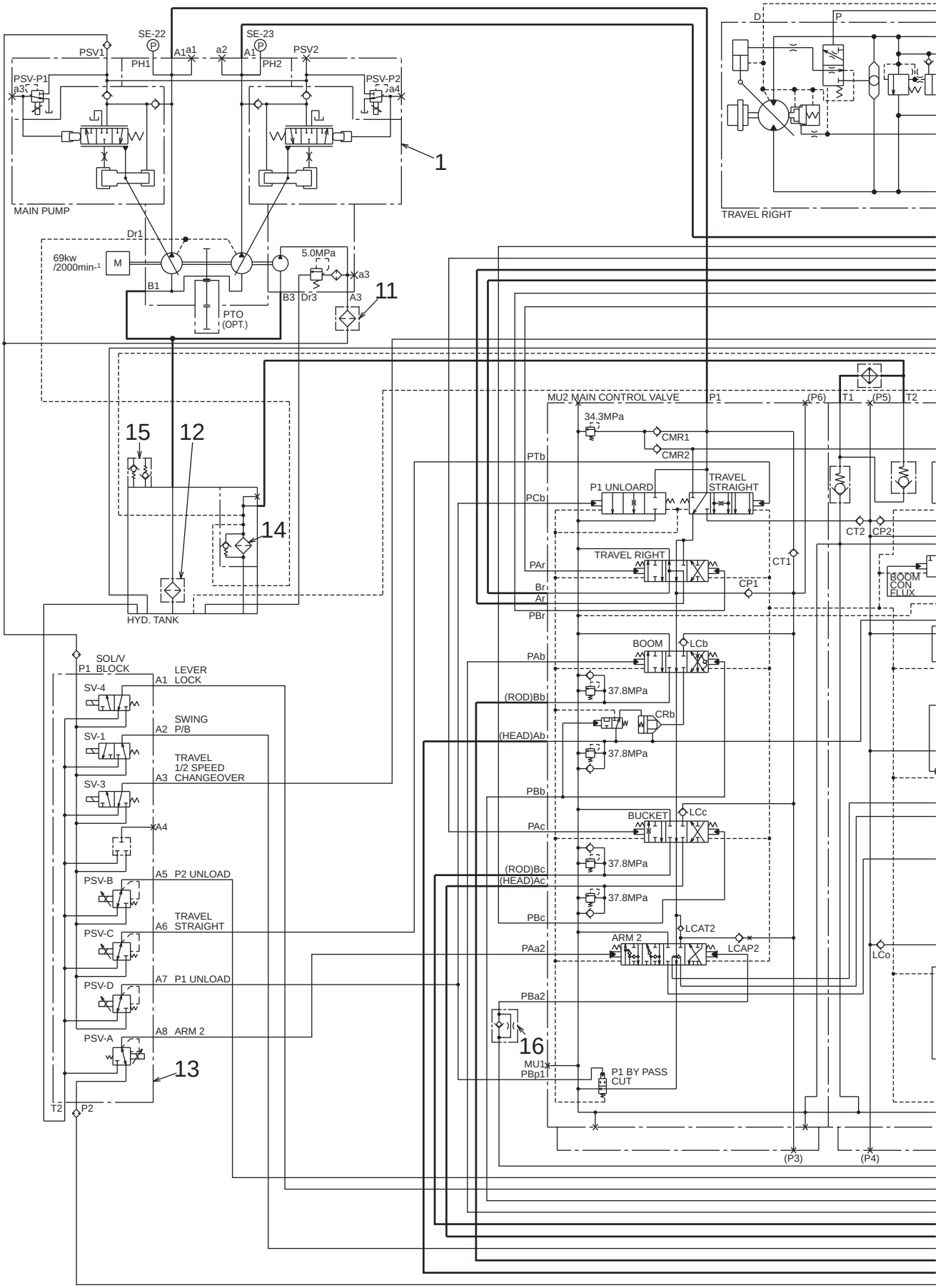
Unit : mm (in)

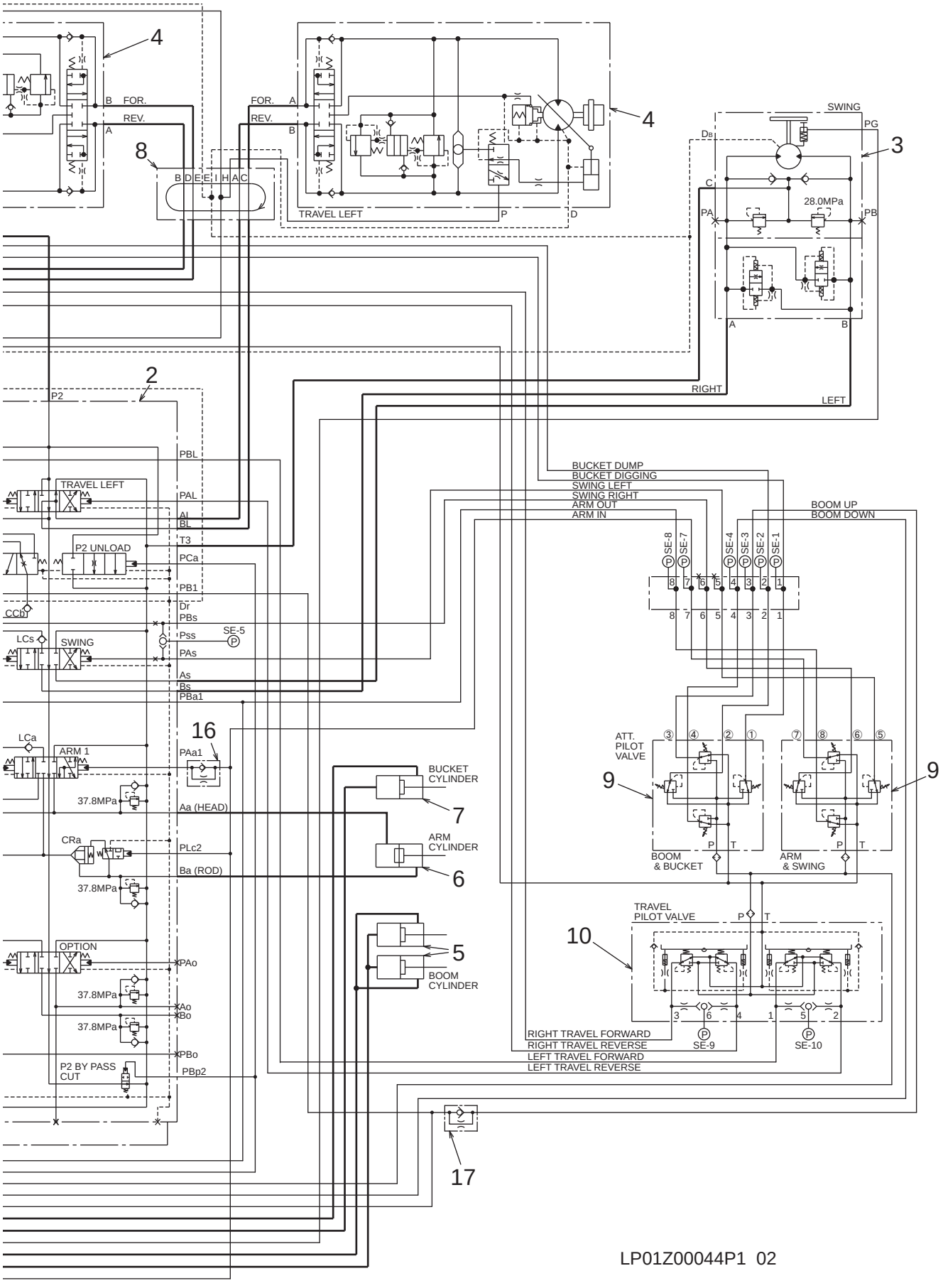
No.	NAME		SK330-8	SK460-8	REMEDY
A	O.d. of sprocket	Standard value	ø 755 (29.7)	ø 876 (34.5)	Reinforcement weld, repair or replace.
		Repairable level	ø 747 (29.4)	ø 868 (34.2)	
		Service limit	ø 745 (29.3)	ø 866 (34.1)	
B	Width of sprocket teeth	Standard value	85 $^{0}_{-4}$ (3.35 $^{0}_{-0.157}$)	89 $^{0}_{-3}$ (3.504 $^{0}_{-0.118}$)	Replace
		RepairableStandard value	79 (3.11)	83 (3.27)	
		Service limit	77 (3.03)	81 (3.19)	
C	O.d. of sprocket bottom	Standard value	ø 664.05 (26.1)	ø 773.3 (30.4)	Reinforcement weld, repair or replace.
		RepairableStandard value	ø 656 (25.8)	ø 765 (30.1)	
		Service limit	ø 654 (25.7)	ø 763 (30.0)	
D	Standard dimensions	Link pitch	215.9±1.5 (8.50±0.591)	228.6±1 (8.90±0.039)	
		Number of teeth	←	23	
E		P.C.D	ø 732.47 (28.837)	ø 847.304 (33.4)	
F		Tooth profile	6.5 (0.256)	10 (0.394)	
G			R34.21 $^{+0.2}_{0}$ (1.35 $^{+0.079}_{0}$)	R37 $^{+0.2}_{0}$ (1.35 $^{+0.079}_{0}$)	
H			15 (0.591)	—	
J			R49 (1.93)	R76 (2.99)	

3. CIRCUIT DIAGRAM

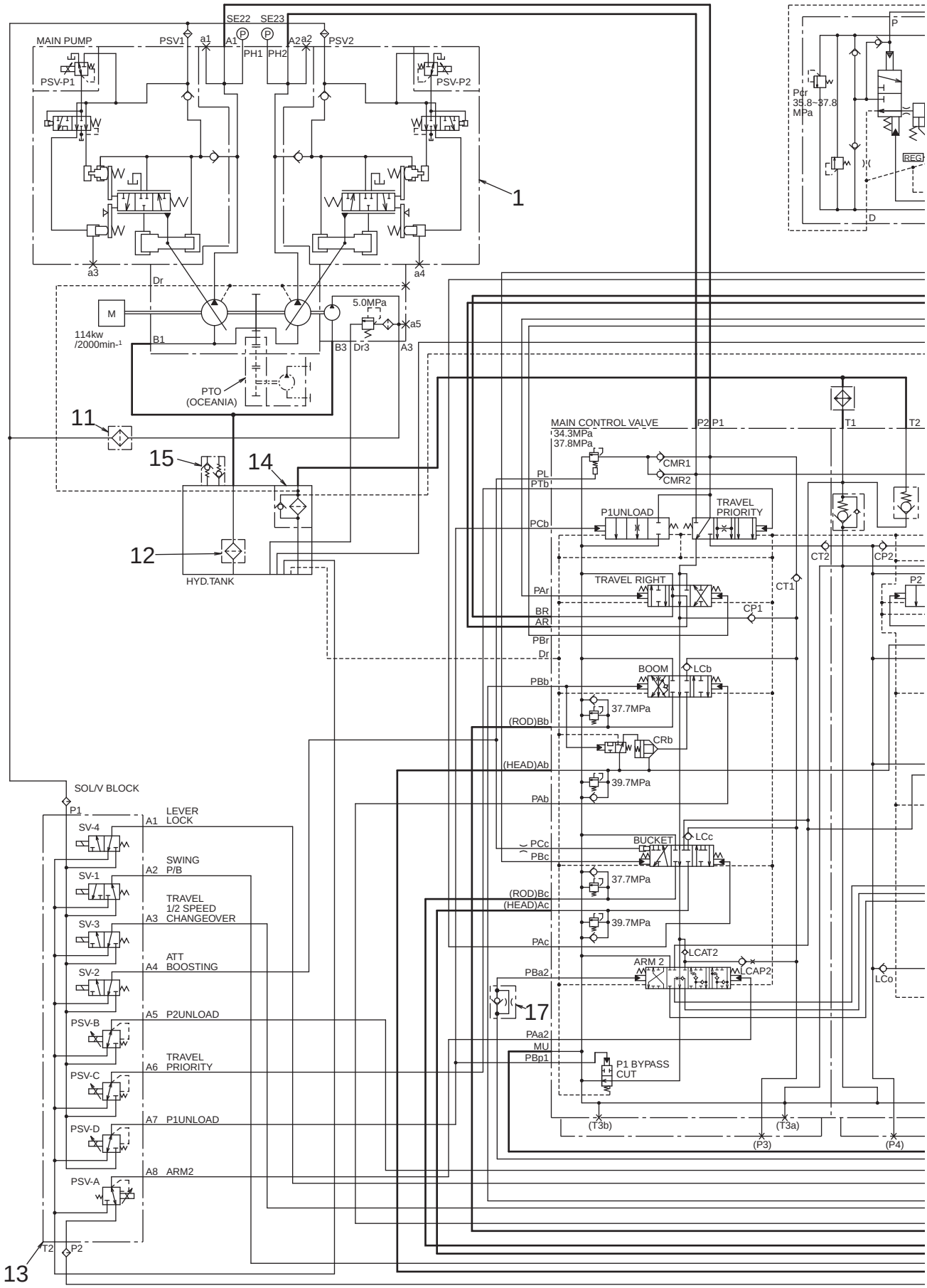
3.1 HYDRAULIC CIRCUITS

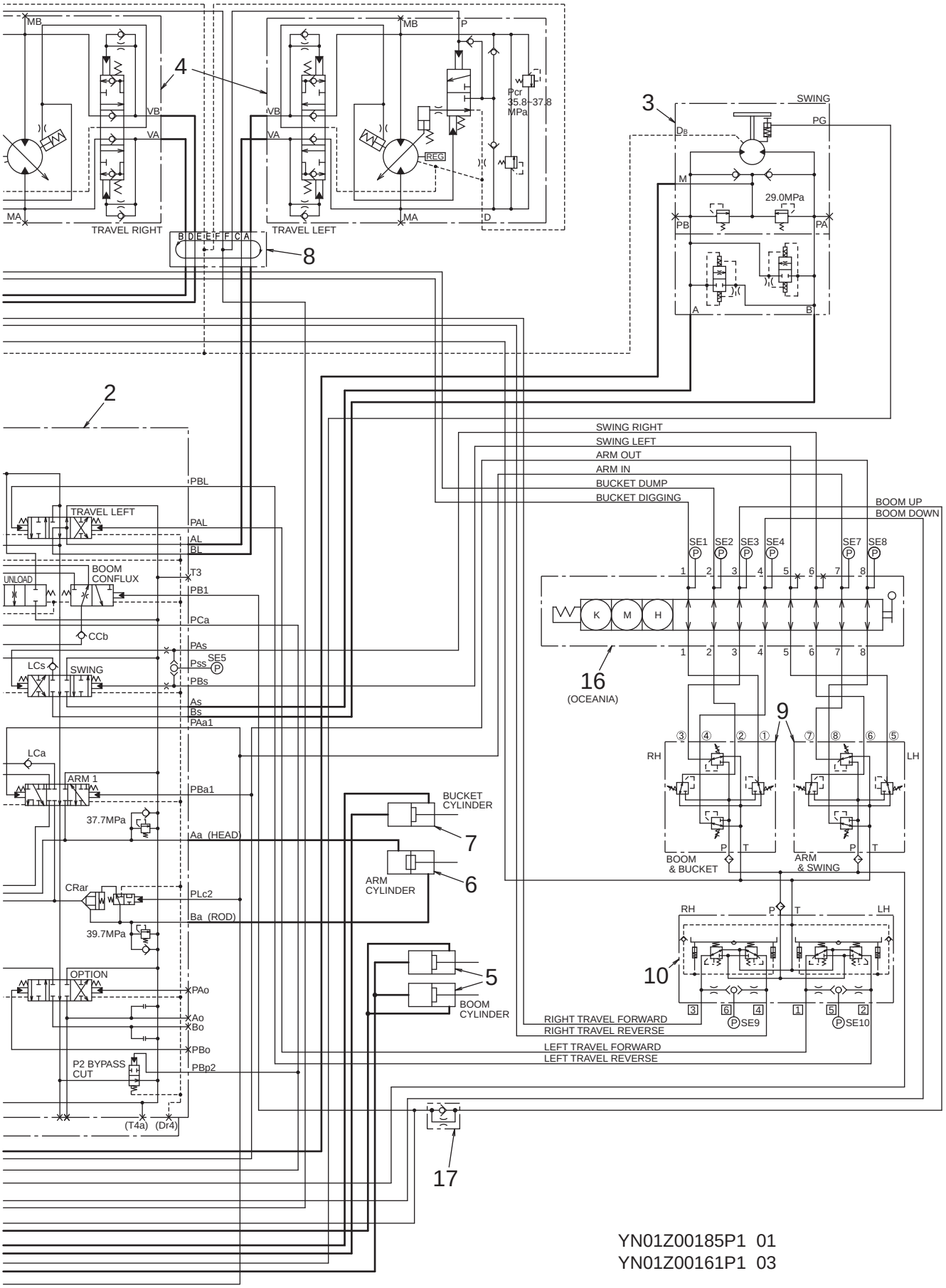
3.1.1 STANDARD (SK140LC-8)





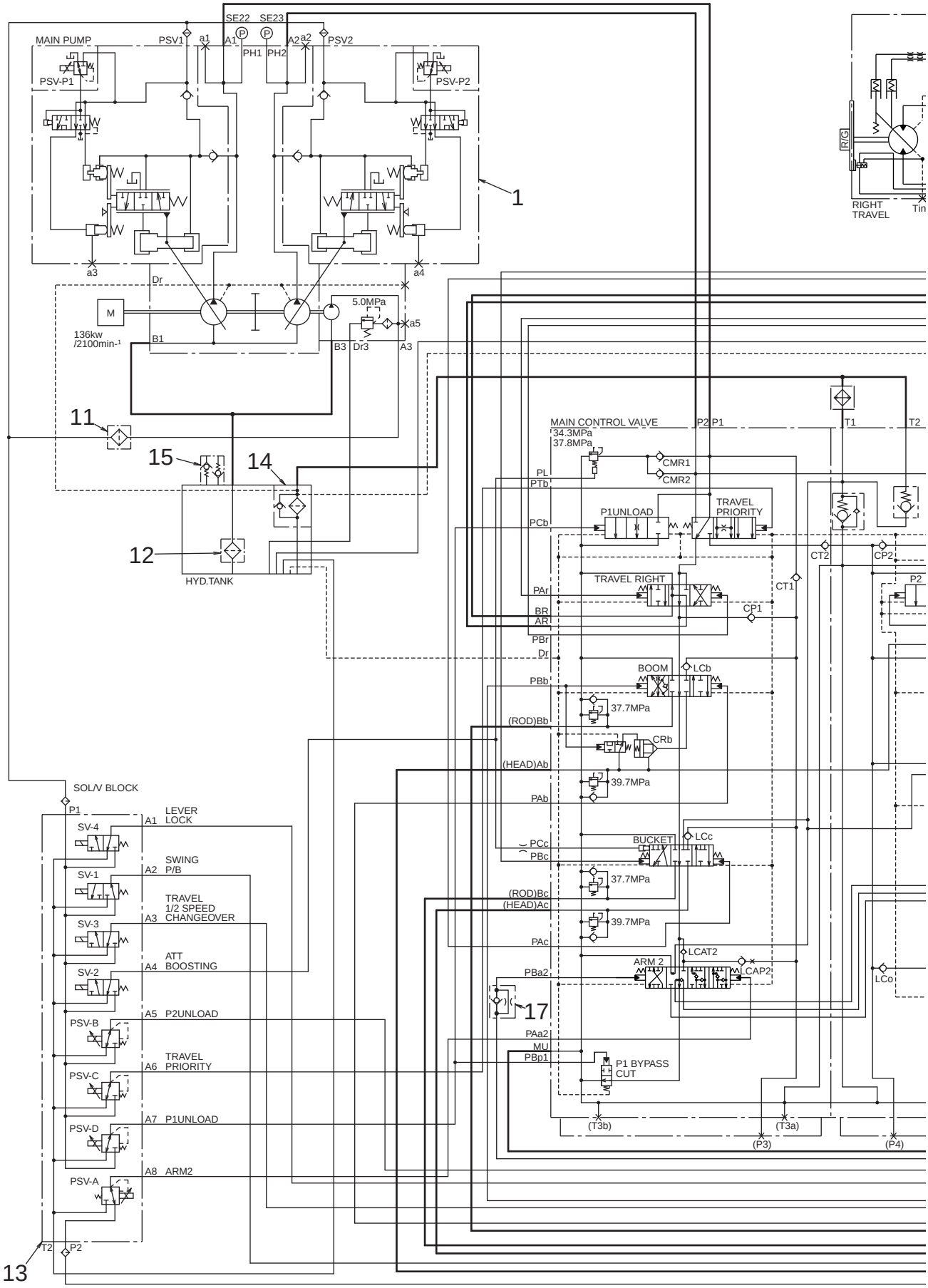
3.1.2 STANDARD (SK200-8)

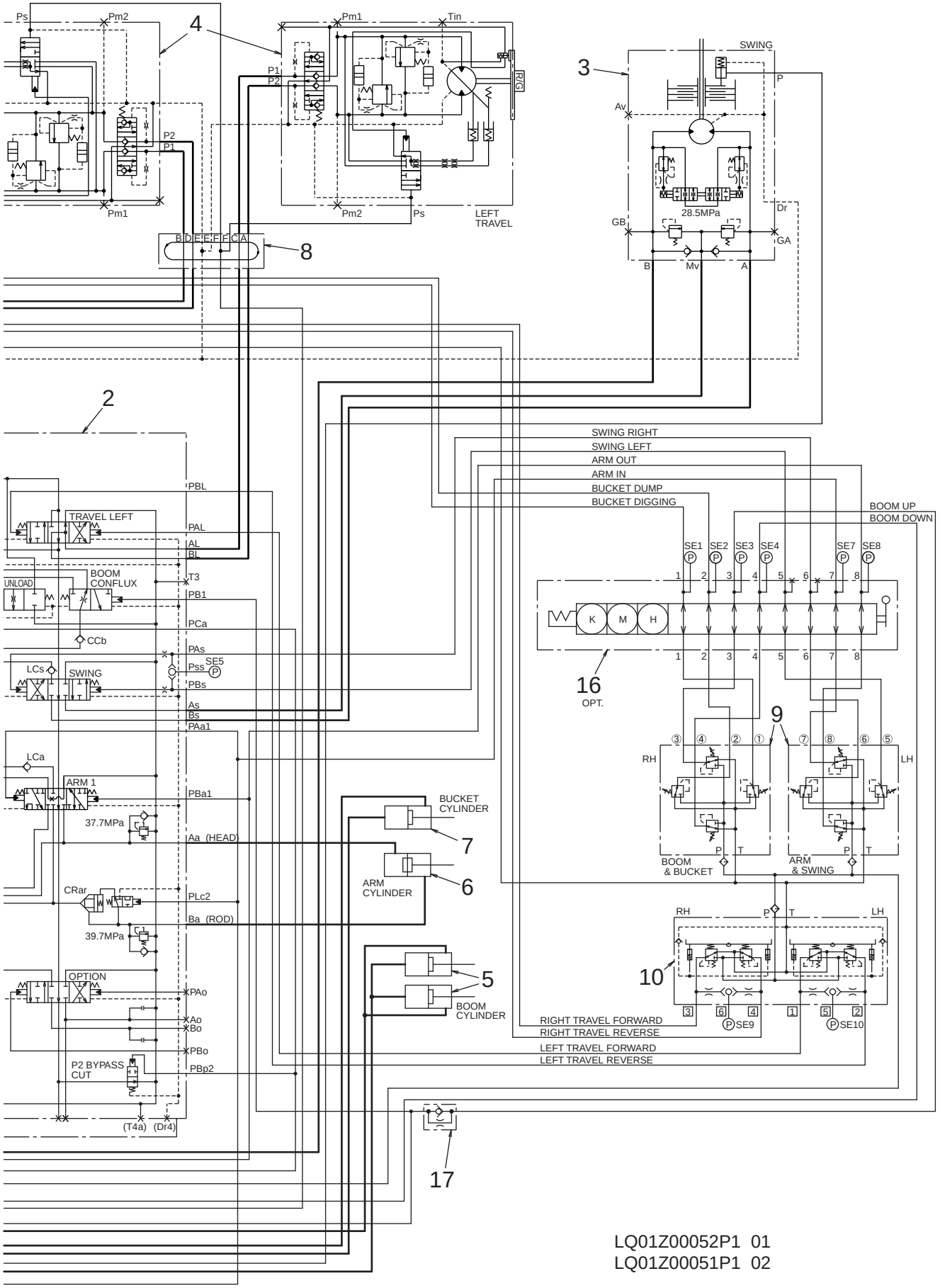




YN01Z00185P1 01
YN01Z00161P1 03

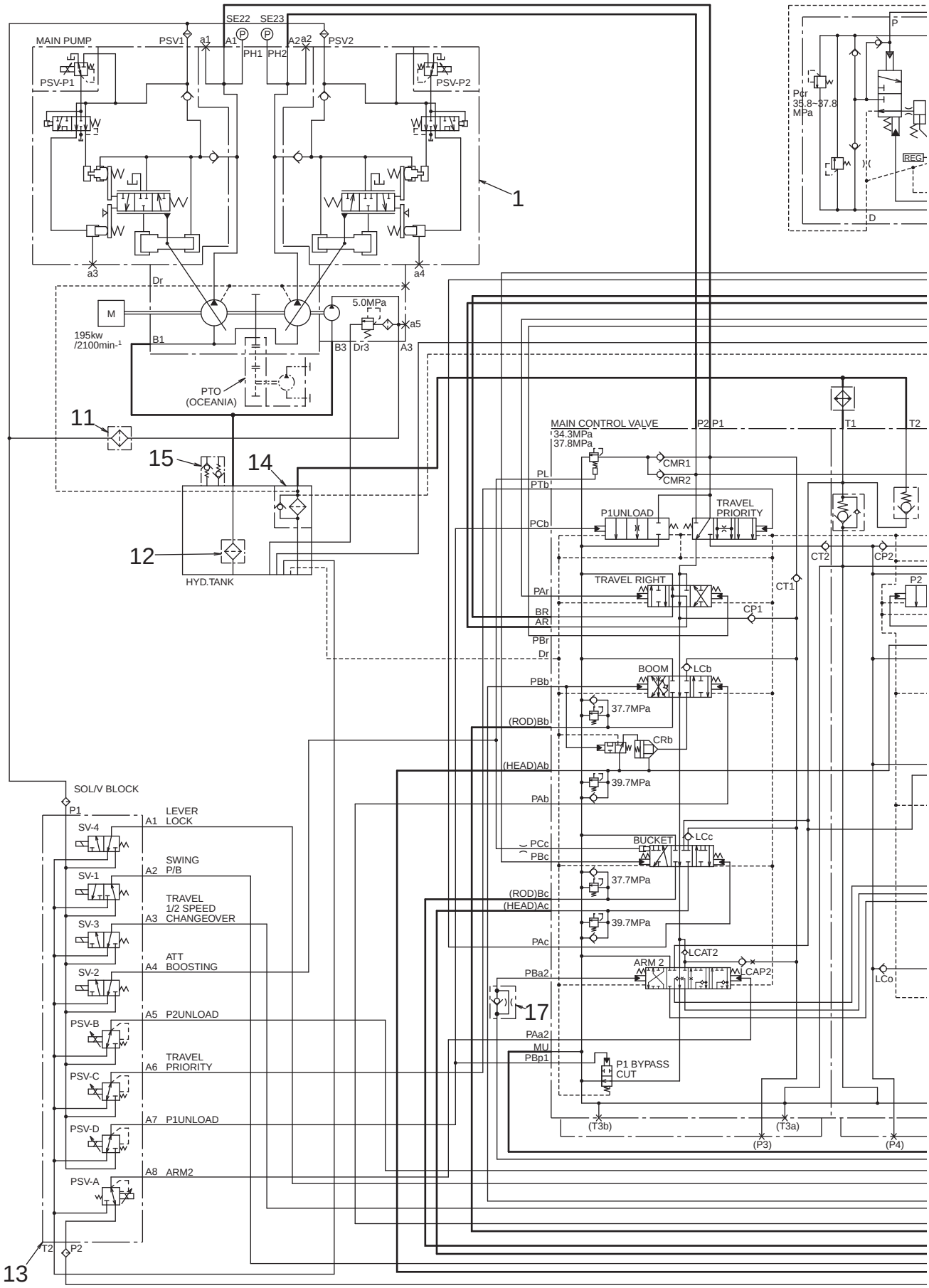
3.1.3 STANDARD (SK250-8)

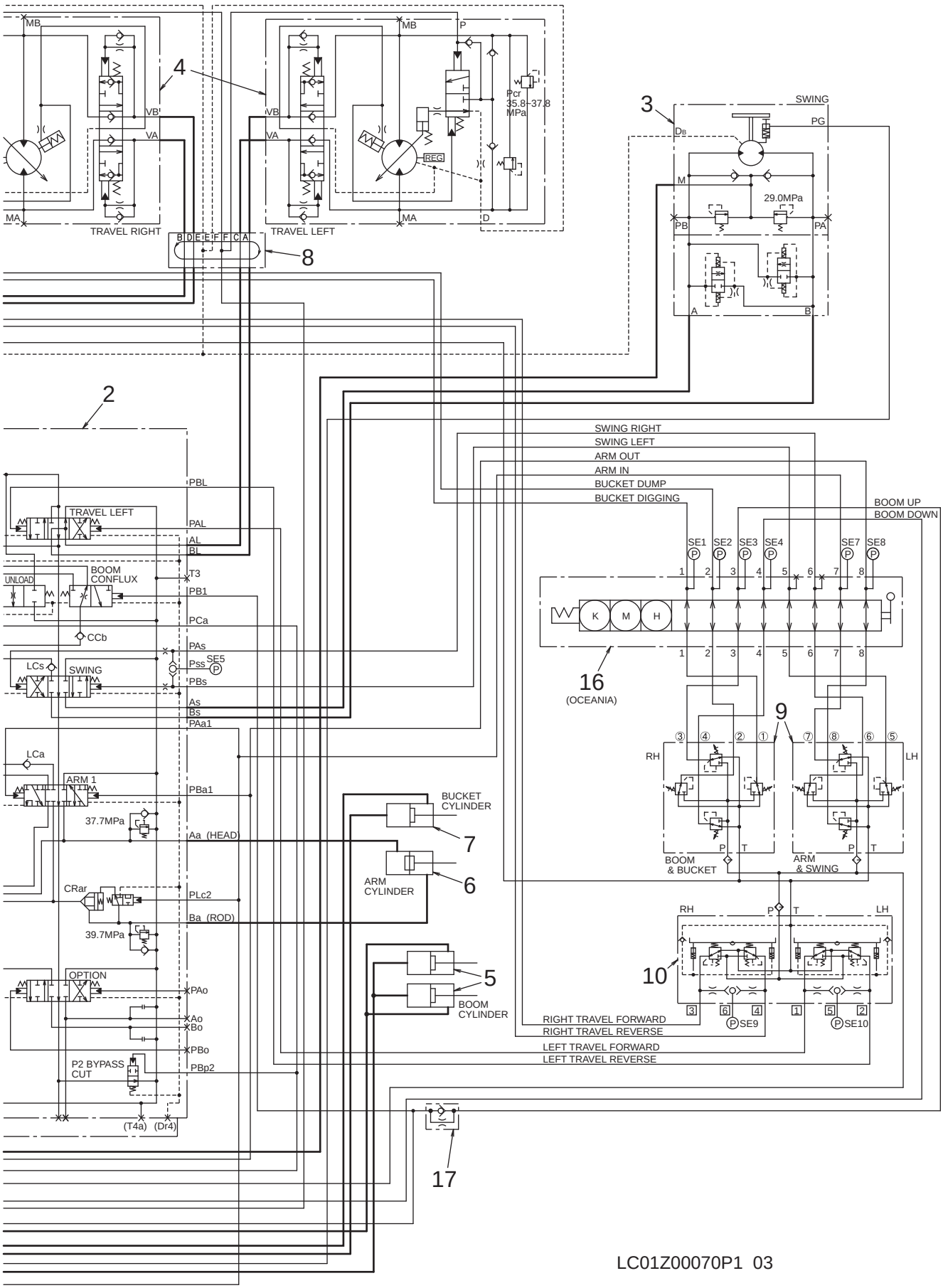




LQ01Z00052P1 01
LQ01Z00051P1 02

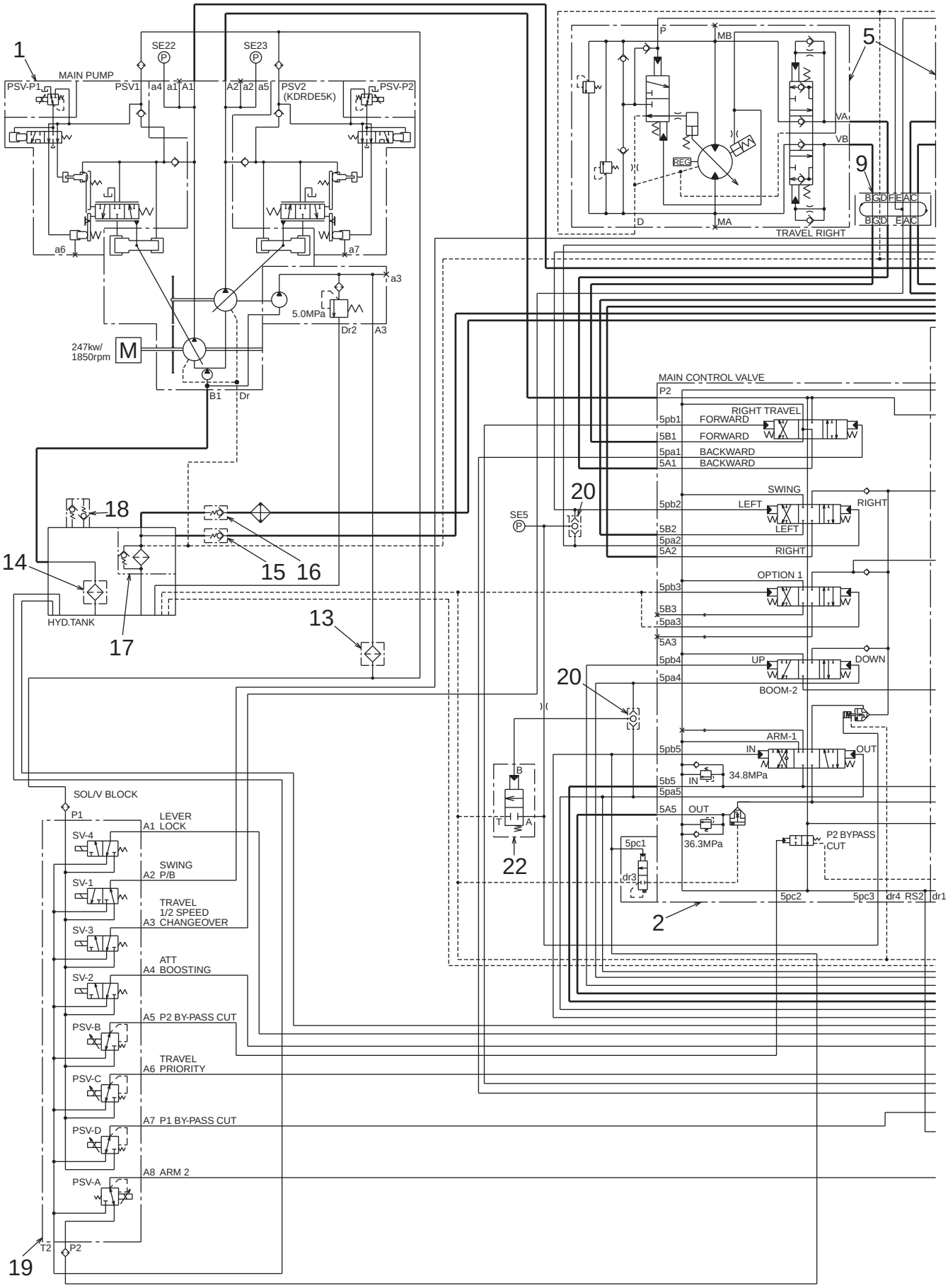
3.1.4 STANDARD (SK330-8)

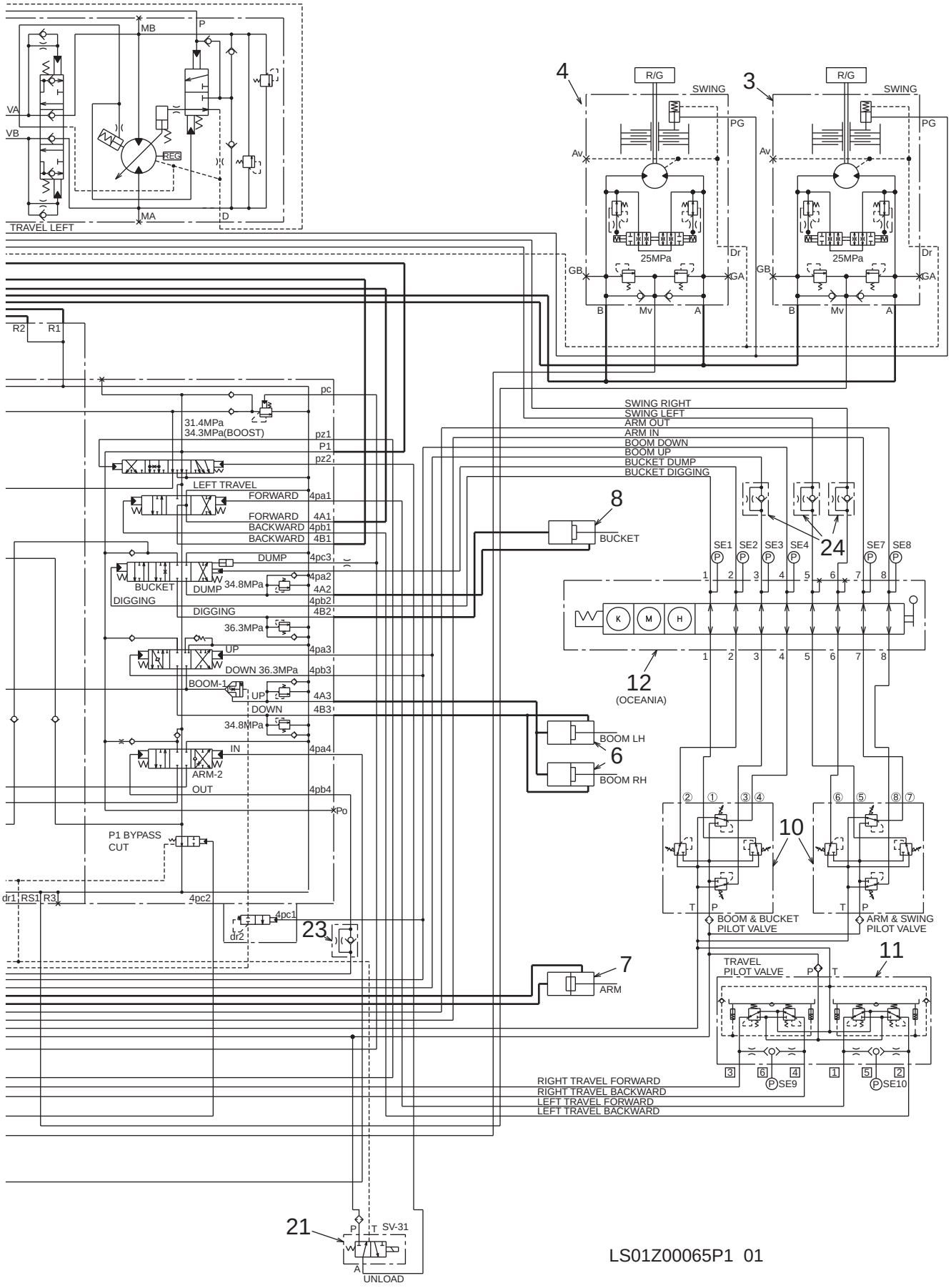




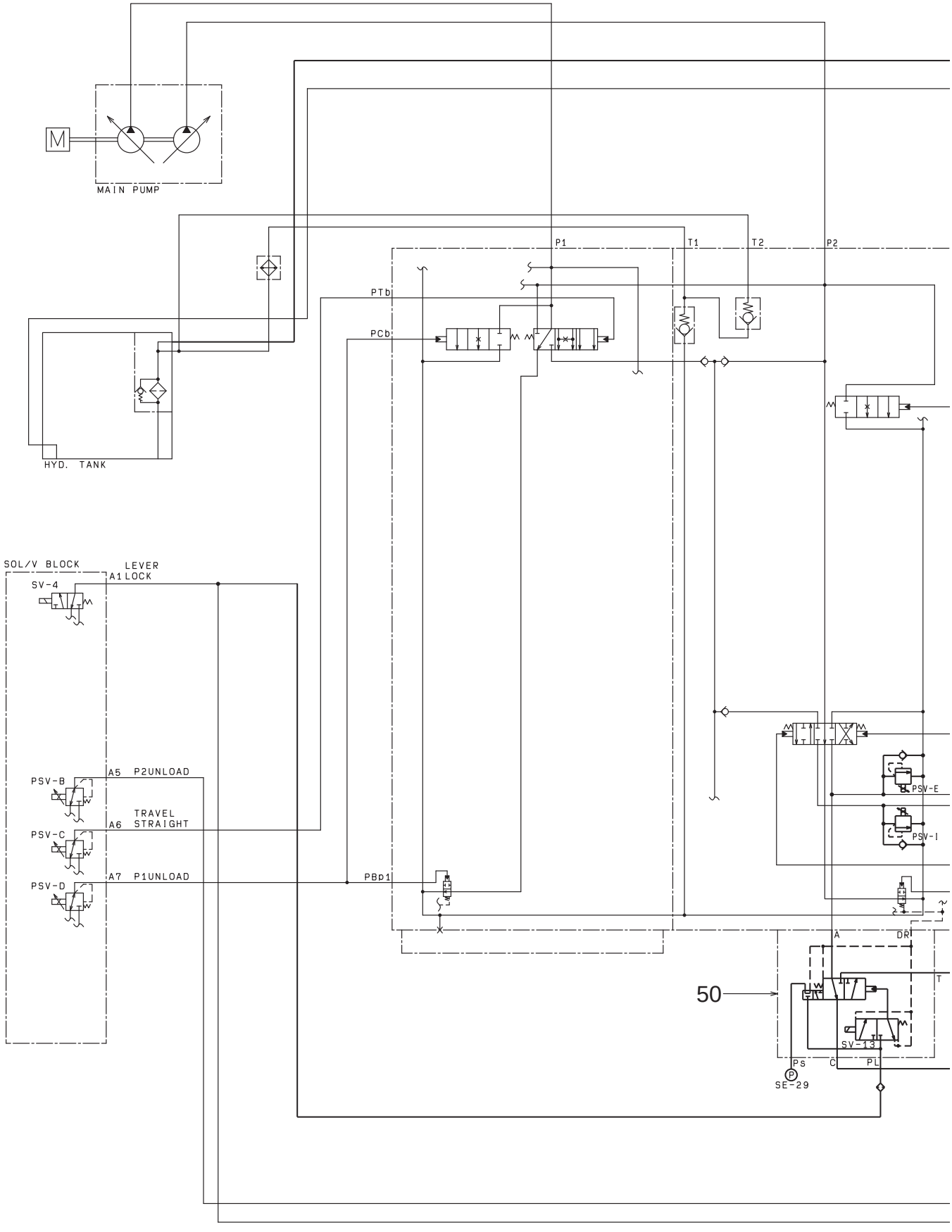
LC01Z00070P1 03

3.1.5 STANDARD (SK460-8)





3.1.6 N&B SPECIFICATION (OPTION) (SK140LC-8)

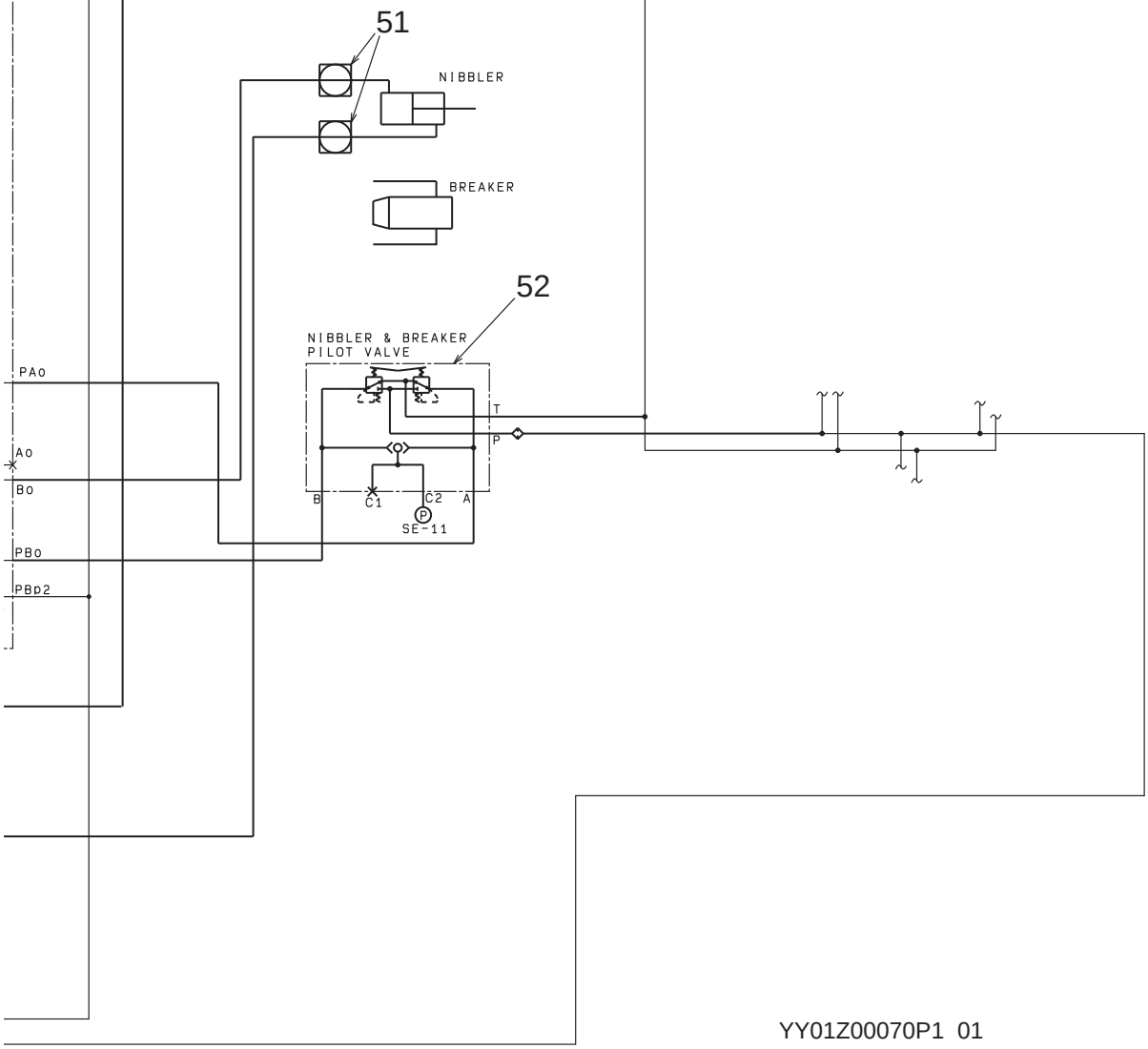


NIBBLER & BREAKER SPECIFICATION		YY01Z00070P1 (01)	
NO.	PARTS	PARTS No.	MODEL No.
50	SELECTOR VALVE	YB30V00018F1	VBY-181
51	STOP VALVE	24100P1006F1	
52	PILOT VALVE	YN30V00080F1	16030-00000

NOTE 1:This hydraulic circuit is used to add to standard circuit.
2:For using of nibbler confluence/single flow or breaker, choosed condition and an order.

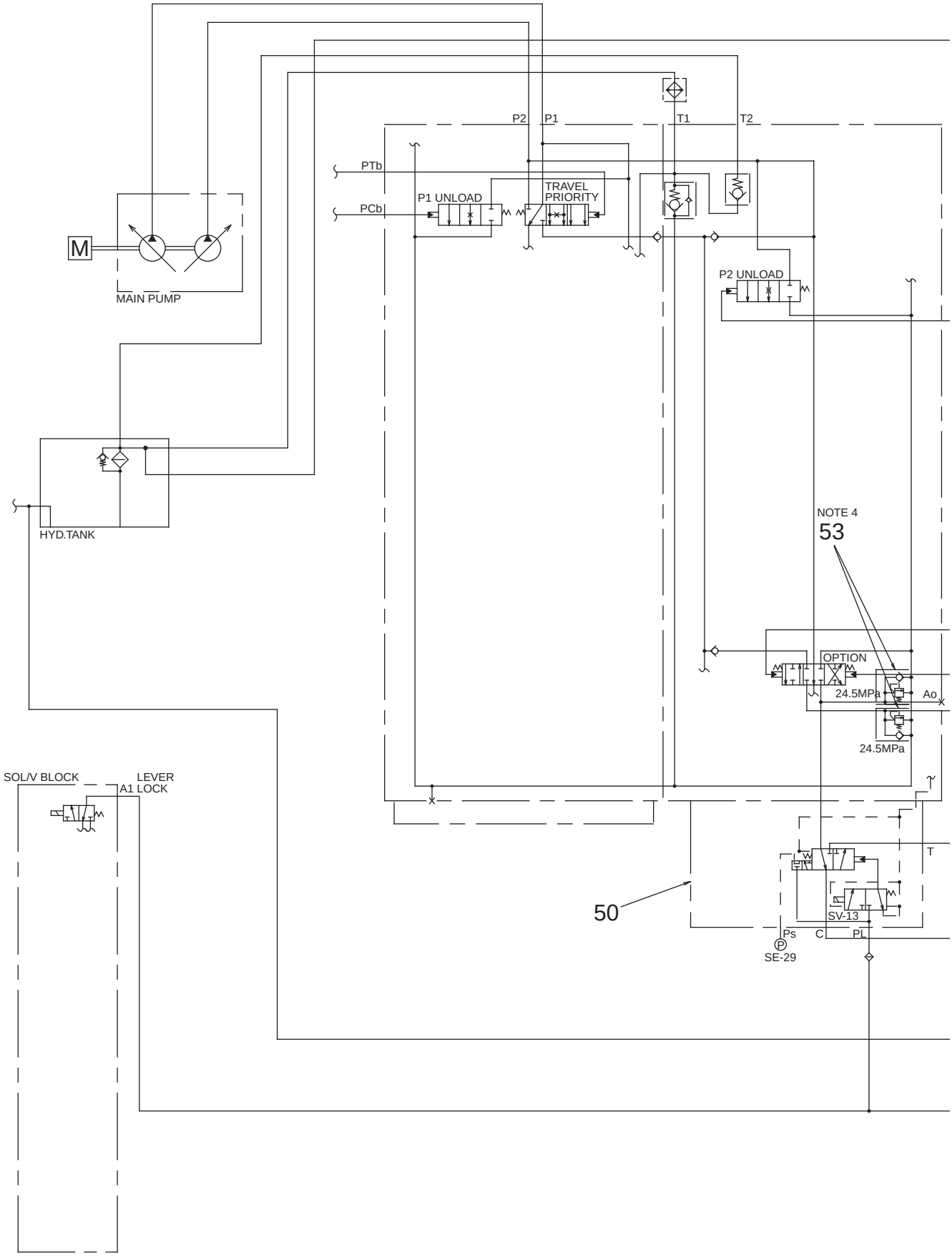
	CHOOSED CONDITION		AN ORDER OF OUTPUT FOR PROPORTIONAL SOLENOID VALVE (W:○ , W/O:−)				
	CONFLUENCE/SINGLE FLOW CHANGEOVER SWITCH	AN ORDER OF OUTPUT FOR PROPORTIONAL SOLENOID VALVE IN VALVE SELECTOR(ITEM 50) (W:○ , W/O:-)	P1 PUMP	P2 PUMP	TRAVEL STRAIGHT	P1 UNLOAD	P2 UNLOAD
CONFLUENCE FLOW OF NIBBLER	CONFLUENCE ON	—	○	○	○	○	○
SINGLE FLOW OF NIBBLER	CONFLUENCE OFF	—	—	○	—	—	○
BREAKER	CONFLUENCE OFF	○	—	○	—	—	○

3:When using nibbler, according to specification of nibbler installed, choose confluence or single flow by "confluence/single flow changeover switch"



YY01Z00070P1 01

3.1.7 N&B SPECIFICATION (OPTION) (SK200-8, SK250-8, SK330-8)



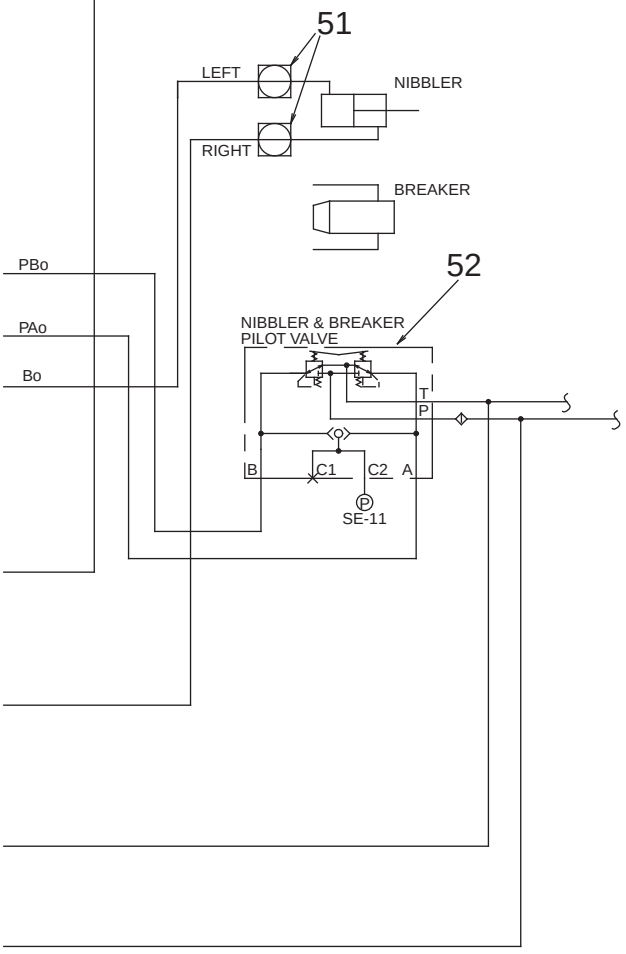
	N&B specification	YN01Z00162P1	
NO.	PARTS	PART No.	MODEL No.
50	SELECTOR VALVE	YN30V00104F1	VBY-174B
51	STOP VALVE	24100P3133F1	
52	PILOT VALVE	YN30V00080F1	16030-00000
53	RELIEF VALVE	YN22V00021F1	KRX16EK22

NOTE:

1. THIS HYDRAULIC CIRCUIT IS USED TO ADD TO STANDARD CIRCUIT.
2. SELECTION CONDITION AND PROPORTIONAL VALVE COMMAND WHEN ANY OF NIBBLER SINGLE & CONFLUX FLOW OR BREAKER IN SERVICE.

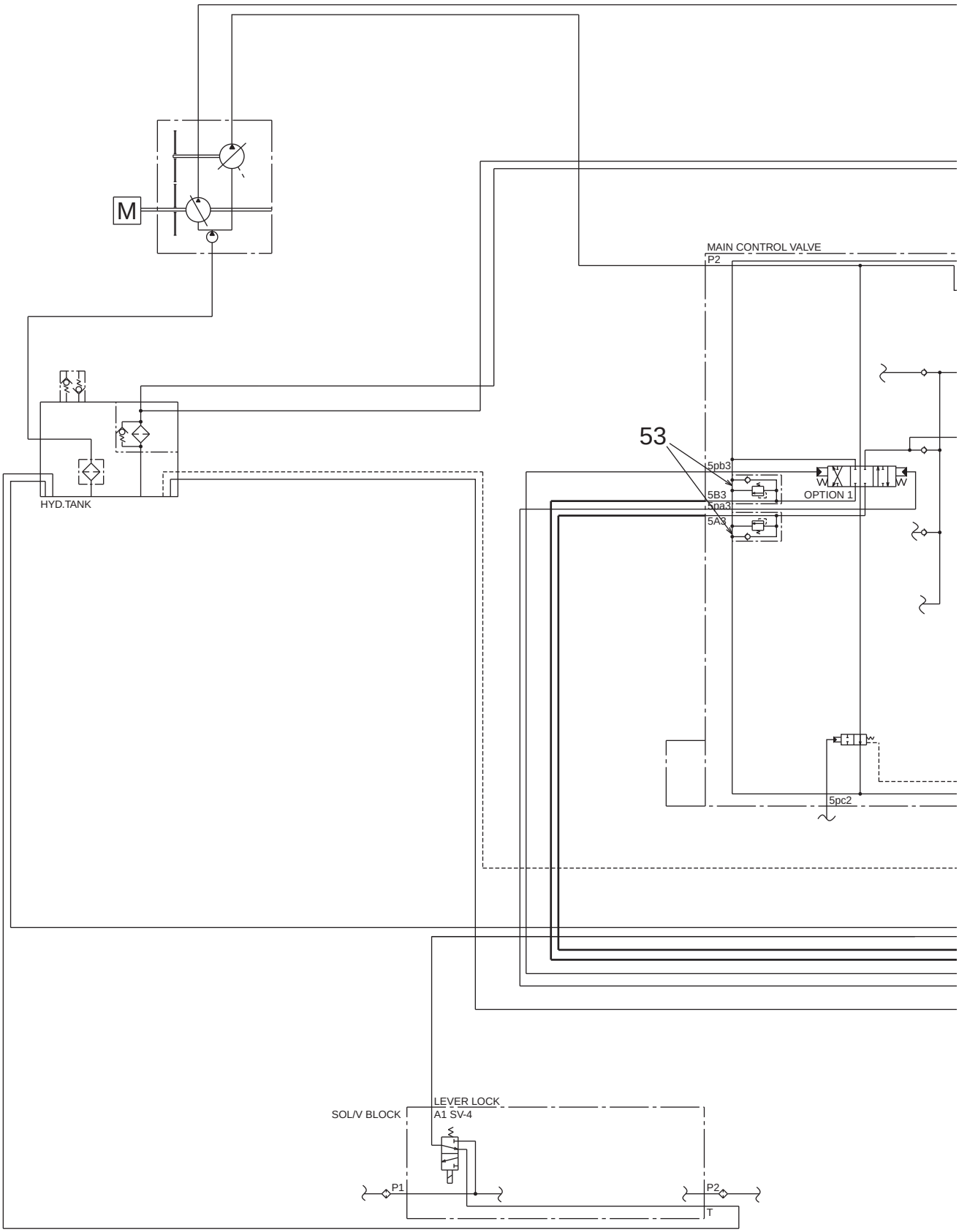
	SELECTION		COMMAND SIGNAL OF SOLENOID PROPORTIONAL VALVE (W: ○, W/O: –)				
	CONFLUX / SINGLE FLOW CHANGEOVER SWITCH	ELECTROMAGNETIC COMMAND SIGNAL OF SELECTOR VALVE (ITEM 50)(W:O, W/O:-)	P1 PUMP	P2 PUMP	TRAVEL STRAIGHT	P1 UNLOAD	P2 UNLOAD
CONFLUX FLOW OF NIBBLER	CONFLUX "ON"	–	○	○	○	○	○
SINGLE FLOW OF NIBBLER	CONFLUX "OFF"	–	–	○	–	–	○
BREAKER	CONFLUX "OFF"	○	–	○	–	–	○

3. WHEN USING NIBBLER, ACCORDING TO SPECIFICATION OF NIBBLER INSTALLED,
   CHOOSE CONFLUENCE OR SINGLE FLOW BY CONFLUENCE FLOW CHANGEOVER SWITCH.
4. ADJUST OVERLOAD RELIEF VALVE OF OPTIONAL PORT TO CUSTOMIZE SPECIFICATION ORDINARY SET PRESSURE.

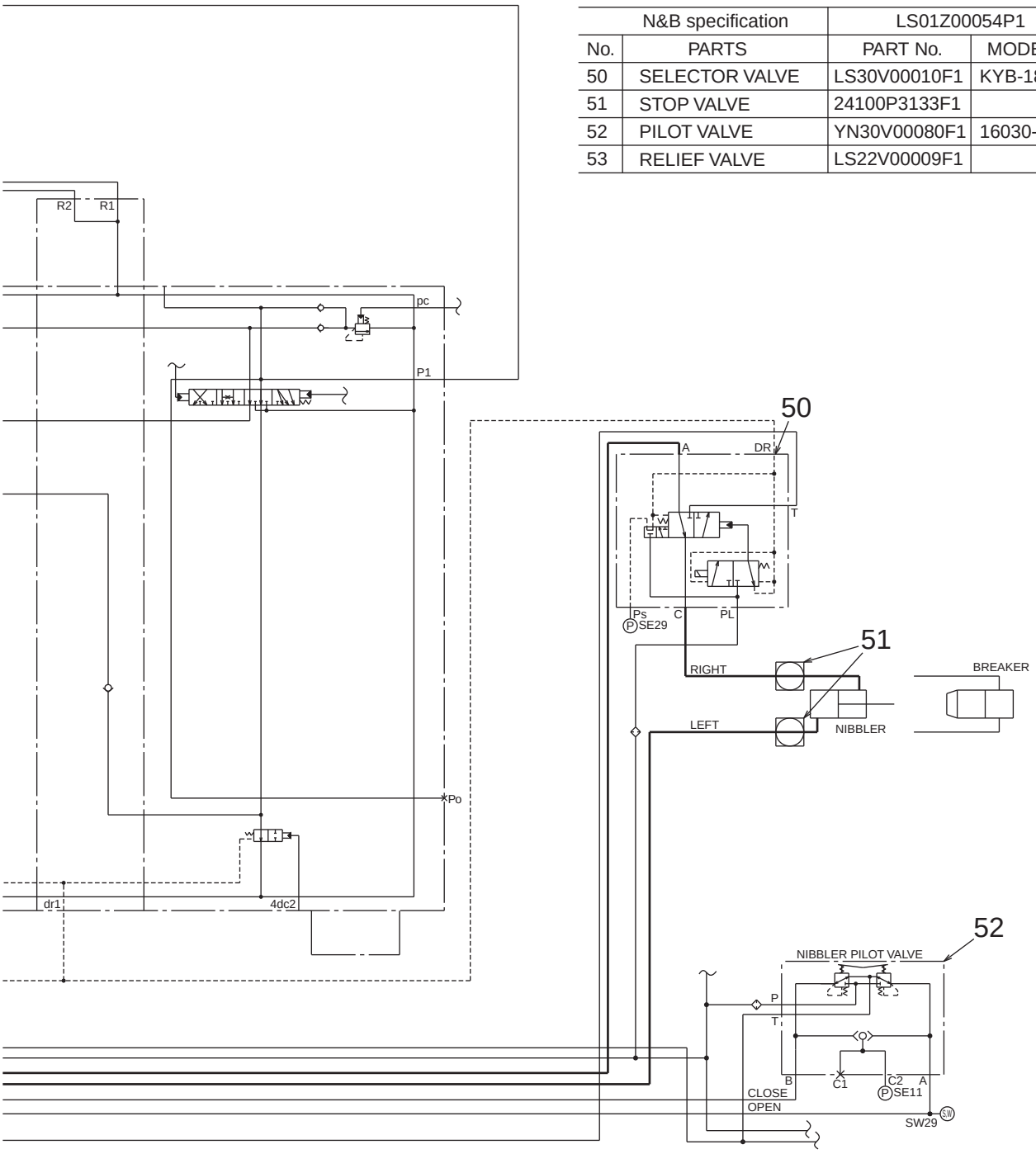


YN01Z00162P1 01

3.1.8 N&B SPECIFICATION (OPTION) (SK460-8)



N&B specification		LS01Z00054P1	
No.	PARTS	PART No.	MODEL No.
50	SELECTOR VALVE	LS30V00010F1	KYB-182
51	STOP VALVE	24100P3133F1	
52	PILOT VALVE	YN30V00080F1	16030-00000
53	RELIEF VALVE	LS22V00009F1	



NOTE:

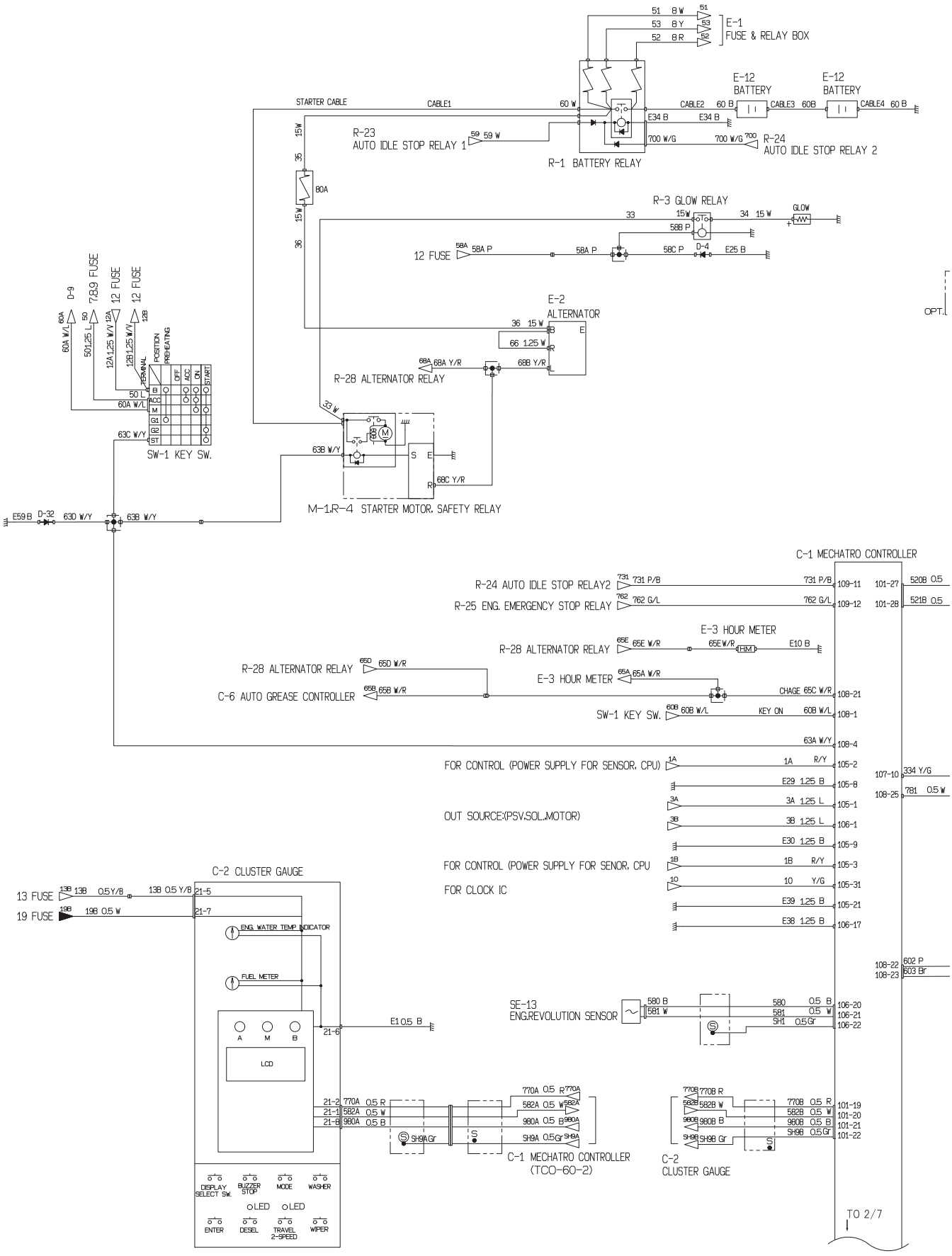
1. THIS HYDRAULIC CIRCUIT IS USED TO ADD TO STANDARD CIRCUIT.
2. SELECTION CONDITION AND PROPORTIONAL VALVE COMMAND WHEN ANY OF NIBBLER SINGLE & CONFLUX FLOW OR BREAKER IN SERVICE.

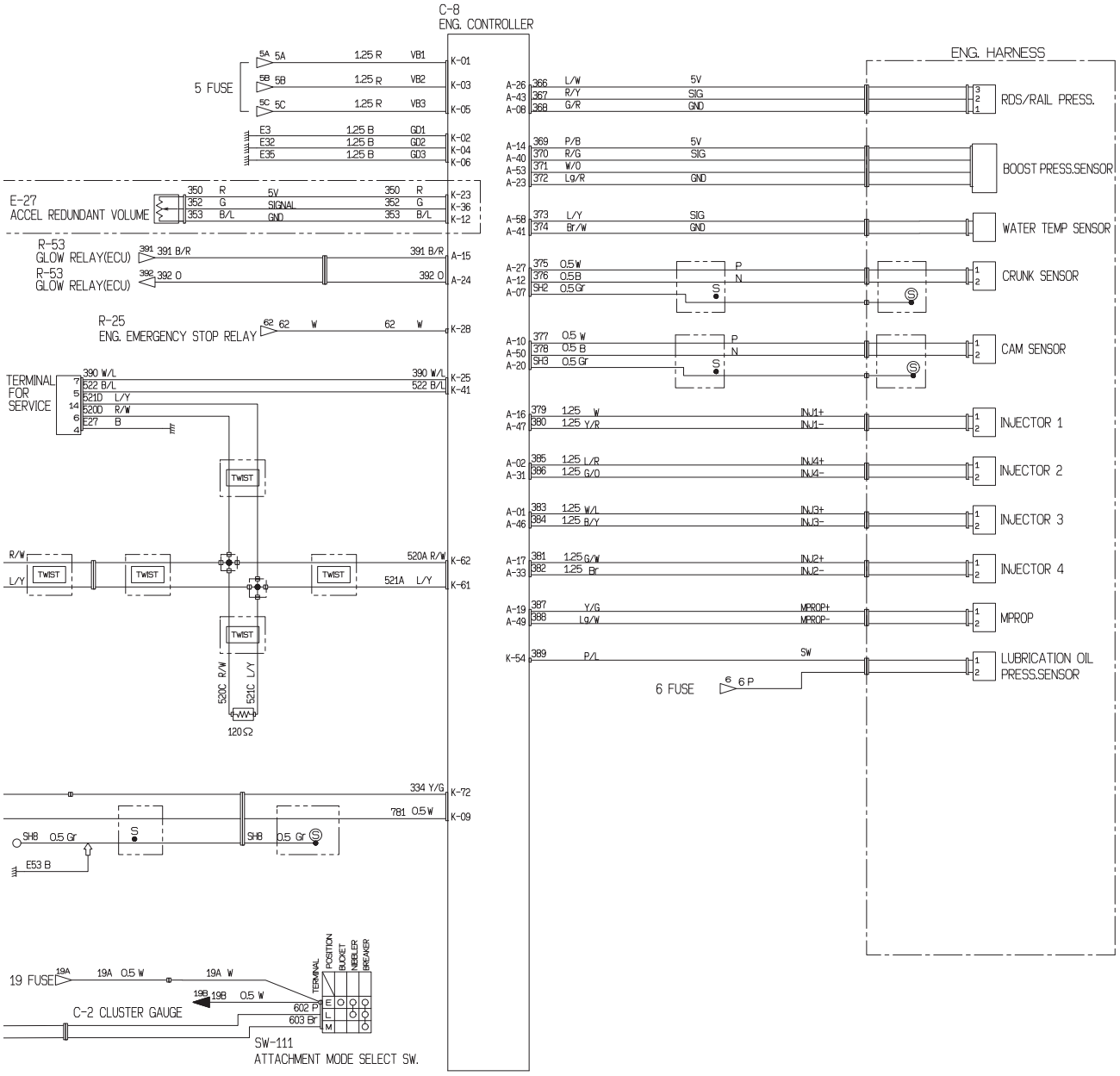
	SELECTION		COMMAND SIGNAL OF SOLENOID PROPORTIONAL VALVE (W: ○, W/O: –)				
	CONFLUX / SINGLE FLOW CHANGEOVER SWITCH	ELECTROMAGNETIC COMMAND SIGNAL OF SELECTOR VALVE (ITEM 50)(W:O,W/O:-)	P1 PUMP	P2 PUMP	TRAVEL STRAIGHT	P1 CUT	P2 CUT
CONFLUX FLOW OF NIBBLER	CONFLUX "ON"	–	○	○	–	○	–
SINGLE FLOW OF NIBBLER	CONFLUX "OFF"	–	–	○	–	–	–
BREAKER	CONFLUX "OFF"	○	–	○	–	–	–

3. WHEN USING NIBBLER, ACCORDING TO SPECIFICATION OF NIBBLER INSTALLED,
   CHOOSE CONFLUENCE OR SINGLE FLOW BY CONFLUENCE FLOW CHANGEOVER SWITCH.
4. ADJUST OVERLOAD RELIEF VALVE OF OPTIONAL PORT TO CUSTOMIZE SPECIFICATION ORDINARY SET PRESSURE.

LS01Z00054P1 01

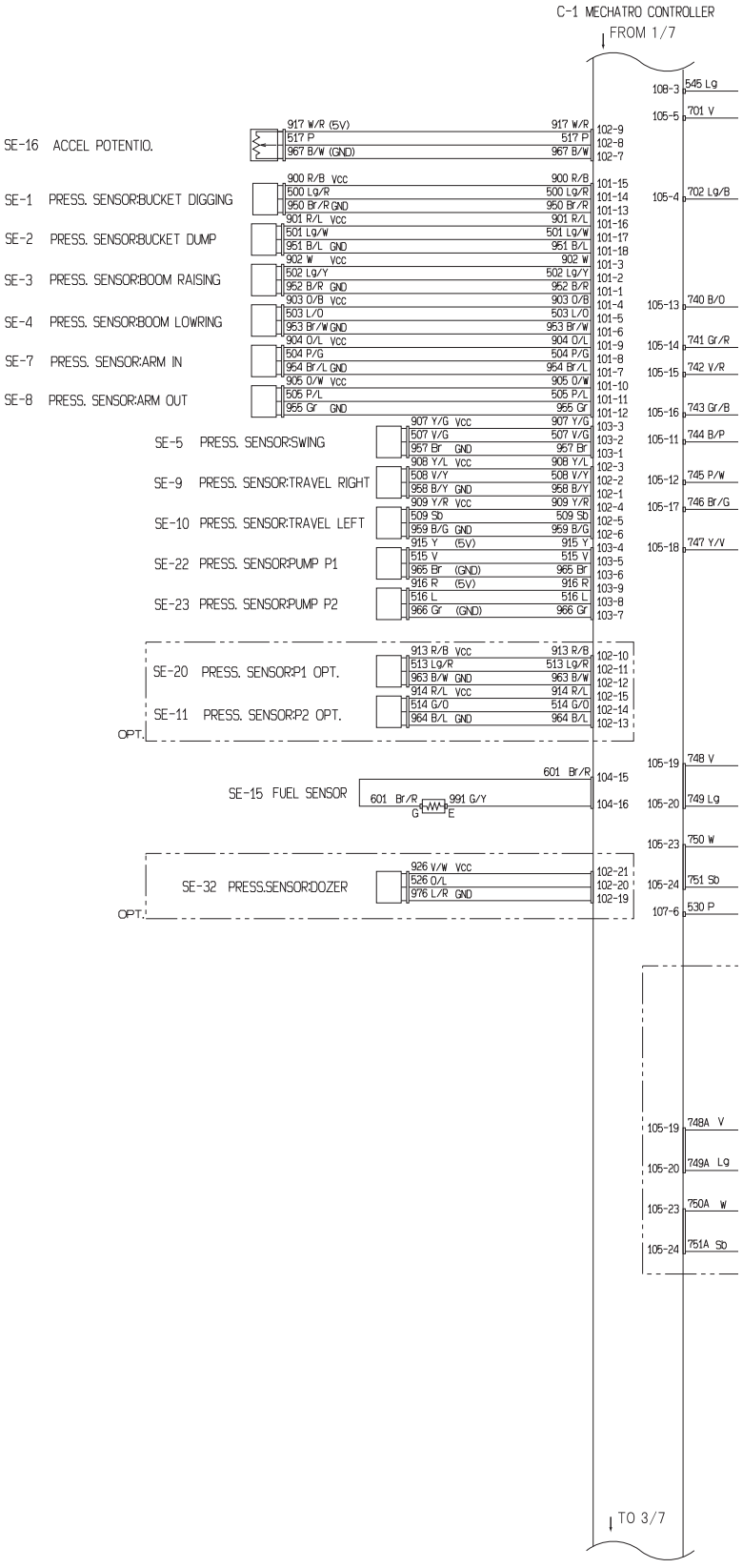
3.2 ELECTRIC CIRCUIT DIAGRAM (SK140LC-8)

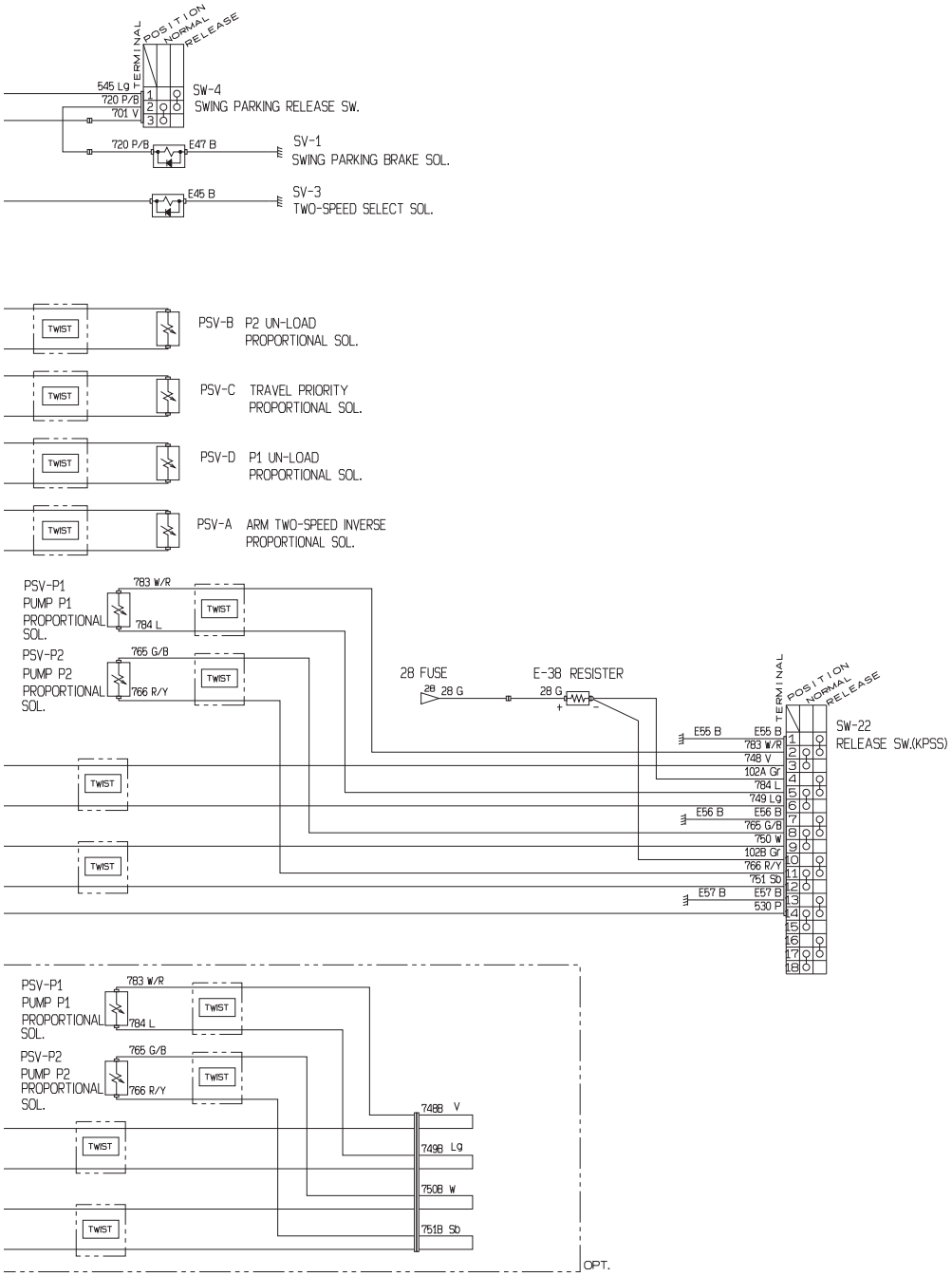


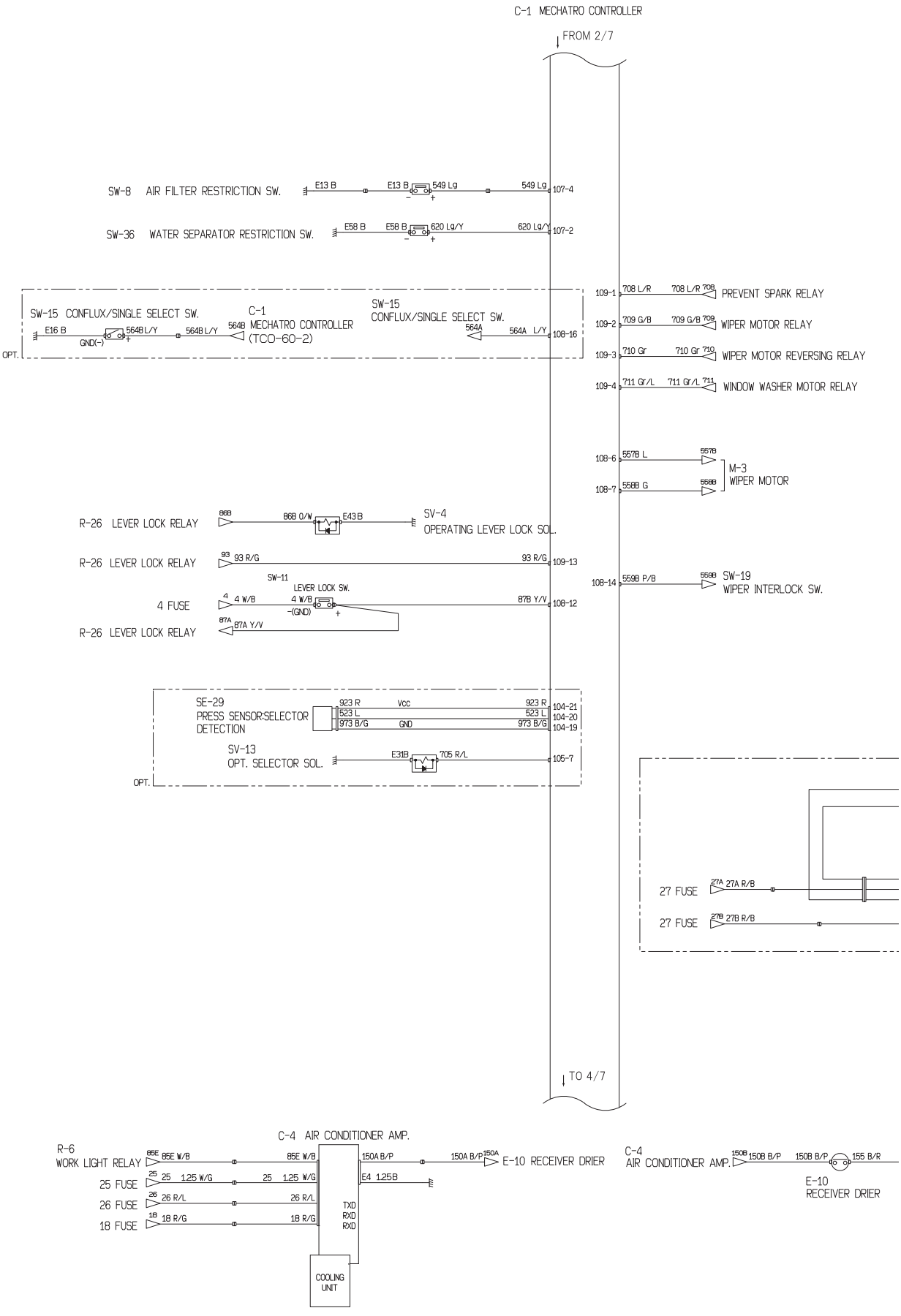


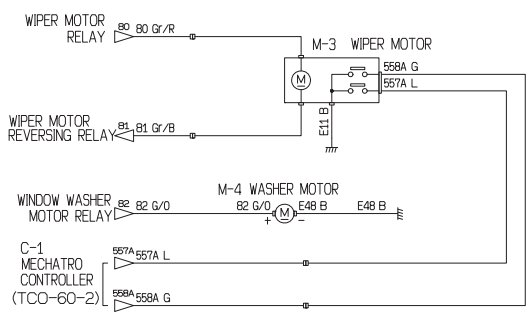
(1/7)

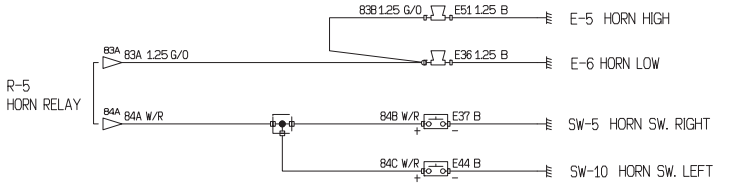
LP03Z00005P1 (01)

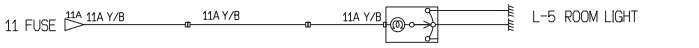


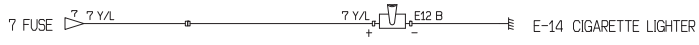


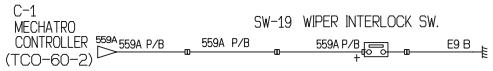


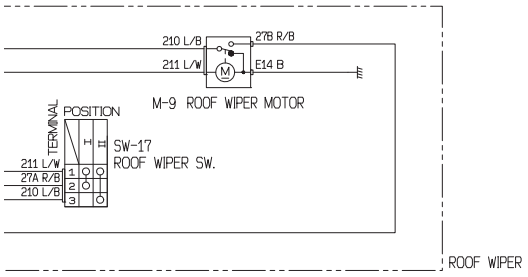


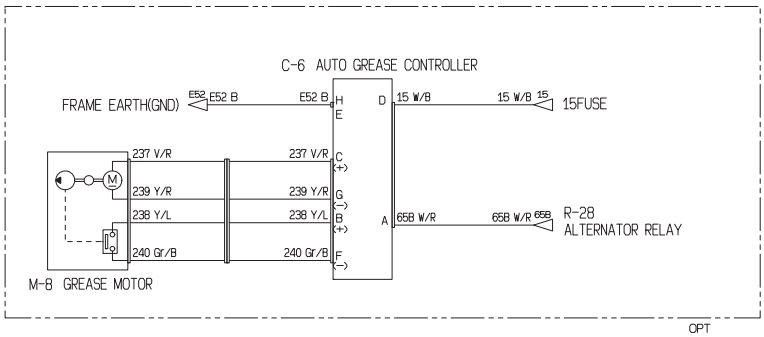


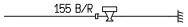


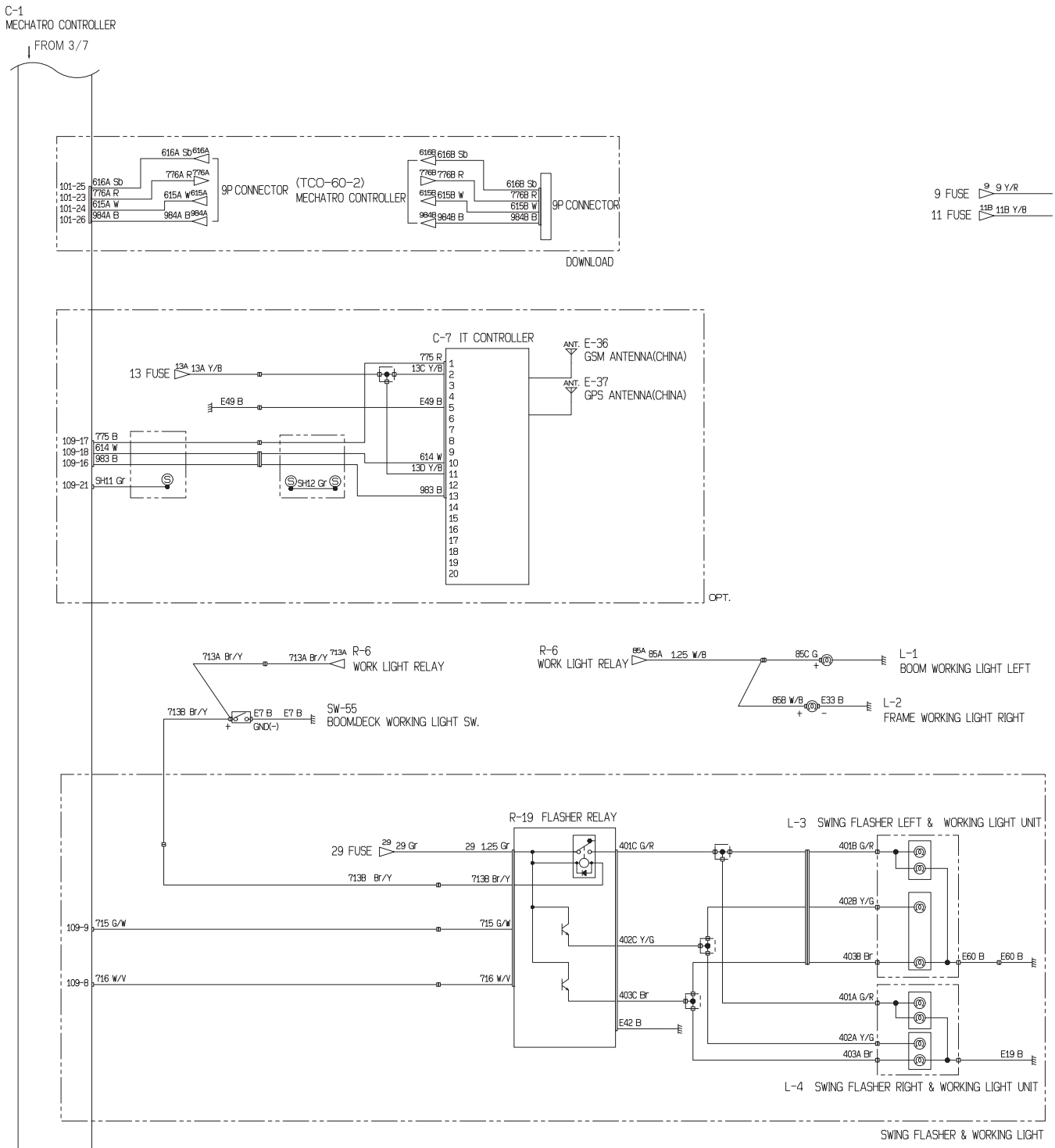


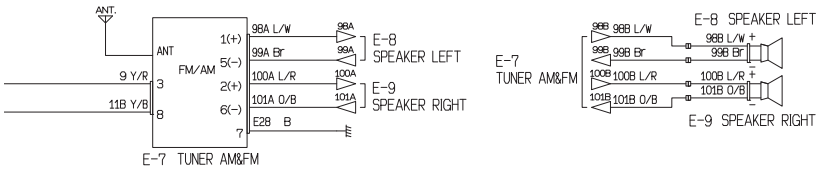


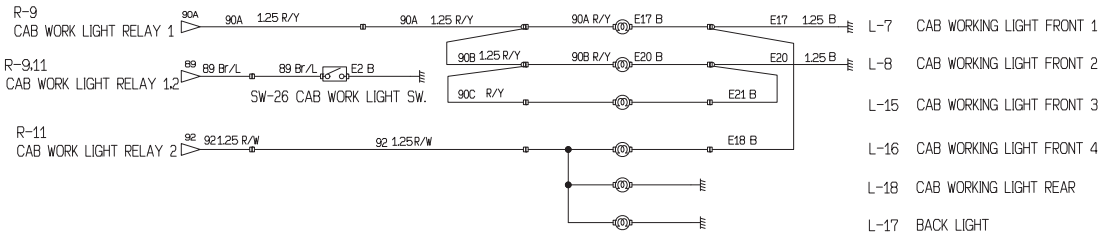


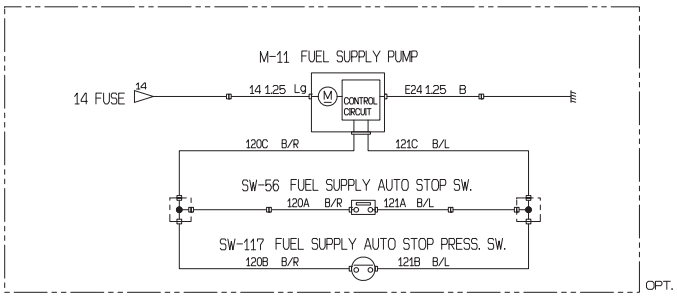


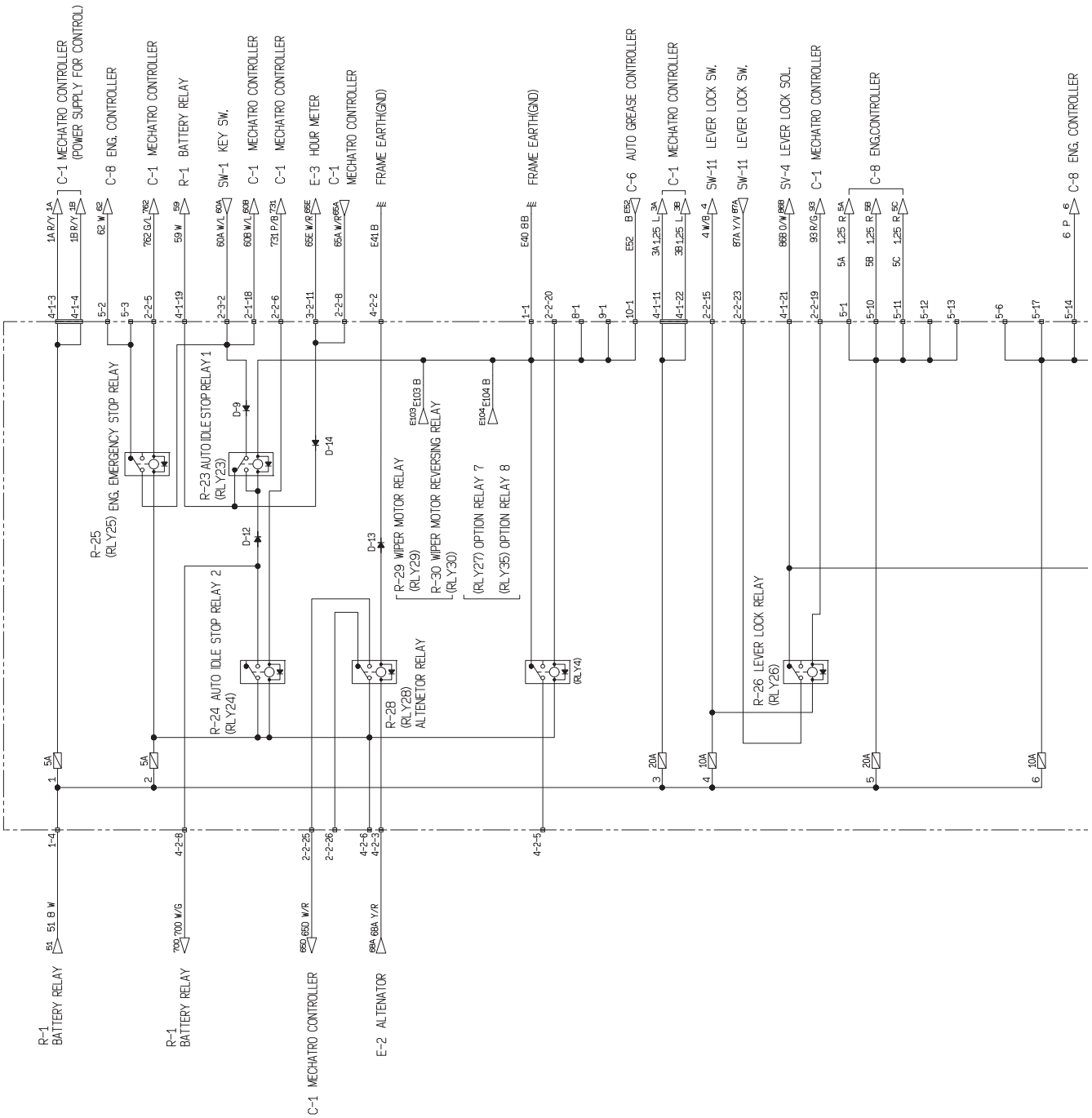


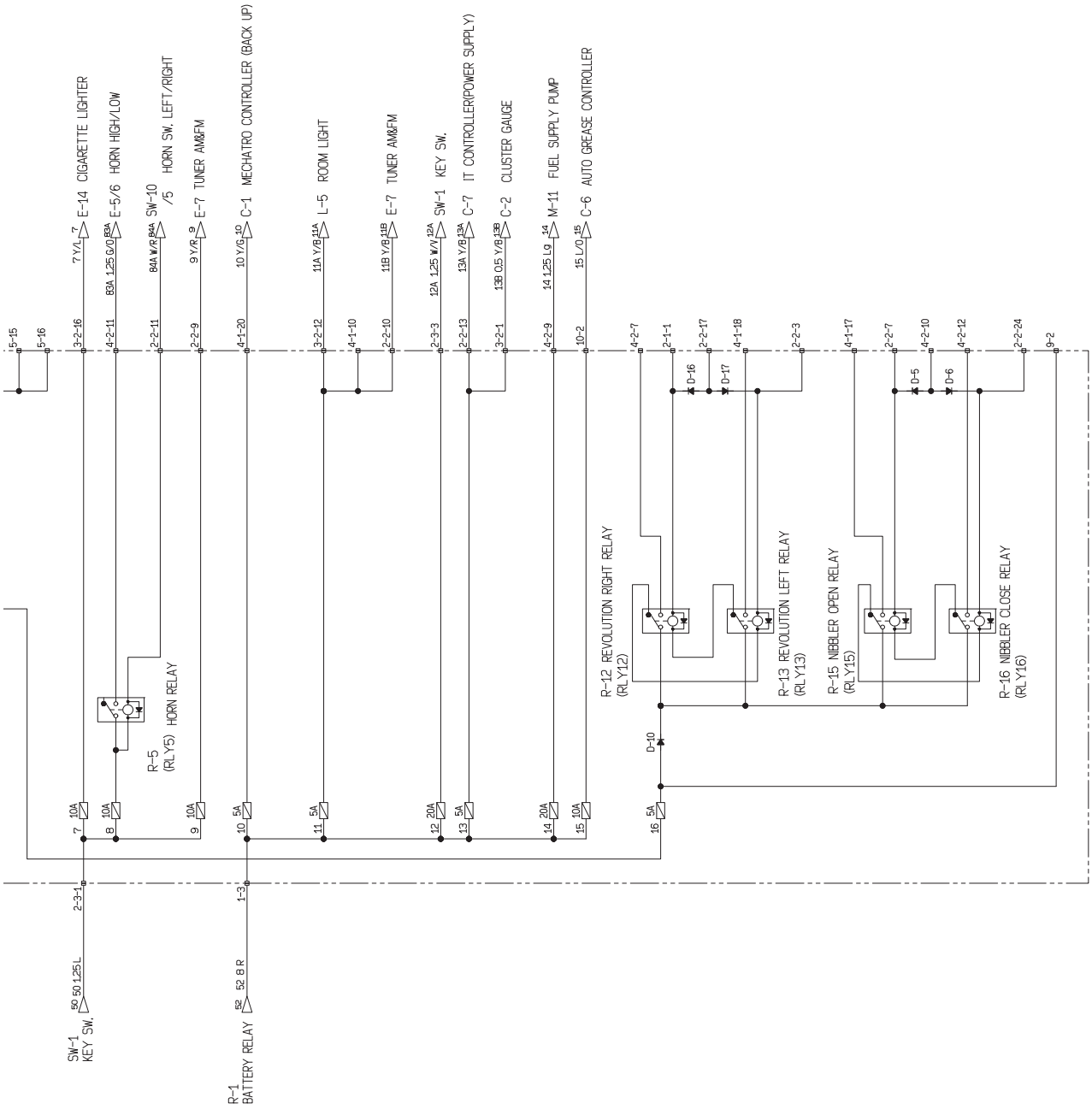






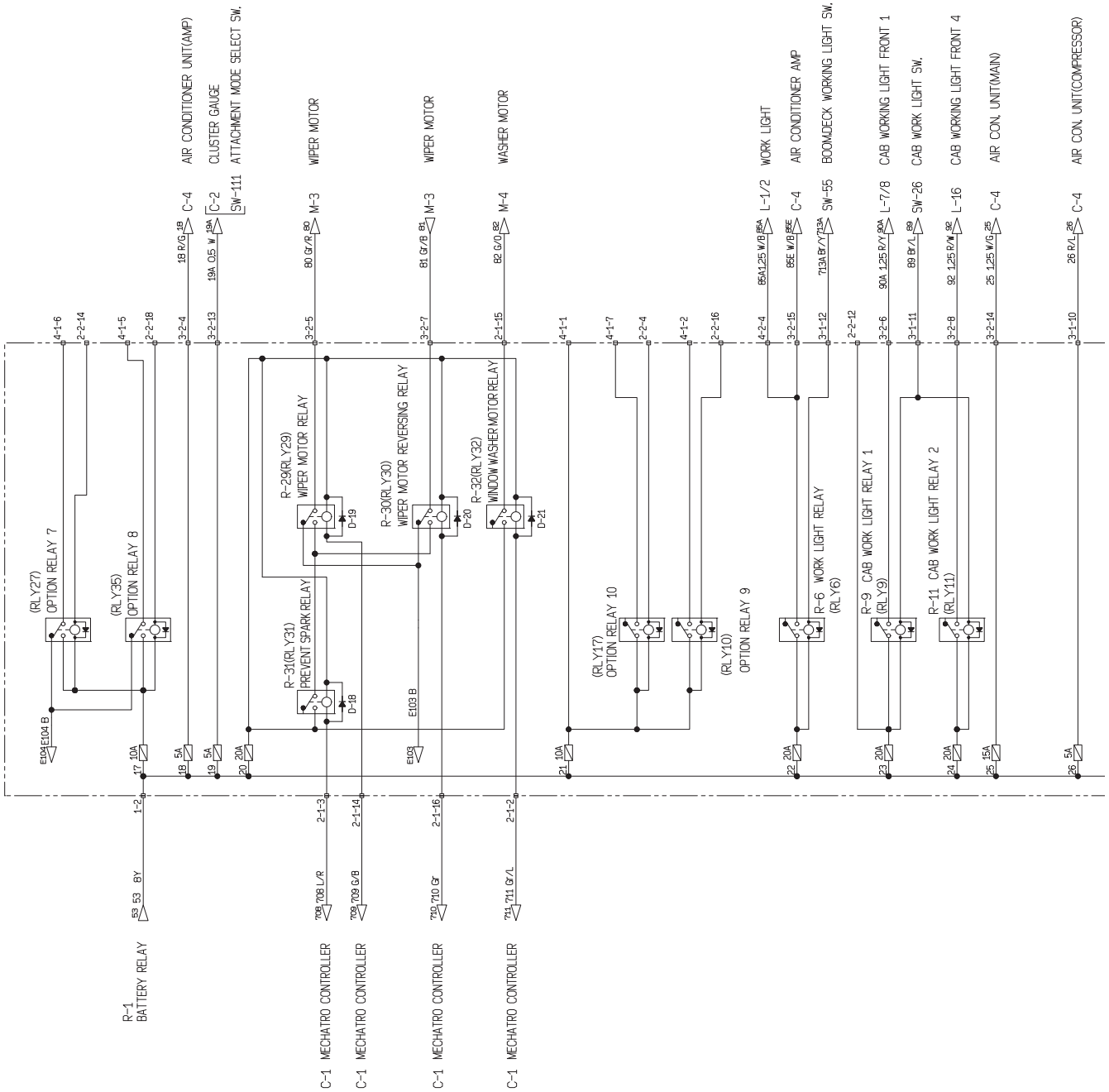


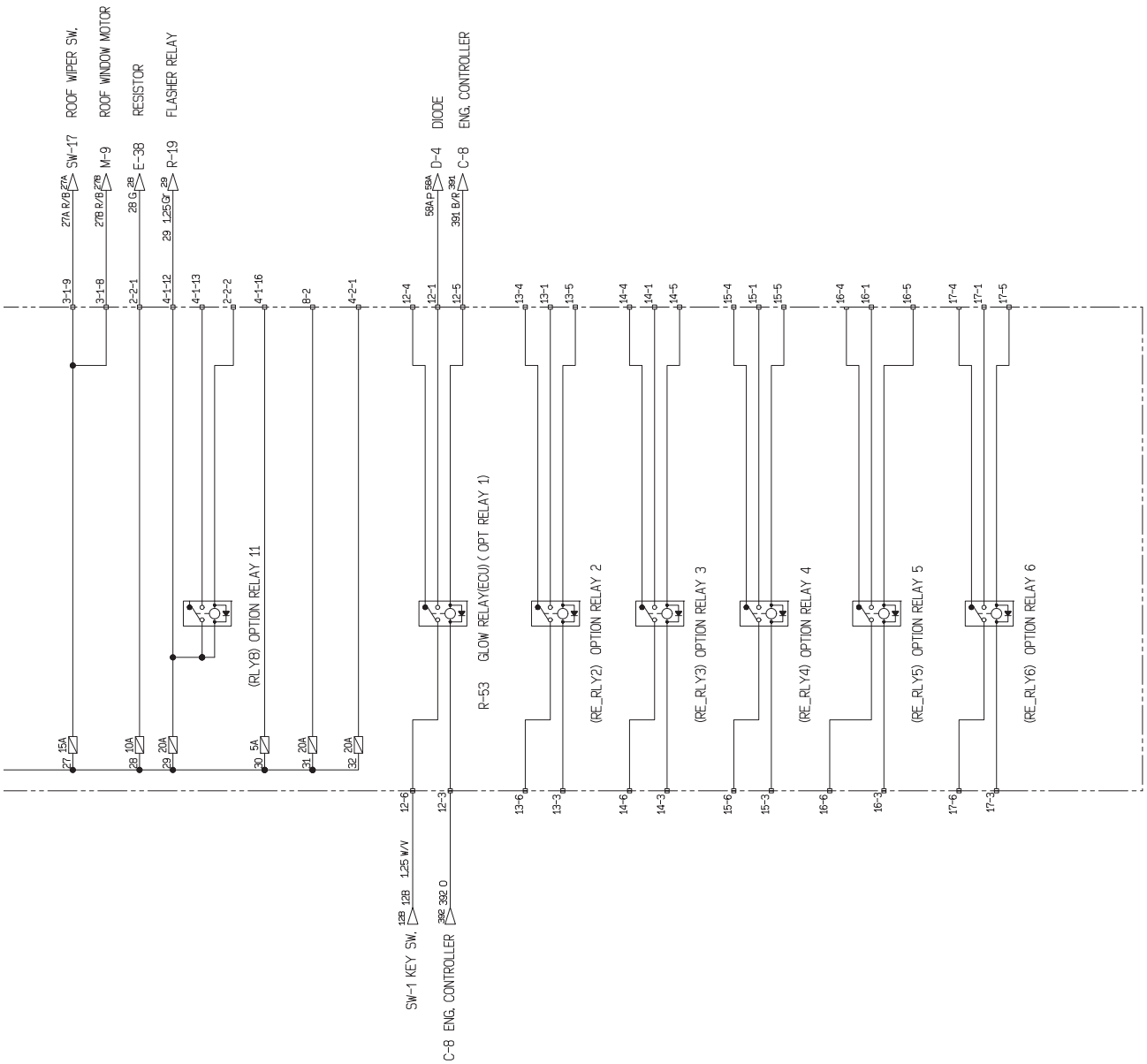




(5/7)

LP03Z00005P1 (01)





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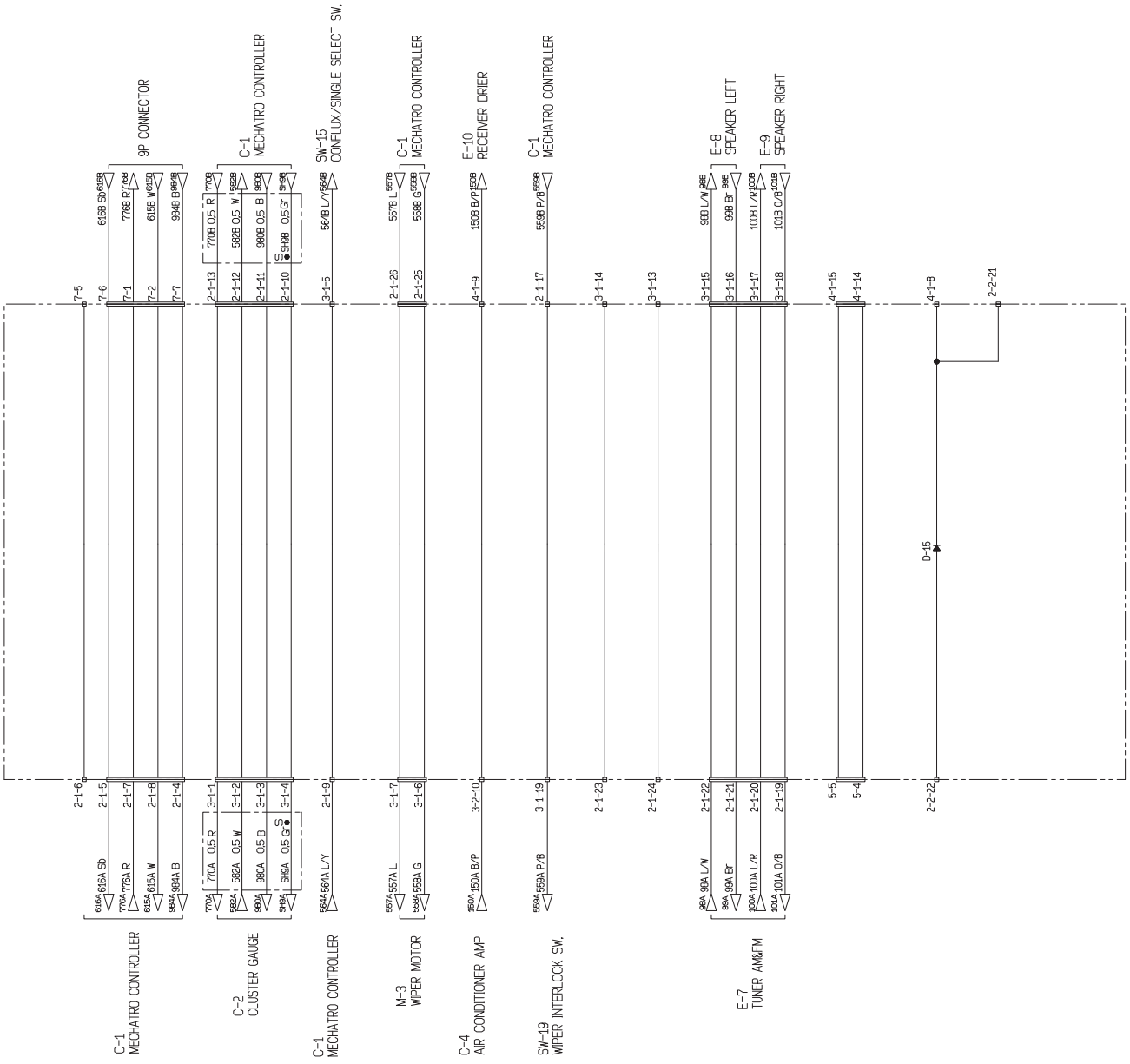
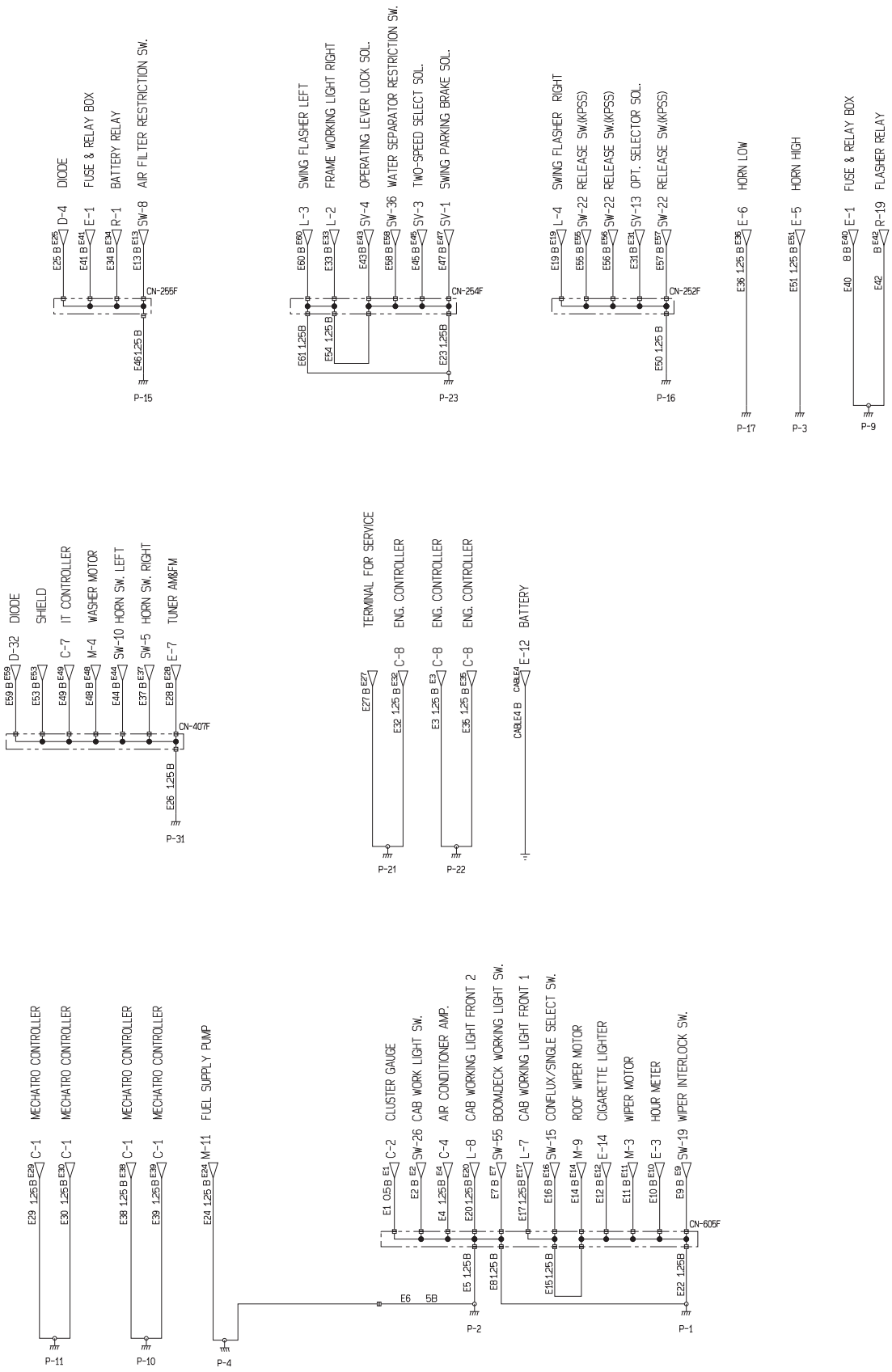
LP03Z00005P1 (01)





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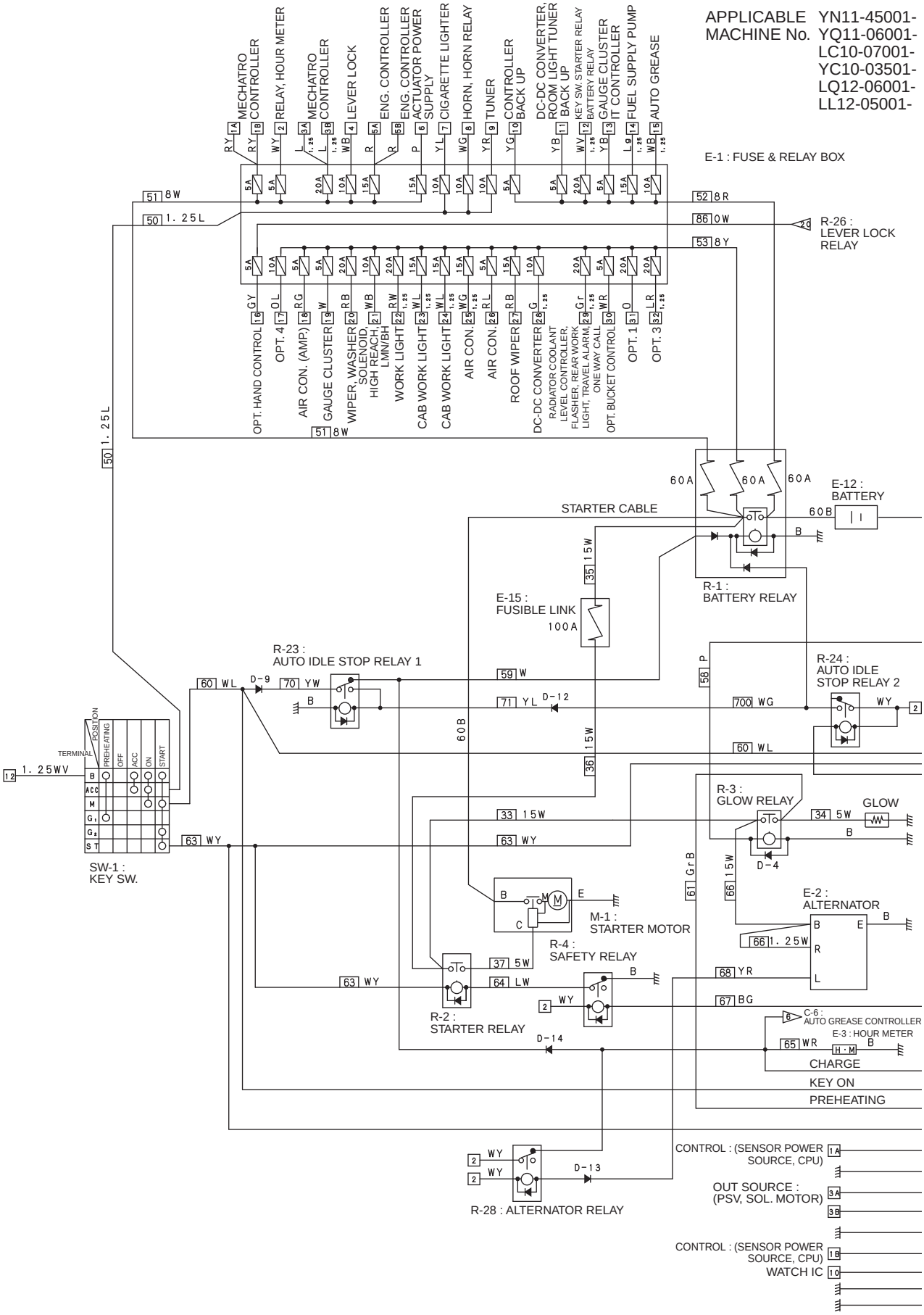
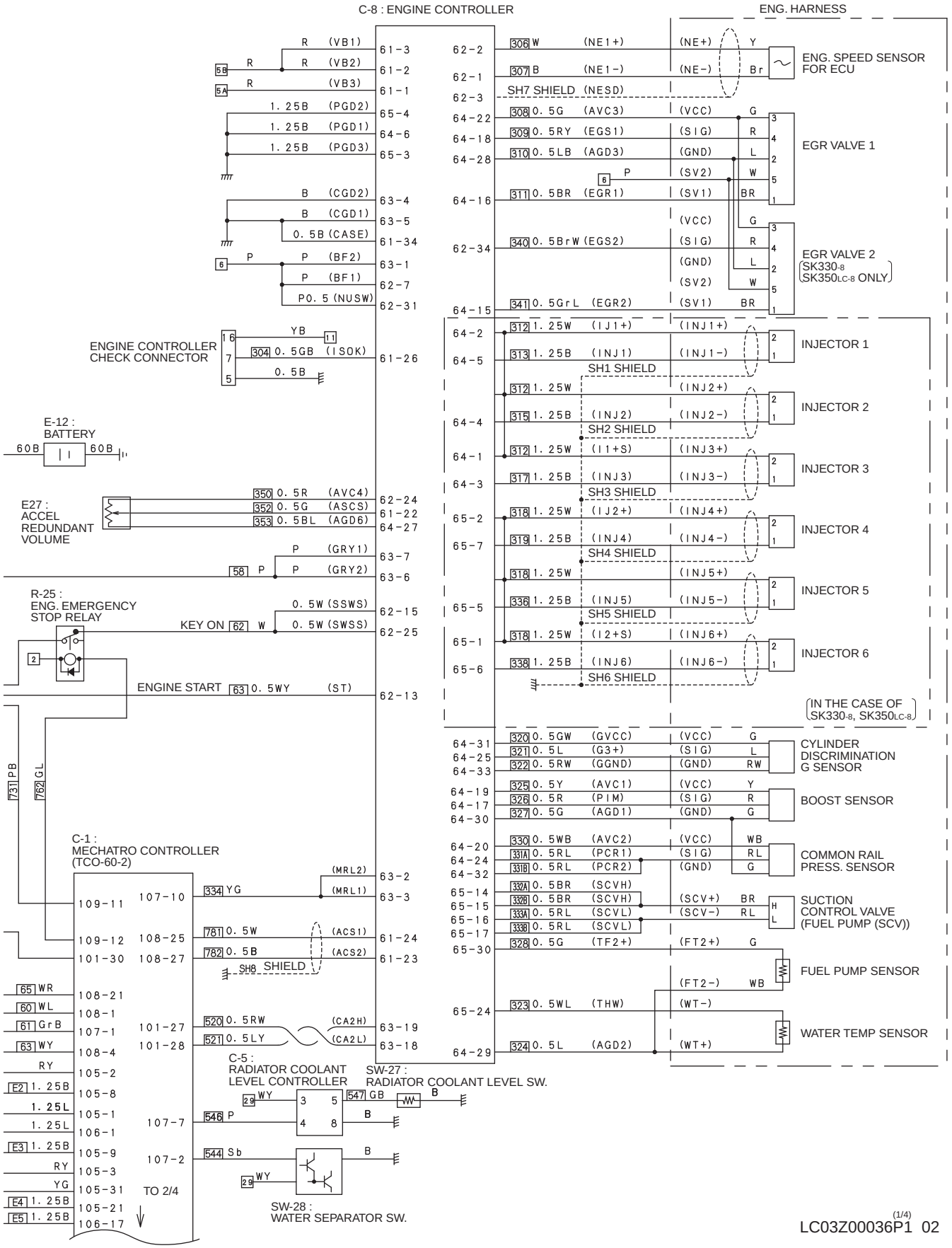
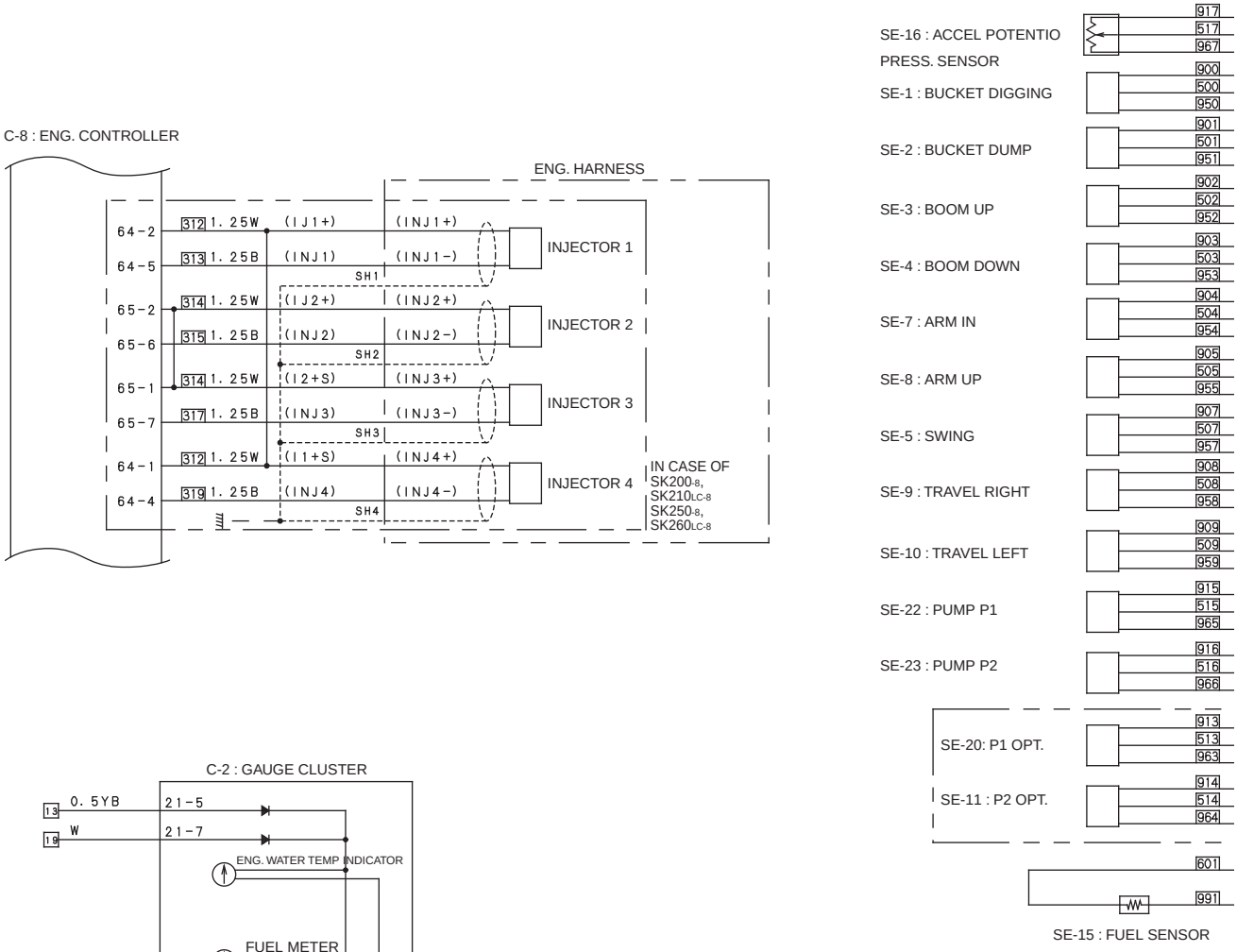
LP03Z00005P1 (01)

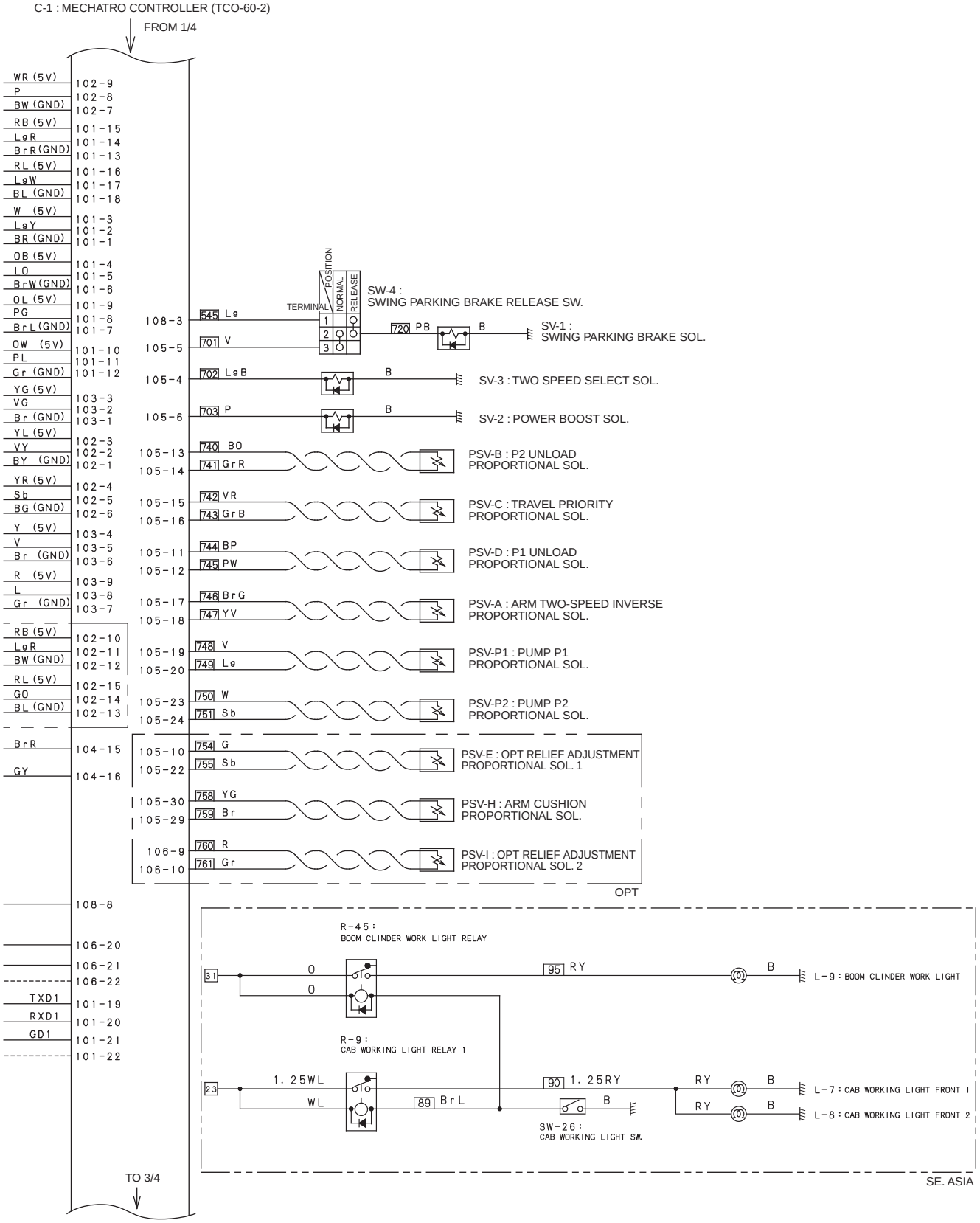
3.3 ELECTRIC CIRCUIT DIAGRAM (SK200-8, SK250-8, SK330-8)



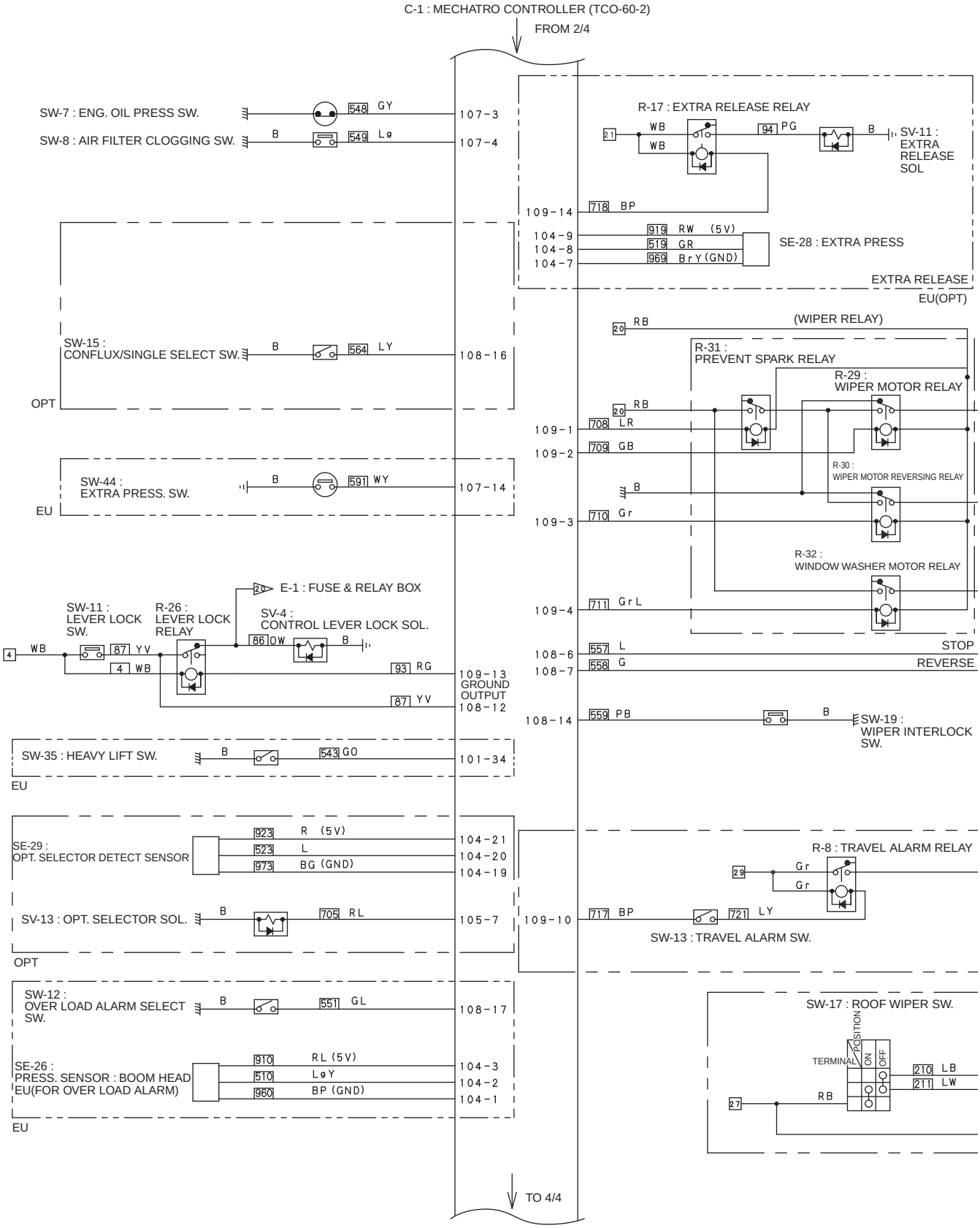


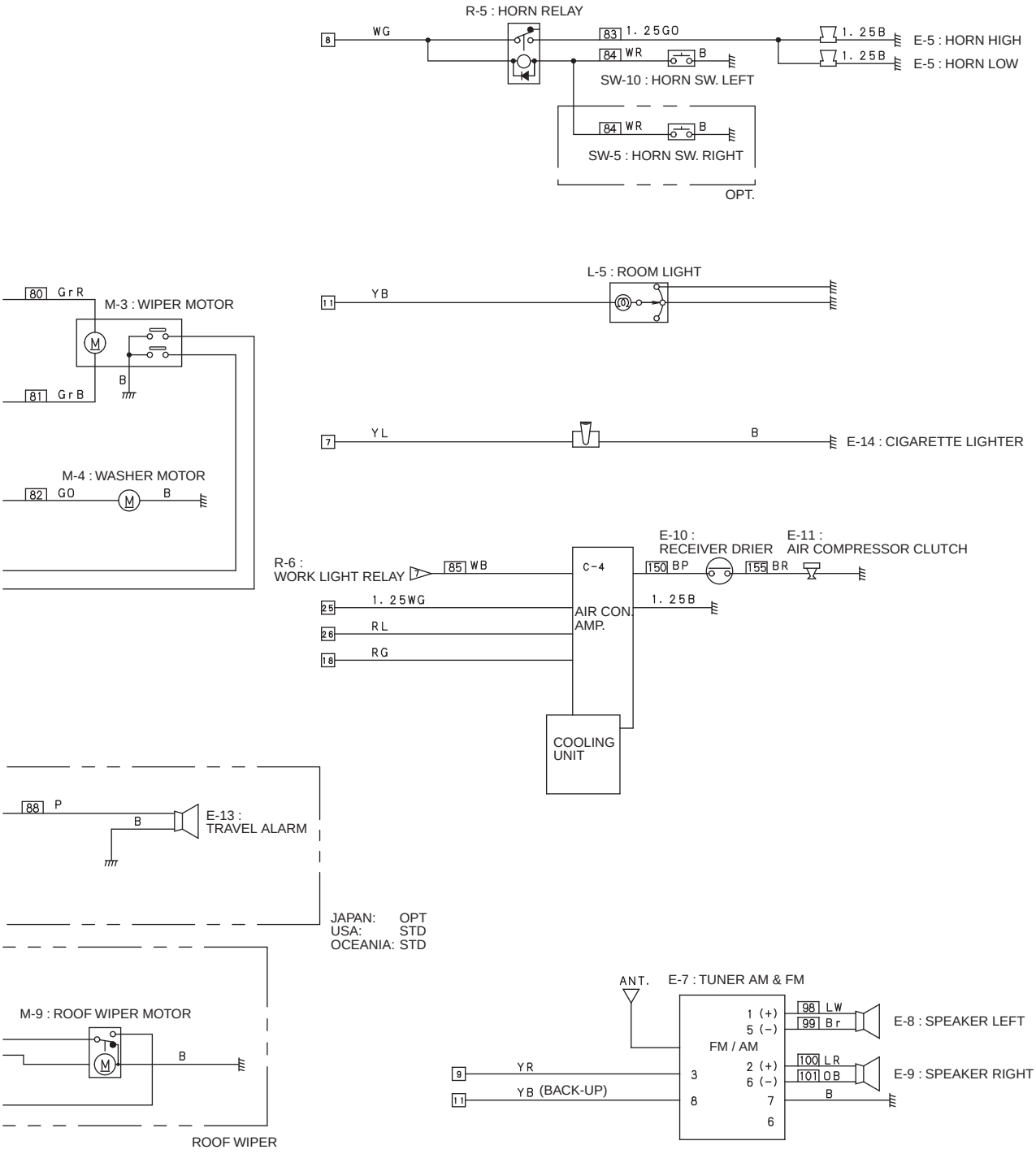
(1/4)
LC03Z00036P1 02



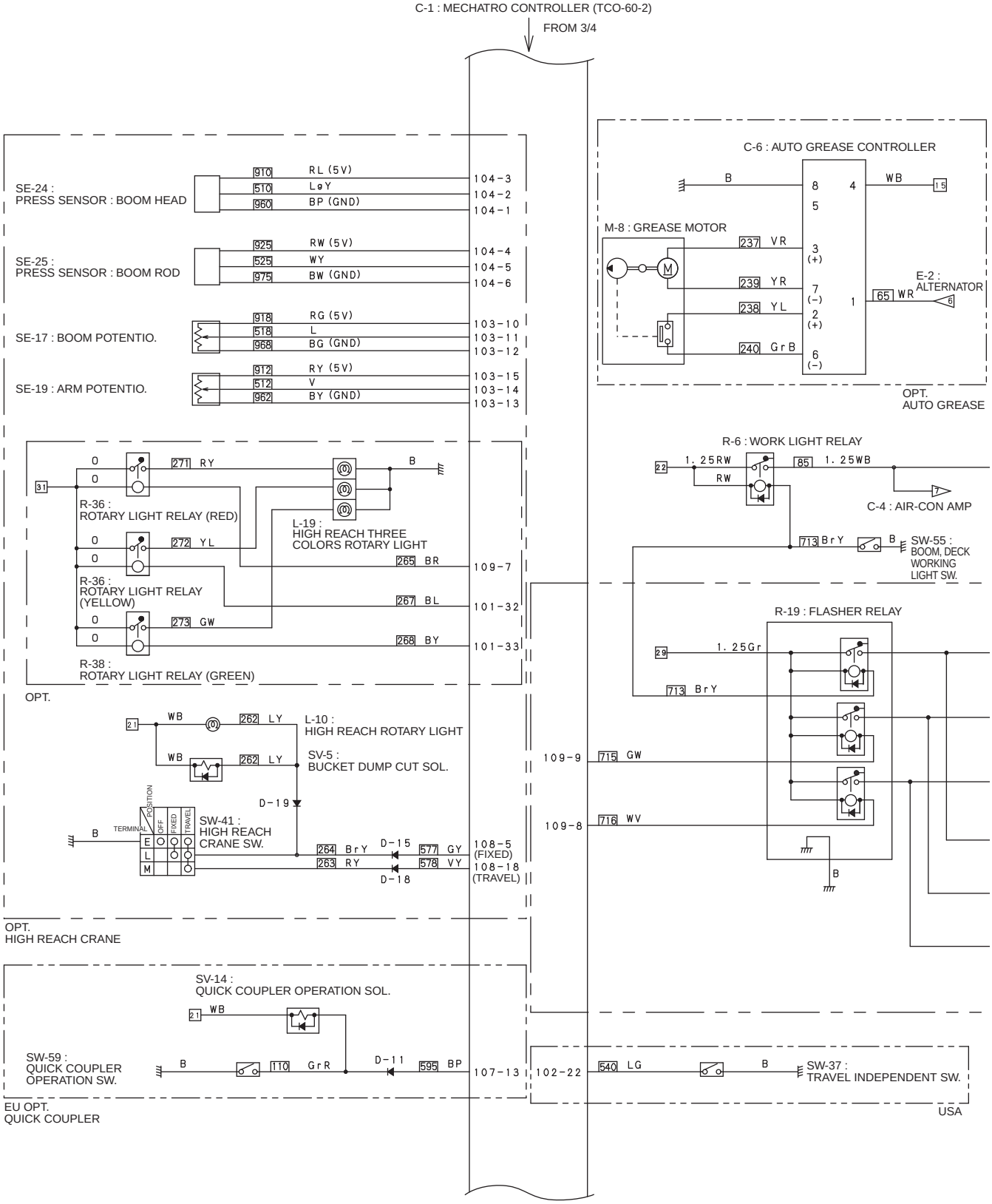


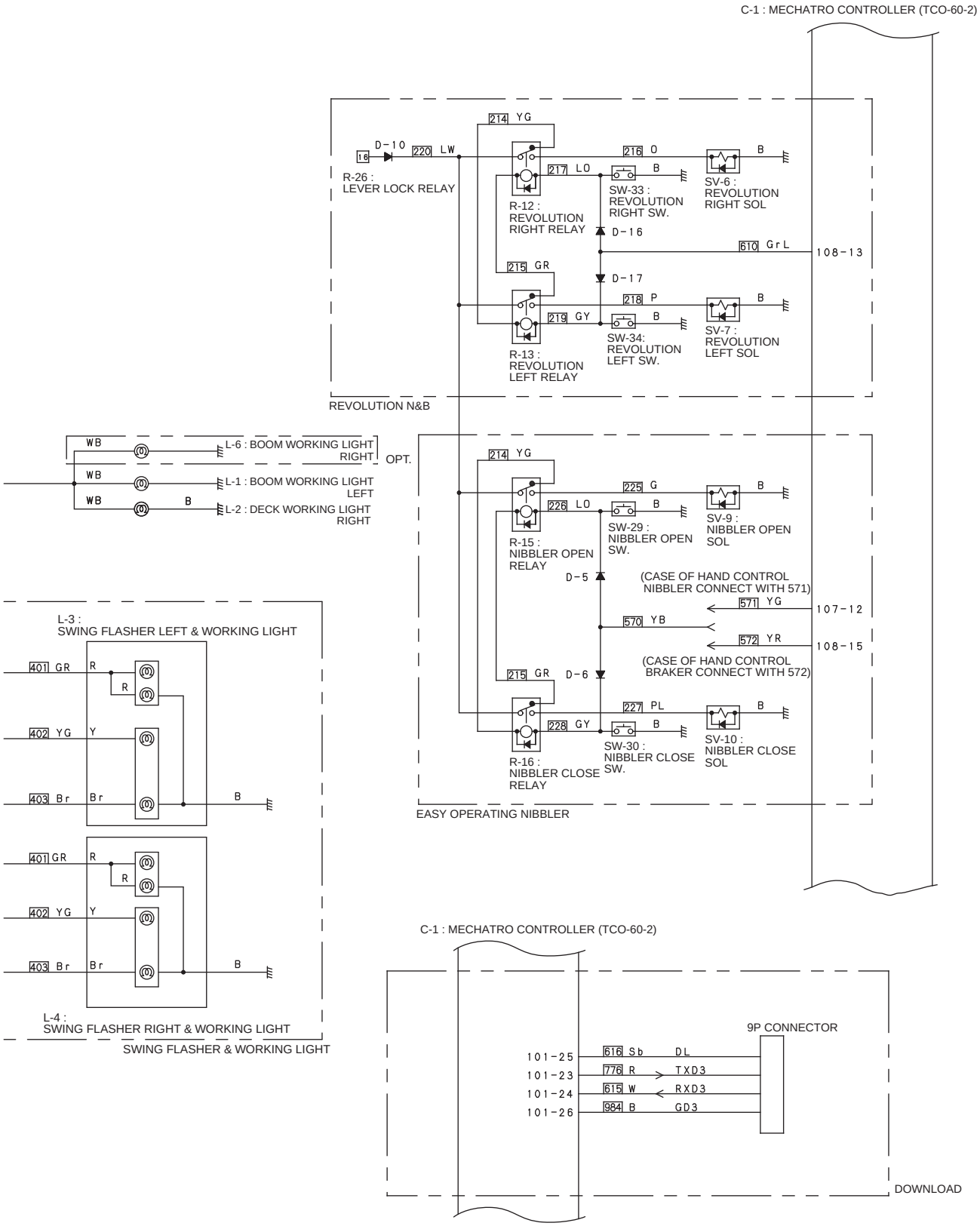
(2/4)
LC03Z00036P1 02





(3/4)
LC03Z00036P1 02





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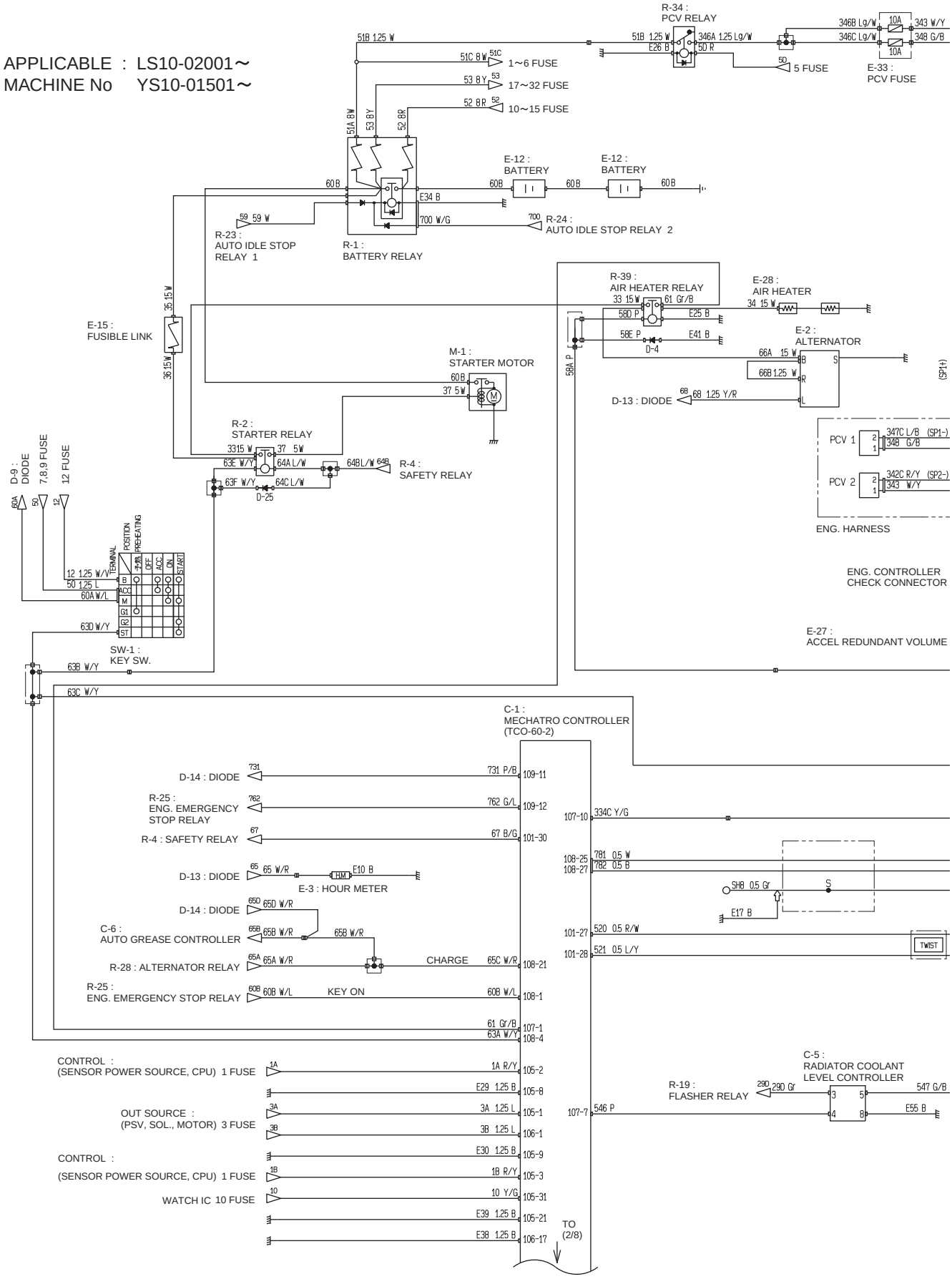
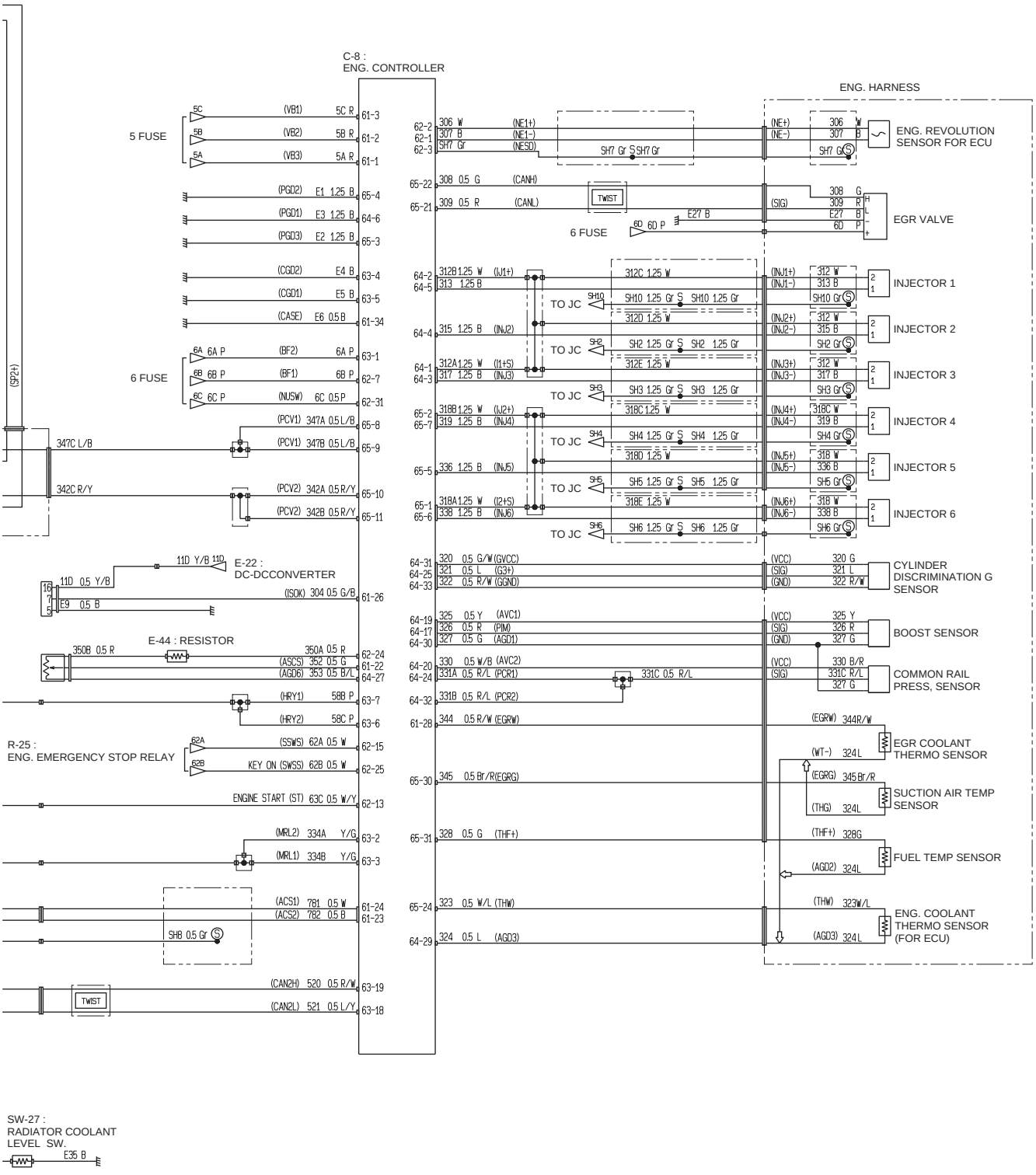
LC03Z00036P1 02

3.4 ELECTRIC CIRCUIT DIAGRAM (SK460-8)

APPLICABLE : LS10-02001～
MACHINE No YS10-01501～





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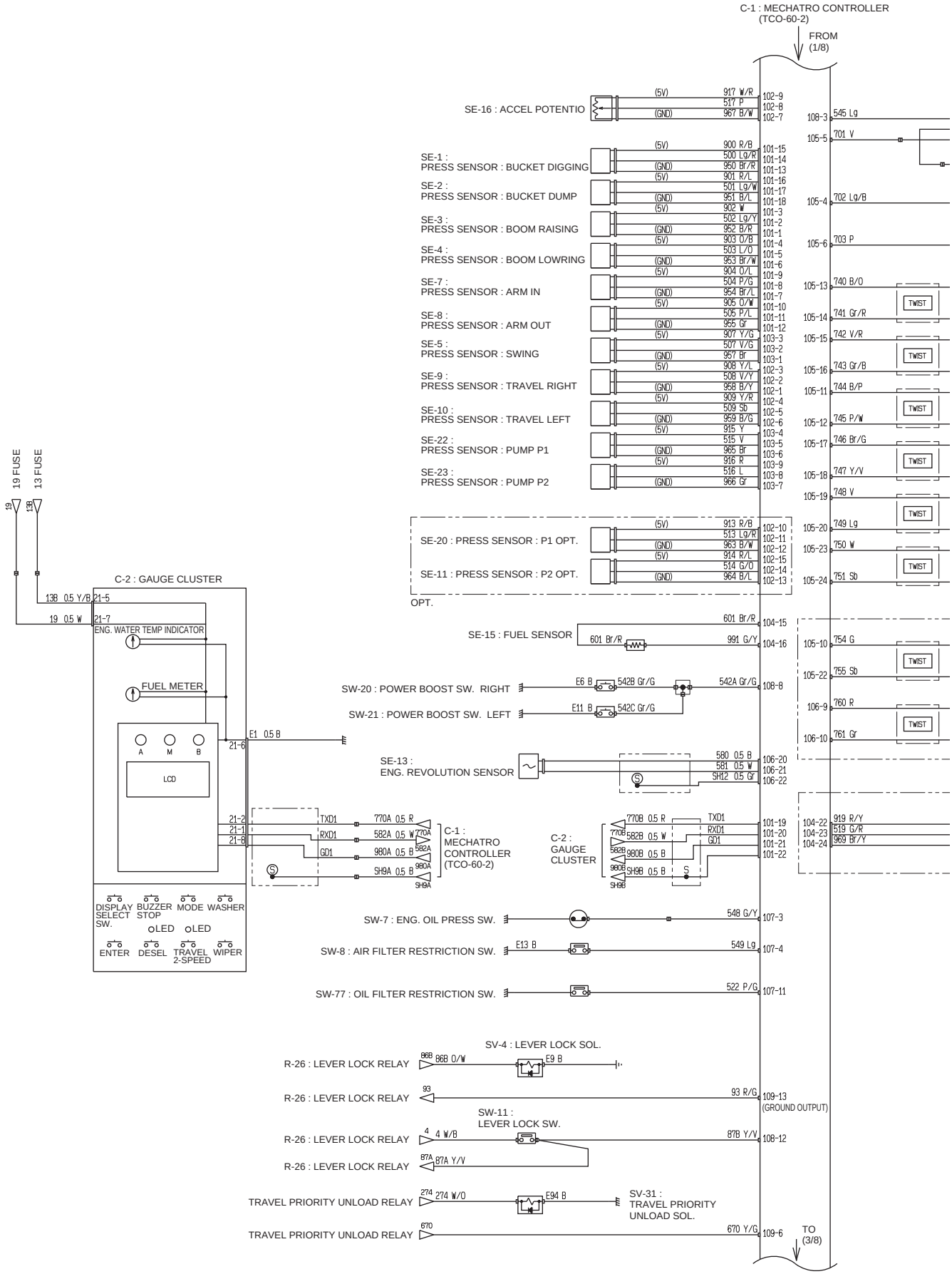
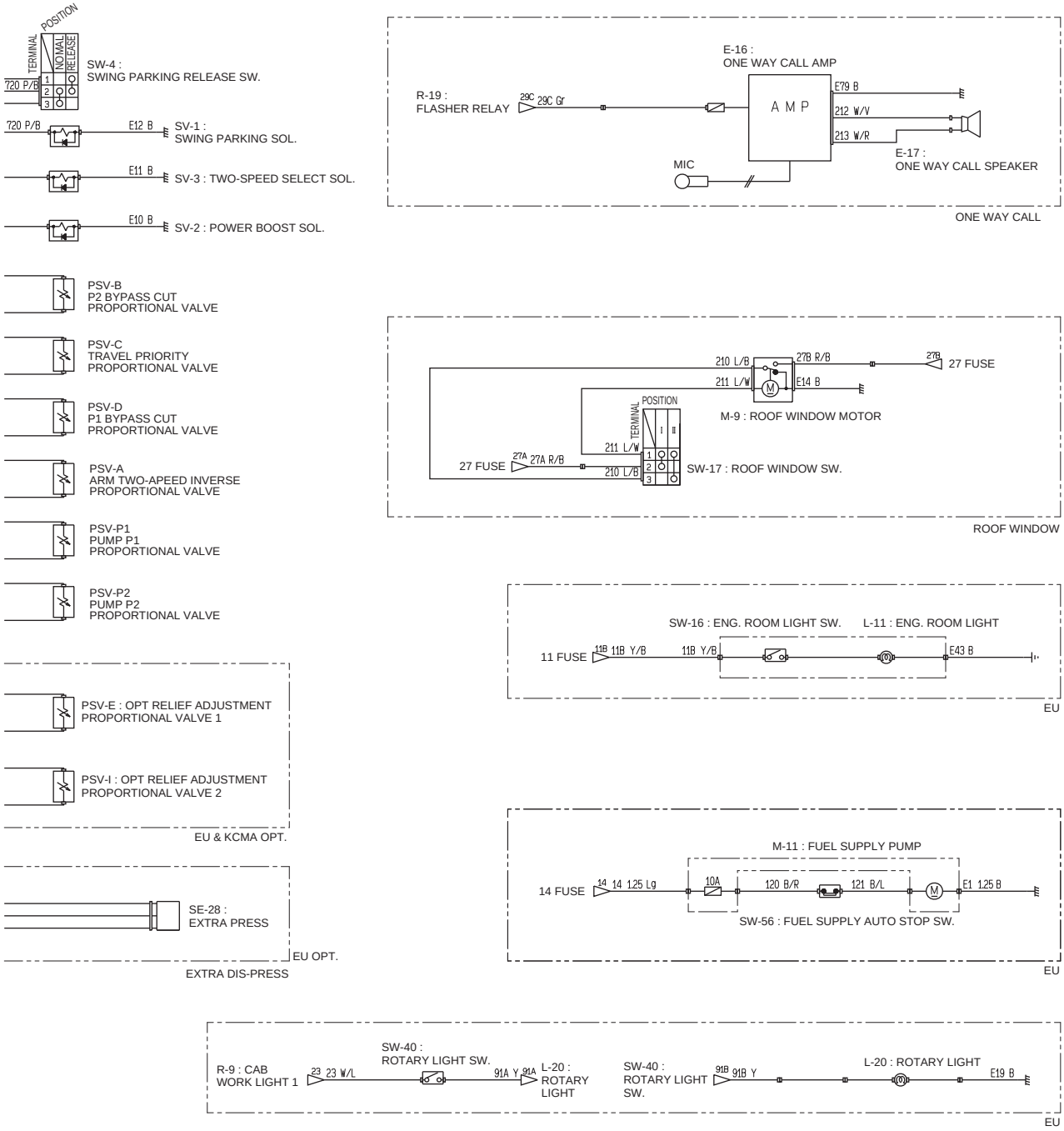
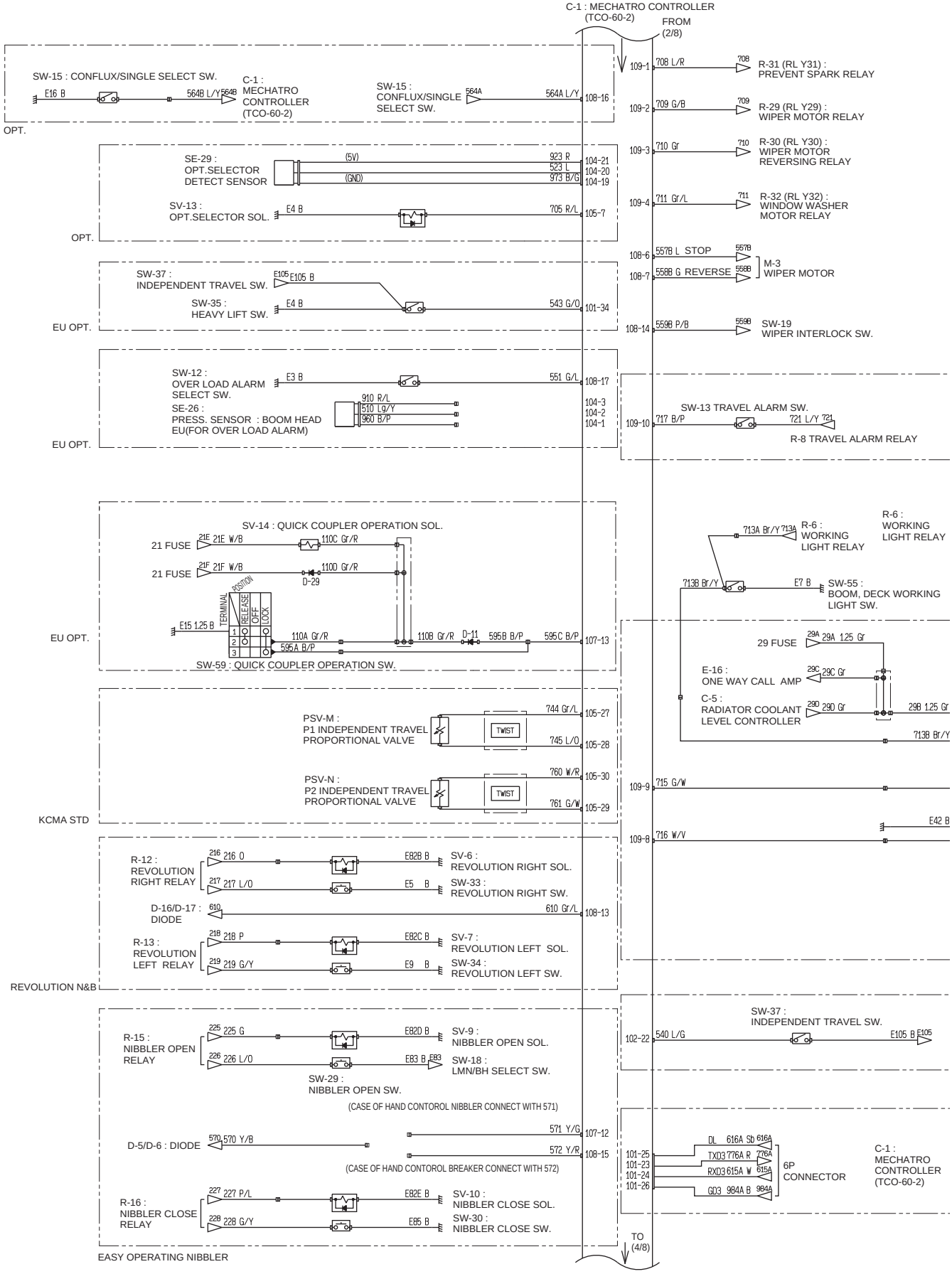
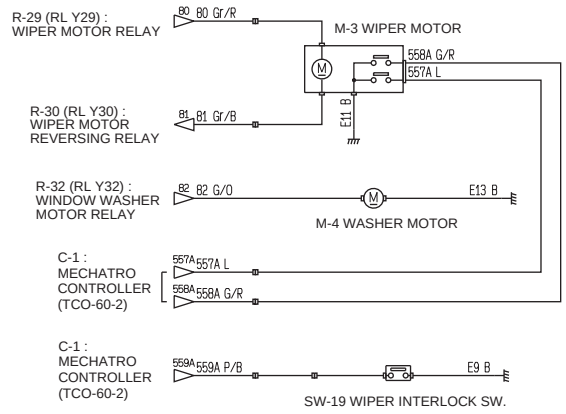
LS03Z00021P1 02

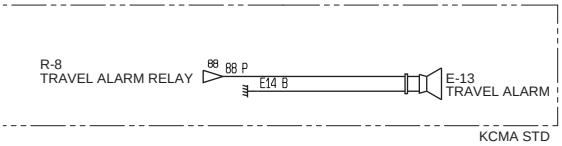


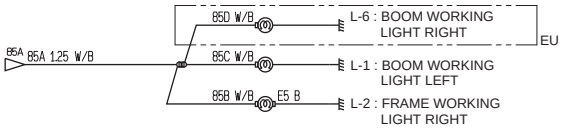


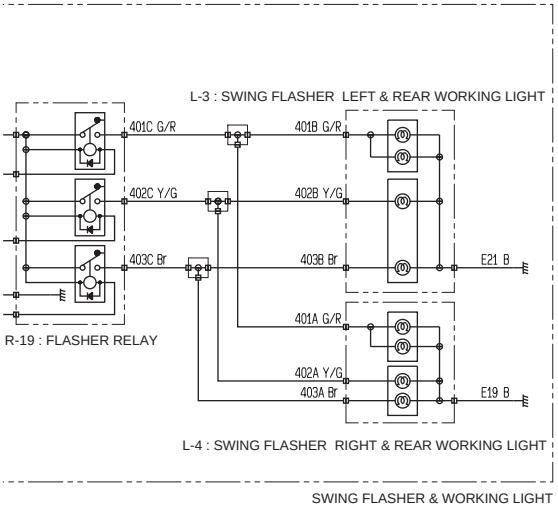
(2/8)
LS03Z00021P1 02

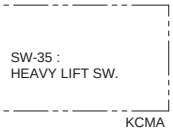


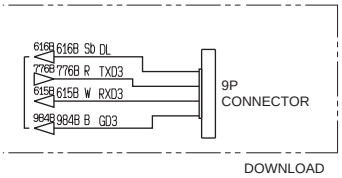


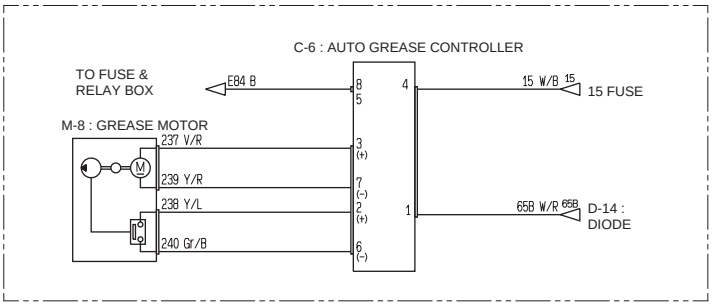


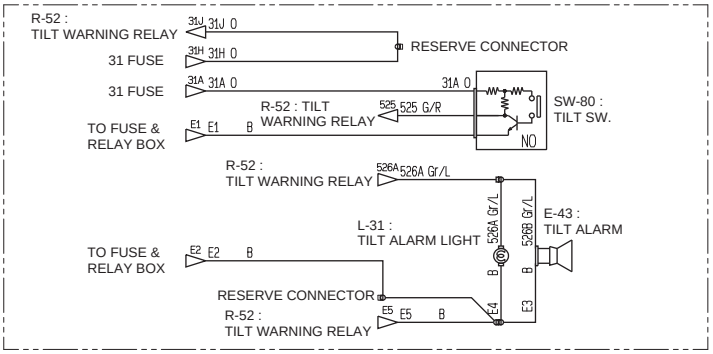


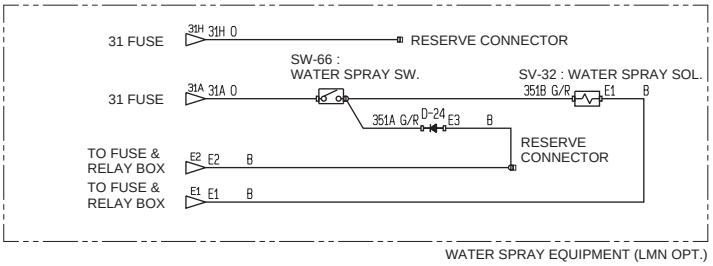


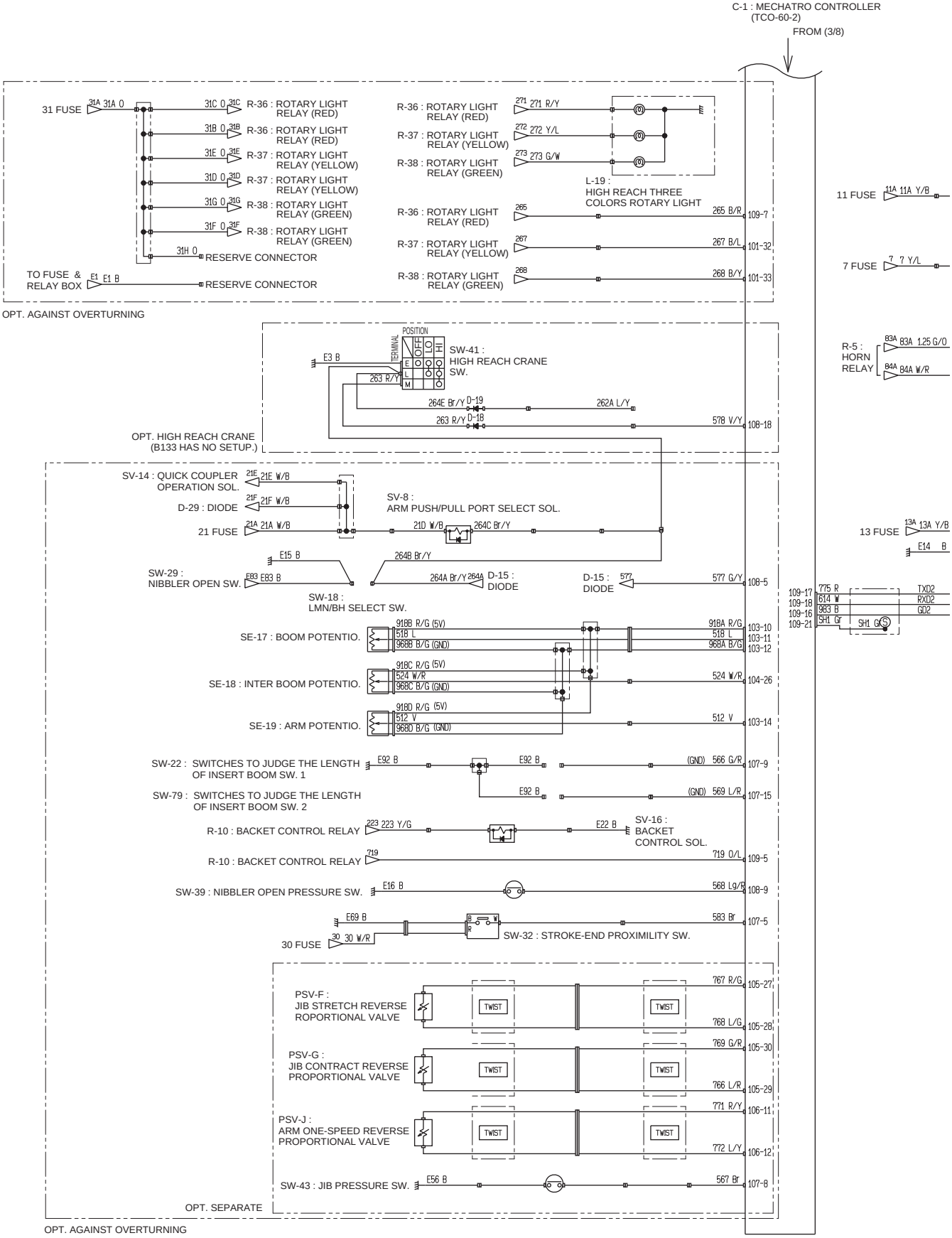


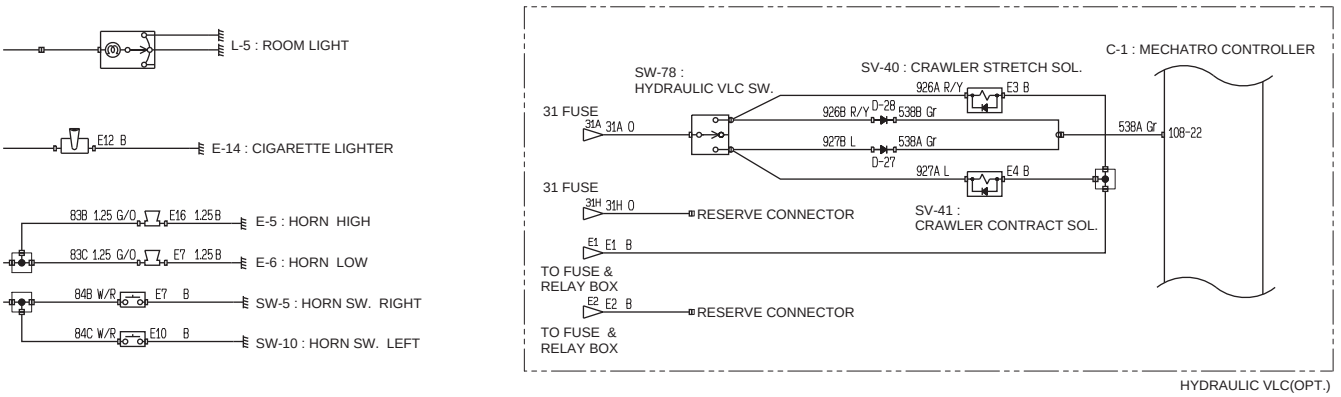


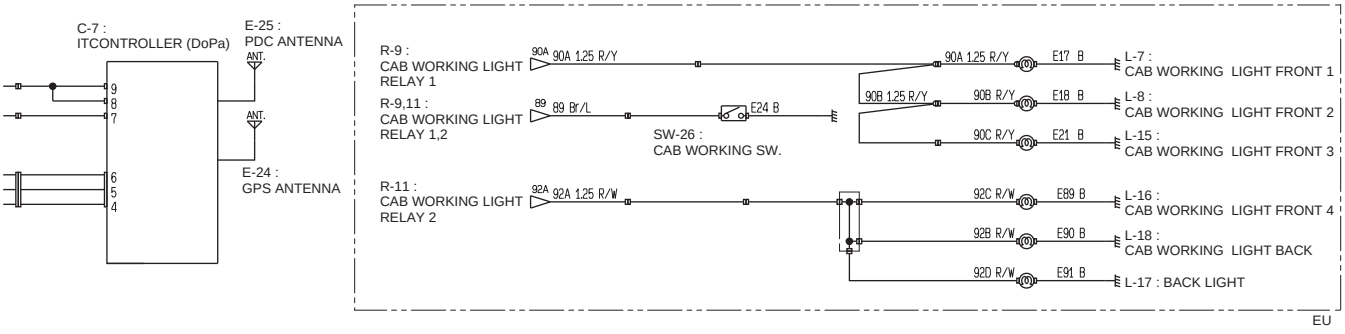


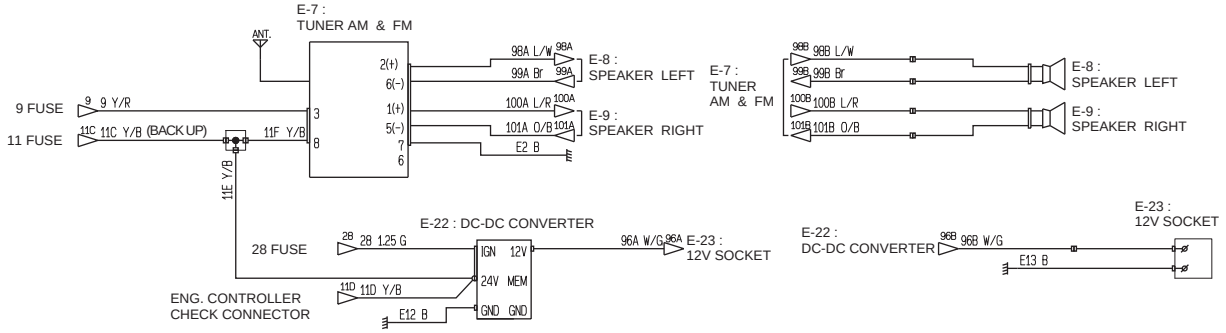


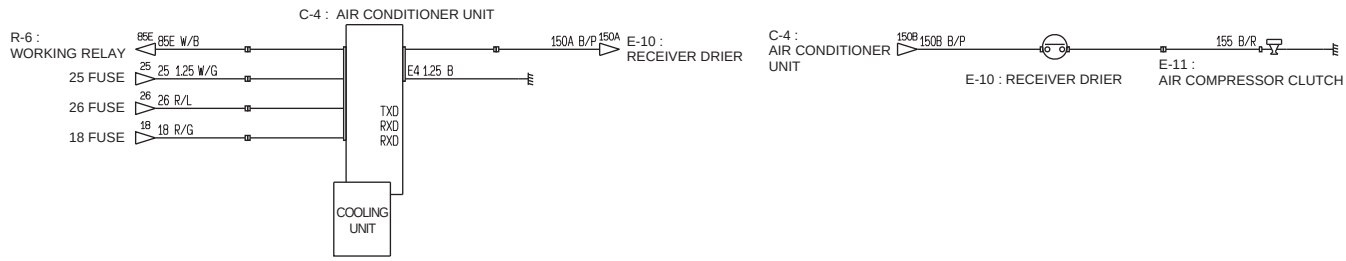


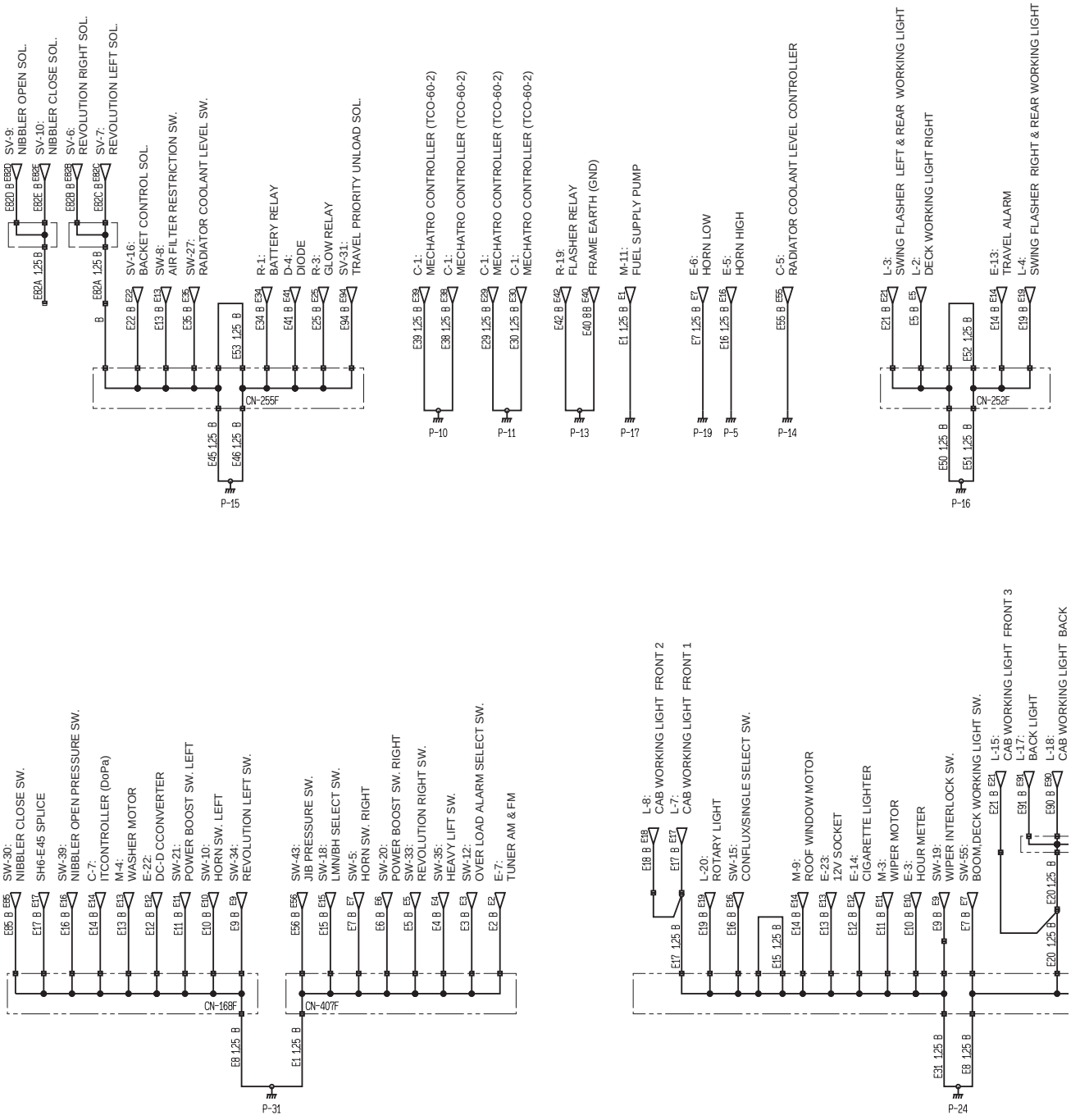


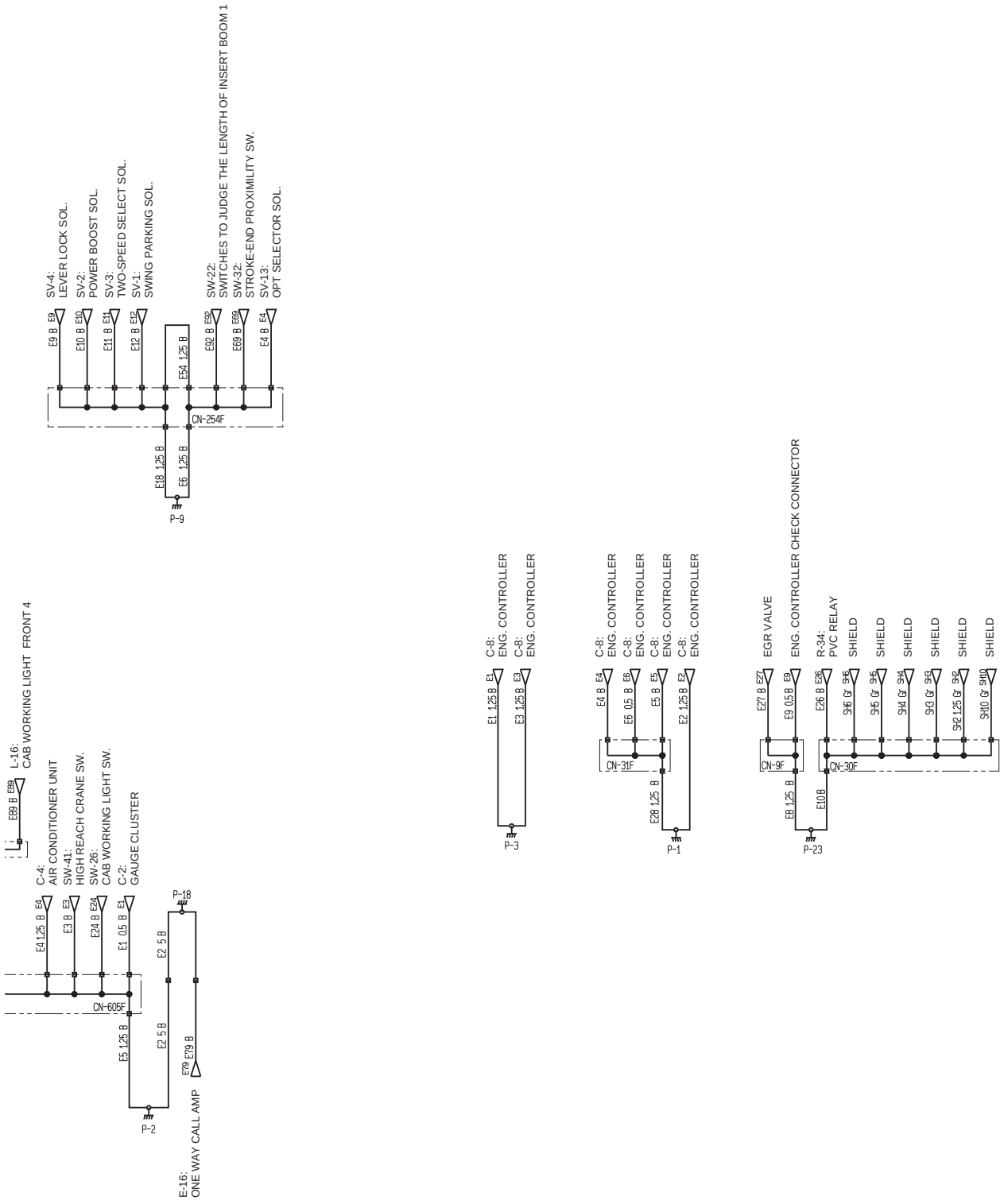












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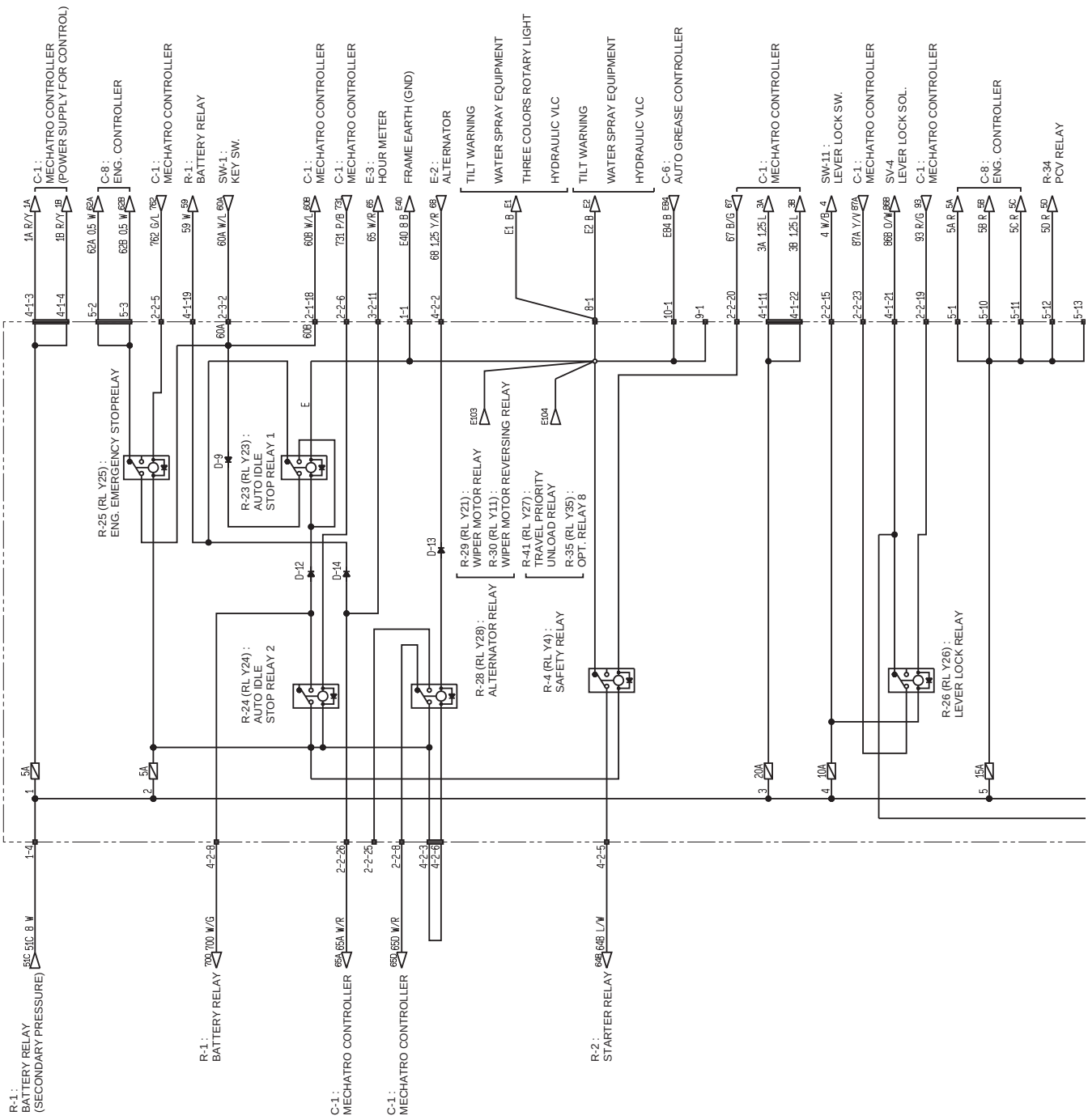
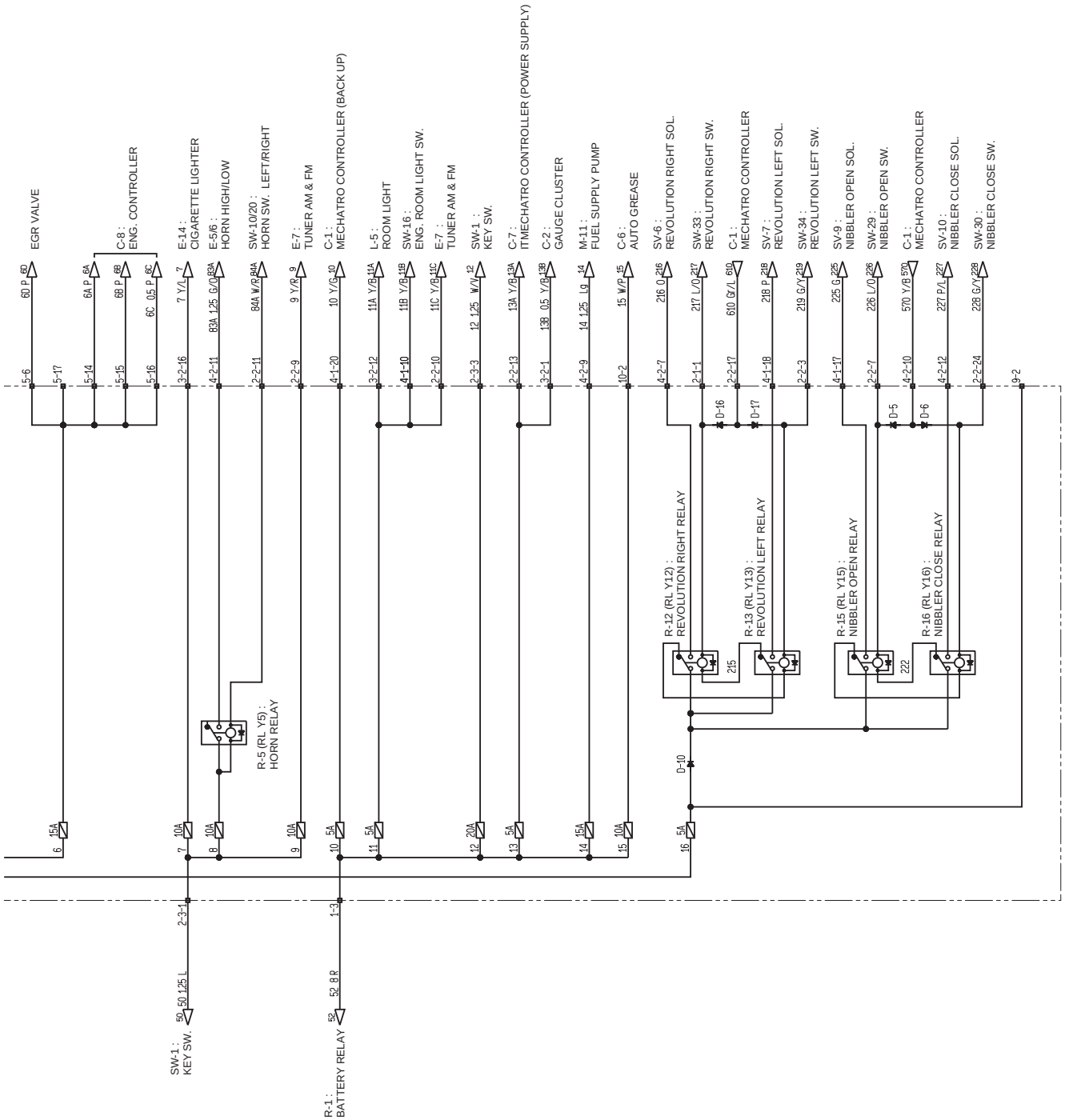
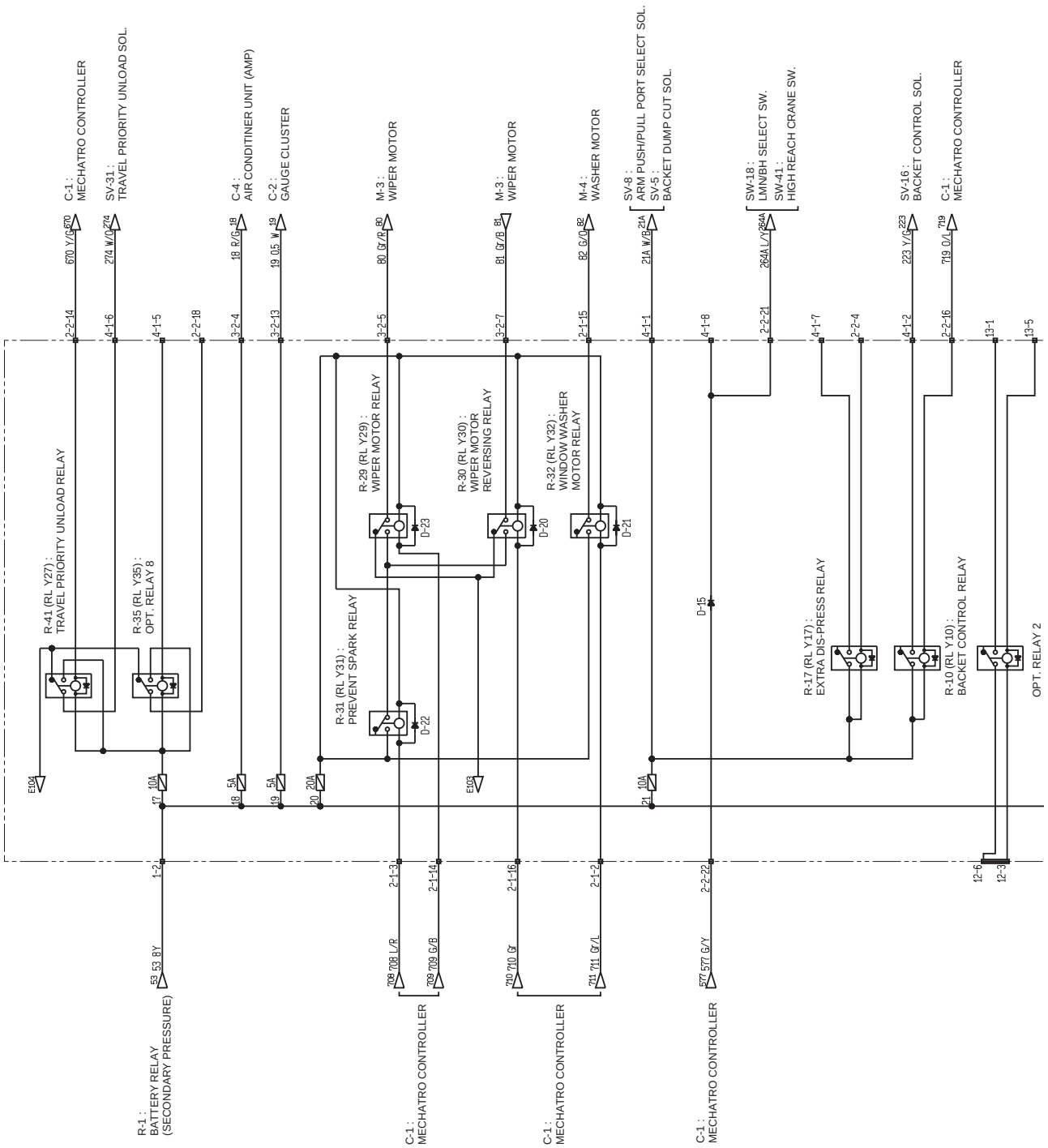
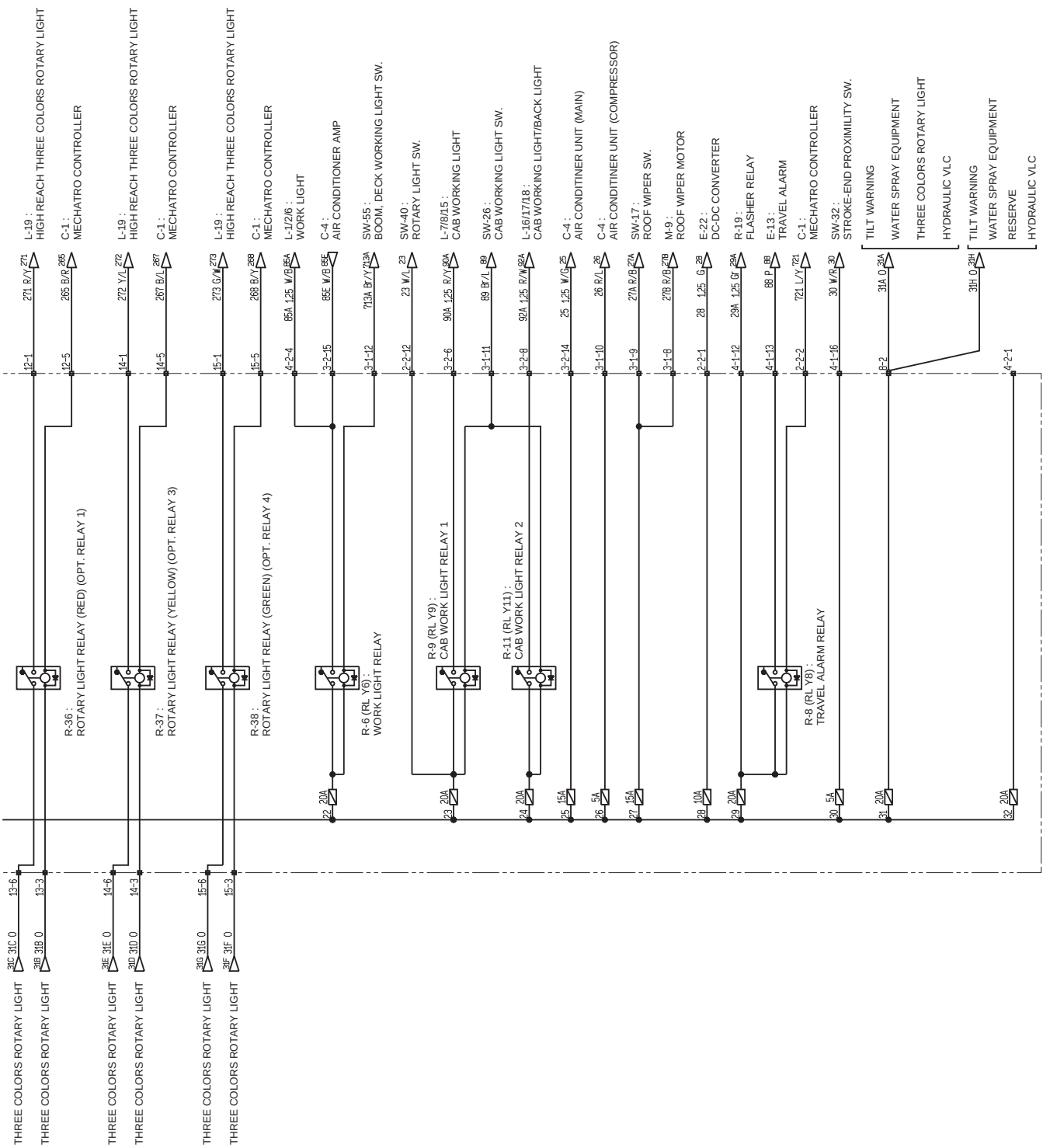
LS03Z00021P1 02





(5/8)
LS03Z00021P1 02





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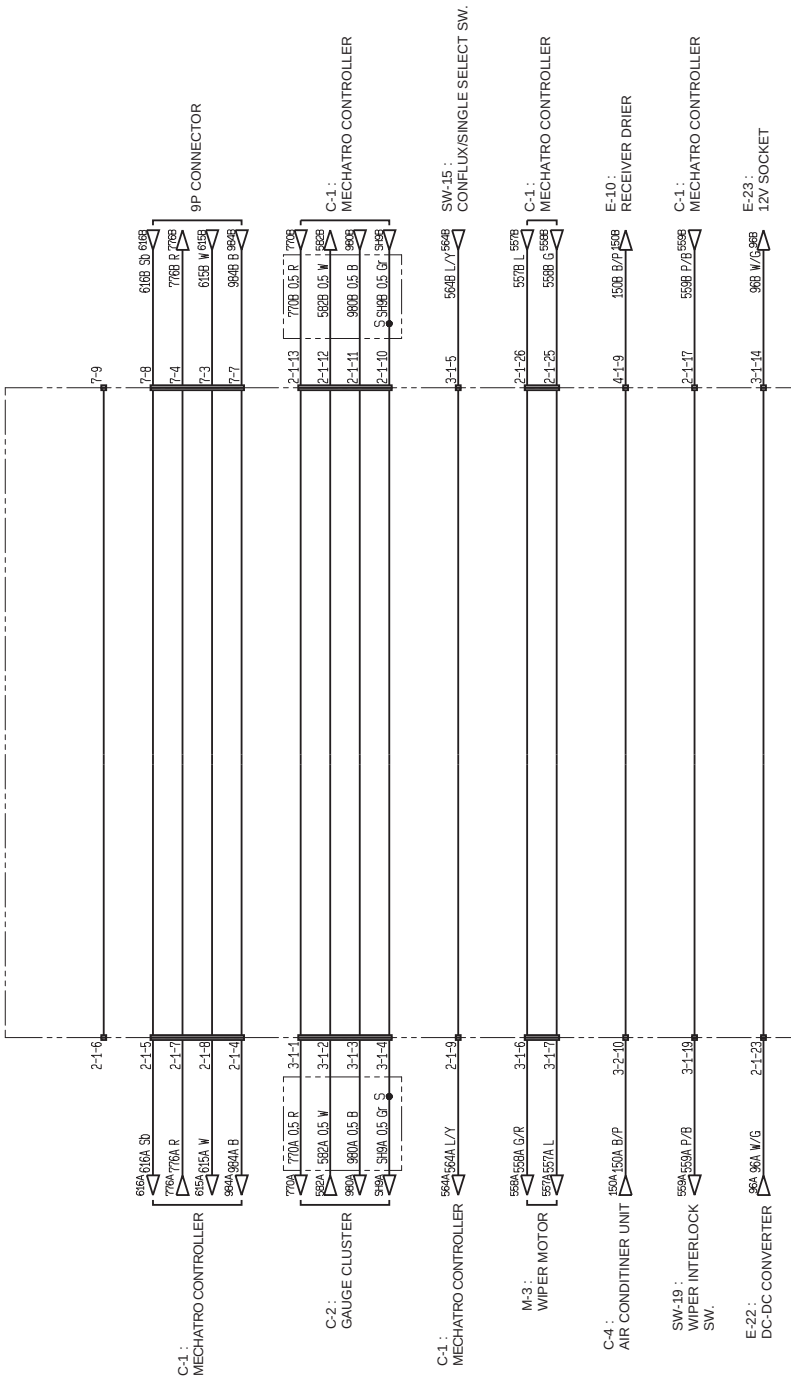
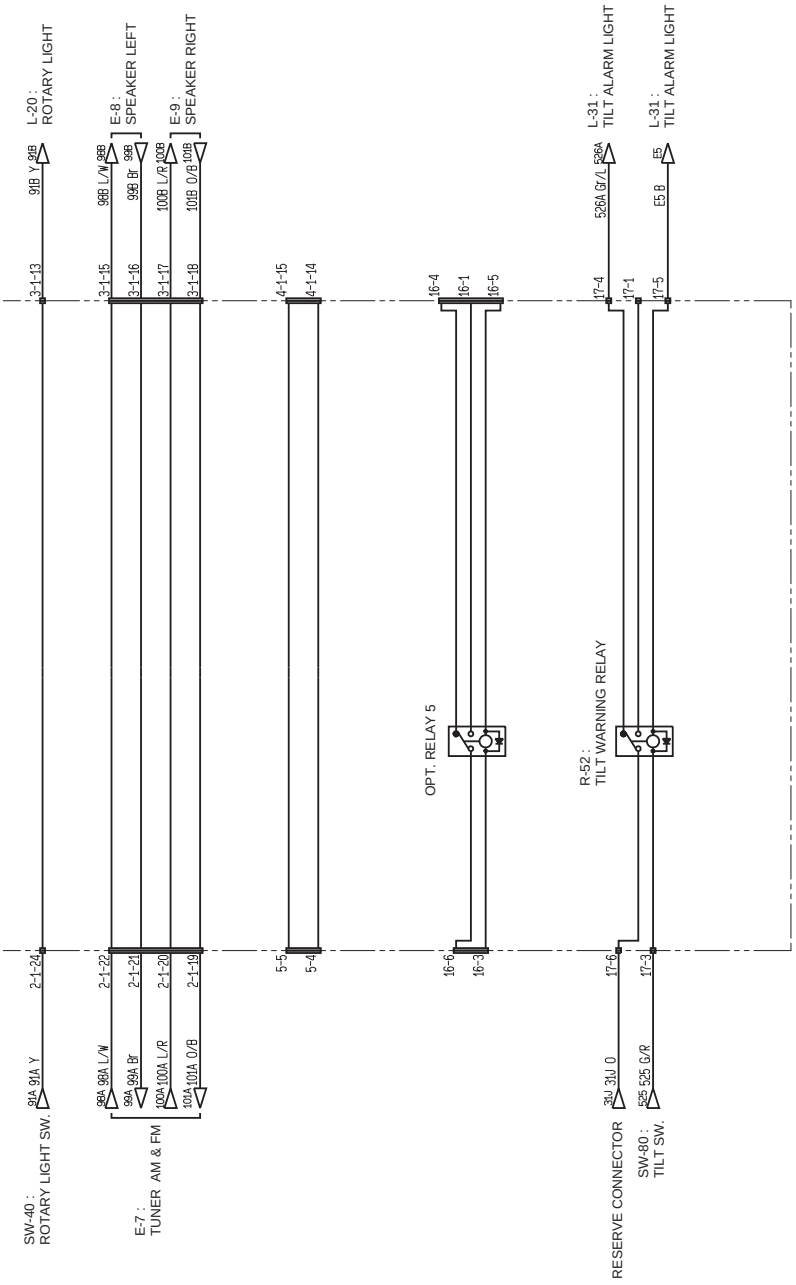
LS03Z00021P1 02



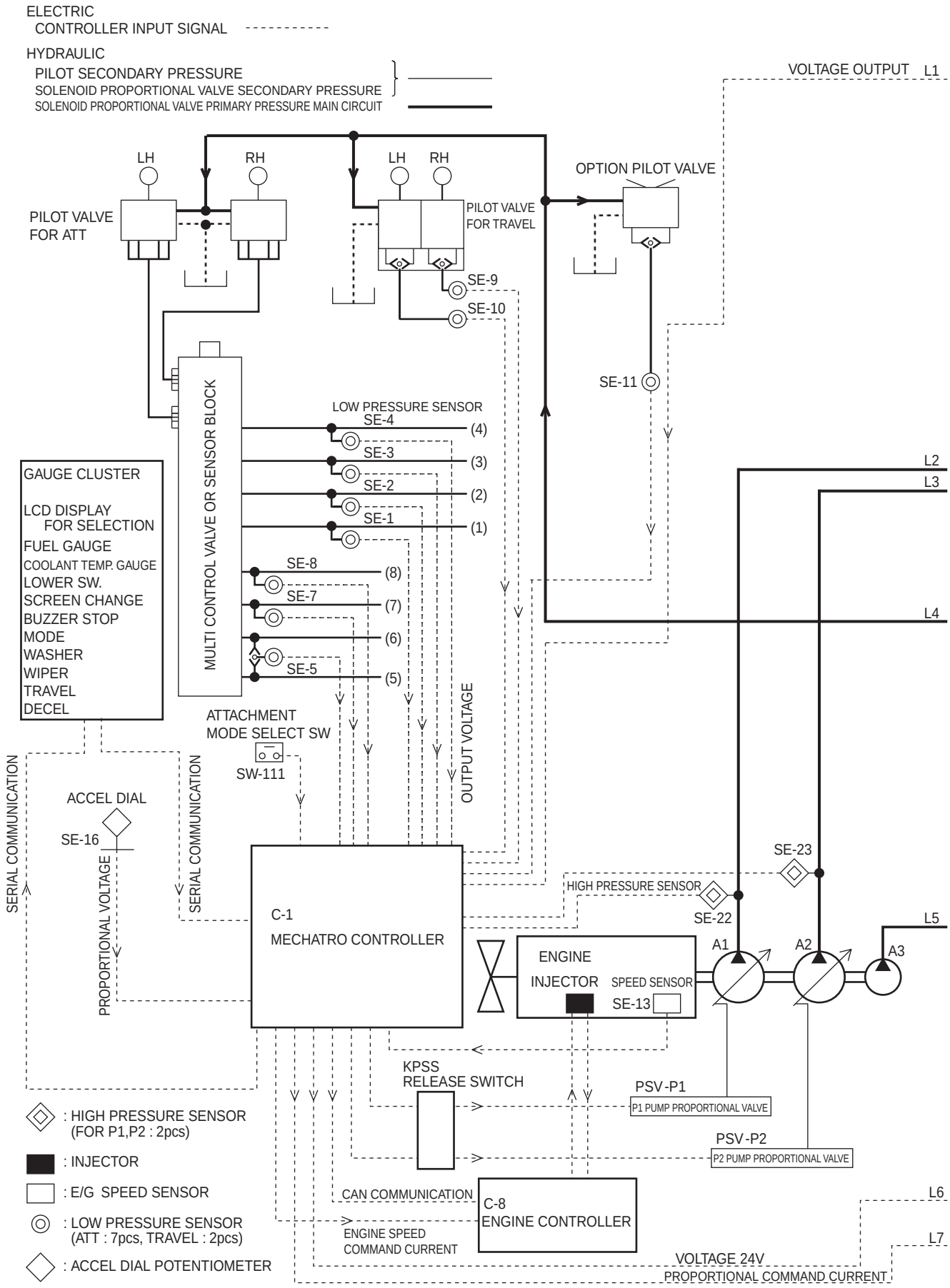


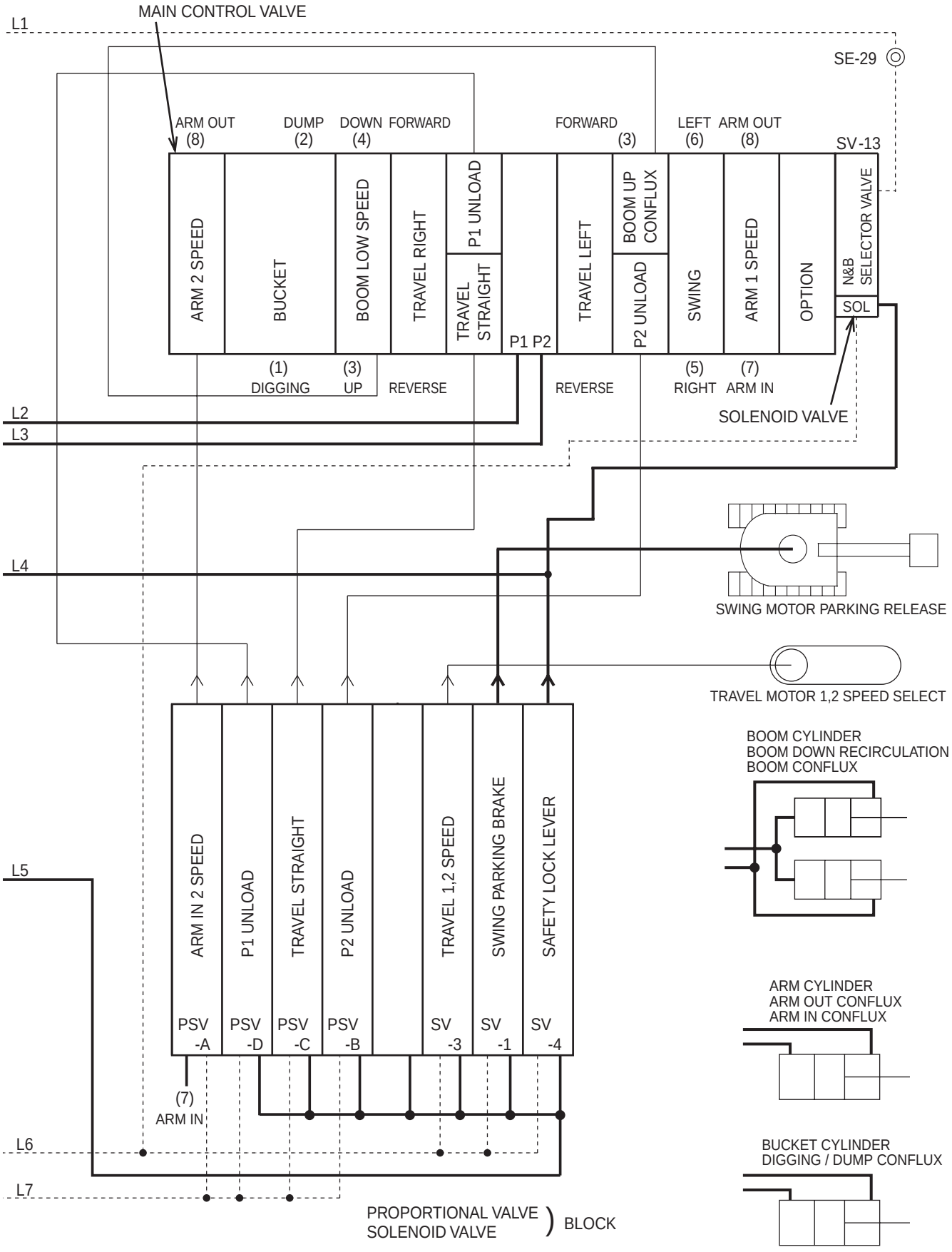
[MEMO]

4. MECHATRO CONTROL SYSTEM

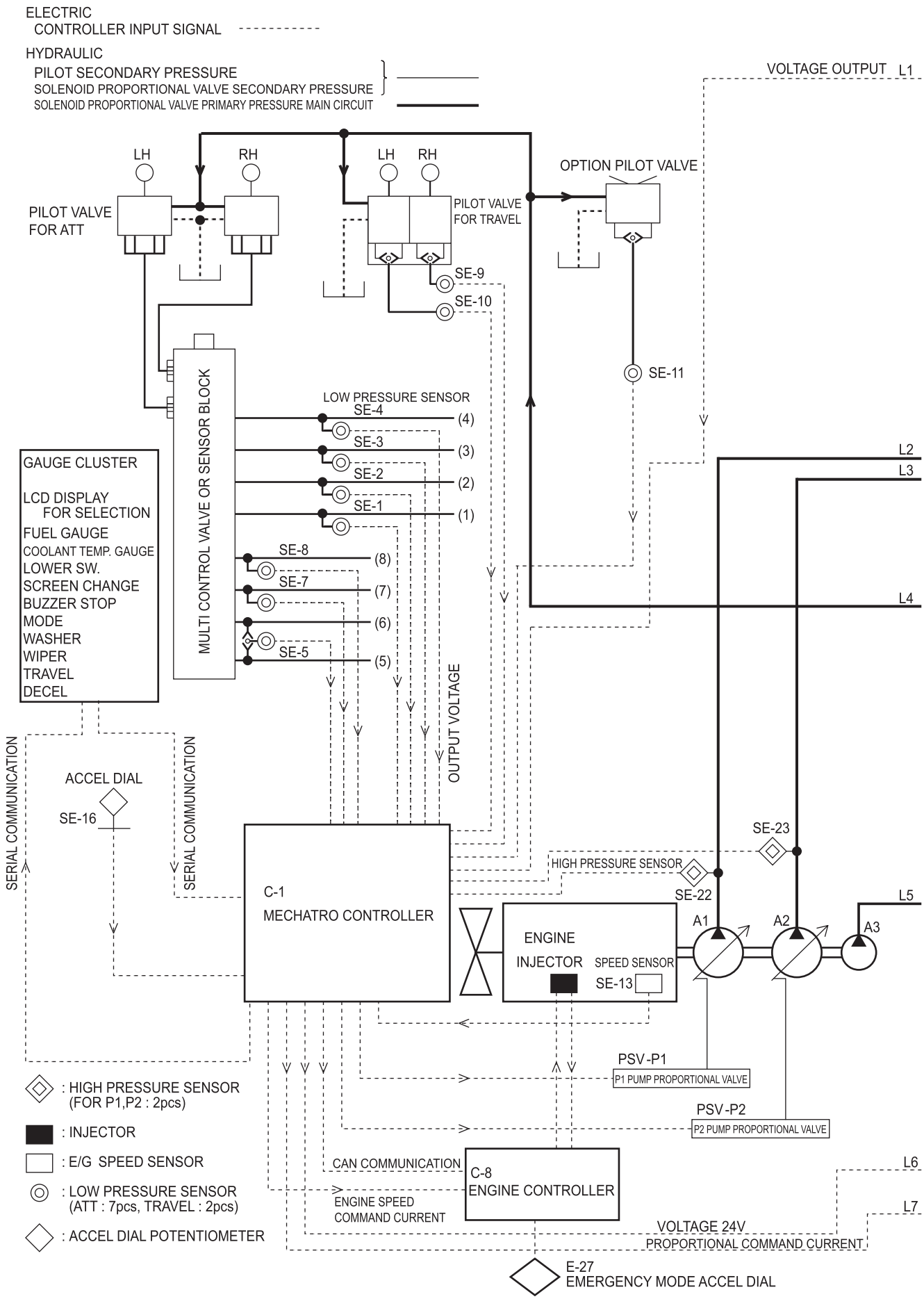
4.1 SUMMARY OF MECHATRO CONTROL SYSTEM

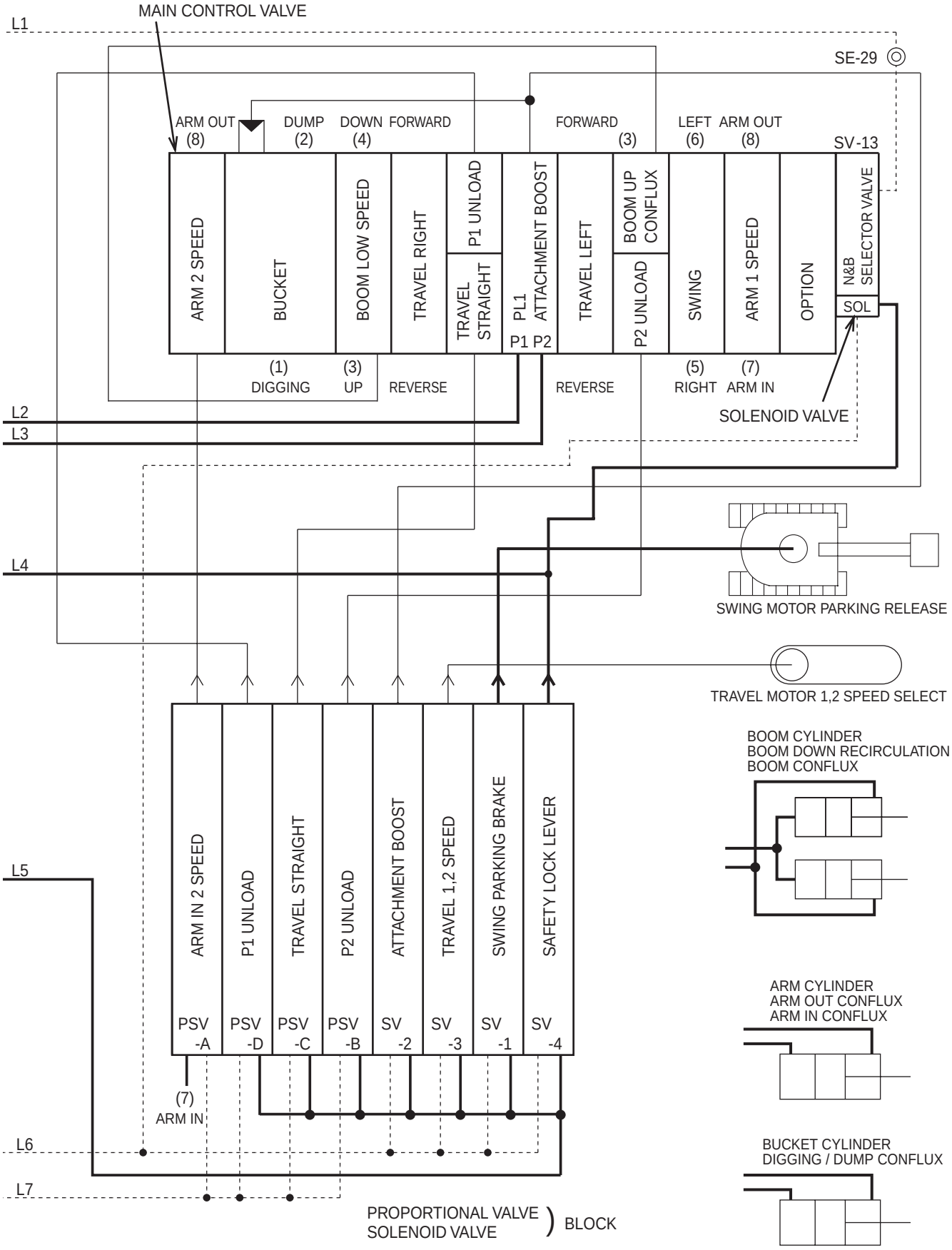
4.1.1 MECHATRO CONTROL SYSTEM IN GENERAL (SK140LC-8)





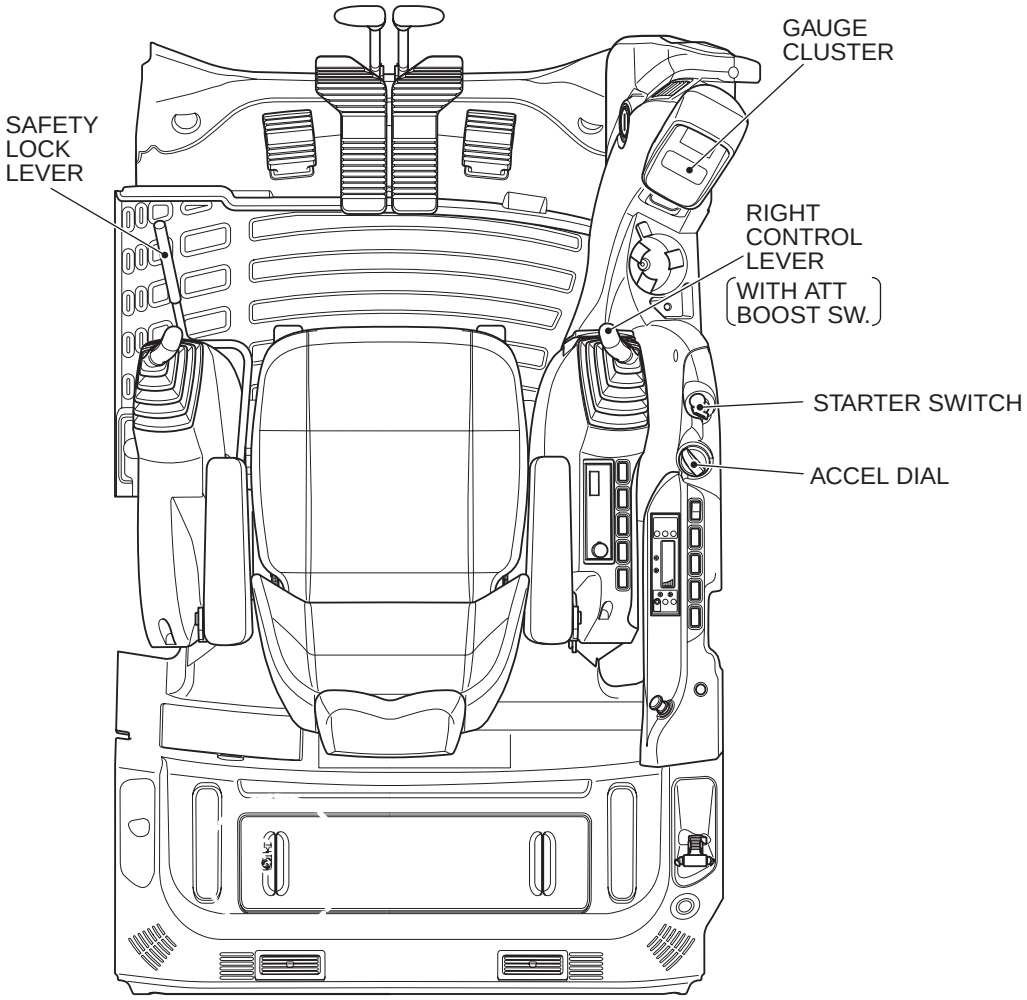
4.1.2 MECHATRO CONTROL SYSTEM IN GENERAL (SK200-8, SK250-8, SK330-8, SK460-8)



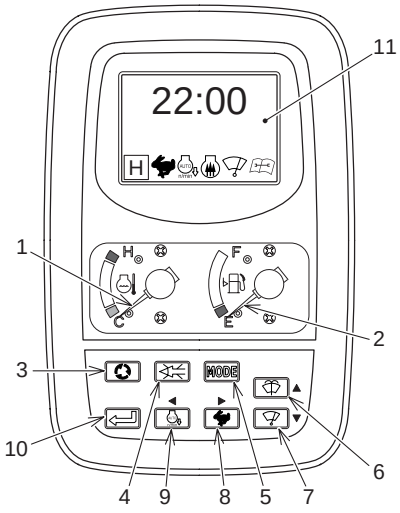


4.1.3 MECHATRO CONTROLLER

Electro-hydraulic conversion information is displayed on the multi display of the gauge cluster.
Controls



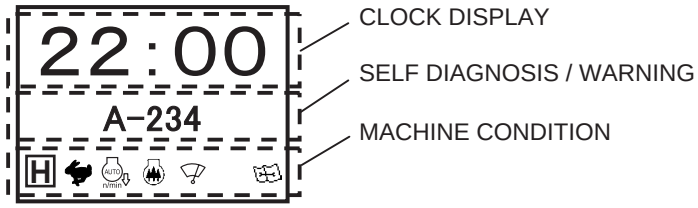
Gauge cluster



No.	Name
1	Engine coolant temperature gauge
2	Fuel level gauge
3	Screen change switch
4	Buzzer stop switch
5	Work mode select switch
6	Washer switch
7	Wiper switch
8	Travel high speed, low speed select switch
9	Auto accel switch
10	Select switch
11	Multi display (LCD)

4.1.3.1 GAUGE CLUSTER DISPLAY

After key is switched on and logo mark display disappears, screen for operator is displayed on multi screen. The display functions of multi display are explained below.



MULTI DISPLAY INDICATIONS

1) Display function for operator ..... Screen usually displayed during operation
   1.1 Clock display function ..... Current time is displayed.
   1.2 Self-diagnosis display ..... When abnormality is detected on mechatro system like sensor, proportional valve, etc., this displays error code.
   1.3 Warning display ..... When machine was thrown into dangerous state, or was failed, displays warning contents with the symbol and statement. (For warning contents, see items shown below.)
   1.4 Machine condition display ..... Displays machine operating condition.
2) Display function for maintenance ..... Displays remaining time up to replacement/change of following items.
   (1) Engine oil (2) Fuel filter (3) Hydraulic oil filter (4) Hydraulic oil
3) Failure history display function ..... Stores abnormality occurred on mechatro system in the past and displays in order of recent occurrence.
4) Mechatro adjustment display ..... Displays procedure for adjustment of mechatro system like output adjustment and unload adjustment, etc.
5) Service diagnosis display ..... Displays information like pressure sensor sensed value, proportional valve command, etc. output by mechatro controller

・Warning

These descriptions indicate error codes.

CAUTION ATTACHMENT W009	LOW ENG OIL PRESS. W005	PREHEAT W011
AUTO IDLE STOP	HIGH ENG WATER TEMP. W006	CHARGE ERROR
POWER BOOST ON	LOW ENG WATER LEVEL W004	LOW FUEL LEVEL
WARM FINISH WARM-UP	DRAIN WATER SEPA W010	WARM AUTO WARMING UP
CPU DATA COMMUNICATION ERROR	CLOGGED AIR FLTR W008	CHANGE ENG OIL
SWING BRAKE DISENGAGED W001	STOP ENGINE STOP	

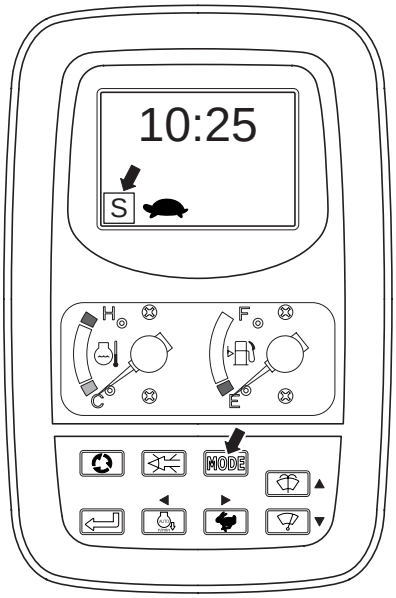
Notice

Error codes were stored as trouble history, and displayed on the monitor by the trouble history display function.

4.1.3.2 SCREEN SELECTION BY WORK MODE SELECT SWITCH

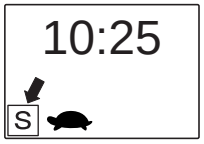
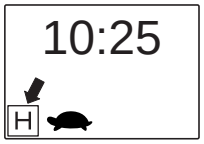
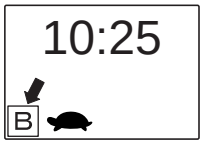
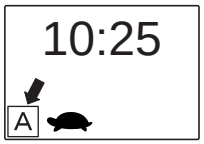
Press the work mode selector switch (MODE) in order, and **"S"** → **"H"** → **"B"** → **"A"** mode can be selected.
Select the effective work mode according to the work condition and working target from the table shown below.
For the selected work mode, refer to the table shown below.

- S mode: For standard excavating work
- H mode: For heavy duty excavating work
- B mode: For works with breaker
- A mode: For demolition works with crusher (Nibbler)



CAUTION

- The initial setting (default) of work mode had been set to "S" mode at factory.
  As for the work mode after the engine starts, the mode that was used the last time engine was stopped is automatically set.
  Check that the selected mode conforms to the work before starting work.
- Check that the attachment in use conforms to the work mode before starting work. If not conformed, select proper mode with the work mode select switch.
- The operation under improper work mode may cause damage to machine.

Work mode	Display	Contents
S mode		**"S mode"**is suitable for standard digging and loading works and is in fuel saving and is maintained well-balanced relations with workload.
H mode		**"H mode"**is suitable for heavy duty digging work which gives priority to the workload at the high speed.
B mode		For the work with breaker, select **"B mode"** without fail.
A mode		For the work with crusher (nibbler), select **"A mode"**.

CAUTION

For the work with breaker, select "B mode" without fail.
The work with breaker in any mode other than "B mode" may cause damage to the hydraulic equipment and breaker.

1) Pump flow rate adjustment (A mode /B mode)

No.	Switches
1	Screen change switch
2	Buzzer stop switch
3	KPSS work mode select switch
4	Washer switch
5	Wiper switch
6	Travel speed select switch
7	Auto accel switch
8	Select switch

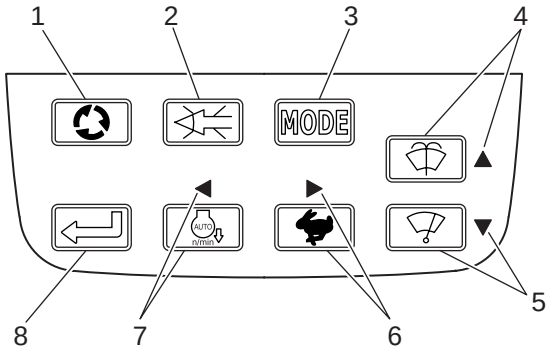
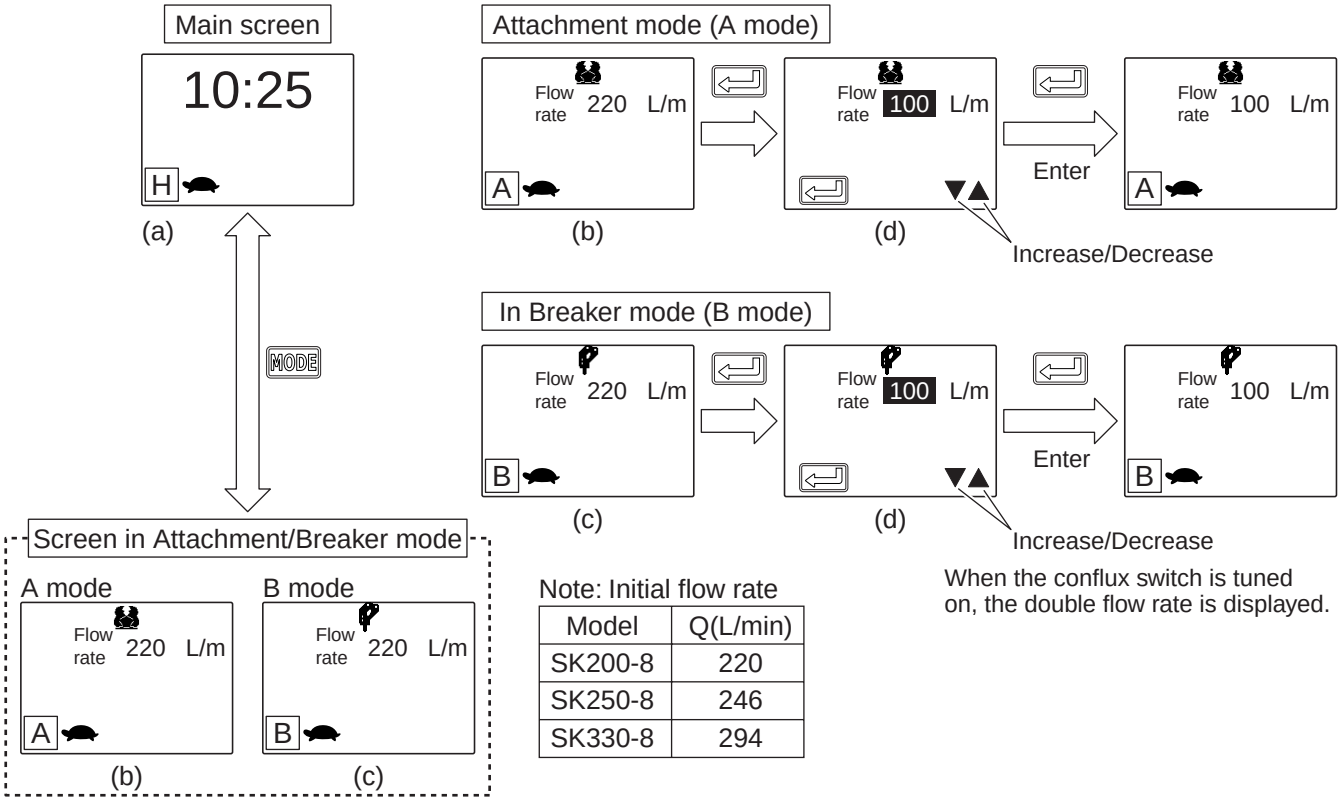


Fig. 4-1

According to some kind of attachment, it is required to change the flow rate for service circuit. Change the flow rate in accordance with the procedure mentioned below.
In this machine, last set flow rate has been stored. The adjustment (increase or decrease) of flow rate is changeable by 10L/min step.



Note: Initial flow rate

Model	Q(L/min)
SK200-8	220
SK250-8	246
SK330-8	294

When the conflux switch is tuned on, the double flow rate is displayed.

1. Turn starter key switch on and display main screen (a).
2. The display on the left lower corner of screen is changed in order of **"S"** → **"H"** → **"B"** → **"A"** each time the **"MODE"** switch (3) is pressed under the condition where main screen (a) is displayed.
3. Select **"A"** and A mode screen is displayed, and select **"B"** and B mode screen is displayed.
4. Press select switch (8) in A/B mode display screens (b)/(c) and the value of flow rate reverses in black and the screen (d) is displayed. In this condition, press FEED ▲ (4)/▼ (5) and the flow rate value increases or decreases.
5. Select the desired setting value and then press select switch (8) and the flow rate is set to the desired value.

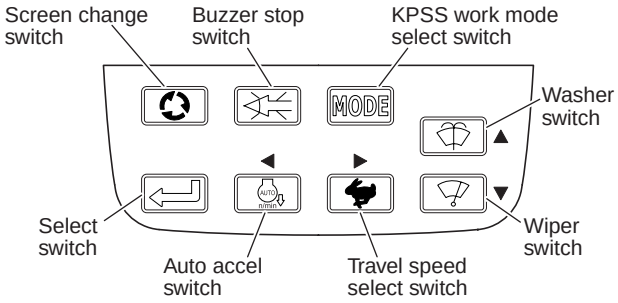
4.1.3.3 SET PROCEDURE OF MAINTENANCE SCHEDULE

This machine is equipped with multi-display which allows confirmation of remaining time to the coming replacement/ change time of engine oil, fuel filter, hydraulic oil filter and hydraulic oil, therefore when the remaining time reaches to Zero (0), replace or change engine oil, fuel filter, hydraulic filter, hydraulic oil, etc. and perform the initial setting by the following order.

Notice

Interval of replacement of parts is mentioned below.

- Engine oil : 500 Hr
- Fuel filter : 500 Hr
- Hydraulic filter : 1,000 Hr
- Hydraulic oil : 2,000 Hr (ASIA)
  5,000 Hr (OCEANIA)



Procedure	Operating Procedure	Display on Multidisplay
1	Turn starter key switch on.	KOBELCO → After several seconds, display is changed to clock autmatically. → 10:25 H
2	Press " " switch press once display change switch on the switch panel once. And the clock display changes to the display of remaining time for coming engine oil change.	10:25 H → Press screen change switch once more. → 250 Hr ENGINE OIL H
3	Press " " switch press once select switch once and the display for the engine oil change reverses.	250 Hr ENGINE OIL H → Press select switch once more. → 250 Hr ENGINE OIL ▼▲
4	When required to adjust the interval to the coming change time by 10 hours, press " ▲" switch and the time to the coming engine oil change is added. Press " ▼" switch and the time to the coming engine oil change is reduced. When desired to return to the initial set time, press " " buzzer stop switch once.	250 Hr ENGINE OIL ▼▲ → Replacing interval is changed with each pressing of switch. → 500 Hr ENGINE OIL ▼▲
5	Press " " select switch once and the set time is stored.	500 Hr ENGINE OIL ▼▲ → To set the desired interval, press the select switch → 500 Hr ENGINE OIL H

Notice

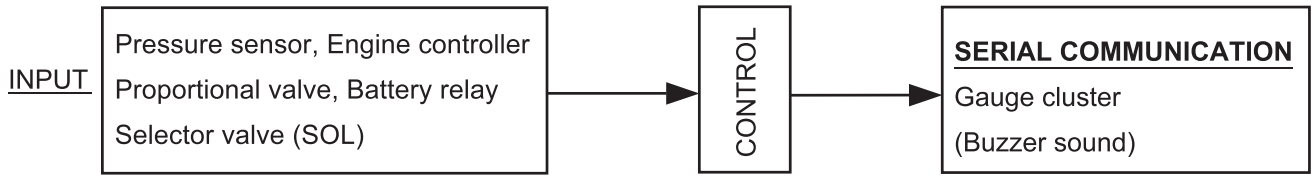
1. After displaying the display for setting by pressing the display change switch, set the respective maintenance time for fuel filter, hydraulic oil filter and hydraulic oil while repeating the procedure 2 to 5.
2. The engine oil change time is displayed on the multi-display by 500 hours as a warning, but the buzzer does not sound.

4.1.3.4 SELF DIAGNOSIS DISPLAY

(1) Outline

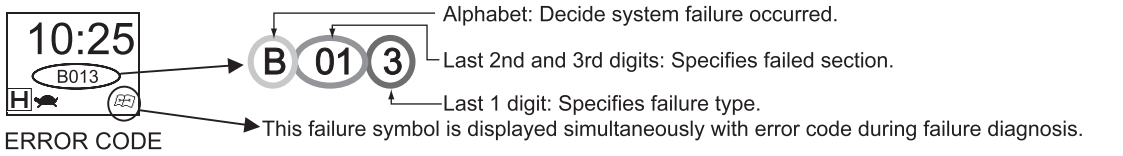
This function identifies abnormality of control I/O signal like pressure, proportional valve, etc. during machine operation through self diagnosis. The failed items are displayed on multi display of gauge cluster. For connector No. and pin No., refer to the section "C-1 Mechatro controller" explained later. Electric circuit diagram or harness is available to identify wire No. and wire color.

(2) I/O configuration



(3) Self diagnosis display items

As-displayed clock (Usually main screen). When error occurred, specifies failed section and the failure type with the aid of error code.



	A	B	C	D	E	F	G	H	I	K	P	R
Last 2,3 digits	Controller memory	Low pressure sensor	High pressure sensor	Proportional valve for valves	Proportional valve for pumps	Solenoid valve	Speed sensor	Potentiometer etc	Communication	Battery relay	Engine ECU	Relay output
01	Engine adjust data	Boom up	P1 pump	P1 unload	P1 pump	ATT boost		Acceleration		Battery relay		Wiper ark prevention relay
02	Torque adjust data	Boom down	P2 pump	P2 unload	P2 pump	Swing parking		Boom angle				Wiper ark forward rotation relay
03	Unload adjust data	Arm out	Boom head	Travel straight		Travel 1,2 speed	Angle sensor for shovel	Arm angle				Wiper ark reverse rotation relay
04	Boom up adjust data	Arm in	Boom rod			Option selector	Angle sensors for shovel & ECU					Washer motor
05	Arm in adjust data	Bucket digging										Bucket stroke limit
06	Arm out adjust data	Bucket dump		Arm 2 spool for arm in								
07		Swing										
08												
09		Travel right						Fuel sensor				
10		Travel left										
11		Selector position detection							CAN communication			
12												
13												Swing flasher right relay
14												Swing flasher left relay
15												Travel alarm relay
16		P1 side option										AIS relay 2
17		P2 side option										Engine stop relay
18												Safety lock lever relay
19												
21	Adjustment data sector 1											Safety relay
22	Adjustment data sector 2											
23	Hourmeter sector 1											
24	Hourmeter sector 2											
25	Proportional valve adjust data											
31									Cluster communication			

Refer to next page (Engine)

0		Larger than normal range	Larger than normal range									
1	–					Transistor OFF failure / Grounding short circuit			CAN error			
2	–	Wrong output	Wrong output	Transistor ON failure	Transistor ON failure		Over run					
3	–	Disconnection	Disconnection	Disconnection	Disconnection	Transistor ON failure / Disconnection	Disconnection	Disconnection	Time is over			
4	–	Power source short circuit	Power source short circuit					Power source short circuit		Contact point is melted and adhered		Power source short circuit
5												

Refer to next page (Engine)

SK140LC-8

ERROR CODE OF ENGINE

Failure Code	Malfunctioned component	Content of Failure	[Class]/Limitation of output when failure occurs
20081	ADC monitoring	ECU failure	[1]
20082	Dfp_ADCMon	A/D converter is abnormal in ECU.	Engine is shut down
20084			
20088			
00291	Accelerator sensor 1	Analog signal input is defective.	[5]
00292	SRC	Defective analog input signal from controller is detected.	Warning
	Dfp_APP1		
03838	Accelerator sensor	Accelerator signal mutual comparison is defective.	[5]
	mutual diagnosis	When there is deflection of 20% or more between CAN signal and analog signal, sensor detects it.	Warning
	Dfp_APPSync		
01081	Atmospheric pressure sensor	Atmospheric pressure sensor fails	[4]
01082	Dfp_APSCD	Defective operation of atmospheric pressure sensor in ECU (Disconnection, short circuit and characteristic defect) is detected.	Engine power down
01021	Inlet manifold pressure sensor	Inlet manifold pressure sensor failure	[4]
01022	Dfp_BPSCD	Defective operation of inlet manifold pressure sensor attached to engine (Disconnection, short circuit and characteristic defect) is detected.	Engine power down
01101	Coolant temperature sensor	Coolant temperature sensor failure	[5]
01102	Dfp_CTSCD	Defective operation of coolant temperature sensor attached to engine (Disconnection, short circuit and characteristic defect) is detected.	Engine power down
05181	Q tune resistance	Q tune resistance failure	[8]
05182	SRCDfp_EngCD_TrqAdj	Input failure of Q tune resistance is detected.	Warning
06351	Cam single operation warning	Crank sensor failure	[3]
	Dfp_EngMBackUp	It is detected that crank sensor fails and engine is operated with the cam sensor.	Engine power down
06361	Cam sensor	Cam sensor failure	[5]
06362	Dfp_EngMCaS1	Failure of cam sensor (Disconnection, short circuit, and damaged tooth) is detected.	Warning
06371	Crank sensor	Crank sensor failure	[3]
06372	Dfp_EngMCrS1	Failure of crank sensor (Disconnection, short circuit, and damaged tooth) is detected.	Engine power down
02281	Misalignment between cam and crank	Misalignment between cam and crank	[3]
	Dfp_EngMOfsCaSCrS	Misalignment between cam and crank is detected.	Engine power down
00914	CAN accelerator	CAN communication failure	[7]
	Dfp_FrmMngCANAPP	It is detected that accelerator opening (APPREQ) received with CAN is defective.	Warning
16744	APPREQ message time-out	CAN communication failure	[7]
	Dfp_FrmMngTOAPPREQ	Accelerator opening (APPREQ) signal is received by CAN. But it detects that the CAN cannot receive the signal.	Warning
20284	CAN transmission time-out	CAN communication failure	[7]
	Dfp_FrmMngTxTO	The transmission of CAN message is defective.	Warning
06771	Air heater relay power stage	Air heater relay failure	[5]
06772	Dfp_GlwCD_Actr	Failure of air heater relay or wiring harness is detected.	Warning
06774			
06778			
12311	SPI communication error	ECU failure	[1]
	Dfp_HWEMonCom	SPI (Serial peripheral interface): Serial communication malfunction between CPU and each internal IC occurs.	Engine is shut down
12352	EEPROM	ECU failure	[5]
12354	Dfp_HWEMonEEPROM	Defective reading and writing to EEPROM are detected.	Warning
12358			
16688	Recovery occurrence	ECU failure	[5]
	Dfp_HWEMonRcyLocked	Recovery (partial reset) occurred by ECU internal malfunction.	Warning
16708	Recovery generation	ECU failure	[5]
	Dfp_HWEMonRcyVisible	Recovery (partial reset) occurred by ECU internal malfunction.	Warning
15421	CJ945 excessive voltage	ECU failure	[1]
	Dfp_HWEMonUMaxSupply	The supply voltage is excessive for power stage control IC.	Engine is shut down
15432	CJ945 voltage is too low	ECU failure	[1]
	Dfp_HWEMonUMinSupply	The supply voltage is too low for power stage control IC.	Engine is shut down
06511	Injector drive bank 1	Injector failure (ECU internal circuit)	[1]
06512	Dfp_InjVlvBnk1A	The injector drive circuit detected short circuit.	Engine is shut down
06518			
06524	Injector drive bank 1	Injector failure (ECU internal circuit)	[1]
	Dfp_InjVlvBnk1B	The injector drive circuit detected disconnection.	Engine is shut down
06531	Injector drive bank 2	Injector failure (ECU internal circuit)	[1]
06532	Dfp_InjVlvBnk2A	The injector drive circuit detected short circuit.	Engine is shut down
06538			
06544	Injector drive bank 2	Injector failure (ECU internal circuit)	[1]
	Dfp_InjVlvBnk2B	The injector drive circuit detected disconnection.	Engine is shut down
06551	Injector drive IC	ECU failure	[1]
06552	Dfp_InjVlvChipA	IC which controls injector is malfunctioned.	Engine is shut down
06554			
06558			
06561	Injector drive IC	ECU failure	[1]
06562	Dfp_InjVlvChipB	IC which controls injector is malfunctioned.	Engine is shut down
06564			
06568			
06571	Injector #1	Injector failure	[1]
06574	Dfp_InjVlvCyl1A	Short circuit is detected in injector or harness.	Engine is shut down
06578			
06584	Injector #1	Injector failure	[5]
	Dfp_InjVlvCyl1B	Disconnection is detected in injector or harness.	Warning
06591	Injector #2	Injector failure	[1]
06594	Dfp_InjVlvCyl2A	Short circuit is detected in injector or harness.	Engine is shut down
06598			

Note) For detail of engine error code refer to "Section 51 ENGINE CHAPTER"

Failure Code	Malfunctioned component	Content of Failure	[Class]/Limitation of output when failure occurs
06604	Injector #2	Injector failure	[5]
	Dfp_InjVlvCyl2B	Disconnection is detected in injector or harness.	Warning
06611	Injector #3	Injector failure	[1]
06614	Dfp_InjVlvCyl3A	Short circuit is detected in injector or harness.	Engine is shut down
06618			
06624	Injector #3	Injector failure	[5]
	Dfp_InjVlvCyl3B	Disconnection is detected in injector or harness.	Warning
06631	Injector #4	Injector failure	[1]
06634	Dfp_InjVlvCyl4A	Short circuit is detected in injector or harness.	Engine is shut down
06638			
06644	Injector #4	Injector failure	[5]
	Dfp_InjVlvCyl4B	Disconnection is detected in injector or harness.	Warning
20004	MPROP power stage	MPROP failure	[2]
20008	Disconnection and excessive load	Disconnection or short circuit of MPROP or harness.	Engine power down
	Dfp_MeUnCDNoLoad		
20011	MPROP power stage	MPROP failure	[2]
	VB short	Battery short circuit of MPROP or harness	Engine power down
	Dfp_MeUnCDSCBat		
20022	MPROP power stage	MPROP failure	[2]
	GND short circuit	GND short circuit of MPROP or harness	Engine power down
	Dfp_MeUnCDSCGnd		
14848	Supervision	ECU failure	[1]
	Dfp_Montr	Malfunction judgment by self-diagnosis function in ECU.	Engine is shut down
16711	CAN A Pass off	CAN communication failure	[7]
	Dfp_NetMngCANAOff	Disconnection and short circuit of CAN communication line	Warning
16731	CAN C Pass off	CAN communication failure	[7]
	Dfp_NetMngCANCOff	Disconnection and short circuit of CAN communication line	Warning
00198	Oil pressure switch	Oil pressure switch failure	[8]
	Dfp_OPSCDPlaus1	Engine speed is high but sensor is OFF status.	LOW IDLE
01008	Oil pressure switch	Oil pressure switch failure	[1]
	Dfp_OPSCDPlaus2	Engine speed is high but sensor is OFF status.	Engine is shut down
20051	Engine speed	ECU failure	[5]
	Dfp_OvRMonSigA	Recognized engine speed is defective.	Warning
20411	DBV valve opening	DBV valve opening	[2]
	Dfp_PRVMonMax	It is recognized that DBV opened.	Engine power down
20422	DBV kick off	DBV valve is opened forcibly.	[2]
	Dfp_PRVMonMin	Open valve forcible command is ordered for entering into Limp-home mode.	Engine power down
20434	DBV valve is seized in closed position	DBV valve is seized in closed position	[1]
	Dfp_PRVMonSig	If you try to open valve forcibly, valve doesn't open.	Engine is shut down
20441	Holding pressure of DBV	Holding pressure of DBV is abnormal	[1]
	2-step is too high	Holding pressure of DBV 2-step is higher than standard level.	Engine is shut down
	Dfp_PRVPresHi		
20452	Holding pressure of DBV	Holding pressure of DBV is abnormal	[1]
	2-step is too low	Holding pressure of DBV 2-step is lower than standard level.	Engine is shut down
	Dfp_PRVPresLo		
20111	Rail pressure sensor SRC	Rail pressure sensor failure	[2]
20112	Dfp_RailCD	Disconnection and short circuit of rail pressure sensor or harness are detected.	Engine power down
20121	Rail pressure sensor offset	Rail pressure sensor failure	[2]
20122	monitoring	Zero-adjustment failure of rail pressure sensor.	Engine power down
	Dfp_RailCDOfsTst		
20131	Rail pressure governor has deviation	Rail pressure control failure	[4]
	(Nonattainment of target value)	Rail pressure doesn't achieve target value.	Engine power down
	Dfp_RailMeUn0		
20141	Rail pressure governor has deviation	Rail pressure control failure	[1]
	(Nonattainment of target value &	Despite fully pressurized feed of pump, rail pressure doesn't achieve target value.	Engine is shut down
	Fully pressurized feed of pump)		
	Dfp_RailMeUn1		
20151	Rail pressure governor has deviation	Rail pressure control failure	[2]
	(Pressure exceeds target value	Despite fully closed pump, rail pressure is higher than target value.	Engine power down
	& Pump doesn't inject)		
	Dfp_RailMeUn2		
20161	Rail pressure governor	Rail pressure control failure	[1]
	(Real pressure is too low)	Rail pressure is lower than standard value.	Engine is shut down
	Dfp_RailMeUn3		
20171	Rail pressure governor	Rail pressure control failure	[2]
	(Real pressure is too high)	Rail pressure is higher than standard value.	Engine power down
	Dfp_RailMeUn4		
11102	Shut-off pass test	ECU failure	[5]
11104	Dfp_SOPTst	Emergency injection stop circuit doesn't operate.	Warning
11108			
10791	Sensor supply voltage monitor1	ECU failure	[5]
10792	Dfp_SSpMon1	Failure of 5V power line which supplies power to sensor.	Warning
10801	Sensor supply voltage monitor 2	ECU failure	[4]
10802	Dfp_SSpMon2	Failure of 5V power line which supplies power to sensor.	Engine power down
06201	Sensor supply voltage monitor 3	ECU failure	[5]
06202	Dfp_SSpMon3	Failure of 5V power line which supplies power to sensor.	Warning
20098	TPU monitoring	ECU failure	[1]
	Dfp_TPUMon	Failure of TPU in ECU Failure of	Engine is shut down
		Arithmetic circuit of rotational pulse	
20108	SPIDfp_WdCom	ECU failure	[1]
		Judgment of malfunction by self-diagnosis for ECU Error of watch dog	Engine is shut down

SK200-8 SK250-8

ERROR CODE OF ENGINE

	ERROR CODE	POSSIBLE CAUSE	PROBLEM
SENSOR SYSTEM	P2228	Atmospheric pressure sensor malfunction (LOW)	Insufficient engine power
	P2229	Atmospheric pressure sensor malfunction (HI)	Insufficient engine power
	P0192	Common rail pressure sensor malfunction (LOW)	Insufficient engine power
	P0193	Common rail pressure sensor malfunction (HI)	Insufficient engine power
	P0191	Common rail pressure sensor malfunction	Insufficient engine power
	P0237	Boost pressure sensor malfunction (LOW)	Insufficient engine power
	P0108	Boost pressure sensor malfunction (HI)	Insufficient engine power
	P0117	Coolant temperature sensor malfunction (LOW)	Insufficient engine power
	P0118	Coolant temperature sensor malfunction (HI)	Insufficient engine power
	P0182	Fuel temperature sensor malfunction (LOW)	–
	P0183	Fuel temperature sensor malfunction (HI)	–
	P0335	Engine speed main sensor circuit malfunction	Engine does not start / Engine stopped.
	P0340	Engine speed sub sensor circuit malfunction	–
	P2120	Accelerator sensor 1 and 2 malfunction	Insufficient engine power (Low idle 800rpm fixing)
	P2122	Accelerator sensor 1 malfunction (LOW)	–
	P2123	Accelerator sensor 1 malfunction (HI)	–
	P2127	Accelerator sensor 2 malfunction (LOW)	–
	P2128	Accelerator sensor 2 malfunction (HI)	–
	P1133	Emergency accelerator sensor malfunction high input	Normal operation
SWITCH, RELAY SYSTEM	P0540	Preheat circuit malfunction (Open / GND short circuit)	Difficult to start engine.
	P0540	Preheat circuit malfunction (+B short circuit)	Difficult to start engine.
	P0617	Starter signal malfunction	–
	P0686	Main relay malfunction	–
SUPPLY PUMP SYSTEM	P0629	Supply pump SCV malfunction (Power source line short)	Engine does not start / Engine stopped.
	P0628	Supply pump SCV malfunction (Full discharge mode)	Low output
	P2635	Supply pump abnormal pressure record	–
	P2635	Supply pump SCV sticking	Low output
	P0088	Excessive common rail pressure	Low output
INJECTOR SYSTEM	P1211	Injector common 1 ground short	Low output
	P1214	Injector common 2 ground short	Low output
	P1212	Injector common 1 open circuit	Low output
	P1215	Injector common 2 open circuit	Low output
	P0201	Injector circuit malfunction-cylinder 1	Low output
	P0202	Injector circuit malfunction-cylinder 2	Low output
	P0203	Injector circuit malfunction-cylinder 3	Low output
	P0204	Injector circuit malfunction-cylinder 4	Low output
	P0263	Cylinder 1 contribution / balance fault	–
	P0266	Cylinder 2 contribution / balance fault	–
	P0269	Cylinder 3 contribution / balance fault	–
	P0272	Cylinder 4 contribution / balance fault	–
EGR SYSTEM	P0489	EGR solenoid 1 malfunction (Open circuit, ground line short)	Other problem
	P0490	EGR solenoid 1 malfunction (Power source line short)	Other problem
	P0404	EGR valve 1 stick	Other problem
	P0405	EGR lift sensor 1 circuit low input	Other problem
	P0406	EGR lift sensor 1 circuit high input	Other problem
TURBO CHARGER SYSTEM	P0234	Turbo charger over boost	Low output
ENGINE CONDITION	P0217	Engine over heat	Low output
	P0219	Engine over run	–
COMMUNICATION	U1001	Interruption of CAN communication (Machine)	–
ECU SYSTEM	P0611	ECU charge circuit low input	Low output
	P0200	ECU charge circuit high input	Low output
	P0605	Flash ROM error	Low output
	P0606	CPU malfunction (Hard detection)	Engine does not start / Engine stopped.
	P0607	Monitoring IC malfunction in CPU	Low output
INJECTOR SYSTEM	P1601	Injector correction data conformity error	Low output
			–
SUPPLY PUMP SYSTEM	P0088	Excessive common rail pressure, supply pump excess forced feed	Low output
SUPPLY PUMP SYSTEM	P2635	Supply pump malfunction	Low output

SK330-8

ERROR CODE OF ENGINE

	ERROR CODE	POSSIBLE CAUSE	PROBLEM
SENSOR SYSTEM	P2228	Atmospheric pressure sensor malfunction (LOW)	Insufficient engine power
	P2229	Atmospheric pressure sensor malfunction (HI)	Insufficient engine power
	P0192	Common rail pressure sensor malfunction (LOW)	Insufficient engine power
	P0193	Common rail pressure sensor malfunction (HI)	Insufficient engine power
	P0191	Common rail pressure sensor malfunction	Insufficient engine power
	P0237	Boost pressure sensor malfunction (LOW)	Insufficient engine power
	P0108	Boost pressure sensor malfunction (HI)	Insufficient engine power
	P0117	Coolant temperature sensor malfunction (LOW)	Insufficient engine power
	P0118	Coolant temperature sensor malfunction (HI)	Insufficient engine power
	P0182	Fuel temperature sensor malfunction (LOW)	–
	P0183	Fuel temperature sensor malfunction (HI)	–
	P0335	Engine speed main sensor circuit malfunction	Engine does not start / Engine stopped.
	P0340	Engine speed sub sensor circuit malfunction	–
	P2120	Accelerator sensor 1 and 2 malfunction	Insufficient engine power (Low idle 800rpm fixing)
	P2122	Accelerator sensor 1 malfunction (LOW)	–
	P2123	Accelerator sensor 1 malfunction (HI)	–
	P2127	Accelerator sensor 2 malfunction (LOW)	–
	P2128	Accelerator sensor 2 malfunction (HI)	–
	P1133	Emergency accelerator sensor malfunction	Normal operation
SWITCH, RELAY SYSTEM	P0540	Preheat circuit malfunction (Open / GND short circuit)	Difficult to start engine.
	P0540	Preheat circuit malfunction (+B short circuit)	Difficult to start engine.
	P0617	Starter signal malfunction	–
	P0686	Main relay malfunction	–
SUPPLY PUMP SYSTEM	P0629	Supply pump SCV malfunction (Power source line short)	Engine does not start / Engine stopped.
	P0628	Supply pump SCV malfunction (Full discharge mode)	Low output
	P2635	Supply pump abnormal pressure record	–
	P2635	Supply pump SCV sticking	Low output
	P0088	Excessive common rail pressure	Low output
INJECTOR SYSTEM	P1211	Injector common 1 ground short	Low output
	P1214	Injector common 2 ground short	Low output
	P1212	Injector common 1 open circuit	Low output
	P1215	Injector common 2 open circuit	Low output
	P1601	Injector correction data conformily error	–
	P0201	Injector circuit malfunction-cylinder 1	Low output
	P0202	Injector circuit malfunction-cylinder 2	Low output
	P0203	Injector circuit malfunction-cylinder 3	Low output
	P0204	Injector circuit malfunction-cylinder 4	Low output
	P0205	Injector circuit malfunction-cylinder 5	Low output
	P0206	Injector circuit malfunction-cylinder 6	Low output
	P0263	Cylinder 1 contribution / balance fault	–
	P0266	Cylinder 2 contribution / balance fault	–
	P0269	Cylinder 3 contribution / balance fault	–
	P0272	Cylinder 4 contribution / balance fault	–
	P0275	Cylinder 5 contribution / balance fault	–
	P0278	Cylinder 6 contribution / balance fault	–
EGR SYSTEM	P0489	EGR solenoid 1 malfunction (Open circuit, ground line short)	Other problem
	P0490	EGR solenoid 1 malfunction (Power source line short)	Other problem
	P0404	EGR valve 1 stick	Other problem
	P0405	EGR lift sensor 1 circuit low input	Other problem
	P0406	EGR lift sensor 1 circuit high input	Other problem
	P0407	EGR lift sensor 2 circuit low input	–
	P0408	EGR lift sensor 2 circuit high input	–
	P1401	EGR valve 2 stick	–
	P1402	EGR solenoid 2 malfunction (Open / ground short-circuit)	–
	P1403	EGR solenoid 2 malfunction (VB short-circuit)	–
TURBO CHARGER SYSTEM	P0234	Turbo charger over boost	Low output
ENGINE CONDITION	P0217	Engine over heat	Low output
	P0219	Engine over run	–
COMMUNICATION	U1001	Interruption of CAN communication (Machine)	–
ECU SYSTEM	P0611	ECU charge circuit low input	Low output
	P0200	ECU charge circuit high input	Low output
	P0605	Flash ROM error	Low output
	P0606	CPU malfunction (Hard detection)	Engine does not start / Engine stopped.
	P0607	Monitoring IC malfunction in CPU	Low output
INJECTOR SYSTEM	P1601	Injector correction data conformity error	Low output
			–
SUPPLY PUMP SYSTEM	P0088	Excessive common rail pressure, supply pump excess forced feed	Low output
SUPPLY PUMP SYSTEM	P2635	Supply pump malfunction	Low output

SK460-8

ERROR CODE OF ENGINE

	ERROR CODE	POSSIBLE CAUSE	PROBLEM	PAGE FOR REFERENCE
SENSOR SYSTEM	P2228	Atmospheric pressure sensor malfunction (LOW)	Insufficient engine power	17-44
	P2229	Atmospheric pressure sensor malfunction (HI)	Insufficient engine power	17-44
	P0192	Common rail pressure sensor malfunction (LOW)	Insufficient engine power	17-34
	P0193	Common rail pressure sensor malfunction (HI)	Insufficient engine power	17-34
	P0191	Common rail pressure sensor malfunction	Insufficient engine power	17-33
	P0237	Boost pressure sensor malfunction (LOW)	Insufficient engine power	17-27
	P0108	Boost pressure sensor malfunction (HI)	Insufficient engine power	17-27
	P1417	EGR cooler coolant temperature sensor malfunction (LOW)	-	17-30
	P1418	EGR cooler coolant temperature sensor malfunction (HI)	-	17-30
	P0117	Coolant temperature sensor malfunction (LOW)	Insufficient engine power	17-23
	P0118	Coolant temperature sensor malfunction (HI)	Insufficient engine power	17-23
	P0187	Fuel temperature sensor malfunction (LOW)	-	17-26
	P0188	Fuel temperature sensor malfunction (HI)	-	17-26
	P0335	Engine speed main sensor circuit malfunction	Engine does not start / Engine stopped.	17-15
	P0336	Abnormal engine main rotation sensor pulse count	-	17-16
	P0340	Engine speed sub sensor circuit malfunction	-	17-18
	P0341	Abnormal engine auxiliary rotation sensorn pulse count	-	17-20
	P2120	Accelerator sensor 1 and 2 malfunction	Insufficient engine power (Low idle 800rpm fixing)	17-41
	P2122	Accelerator sensor 1 malfunction (LOW)	-	17-37
	P2123	Accelerator sensor 1 malfunction (HI)	-	17-37
	P2127	Accelerator sensor 2 malfunction (LOW)	-	17-39
	P2128	Accelerator sensor 2 malfunction (HI)	-	17-39
	P1133	Emergency accelerator sensor malfunction	Normal operation	17-42
SWITCH, RELAY SYSTEM	P0540	Preheat circuit malfunction (Open / GND short circuit)	Difficult to start engine.	17-71
	P0540	Preheat circuit malfunction (+B short circuit)	Difficult to start engine.	17-71
	P0617	Starter signal malfunction	-	17-76
	P0686	Main relay malfunction	-	17-75
SUPPLY PUMP SYSTEM	P0629	Supply pump SCV malfunction (Power source line short)	Engine does not start / Engine stopped.	17-58
	P0628	Supply pump SCV malfunction (Full discharge mode)	Low output	17-54
	P1229	Supply pump over-feed	Low output	17-66
	P1266	Supply pump over-feed	Low output	17-67
	P2633	PCV 2 malfunction	Low output	17-61
	P2634	PCV 2 out put short to GND	Low output	17-64
	P0088	Excessive common rail pressure	Low output	17-31
	P0093	Fuel leakage	Low output	17-36
INJECTOR SYSTEM	P1211	Injector common 1 ground short	Low output	17-45
	P1214	Injector common 2 ground short	Low output	17-45
	P1212	Injector common 1 open circuit	Low output	17-47
	P1215	Injector common 2 open circuit	Low output	17-47
	P1601	Injector correction data conformily error	-	17-72
	P0201	Injector circuit malfunction-cylinder 1	Low output	17-49
	P0202	Injector circuit malfunction-cylinder 2	Low output	17-49
	P0203	Injector circuit malfunction-cylinder 3	Low output	17-49
	P0204	Injector circuit malfunction-cylinder 4	Low output	17-49
	P0205	Injector circuit malfunction-cylinder 5	Low output	17-49
	P0206	Injector circuit malfunction-cylinder 6	Low output	17-49
	P0263	Cylinder 1 contribution / balance fault	-	17-52
	P0266	Cylinder 2 contribution / balance fault	-	17-52
	P0269	Cylinder 3 contribution / balance fault	-	17-52
	P0272	Cylinder 4 contribution / balance fault	-	17-52
	P0275	Cylinder 5 contribution / balance fault	-	17-52
	P0278	Cylinder 6 contribution / balance fault	-	17-52
EGR SYSTEM	P1458	EGR actuator fault	Low output	17-67
	P1459	EGR actuator fault	Low output	17-68
	P1416	EGR cooler overheat	-	17-70
	P0404	EGR valve 1 stick	Other problem	17-69
TURBO CHARGER SYSTEM	P0234	Turbo charger over boost	Low output	17-29
ENGINE CONDITION	P0217	Engine over heat	Low output	17-24
	P0219	Engine over run	-	17-25
COMMUNICATION	U1122	CAN communication loss EGR actuator	Low output	17-77
	U1001	Interruption of CAN communication (Machine)	-	17-78
ECU SYSTEM	P0611	ECU charge circuit low input	Low output	17-74
	P0200	ECU charge circuit high input	Low output	17-74
	P0605	Flash ROM error	Low output	17-73
	P0606	CPU malfunction (Hard detection)	Engine does not start / Engine stopped.	17-73
	P0607	Monitoring IC malfunction in CPU	Low output	17-73
INJECTOR SYSTEM	P1601	Injector correction data conformity error	Low output	17-72
			-	
SUPPLY PUMP SYSTEM	P0088	Excessive common rail pressure, supply pump excess forced feed	Low output	17-32

4.1.3.5 TROUBLE HISTORY DIAGNOSIS

The items of error detected by mechatro controller self diagnosis function are stored in mechatro controller as one of history. And the errors are able to be indicated on the multi display.
The warning content is record partially in "Travel history screen".
The error code for self diagnosis is stored.

(1) How to display

1) Turn starter switch on.
2) Press buzzer stop switch for 10 seconds continuously 5 times and the trouble history screen is displayed.

(Example)

No errors	NO ERROR
Error detected in the past	１０５３０Ｈｒ　Ｆ０２３ ８５００Ｈｒ　Ｇ０３３ ３０００Ｈｒ　Ｐ１２１１ １５００Ｈｒ　Ｃ０１３

3) Transmit trouble history data (One or many) and hour meter to gauge cluster.
   - Hour meter and 4 failure data are displayed on screen.
   - In case of more than 4 failure data, 4 data is displayed at a time for 10 seconds by turns.
4) Paging (Up and down)
   - Press washer switch (▲), and the item moves upward.
   - Press wiper switch (▼), and the item moves downward.
5) Turn starter switch off, and the display is disappeared.

(2) How to delete contents of trouble history

1) When "NO ERROR" is displayed, the deletion is completed.
2) Press work mode change switch and buzzer stop switch simultaneously for 10 seconds or more.
3) When "NO ERROR" is displayed, the deletion is completed.
4) Turn starter switch off.

Note

All the stored items are erased. It is impossible to erase data partially.

4.1.3.6 SERVICE DIAGNOSIS DISPLAY FUNCTION

The current service diagnosis is displayed on multi display based on the data received from mechatro controller. This section explains the operating procedure and examples of each screen. The values in display changes according to the conditions like engine speed, attachment position, etc.

(1) Service diagnosis display screen operating procedure

1) Turn starter switch ON keeping buzzer stop switch pressed.
2) After logo mark is displayed, the screen changes in service diagnosis mode.
   The service diagnosis screen "Mode No.1", "Screen No.1" is displayed first.
   The service diagnosis is classified into three modes, 1, 2, and 3, and the present mode is displayed in "Screen No.1".
   The screen number each mode can display differs. The screen number displayed by each mode is as follows.
   - Mode No.1 : Screen No.1~No.30
   - Mode No.2 : Screen No.1, Screen No.31~No.40
   - Mode No.3 : Screen No.1, Screen No.41~No.50
3) The screen changes each time each switch is pressed from now on.
   Washer switch: Screen gains by 1 in order. (No.2→No.3→No.4→...)
   Wiper switch: Screen loses by 1 in order. (No.24→No.23→No.22→...)
   Auto idling switch: Service diagnosis number advances from No.1 to No.3, and then returns to No.1. (No.1→No.2→No.3→No.1→...)
   Travel 1, 2 speed switch: Service diagnosis number advances from No.3 to No.1, and then returns to No.3. (No.3→No.2→No.1→No.3→...)
4) Turn key switch OFF and the display of service diagnosis mode is closed.

(2) Service diagnosis display screen (Example)

SERVICE DIAGNOSIS MODE NO.1

Note

The indicated values are display examples in the case of machine model SK200-8 "H mode", "Engine low speed", and "Lever at neutral".

No.	Displays	Contents	No.	Displays	Contents
1	NO.1 MAIN CONT. P/N YN22E00001F1 PROGRAM VERSION 1-VER 11.11 2-VER 00.00 SERVICE DIAG 1	 P/No. indication Program version indication MERIT controller program version Service diagnosis mode	6	NO.6 PRESS.SENSOR B-7 SWING 3.5V 2.6M B-9 TRAVEL(R) 3.5V 2.6M B-10 TRAVEL(L) 3.5V 2.6M B-16 P1 OPT. 3.5V 2.6M B-17 P2 OPT. 3.5V 2.6M B-18 DOZER 1 3.5V 2.6M B-19 DOZER 2 3.5V 2.6M	 Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value
2	NO.2 ENG G-3 SPEED SET 2205 MEAS1 2201 MEAS2 2201 G-5 ENG PRS. LIVE WATER TEMP 100 OFF MODE HM H-1 ACCEL VOLT. 4.2V POS. 100% ECU OUTPUT 0.5V	 No load setting rpm Actual rpm 1 Actual rpm 2 (Engine controller) Engine oil pressure Coolant temperaturre sensor Work mode Potentiometer voltage Voltage % indication Accel output voltage to engine controller	7	NO.7 P.SENSOR PROPO-V C-1 PUMP P1 3.5V 32.6M C-2 PUMP P2 3.5V 32.6M C-3 BOOM-HEAD 3.5V 32.6M C-4 BOOM-ROD 3.5V 32.6M PROPO-VALVE E-3 OPT RELIEF 1 COMP. 600mA 14.5M MEAS. 600mA 14.5M E-4 OPT RELIEF 2	 Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Set value in computer / Converted value from pressure Measured value / Converted value from pressure Set value in computer / Converted value from pressure Measured value / Converted value from pressure
3	NO.3 SOL.VALVE F-1 POWER BOOST COMP. OFF MEAS. OFF SWITCH OFF F-2 SWING-BRAKE COMP. OFF MEAS. OFF RELEASE SW OFF F-3 1/2-TRAVEL COMP. OFF MEAS. OFF SWITCH OFF	 Set value in computer Measured value Switch Set value in computer Measured value Switch Set value in computer Measured value Switch	8	NO.8 PROPO-VALVE D-1 P1 UN-LOAD(BP-CUT) COMP. 600mA 4.5M MEAS. 600mA 4.5M D-2 P2 UN-LOAD(BP-CUT) COMP. 600mA 4.5M MEAS. 600mA 4.5M D-3 S-TRAVEL COMP. 600mA 4.5M MEAS. 600mA 4.5M D-6 ARM IN-2-SPEED COMP. 600mA 4.5M MEAS. 600mA 4.5M	 Set value in computer / Converted value from pressure Measured value / Converted value from pressure Set value in computer / Converted value from pressure Measured value / Converted value from pressure Set value in computer / Converted value from pressure Measured value / Converted value from pressure Set value in computer / Converted value from pressure Measured value / Converted value from pressure
4	NO.4 RELAY K-1 AIS RELAY 2 OFF K-2 SAFETY RLY OFF K-3 ENG STOP OFF KEY SWITCH OFF START SWITCH OFF CHARGE LIVE K-4 LOCK LEVER OFF SWITCH OFF	 Indicated value Indicated value Indicated value Key switch Starter switch Alternator Indicated value Switch	9	NO.9 PROPO-VALVE E-1 P1 PUMP COMP. 600mA 4.5M MEAS. 600mA 4.5M POWER SHIFT 100mA FLOW RATE 100L E-2 P2 PUMP COMP. 600mA 4.5M MEAS. 600mA 4.5M POWER SHIFT 100mA FLOW RATE 100L	 Set value in computer / Converted value from pressure Measured value / Converted value from pressure Power shift Flow rate of pump P1 Set value in computer / Converted value from pressure Measured value / Converted value from pressure Power shift Flow rate of pump P2
5	NO.5 PRESS.SENSOR B-1 BOOM RAISE 3.5V 2.6M B-2 BOOM LOWER 3.5V 2.6M B-3 ARM OUT 3.5V 2.6M B-4 ARM IN 3.5V 2.6M B-5 BUCKET DIG 3.5V 2.6M B-6 BUCKET DUMP 3.5V 2.6M	 Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value	10	NO.10 SENSOR,SWITCH H-9 FUEL LEVEL 4.5V 90 H-10 HYD.OIL TEMP 4.5V 30℃ GLOW OFF AIR FILTER LIVE WATER SEPA. LIVE ENG OIL FILTER LIVE FRONT WINDOW OFF DOUBLE FLOW ON KPSS SW OFF HEATER OFF ENG OIL LEVEL LIVE COOLANT LEVEL LIVE	 Fuel level Hydraulic oil temperature Glow switch Air filter clogging Water separator clogging Engine oil filter clogging Front window open/close switch Conflux/Single flow select switch KPSS switch Command from air heater Engine oil level Coolant level

Note

The indicated values are display examples in the case of machine model SK200-8 "H mode", "Engine low speed", and "Lever at neutral".

No.	Displays	Contents	No.	Displays	Contents
11	NO.11 SOL.VALVE F-4 OPT SELECT COMP. OFF MEAS. OFF SPOOL POS. NIB SELECT SWITCH NIB F-5 FAN PUMP COMP. OFF MEAS. OFF F-6 COMP. OFF MEAS. OFF	 Set value in computer Measured value (Feed back value) Spool position Mode of selector valve Set value in computer Measured value Set value in computer Measured value	16	NO.16 PRESS.SENSOR B-11 3.5V 12.6M B-12 3.5V 12.6M B-13 3.5V 12.6M B-14 3.5V 12.6M B-15 3.5V 12.6M B-20 3.5V 12.6M	 Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value Sensor voltage / Pressure converted value
12	NO.12 POTENTIO. H-2 BOOM 3.5V 137 H-3 ARM 3.5V 137	 Sent value from sensor / Converted value from angle Sent value from sensor / Converted value from angle			

			CONTENTS OF DIGITAL INPUT/OUTPUT	
			FUNCTION	SIGNAL LEVEL ON/OFF
18	NO.18 DIGITAL INPUT DI1 OFF DI2 OFF DI3 OFF DI4 OFF DI5 OFF DI6 OFF DI7 OFF DI8 OFF DI9 OFF DI10 OFF DI11 OFF DI12 OFF DI13 OFF DI14 OFF	 ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication	See Mechatro controller connector	 Cab up-and-down stop Key switch (ON) Key switch (Glow) Not used Swing parking brake release Engine start, High-reach (Hoisting during parking) Water separator Engine oil pressure Air-filter Stroke end detection Not used Coolant temperature Not used	 EARTH/OPEN +24V/OPEN +24V/OPEN +24V/OPEN EARTH/OPEN +24V/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN
19	NO.19 DIGITAL INPUT DI15 OFF DI16 OFF DI17 OFF DI18 OFF DI19 OFF DI20 OFF DI21 OFF DI22 OFF DI23 OFF DI24 OFF DI25 OFF DI26 OFF DI27 OFF DI28 OFF	 ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication		Not used Wiper rise-up Wiper reverse Attachment boost Nibbler open detection switch ECU main relay Elevator cab up detection Not used Lever lock Hand control Rotation/Clamp open & close Front window open & close Hand control breaker Confulx / Single flow change Not used	 EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN +24V/OPEN +24V/OPEN +24V/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN
20	NO.20 DIGITAL INPUT DI29 OFF DI30 OFF DI31 OFF DI32 OFF DI33 OFF DI34 OFF DI35 OFF DI36 OFF DI37 OFF DI38 OFF DI39 OFF DI40 OFF DI41 OFF DI42 OFF	 ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication ON/OFF indication		 Overload select High-reach (Hoisting during travel) Hand control Nibbler Charging Not used Not used Heavy lift Not used Quick coupler Extra pressure Not used Not used	 EARTH/OPEN EARTH/OPEN EARTH/OPEN ～12V/12V～ +24V/OPEN +24V/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN EARTH/OPEN

Note

The indicated values are display examples in the case of machine model SK200-8 "H mode", "Engine low speed", and "Lever at neutral".

No.	Displays	Contents	FUNCTION	SIGNAL LEVEL ON/OFF
21	NO.21 DIGITAL OUTPUT DO1 COMP. OFF MEAS. OFF DO2 COMP. OFF MEAS. OFF DO3 COMP. OFF MEAS. OFF DO4 COMP. OFF MEAS. OFF DO5 COMP. OFF MEAS. OFF DO6 COMP. OFF MEAS. OFF DO7 COMP. OFF MEAS. OFF	Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value	Wiper ark prevention Wiper forward Wiper reverse Washer motor Bucket limitation Not used Travel 1/2 speed selector valve	EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN +24V / OPEN
22	NO.22 DIGITAL OUTPUT DO8 COMP. OFF MEAS. OFF DO9 COMP. OFF MEAS. OFF DO10 COMP. OFF MEAS. OFF DO11 COMP. OFF MEAS. OFF DO12 COMP. OFF MEAS. OFF DO13 COMP. OFF MEAS. OFF DO14 COMP. OFF MEAS. OFF	Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value	Swing parking brake change valve Att power boost selector valve Cab up-and-down selector valve Option selector valve Tricolor light (Red) Swing flasher (RH) Swing flasher (LH)	+24V / OPEN +24V / OPEN EARTH / OPEN +24V / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN
23	NO.23 DIGITAL OUTPUT DO15 COMP. OFF MEAS. OFF DO16 COMP. OFF MEAS. OFF DO17 COMP. OFF MEAS. OFF DO18 COMP. OFF MEAS. OFF DO19 COMP. OFF MEAS. OFF DO20 COMP. OFF MEAS. OFF DO21 COMP. OFF MEAS. OFF	Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value	Travel alarm Auto idling stop relay 2 Engine stop Lever lock Pressure release for Extra Not used Safety relay	EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN EARTH / OPEN
24	NO.24 DIGITAL OUTPUT DO22 COMP. OFF MEAS. OFF DO23 COMP. OFF MEAS. OFF DO24 COMP. OFF MEAS. OFF DO25 COMP. OFF MEAS. OFF DO26 COMP. OFF MEAS. OFF DO27 COMP. OFF MEAS. OFF DO28 COMP. OFF MEAS. OFF	Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value Set value in computer Measured value	Not used Tricolor light (Yellow) Tricolor light (Green)	EARTH / OPEN EARTH / OPEN EARTH / OPEN
25	NO.25 WIPER SYSTEM WIPER SW OFF RISEUP SW OFF REVERSE SW OFF PREVENT ARC OFF CW MOTOR RLY OFF CCW MOTOR RLY OFF WASHER SW OFF MOTOR RELAY OFF	Wiper switch Wiper rise-up switch Wiper reverse rotation switch Wiper motor ark prevention relay Wiper normal rotation relay Wiper reverse rotation relay Washer switch Washer motor relay		

No.	Displays	Contents
27	NO.27 MERIT SYSTEM COMMUNICATION OFF 4 0412051200	Status of communication in MERIT controller
28	NO.28 ENG CONT. TRANS.COUNT. 100 RECEIVE COUNT. 100 DIAG STATUS 9 NUMBER OF DIAG 100 BOOST PRESS. 100 BOOST TEMP. -100 BAROMETRIC P. 100 FUEL TEMP. -100 FUEL CONS. 200 INTAKE TEMP. -100 ENG PRESS. 300 GLOW OFF ENG STOP OFF TORQUE 1000	Counted number of transmission error Counted number of reception error Diagnosis status Numbers of error Boost pressure Boost temperature Atmospheric pressure Fuel temperature Fuel consumption Intake air temperature Engine oil pressure Glow output from ECU Engine stop command from ECU Calculated torque of ECU

SERVICE DIAGNOSIS MODE NO.2

Note

The indicated values are display examples in the case of machine model SK200-8 "H mode", "Engine low speed", and "Lever at neutral".

No.	Displays	Contents	No.	Displays	Contents
1	NO.1 MAIN CONT. P/N YN22E00001F1 PROGRAM VERSION 1-VER 11.11 2-VER 00.00 SERVICE DIAG 2	 P/No. indication Program version indication MERIT controller program version Service diagnosis mode	33	NO.33 BUCKET C-1 P1-PRES 13.9M C-2 P2-PRES 13.9M E-1 P1-PSV 600mA E-2 P2-PSV 600mA D-1 P1-UL(BPC) 600mA D-2 P2-UL(BPC) 600mA D-3 S-TRAVEL 600mA B-5 BUCKET DIG 1.9M B-6 BUCKET DUMP 1.9M G-3 ENG SPEED 2205 POWER SHIFT 100mA	 Pump pressure sensor Pump pressure sensor Command current Command current Command current Command current Command current Bucket digging pressure sensor Bucket dump pressure sensor Engine actual speed Power shift current
31	NO.31 BOOM C-1 P1-PRES 13.9M C-2 P2-PRES 13.9M E-1 P1-PSV 600mA E-2 P2-PSV 600mA D-1 P1-UL(BPC) 600mA D-2 P2-UL(BPC) 600mA B-1 BOOM RAISE 1.9M B-2 BOOM LOWER 1.9M G-3 ENG SPEED 2205 POWER SHIFT 100mA	 Pump pressure sensor Pump pressure sensor Command current Command current Command current Command current Boom up pressure sensor Boom down pressure sensor Engine actual speed Power shift current	34	NO.34 TRAVEL C-1 P1-PRES 13.9M C-2 P2-PRES 13.9M E-1 P1-PSV 600mA E-2 P2-PSV 600mA D-1 P1-UL(BPC) 600mA D-2 P2-UL(BPC) 600mA D-3 S-TRAVEL 600mA B-9 TRAVEL(R) 13.9M B-10 TRAVEL(L) 13.9M Pi-P1 13.9M Pi-P2 13.9M G-3 ENG SPEED 2205 POWER SHIFT 100mA	 Pump pressure sensor Pump pressure sensor Command current Command current Command current Command current Command current Travel right pressure sensor Travel left pressure sensor Pilot pressure at travel straight (P1 side) Pilot pressure at travel straight (P2 side) Engine actual rpm Power shift current
32	NO.32 ARM,SWING C-1 P1-PRES 13.9M C-2 P2-PRES 13.9M E-1 P1-PSV 600mA E-2 P2-PSV 600mA D-1 P1-UL(BPC) 600mA D-2 P2-UL(BPC) 600mA D-3 S-TRAVEL 600mA D-6 ARM-IN-2 600mA B-3 ARM OUT 13.9M B-4 ARM IN 13.9M B-1 BOOM RAISE 13.9M B-7 SWING 13.9M G-3 ENG SPEED 2205 POWER SHIFT 100mA	 Pump pressure sensor Pump pressure sensor Command current Command current Command current Command current Command current Command current Arm out pressure sensor Arm in pressure sensor Boom up pressure sensor Swing pressure sensor Engine actual speed Power shift current	35	NO.35 OPT C-1 P1-PRES 13.9M C-2 P2-PRES 13.9M E-1 P1-PSV 600mA E-2 P2-PSV 600mA D-1 P1-UL(BPC) 600mA D-2 P2-UL(BPC) 600mA D-3 S-TRAVEL 600mA E-3 OPT RELIEF 600mA B-16 P1 OPT 1.9M B-17 P2 OPT 1.9M F-4 OPT SELECT NIB DOUBLE FLOW SW NIB G-3 ENG SPEED 2205 POWER SHIFT 100mA	 Pump pressure sensor Pump pressure sensor Command current Command current Command current Command current Command current Command current P1 side option pressure sensor P2 side option pressure sensor Optional selector SOL (Nibbler line) Conflux/ Single selector switch Engine actual rpm Power shift current

SERVICE DIAGNOSIS MODE NO.3

No.	Displays	Contents	No.	Displays	Contents
1	NO.1 MAIN CONT. P/N YN22E00001F1 PROGRAM VERSION 1-VER 11.11 2-VER 00.00 SERVICE DIAG 3	 P/No. indication Program version indication MERIT controller program version Service diagnosis mode	43	NO.43 MACHINE-INFORM. HOUR METER 3550 TRIP METER 3500 OPERATION 3300 TRAVEL 300 SWING 3000 HAMMER 100 CRANE 100 STARTER 1200	 Hour meter of controller Trip meter of controller All accumulated operating time All accumulated traveling time All accumulated swing time All accumulated breaker operating time All accumulated high-reach crane operating time All accumulated starter operating time
41	NO.41 ADJUSTMENT 1 ENG HI-IDLE 2205 PUMP ACT I 515mA △ 15mA PUMP P 35.0M ESS N 2040 UN-LOAD P1 600mA P2 600mA BOOM 137° 137° ARM 137° 137° OFFSET 137° 137° INTER-B 137° 137°	 Engine speed high idle Current at pump adjustment Current correction at pump adjustment Pressure at pump adjustment Engine speed sensor rpm P1 unload corrective current P2 unload corrective current Angle adjustment Angle adjustment Angle adjustment Angle adjustment	44	NO.44 MACHINE-INFORM. PUMP PRESS. TOTAL 10Hr LEVEL1 24% 22% LEVEL2 50% 50% LEVEL3 25% 25% LEVEL4 1 % 3% WATER TEMP. TOTAL 10Hr LEVEL1 24% 22% LEVEL2 50% 50% LEVEL3 25% 25% LEVEL4 1 % 3%	 Pump pressure distribution (%) Total / In the last 10 hours Total / In the last 10 hours Total / In the last 10 hours Total / In the last 10 hours Coolant temperature distribution (%) Total / In the last 10 hours Total / In the last 10 hours Total / In the last 10 hours Total / In the last 10 hours

4.1.3.7 TROUBLE DIAGNOSIS MODE

The trouble diagnosis mode is used to automatically specify the failed sections for the troubles which can not be detected by auto diagnosis function (the trouble can be specified by error code) like disconnection, abnormal output.

(1) Function

There are two types of trouble diagnosis mode.

1) Trouble diagnosis mode 1: Used to diagnose unload system, pump system, travel straight system and engine system.

2) Trouble diagnosis mode 2: Used to diagnose pilot system.
In any mode, with the attachment not operated, both selector valve and proportional valve are automatically actuated, the sensor detects the machine condition and the mechatro controller identifies the normal condition or failed condition of the system.

(2) How to use and flow chart

The operation is performed through gauge cluster.

No.1 Select service adjustment select screen.

(Switch starter key on while pressing buzzer stop switch and press select switch three times while pressing buzzer stop switch on the service diagnosis screen No.1.)

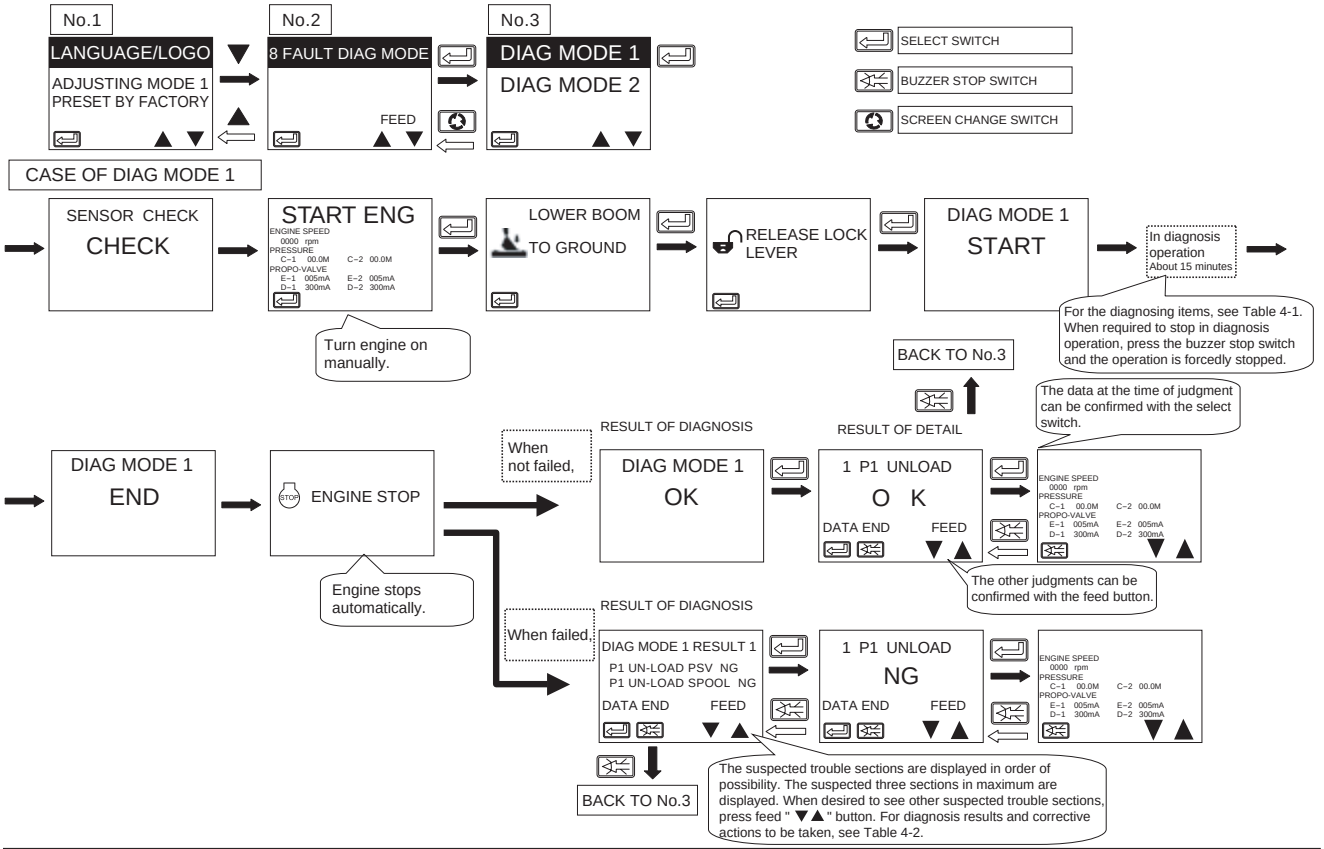
No.2 Select Trouble diagnosis mode

(Move the cursor to the desired position with screen change switch "▼▲", and press the select switch.)

No.3 Select either "DIAG MODE 1" or "DIAG MODE 2"

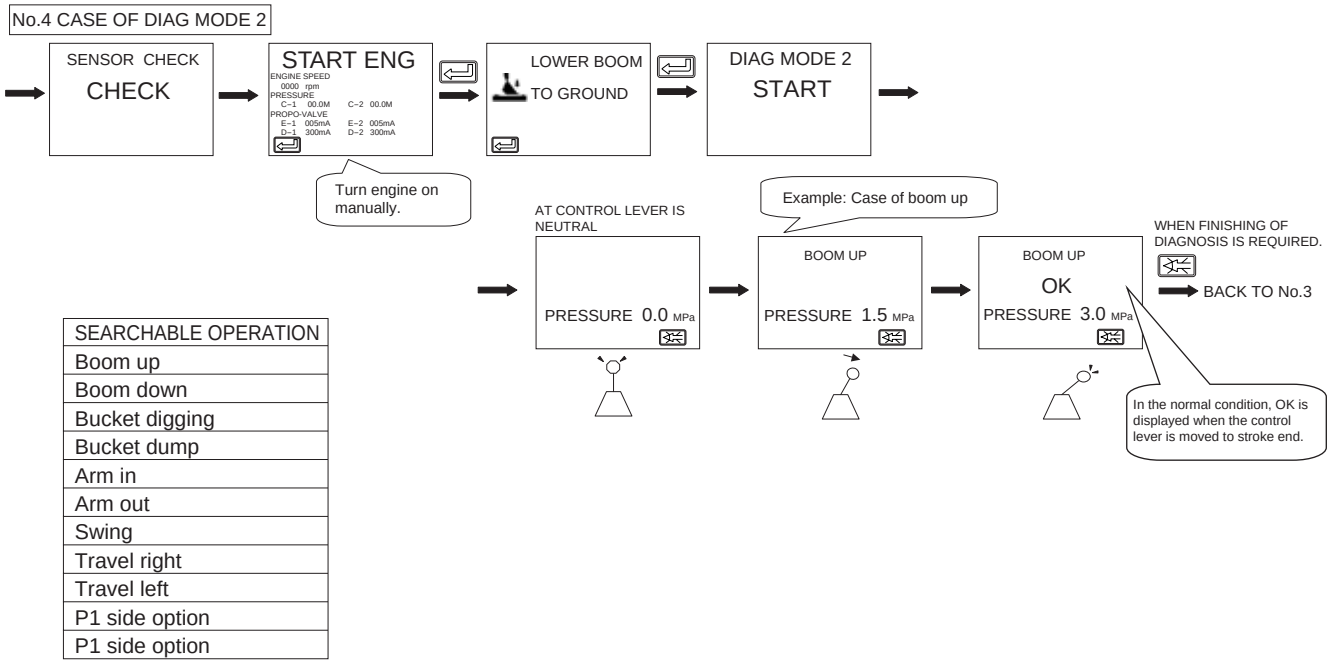
(Move the cursor to the desired position with screen change switch "▼▲", and press the select switch.)

No.4 Go ahead the operation according to the instructions on the screen of cluster gauge.



Notes:

1. When the trouble diagnosis mode is operating, lower the attachment and put the bucket on the ground. If the machine failed; the unexpected touch to the lever may move the attachment and it causes injury or death.Because the bucket-grounded/bucket-not-grounded can not be automatically identified, do not fail to start operating the trouble diagnosis mode after making sure of the bucket-grounded condition.
2. Before executing the trouble diagnosis mode, check each pressure sensor proportional valve and select valve for possible abnormality.
   Check that the commands of proportional valve and select valve do not largely differ from the actually measured values through the service diagnosis.
   The preliminary investigation of electric system makes the time saving and high precision diagnosis possible.
3. For the diagnosis results and the corrective actions to be taken, usually occurred troubles are taken as an example. When multiple troubles are occurred at the same time, there is a case no accordance of diagnosis obtained. In this case, contact our dealer/distributor.
4. When the trouble diagnosis mode is executing, the error display with self-diagnosis and warning does not appear. If necessary, examine the presence or absence of trouble referring to the trouble history.



SEARCHABLE OPERATION
Boom up
Boom down
Bucket digging
Bucket dump
Arm in
Arm out
Swing
Travel right
Travel left
P1 side option
P1 side option

Notes:
1. When the trouble diagnosis mode is operating, lower the attachment and put the bucket on the ground. If the machine failed; the unexpected touch to the lever may move the attachment and it causes injury or death. Because the bucket-grounded/bucket-not-grounded can not be automatically identified, do not fail to start operating the trouble diagnosis mode after making sure of the bucket-grounded condition. Place the bucket on the ground between both crawlers.
2. In the case of "DIAG MODE2", pump pressure is unloaded with unload valve in order not to actuate attachment.
   When trouble diagnosis is performed, if the pump pressure is generated, the engine stops and "UN-LOAD PSV NG" is displayed. Check the troubled section according to indication.
3. When the trouble diagnosis mode is executing, the error display with self-diagnosis and warning does not appear. If necessary, examine the presence or absence of trouble referring to the trouble history.

Table4-1 Failure diagnosis Mode-1/Diagnosis item

No.	Display	Contents of diagnosis
1	1 P1 UNLOAD	Is normal pressure generated in the condition that the flow rate at P1 side is minimum and the unloading valve is in the emergency position?
2	2 P1 UNLOAD	Is normal pressure generated in the condition that the minimum flow rate is relieved at P1 side?
3	3 P1 UNLOAD	Is normal pressure generated in the condition that the unload valve is fully opened, and P1 side flow rate is minimum?
4	1 P2 UNLOAD	Is normal pressure generated in the condition that the unload valve is in emergency position, and P2 side flow rate is minimum?
5	2 P2 UNLOAD	Is normal pressure generated in the condition that the minimum flow rate is relieved at P2 side?
6	3 P2 UNLOAD	Is normal pressure generated in the condition that the unload valve is fully opened, and P2 side flow rate is minimum?
7	1 P1 PUMP	Is normal pressure generated in the condition that the flow rate at P1 side is emergency and the unloading valve is in the emergency position?
8	2 P1 PUMP	Is normal pressure generated in the condition that the unload valve is emergency, and P1 side flow rate is minimum?
9	3 P1 PUMP	Is normal pressure generated in the condition that the unload valve is in emergency position, and P1 side flow rate is maximum?
10	1 P2 PUMP	Is normal pressure generated in the condition that the flow rate at P2 side is emergency and the unloading valve is in the emergency position?
11	2 P2 PUMP	Is normal pressure generated in the condition that the unload valve is emergency, and P2 side flow rate is minimum?
12	3 P2 PUMP	Is normal pressure generated in the condition that the unload valve is in emergency position, and P2 side flow rate is maximum?

Table4-1 Failure diagnosis Mode-1/Diagnosis item

No.	Display	Contents of diagnosis
13	1 TRAVEL-S	Is normal pressure generated in the condition that P1 side flow rate is minimum, unload valve is emergency position and travel straight is stroked fully?
14	2 TRAVEL-S	Is normal pressure generated in the condition that P2 side flow rate is minimum, unload valve is emergency position and travel straight is stroked fully?
15	1 P1 ENGINE	Is rated engine speed obtained in the condition that P1 side flow rate increases little by little when P1 side flow rate is relieved?
16	2 P2 ENGINE	Is rated engine speed obtained in the condition that P2 side flow rate increases little by little when P2 side flow rate is relieved?

Note

When pump regulator does not have "Total power control of Emergency mode", "1 P1 PUMP" of No.7 and "1 P2 PUMP" of No.10 are not given a diagnosis.

Table4-2 Failure diagnosis Mode-1/Diagnosis and Remedy

Diagnosis (Display)	Possible cause	Remedy
SENSOR CHECK NG	Disconnection of pressure sensor, Short circuit, Abnormal output	Check each pressure sensor by service diagnosis and replace it if necessary
P1 UN-LOAD PSV NG	Secondary pressure is excessive high against the command	Check P1 unload proportional valve and replace it if necessary
	Secondary pressure is excessive low against the command	
P1 UN-LOAD SPOOL NG	Stuck at full-stroke side	Check P1 unload spool and replace it if necessary
	Stuck at neutral side	
P2 UN-LOAD PSV NG	Secondary pressure is excessive high against the command	Check P2 unload proportional valve and replace it if necessary
	Secondary pressure is excessive low against the command	
P2 UN-LOAD SPOOL NG	Stuck at full-stroke side	Check P2 unload spool and replace it if necessary
	Stuck at neutral side	
P1 B-P CUT NG	Stuck at closing side	Check P1 by-pass cut valve and replace it if necessary
	Stuck at neutral side	
P2 B-P CUT NG	Stuck at closing side	Check P2 by-pass cut valve and replace it if necessary
	Stuck at neutral side	
P1 PUMP PSV NG	Secondary pressure is excessive high against the command	Check P1 pump proportional valve and replace it if necessary
	Secondary pressure is excessive low against the command	
P1 PUMP NG	Delivery rate is excessive large against the command	Check P1 pump regulator and replace it if necessary.
	Delivery rate is excessive small against the command	Check P1 pump and replace it if necessary.
P2 PUMP PSV NG	Secondary pressure is excessive high against the command	Check P2 pump proportional valve and replace it if necessary
	Secondary pressure is excessive low against the command	

Table4-2 Failure diagnosis Mode-1/Diagnosis and Remedy

Diagnosis (Display)	Possible cause	Remedy
P2 PUMP NG	Delivery rate is excessive large against the command	Check P2 pump regulator and replace it if necessary.
	Delivery rate is excessive small against the command	Check P2 pump and replace it if necessary.
S-TRAVEL PSV NG	Secondary pressure is excessive high against the command	Check travel straight proportional valve and replace it if necessary
	Secondary pressure is excessive low against the command	
S-TRAVEL SPOOL NG	Stuck at full-stroke side	Check travel straight spool and replace it if necessary
	Stuck at neutral side	
PUMP 1 PRESS. SENSOR NG	Pressure is recognized lower than it is	Check P1 high pressure sensor and replace it if necessary
PUMP 2 PRESS. SENSOR NG	Pressure is recognized lower than it is	Check P2 high pressure sensor and replace it if necessary
MAIN RELIEF NG	Set pressure decreases	Check main relief valve and replace it if necessary
	Set pressure increases	
ENGINE NG	Output is lowered	Check engine and replace it if necessary
E/G R SENSOR NG	Characteristics is misaligned	Check engine speed sensor and replace it if necessary

4.1.3.8 MECHATRO CONTROLLER (A), (B), (C) ADJUSTMENT FUNCTION

(1) Preparation

1) Perform warm-up operation. (The temperature of not only engine but also hydraulic oil should be raised.)
2) Place attachment on the ground and stop engine, and then turn the key switch off.
3) Adjust the "Check injector" of "Adjust mode 1" to "ON", and run the engine about 10 minutes by no load (possible to skip).
4) Stop engine and turn key switch off (possible to skip).

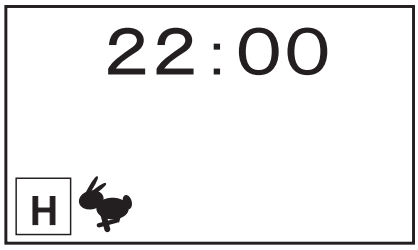
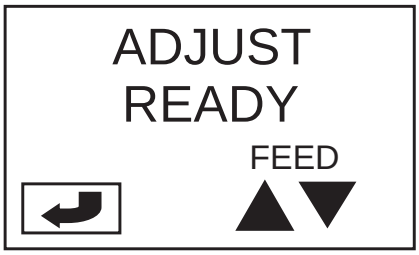
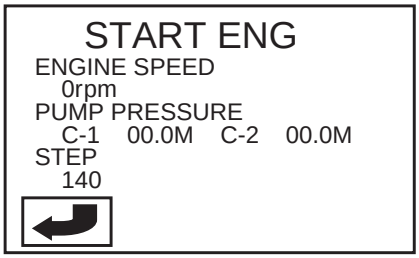
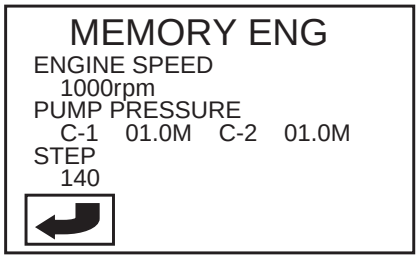
(2) Notes

1) There are cases that the normal adjustment could not be performed with the engine loaded.
   - Carry out the adjustment with air conditioner turned off.
   - In case that machine is equipped with "LIFTING MAGNET", carry out the adjustment with generator turned off.
2) In case the machine is failed, there are cases the normal adjustment could not be performed. Firstly, carry out the adjustment after repairing the machine.

WARNING

Make sure to carry out the adjustment after placing the attachment on the ground.

(3) ENGINE ADJUSTMENT ("A" ADJUSTMENT)

PROCESS	MULTI DISPLAY (EXAMPLE)
1) Hold the work mode select switch down and turn starter key to ON position, and keep the turned-on condition for 5~10 seconds and then release the starter key.	
2) Press the buzzer stop switch for about 5 seconds and the "Adjust screen" is displayed. When adjusting data is not stored in mechatro controller, "READY" is displayed. And the adjustment is performed, "FIN" is displayed. * When required to carry out unload (C) adjustment only, select the feed mark on this display, and "ADJUST UNLOAD" are displayed. Determine this display with the select switch and carry out the adjustment.	
3) Press the select switch and "START ENG" is displayed. The "ENGINE SPEED", "P1 and P2 pump PRESSURE", and "STEP" (accel command voltage) are indicated.	
4) After starting engine, press the select switch and "MEMORY ENG" is displayed, the engine speed is raised automatically and simultaneously engine adjustment is performed. (When required to limit engine speed, press the select switch corresponding to engine speed and the engine adjustment operation is ended. Then the default value is written without carrying out "Torque (B) adjustment" and "Unload (C) adjustment".)	

PROCESS	MULTI DISPLAY (EXAMPLE)
5) The adjustment is completed in case where the high idling speed is detected properly. (The engine adjustment is ended by pressing buzzer stop switch during this display appeared. Then the default value is written without carrying out "Torque (B) adjustment" and "Unload (C) adjustment".)	FINISH ENG ENGINE SPEED 2000rpm PUMP PRESSURE C-1 2.0M C-2 2.0M STEP 400 

(4) PUMP ADJUSTMENT ("B" ADJUSTMENT)

PROCESS	MULTI DISPLAY (EXAMPLE)
1) The adjustment is automatically shifted from an engine adjustment to a pump adjustment. And also the engine speed increases from the low idling to the high idling. In addition, an unloading proportional valve and a pump proportional valve are actuated and the load to pump increases. The "ENGINE SPEED", "P1 and P2 pump PRESSURE", and "P1 and P2 pump proportional valve current (command value)" are indicated.	FINISH ENG ENGINE SPEED 2000rpm PUMP PRESSURE C-1 2.0M C-2 2.0M STEP 400 
2) The pump adjustment is completed automatically after the rated engine speed is detected. (The pump adjustment is ended by pressing buzzer stop switch during this display appeared. Then the default value is written without carrying out "Unload (C) adjustment.)	FINISH PUMP ENGINE SPEED 2000rpm PUMP PRESSURE C-1 34.0M C-2 34.0M PROPO-VALVE E-1 300mA E-2 300mA

(5) UNLOAD VALVE ADJUSTMENT ("C" ADJUSTMENT)

PROCESS	MULTI DISPLAY (EXAMPLE)
1) The adjustment is automatically shifted from a pump adjustment to an unload adjustment, the unloading proportional valve is actuated and pump pressure is detected. The "ENGINE SPEED", "P1 and P2 pump PRESSURE", and "P1 and P2 unload proportional valve current (command value)" are indicated.	MEMORY UNLOAD ENGINE SPEED 2000rpm PUMP PRESSURE C-1 2.0M C-2 2.0M PROPO-VALVE D-1 300mA D-2 300mA
2) After the unloading proportional valve moves to the specified value, the unload valve adjustment is completed. The adjusting current value is indicated to P1 and P2 pump unload proportional valve current. The adjusting range is usually 520~635mA. Stop the engine. (The adjusting value is automatically stored.)	FINISH UNLOAD ENGINE SPEED 2000rpm PUMP PRESSURE C-1 0.3M C-2 0.3M PROPO-VALVE E-1 575mA E-2 575mA

5. ATTACHMENT DIMENSIONS

5.1 BOOM

5.1.1 BOOM DIMENSIONAL DRAWING

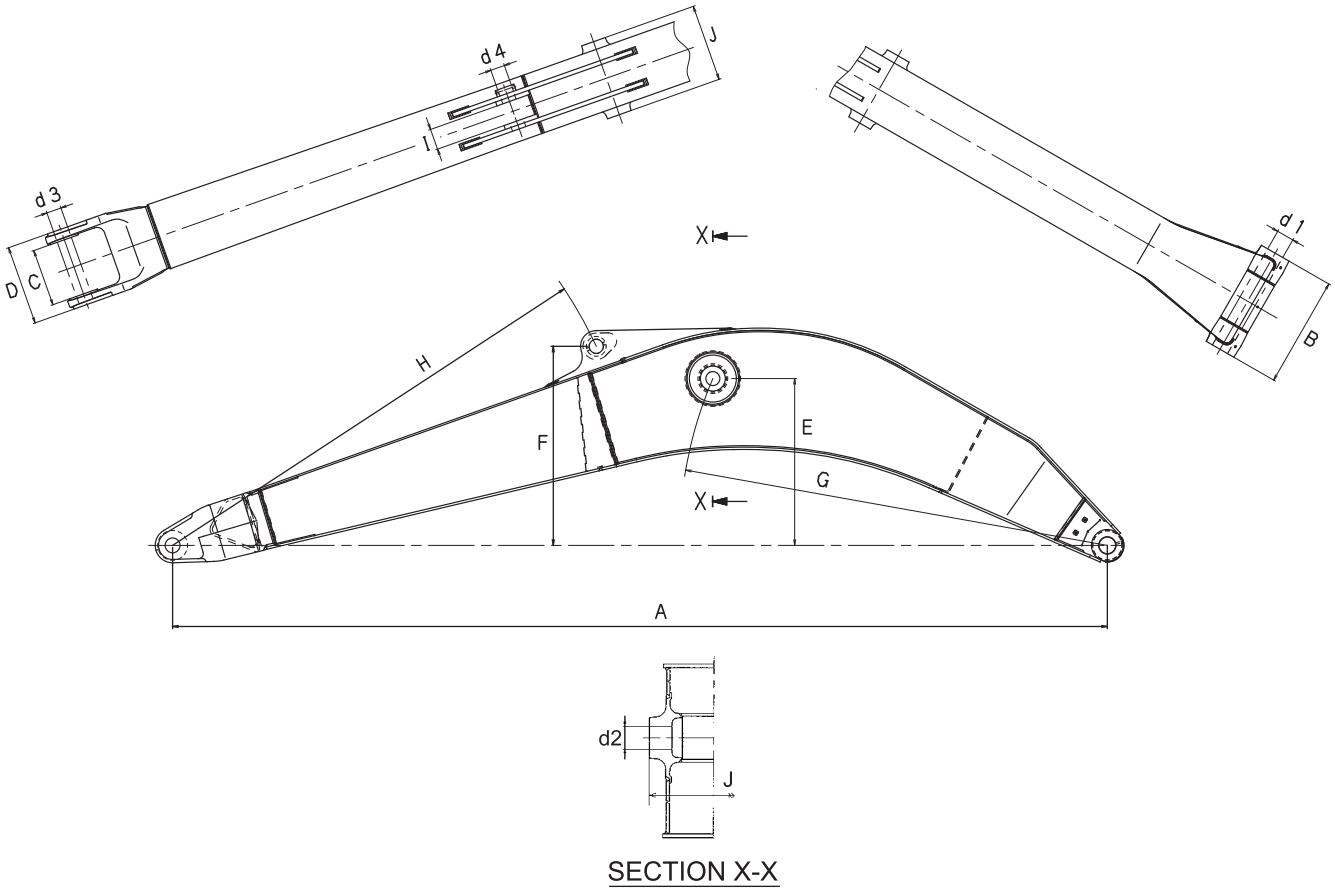


Fig. 5-1 Boom dimensional drawing (Shown in SK200-8)

Unit : mm (ft-in)

No	NAME	MODEL		
		SK140LC-8	SK200-8	SK250-8
		4.68 m	5.65 m	6.02 m
A	Boom length	4,680 (15'4")	5,650 (18'6")	6,020 (19'9")
B	Boom foot width	575 (22.6")	670 (26.4")	752 (29.6")
C	Boom end inner width	274 (10.8")	347 (13.7")	380 (15.0")
D	Boom end outer width	386 (15.2")	482 (19")	528 (20.8")
E	Height of boom cylinder rod pin	952 (37.5")	1,008.5 (3'4")	1,063 (3'6")
F	Height of arm cylinder (head side) pin	1,079 (3'6")	1,203.5 (3'11")	1,305 (4'3")
G	Distance between pins of boss	R2,110 (6'11")	R2,589 (8'6")	R2,437 (7'12")
H	Distance between pins of bracket	R2,293 (7'6")	R2,829.5 (9'3")	R3,009.5 (9'10")
I	Arm cylinder (head side) inner width	111 (4.4")	126 (4.96")	136 (5.35")
J	Outer width of bracket on the arm cylinder (rod side) mounting	399 (15.7")	468 (18.4")	522 (20.6")
d1	Boom foot pin dia.	ø 70 (2.76")	ø 90 (3.54")	ø 100 (3.94")
d2	Boom cylinder (rod side) pin dia.	ø 80 (3.15")	ø 85 (3.35")	ø 90(3.54")
d3	Pin dia. of boom end.	ø 70 (2.76")	ø 90 (3.54")	ø 90 (3.54")
d4	Arm cylinder (head side) pin dia.	ø 70 (2.76")	ø 85 (3.35")	ø 90(3.54")

Unit : mm (ft-in)

No	NAME	MODEL	
		SK330-8	SK450-8
		6.5 m	7.0 m
A	Boom length	6,500 (21'4")	7000 (23')
B	Boom foot width	826 (32.5")	926 (36.5")
C	Boom end inner width	405.8 (16.0")	449.8 (17.7")
D	Boom end outer width	577 (22.7")	627 (24.7")
E	Height of boom cylinder rod pin	1,115 (3'8")	1,162 (3'10")
F	Height of arm cylinder (head side) pin	1,460.8 (4'9.5")	1,476.8 (4'10")
G	Distance between pins of boss	R2,955 (9'8")	R3,069 (10'1")
H	Distance between pins of bracket	R3,390.5 (11'1.5")	R3,530 (11'7")
I	Arm cylinder (head side) inner width	146 (5.75")	166 (6.54")
J	Outer width of bracket on the arm cylinder (rod side) mounting	564 (22.2")	638 (25.1")
d1	Boom foot pin dia.	ø 125 (4.92")	ø 120 (4.72")
d2	Boom cylinder (rod side) pin dia.	ø 110 (4.33")	ø 120 (4.72")
d3	Pin dia. of boom end.	ø 110 (4.33")	ø 120 (4.72")
d4	Arm cylinder (head side) pin dia.	ø 110 (4.33")	ø 120 (4.72")

5.2 ARM

5.2.1 ARM DIMENSIONAL DRAWING

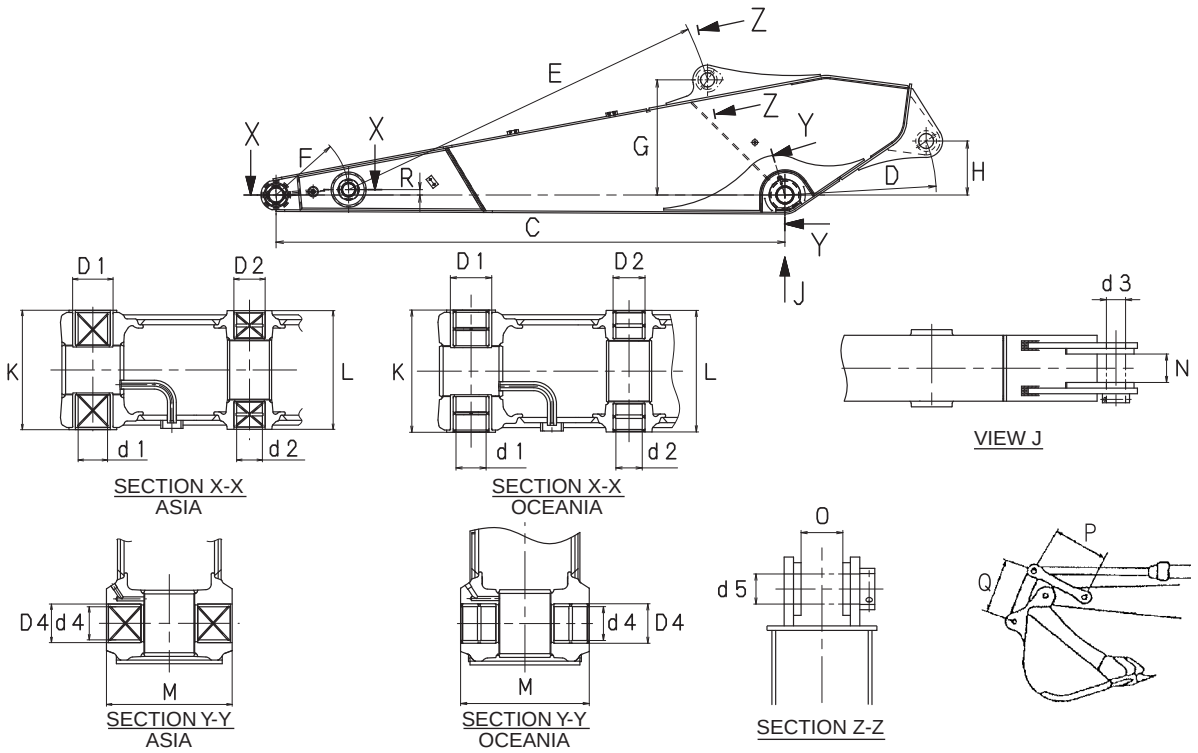


Fig. 5-2 Arm dimensional drawing

SK140LC-8

Unit : mm (ft-in)

Code	NAME	DIMENSION STD 2.38 m (7'10")	Code	NAME	DIMENSION STD 2.38 m (7'10")
C	Arm length	2,380 (7'10")	M	Boss width	269 (10.6")
D	Distance between pins of boss and bracket	R625 (24.6")	N	Bracket inner width	110 (4.33")
D1	I.D of boss	ø95 (3.74")	O	Bracket inner width	91 (3.58")
D2	I.D of boss	ø75 (2.95")	P	Idler link dimension	514 (20.2")
D4	I.D of boss	ø85 (3.35")	Q	Bucket link dimension	492 (19.4")
E	Distance between pins of boss and bracket	R1,862.8 (6'1")	R	Height between pins of boss and center	20 (0.79")
F	Distance between pins of boss and boss	R350 (13.8")	d1	Pin dia.	ø65 (2.56")
G	Height between pins of boss and bracket	462.3 (18.2")	d2	Pin dia.	ø60 (2.36")
H	Height between pins of boss and bracket	200 (7.9")	d3	Pin dia.	ø70 (2.76")
K	Arm top end boss width	250 (9.8")	d4	Pin dia.	ø70 (2.76")
L	Arm link section boss width	254 (10.0")	d5	Pin dia.	ø60 (2.36")

SK200-8

Unit : mm (ft-in)

Code	NAME	DIMENSION			Code	NAME	DIMENSION		
		STD	Short	Long			STD	Short	Long
		2.94 m (9'8")	2.4 m (7'10")	3.5 m (11'6")			2.94 m (9'8")	2.4 m (7'10")	3.5 m (11'6")
C	Arm length	2,940 (9'8")	2,400 (7'10")	3,500 (11'6")	M	Boss width	342 (13.5")	←	←
D	Distance between pins of boss and bracket	R874 (34.4")	R906.5 (35.7")	R894 (35.2")	N	Bracket inner width	126 (4.96")	←	←
D1	I.D of boss	ø110 (4.33")	←	←	O	Bracket inner width	111 (4.37")	←	←
D2	I.D of boss	ø85 (3.35")	←	←	P	Idler link dimension	630 (24.8")	←	←
D4	I.D of boss	ø105 (4.13")	←	←	Q	Bucket link dimension	610 (24")	←	←
E	Distance between pins of boss and bracket	R2,169 (7'1")	←	←	R	Height between pins of boss and center	31 (1.22")	30.5 (1.20")	31.3 (1.23")
F	Distance between pins of boss and boss	R420 (16.5")	←	←	d1	Pin dia.	ø80 (3.15")	←	←
G	Height between pins of boss and bracket	665.5 (26.2")	662.5 (26.1")	667.5 (26.3")	d2	Pin dia.	ø70 (2.76")	←	←
H	Height between pins of boss and bracket	312 (12.3")	384 (15.1")	280 (11.0")	d3	Pin dia.	ø85 (3.35")	←	←
K	Arm top end boss width	325 (12.8")	←	←	d4	Pin dia.	ø90 (3.54")	←	←
L	Arm link section boss width	323 (12.7")	←	←	d5	Pin dia.	ø80 (3.15")	←	←

SK250-8

Unit : mm (ft-in)

Code	NAME	DIMENSION			Code	NAME	DIMENSION		
		STD	Short	Long			STD	Short	Long
		2.98 m (9'9")	2.5 m (8'2")	3.66 m (12'0")			2.98 m (9'9")	2.5 m (8'2")	3.66 m (12'0")
C	Arm length	2,980 (9'9")	2,500 (8'2")	3,660 (12'0")	M	Boss width	375 (14.8")	←	←
D	Distance between pins of boss and bracket	R930.5 (36.6")	R965 (38.0")	R919 (36.2")	N	Bracket inner width	136 (5.35")	←	←
D1	I.D of boss	ø120 (4.72")	←	←	O	Bracket inner width	113 (4.45")	←	←
D2	I.D of boss	ø85 (3.35")	←	←	P	Idler link dimension	695 (27.4")	←	←
D4	I.D of boss	ø105 (4.13")	←	←	Q	Bucket link dimension	636 (25.0")	←	←
E	Distance between pins of boss and bracket	R2,394 (7'10")	←	←	R	Height between pins of boss and center	37 (1.46")	36.7 (1.44")	37.3 (1.47")
F	Distance between pins of boss and boss	R450 (17.7")	←	←	d1	Pin dia.	ø90 (3.54")	←	←
G	Height between pins of boss and bracket	684 (26.9")	←	←	d2	Pin dia.	ø70 (2.76")	←	←
H	Height between pins of boss and bracket	312 (12.3")	387 (15.2")	321 (12.6")	d3	Pin dia.	ø90 (3.54")	←	←
K	Arm top end boss width	325 (12.8")	←	←	d4	Pin dia.	ø90 (3.54")	←	←
L	Arm link section boss width	332 (13.1")	←	←	d5	Pin dia.	ø80 (3.15")	←	←

SK330-8

Unit : mm (ft-in)

Code	NAME	DIMENSION			Code	NAME	DIMENSION		
		STD	Short	Long			STD	Short	Long
		3.3 m (10'10")	2.6 m (8'6")	4.15 m (13'7")			3.3 m (10'10")	2.6 m (8'6")	4.15 m (13'7")
C	Arm length	3,300 (10'10")	2,600 (8'6")	4,150 (13'7")	M	Boss width	400 (15.75")	←	←
D	Distance between pins of boss and bracket	R1,010 (3'4")	R1,080 (3'6.5")	R1,018 (3'4.1")	N	Bracket inner width	146 (5.75")	←	←
D1	I.D of boss	ø120 (4.72")	←	←	O	Bracket inner width	136 (5.35")	←	←
D2	I.D of boss	ø95 (3.74")	←	←	P	Idler link dimension	696 (27.4")	←	←
D4	I.D of boss	ø125 (4.92")	←	←	Q	Bucket link dimension	686 (27.0")	←	←
E	Distance between pins of boss and bracket	R2,429.5 (7'12")	R2,440 (8'0")	R2,429 (7'12")	R	Height between pins of boss and center	44 (1.73")	60 (2.36")	44.5 (1.75")
F	Distance between pins of boss and boss	R515 (20.3")	←	←	d1	Pin dia.	ø90 (3.54")	←	←
G	Height between pins of boss and bracket	735.5 (29.0")	864 (34.0")	740 (29.1")	d2	Pin dia.	ø80 (3.15")	←	←
H	Height between pins of boss and bracket	280 (11.0")	392 (15.4")	239 (9.41")	d3	Pin dia.	ø110 (4.38")	←	←
K	Arm top end boss width	380 (15.0")	←	←	d4	Pin dia.	ø110 (4.33")	←	←
L	Arm link section boss width	390 (15.4")	←	←	d5	Pin dia.	ø90 (3.54")	←	←

SK460-8

Unit : mm (ft-in)

Code	NAME	DIMENSION			Code	NAME	DIMENSION		
		STD	Short	Long			STD	Short	Long
		3.45 m (11'4")	3.0 m (9'10")	4.9 m (16'1")			3.45 m (11'4")	3.0 m (9'10")	4.9 m (16'1")
C	Arm length	3,450 (11'4")	3,000 (9'10")	4,900 (16'1")	M	Boss width	444 (17.5")	←	←
D	Distance between pins of boss and bracket	R1,140 (3'9")	R1,139 (3'8.8")	R1,140.5 (3'8.9")	N	Bracket inner width	166 (6.54")	←	←
D1	I.D of boss	ø140 (5.51")	←	←	O	Bracket inner width	166 (6.54")	←	←
D2	I.D of boss	ø115 (4.53")	←	←	P	Idler link dimension	785 (30.9")	←	←
D4	I.D of boss	ø140 (5.51")	←	←	Q	Bucket link dimension	680 (26.8")	←	←
E	Distance between pins of boss and bracket	R2,728 (8'11")	R2,737 (8'12")	R2,737.5 (8'12")	R	Height between pins of boss and center	48 (1.89")	43 (1.69")	37 (1.46")
F	Distance between pins of boss and boss	R540 (21.3")	←	←	d1	Pin dia.	ø100 (3.94")	←	←
G	Height between pins of boss and bracket	858 (33.8")	914 (36.0")	859.5 (33.8")	d2	Pin dia.	ø100 (3.94")	←	←
H	Height between pins of boss and bracket	479 (18.9")	595 (23.4")	514 (20.2")	d3	Pin dia.	ø120 (4.72")	←	←
K	Arm top end boss width	450 (17.7")	←	←	d4	Pin dia.	ø120 (4.72")	←	←
L	Arm link section boss width	446 (17.6")	←	←	d5	Pin dia.	ø100 (3.94")	←	←

5.3 BUCKET

5.3.1 BUCKET DIMENSIONAL DRAWING

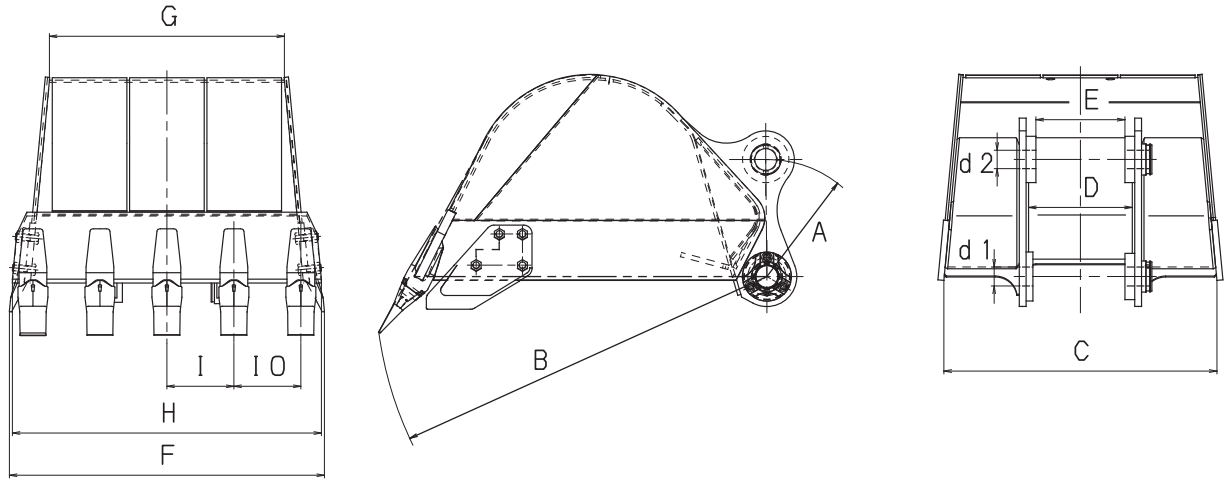


Fig. 5-3 Bucket dimensional drawing

No.	NAME	No.	NAME
A	Distance between pin and bracket	G	Inner width of bucket bottom
B	Distance between bucket pin and tooth end	H	Bucket outer width of front side
C	Inner width of bucket top end	I	Pitch between teeth
D	Inner width of lug	Io	Pitch between teeth
E	Inner width of bracket	d1	Outer dia. of bushing
F	Outer width of side cutter	d2	Pin dia.

SK140LC-8 Unit : mm (ft-in)

Type	Normal digging						
Capacity	0.24 m³ (0.31 cu•yd)	0.31 m³ (0.41 cu•yd)	0.38 m³ (0.50 cu•yd)	0.45 m³ (0.59 cu•yd)	[STD] 0.50 m³ (0.65 cu•yd)	0.57 m³ (0.75 cu•yd)	0.70 m³ (0.90 cu•yd)
Part No.	YY61B00079F1	YY61B00080F1	YY61B00081F1	YY61B00075F1	YY61B00072F1	YY61B00082F1	YY61B00083F1
A	R376 (14.8")	←	←	←	←	←	←
B	R1,225 (4'0.23")	←	←	←	←	←	←
C	462 (18.2")	562 (22.1")	662 (26.1")	772 (30.4")	863 (34.0")	962 (37.9")	1,112 (3'7.8")
D	324 (12.8")	←	←	←	←	←	←
E	252 (9.9")	←	←	←	←	←	←
F	593 (23.3")	700 (27.6")	800 (31.5")	910 (35.8")	1,000 (3'3.37")	1,100 (3'3.7")	-
G	383 (15.1")	439 (17.3")	539 (21.2")	649 (25.6")	739 (29.1")	839 (33.0")	989 (39.0")
H	500 (19.7")	600 (23.6")	700 (27.6")	772 (30.4")	903 (35.6")	1,000 (3'3.37")	1,150 (3'9.3")
I	187 (7.4")	237 (9.3")	191 (7.5")	228 (9.0")	192.5 (7.6")	218.5 (8.6")	256 (10.1")
IO	187 (7.4")	237 (9.3")	191 (7.5")	228 (9.0")	192.5 (7.6")	218.5 (8.6")	256 (10.1")
d1	ø 80 (3.2")	←	←	←	←	←	←
d2	ø 65 (2.6")	←	←	←	←	←	←

Bucket capacity : SAE heaped (Stuck)

SK200-8

Unit : mm (ft-in)

Type	Hoe bucket				
Capacity	[SE. Asia STD] 0.80 m³ (1.05 cu•yd) Side pin type	[Oceania STD] 0.80 m³ (1.05 cu•yd)	0.51 m³ (0.67 cu•yd)	0.70 m³ (0.92 cu•yd)	0.93 m³ (1.21 cu•yd)
A	R430 (16.9")	←	←	←	←
B	R1,440 (4'9")	←	←	←	←
C	1,003 (3'3")	←	712 (28")	925 (36.4")	1,176 (3'10")
D	399 (15.7")	←	←	←	←
E	327 (12.9")	←	←	←	←
F	1,157 (4')	←	868 (34.2")	1,079 (3'6")	1,330 (4'4")
G	863 (34")	←	572 (22.5")	785 (30.9")	1,036 (3'5")
H	1,057 (3'6")	←	766 (30.2")	979 (38.5")	1,230 (4')
I	224 (8.82")	←	300 (11.8")	203 (7.99")	266 (10.5")
IO	224 (8.82")	←	300 (11.8")	203 (7.99")	266 (10.5")
d1	ø 95 (3.74")	←	←	←	←
d2	ø 80 (3.15")	←	←	←	←

SK250-8

Unit : mm (ft-in)

Type	Hoe bucket			
Capacity	0.81 m³ (1.06 cu•yd) Side pin type	[STD] 1.00 m³ (1.31 cu•yd))	1.20 m³ (1.57 cu•yd))	1.40 m³ (1.83 cu•yd))
A	R500 (19.7")	←	←	←
B	R1,515 (4'12")	←	←	←
C	896 (35.3")	1,115 (3'8")	1,276 (4'2")	1,443 (4'9")
D	399 (15.7")	←	←	←
E	327 (12.9")	←	←	←
F	959 (37.8")	1,274 (4'2")	1,339 (4'5")	1,505 (4'11")
G	746 (29.4")	965 (38")	1,126 (3'8")	1,293 (4'3")
H	896 (35.3")	1,178 (3'10")	1,276 (4'2")	1,443 (4'9")
I	256 (10.1")	247 (9.7")	287 (11.3")	263 (10.4")
IO	256 (10.1")	247 (9.7")	287 (11.3")	263 (10.4")
d1	ø 105 (4.13")	←	←	←
d2	ø 90 (3.54")	←	←	←

5.3.2 LUG SECTION DIMENSIONAL DRAWING (SK140LC-8)

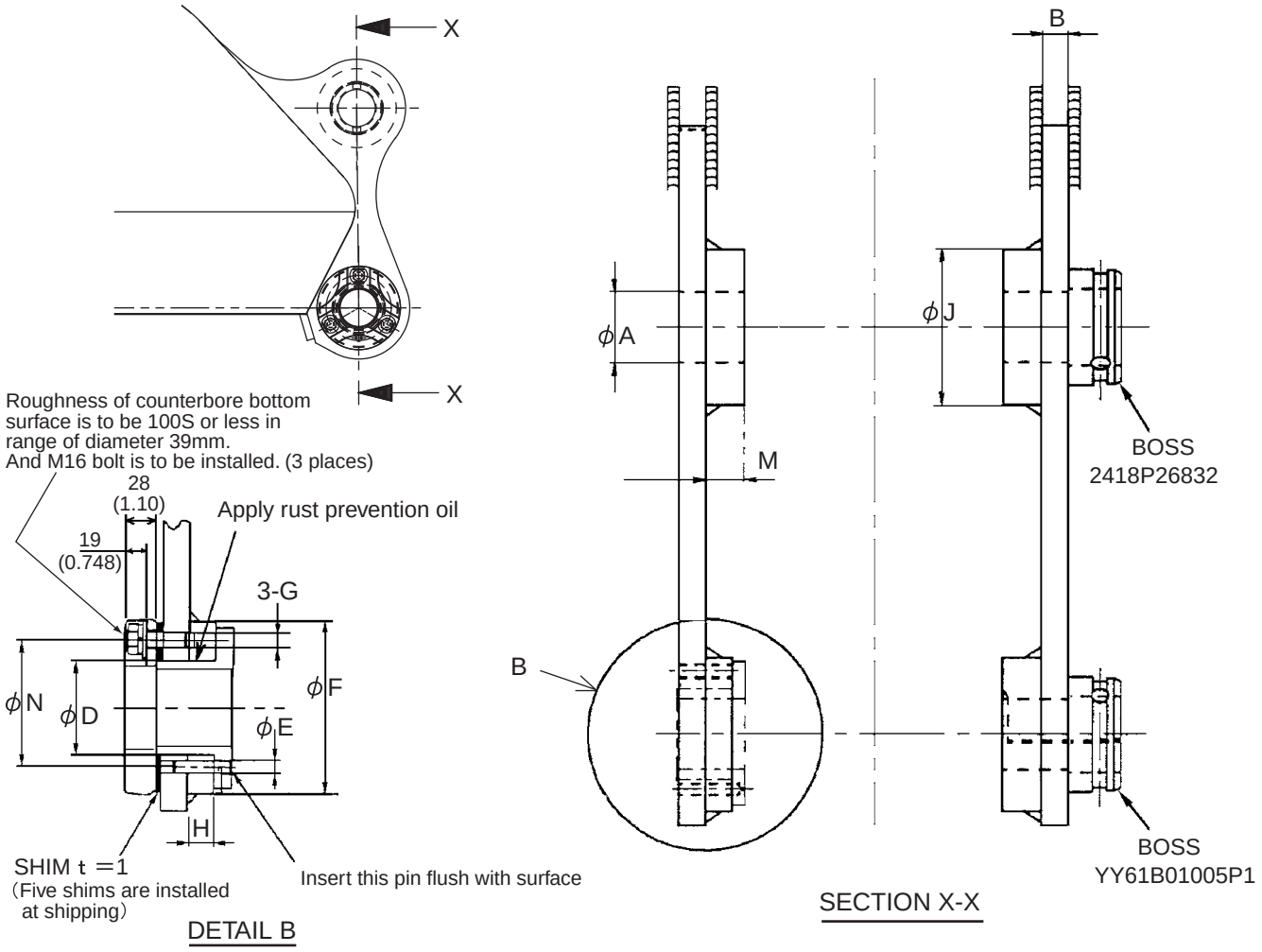


Fig. 5-4 Dimension of lug section

Unit : mm (ft-in)

NAME	Pin hole dia.	Lug plate thickness	Hole dia.	Spring pin dia.	Boss outer dia.	Screw dia.	Boss width.	Boss outer dia.	Boss width.	Screw hole P.C.D
NO.	A	B	D	E	F	G	H	J	M	N
SK140LC-8	ϕ65 (2.56")	22 (0.866")	ϕ80 (3.14")	ϕ10 (0.394")	ϕ146 (5.75")	M14	22 (0.866")	ϕ138 (5.43")	36 (1.42")	115 (4.53")

5.3.3 LUG SECTION DIMENSIONAL DRAWING (SK200-8, SK250-8)

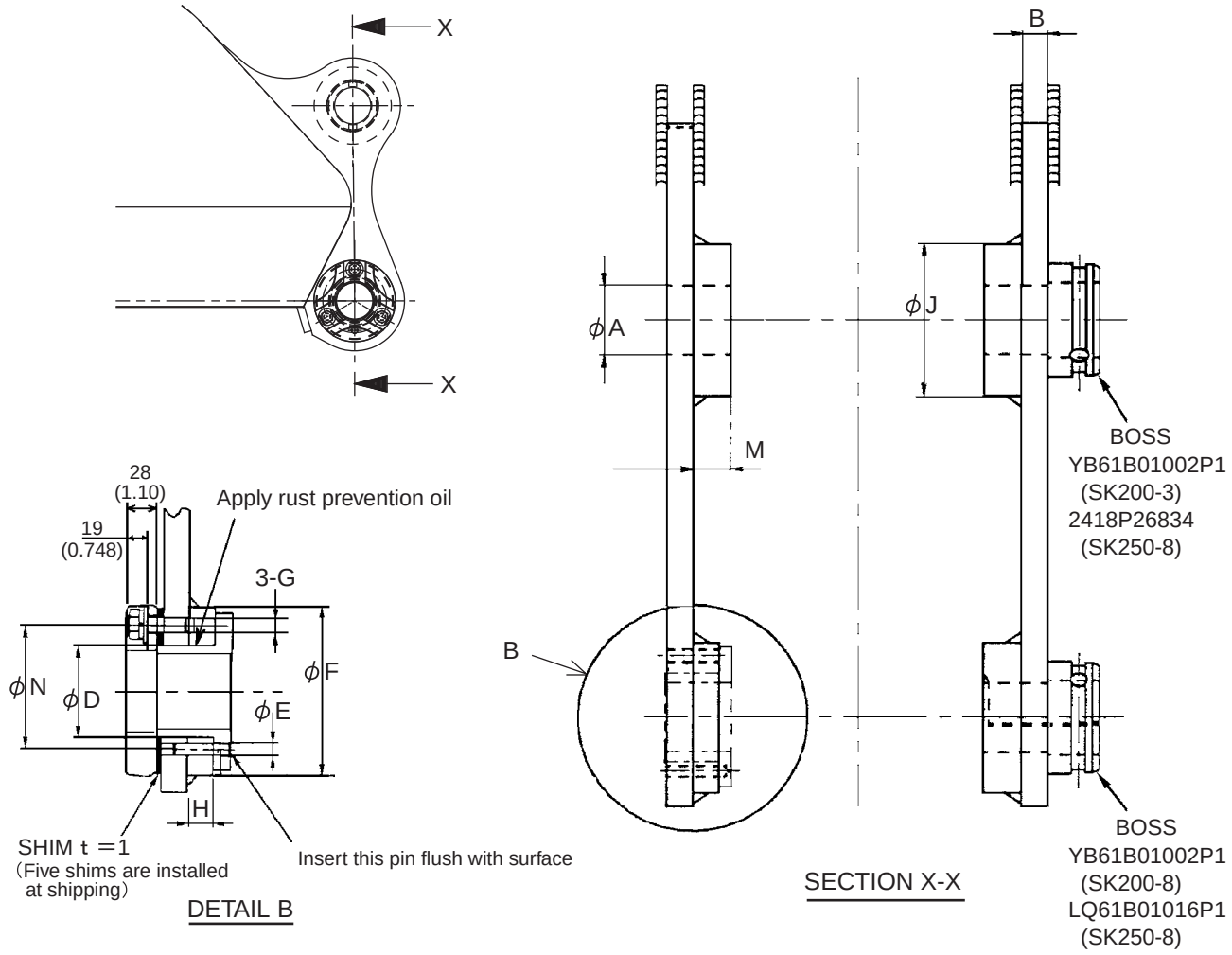


Fig. 5-5 Dimension of lug section

Unit : mm (ft-in)

NAME	Pin hole dia.	Lug plate thickness	Hole dia.	Spring pin dia.	Boss outer dia.	Screw dia.	Boss width.	Boss outer dia.	Boss width.	Screw hole P.C.D
No.	A	B	D	E	F	G	H	J	M	N
SK200-8	ϕ80 (3.15")	25 (0.984")	ϕ95 (3.74")	ϕ13 (0.512")	ϕ180 (7.09")	M16	25 (0.984")	ϕ170 (6.69")	36 (1.42")	140 (5.51")
SK250-8	ϕ90 (3.45")	25 (0.984")	ϕ105 (4.13")	ϕ13 (0.512")	ϕ190 (7.48")	M16	25 (0.984")	ϕ180 (7.09")	36 (1.42")	150 (5.91")

5.3.4 LUG SECTION DIMENSIONAL DRAWING (SK330-8)

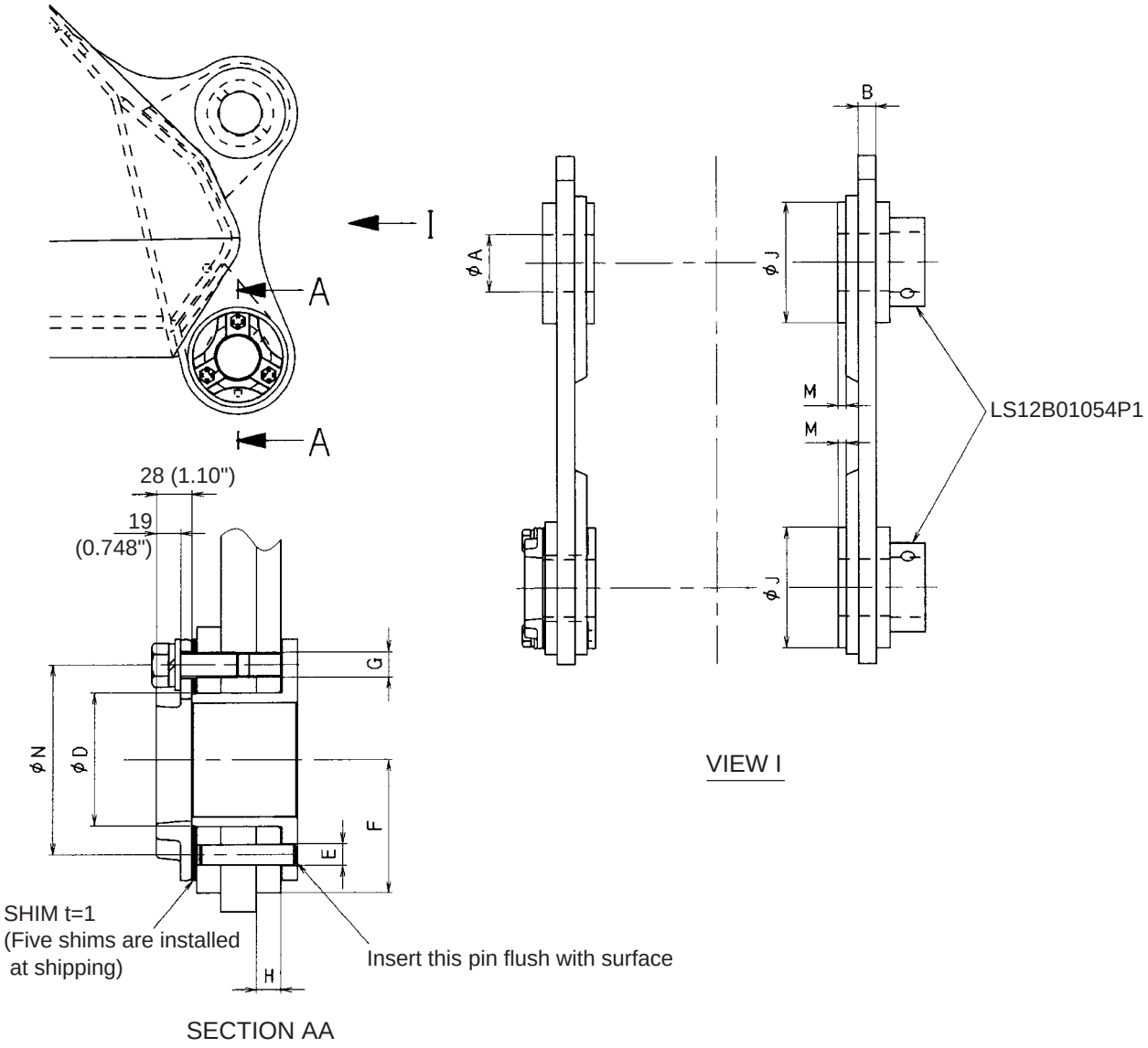


Fig. 5-6 Dimension of lug section

Unit : mm (ft-in)

NAME	Pin hole dia.	Lug plate thickness	Hole dia.	Spring pin dia.	Boss outer radius	Screw dia.	Plate thickness	Boss outer dia.	Boss width.	Screw hole P.C.D
No.	A	B	D	E	F	G	H	J	M	N
SK330-8	φ90 (3.54")	28 (1.10")	φ105 (4.13")	φ16 (0.63")	φ105 (4.13")	M20	19 (0.748")	φ190 (7.48")	12 (0.472")	150 (5.91")

5.3.5 LUG SECTION DIMENSIONAL DRAWING (SK460-8)

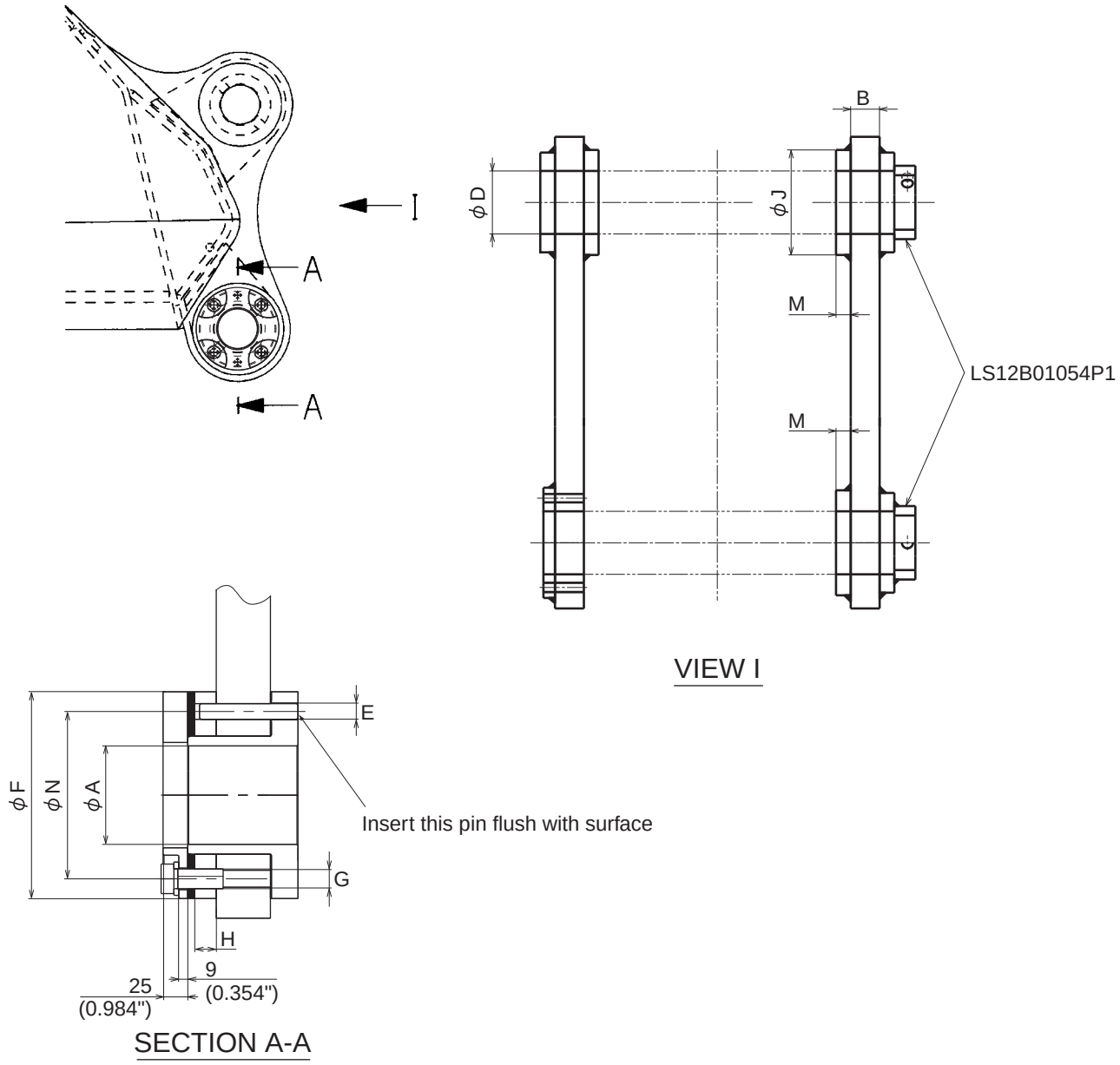


Fig. 5-7 Dimension of lug section

Unit : mm (ft-in)

NAME	Pin hole dia.	Lug plate thickness	Hole dia.	Spring pin dia.	Boss outer dia.	Screw dia.	Boss width.	Boss outer dia.	Boss width.	Screw hole P.C.D
No.	A	B	D	E	F	G	H	J	M	N
SK460-8	φ100 (3.94")	36 (1.42")	φ120 (4.72")	φ16 (0.63")	φ220 (8.66")	M20	22 (0.87")	φ195 (7.68")	28 (1.10")	170 (6.69")

5.3.6 BOSS SECTION DIMENSIONAL DRAWING (SK140LC-8, SK200-8, SK250-8)

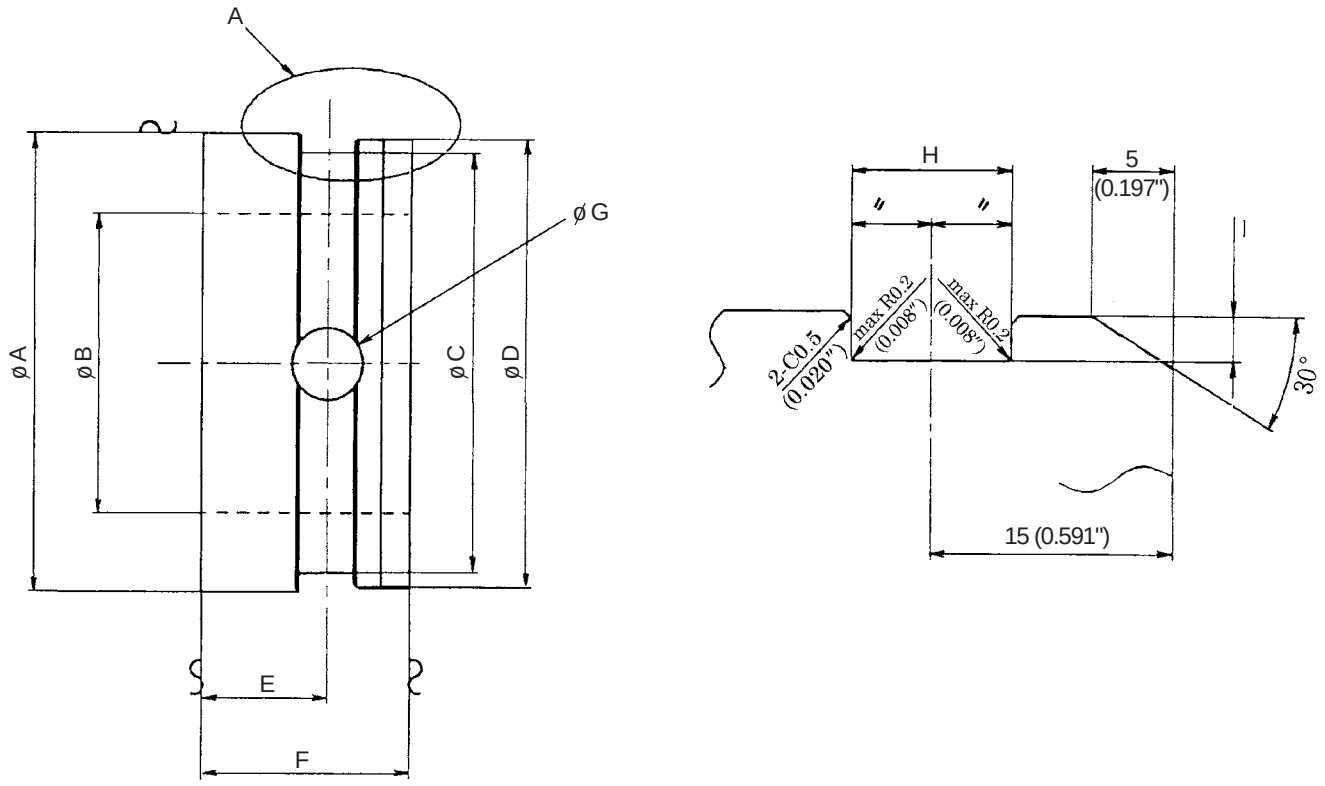


Fig. 5-8 Dimension of boss section

Unit : mm (ft-in)

	Part No. of boss	øA	øB	øC	øD	E	F	øG	H	I
SK140LC-8	YY61B01005P1	101.6 (4.0")	69 (2.72")	94.5 (3.72")	99.5 (3.92")	15 (0.591")	30 (1.18")	15 (0.591")	13 (0.512")	2.5 (0.098")
	2418P26832	↑	↑	↑	↑	19 (0.748")	34 (1.34")	↑	↑	↑
SK200-8	YB61B01002P1	114.3 (4.50")	84 (3.31")	105.5 (4.15")	111.5 (4.39")	23 (0.91")	38 (1.50")	17 (0.669")	13 (0.512")	2.5 (0.098")
SK250-8	LQ61B01016P1	127 (5.00")	94 (3.7")	118.5 (4.67")	124.5 (4.9")	15 (0.59")	30 (1.18")	17 (0.669")	13 (0.512")	3.0 (0.12")
	2418P26834	↑	↑	↑	↑	19 (0.75")	34 (1.34")	↑	↑	↑

5.3.7 BOSS SECTION DIMENSIONAL DRAWING (SK330-8, SK460-8)

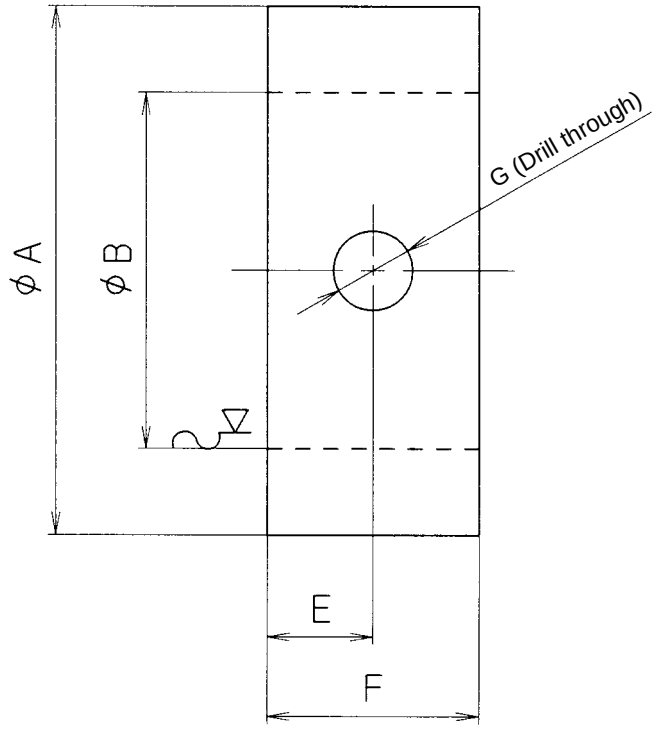


Fig. 5-9 Dimension of boss section

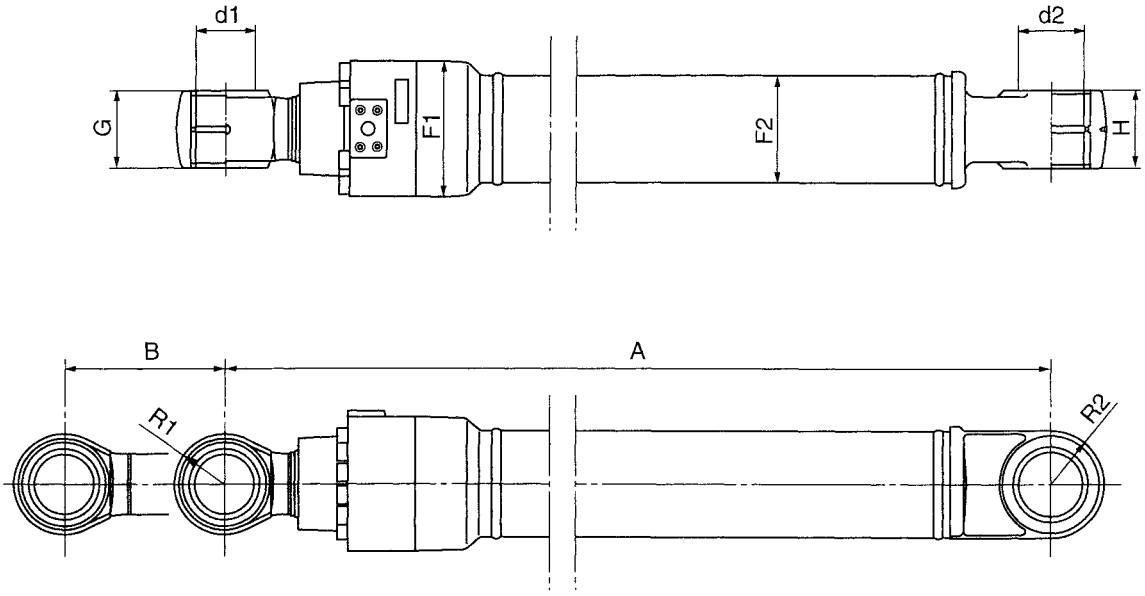
Unit : mm (ft-in)

	Part No. of boss	øA	øB	E	F	øG
SK330-8	LS12B01054P1	139.8 (5.50")	103.8 (4.09")	15 (0.591")	40 (1.58")	21 (0.827")
SK460-8						

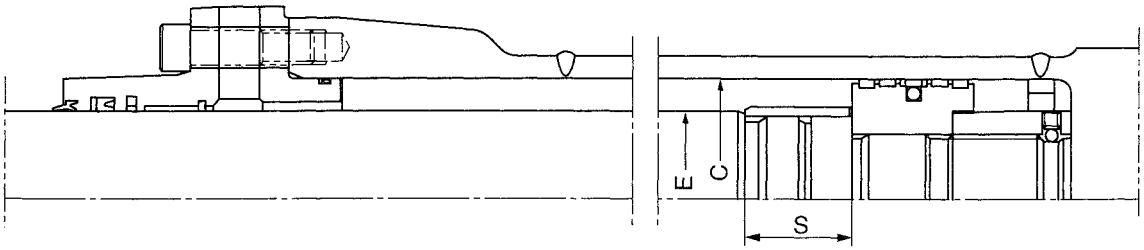
5.4 CYLINDER

5.4.1 HYDRAULIC CYLINDER

BOOM, ARM, BUCKET CYLINDER



BOOM, BUCKET CYLINDER (ROD SIDE CUSHION)



ARM CYLINDER (BOTH SIDE CUSHION)

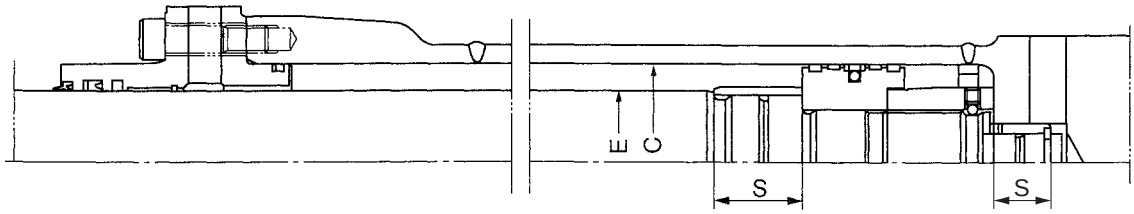


Fig. 5-10 Cylinder dimensions

Unit:mm (ft-in)

MODEL	USE	PART No. OF CYLINDER ASSY	A	B	ϕC	ϕE	ϕF1	ϕF2	G	H	R1	R2	ϕd1	ϕd2	DRY WEIGHT kg (lbs")	CUSHION ROD SIDE	CUSHION BOTTOM SIDE	REMARK
SK140LC-8	BOOM	YY01V00053F2	1,556 (5'1")	1,092 (3'7")	100 (3.94")	70 (2.76")	150 (5.91")	117 (4.61")	80 (3.15")	90 (3.54")	70 (2.76")	60 (2.36")	80 (3.15")	70 (2.76")	101 (223)	O S:50		
	ARM	YY01V00054F3	1,715 (5'8")	1,120 (3'8")	115 (4.53")	80 (3.15")	175 (6.89")	137 (5.39")	105 (4.13")	105 (4.13")	70 (2.76")	70 (2.76")	70 (2.76")	70 (2.76")	148 (326)	O S:60	O S:45	
	BUCKET	YY01V00055F3	1,390 (4'7")	903 (3'0")	95 (3.74")	65 (2.56")	145 (5.71")	111 (4.37")	85 (3.35")	85 (3.35")	60 (2.36")	60 (2.36")	65 (2.56")	60 (2.36")	98 (216)	O S:50		
SK200-8	BOOM	YN01V00151F1	1,844 (6'1")	1,355 (4'5")	120 (4.72")	85 (3.34")	181 (7.13")	139 (5.47")	105 (4.13")	105 (4.13")	70 (2.76")	75 (2.95")	85 (3.35")	85 (3.35")	166 (366)	O S:50		
	ARM	YN01V00175F1	2,079 (6'10")	1,558 (5'1")	135 (5.32")	95 (3.74")	207 (8.15")	162 (6.38")	120 (4.72")	120 (4.72")	80 (3.15")	80 (3.15")	85 (3.35")	85 (3.35")	249 (549)	O S:60	O S:40	OCE
		YN01V00175F2																SE.ASIA
	BUCKET	YN01V00153F1	1,595 (5'3")	1,080 (3'7")	120 (4.72")	80 (3.15")	181 (7.13")	140 (5.51")	105 (4.13")	105 (4.13")	70 (2.76")	70 (2.76")	80 (3.15")	80 (3.15")	149 (329)	O S:50		OCE
		YN01V00153F2																SE.ASIA
SK250-8	BOOM	LQ01V00028F1	1,810 (5'11")	1,235 (4'1")	135 (5.31")	95 (3.74")	207 (8.15")	160 (6.30")	120 (4.72")	120 (4.72")	85 (3.35")	85 (3.35")	90 (3.54")	90 (3.54")	223 (492)	O S:50		
	ARM	LQ01V00038F1	2,221 (7'3")	1,635 (5'4")	145 (5.71")	105 (4.13")	220 (8.66")	176 (6.93")	130 (5.12")	130 (5.12")	90 (3.54")	90 (3.54")	90 (3.54")	90 (3.54")	331 (730)	O S:60	O S:40	OCE
		LQ01V00038F2																SE.ASIA
	BUCKET	LQ01V00030F1	1,762 (5'9")	1,200 (3'11")	125 (4.92")	85 (3.35")	188 (7.40")	148 (5.83")	107 (4.21")	107 (4.21")	83 (3.27")	70 (2.76")	80 (3.15")	80 (3.15")	192 (423)	O S:50		OCE
		LQ01V00030F2																SE.ASIA
SK330-8	BOOM	LC01V00044F1	2,101 (6'11")	1,550 (5'1")	140 (5.51")	100 (3.94")	207 (8.15")	165 (6.50")	130 (5.12")	130 (5.12")	90 (3.54")	85 (3.35")	110 (4.33")	100 (3.94")	269 (593)	O S:60		
	ARM	LC01V00054F1	2,493 (8'2")	1,788 (5'10")	170 (6.69")	120 (4.72")	268 (10.6")	206 (8.11")	140 (5.51")	140 (5.51")	110 (4.33")	110 (4.33")	110 (4.33")	110 (4.33")	504 (1,111)	O S:60	O S:45	OCE
		LC01V00054F2																SE.ASIA
	BUCKET	LC01V00055F1	1,812 (5'11")	1,193 (3'11")	150 (5.91")	100 (3.94")	227 (8.94")	178 (7.00")	130 (5.12")	130 (5.12")	90 (3.54")	85 (3.35")	90 (3.54")	90 (3.54")	265 (584)	O S:60		OCE
		LC01V00055F2																SE.ASIA
SK460-8	BOOM	LS01V00055F1	2,200 (7'3")	1,590 (5'3")	170 (6.69")	115 (4.53")	232 (9.13")	200 (7.87")	140 (5.51")	150 (5.91")	110 (4.33")	110 (4.33")	120 (4.72")	110 (4.33")	395 (871)	O S:60		
	ARM	LS01V00056F1	2,630 (8'8")	1,970 (6'6")	190 (7.48")	130 (5.12")	275 (10.8")	223 (8.78")	160 (6.30")	160 (6.30")	110 (4.33")	110 (4.33")	120 (4.72")	120 (4.72")	584 (1,288)	O S:60	O S:60	
	BUCKET	LS01V00057F1	2,020 (6'8")	1,410 (4'8")	160 (6.30")	110 (4.33")	222 (8.74")	188 (7.40")	160 (6.30")	160 (6.30")	110 (4.33")	100 (3.94")	100 (3.94")	100 (3.94")	359 (792)	O S:60		

5.5 SHAPE AND DIMENSIONS OF PIN

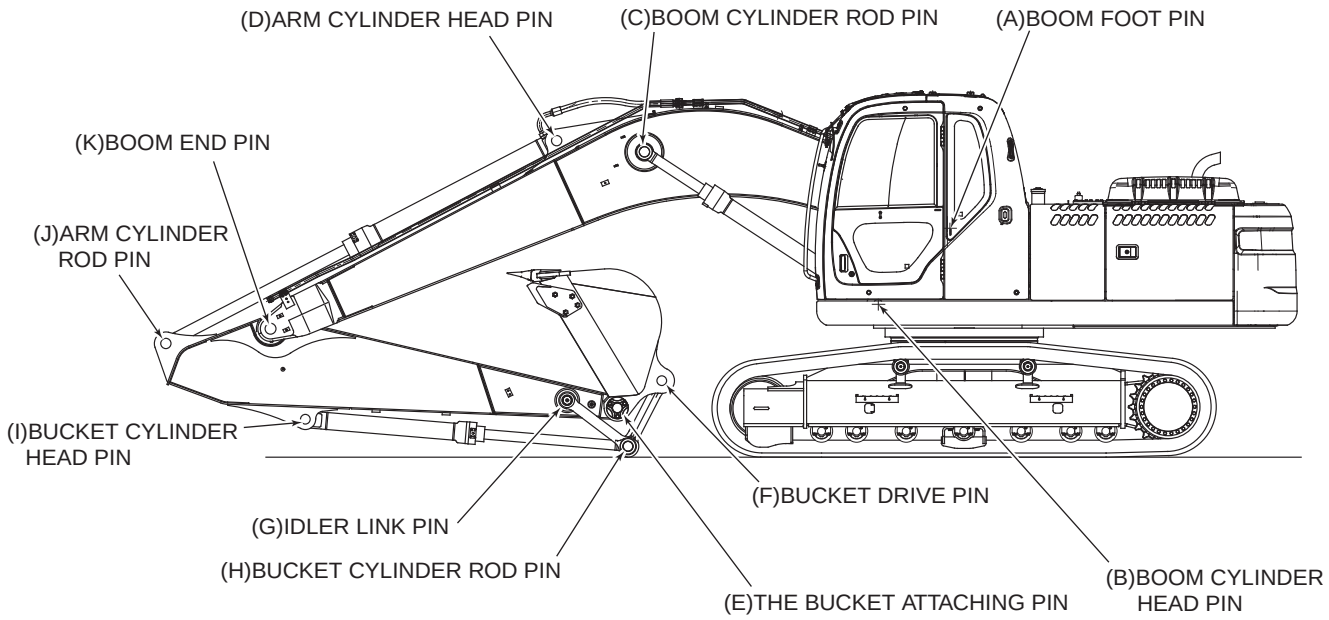
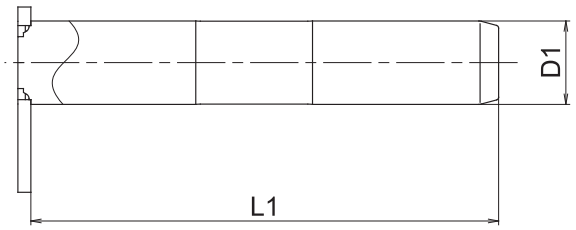


Fig. 5-11 Pin position (Shown in SK200-8)

5.5.1 SHAPE OF PIN

1



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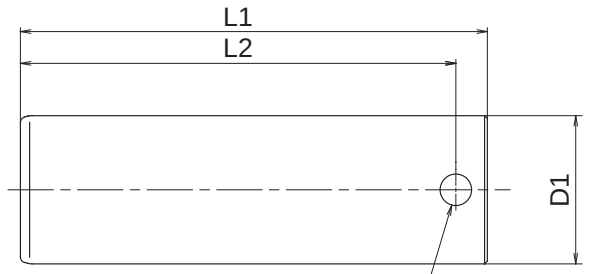
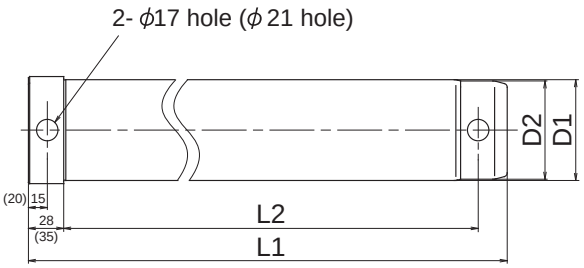


A number in a parenthesis shows SK330-8, SK460-8

3



A number in a parenthesis shows SK330-8, SK460-8

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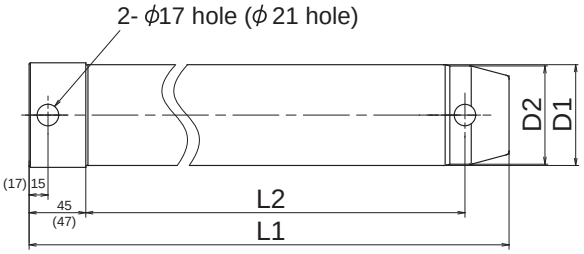
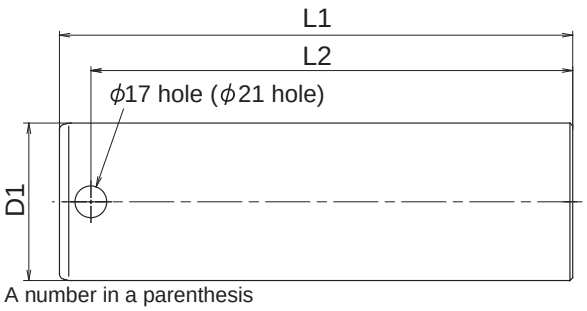


A number in a parenthesis shows SK330-8

5



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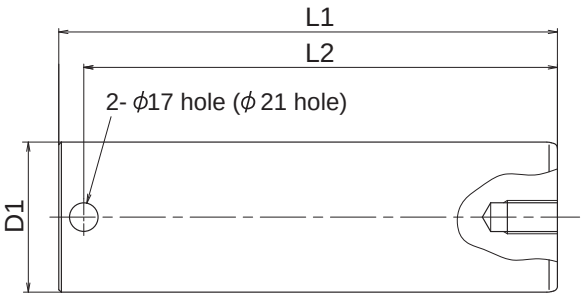
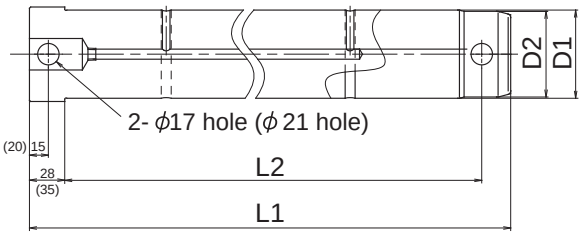
6



A number in a parenthesis shows SK330-8

7



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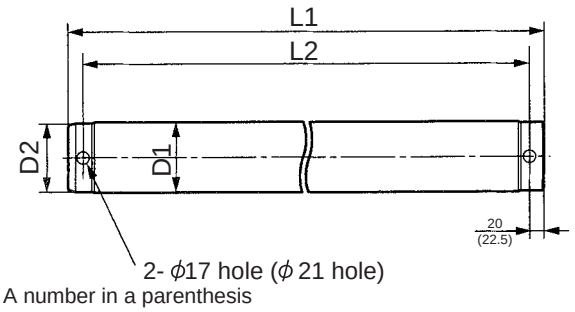
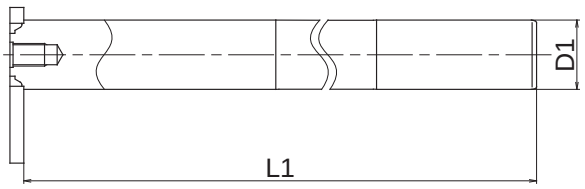


A number in a parenthesis shows SK330-8, SK460-8

9



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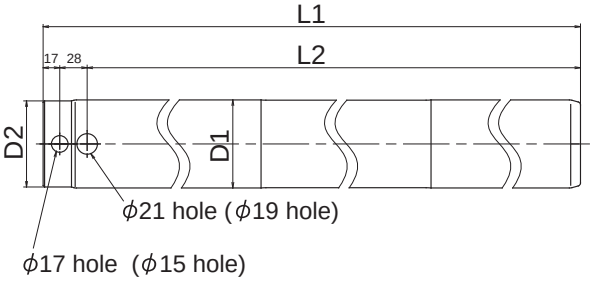

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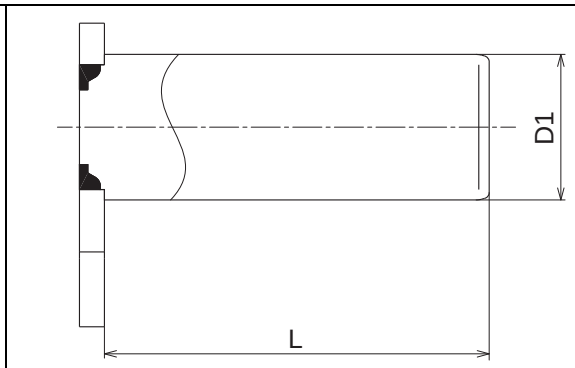
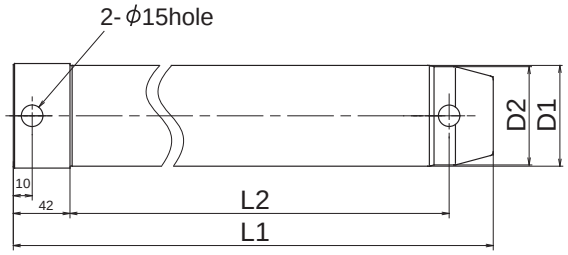
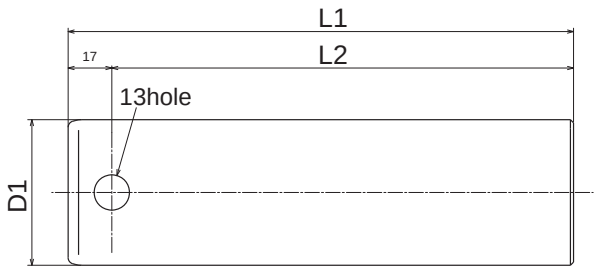
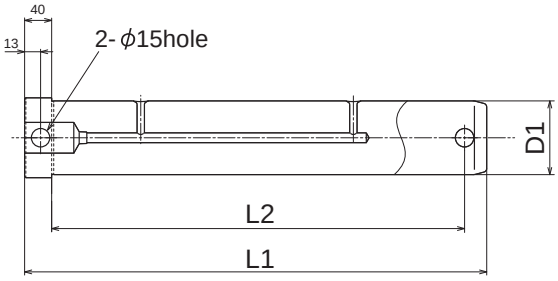
11		13	
12		14	

5.5.2 DIMENSIONS OF PIN

Unit : mm (in)

NAME	MODEL / TYPE	SK140LC-8				
		TYPE OF PIN	L1	L2	øD1	øD2
A	BOOM FOOT PIN	10	777 (30.59)	732 (28.82)	70 (2.76)	68 (2.68)
B	BOOM CYLINDER HEAD PIN	11	194 (7.64)	—	70 (2.76)	—
C	BOOM CYLINDER ROD PIN	8	637 (25.08)	597 (23.50)	80 (3.15)	77 (3.03)
D	ARM CYLINDER HEAD PIN	12	243 (9.57)	222 (8.74)	70 (2.76)	—
E	THE BUCKET ATTACHING PIN	13	470 (18.50)	391 (15.39)	65 (2.56)	63 (2.48)
F	BUCKET DRIVE PIN	13	470 (18.50)	391 (15.39)	65 (2.56)	63 (2.48)
G	IDLER LINK PIN	14	376 (14.80)	336 (13.23)	60 (2.36)	—
H	BUCKET CYLINDER ROD PIN	14	376 (14.80)	336 (13.23)	65 (2.56)	—
I	BUCKET CYLINDER HEAD PIN	12	207 (8.15)	190 (7.48)	60 (2.36)	—
J	ARM CYLINDER ROD PIN	12	243 (9.57)	222 (8.74)	70 (2.76)	—
K	BOOM TOP PIN	1	399 (15.71)	—	70 (2.76)	—

Unit : mm (in)

NAME	MODEL / TYPE	SK200-8					SK250-8				
		TYPE OF PIN	L1	L2	øD1	øD2	TYPE OF PIN	L1	L2	øD1	øD2
A	BOOM FOOT PIN	10	876 (34.49)	831 (32.72)	90 (3.54)	88 (3.46)	1	921 (36.26)	—	100 (3.94)	—
B	BOOM CYLINDER HEAD PIN	2	258 (10.16)	241 (9.49)	85 (3.35)	—	6	299 (11.77)	284 (11.18)	90 (3.54)	—
C	BOOM CYLINDER ROD PIN	8	776 (30.55)	736 (28.98)	85 (3.35)	83 (3.27)	8	850 (33.46)	810 (31.89)	90 (3.54)	88 (3.46)
D	ARM CYLINDER HEAD PIN	5	277 (10.91)	260 (10.24)	85 (3.35)	—	5	296 (11.65)	274 (10.79)	90 (3.54)	—
E	THE BUCKET ATTACHING PIN	4	561 (22.09)	481 (18.94)	80 (3.15)	78 (3.07)	4	552 (21.73)	472 (18.58)	90 (3.54)	88 (3.46)
F	BUCKET DRIVE PIN	4	561 (22.09)	481 (18.94)	80 (3.15)	78 (3.07)	4	552 (21.73)	472 (18.58)	90 (3.54)	88 (3.46)
G	IDLER LINK PIN	7	478 (18.82)	427 (16.81)	70 (2.76)	68 (2.68)	7	505 (19.88)	454 (17.87)	70 (2.76)	68 (2.68)
H	BUCKET CYLINDER ROD PIN	3	478 (18.82)	427 (16.81)	80 (3.15)	78 (3.07)	3	505 (19.88)	454 (17.87)	80 (3.15)	78 (3.07)
I	BUCKET CYLINDER HEAD PIN	2	252 (9.92)	235 (9.25)	80 (3.15)	—	2	264 (10.39)	247 (9.72)	80 (3.15)	—
J	ARM CYLINDER ROD PIN	5	277 (10.91)	260 (10.24)	85 (3.35)	—	5	296 (11.65)	274 (10.79)	90 (3.54)	—
K	BOOM TOP PIN	1	505 (19.88)	—	90 (3.54)	—	1	552 (21.73)	—	90 (3.54)	—

MODEL / TYPE / NAME		SK330-8					SK460-8				
		TYPE OF PIN	L1	L2	øD1	øD2	TYPE OF PIN	L1	L2	øD1	øD2
A	BOOM FOOT PIN	9	1030 (40.55)	—	110 (4.33)	—	1	1179 (46.42)	—	120 (4.72)	—
B	BOOM CYLINDER HEAD PIN	6	314 (12.36)	294 (11.57)	100 (3.94)	—	2	372 (12.36)	354.5 (14.0)	110 (4.33)	—
C	BOOM CYLINDER ROD PIN	8	922 (36.30)	877 (34.52)	110 (4.33)	108 (4.25)	8	1031 (40.59)	986 (38.82)	120 (4.72)	118 (4.65)
D	ARM CYLINDER HEAD PIN	5	331 (13.03)	309 (12.17)	110 (4.33)	—	2	365.5 (14.39)	343.5 (13.52)	120 (4.72)	—
E	THE BUCKET ATTACHING PIN	4	665 (26.18)	576 (22.68)	90 (3.54)	88 (3.46)	4	799 (31.46)	702 (27.64)	100 (3.94)	98 (3.86)
F	BUCKET DRIVE PIN	4	665 (26.18)	576 (22.68)	90 (3.54)	88 (3.46)	4	799 (31.46)	702 (27.64)	100 (3.94)	98 (3.86)
G	IDLER LINK PIN	7	570 (22.44)	512 (20.16)	80 (3.15)	78 (3.07)	7	636 (25.04)	578 (22.76)	100 (3.94)	98 (3.86)
H	BUCKET CYLINDER ROD PIN	3	570 (22.44)	512 (20.16)	90 (3.54)	88 (3.46)	3	636 (25.04)	578 (22.76)	100 (3.94)	98 (3.86)
I	BUCKET CYLINDER HEAD PIN	2	321 (12.64)	299 (11.77)	90 (3.54)	—	2	354 (13.94)	332 (13.07)	100 (3.94)	—
J	ARM CYLINDER ROD PIN	5	331 (13.03)	309 (12.17)	110 (4.33)	—	2	389.5 (15.33)	367.5 (14.47)	120 (4.72)	—
K	BOOM TOP PIN	1	601 (23.66)	—	110 (4.33)	—	1	665 (26.18)	—	120 (4.72)	—

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5.6 SHAPE AND DIMENSIONS OF BUSHING

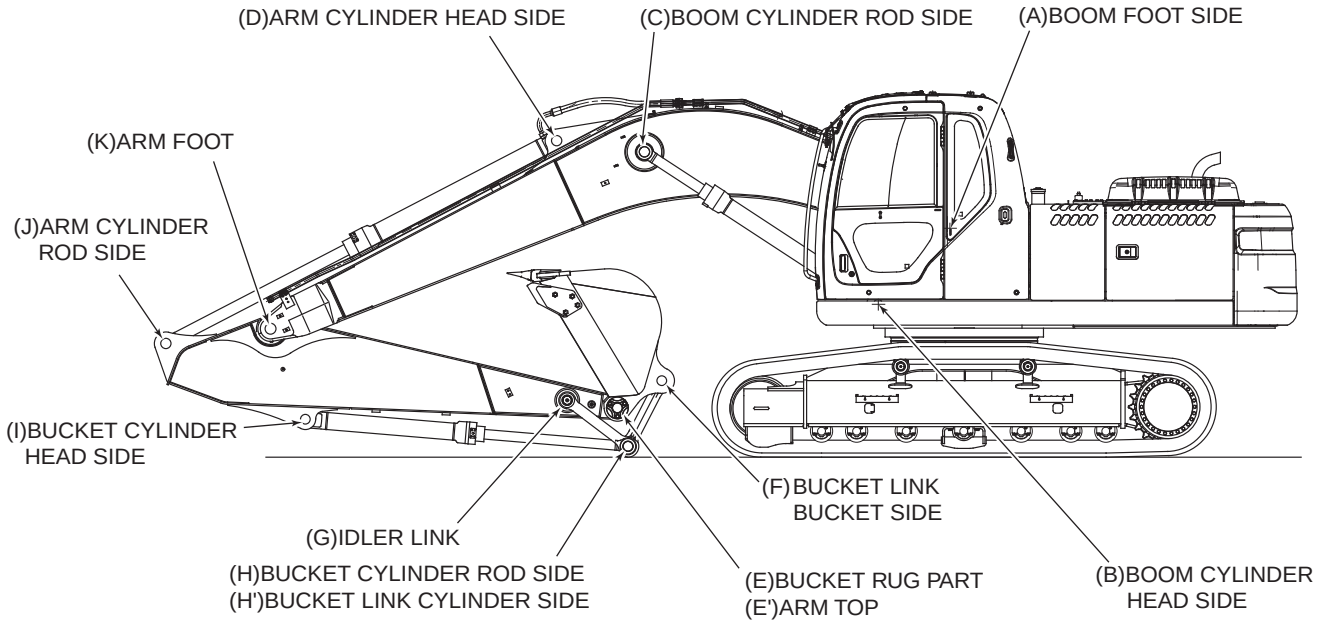
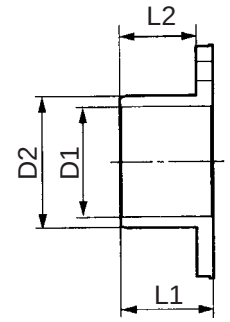
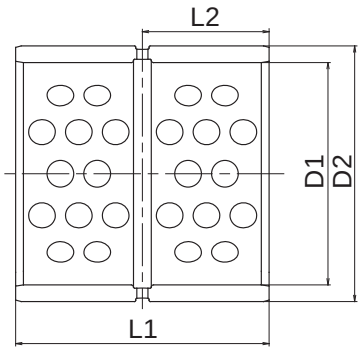
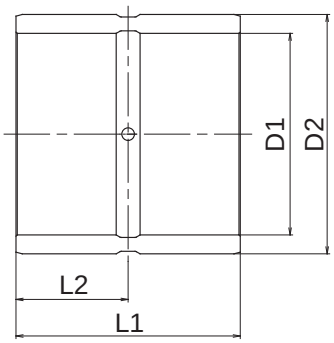
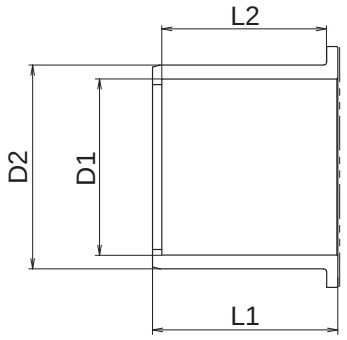
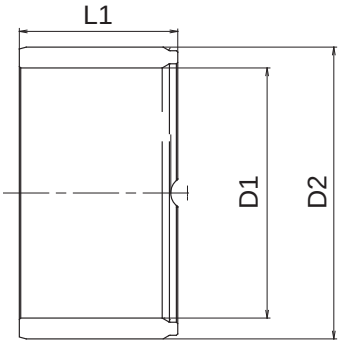
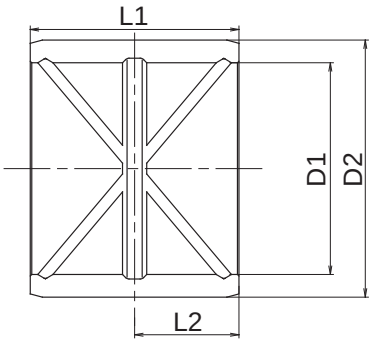
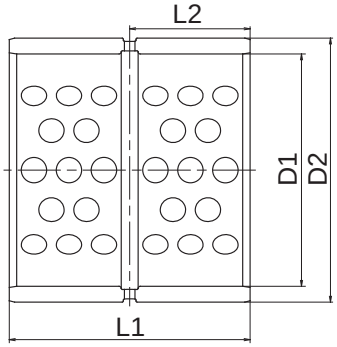
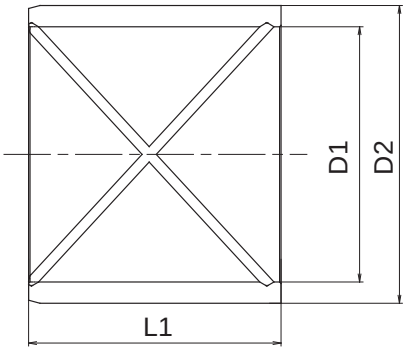
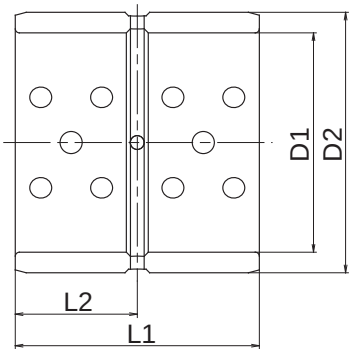
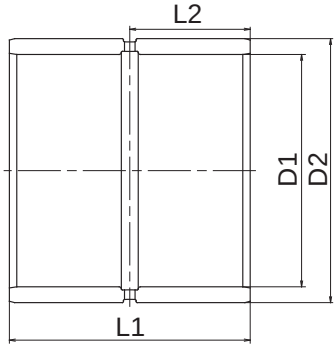


Fig. 5-12 Pin position (Shown in SK200-8)

5.6.1 SHAPE OF BUSHING

1		6	
2		7	
3		8	
4		9	
5		10	

5.6.2 DIMENSIONS OF BUSHING

Unit : mm (in)

NAME	MODEL / TYPE	SK140LC-8				
		BUSHING TYPE	L1	L2	øD1	øD2
A	BOOM FOOT	2	79 (3.11)	39.5 (1.56)	70 (2.76)	85 (3.35)
B	BOOM CYLINDER HEAD SIDE	2	79 (3.11)	39.5 (1.56)	70 (2.76)	85 (3.35)
C	BOOM CYLINDER ROD SIDE	2	69 (2.72)	34.5 (1.36)	80 (3.15)	95 (3.74)
D	ARM CYLINDER HEAD SIDE	3	47 (1.85)	—	70 (2.76)	85 (3.35)
E	BUCKET RUG PART	1	64 (2.52)	49 (1.93)	65 (2.56)	80 (3.15)
E'	ARM TOP	2	69 (2.72)	34.5 (1.36)	65 (2.56)	80 (3.15)
		7	80 (3.15)	74 (2.91)	80 (3.15)	95 (3.74)
F	BUCKET LINK BUCKET SIDE	2	59 (2.32)	29.5 (1.16)	65 (2.56)	80 (3.15)
G	IDLER LINK	2	69 (2.72)	34.5 (1.36)	60 (2.36)	75 (2.95)
H	BUCKET CYLINDER ROD SIDE	2	74 (2.91)	37 (1.46)	65 (2.56)	80 (3.15)
H'	BUCKET LINK CYLINDER SIDE	2	69 (2.72)	34.5 (1.36)	65 (2.56)	80 (3.15)
I	BUCKET CYLINDER HEAD SIDE	2	74 (2.91)	37 (1.46)	60 (2.36)	75 (2.95)
J	ARM CYLINDER ROD SIDE	3	47 (1.85)	—	70 (2.76)	85 (3.35)
K	ARM FOOT	2	79 (3.11)	39.5 (1.56)	70 (2.76)	85 (3.35)

ASIA

Unit : mm (in)

NAME	MODEL / TYPE	SK200-8					SK250-8				
		BUSHING TYPE	L1	L2	øD1	øD2	BUSHING TYPE	L1	L2	øD1	øD2
A	BOOM FOOT	3	54.5 (2.15)	—	90 (3.54)	105 (4.13)	3	57 (2.24)	—	100 (3.94)	115 (4.53)
B	BOOM CYLINDER HEAD SIDE	3	47 (1.85)	—	85 (3.35)	100 (3.94)	3	52 (2.05)	—	90 (3.54)	105 (4.13)
C	BOOM CYLINDER ROD SIDE	3	47 (1.85)	—	85 (3.35)	100 (3.94)	3	52 (2.05)	—	90 (3.54)	105 (4.13)
D	ARM CYLINDER HEAD SIDE	—	—	—	—	—	—	—	—	—	—
E	BUCKET RUG PART	1	67 (2.64)	55 (2.17)	80 (3.15)	95 (3.74)	1	67 (2.64)	55 (2.17)	90 (3.54)	105 (4.13)
E'	ARM TOP	9	89 (3.50)	—	80 (3.15)	95 (3.74)	9	94 (3.70)	—	90 (3.54)	105 (4.13)
		7	100 (3.94)	94 (3.70)	95 (3.74)	110 (4.33)	7	105.5 (4.15)	99.5 (3.92)	105 (4.13)	120 (4.72)
F	BUCKET LINK BUCKET SIDE	2	89 (3.50)	44.5 (1.75)	80 (3.15)	95 (3.74)	2	89 (3.50)	44.5 (1.75)	90 (3.54)	105 (4.13)
G	IDLER LINK	8	69 (2.72)	34.5 (1.36)	70 (2.76)	85 (3.35)	8	69 (2.72)	34.5 (1.36)	70 (2.76)	85 (3.35)
H	BUCKET CYLINDER ROD SIDE	—	—	—	—	—	—	—	—	—	—
H'	BUCKET LINK CYLINDER SIDE	3	47 (1.85)	—	80 (3.15)	95 (3.74)	3	47 (1.85)	—	80 (3.15)	95 (3.74)
I	BUCKET CYLINDER HEAD SIDE	—	—	—	—	—	—	—	—	—	—
J	ARM CYLINDER ROD SIDE	—	—	—	—	—	—	—	—	—	—
K	ARM FOOT	9	89 (3.50)	—	90 (3.54)	105 (4.13)	9	104 (4.09)	—	90 (3.54)	105 (4.13)

ASIA ASIA•OCE Unit : mm (in)

NAME	MODEL / TYPE	SK330-8					SK460-8				
		BUSHING TYPE	L1	L2	øD1	øD2	BUSHING TYPE	L1	L2	øD1	øD2
A	BOOM FOOT	4	134 (5.28)	67 (2.64)	110 (4.33)	125 (4.92)	8	134 (5.28)	67 (2.64)	120 (4.72)	140 (5.51)
B	BOOM CYLINDER HEAD SIDE	6	114 (4.49)	57 (2.24)	100 (3.94)	115 (4.53)	8	140 (5.51)	70 (2.76)	110 (4.33)	130 (5.12)
C	BOOM CYLINDER ROD SIDE	4	114 (4.49)	57 (2.24)	110 (4.33)	125 (4.92)	8	130 (5.12)	65 (2.56)	120 (4.72)	140 (5.51)
D	ARM CYLINDER HEAD SIDE	—	—	—	—	—	8	150 (5.91)	75 (2.95)	120 (4.72)	140 (5.51)
E	BUCKET RUG PART	1	83 (3.27)	71 (2.80)	90 (3.54)	105 (4.13)	1	112 (4.41)	85 (3.35)	100 (3.94)	120 (4.72)
E'	ARM TOP	9	114 (4.49)	—	90 (3.54)	105 (4.13)	5	128 (5.04)	64 (2.52)	100 (3.94)	120 (4.72)
		7	125.5 (4.94)	119.5 (4.70)	105 (4.13)	120 (4.72)	7	141 (5.55)	128 (5.04)	120 (4.72)	140 (5.51)
F	BUCKET LINK BUCKET SIDE	3	57 (2.24)	—	90 (3.54)	105 (4.13)	3	54.5 (2.15)	—	100 (3.94)	115 (4.53)
G	IDLER LINK	8	89 (3.50)	44.5 (1.75)	80 (3.15)	95 (3.74)	3	49.5 (1.95	—	100 (3.94)	115 (4.53)
H	BUCKET CYLINDER ROD SIDE	—	—	—	—	—	3	62 (2.44)	—	100 (3.94)	115 (4.53)
H'	BUCKET LINK CYLINDER SIDE	3	57 (2.24)	—	90 (3.54)	105 (4.13)	3	62 (2.44)	—	100 (3.94)	115 (4.53)
I	BUCKET CYLINDER HEAD SIDE	—	—	—	—	—	3	75 (2.95)	—	100 (3.94)	115 (4.53)
J	ARM CYLINDER ROD SIDE	—	—	—	—	—	8	150 (5.91)	75 (2.95)	120 (4.72)	140 (5.51)
K	ARM FOOT	9	114 (4.49)	—	110 (4.33)	125 (4.92)	8	129 (5.08)	64.5 (2.54)	120 (4.72)	140 (5.51)

OCEANIA

Unit : mm (in)

	MODEL	SK200-8					SK250-8				
	TYPE / NAME	BUSHING TYPE	L1	L2	øD1	øD2	BUSHING TYPE	L1	L2	øD1	øD2
A	BOOM FOOT	3	54.5 (2.15)	—	90 (3.54)	105 (4.13)	3	57 (2.24)	—	100 (3.94)	115 (4.53)
B	BOOM CYLINDER HEAD SIDE	3	47 (1.85)	—	85 (3.35)	100 (3.94)	3	52 (2.05)	—	90 (3.54)	105 (4.13)
C	BOOM CYLINDER ROD SIDE	3	47 (1.85)	—	85 (3.35)	100 (3.94)	3	52 (2.05)	—	90 (3.54)	105 (4.13)
D	ARM CYLINDER HEAD SIDE	3	54.5 (2.15)	—	85 (3.35)	95 (3.74)	3	57 (2.24)	—	90 (3.54)	105 (4.13)
E	BUCKET RUG PART	1	67 (2.64)	55 (2.17)	80 (3.15)	95 (3.74)	1	67 (2.64)	55 (2.17)	90 (3.54)	105 (4.13)
E'	ARM TOP	5	89 (3.50)	44.5 (1.75)	80 (3.15)	95 (3.74)	5	94 (3.70)	47 (1.85)	90 (3.54)	105 (4.13)
		7	100 (3.94)	94 (3.70)	95 (3.74)	110 (4.33)	7	105.5 (4.15)	99.5 (3.92)	105 (4.13)	120 (4.72)
F	BUCKET LINK BUCKET SIDE	2	89 (3.50)	44.5 (1.75)	80 (3.15)	95 (3.74)	2	89 (3.50)	44.5 (1.75)	90 (3.54)	105 (4.13)
G	IDLER LINK	2	69 (2.72)	34.5 (1.36)	70 (2.76)	85 (3.35)	2	69 (2.72)	34.5 (1.36)	70 (2.76)	85 (3.35)
H	BUCKET CYLINDER ROD SIDE	3	47 (1.85)	—	80 (3.15)	95 (3.74)	3	47 (1.85)	—	80 (3.15)	95 (3.74)
H'	BUCKET LINK CYLINDER SIDE	3	47 (1.85)	—	80 (3.15)	95 (3.74)	3	47 (1.85)	—	80 (3.15)	95 (3.74)
I	BUCKET CYLINDER HEAD SIDE	3	47 (1.85)	—	80 (3.15)	95 (3.74)	3	47 (1.85)	—	80 (3.15)	95 (3.74)
J	ARM CYLINDER ROD SIDE	3	54.5 (2.15)	—	85 (3.35)	95 (3.74)	3	57 (2.24)	—	90 (3.54)	105 (4.13)
K	ARM FOOT	2	89 (3.50)	44.5 (1.75)	90 (3.54)	105 (4.13)	3	52 (2.05)	—	90 (3.54)	105 (4.13)

OCEANIA

Unit : mm (in)

NAME		MODEL / TYPE	BUSHING TYPE	L1	L2	øD1	øD2
			SK330-8				
A	BOOM FOOT		4	134 (5.28)	67 (2.64)	110 (4.33)	125 (4.92)
B	BOOM CYLINDER HEAD SIDE		6	114 (4.49)	57 (2.24)	100 (3.94)	115 (4.53)
C	BOOM CYLINDER ROD SIDE		4	114 (4.49)	57 (2.24)	110 (4.33)	125 (4.92)
D	ARM CYLINDER HEAD SIDE		4	124 (4.88)	62 (2.44)	110 (4.33)	125 (4.92)
E	BUCKET RUG PART		1	83 (3.27)	71 (2.80)	90 (3.54)	105 (4.13)
E'	ARM TOP		5	114 (4.49)	57 (2.24)	90 (3.54)	105 (4.13)
			7	125.5 (4.94)	119.5 (4.70)	105 (4.13)	120 (4.72)
F	BUCKET LINK BUCKET SIDE		3	57 (2.24)	—	90 (3.54)	105 (4.13)
G	IDLER LINK		2	89 (3.50)	44.5 (1.75)	80 (3.15)	95 (3.74)
H	BUCKET CYLINDER ROD SIDE		3	57 (2.24)	—	90 (3.54)	105 (4.13)
H'	BUCKET LINK CYLINDER SIDE		3	57 (2.24)	—	90 (3.54)	105 (4.13)
I	BUCKET CYLINDER HEAD SIDE		3	57 (2.24)	—	90 (3.54)	105 (4.13)
J	ARM CYLINDER ROD SIDE		4	124 (4.88)	62 (2.44)	110 (4.33)	125 (4.92)
K	ARM FOOT		4	114 (4.49)	57 (2.24)	110 (4.33)	125 (4.92)

[MEMO]

6. DIFFERENTIAL MATERIAL

6.1 TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables Table6-1 and Table6-2 indicate tightening torques applicable to cases where no special note is given.
Overtightening of bolts may result in a twist-off and a fracture under load.
Insufficient tightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

Table6-1 Tightening torque for metric coarse threads (not plated)

Unit : N•m (lbf•ft)

Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.5 (3.2±0.4)	3.7±0.4 (2.7±0.3)	9.6±1.0 (7.1±0.7)	8.1±0.8 (6.0±0.6)	17.4±1.8 (12.8±1.3)	14.7±1.5 (10.8±1.1)
M8	P=1.25	10.7±1.1 (7.9±0.8)	9.0±0.9 (6.6±0.7)	23.5±2.0 (17.3±1.5)	19.6±2.0 (14.5±1.5)	42.2±3.9 (31.1±2.9)	35.3±3.9 (26.0±2.9)
M10	P=1.5	21.6±2.0 (15.9±1.4)	17.9±1.8 (13.2±1.3)	46.1±4.9 (34.0±3.6)	39.2±3.9 (28.9±2.9)	83.4±8.8 (61.5±6.5)	70.6±6.9 (52.1±5.1)
M12	P=1.75	36.3±3.9 (26.8±2.9)	31.4±2.9 (23.2±2.1)	79.4±7.8 (58.6±5.8)	66.7±6.9 (49.2±5.1)	143±15 (105±11)	121±12 (89.2±8.9)
M14	P=2	57.9±5.9 (42.7±4.4)	49.0±4.9 (36.1±3.6)	126±13 (92.9±9.6)	106±10 (78.2±7.4)	226±20 (167±15)	191±19 (141±14)
M16	P=2	88.3±8.8 (65.1±6.5)	74.5±6.9 (55.0±5.1)	191±20 (141±15)	161±16 (119±12)	343±39 (253±29)	284±29 (209±21)
M18	P=2.5	122±12 (90.0±8.9)	103±10 (75.8±7.2)	265±29 (195±21)	226±20 (167±15)	481±49 (355±36)	402±39 (297±29)
M20	P=2.5	172±17 (127±13)	144±14 (106±10)	373±39 (275±29)	314±29 (232±21)	667±69 (492±51)	559±59 (412±44)
M22	P=2.5	226±20 (167±15)	192±20 (142±15)	500±49 (369±36)	422±39 (311±29)	902±88 (665±65)	755±78 (557±58)
M24	P=3	294±29 (217±21)	235±29 (173±21)	637±69 (470±51)	520±49 (383±36)	1160±118 (856±87)	941±98 (694±72)
M27	P=3	431±39 (318±29)	353±39 (260±29)	941±98 (694±72)	765±78 (564±58)	1700±167 (1250±123)	1370±137 (1010±101)
M30	P=3.5	588±59 (434±44)	490±49 (361±36)	1285±127 (948±94)	1079±108 (796±80)	2300±235 (1700±173)	1940±196 (1430±145)
M33	P=3.5	794±78 (586±58)	667±69 (492±51)	1726±177 (1270±131)	1451±147 (1070±108)	3110±314 (2290±232)	2610±265 (1930±195)
M36	P=4	1030±98 (760±72)	863±88 (637±65)	2226±226 (1640±167)	1863±186 (1370±137)	4010±402 (2960±297)	3360±333 (2480±246)

Table6-2 Tightening torques for metric fine threads (not plated)

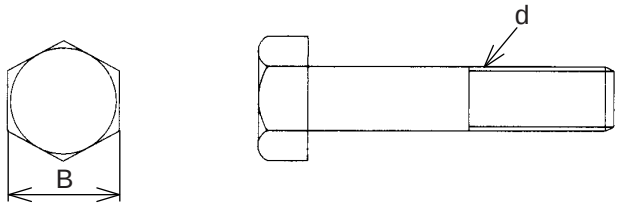
Torque value Unit : N•m (lbf•ft)

Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M8	P=1.0	11.3±1.1 (8.3±0.8)	9.5±1.0 (7.0±0.7)	24.5±2.0 (18.1±1.5)	20.6±2.0 (15.2±1.5)	44.1±3.9 (32.5±2.9)	37.3±3.9 (27.5±2.9)
M10	P=1.25	22.6±2.0 (16.7±1.5)	18.7±1.9 (13.8±1.4)	48.1±4.9 (35.5±3.6)	41.2±3.9 (30.3±2.9)	87.3±8.8 (64.4±6.5)	73.5±6.9 (54.2±5.1)
M12	P=1.25	39.2±3.9 (28.9±2.9)	33.3±2.9 (24.6±2.1)	85.3±8.8 (62.9±6.5)	71.6±6.9 (52.8±5.1)	154±16 (114±12)	129±13 (95.2±9.6)
M16	P=1.5	92.2±8.8 (68.0±6.5)	77.5±7.8 (57.2±5.8)	196±20 (145±15)	169±17 (125±13)	363±39 (268±29)	304±29 (224±21)
M20	P=1.5	186±19 (137±14)	155±16 (114±12)	402±39 (297±29)	333±29 (246±21)	726±69 (535±51)	608±59 (448±44)
M24	P=2	314±29 (232±21)	265±29 (195±21)	686±69 (506±51)	569±59 (420±44)	1240±118 (915±87)	1030±98 (760±72)
M30	P=2	637±59 (470±44)	530±49 (391±36)	1390±137 (1030±101)	1157±118 (853±87)	2500±255 (1840±188)	2080±206 (1530±152)
M33	P=2	853±88 (629±65)	706±70 (521±52)	1860±186 (1370±137)	1550±155 (1140±114)	3350±334 (2470±246)	2790±275 (2060±203)
M36	P=3	1070±108 (789±80)	892±88 (658±65)	2330±226 (1720±167)	1940±196 (1430±145)	4200±422 (3100±311)	3500±353 (2580±260)

6.2 SCREW SIZE

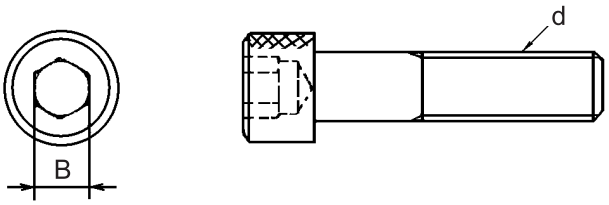
6.2.1 CAPSCREW (BOLT)

Nominal screw size (d)	B mm Tool size	Nominal screw size (d)	B mm Tool size
M6	10	M36	55
M8	13	M42	65
M10	17	M45	70
M12	19	M48	75
(M14)	22	M56	85
M16	27	(M60)	90
(M18)	27	M64	95
M20	30	(M68)	100
(M22)	32	M72	105
M24	36	M76	110
(M27)	41	M80	115
M30	46		



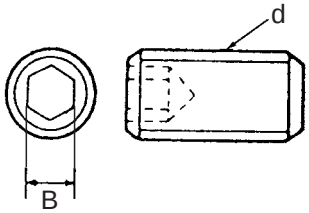
6.2.2 CAPSCREW (SOCKET BOLT)

Nominal screw size (d)	B mm Tool size	Nominal screw size (d)	B mm Tool size
(M3)	2.5	M20	17
(M4)	3	(M22)	17
(M5)	5	M24	19
M6	5	(M27)	19
M8	6	M30	22
M10	8	M36	27
M12	10	M42	32
M14	12	(M45)	32
M16	14	M48	36
(M18)	14	M52	36



6.2.3 SOCKET SET SCREW

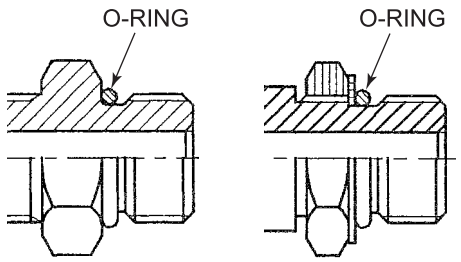
Nominal screw size (d)	B mm Tool size	Nominal screw size (d)	B mm Tool size
M2.5	1.27	M8	4
M3	1.5	M10	5
M4	2	M12	6
M5	2.5	M16	8
M6	3	M20	10



6.3 TIGHTENING TORQUE FOR HOSE AND FITTING

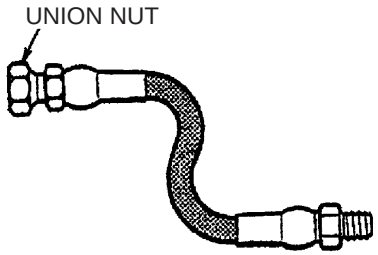
6.3.1 JOINT (O-RING TYPE)

Size (PF)	Wrench (mm)	Tightening torque N•m (lbf•ft)
1 / 8	14	17±2 (13±1.5)
1 / 4	19	36±2 (27±1.5)
3 / 8	22	74±5 (55±4)
1 / 2	27	108±9.8 (80.0±7)
3 / 4	36	162±9.8 (119±7)
1	41	255±9.8 (188±7)



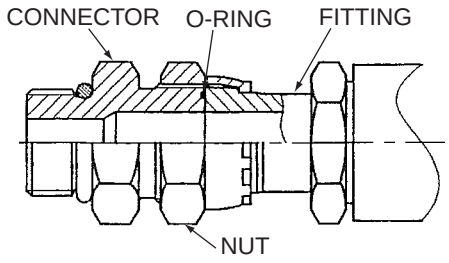
6.3.2 HYDRAULIC HOSE (30° FLARE TYPE)

Size (PF)	Wrench(mm)	Tightening torque N•m (lbf•ft)
1 / 8	17	15±2.0 (11±1.5)
1 / 4	19	29±4.9 (21±3.6)
3 / 8	22	49±4.9 (36±3.6)
1 / 2	27	78±4.9 (58±3.6)
3 / 4	36	118±9.8 (87±7.2)
1	41	137±15 (101±11)



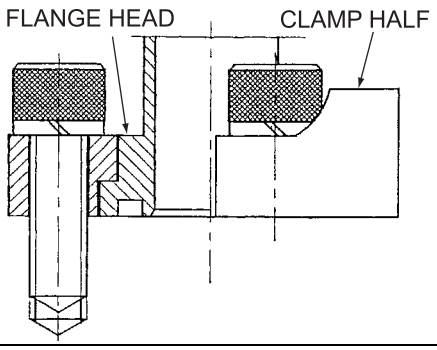
6.3.3 JOINT (ORS TYPE)

Unified screw size	Opposing flats	Tightening Torque N•m (lbf•ft)
1-14 UNS	30, 32	137±14 (101±10)
1 3 / 16-12 UN	36	177±18 (131±13)
	41	206±26 (152±15)
1 7/ 16-12 UN	41	206±26 (152±15)
	46	206±26 (152±15)



6.3.4 SPLIT FLANGE

Size	Tightening torque N•m (lbf•ft)			
	Standard pressure series 20.6 MPa	Bolt size	Hi pressure series 41.2 MPa	Bolt size
3 / 4	33.9±5.6 (25±4)	M10	39.5±5.6 (29±4)	M10
1	42.4±5.6 (31±4)	M10	62.2±5.6 (46±4)	M12
1 1 / 4	55.1±7.1 (41±5)	M10	93.3±8.4 (69±6)	M14
1 1 / 2	70.6±8.4 (52±6)	M12	169±11 (125±8)	M16
2	81.9±8.4 (60±6)	M12	282±11 (208±8)	M20



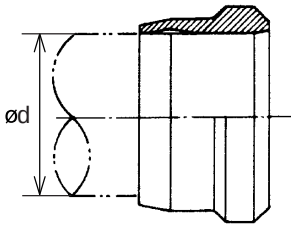
6.4 TIGHTENING TORQUES FOR NUTS AND SLEEVES

Table6-3 indicates standard tightening torques applicable to cases where no particular note is given.
Overtightening or undertightening of nuts and sleeves in FLARELESS JOINT may develop oil leaks through pipe connections.
Always tighten nuts and sleeves to proper torques.

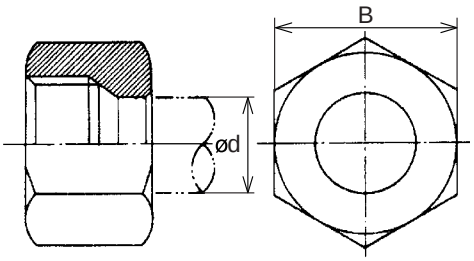
Table6-3

Manufacturer's name	Working pressure MPa (psi)	Tube size OD × thickness mm (in)	Opposing flats (HEX) mm	Tightening torque N•m (lbf•ft)
Nippon A.M.C.	29.4 (4270)	ø10×1.5 (0.394×0.059)	19	49.0±9.8 (36±7.2)
		ø15×2.0 (0.591×0.079)	27	118±12 (87±8.7)
		ø18×2.5 (0.709×0.098)	32	147±15 (110±11)
		ø22×3.0 (0.866×0.118)	36	216±22 (160±16)
		ø28×4.0 (1.10×0.157)	41	275±27 (200±20)
Ihara Koatu	29.4 (4270)	ø35×5.0 (1.38×0.197)	55	441±44 (330±33)

SLEEVE



NUT

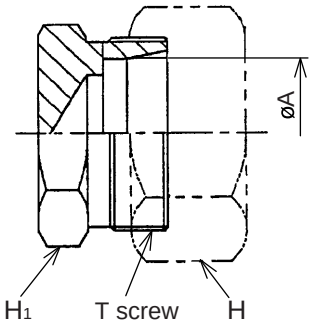


Tube size ød	Parts No.		Tube size ød	Opposing flats (HEX) mm	Parts No.	
	Ihara Koatu	Nippon A.M.C.			Ihara Koatu	Nippon A.M.C.
6	ZF93S06000	—	6	14	ZF93N06000	—
8	ZF93S08000	—	8	17	ZF93N08000	—
10	ZF93S10000	ZA93S10000	10	19	ZF93N10000	ZA93N10000
12	ZF93S12000	—	12	22	ZF93N12000	—
15	ZF93S15000	ZA93S15000	15	27	ZF93N15000	ZA93N15000
18	ZF93S18000	ZA93S18000	18	32	ZF93N18000	ZA93N18000
22	ZF93S22000	ZA93S22000	22	36	ZF93N22000	ZA93N22000
28	ZF93S28000	ZA93S28000	28	41	ZF93N28000	ZA93N28000
32	ZF93S32000	—	32	50	ZF93N32000	—
35	ZF93S35000	ZA93S35000	35	55	ZF93N35000	ZA93N35000
38	ZF93S38000	—	38	60	ZF93N38000	—

6.5 PLUG

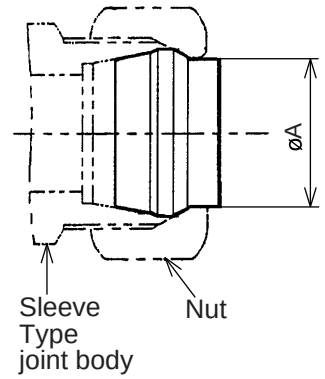
6.5.1 PLUG FOR HYDRAULIC PIPE JOINT

(1) Cap nut (Joint plug)



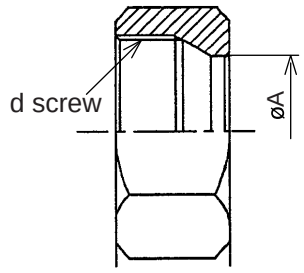
Applicable tube O. D : A	Cap nut parts No.	T screw	Opposing flats	
			H_1	H
6	ZF83H06000	M12 × 1.5	14	14
8	ZF83H08000	M14 × 1.5	17	17
10	ZF83H10000	M16 × 1.5	17	19
12	ZF83H12000	M18 × 1.5	19	22
15	ZF83H15000	M22 × 1.5	24	27
18	ZF83H18000	M26 × 1.5	27	32
22	ZF83H22000	M30 × 1.5	32	36
28	ZF83H28000	M36 × 1.5	38	41

(2) Plug (Tube plug)



Applicable tube O. D : A	Plug parts No.
6	ZF83P06000
8	ZF83P08000
10	ZF83P10000
12	ZF83P12000
15	ZF83P15000
18	ZF83P18000
22	ZF83P22000
28	ZF83P28000

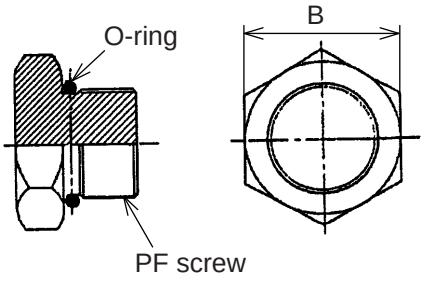
(3) Nut



Applicable tube O. D : A	Nut parts No.	d screw	Opposing flats
6	ZF93N06000	M12 × 1.5	14
8	ZF93N08000	M14 × 1.5	17
10	ZF93N10000	M16 × 1.5	19
12	ZF93N12000	M18 × 1.5	22
15	ZF93N15000	M22 × 1.5	27
18	ZF93N18000	M26 × 1.5	32
22	ZF93N22000	M30 × 1.5	36
28	ZF93N28000	M36 × 1.5	41
32	ZF93N32000	M42 × 1.5	50
35	ZF93N35000	M45 × 1.5	55
38	ZF93N38000	M48 × 1.5	60

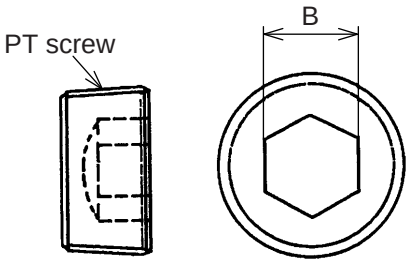
6.5.2 PLUG FOR HYDRAULIC EQUIPMENT

(1) PF screw



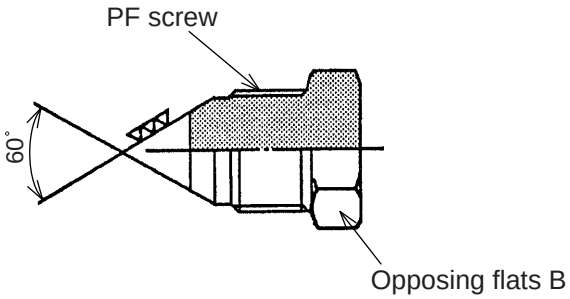
PF screw	Plug parts No.	B mm	O-ring parts No.	Nominal O-ring
PF1/4	ZE72X04000	19	ZD12P01100	1B P11
PF3/8	ZE72X06000	22	ZD12P01400	1B P14
PF1/2	ZE72X08000	27	ZD12P01800	1B P18
PF3/4	ZE72X12000	36	ZD12P02400	1B P24
PF1	ZE72X16000	41	ZD12P02900	1B P29

(2) PT screw

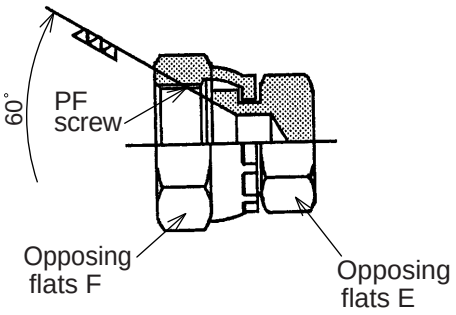


PT screw	Plug parts No.	B mm
PT1/8	ZE82T02000	5
PT1/4	ZE82T04000	6
PT3/8	ZE82T06000	8
PT1/2	ZE82T08000	10
PT3/4	ZE82T12000	14
PT1	ZE82T16000	17
PT1 1/4	ZE82T20000	22
PT1 1/2	ZE82T24000	22

(3) Plug for (F) flare hose



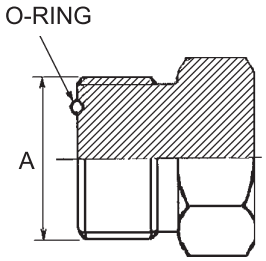
PF screw	Plug parts No.	B mm
PF1/4	2444Z2728D1	14
PF3/8	2444Z2728D2	17
PF1/2	2444Z2728D3	22
PF3/4	2444Z2728D4	27
PF1	2444Z2728D5	36



PF screw	Plug parts No.	E mm	F mm
PF1/4	2444Z2729D1	14	19
PF3/8	2444Z2729D2	17	22
PF1/2	2444Z2729D3	23	27
PF3/4	2444Z2729D4	27	36
PF1	2444Z2729D5	36	41
PF1 1/4	2444Z2729D6	40	50

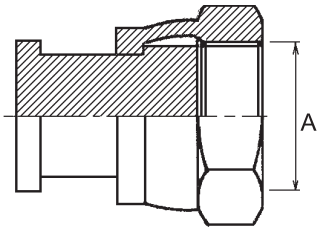
(4) Plug for ORS joints

Male



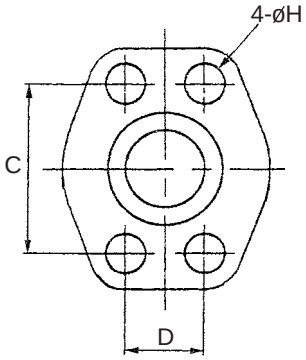
Screw size A	Applicable hose O.D	Plug parts No.	Opposing flats (HEX)	O-ring parts No.	Nominal O-ring
1-14UNS	ø21.7	YN01H01001P1	27	ZD12A01600	1B A16
1 3/16-12UN	ø27.2	YN01H01002P1	36	ZD12A01800	1B A18
1 7/16-12UN	ø34.0	YN01H01003P1	41	ZD12A02100	1B A21

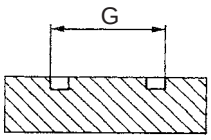
Female



Screw size A	Applicable tube O.D	Plug parts No.	Opposing flats (HEX)
1-14UNS	ø21.7	YN01H01004P1	32
1 3/16-12UN	ø27.2	YN01H01005P1	36
1 7/16-12UN	ø34.0	YN01H01006P1	41

(5) Plug for half clamp





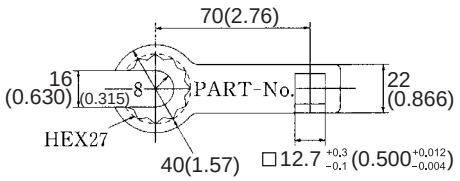
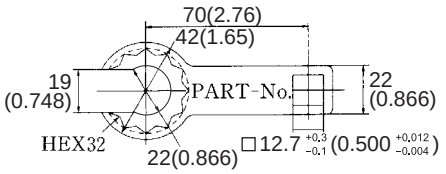
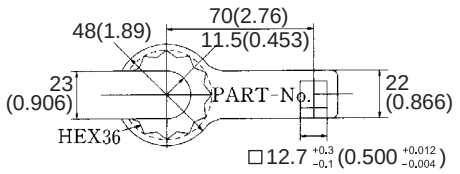
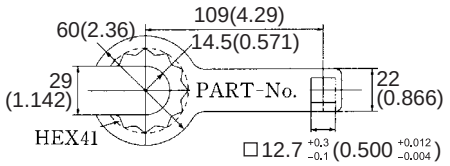
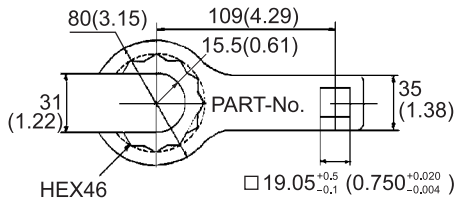
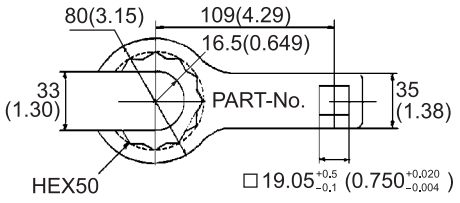
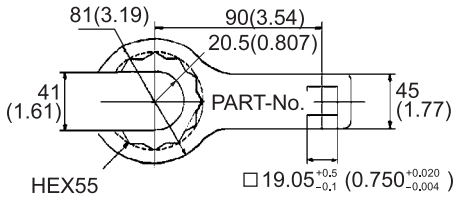
For standard pressure : 20.6 MPa (2990 psi)

Size	Plug part No.	C mm	D mm	G mm	H mm	O-ring part No.
1/2	ZE12Q08000	38.10	17.48	25.53~ 25.40	9	45Z91D2
3/4	ZE12Q12000	47.63	22.23	31.88~ 31.75	11	ZD12P02600
1	ZE12Q16000	52.37	26.19	39.75~ 39.62	11	ZD12P03400
1 1/4	ZE12Q20000	58.72	30.18	44.58~ 44.45	11	ZD12P03800

For high pressure : 41.2 MPa (5970 psi)

Size	Plug part No.	C mm	D mm	G mm	H mm	O-ring part No.
1/2	ZE13Q08000	40.49	18.24	25.53~ 25.40	9	2445Z831D1
3/4	ZE13Q12000	50.80	23.80	31.88~ 31.75	11	ZD12P02600
1	ZE13Q16000	57.15	27.76	39.75~ 39.62	13	ZD12P03400
1 1/4	ZE13Q20000	66.68	31.75	44.58~ 44.45	15	ZD12P03800

6.6 SPECIAL SPANNER FOR TUBE

Applicable tube diameter mm (in)	Part No.	HEX (mm)	Drawing of a special spanner mm (in)
15 (0.591)	2421T160	27	
18 (0.709)	2421T138	32	
22 (0.866)	2421T130	36	
28 (1.10)	2421T115	41	
28 (1.10)	2421T231	46	
32 (1.26)	2421T232	50	
35 (1.38)	2421T314	55	

6.7 SPECIAL TOOLS

Table6-4

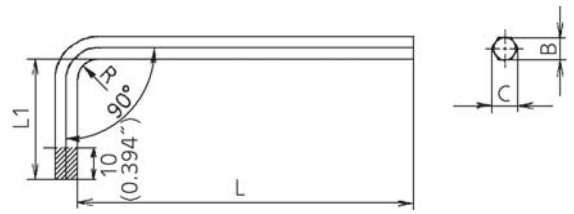
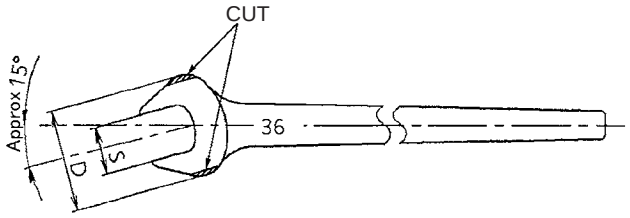
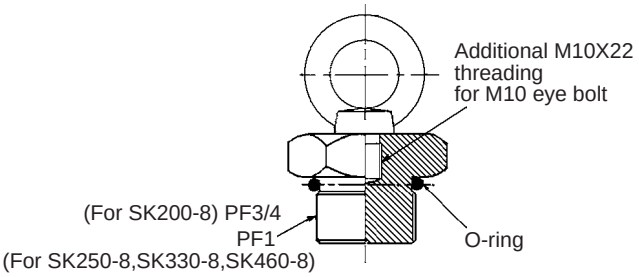
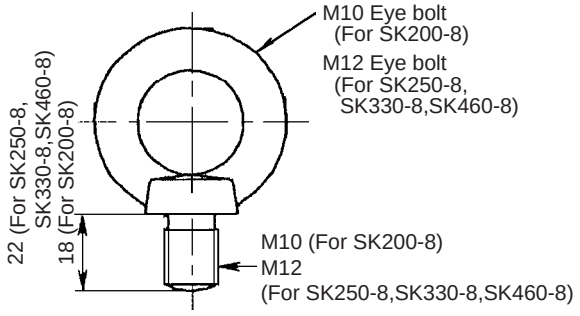
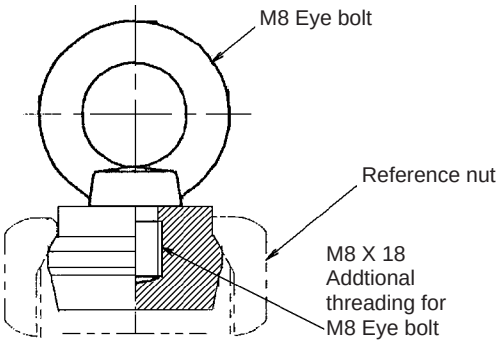
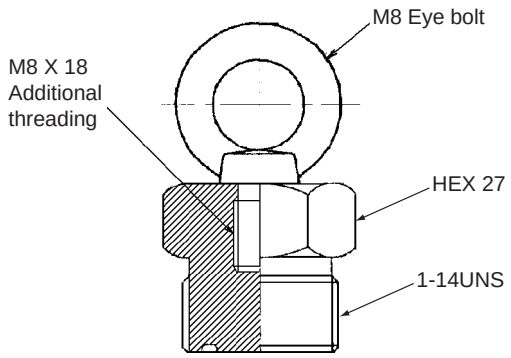
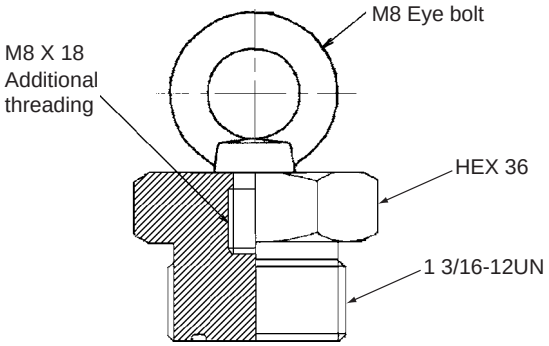
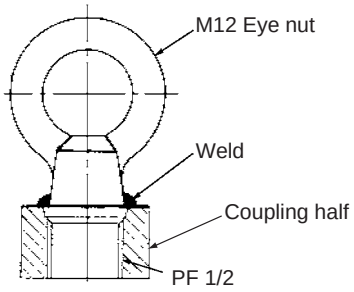
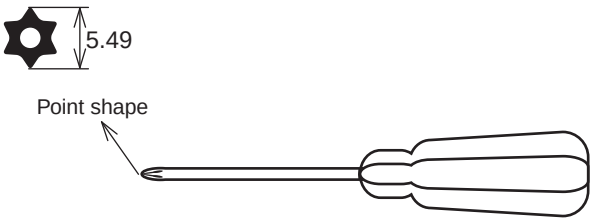
No.	Tools name	Tools No.	Shape	Applicable
1	Allen wrench Nominal B : 10, C : 11.3 (For SK140LC-8, SK250-8, SK330-8)	ZT22A10000	 Commercial tool length (L1) - cut length = Required length 40 (1.57") - 10 (0.39") = 30 (1.18")	Pump suction
2	Spanner or socket Nominal B : 17		General tools	Pump install
3	Spanner Nominal S : 36	ZT12A36000	 Commercial tool outer width (D) - cut length = Required length 81 (3.19") - 16 (0.63") = 65 (2.56")	Swing motor A,B port
4	Plug PF3/4 (For SK200-8)	ZE72X12000		For slinging the swing motor
	Plug PF1 (For SK250-8, SK330-8, SK460-8)	ZE72X16000		
5	Eye bolt M10×18 (For SK140LC-8, SK200-8)	ZS91C01000 or commercial equivalent		For slinging the swing motor & Flare hose
	Eye bolt M12×22 (For SK250-8, SK330-8, SK460-8)	ZS91C01200 or commercial equivalent		
6	Plug (Nominal tube dia. 22) Reference Eye bolt Nut	ZF83P22000 ZS91C00800 ZF93N22000		Flare hose

Table6-4

7	Plug Nominal 1-14UNS Eye bolt	YN01H01001P1 ZS91C00800		Flare hose
8	Plug Nominal 1 3/16-12UN Eye bolt	YN01H01002P1 ZS91C00800		Flare hose
9	Plug PF1/2	ZE25F08000 Coupling half		For slinging the swivel joint
10	TORX driver (with tamper proof) T30 (For M6)	—		For instrument panel cover (RH)

6.8 APPLICATION OF SCREW LOCKING COMPOUND AND SEALING COMPOUND

For general use

Service	Manufacturer		Features
	Loctite	Three-Bond	
Screw locking compound	#242	1360K	Low strength
	#262	1374	Middle strength
	#271	1305	High strength
Sealing compound	#515	1215	Sealing

For specific location

No.	Use	Manufacturer	Name	Equivalent	Applicable
1	Sealing compound & adhesive	Three-Bond	# 1901	(Manufacturer ; Loctite) Anti-seizure	Cylinder
			# 1215 gray	# 5699	Swing motor
			# 1211 white	# 5301J	Swing motor
			# 1303B	# 211	Main pump
		Loctite	# 222	(Manufacturer ; Three-Bond) # 1344N	Main pump
			# 277	# 1307N	Pilot valve
		Loctite	Parmatex 98D	(Manufacturer ; Three-Bond) # 1121	Hydraulic oil tank :
		Sumitomo Chemical Co., Ltd.	Cyano Bond PO-1		Hose
		Shell petroleum	Shell Alvania EP2	New Molyknock Grease 2	Swing bearing grease bath

6.9 SPECIAL TOOLS

6.9.1 SUCTION STOPPER

COMPONENTS

(SK200-6, SK250-8, SK330-8)

No.	NAME	PARTS No.	Q'TY
	SUCTION STOPPER ASSY	24100P978F2	
1	ROD	2420T4660D1	1
2	NUT	ZN16C08007	1
3	COVER	2414T2123D2	1
4	O-RING	45Z91D6	1

(SK460-8)

No.	NAME	PARTS No.	Q'TY
	SUCTION STOPPER ASSY	24100P978F3	
1	ROD	2420T4660D1	1
2	NUT	ZN16C08007	1
3	COVER	2414T2123D3	1
4	O-RING	45Z91D7	1

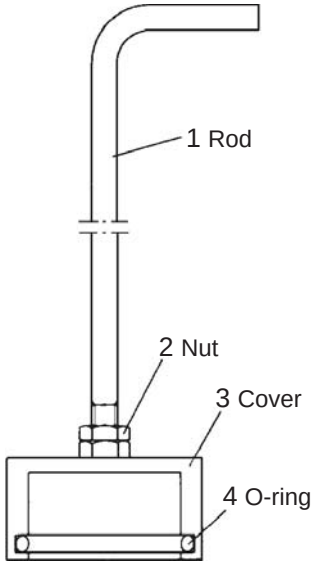


Fig. 6-1 Components of suction stopper

DIMENSION

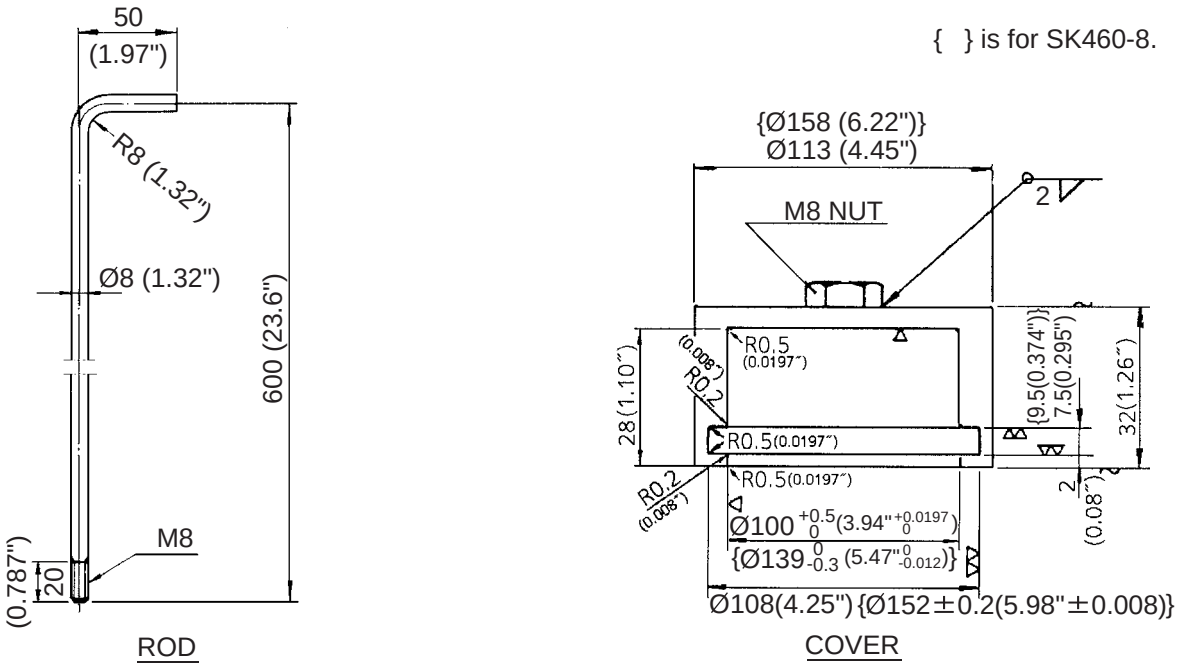


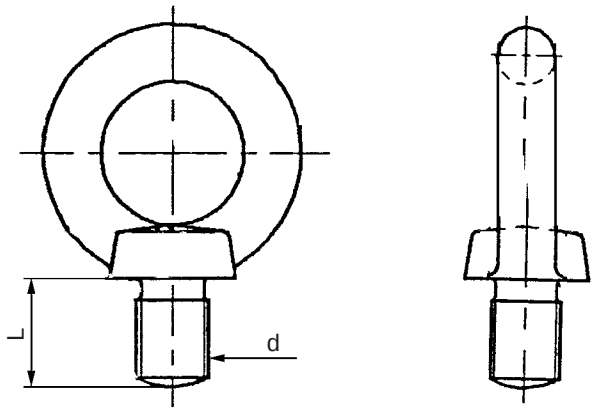
Fig. 6-2 Dimension of suction stopper

APPLICABLE MODEL

Part No. \ Applicable model	SK100	SK120	SK100-2	SK120-2	SK100-3	SK120-3	SK115SR	SK135SR	SK235SR	SK200-6	SK200-6E	SK200-6ES	SK200-8	SK250-8	SK330-8	SK450(LC)-6	SK460-8
24100P978F2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	—	—
24100P978F3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	○	○

6.9.2 COUNTER WEIGHT LIFTING JIG (SK140LC-8, SK200-8, SK250-8 ONLY)

STANDARD EYE BOLT



Size		Part No.	Vertical lifting load kg (lbs)
d	L		
M8	15	ZS91C00800	80 (176)
M10	18	ZS91C01000	150 (331)
M12	22	ZS91C01200	220 (485)
M16	27	ZS91C01600	450 (992)
M20	30	ZS91C02000	630 (1390)
M24	38	ZS91C02400	950 (2090)
M30	45	ZS91C03000	1500 (3310)
M36	55	ZS91C03600	2300 (5070)
M42	65	ZS91C04200	3400 (7490)
M48	70	ZS91C04800	4500 (9920)

Fig. 6-3 Eye bolt

6.9.3 UPPER FRAME LIFTING JIG

SK140LC-8

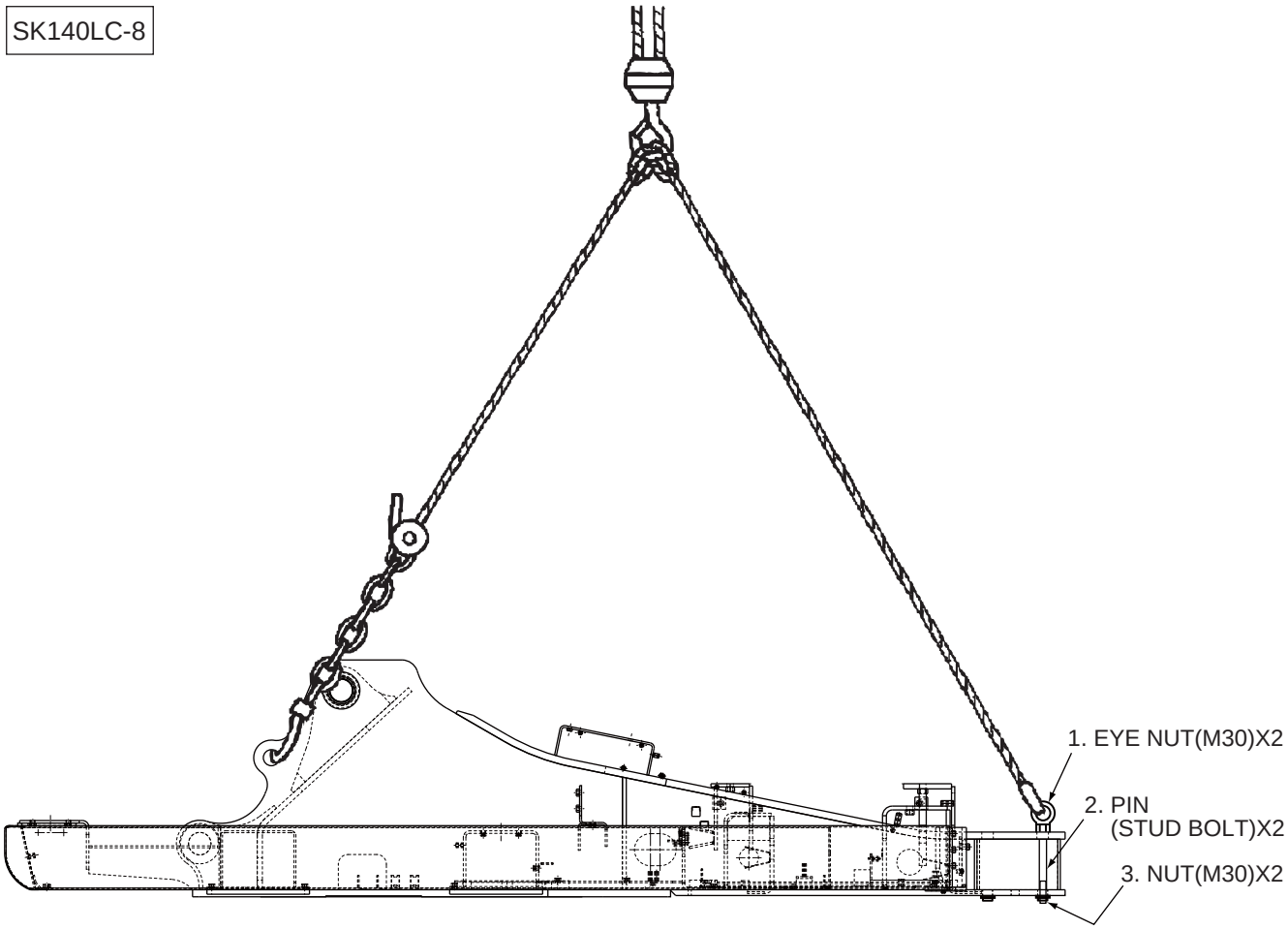
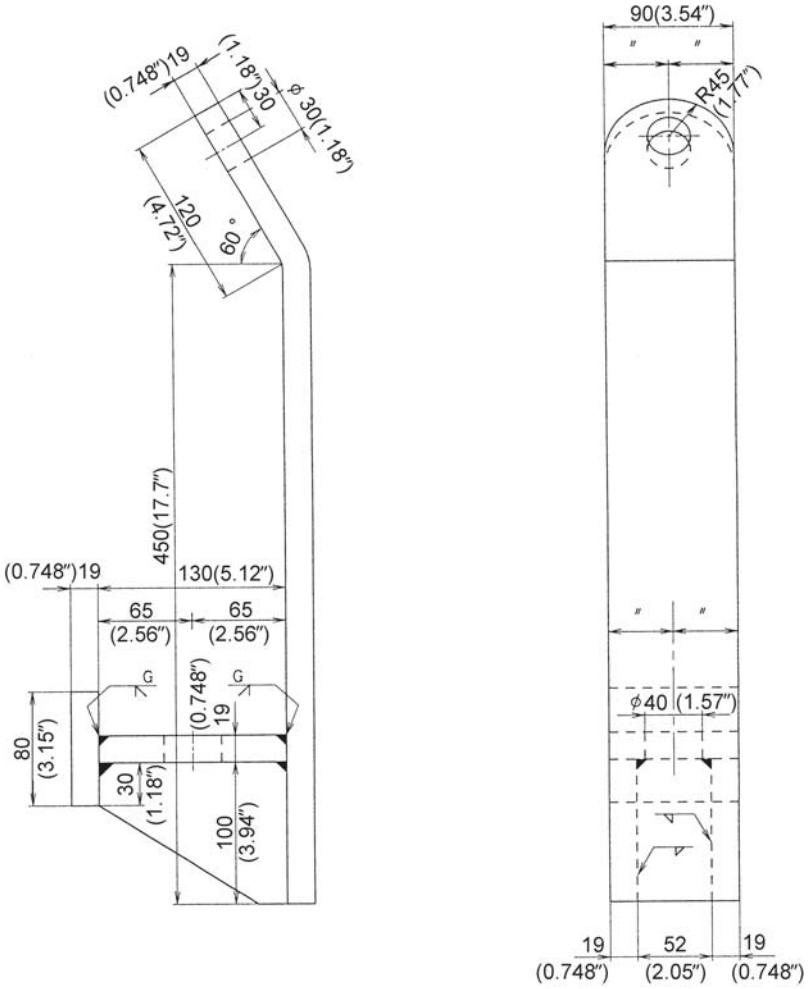


Fig. 6-4 Upper frame lifting jig

SK200-8

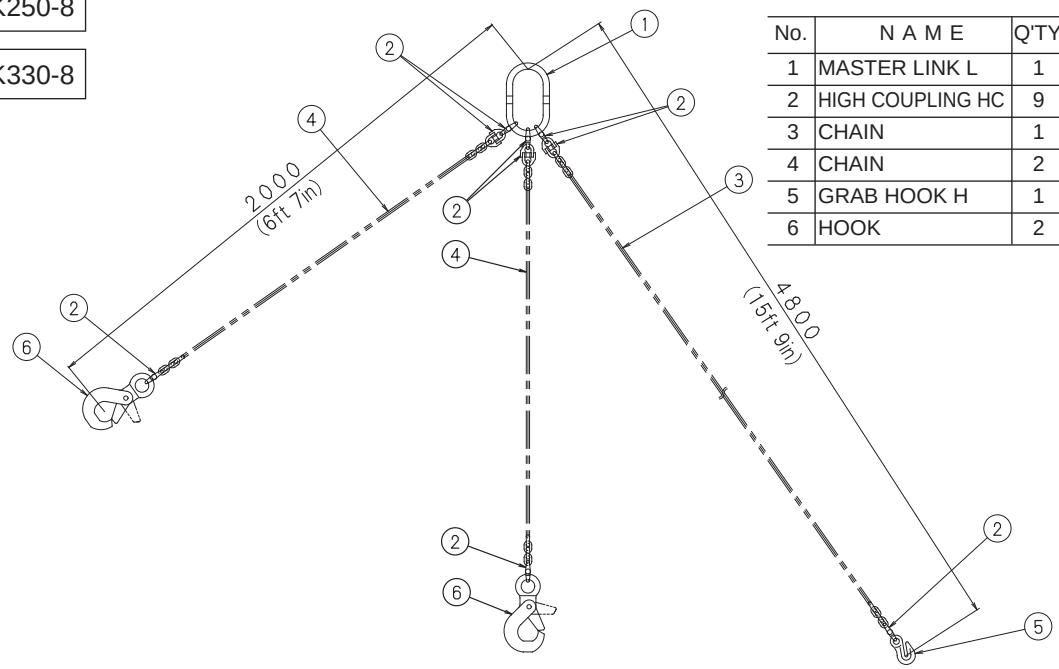


Q'ty : 2 sets

Material : Mild steel

SK250-8

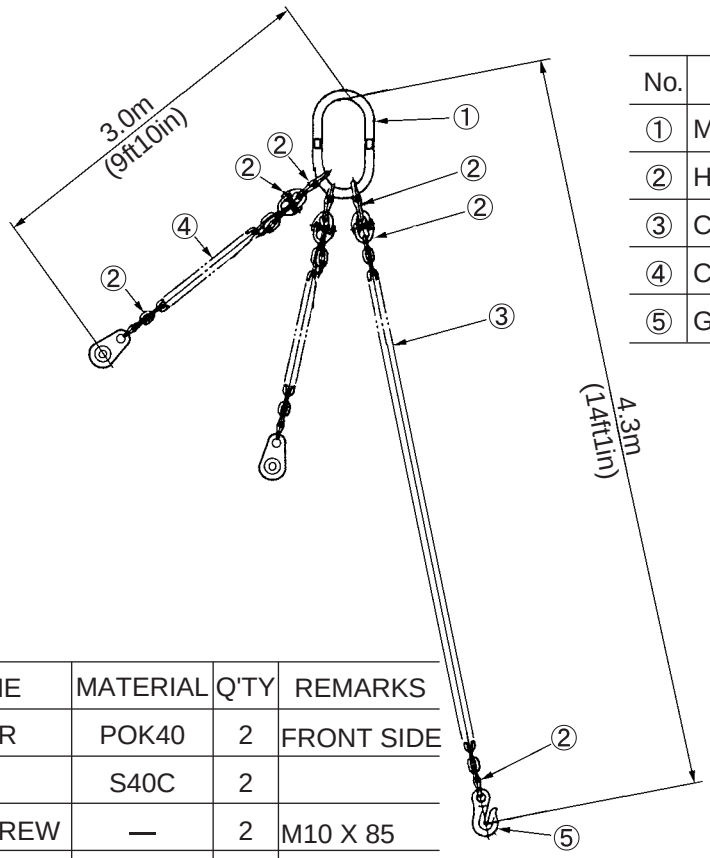
SK330-8



No.	N A M E	Q'TY	TYPE
1	MASTER LINK L	1	KITO HL050
2	HIGH COUPLING HC	9	KITO HC020
3	CHAIN	1	ϕ8×4.4m(14' 5")
4	CHAIN	2	ϕ8×1.5m(4' 11")
5	GRAB HOOK H	1	KITO HH020
6	HOOK	2	KITO HJ050

Fig. 6-5 Upper frame lifting jig

SK460-8



No.	NAME	Q'TY	REMARKS
①	MASTER LINK M	1	
②	HIGH COUPLING HC	12	
③	CHAIN	2	ϕ10 X 3.8m
④	CHAIN	2	ϕ10 X 2.5m
⑤	GRAB HOOK H	2	

No.	NAME	MATERIAL	Q'TY	REMARKS
1	HOLDER	POK40	2	FRONT SIDE
2	PIN	S40C	2	
3	CAPSCREW	—	2	M10 X 85
4	HOLDER	POK40	2	REAR SIDE

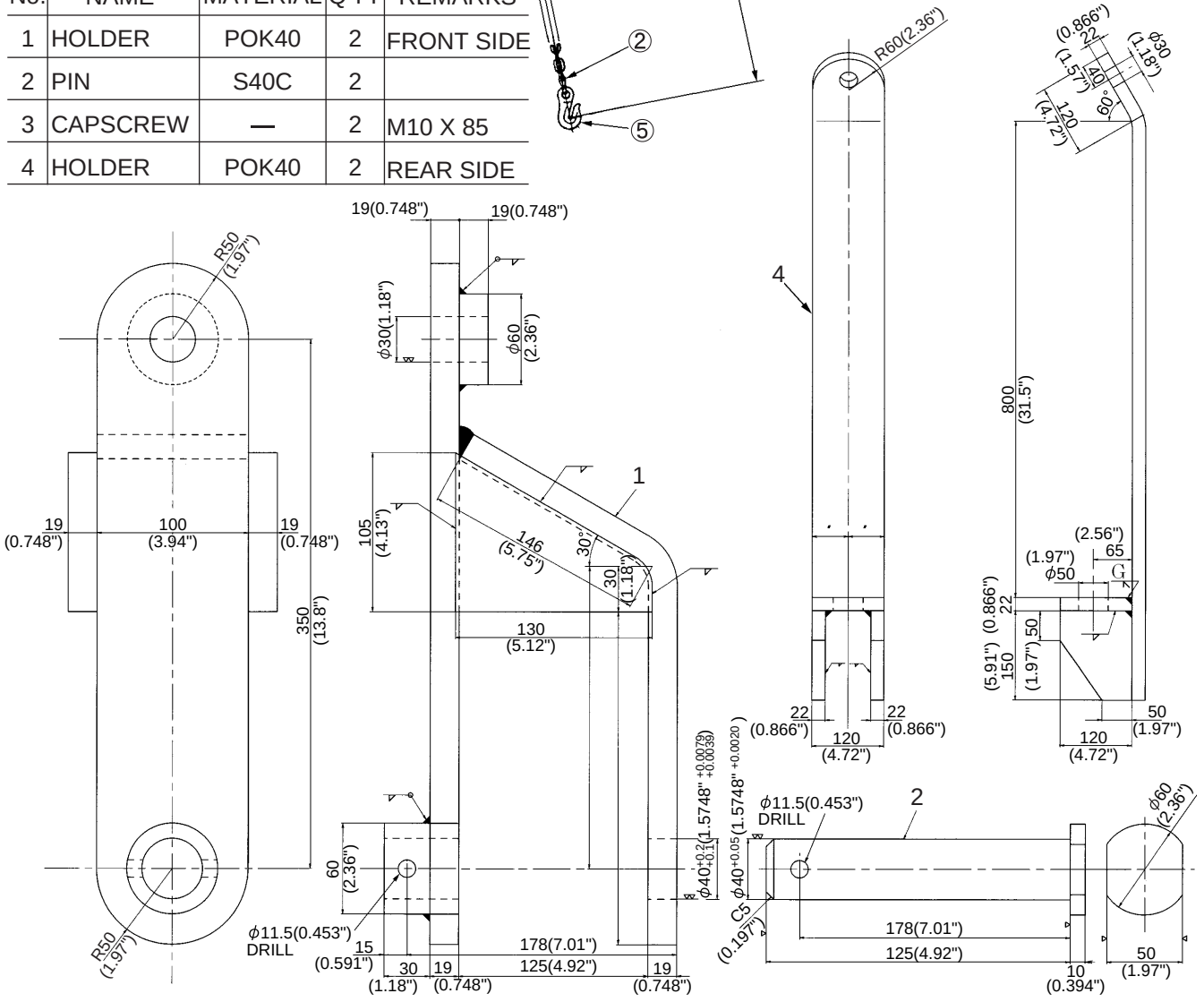
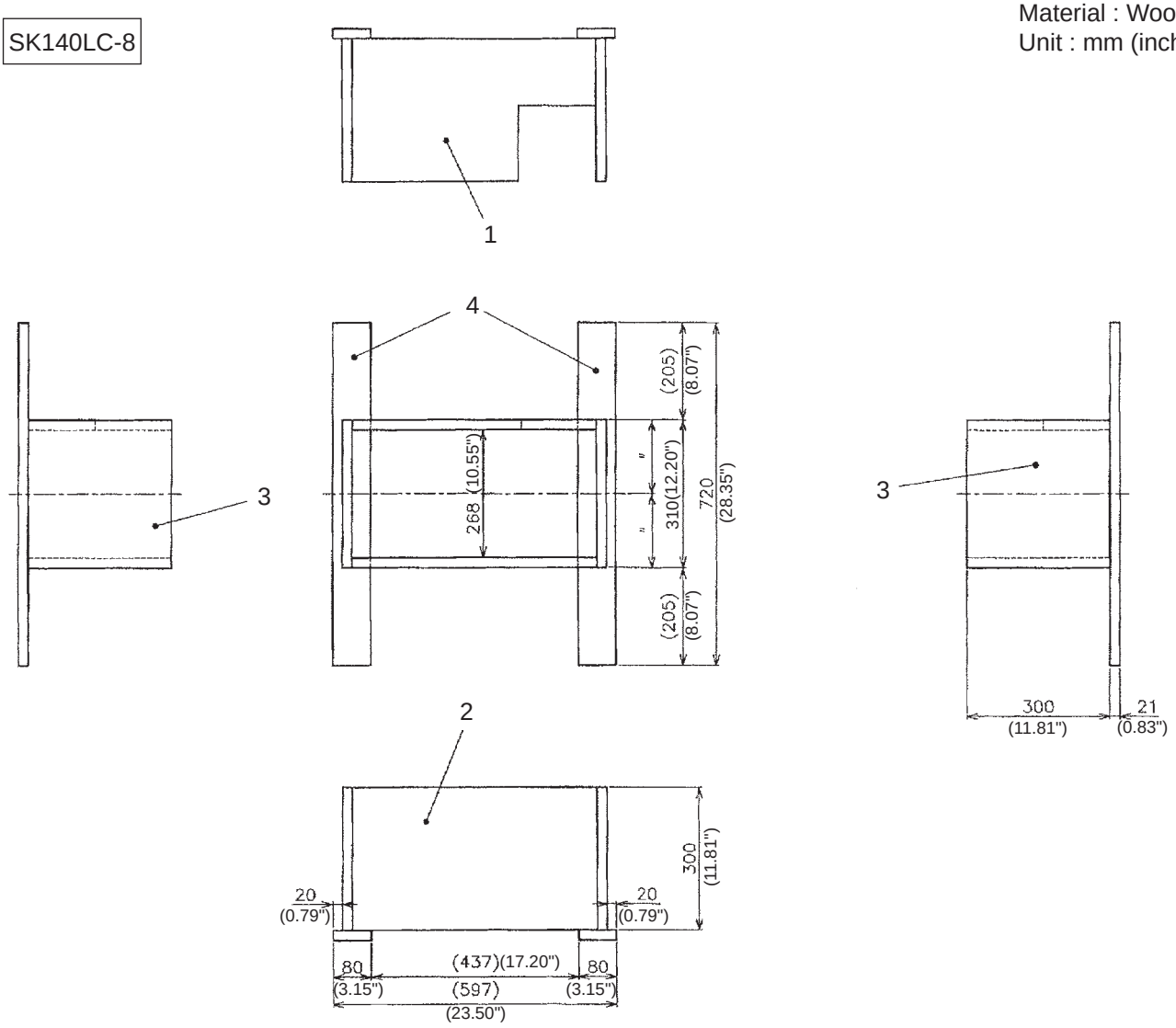


Fig. 6-6 Upper frame lifting jig

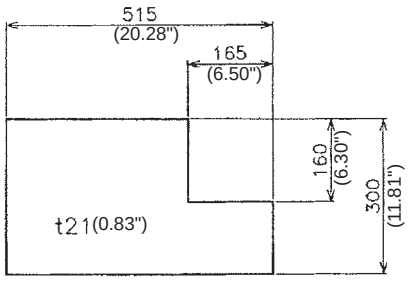
6.9.4 ENGINE MOUNTING PEDESTAL

SK140LC-8

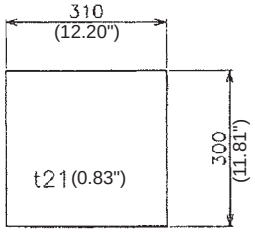
Material : Wood
Unit : mm (inch)



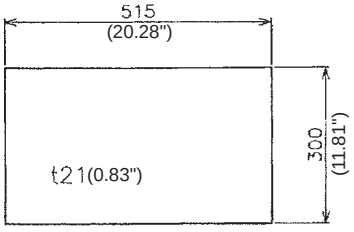
1×1piace



3×2piace



2×1piace



5×2piace

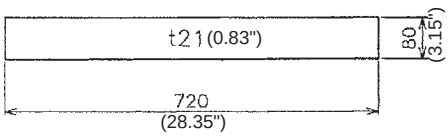
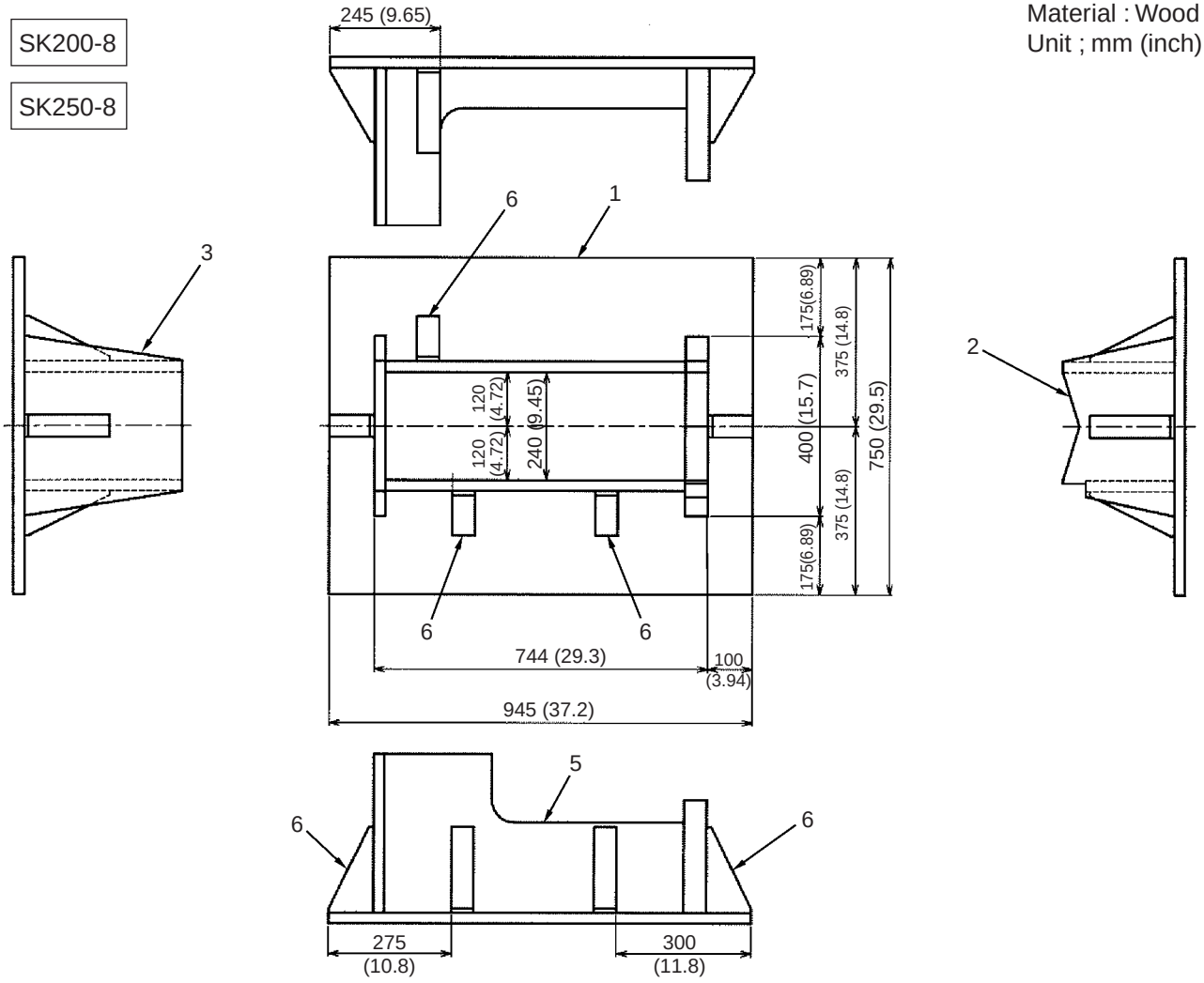


Fig. 6-7 Engine stand

SK200-8

SK250-8

Material : Wood
Unit ; mm (inch)



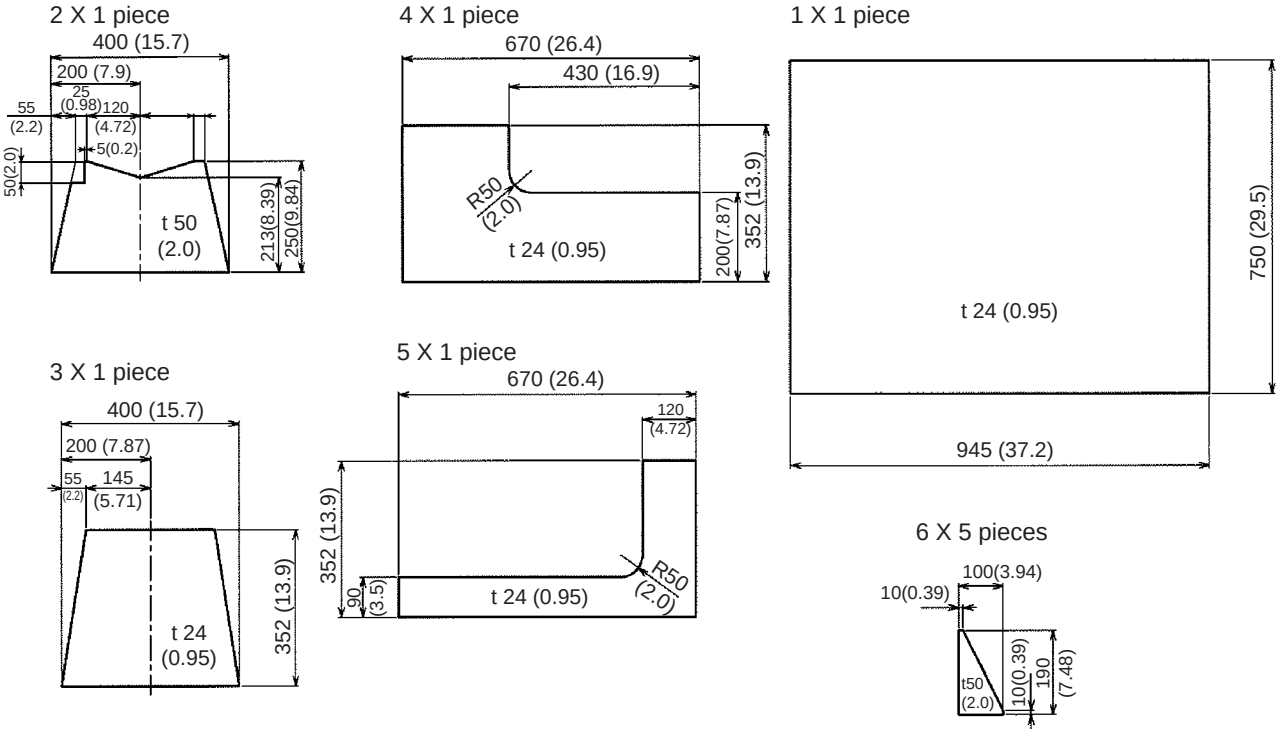


Fig. 6-8 Engine stand

SK330-8

Material : Wood
Unit : mm(inch)

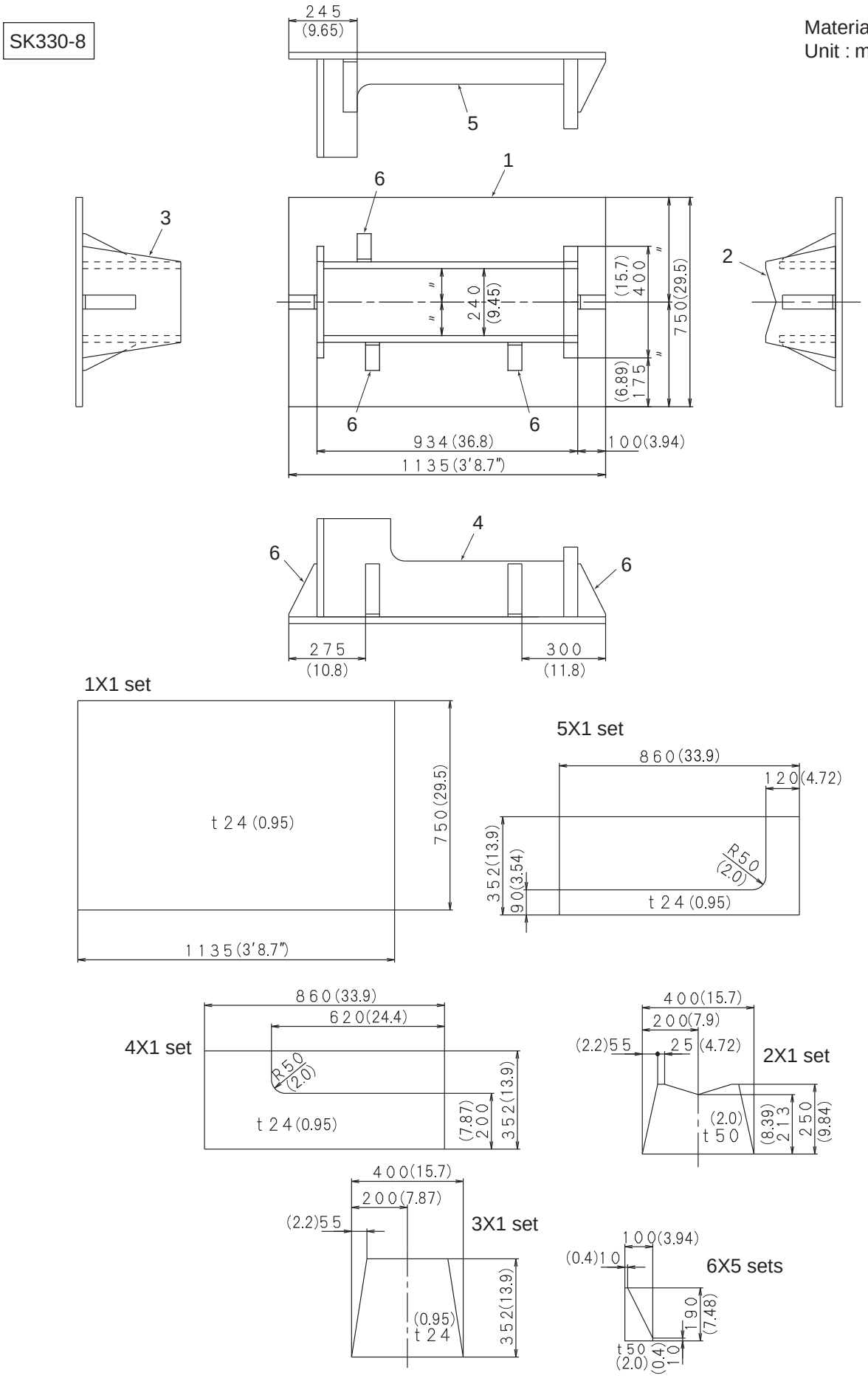
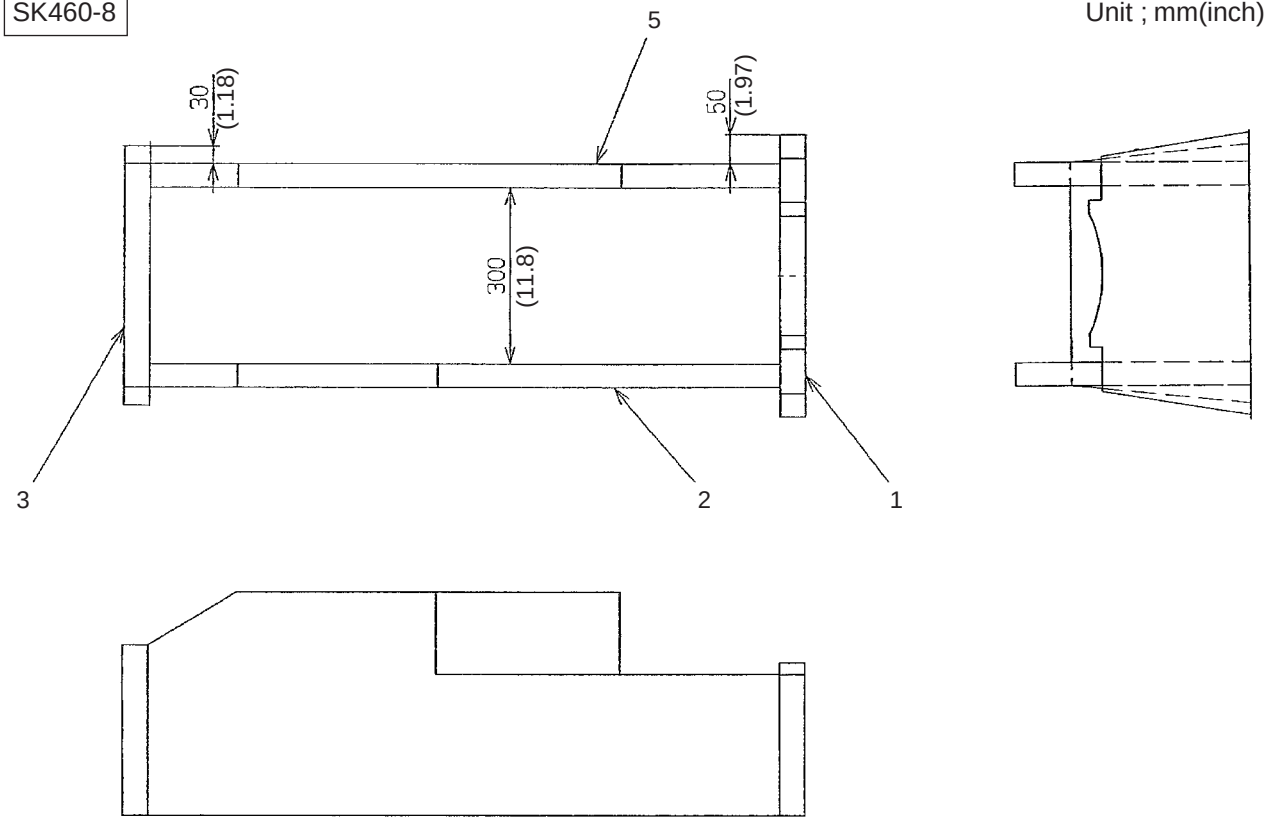


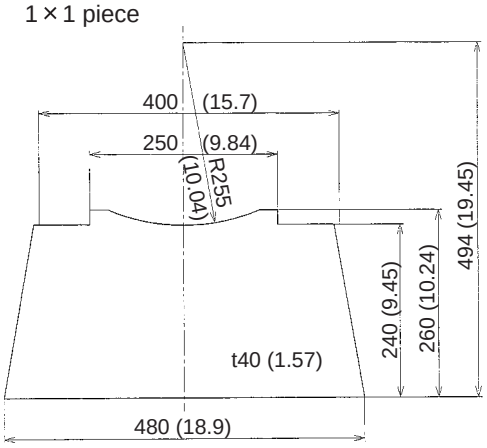
Fig. 6-9 Engine stand

SK460-8

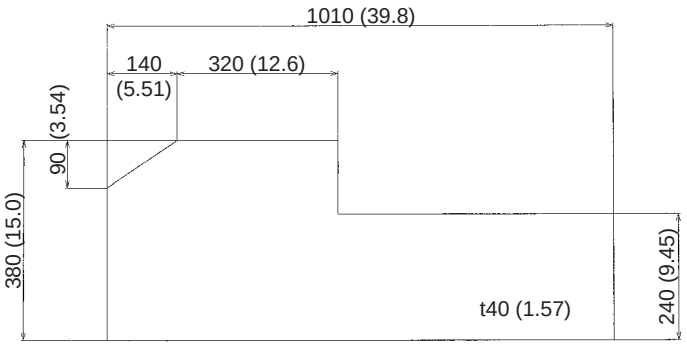
Material : wood
Unit ; mm(inch)



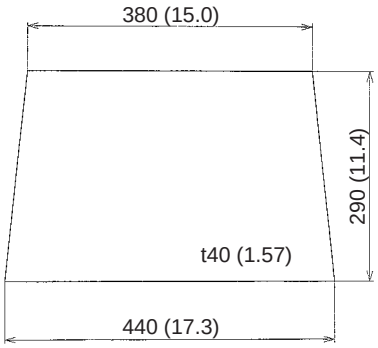
1 × 1 piece



2 × 1 piece



3 × 1 piece



5 × 1 piece

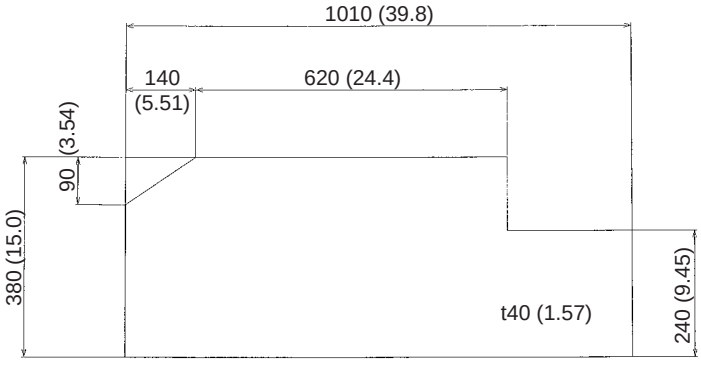


Fig. 6-10 Engine stand

6.9.5 TRACK SPRING SET JIG

SK140LC-8

SK200-8

SK250-8

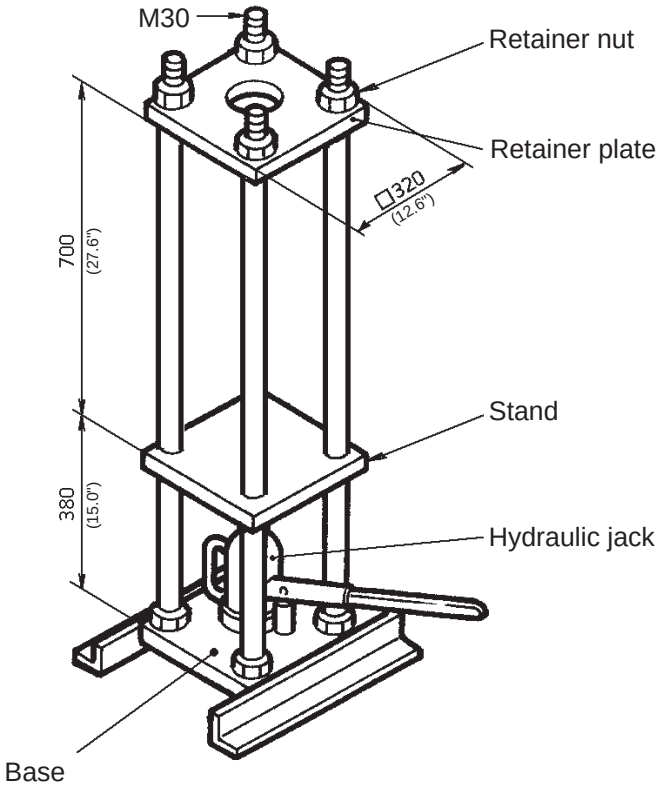


Fig. 6-11 Track spring set jig

6.10 REFERENTIAL TABLE

6.10.1 INTERNATIONAL UNIT

BASE UNIT

Quantity	Designation	Symbol
Length	Meter	m
Mass	Kilogram	kg
Time	Seconds	s
Current	Ampere	A
Thermodynamic temperature	Kelvin	K
Gram molecule	Mol	mol
Luminous intensity	Candela	cd

SUPPLEMENTARY UNIT

Quantity	Designation	Symbol
Plane angle	Radian	rad
Solid angle	Steradian	sr

DERIVED UNIT OF BASE UNIT

Quantity	Designation	Unit
Area	Square meter	m^2
Volume	Cubic meter	m^3
Speed	Meter per second	m/s
Acceleration	Meter per every second	m/s^2
Density	Kilogram per cubic meter	kg/m^3

DERIVED UNIT HAVING PROPER DESIGNATION

QUANTITY	DESIGNATION	SYMBOL	
Frequency	Herz	Hz	$1Hz=1s^{-1}$
Force	Newton	N	$1N=1kg \cdot m/s^2$
Pressure,Stress	Pascal	Pa	$1Pa=1N/m^2$
Energy Work Quantity of heat	Joule	J	1J=1N • m
Power Motive Power,Electric Power	Watt	W	1W=1J/s
Electric Charge, Quantity of electricity	Coulomb	C	1C=1A • s
Electric Potential Voltage Electromotive force	Volt	V	1V=1J/C(1W/A)
Quantity of static electricity Capacitance	Farad	F	1F=1C/V
Electric resistance	Ohm	Ω	1Ω=1V/A
Celcius temperature	Celcius Degree or degree	°C	
Illuminance	Lux	lx	$1lx=1lm/m^2$

SI CONJUNCTIVE WORDS

Quantity		Unit
Designation	Symbol	
Giga-	G	10^9
Mega-	M	10^6
Kilo-	K	10^3
Hecto-	h	10^2
Deca-	da	10
Deci-	d	10^{-1}
Centi-	C	10^{-2}
Milli-	m	10^{-3}
Micro-	μ	10^{-6}
Nano-	n	10^{-9}
Pico-	P	10^{-12}

6.10.2 CONVERSION TABLE

NOTE: Figures in ( ) in the table denote the number of zeros after the decimal point.
(e.g.) 0.(2)1=0.001

LENGTH

Unit	mm	cm	m	km	in	ft	yd	mile
mm	1	0.1	0.001	0.00001	0.03937	0.0032828	0.0010936	0.(6)6214
cm	10	1	0.01	0.0001	0.3937	0.032808	0.010936	0.(5)6214
m	1000	100	1	0.001	39.37	3.28083	1.0936	0.(3)6214
km	—	100000	1000	1	39370	3280.83	1093.61	0.62137
in	25.40	2.540	0.0254	0.(4)254	1	0.0833	0.02778	0.(4)1578
ft	304.8	30.48	0.3048	0.(3)3048	12	1	0.3333	0.(3)1894
yd	914.4	91.44	0.9144	0.(3)9144	36	3	1	0.(3)5682
mile	1609347.0	160934.70	1609.35	1.60935	63360	5280	1760	1

VOLUME

Unit	cm^3	m^3	l	kl	in^3	ft^3	yd^3	gal (Fluid) [USA]
cm^3	1	1.(5)1	0.001	0.(5)1	0.06102	0.(4)3531	0.(5)1308	0.(3)2642
m^3	1000000	1	1000	1	61020	35.31	1.308	264.2
l	1000	0.001	1	0.001	61.02	0.03531	0.001308	0.2642
dl	100000	1	1000	1	61020	35.31	1.308	264.2
in^3	16.39	0.(4)1639	0.01639	0.(4)1639	1	0.(3)5787	0.(4)2143	0.004329
ft^3	28320	0.02832	28.32	0.02832	1728	1	0.03704	7.48055
yd^3	764500	0.7645	764.5	0.7645	46660	27	1	201.974
gal (Fluid) [USA]	3785	0.003785	3.785	0.003785	231	0.1337	0.004951	1

WEIGHT

Unit	kg	oz	lb	(200 lb) nt	(2240 lb) gt	mt
kg	1	35.2740	2.20462	0.001102	0.(3)9842	0.001
oz	0.02835	1	0.06250	0.(4)3125	0.(4)2790	0.(4)2835
lb	0.45359	16	1	0.00050	0.(3)4464	0.(3)4536
nt	907.185	32000	2000	1	0.89286	0.90719
gt	1016.05	35840	2240	1.12	1	1.01605
mt	1000	35274	2204.6	1.10231	0.98421	1

NOTE : mt : ton (metric), nt : ton (USA), GT : (UK)

PRESSURE

Bar	kgf / cm^2	lbf / in^2	gtf / ft^2	Standard atmospheric pressure (760mm)	Mercury column height at 0℃ (32˚F)		Mercury column height at 15℃ (59˚F)	
					m	in	m	ft
1	1.0204	14.51	0.9330	0.9869	0.75055	29.55	10.213	33.51
0.98	1	14.22	0.9144	0.9672	0.7355	28.96	10.009	32.84
0.06895	0.07031	1	0.06429	0.06800	0.05171	2.036	0.7037	2.309
1.075	1.094	15.56	1	1.058	0.8044	31.67	10.95	35.91
1.0133	1.0340	14.706	0.9454	1	0.76052	29.94	10.35	33.90
1.3324	1.3595	19.34	1.243	1.3149	1	39.37	13.61	44.64
0.03384	0.03453	0.4912	0.03158	0.03340	0.02540	1	0.3456	1.134
0.09791	0.09991	1.421	0.09136	0.09663	0.07349	2.893	1	3.281
0.02984	0.03045	0.4331	0.02785	0.02945	0.02240	0.8819	0.3048	1

NOTE : gt : ton (UK)·····760mm=29.92"

DENSITY

Unit	g / cm^3	kg / cm^3	lb / in^3	lb / ft^3	lb / yd^3	lb / gal (USA)
g / cm^3	1	1000	0.03613	62.4283	1685.56	8.34545
kg / m^3	0.001	1	0.(4)3613	0.06243	1.68556	0.(2)8345
lb / in^3	27.6797	27679.7	1	1728	46656	231
lb / ft^3	0.01602	16.0184	0.(3)5787	1	27	0.13368
lb / yd^3	0.(3)5933	0.59327	0.(4)2143	0.03704	1	0.(2)4951
lb / gal (USA)	0.11983	119.826	0.(2)4329	7.48052	201.974	1

6.11 INCLINE CONVERSION TABLE

DEGREE	%
1	1.8
2	3.5
3	5.2
4	7.0
5	8.8
6	10.5
7	12.3
8	14.1
9	15.8
10	17.6
11	19.4
12	21.3
13	23.1
14	24.9
15	26.8

DEGREE	%
16	28.7
17	30.6
18	32.5
19	34.4
20	36.4
21	38.4
22	40.4
23	42.5
24	44.5
25	46.6
26	48.8
27	51.0
28	53.2
29	55.4
30	57.7

DEGREE	%
31	60.1
32	62.5
33	64.9
34	67.5
35	70.0
36	72.7
37	75.4
38	78.1
39	81.0
40	83.9
41	86.9
42	90.0
43	93.3
44	96.6
45	100.0

[MEMO]