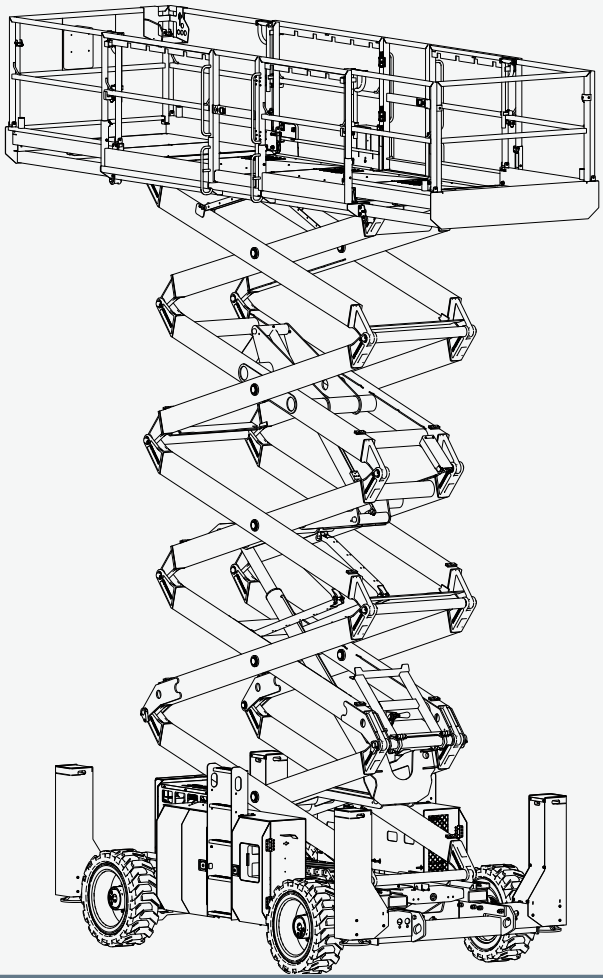
Part No.502013110002
Rev: B
Mar. 2022

Maintenance Manual

1323RD/4389RD
1623RD/5389RD



ANSI AS/NZS EAC GB

SINOBOOM

⚠ WARNING

Operating, servicing and maintaining this vehicle or equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle or equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing. For more information go to: www.P65warnings.ca.gov.
For disposal, please follow your nation regulation.

Manual revision history:

REV	DATE	DESCRIPTION	REMARK
A	Jul, 2021	Original issue of the manual	
B	Mar, 2022	Updated manual, added Yanmar engine information	

Please contact us:

Website : www.sinoboom.com

E-mail : sales@sinoboom.com

Sales Tel : 0086-0731-87116222

Service Tel : 0086-0731-87116333

Address : No.128, East Jinzhou Avenue, Ningxiang High-tech Industrial Park, Changsha, Hunan, China

Zip Code : 410600

APPLICATION

Use the following table to identify the specific serial number for models included in this manual. Check the model of your machine before consulting the manual, and then use the correct manual according to the serial number of the model. See the nameplate on your machine to identify the model and serial number. (See ***Decals/Nameplate Inspection*** of the *Operation Manual* for details.)

Models	Trade Identification		Serial Numbers
	Metric	Imperial	
1323RD	1323RD	4389RD	0201200100 to present
1623RD	1623RD	5389RD	0201300109 to present

NOTE:

- Product model is applied in product nameplate for distinction of products of different main parameters.
- Product trade identification is applied in marketing and machine decals for distinction of products of different main parameters, and can be classified as metric type and imperial type: The metric trade identification is applicable to machines for countries/regions using metric system or as specially required by customers; The imperial trade identification is applicable to the machines for countries/regions using imperial system or as specially required by customers.

This Page Intentionally Left Blank

STATEMENTS

Hunan Sinoboom Intelligent Equipment Co., Ltd. (Hereinafter referred to as Sinoboom) will upload the latest product manual information to the website www.sinoboom.com as soon as possible. However, due to continuous product improvement, the information in this manual is subject to change without prior notice.

This manual covers the basic parts information of one or more products. Therefore, please use this manual according to your needs. If you find problems in the manual or have suggestions for improvement, feel free to share your feedback with Sinoboom, and we will address these issues as soon as possible.

Feel free to consult and download the *Operation Manual*, *Maintenance Manual* and *Parts Manual* of the products you need online at www.sinoboom.com.

Hunan Sinoboom Intelligent Equipment Co., Ltd. retains the right of final interpretation of the manual.

This Page Intentionally Left Blank

TABLE OF CONTENTS

INTRODUCTION

Thank you for choosing and using the machinery of Hunan Sinoboom Intelligent Equipment Co., Ltd. Always read, understand and become familiar with the operation requirements of the machine and its associated safety procedures before operating, maintaining and repairing the machine. Operating the machine without becoming familiar with its specific operation requirements and safety procedures poses serious risks. Operators who follow safety rules and operate the machine carefully and effectively will prevent personal injury, property loss and accidents.

Use this machine only to transport tools to work locations and for performing tasks on the work platform. Operators must be competent and must obtain training to carefully use the machine and follow safety procedures. Only trained and authorized personnel may operate the machine.

This manual guides the operator and authorized personnel in maintaining the machine. The operator is responsible for reading, understanding and implementing the maintenance and safety procedures in this manual and for following the manufacturer's instructions before beginning any work. Read, understand and follow all safety rules and operating instructions. The operator must also consider the machine's uses and limitations and the conditions at the jobsite before using this machine. Strictly following all safety requirements in this manual is critical.

Consider this manual a part of the machine, along with *Operation Manual* and *Parts Manual*, and always keep the manuals with the machine. The owner or administrator of the machine shall offer all manuals and other necessary information provided by the machine manufacturer regarding the daily inspection and maintenance to each of the renters. If the machine is sold, the owner or administrator must pass along the manuals and other necessary information to the purchaser. The owner or administrator of the machine shall also provide the manufacturer's maintenance information to the person responsible for maintaining the machine.

If you have any questions, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

This Page Intentionally Left Blank

1 SPECIFICATIONS

MACHINE SPECIFICATIONS

Table 1-1 1323RD specifications

MEASURE	1323RD (METRIC)	4389RD (IMPERIAL)
DIMENSIONS		
Max. platform height	13.1 m	42ft 11.7in
Max. working height	15.1 m	49ft 6.5in
Max. horizontal reach (rear extension platform extended)	1.2 m	3ft 11.2in
Max. horizontal reach (front extension platform extended)	1.5 m	4ft 11.1in
Overall length	4.88 m	16ft
Overall width	2.28 m	7ft 5.7in
Overall height (stowed, rails folded)	2.22 m	7ft 3.4in
Overall height (stowed, rails up)	2.98 m	9ft 9.3in
Wheelbase	2.84 m	9ft 3.8in
Wheel span	1.95 m	6ft 4.7in
Ground clearance	0.36 m	1ft 2.2in
Tire size (diameter × width / type)	33×12-20/solid	315/55D20/foam-filled
Platform dimension (Length × Width × Height)-6.5 m Platform	3.96 m×1.82 m×1.1 m	13ft×6ft×3ft 7in
Platform dimension (Length × Width × Height)-7.4 m Platform	4.84 m×1.82 m×1.1 m	15ft 10.6in×6ft×3ft 7in
PERFORMANCE		
Rated platform capacity	680 kg	1499 lb
Individual extension platform capacity	227 kg	500 lb
Max. platform occupancy	7 persons	
Drive speed (stowed)	0 ~ 6.1 km/h	0 ~ 3.8 mph
Drive speed (raised)	0 ~ 1.1 km/h	0 ~ 0.68 mph
Up time (no load)	40 ~ 50 s	
Down time (no load)	34 ~ 44 s	
Gradeability	50% (26.6°)	

MEASURE	1323RD (METRIC)	4389RD (IMPERIAL)
Max. allowable inclination (front-to-back)	3°	
Max. allowable inclination (side-to-side, outrigger retracted/extended)	2°/0.8°	
Max. outrigger leveling angle (front-to-back)	7°	
Max. outrigger leveling angle (side-to-side)	12°	
Turning radius (inside)	2.2 m	7ft 2.6in
Turning radius (outside)	5.3 m	17ft 4.7in
Max. allowable side force	400 N	90 lbf
Max. operating noise	86 dB	
POWER		
Drive mode (drive×steer)	4WD×2WS	
Engine (rated power, RPM)	36.3 kW, 2800 rpm (Deutz D2011 L03i) 35.5 kW, 3000 rpm (Yanmar 4TNV88C-DFLT) 36.4kW, 3000 rpm (Yanmar 4TNV88-BDFLTC) 35.3kW, 3000 rpm (Yanmar 4TNV88-ZCDCSI)	
Fuel tank capacity	110 L	24 gal (UK)/29 gal (US)
Hydraulic tank capacity	140 L	30.8 gal (UK)/37 gal (US)
Hydraulic system pressure	24 MPa	3481 psi
Battery specification (voltage, capacity, rate of discharge)	12 V, 110 Ah, 5 hr	
Power system voltage	12 VDC	
System control voltage	12 VDC	
GROUND BEARING INFORMATION		
Max. tire load	3900 kg	8598 lb
Tire contact pressure	720 kPa	104 psi
Max. outrigger load	3200 kg	7055 lb
Outrigger contact pressure	630 kPa	91 psi
ENVIRONMENT		
Max. allowable wind speed (indoor)	0 m/s	0 mph
Max. allowable wind speed (outdoor)	12.5 m/s	28 mph
Max. allowable altitude	1000m	3280.8ft
Allowable ambient temperature (lead-acid batteries)	-10℃ ~ 40℃	14℉ ~ 104℉
Allowable ambient temperature (-lithium batteries)	-20℃ ~ 40℃	-4℉ ~ 104℉

MEASURE	1323RD (METRIC)	4389RD (IMPERIAL)
Max. allowable ambient relative humidity	90%	
Storage condition	Stored at -20℃ to 50℃ (-4℉ to 122℉) in a well-ventilated environment with 90% relative humidity (20℃ [68℉]), and away from rain, sun, corrosive gas, inflammables and explosives.	
WEIGHT		
Total weight	7700 kg	16976 lb

Table 1-2 1623RD specifications

MEASURE	1623RD (METRIC)	5389RD (IMPERIAL)
DIMENSIONS		
Max. platform height	16.2 m	53ft 1.8in
Max. working height	18.2 m	59ft 8.5in
Max. horizontal reach (rear extension platform extended)	1.2 m	3ft 11.2in
Max. horizontal reach (front extension platform extended)	1.5 m	4ft 11.1in
Overall length	4.88 m	16ft
Overall width	2.28 m	7ft 5.7in
Overall height (stowed, rails folded)	2.44 m	8ft
Overall height (stowed, rails up)	3.21 m	10ft 6.3in
Wheelbase	2.84 m	9ft 3.8in
Wheel span	1.95 m	6ft 4.7in
Ground clearance	0.36 m	1ft 2.2in
Tire size (diameter × width / type)	33×12-20/solid	315/55D20/foam-filled
Platform dimension (Length × Width × Height)-6.5 m Platform	3.96 m×1.82 m×1.1 m	13ft×6ft×3ft 7in
Platform dimension (Length × Width × Height)-7.4 m Platform	4.84 m×1.82 m×1.1 m	15ft 10.6in×6ft×3ft 7in
PERFORMANCE		
Rated platform capacity	680 kg	1499 lb
Individual extension platform capacity	227 kg	500 lb
Max. platform occupancy	4 persons	
Drive speed (stowed)	0 ~ 6.1 km/h	0 ~ 3.8 mph
Drive speed (raised)	0 ~ 1.1 km/h	0 ~ 0.68 mph
Uptime (no load)	70 s ~ 90 s	

MEASURE	1623RD (METRIC)	5389RD (IMPERIAL)
Downtime (no load)	45 s ~ 55 s	
Gradeability	40% (22°)	
Max. allowable inclination (front-to-back)	3°	
Max. allowable inclination (side-to-side, outrigger retracted/extended)	2°/0.8°	
Max. outrigger leveling angle (front-to-back)	7°	
Max. outrigger leveling angle (side-to-side)	12°	
Turning radius (inside)	2.2 m	7ft 2.6in
Turning radius (outside)	5.3 m	17ft 4.7in
Max. allowable side force	400 N	90 lbf
Max. operating noise	86 dB	
POWER		
Drive mode (drive×steer)	4WD×2WS	
Engine (rated power, RPM)	36.3 kW, 2800 rpm (Deutz D2011 L03i) 35.5 kW, 3000 rpm (Yanmar 4TNV88C-DFLT) 36.4kW, 3000 rpm (Yanmar 4TNV88-BDFLTC) 35.3kW, 3000 rpm (Yanmar 4TNV88-ZCDCSI)	
Fuel tank capacity	110 L	24 gal (UK)/29 gal (US)
Hydraulic tank capacity	140 L	30.8 gal (UK)/37 gal (US)
Hydraulic system pressure	24 MPa	3481 psi
Battery specification (voltage, capacity, rate of discharge)	12 V, 110 Ah, 5 hr	
Power system voltage	12 VDC	
System control voltage	12 VDC	
GROUND BEARING INFORMATION		
Max. tire load	3900 kg	8598 lb
Tire contact pressure	720 kPa	104 psi
Max. outrigger load	3200 kg	7055 lb
Outrigger contact pressure	630 kPa	91 psi
ENVIRONMENT		
Max. allowable wind speed (indoor)	0 m/s	0 mph
Max. allowable wind speed (outdoor)	12.5 m/s	28 mph
Max. allowable altitude	1000m	3280.8ft

MEASURE	1623RD (METRIC)	5389RD (IMPERIAL)
Allowable ambient temperature (lead-acid batteries)	-10℃ ~ 40℃	14℉ ~ 104℉
Allowable ambient temperature (-lithium batteries)	-20℃ ~ 40℃	-4℉ ~ 104℉
Max. allowable ambient relative humidity	90%	
Storage condition	Stored at -20℃ to 50℃ (-4℉ to 122℉) in a well-ventilated environment with 90% relative humidity (20℃ [68℉]), and away from rain, sun, corrosive gas, inflammables and explosives.	
WEIGHT		
Total weight	8780 kg	19357 lb

NOTE:
a) The platform height plus the operator height (taken as 2m [6ft 7in]) is the working height.
b) In different areas, hydraulic oil, engine oil, coolant, fuel and lubricant should be added in accordance with the environmental temperature.
c) In cold weather, auxiliary devices are needed to start the machines.
d) The ground bearing data is approximate, not considering different options and only applicable when it is safe enough.
e) The loads of persons, accessories, tools and materials are factored into the rated platform capacity.
f) The total vibration value of the platform does not exceed 2.5m/s², and the maximum root-mean-square value of the weighted acceleration of the entire machine does not exceed 0.5m/s².
g) The hydraulic tank capacity is the maximum volume in the hydraulic tank.

MAJOR COMPONENT WEIGHTS

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Do not move heavy components without mechanical assistance.**
- **Do not place heavy components upon instable surfaces.**

Table 1-3

Component	Metric (kg)	Imperial (lb)
Chassis assembly	3632	8007
Reducer and motor	59	130
Steer cylinder	8	18
Outrigger cylinder	69	152
Oscillation cylinder	12	26

Component	Metric (kg)	Imperial (lb)
Tire	161	355
Steer disc	25	55
Left door assembly	285	628
Right door assembly	380	838
Battery	26	57
Power unit	20	44
Scissor assembly	3155	6956
Lift cylinder, upper	124	273
Lift cylinder, lower	262	578
Engine (Deutz D2011 L03i)	244	538
Engine (Yanmar 4TNV88C-DFLT)	267	589
Engine (Yanmar 4TNV88-BDFLTC)	190	419
Engine (Yanmar 4TNV88-ZCDCSI)	199	439
Platform (6.5m Platform)	940	2072
Platform (7.4m Platform)	1057	2330
Note: the component weight may vary with different options of the machine selected.		

ENGINE SPECIFICATIONS

Table 1-4 Deutz D2011 L03i

Type	In-line, air-cooled, 4–stroke
Number of Cylinders	3
Bore	94mm (3.7 in)
Stroke	112mm (4.4 in)
Total Displacement	1.123L 0.25 gal (UK) 0.3 gal (US)
Compression Ratio	19 : 1
Firing Order	1-2-3
Output	36.3kw@2800rpm
Torque	137Nm (101 ft-lb)@1700rpm
Low IdleSpeed	1600rpm
Alternator	14V-60A

Table 1-5 Yanmar 4TNV88C-DFLT

Type	In-line, water-cooled, 4–stroke
Number of Cylinders	4
Bore	88mm (3.46 in)
Stroke	90mm (3.54in)
Total Displacement	2.189L 0.48 gal (UK) 0.58 gal (US)
Compression Ratio	19.1 : 1
Firing Order	1-3-4-2
Output	35.5kW@3000rpm
Low RPM	3150rpm
High RPM	800rpm
Generator capacity	12V-55A

Table 1-6 Yanmar 4TNV88-BDFLTC

Type	In-line, water-cooled, 4–stroke
Number of Cylinders	4
Bore	88mm (3.46 in)
Stroke	90mm (3.54in)
Total Displacement	2.19L 0.48 gal (UK) 0.58 gal (US)
Compression Ratio	19.1 : 1
Firing Order	1-3-4-2

Output	34.5kW@3000rpm
Low RPM	3210rpm
High RPM	1000rpm
Generator capacity	12V-55A

POWER SYSTEM SPECIFICATIONS

Table 1-7

ITEM	SPECIFICATION
Hydraulc Oil	
Normal temperature region (0℃~40℃ [32℉~104℉])	L-HM46
Cold temperature region (-25℃~25℃ [-13℉~77℉])	L-HV32
High temperature region (> 40℃ [104℉])	L-HM68
Extremely cold temperature region (< -30℃ [-22℉])	Special program to be determined
Function Pump	
Type	Gear pump
Displacement	16 cc/r
Drive Pump	
Type	Variable displacement pump
Displacement	46 cc/r
Function Manifold	
System relief valve pressure	24 MPa (3480 Psi)
Lift relief valve pressure	21 MPa (3045 Psi)
Steer relief valve pressure	15.5 MPa (2247.5 Psi)
Drive relief valve pressure	28 MPa (4060 Psi)
Drive brake start pressure	3.5 MPa (507.5 Psi)
Return Filter	
Return filter bypass pressure	0.7 MPa (101.5 Psi)

NOTICE

The factory-filled hydraulic oil can be selected to suit the customer's demand. Do not intermix different types of hydraulic oil.

HYDRAULIC HOSE AND FITTING SPECIFICATIONS

HYDRAULIC HOSE TORQUE

Hydraulic hoses must be torqued to the following specifications.

Table 1-8 Hydraulic Hose Torque

METRIC THREAD	L (LIGHT-DUTY)	S (HEAVY-DUTY)
M12 × 1.5	19 ± 1 Nm (14 ± 1 ft-lb)	
M14 × 1.5	26 ± 2 Nm (19 ± 2 ft-lb)	
M16 × 1.5	40 ± 3 Nm (30 ± 2 ft-lb)	
M18 × 1.5	50 ± 4 Nm (37 ± 3 ft-lb)	
M20 × 1.5	-	60 ± 4 Nm (44 ± 3 ft-lb)
M22 × 1.5	70 ± 5 Nm (52 ± 4 ft-lb)	-
M24× 1.5	-	85 ± 6 Nm (63 ± 4 ft-lb)
M26 × 1.5	90 ± 6 Nm (66 ± 4 ft-lb)	-
M30 × 2	120 ± 8 Nm (89 ± 6 ft-lb)	140 ± 10 Nm (103 ± 7 ft-lb)
M36 × 2	150 ± 12 Nm (111 ± 9 ft-lb)	180 ± 12 Nm (133 ± 9 ft-lb)
M42 × 2	-	260 ± 16 Nm (192 ± 12 ft-lb)
M45 × 2	240 ± 15 Nm (177 ± 11 ft-lb)	-
M52 × 2	250 ± 16 Nm (184 ± 12 ft-lb)	280 ± 18 Nm(207 ± 13 ft-lb)

HYDRAULIC FITTING TORQUE

Hydraulic fittings with metric thread must be torqued to the following specifications.

Table 1-9 Hydraulic Fitting Torque – Metric

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
L (LIGHT-DUTY)			
M10×1	18 ± 1 Nm(13 ± 1 ft-lb)	20 ± 2 Nm (15 ± 2 ft-lb)	18 ± 1 Nm (13 ± 1 ft-lb)
M12×1.5	30 ± 2 Nm (22 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)	30 ± 2 Nm (22 ± 2 ft-lb)
M14×1.5	42 ± 3 Nm (31 ± 2 ft-lb)	48 ± 4 Nm (35 ± 3 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
M16×1.5	55 ± 4 Nm (41 ± 3 ft-lb)	60 ± 4 Nm (44 ± 3 ft-lb)	40 ± 3 Nm (30 ± 3 ft-lb)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
M18×1.5	75 ± 5 Nm (55 ± 4 ft-lb)	75 ± 5 Nm (55 ± 4 ft-lb)	45 ± 3 Nm (33 ± 4 ft-lb)
M22×1.5	90 ± 6 Nm (66 ± 4 ft-lb)	130 ± 8 Nm (96 ± 6 ft-lb)	60 ± 4 Nm(44 ± 3 ft-lb)
M27×2	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	100 ± 7 Nm (74 ± 5 ft-lb)
M30×2	140 ± 8 Nm (103 ± 6 ft-lb)	245 ± 15 Nm (181 ± 11 ft-lb)	135 ± 8 Nm (100 ± 6 ft-lb)
M33×2	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	160 ± 10 Nm(118 ± 7 ft-lb)
M42×2	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	210 ± 13 Nm (155 ± 10 ft-lb)
M48×2	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	260 ± 15 Nm (192 ± 11 ft-lb)
S (HEAVY-DUTY)			
M12×1.5	33 ± 2 Nm (24 ± 2 ft-lb)	43 ± 3 Nm (32 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
M14×1.5	42 ± 3 Nm (31 ± 2 ft-lb)	50 ± 4 Nm (37 ± 3 ft-lb)	45 ± 3 Nm (33 ± 2 ft-lb)
M16×1.5	55 ± 4 Nm (41 ± 3 ft-lb)	75 ± 5 Nm (55 ± 4 ft-lb)	55 ± 4 Nm (41 ± 3 ft-lb)
M18×1.5	75 ± 5 Nm (55 ± 4 ft-lb)	95 ± 6 Nm (70 ± 4 ft-lb)	70 ± 5 Nm (52 ± 4 ft-lb)
M22×1.5	90 ± 6 Nm (66 ± 4 ft-lb)	140 ± 8 Nm(103 ± 6 ft-lb)	100 ± 10 Nm (74 ± 7 ft-lb)
M27×2	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	160 ± 10 Nm (118 ± 7 ft-lb)
M30×2	140 ± 8 Nm (103 ± 6 ft-lb)	245 ± 15 Nm (181 ± 11 ft-lb)	210 ± 13 Nm (155 ± 10 ft-lb)
M33×2	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	260 ± 15 Nm (192 ± 11 ft-lb)
M42×2	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	330 ± 20 Nm (243 ± 15 ft-lb)
M48×2	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	420 ± 25 Nm (310 ± 18 ft-lb)

Hydraulic fittings with British Standard Pipe (BSP) thread) must be torqued to the following specifications.

Table 1-10 Hydraulic Fitting Torque – British Standard Pipe (BSP)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
L (LIGHT-DUTY)			
G1/8A	20 ± 1 Nm (15 ± 1 ft-lb)	20 ± 1 Nm (15 ± 1 ft-lb)	-
G1/4A	35 ± 2 Nm (26 ± 2 ft-lb)	40 ± 2 Nm (30 ± 2 ft-lb)	-
G3/8A	50 ± 3 Nm (37 ± 2 ft-lb)	75 ± 5 Nm (55 ± 2 ft-lb)	-
G1/2A	75 ± 5 Nm (55 ± 2 ft-lb)	95 ± 6 Nm (70 ± 4 ft-lb)	-
G3/4A	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	-
G1A	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	-
G1-1/4A	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
G1-1/2A	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	-
S (HEAVY-DUTY)			
G1/4A	40 ± 3 Nm (30 ± 2 ft-lb)	43 ± 3 Nm (32 ± 2 ft-lb)	-
G3/8A	55 ± 3 Nm (41 ± 2 ft-lb)	85 ± 5 Nm (63 ± 4 ft-lb)	-
G1/2A	80 ± 5 Nm (59 ± 4 ft-lb)	120 ± 8 Nm (89 ± 6 ft-lb)	-
G3/4A	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	-
G1A	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	-
G1-1/4A	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-
G1-1/2A	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	-

Hydraulic fittings with Unified Thread Standard (UNC/UNF) thread must be torqued to the following specifications.

Table 1-11 Hydraulic Fitting Torque – Unified Thread Standard (UNC/UNF)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL
	O-RING	O-RING
L (LIGHT-DUTY)		
7/16-20	21 ± 2 Nm (15 ± 2 ft-lb)	21 ± 2 Nm (15 ± 2 ft-lb)
9/16-18	34 ± 2 Nm (25 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
11/16-12	40 ± 3 Nm (30 ± 2 ft-lb)	50 ± 4 Nm (37 ± 3 ft-lb)
3/4-16	50 ± 3 Nm (37 ± 2 ft-lb)	65 ± 4 Nm (48 ± 3 ft-lb)
7/8-14	75 ± 5 Nm (55 ± 4 ft-lb)	110 ± 8 Nm (81 ± 6 ft-lb)
1-1/16-12	110 ± 8 Nm (81 ± 6 ft-lb)	140 ± 10 Nm (103 ± 7 ft-lb)
1-5/16-12	160 ± 10 Nm (118 ± 7 ft-lb)	210 ± 15 Nm (155 ± 11 ft-lb)
S (HEAVY-DUTY)		
7/16-20	21 ± 2 Nm (15 ± 2 ft-lb)	23 ± 2 Nm (17 ± 2 ft-lb)
9/16-18	34 ± 2 Nm (25 ± 2 ft-lb)	40 ± 3 Nm (30 ± 2 ft-lb)
11/16-12	40 ± 3 Nm (30 ± 2 ft-lb)	65 ± 4 Nm (48 ± 3 ft-lb)
3/4-16	50 ± 3 Nm (37 ± 2 ft-lb)	80 ± 6 Nm (59 ± 4 ft-lb)
7/8-14	75 ± 5 Nm(55 ± 4 ft-lb)	125 ± 10 Nm (92 ± 7 ft-lb)
1-1/16-12	110 ± 8 Nm (81 ± 6 ft-lb)	185 ± 15 Nm (136 ± 11 ft-lb)
1-5/16-12	160 ± 10 Nm (118 ± 7 ft-lb)	280 ± 20 Nm (207 ± 15 ft-lb)

HYDRAULIC HOSE AND FITTING TIGHTENING PROCEDURE

The hydraulic hose and fitting must be installed as per the following requirements.

1. Before installation, check the seals on the hose and fitting, and replace the seal or even the hose assembly and fitting if the seal is found to be damaged or oil spills out of the seal. The seal cannot be reused if the fitting or hose end has been tightened beyond specifications.
2. If the seal is to be replaced, lubricate the seal before installation.
3. Position the hose and nut squarely on the fitting. Then tighten the nut as required.
4. Tighten the nut or fitting to the torque specified in the appropriate table.
5. After installation, perform all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

FASTENER TORQUE SPECIFICATIONS

Unless special torque requirements are stated in this manual or other instructions, torque metric bolts to the values listed in the table below.

Table 1-12 Fastener Torque Specifications – Metric

NOMINAL DIAMETER (MM)	PITCH (MM)	CLASS 8.8	CLASS 10.9	CLASS 12.9
5	0.8	7 Nm (5 ft-lb)	9 Nm (7 ft-lb)	10 Nm (7 ft-lb)
6	1	12 Nm (9 ft-lb)	15 Nm (11 ft-lb)	18 Nm (13 ft-lb)
8	1.25	30 Nm (22 ft-lb)	35 Nm (26 ft-lb)	42 Nm (31 ft-lb)
	1	30 Nm (22 ft-lb)	37 Nm (27 ft-lb)	45 Nm (33 ft-lb)
10	1.5	55 Nm (41 ft-lb)	75 Nm (55 ft-lb)	85 Nm (63 ft-lb)
	1.25	56 Nm (41 ft-lb)	77 Nm (57 ft-lb)	87 Nm (64 ft-lb)
	1	60 Nm (44 ft-lb)	80 Nm (59 ft-lb)	92 Nm (68 ft-lb)
12	1.75	95 Nm (70 ft-lb)	125 Nm (92 ft-lb)	150 Nm (111 ft-lb)
	1.5	100 Nm (74 ft-lb)	130 Nm (96 ft-lb)	155 Nm (114 ft-lb)
	1.25	105 Nm (77 ft-lb)	135 Nm (100 ft-lb)	160 Nm (118 ft-lb)
14	2	150 Nm (110 ft-lb)	200 Nm (148 ft-lb)	230 Nm (170 ft-lb)
	1.5	165 Nm (122 ft-lb)	210 Nm (155 ft-lb)	250 Nm (184 ft-lb)
16	2	230 Nm (170 ft-lb)	300 Nm (221 ft-lb)	360 Nm (266 ft-lb)
	1.5	250 Nm (184 ft-lb)	320 Nm (236 ft-lb)	380 Nm (280 ft-lb)
18	2.5	320 Nm (236 ft-lb)	420 Nm (310 ft-lb)	500 Nm (369 ft-lb)
	1.5	360 Nm (266 ft-lb)	470 Nm (345 ft-lb)	550 Nm (406 ft-lb)
20	2.5	450 Nm (332 ft-lb)	600 Nm (443 ft-lb)	700 Nm (516 ft-lb)
	1.5	500 Nm (369 ft-lb)	650 Nm(479 ft-lb)	770 Nm (568 ft-lb)
22	2.5	600 Nm (443 ft-lb)	800 Nm (590 ft-lb)	980 Nm (723 ft-lb)
	2	650 Nm (479 ft-lb)	850 Nm (627 ft-lb)	1050 Nm (774 ft-lb)

NOMINAL DIAMETER (MM)	PITCH (MM)	CLASS 8.8	CLASS 10.9	CLASS 12.9
24	3	750 Nm (553 ft-lb)	1050 Nm (774 ft-lb)	1250 Nm (923 ft-lb)
	2	800 Nm (590 ft-lb)	1100 Nm (811 ft-lb)	1300 Nm (959 ft-lb)
27	3	1150 Nm (848 ft-lb)	1500 Nm (1106 ft-lb)	1800 Nm (1327 ft-lb)
30	3.5	1500 Nm (1106 ft-lb)	2000 Nm (1475 ft-lb)	2400 Nm (1770 ft-lb)

Unless special torque requirements are listed in this manual or other instructions, torque Unified Thread Standard bolts (label: UNC) to the values listed in the table below.

Table 1-13 Bolt Torque Specifications Unified – Thread Standard (UNC)

NOMINAL DIAMETER (IN)	OPPOSITE NUT SIZE (S)	CLASS 5	CLASS 8
1/4-20	7/16"	10 Nm (7 ft-lb)	14 Nm (10 ft-lb)
5/16-18	1/2"	21 Nm (15 ft-lb)	29 Nm (21 ft-lb)
3/8-16	9/16"	37 Nm (27 ft-lb)	51 Nm (38 ft-lb)
7/16-14	5/8"	60 Nm (44 ft-lb)	82 Nm (60 ft-lb)
1/2-13	3/4"	90 Nm (66 ft-lb)	130 Nm (96 ft-lb)
9/16-12	13/16"	130 Nm (96 ft-lb)	180 Nm (133 ft-lb)
5/8-11	15/16"	178 Nm (131 ft-lb)	250 Nm (184 ft-lb)
3/4-10	1-1/8"	315 Nm (232 ft-lb)	445 Nm (328 ft-lb)
7/8-9	-	509 Nm (375 ft-lb)	715 Nm (527 ft-lb)

Unless special torque requirements are listed in this manual or other instructions, torque Unified Thread Standard bolts (label: UNF) to the values listed in the table below.

Table 1-14 Bolt Torque Specifications – Thread Standard (UNF)

NOMINAL DIAMETER (IN)	OPPOSITE NUT SIZE (S)	CLASS 5	CLASS 8
1/4-28	7/16"	11.5 Nm (8 ft-lb)	16 Nm (11 ft-lb)
5/16-24	1/2"	23 Nm (17 ft-lb)	32 Nm (24 ft-lb)
3/8-24	9/16"	41 Nm (30 ft-lb)	58 Nm (43 ft-lb)
7/16-20	5/8"	65 Nm (48 ft-lb)	92 Nm (68 ft-lb)
1/2-20	3/4"	100 Nm (74 ft-lb)	145 Nm (107 ft-lb)
9/16-18	13/16"	145 Nm (107 ft-lb)	200 Nm (148 ft-lb)
5/8-18	15/16"	200 Nm (148 ft-lb)	280 Nm (207 ft-lb)
3/4-16	1-1/8"	350 Nm (258 ft-lb)	495 Nm (365 ft-lb)
7/8-14	-	560 Nm (413 ft-lb)	780 Nm (575 ft-lb)

2 SAFETY

Read, understand and comply with the safety rules and regulations of your workplace and your government.

Before using the machine, ensure the operator is properly trained and qualified in safely operating the machine. The training includes but is not limited to：

- Warning and instruction decals on the machine
- Pre-operation inspection
- Any factors that may affect the machine stability
- Common hazards and countermeasures
- Jobsite inspection
- Functions of all controls and associated knowledge, including emergency control.
- Personal protection equipment that suits the task, workplace and environment.
- Safety operation
- Transporting the machine
- Measures against unauthorized use
- Operating instructions

Understand that as the operator you have the responsibility and right to shut down the machine in case of failure with the machine or other emergency at your workplace.

NOTICE

People suffering from heart disease, hypertension, epilepsy and other diseases and people who fear heights must never operate or use this machine. Also, people who have alcohol or drugs in their system, or experience excessive fatigue or depression, are prohibited from operating or using this machine.

SAFETY DEFINITIONS

This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

⚠ DANGER

Indicates a hazardous situation that, if not avoided, *will* result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation that, if not avoided, *could* result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation that, if not avoided, *could* result in minor or moderate injury.

NOTICE

Indicates a situation that can cause damage to the engine, personal property and/or the environment, or cause the equipment to operate improperly.

NOTE: Indicates a procedure, practice or condition that should be followed in order for the engine or component to function in the manner intended.

REPORTING ACCIDENTS

In case of any accident involving the machine of Hunan Sinoboom Intelligent Equipment Co., Ltd., notify Hunan Sinoboom Intelligent Equipment Co., Ltd. immediately, even if no personal injury or property damage occurs in the accident. Contact Hunan Sinoboom Intelligent Equipment Co., Ltd. by telephone and provide all necessary details. Failure to notify the manufacturer within 48 hours of the incident involving the machine of Hunan Sinoboom Intelligent Equipment Co., Ltd. may void the product's warranty.

NOTICE

Thoroughly inspect the machine and all its functions after any accident. Make sure to test it first from the ground controller and then from the platform controller. Ensure the machine's lifting height does not exceed 3 m (9.8 ft) until all damage has been repaired and all controllers operate properly.

ELECTROCUTION HAZARDS

NOTE: This machine is not insulated and does not have an electric shock protection function.

All operators and managers shall comply with national or local regulations regarding the minimum safe distance of live conductors above the ground. In the absence of such requirements, operators and managers should follow the minimum safety distance requirements in *Table 2-1 Minimum Safe Distance, page 2-2*.

⚠ WARNING

ELECTRICAL SHOCK HAZARDS

- **Always maintain a safe distance from power lines and electrical equipment in accordance with applicable government regulations and see *Table 2-1 Minimum Safe Distance, page 2-2*.**
- **Consider platform movement, wire swinging or drooping, beware of strong winds or gusts, and do not operate the machine when there is lightning or heavy rain.**
- **If the machine comes into contact with live wires, keep away from the machine. Personnel on the ground or on the platform must not touch or operate the machine until the power is switched off.**
- **Do not use the machine as a ground wire during welding and polishing operations.**

Table 2-1 Minimum Safe Distance

Voltage (Phase to Phase, kV)	Minimum Safe Distance (m/ft)
0-50	3.05 (10)
50-200	4.60 (15)
200-350	6.10 (20)
350 -500	7.62 (25)
500 -750	10.67 (35)
750 -1000	13.725 (45)

TIPPING HAZARDS AND RATED LOAD

Maximum platform capacity:

Table 2-2

1323RD	
Platform retracted	680 kg (1499 lb)
Platform extended-extension platform only (single)	227 kg (500 lb)
1623RD	
Platform retracted	680 kg (1499 lb)
Platform extended-extension platform only (single)	227 kg (500 lb)

⚠ WARNING

TIPPING HAZARDS

- **Personnel, equipment and materials on the platform must not exceed the maximum platform capacity.**
- **Only raise or extend the platform when the machine is on solid, level ground.**
- **Do not use the tilt alarm as a level indicator. The tilt alarm on the platform will sound only if the machine is heavily tilted. If the tilt alarm sounds:**
  - **Be very careful to lower the platform. Transfer the machine to solid, level ground. Do not change the level or limit switch.**
- **Do not drive faster than 1.1 km/h (0.68 mph) when the platform is raised.**
- **When the platform is raised, the machine cannot travel on uneven terrain, unstable surfaces or in other dangerous conditions.**
- **Do not operate the machine during strong winds or gusts, and do not increase the surface area of the platform or load. Increasing the area exposed to the wind will reduce the stability of the machine.**
- **When the machine is on rough ground, with gravel or other uneven surfaces, or near holes and steep slopes, use caution and reduce the speed.**
- **Do not use the machine to push or pull objects outside of the platform. The maximum side force allowed is 400 N (90 lbf)**
- **Do not change any machine parts that may affect safety and stability.**
- **Do not replace key parts that affect machine stability with parts of different weights or specifications.**
- **Do not modify or change moving aerial platforms without the manufacturer's prior written permission.**

⚠ WARNING

TIPPING HAZARDS

- **On the platform, do not attach an additional device for placing tools or other materials to the guardrail. This will increase the platform weight, surface area and load.**
- **Do not place or fasten any overhanging load on or to any part of this machine.**
- **Do not place ladders or scaffolding on the platform or any parts of the machine.**
- **Do not use the machine on a moving or active surface or on a vehicle. Ensure all tires are in good condition, the slotted nuts tightened and the cotter pins complete.**
- **Do not use any battery that weighs less than the original battery (27kg [60 lb]). The battery not only provides power, but also acts as counterweight, which is quite important to maintain the stability of the machine.**
- **Do not use the platform to push other machines or objects.**
- **Do not let the platform touch nearby objects.**
- **Do not tie off the platform with rope or other binding materials to nearby objects.**
- **Do not place loads outside the platform.**
- **Do not operate the machine when the chassis doors are open.**
- **When the platform is caught or stuck or when other objects in the vicinity impede its normal movement, do not use the platform controller to lower the platform. If you intend to lower the platform with the ground controller, you must operate it only after all personnel have left the platform.**

WORK ENVIRONMENT HAZARDS

⚠ WARNING

UNSAFE JOBSITE HAZARDS

- **Do not operate the machine on surfaces, edges or potholes that cannot bear the weight of the machine. Raise or extend the platform only when the machine is on firm, flat ground.**
- **Do not use the tilt alarm as a horizontal indicator. The tilt alarm on the platform will sound only when the machine is heavily tilted.**
- **If the tilt alarm sounds while lifting the platform, be very careful when lowering the platform. Do not change the level or limit switch.**
- **Drive speed should not exceed 1.1 km/h (0.68 mph) when the platform rises.**
- **If the machine can be used outdoors, never operate it during strong winds or gusts. Do not lift the platform when the wind speed exceeds 12.5 m/s (28 mph). If the wind speed increases to beyond 12.5 m/s (28 mph) after the platform is lifted, retract the platform and stop operating the machine.**
- **Never use any devices that may increase the wind load on the machine.**
- **Never travel on uneven terrain or unstable surfaces or in other dangerous conditions when raising the platform.**
- **With the machine retracted, be careful and slow down when the machine is moving on uneven terrain, crushed stone, unstable or slippery surfaces, steep slopes and near cave entrances.**
- **Do not drive or lift the machine on slopes, steps or vaulted surfaces that exceed the maximum climbing capacity of the machine.**

Before or during machine operation, check the jobsite for potential hazards and pay attention to the environmental limitations, including potentially flammable and explosive gas/dust. If the machine is to be used in any other applications or by any other means other than those specified by **Sinoboom**, it must be approved or guided by the manufacturer.

Table 2-3

BEAUFORT NUMBER	METERS/ SECOND	MILE/ HOUR	DESCRIPTION	GROUND CONDITION
0	0 ~ 0.2	0 ~ 0.5	Calm	Calm. Smoke rises vertically.
1	0.3 ~ 1.5	1 ~ 3	Light air	Wind motion visible in smoke.
2	1.6 ~ 3.3	4 ~ 7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	3.4 ~ 5.4	8 ~ 12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	5.5 ~ 7.9	13 ~ 18	Moderate breeze	Dust and loose paper rise. Small branches begin to move.
5	8.0 ~ 10.7	19 ~ 24	Fresh breeze	Smaller trees sway.
6	10.8 ~ 13.8	25 ~ 31	Strong breeze	Large branches in motion. Flags waving near horizontal. Umbrella use becomes difficult.

BEAUFORT NUMBER	METERS/ SECOND	MILE/ HOUR	DESCRIPTION	GROUND CONDITION
7	13.9 ~ 17.1	32 ~ 38	Near gale/moderate gale	Whole trees in motion. Effort needed to walk against the wind.
8	17.2 ~ 20.7	39 ~ 46	Fresh gale	Twigs broken from trees. Cars veer on road.
9	20.8 ~ 24.4	47 ~ 54	Strong gale	Light structure damage.

NOTICE

Maximum climbing ability or gradeability is suitable for machines with platform retracted.

1323RD gradeablity: 50% (26.6°)
1623RD gradeability: 40% (22°)

Gradeability means the maximum allowable tilt angle of the machine when it is on solid ground and the platform is only capable of carrying one person. As the weight of the machine's platform increases, the machine's climbing capacity reduces.

UNSAFE OPERATION HAZARDS

At a minimum, operators must operate and maintain the machine as stated in the *Operation Manual* and the *Maintenance Manual* in addition to following more stringent industry regulations and workplace rules. Never engage in unsafe machine operation.

Do not use the machine in the following situations：

- Unrelated personnel/equipment is present in the working envelope of the machine.
- Use as a crane (except the custom-made ones with such function).
- Use on the truck, trailer, tracked vehicle, ship, scaffold and the like without written consent by the manufacturer or a qualified professional.
- Improper securing of the machine to another object by just leaning, fastening or binding.
- Stunt or imprudent use of the machine.
- Overloaded or over-moment situation.
- Other situations as specified in the Manuals.

⚠ WARNING

UNSAFE OPERATION HAZARDS

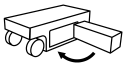
- **Do not use the machine to push or pull objects outside of the platform. The maximum side force allowed is 400 N (90 lbf)**

- **Do not change any machine parts that may affect safety and stability.**
- **Do not replace key parts that affect machine stability with parts of different weights or specifications.**
- **Do not change or modify moving aerial platforms without the manufacturer's written permission.**

- **On the platform, do not attach an additional device for placing tools or other materials to the guardrail. This will increase the platform weight, surface area and load.**
- **Do not put ladders or scaffolding on the platform or any part of this machine.**
- **Do not use additional devices to increase the working height of the machine.**

- **Do not use the machine on any mobile or movable surface or vehicle. Ensure all tires are in good condition, the slotted nuts tightened and the cotter pins complete.**

- **Do not use any battery that weighs less than the original battery (27kg [60 lb]). The battery not only provides power, but also acts as counterweight, which is quite important to maintain the stability of the machine.**



- **Do not place or attach any suspended load onto any part of the machine.**
- **Do not use the machine as a crane.**
- **Do not use the platform to push other machines or objects.**
- **Do not allow the platform to touch nearby objects.**

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Do not tie the platform onto nearby objects.**
- **Do not place loads outside the platform.**
- **When the platform is caught or stuck or when other objects in the vicinity impede its normal movement, do not use the platform controller to lower the platform. If you intend to lower the platform with the ground controller, you must operate it only after all personnel have left the platform.**
- **Do not operate the machine when the chassis door box is open.**
- **When one or more of the machine's tires are off the ground, evacuate all personnel before attempting to stabilize the equipment. Use a crane, forklift or other suitable apparatus to stabilize the equipment.**

FALL HAZARDS

At a minimum, operators must operate and maintain the machine as stated in ***Operation Manual*** and in the ***Maintenance Manual*** in addition to following more stringent industry regulations and workplace rules.

⚠ WARNING

FALL HAZARDS

- **Each person on the platform must wear harnesses or use safety equipment consistent with government regulations. Fasten the cable to the fixed point of the platform. Never fasten the cable of more than one person to a fixed point on the platform.**
- **Do not sit, stand or crawl on the guardrails. When on the platform always remain standing on the platform floor.**
- **Do not climb down from the platform when the platform is elevated.**
- **Keep the platform floor free of obstacles.**
- **Do not enter or exit the platform unless the machine is fully in place.**
- **Close the platform entrance door before operating the machine.**
- **Do not operate the machine if the handrails are not properly installed and the platform entry door is not closed.**

COLLISION HAZARDS

At a minimum, operators must operate and maintain the machine as stated in the *Operation Manual* and in the *Maintenance Manual* in addition to following more stringent industry regulations and workplace rules.

⚠ WARNING

COLLISION HAZARDS

- **Pay attention to the field of sight and the presence of blind spots when moving or operating the machine.**
- **Pay attention to the extended platform when moving the machine.**
- **Check the work area to avoid ground and overhead obstructions or other possible risks.**
- **Be sure to exercise caution when using the platform controller and chassis controller. Color-marked directional arrows show the function of travel, lift and steering.**
- **Users must comply with user, workplace and government rules regarding the use of personal protective equipment (hard hats, safety belts and gloves, etc.).**
- **Place the machine on level ground or in a secured position before releasing the brakes.**
- **Only lower the platform when there are no people or obstructions in the area beneath it.**
- **Limit the speed of travel according to ground conditions, crowding, gradients, the presence and location of personnel and any other factors that may cause collisions.**
- **Do not operate the machine on any crane or overhead traveling device unless the crane control is locked or precautions have been taken to prevent any potential collision.**
- **Do not place your hands and arms where they may become crushed or trapped.**
- **Do not work in or under the platform or near the scissor arms when the safety lever is not in place.**
- **Maintain good judgment and planning when using the controller on the ground to operate the machine. Maintain proper distance between operator, machine and fixed object.**

⚠ WARNING

COLLISION HAZARDS

- **Keep the machine away from any stationary objects (buildings etc.) or mobile objects (vehicles, cranes etc.).**
- **Never operate a machine dangerously or for fun.**

CRUSH HAZARDS

A potential crush hazard exists during movement of the machine. Always keep body parts and clothing a safe distance from the machine during machine operation.

⚠ WARNING

CRUSH HAZARDS

- **Do not place your hands and arms where they may become crushed or trapped.**
- **Do not work in or under the platform or near the scissor arms when the safety lever is not in place.**
- **Maintain good judgment and planning when using the controller on the ground to operate the machine. Maintain proper distance between operator, machine and fixed object.**

EXPLOSION AND FIRE HAZARDS

⚠ WARNING

EXPLOSION AND FIRE HAZARDS

- **Do not use the machine or charge the battery in hazardous or potentially flammable or explosive atmosphere.**
- **For the engine-powered machines, never add fuel while the engine is still running, and only add fuel when the place is well ventilated and free of flame, spark or any other hazards that may cause explosion.**
- **Never spray ether on the engine equipped with glow plug.**

DAMAGED MACHINE HAZARDS

NOTICE

To avoid machine damage, follow all operation and maintenance requirements in the Operation Manual and the Maintenance Manual.

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Do not use the machine if it is damaged or not in proper operating condition.**
- **Thoroughly inspect and test for all functions of the machine before use. Immediately mark and stop damaged or faulty machines.**
- **Ensure that all maintenance operations have been performed in accordance with the *Operation Manual* and the corresponding *Maintenance Manual*.**
- **Make sure all labels are in place and are legible.**
- **Ensure that the *Operation Manual* and *Maintenance Manual* are sound, easy to read and stored in the storage compartment on the platform.**

BODILY INJURY HAZARDS

Always follow all operation and maintenance requirements in the *Operation Manual* and the *Maintenance Manual*.

⚠ WARNING

UNSAFE OPERATION HAZARD

Do not operate the machine when there are oil spills/leaks. Oil spills or leaks in hydraulic fluids may penetrate and burn the skin.

NOTE: The operator must carry out maintenance during the pre-operation inspection only. During operation, keep the left and right doors of the chassis closed and locked. Only trained service personnel can open the left and right doors to repair the machine.

BATTERY HAZARDS

⚠ WARNING

FIRE AND EXPLOSION HAZARD

- **Batteries contain sulfuric acid and may generate explosive mixtures of hydrogen and oxygen gases. Keep any device that may produce sparks or flames (-including cigarettes/smoking materials) away from the battery to prevent explosion.**
- **Do not touch the battery terminals or cable clips with tools that may produce sparks.**
- **Do not charge the battery under direct sunlight.**
- **The battery should be charged in a well-ventilated site.**
- **Should the battery overheat, deform, leak, smell or smoke during service, stop using the battery immediately and place it in an open area far away from the crowd.**
- **Do not throw the battery to a fire or heater.**

⚠ WARNING

ELECTROCUTION HAZARD

- **Contact with hot circuit may cause serious injury or death. Be sure to wear goggles, gloves and protective clothing.**
- **Remove all rings, watches and other accessories.**

⚠ WARNING

CHEMICAL BURN HAZARD

- **Avoid battery acid spilling or contacting unprotected skin. Wash the skin with plenty of water and seek medical attention immediately if battery acid contacts skin.**
- **If the battery acid escapes, please use baking soda to neutralize the acid.**

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Strictly follow the manufacturer's recommendations on how to properly use and maintain the battery.**
- **The battery charger can only be connected to 3–phase AC outlet, and ensure the charger works properly before charging.**
- **Only use the charger provided by the manufacturer.**
- **The battery is only applicable for the matching equipment, so do not use it otherwise.**
- **Only the properly trained personnel authorized by the workplace are allowed to remove the battery from the machine.**
- **Before replacing the battery, be sure to identify the appropriate number of personnel and the lifting method.**
- **The wrapping of the battery is prone to becoming damaged by pointed objects, so do not use a pointed part to collide with the battery.**
- **Do not place other objects or tools upon the battery to avoid short circuit.**
- **Always keep the battery vertically placed. If tiltedly placed, the battery acid may escape.**
- **Never short circuit the battery positive and negative poles.**
- **Do not use the battery positive and negative conversely.**
- **Do not connect the battery directly to a power outlet.**
- **Do not tap, throw or step on the battery.**
- **Do not immerse the battery under water, acid or alkaline solution with salt, and do not expose the battery to the rain.**
- **Do not tamper with battery system to avoid serious accident.**
- **Cut off the battery main switch if the battery is not to be used for an extended period.**

⚠ WARNING

UNSAFE OPERATION HAZARD

- **The waste battery may pose danger, so do not discard at will. If it needs to be scrapped, contact a battery recycling company.**
- **Except for the professionals, do not perform a systematic maintenance or service to the battery, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not tamper with the settings or service a signal light when the system is running, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not remove the battery housing, otherwise it may cause damage to the battery system.**

NOTICE

It will not covered by the warranty if the battery attenuates or fails due to customer's overuse (-continued use after battery level less than 10%) or failure to charge the battery for a long time (not timely charged for 3 days or longer when the battery level less than 10%).

HYDRAULIC SYSTEMS HAZARD

⚠ WARNING

BURN AND HIGH PRESSURE HAZARD

- **Hydraulic systems are hot. DO NOT TOUCH! Serious personal injury may result from hot hydraulic fluid.**
- **When work on the hydraulic system is completed, thoroughly clean any spilled oil from the machine. Do not spill any hydraulic fluid on the ground. Clean any hydraulic fluid from your skin as soon as soon as you have completed performing maintenance and repairs. Dispose of used fluid as required by law.**
- **Never inspect for hydraulic leaks with bare hands or other exposed body parts. As a minimum, wear leather gloves and use cardboard or wood to inspect for leaks. If leaks are present, relieve pressure to allow system to cool prior to servicing. If injured by escaping hydraulic fluid, contact a physician immediately. Serious complications may arise if not treated immediately.**

WELDING AND POLISHING REQUIREMENTS

Before welding, grinding and polishing operations, always ensure you read and understand all operation and maintenance requirements in the *Operation Manual* and the *Maintenance Manual*.

⚠ WARNING

WELDING HAZARDS

- **Comply with the welder manufacturer's recommendations for procedures concerning proper use of the welder.**
- **Welding leads or cables may only be connected after turning off the power unit.**
- **Carry out welding operations only after the welding cable has been correctly connected.**
- **Do not use the machine as a ground wire during welding operation.**
- **At all times, make sure that the power tools are completely stored in the working platform. Do not hang the power tools on the railing of the working platform or the work area outside the working platform, or hang the power tools directly by the wire.**

Before performing welding, grinding and polishing work, welders must seek permission of the responsible department at the workplace.

AFTER USING THE MACHINE

1. Choose a safe parking location that is on sturdy, level ground and that is free of obstructions. Avoid areas with heavy traffic.
2. Lower the platform.
3. Turn the emergency stop switch of the ground controller to the "OFF" position
4. Turn the key switch to the "OFF" position and remove the key to avoid unauthorized use of the machine.
5. Block the wheels with the wheel wedges.
6. Charge the battery.

NOTICE

After using the machine, the power off switch must be disconnected.

3 SYSTEM DESCRIPTIONS

POWER SYSTEM

The machine is powered by either of the following diesel engines (optional) to drive a gear pump (16cc/r):

- Deutz D2011 L03i
- Yanmar 4TNV88C-DFLT
- Yanmar 4TNV88-BDFLTC

The diesel engine drives the oil pump to provide main power.

One 12V battery provides power for a 12V DC power unit which drives the gear pump to provide auxiliary power for the system.

HYDRAULIC SYSTEM

All functions of the machine are driven by the hydraulic system. The entire hydraulic system can be divided into two parts: one for controlling such functions as lift/lower, steer, outrigger extend/retract/oscillation, the other for controlling the drive function.

When the engine operates, the hydraulic pump diverts the pressure oil to each function manifold, on which is installed with directional valves and flow regulator valves for completing various functions and regulating the speed. Relief valves are also fitted on the manifold to prevent the system from getting overloaded.

ELECTRICAL SYSTEM

The system uses a 12V lead-acid battery to start the engine and the auxiliary pump, and serve as a power source for the entire electrical system. The battery is charged by the DC generator in the engine. Circuit breakers are used to protect the control system.

MACHINE CONTROL

The machine functions are controlled by two controllers, one installed on the left side of turntable to control the boom functions, the other on the platform to control the machine drive and platform lift/lower functions. The controller communicates signals through a high-speed data bus.

SAFETY MEASURES

A wide range of angle sensors and limit switches are used to provide signals for the controller.

- The level sensor measures the inclinations in X axis and Y axis of the chassis. When the inclined angle in X exceeds 2°or in Y axis exceeds 3°, an alarm will be triggered and such functions as lift, drive and steer will be restricted. Refer to ***B-14 Test Tilt Protection System, page 5-25*** for details.
- The outrigger travel switch is used to confirm whether the outrigger extension mechanism is extended in place. After the outrigger cylinder touches the ground, press and hold the outrigger auto-leveling switch, and hold the enable switch of joystick and slowly pull back the joystick to extend the outrigger, thus leveling the machine.
- The oscillation travel switch is used to detect the outrigger oscillation function. When the switch detects that the outrigger oscillation function has malfunctions, an alarm will be triggered.
- The up limit switch serves to restrict the platform lifting height. For details, please see ***C-6 Inspect Raising Limit Switch, page 5-30***.
- The down limit switch serves to control the platform lowering in stages as well as the lowering speed. For details, please see ***C-7 Inspect Staged Lowering, page 5-31*** and ***B-13 Test Drive Speed, page 5-25***.
- The weighing system (synergic operation of pressure and angle sensors) serves to restrict the platform loads. For details, please see ***C-4 Test Weighing System, page 5-29***.

This Page Intentionally Left Blank

4 SERVICE AND GUIDELINES

MACHINE PREPARATION, INSPECTION AND MAINTENANCE

GENERAL

This section provides safety and necessary information for the machine operators. For maximum service life and safe operation, ensure that all necessary inspections and maintenance have been completed before placing the machine into service.

Machine positions

Operating/raised position：

The machine comes in operating/raised position when the platform is raised until the down limit switch disengages.

Platform heights at which the down limit switch disengages (heightfromgroundtoplatformfloor)：3 ±0.3m (9ft 10in±12in).

Stowed position：

The machine comes in stowed position when fully retracted.

PREPARATION, INSPECTION AND MAINTENANCE

It is important to establish and conform to a comprehensive inspection and preventive maintenance program. This mamual outlines the scheduled machine inspections and maintenance recommended by Hunan Sinoboom Intelligent Co., Ltd., Consult your national, regional or local regulations for aerial work platforms. The frequency of inspections and maintenance must be increased as environment, severity and frequency of usage requires.

QUALIFIED SINOBOOM EQUIPMENT MECHANIC

Qualified Sinoboom equipment mechanic is a person recognized by Sinoboom as one who, by possession of a recognized degree, certificate, training, has successfully demonstrated the ability and proficiency to service, repair and maintain the subject Sinoboom product model.

PRE-OPERATION INSPECTION

Prior to daily use or work shift of operators, the user or operator shoud perform a pre-operation inspection. Refer to the *Operation Manual* for the complete procedure for the pre-operation inspection. The *Operation Manual* must be entirely read and understood before performing the pre-operation inspection.

PRE-DELIVERY INSPECTION AND FREQUENT INSPECTION

The pre=delivery inspection shall be performed by qualified Sinoboom equipment mechanic. The pre-delivery inspection and the frequent inspection are performed in the same manner, but at different times. The pre-delivery inspection shall be performed before each sale, lease or rental delivery. The frequent inspection shall be accomplished for each machine in service for 3 months or 150 hours (whichever comes first); out of service for a period of more than 3 months; or when purchased used. The frequency of this inspection must be increased as environment, severity and frequency of usage requires.

Reference the *Prepare the Work Record before Delivery* and *Repair & Inspection Report* for items requiring inspection. Reference the *Inspection Procedures* in appropriate areas of this manual to perform the inspection and maintenance procedures.

ANNUAL MACHINE INSPECTION

The annual machine inspection must be performed on an annual basis, no later than 13 months from the date of the prior annual machine inspection. Hunan Sinoboom Intelligent Equipment Co.,Ltd. recommends this task be performed by a factory-trained service technician, a person recognized by Sinoboom as one who, by possession of a recognized degree, certificate, training, has successfully demonstrated the ability and proficiency to service, repair and maintain the subject Sinoboom product model.

Reference the *Repair & Inspection Report* for items requiring inspection. Reference the *Inspection Procedures* in appropriate areas of this manual to perform the inspection and maintenance procedures.

For the purpose of receiving the safety-related bulletins, it is important that Hunan Sinoboom Intelligent Equipment Co., Ltd. has updated ownership information for each machine. When performing each

annual machine inspection, notify Hunan Sinoboom Intelligent Equipment Co., Ltd. of the current machine ownership information.

PREVENTIVE MAINTENANCE

The preventive maintenance must be performed by a qualified Sinoboom equipment mechanic.

Reference the *Repair & Inspection Report* and *Maintenance Schedule* in this manual for the inspecton items and intervals. Reference the *Inspection Procedures* in appropriate areas of this manual to perform the inspection and maintenance procedures.

Table 4-1

Type	Frequency	Primary Responsibility	Service Qualification	Reference
Pre-operation Inspection	Prior to use each day; or at cach operator change.	User or operator	User or operator	Operation Manual
Pre-delivery Inspection	Prior to each sale, lease or rental delivery.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual, Pre-delivery Preparation Form, and Maintenance Inspection Report
Frequent Inspection	In service for 3 months or 150 hours, whichever comes first; or out of service for a period of more than 3 months; or purchased used.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual and Maintenance Inspection Report
Annual Machine Inspection	Annually, no later than 13 months from the date of the prior annual inspection.	Owner, dealer or user	Factory-trained service technician	Maintenance Manual, Pre-delivery Preparation Form, and Maintenance Inspection Report
Preventive Maintenance	At inervals as specified in the Maintenance Manual.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual, Maintenance Inspection Report, and Maintenance Schedule

STORAGE

Please observe the following recommendations to ensure the best performance of cylinders and avoid corrosion due to an extended period of storage (indoor/outdoor):

- The machine should be stored in stowed position with all tires adjusted to keep aligned.
- Fully raise and lower the scissor and steer left and right the wheels twice a week to lubricate the cylinders.

MAINTENANCE AND SERVICING PRECAUTIONS

GENERAL

This section assists you in the use and application of the maintenance and servicing procedures contained in this manual.

SAFETY AND WORKMANSHIP

Before servicing the machine, take the following preventive measures:

1. Cut off the power source to disable the machine and set up a sign in a readily visible place.
2. Place all controls in OFF position to prevent unintended activation of the controls.
3. Lower the platform to the lowest position if possible, or at least ensure it won't fall off.
4. Before releasing or removing any hydraulic component, dissipate the hydraulic pressure in the hydraulic circuit.

If the machine is not serviced in the state as above for the sake of the particular nature of the maintenance task, it should at least observe the safety rules regarding the maintenance and repair of the machine contained in this manual and the Operation Manual.

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

CLEANLINESS

1. The most important single item in preserving the service life of a machine is to keep dirt and foreign materials out of the vital components. Precautions have been taken to safeguard against this. Shields, covers, seals and filters are provided to keep air, fuel and oil supplies clean; however, these items must be maintained on a scheduled basis to function properly.
2. When air, fuel or oil lines are disconnected, clean the adjacent areas as well as the openings and fittings. As soon as a component or line is disconnected, cap or cover all openings to prevent entry of foreign matter.
3. Clean and inspect all parts during servicing and maintenance, and assure that all passages and openings are unobstructed. Cover all parts to keep them clean. Be sure all parts are clean before they are installed. New parts should remain in their containers until they are ready to be used.

COMPONENT REMOVAL AND INSTALLATION

1. Establish as per this manual a safe and reasonable program appropriate to the on-site conditions for installation of the machine.
2. The personnel engaging in disassembly and installation of this machine should be competent in the task and understand how to use the personal protection equipment in a correct manner.
3. The qualified personnel should not install the machine unless a thorough inspection of the ground for installation, the hidden foundation as well as the anchored parts is made or sufficiently evidenced to comply with the manufacturer's requirements.
4. The wind speed at the installation location should not be more than 8.3m/s.
5. Check the on-site conditions like power supply, foundation, track, etc., and install only when all are eligible.
6. All parts should be checked before installation to verify they are in good condition.
7. The high-strength bolts should be tightened as required in this manual.
8. The requirements for the reception of the on-site installed machine are as follows:
    - Conduct the required inspection and function test to confirm the machine is properly installed for the purpose of the particular application and all safety devices operate smoothly.
    - The static and dynamic load tests of the machine suggest a compliance with the relevant standard.
    - The qualified personnel should sign on the handover document to evidence the integrity of the machine. All inspection/test results should be documented (including the inspector name, title, organization and date).
9. The disassembly of the machine should also follow the same safety requirements for the installation of the machine.
10. If mechanical assistance is required for the disassembly of the machine, please choose the suitable lifting points, lifting tools, and lifting equipment according to this manual and the onsite conditions. The lifting equipment that allows adjustment is preferred. All lifting tools (chains, sling, etc.) should be parallel to each other and should better remain vertical to the top of the component being lifted.
11. Should it be necessary to remove a component on an angle, keep in mind that the capacity of an eyebolt or similar bracket lessens, as the angle between the supporting structure and the component becomes less than 90 degrees.
12. If a part resists removal, check to see whether all nuts, bolts, cables, brackets, wiring, etc., have been removed and that no adjacent parts are interfacing.

COMPONENT DISASSEMBLY AND ASSEMBLY

When disassembling or reassembling a component, complete the procedural steps in sequence. Do not partially disassemble or assemble one part, then start on another. Always recheck your work to assure that nothing has been overlooked. Do not make any adjustments, other than those recommended, without obtaining proper approval.

SCRAP OF STRUCTURAL PARTS

- When some major component fails to fulfill the safety requirements due to corrosion, wear, etc., it should be refitted or reinforced, otherwise it should be scrapped.
- When the stressed structure suffers a permanent deformation and a repair is impossible, it should be scrapped.
- When the major stressed structure loses stability at large, it should never get repaired and must be scrapped.
- When a crack is present on a structure or a weld, it can be properly reinforced according to the stress and crack conditions, and continued use is only allowed when it meets the original design requirements, otherwise it should be scrapped.

PRESSURE-FIT PARTS

When assembling pressure-fit part, use a molybdenum disulfide base compound or equivalent to lubricate the mating surface.

BEARINGS

1. When a bearing is removed, cover it to keep out dirt and abrasives. Clean bearings in nonflammable cleaning solvent and allow to drip dry. Compressed air can be used but do not spin the bearing.
2. Discard bearings if the races and balls (or rollers) are pitted, scored, or burned.
3. If bearing is found to be serviceable, apply a light coat of oil and wrap it in clean (waxed) paper. Do not unwrap reusable or new bearings until they are ready to install.
4. Lubricate new or used serviceable bearings before installation. When pressing a bearing into a retainer or bore, apply pressure to the outer race. If the bearing is to be installed on a shaft, apply pressure to the inner race.

GASKETS

Check that holes in gaskets align with openings in the mating parts. If it becomes necessary to hand-fabrictae a gasket, use gasket material or stock of equivalent material and thickness. Be sure to cut holes in the right location, as blank gaskets can cause serious system damage.

BOLT USAGE AND TORQUE APPLICATION

NOTICE

Self-locking fasteners, such as nylon insert and thread deforming locknuts, are not intended to be reinstalled after removal.

1. Always use new replacement hardware when installing locking fasteners. Use bolts of proper length. A bolt which is too long will bottom before the head is tight against its related part. If a bolt is too short, there will not be enough thread area to engage and hold the part properly. When replacing parts, use only those having the same specifications of the original, or one which is equivalent.
2. Unless specific torque requirements are given within the text, standard torque values should be used on heat-treated bolts, studs, and steel nuts, in accordance with recommended shop practices. (See ***Fastener Torque Specifications, page 1-11***)

HYDRAULIC LINES AND ELECTRICAL WIRING

Clearly mark or tag hydraulic lines and electrical wiring, as well as their receptacles, when disconnecting or removing them from the unit. This will assure that they are correctly reinstalled.

HYDRAULIC SYSTEM

1. The primary enemy of a hydraulic system is contamination. Contaminants enter the system by various means, e.g., using inadequate hydraulic oil, allowing moisture, grease, filings, sealing components, sand, etc., to enter when performing maintenance.
2. Keep the system clean. If evidence of metal or rubber particles are found in the hydraulic system, drain and flush the entire system.
3. Disassemble or reassemble parts on clean work surface. Clean all metal parts with non-flammable cleaning solvent. Lubricate components, as required, to aid assembly.

LUBRICATION

Service applicable components with the amount, type, and grade of lubricant recommended in this manual, at the specified intervals. When recommended lubricants are not available, consult your local supplier for an equivalent that meets or exceeds the specifications listed.

BATTERY

Clean battery, using a non-metallic brush and a solution of baking soda and water. Rinse with clean water. After cleaning, thoroughly dry battery and coat terminals with an anti-corrosion compound.

PINS AND COMPOSITE BEARING

1. Pinned joints should be disassembled and inspected if the following occurs:
   - Excessive sloppiness in joints.
   - Noise originating from the joint during operation.

2. The composite bearing should be replaced if the following occurs:
   - Frayed or separated fibers on the liner surface.
   - Cracked or damaged liner backing.
   - Bearing that have moved or spun in their housing.
   - Debris embedded in liner surface.
3. Pins should be replaced if any of the following is observed (pin should be properly cleaned prior to inspection:
   - Detectable wear in the bearing area.
   - Flaking, pealing, scoring, or scratches on the pin surface.
   - Rusting of the pin in the bearing area.
4. Reassembly of pins and composite bearing:
   - Housing should be blown out to remove all dirt and debris. Bearings and bearing housings must be free of all contamination.
   - Bearing/pins should be cleaned with a solvent to remove all grease and oil. The composite bearing is a dry joint and needs no lubricating.
   - Pins should be inspected to ensure it is free of burrs, nicks, and scratches which would damage the bearing during installation and operation.

APPLICATION OF INSULATING SILICONE GREASE TO ELECTRICAL CONNECTIONS

Insulating silicone grease should be applied to all electrical connections for the purpose of：

- Avoiding oxidization of the mechanical joints between the male pins and female pins.
- Avoiding electrical failure due to low conductivity between the pins in humid environment.

The following procedure should be observed to apply the insulating silicone grease to the electrical connections. The procedure applies to all plugged connections outside of the power distribution box. The silicone grease is not suitable for the connectors with enclosed outer surface.

1. Prior to the machine assembling, apply silicone grease around the male pins and female pins inside the connectors to prevent oxidization. An injector may be used for the convenience of operation.

NOTICE

The oxidization exceeding a certain period will increase the resistance of the connector and eventually lead to electrical failure.

2. Silicone grease should be applied to each electrical cord that is exposed at the outside of the connector to prevent short circuit. Besides, the joint between the male and female connectors should also been applied with silicone grease. Other joints that may allow entry of water into the connectors, like the area around the anti-pull buckle, should be properly sealed as well.

NOTICE

Since the electrical conductivity of cleaning solvent is superior to that of water, it is mostly likely that this will occur when using pressure cleaning method to clean the machine.

3. Silicone grease should be applied to each contact of the connectors for battery case and charger.

NOTICE

The setting type sealant can be used to avoid short circuit and keep the connections tidy, but it will make the future removal of pins more difficult.

5 MAINTENANCE

This section provides detailed procedures for regular maintenance inspections.

⚠ WARNING

UNSAFE OPERATION HAZARD

Failure to follow the proper maintenance may result in death, serious injury or damage to the machine.

Follow these general rules:

- Preventive maintenance procedure should be established by the user according to the manufacturer's recommendations, machine operational environment and intensity of use, which should include both the regular inspection and the annual inspection.
- Routine maintenance inspections on this machine must be conducted by professionally trained, qualified personnel.
- Daily routine maintenance inspections must occur during normal operation of the machine. Maintenance inspectors must carry out inspection and maintenance according to the repair & inspection report and must complete the repair & inspection report.
- Regular maintenance inspections must occur by operators and at quarterly, biannual and annual intervals by qualified, trained personnel. Qualified, trained personnel must check and maintain the machine according to the repair & inspection report and must complete the repair & inspection report.
- Damaged or malfunctioning machines must be immediately removed, marked and stopped from operation.
- Repair any damaged or malfunctioning machine before operating it.
- Keep all machine inspection records for at least 10 years or until the machine is no longer in use or as required by machine owner/company/custodian.
- The inspection and maintenance intervals depend on the manufacturer's recommendations, and should also be appropriate to the operational conditions and environment.
- Conduct quarterly inspection on machines that have been out of service for a period longer than three months.
- Without the manufacturer's approval, do not change any parts, especially those load-bearing and safety-relevant parts. While maintaining the machine, replace any parts on the machine using the same parts or the equivalent parts of the original machine.
- Any change that may affect the stability, strength or performance of the machine, must obtain the manufacturer's prior approval.
- After any major change or maintenance that may affect the stability, strength or performance of the entire machine or its parts, the machine must be inspected and verified.
- Unless otherwise specified, perform all maintenance procedures according to the following terms and conditions:
  - Park the machine on flat, level, firm ground.
  - Keep the machine in the stowed position.
  - Ensure the key switch of the ground controller is in the OFF position and remove the key to prevent unauthorized use of the machine.
  - Place the red emergency stop button on the platform control box and ground controller in the OFF position to avoid accidental start-up of the operating system.
  - Disconnect main power switch.
  - Disconnect all DC power from the machine.
  - Lock all wheels to prevent movement of the machine.
  - Before releasing or removing the hydraulic components, release the hydraulic oil pressure in the hydraulic pipeline.

CONDUCTING A PRE-DELIVERY INSPECTION

When the machine owner/company changes, in addition to conducting a pre-delivery inspection, the corresponding inspection shall be carried out according to the maintenance schedule requirement and repair & inspection report. When conducting a pre-delivery inspection, comply with the following requirements:

1. It is the responsibility of the machine owner/company to perform a pre-delivery inspection.
2. Follow this procedure each time before delivery. Performing a pre-delivery inspection could reveal

potential problems with the machine before you begin putting the machine into service.

3. Never use a damaged or malfunctioning machine. Tag the machine and do not use it.
4. Only professionally trained, qualified personnel may repair the machine and must follow the procedures as stated in *operation manual* and *maintenance manual*.
5. A competent operator must conduct daily maintenance on this machine as stated in *operation manual* and *maintenance manual*.

Before delivering the machine, complete the following record using these instructions:

1. Prepare the machine before delivery, which includes performing a pre-delivery inspection, following maintenance procedures and performing functional inspections.
2. Use the following table to note the results. After each section is complete, mark the appropriate box.
3. Record the inspection results. If any inspection results are "NO", the machine must be stopped and re-inspected after repair is completed and marked in the box marked "inspection".

Table 5-1

PREPARE THE WORK RECORD BEFORE DELIVERY			
Model			
Serial No.			
Inspection Item	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/Machine Has Been Repaired**
Pre-operational Inspection			
Maintenance Procedure			
Functional Inspection			
Machine Buyer/ Renter			
Inspector Signature			
Inspector Title			
Inspector Company			

FOLLOWING A MAINTENANCE SCHEDULE

Regular maintenance inspections must occur daily, quarterly, biannually (every 6 months) and annually,and must be performed by the personnel qualified in the maintenance and service of the machine models involved. Use the table to help you adhere to a routine maintenance schedule.

Table 5-2

INSPECTION INTERVAL	INSPECTION PROCEDURES
Every day or every 8 hours	A
Every quarter or every 250 hours	A+B
Every half a year or every 500 hours	A+B+C
Every year or every 1000 hours	A+B+C+D

COMPLETING A REPAIR & INSPECTION REPORT

1. Divide the Repair & Inspection Report into four sections (A, B, C and D) according to the time requirements of the maintenance schedule and the maintenance procedure requirements.
2. The Repair & Inspection Report shall include the inspection table of each regular inspection.

3. Duplicate the Repair & Inspection Report template for each inspection. Store the completed tables for 10 years or until the machine is no longer in use or as required by machine owner/company/custodian.
4. Use the following table to record the results. After each section is complete, mark the appropriate box.
5. If any inspection results are marked as "NO", the machine must be stopped and re-inspected after repair is completed and the box marked "-REPAIRED" shall be checked. Select the appropriate inspection procedure based on the inspection type.

Table 5-3

REPAIR & INSPETION REPORT				
Model				
Serial No.				
Checklist A Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**
A-1 Inspect All Manuals				
A-2 Inspect All Decals				
A-3 Inspect Damaged, Loose or Lost Parts				
A-4 Inspect Hydraulic Oil Level				
A-5 Inspect Hydraulic Oil Leakage				
A-6 Inspect Fuel Level				
A-7 Inspect Fuel Leakage				
A-8 Inspect Engine Oil Level				
A-9 Inspect Engine Intake System				
A-10 Inspect Engine Belt				
A-11 Inspect Fuel Filter				
A-12 Inspect Cooling Fan				
A-13 Inspect Coolant Level (Water-cooled Engine)				
A-14 Functional Tests				
A-15 Perform Maintenance after 30 Days				
Checklist B Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**
B-1 Inspect Electrical Wiring				

REPAIR & INSPETION REPORT				
B-2 Inspect Rim, Tire and Fasteners				
B-3 Inspect Hydraulic Oil				
B-4 Inspect Cooling System				
B-5 Replace Fuel filter				
B-6 Inspect Air Filter of Hydraulic Tank				
B-7 Replace High-Pressure Filter Element				
B-8 Replace Engine Air Filter Element				
B-9 Inspect the Battery				
B-10 Inspect Engine Exhaust System				
B-11 Inspect Drive Reducer Oil Level				
B-12 Test Oscillate Outriggers				
B-13 Test Drive Speed				
B-14 Test Tilt Protection System				
B-15 Test Brake Distance				
Checklist C Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**
C-1 Replace Fuel Filter Element				
C-2 Replace Engine Oil				
C-3 Replace Engine Oil Filter				
C-4 Test Weighing System				
C-5 Inspect Carbon Brush of Motor				
C-6 Inspect Raising Limit Switch				
C-7 Inspect Staged Lowering				
Checklist D Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**

REPAIR & INSPETION REPORT				
D-1 Replace Drive Reducer Gear Oil				
D-2 Inspect Scissor Arm Sliders				
D-3 Replace Hydraulic Oil				
D-4 Replace Hydraulic Tank Suction Filter				
D-5 Inspect Scissor Arm Bearing				

User	
Inspector Signature	
Inspection Date	
Inspector Title	
Inspector Company	

MAJOR MODIFICATION AND REPAIR RECORD

1. A major modification/repair is a modification/repair made to all or part of a machine that affects the stability, strength or performance of the machine.
2. Each time the machine owner/company makes a major modification/repair to the machine, it should be documented using the form below. Keep the form properly until the machine is taken out of service, or as requested by the machine owner/company.
3. Major modifications/repairs to the machine must be performed by a qualified service technician.
4. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the maintenance and inspection report.
5. If the inspection result of each item in the Maintenance and Inspection Report is “YES”, the “Machine Status after Modification/Repair” in the form will be “Good” and the machine can be used. If either inspection result is “NO”, the machine must be re-inspected after the repair is completed until the machine is in “Good” condition before continuing to use the machine.

Table 5-4

Major Modification and Repair Record					
Model					
Serial No.					
Date	**Problem Description**	**Modification/Repair Item**	**Machine Status af-ter Change**	**Repairman’s Company and Position**	**Repair-man Signature**

CHECKLIST A PROCEDURES

A-1 Inspect All Manuals

Storing the *Operation Manual* and the *Maintenance Manual* in the appropriate place is important for the safe operation of the machine. The manuals must be stored in the manual storage container on the platform. Illegible or damaged manuals cannot provide necessary safety and operation information for safe operation.

- Inspect and confirm that the manual storage container is placed on the appropriate position of the platform.
- Inspect and confirm that the *Operation Manual* and the *Maintenance Manual* are stored in the manual storage container on the platform.
- Inspect the pages of the manuals and confirm that they are legible and intact.
- Inspect the pages of the manuals and confirm that they are legible and intact.

NOTICE

If needing to replace the manuals, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

A-2 Inspect All Decals

Ensuring that all labels are in good condition is essential for safe operation of the machine. Decals warn operators of the dangers they may encounter during operations, and they provide users with operational and maintenance information. Illegible decals do not properly guide operators, which can lead to unsafe operations.

- Refer to the decal instructions in the *Operation Manual* and use the decals list and graphic to determine the correct placement of the decal.
- Check whether all decals are legible and damaged. Replace damaged and illegible decals before operating the machine.

NOTICE

If needing to replace the decals, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

A-3 Inspect Damaged, Loose or Lost Parts

Before each use or work shift,check the machine for any damaged, improperly installed, loose or missing parts and unauthorized changes:

- Electrical components, wiring,cables and safety ropes
- Hydraulic hoses, fittings, cyinders and counterbalance valves
- Drive motors
- Wear pads
- Tires and wheels
- Limit switches, alarms and horn
- Beacons and indicator lights (if equipped)

- Bolts, nuts and other fasteners
- Safety arm
- Scissor arm pins and fasteners
- Platform joystick
- Outriggers (if equipped)
- Fuel tank, hydraulic tank
- Enigine and associated parts
- Platform (including rails, floor plate, safety lock, brackets and entry door)
- Generator (if equipped)
- Personal protection equipment
- Emergency control equipment
- Operation instructions, warning and control decals

NOTICE

If any part is found damaged, missing, or improperly installed, please immediately replace with a new one and install correctly; if any fastener is found detached or loose, please tighten immediately.

A-4 Inspect Hydraulic Oil Level

Ensuring appropriate hydraulic oil level is vital to proper operation of the machine. If too high, the oil will spill out from the oil tank during machine operation, if too low, the oil pump will suction air and damage hydraulic components. Performing daily inspection of the hydraulic oil level will help you determine if a problem exists in the hydraulic system.

Perform the following procedure with the platform retracted:

1. Visually inspect on the hydraulic tank side to be sure the hydraulic oil level is whithin the marking range of sight gauge.

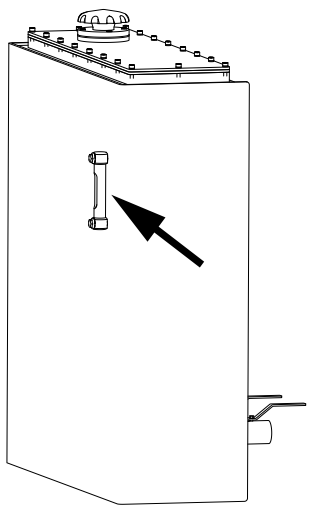


Figure 5-1

2. Ensure the tank body and ports are free of leakage.
3. Add hydraulic oil as needed. Never overfill the tank.

Table 5-5

CUSTOMER REQUIREMENTS	HYDRAULIC OIL MARK
Normal-temperature region 0°C to 40°C (32°F to 104°F)	L-HM46
Cold region -25°C to 25°C (-13°F to 77° F)	L-HV32
High-temperature region greater than 40°C (104°F)	L-HM68
Extremely cold region less than -30°C (-22°F)	Special programmes need to be identified.

NOTICE

Different hydraulic oils can be added according to customer requirements upon factory delivery, but cannot be mixed.

A-5 Inspect Hydraulic Leakage

Preventing the hyrdraulic oil from leaking is vital to safe and normal machine operation. If the hydraulic leaks fail to be discovered, it will lead to hazardous situations, reduce the machine performance and damage components.

Inspect the area on or around the following components for hydraulic spillage, dripping or residues:

- Hydraulic tank, filters, hoses and fittings
- Power unit
- Hydraulic cylinders
- Engine
- Hydraulic valves and pumps
- Hydraulic motors
- Areas around the machine

A-6 Inspect Fuel Level

NOTICE

Make sure to shut down the engine before inspection.

Keeping the diesel fuel at an appropriate level is vital to maintaining the engine performance and extending service life. An inappropriate fuel level will bring damage to the engine parts and lead to improper functioning of the machine.

1. Open the rear right door of chassis, and locate the fuel tank.
2. Inspect the fuel level to ensure it is within the marking range of sight gauge.

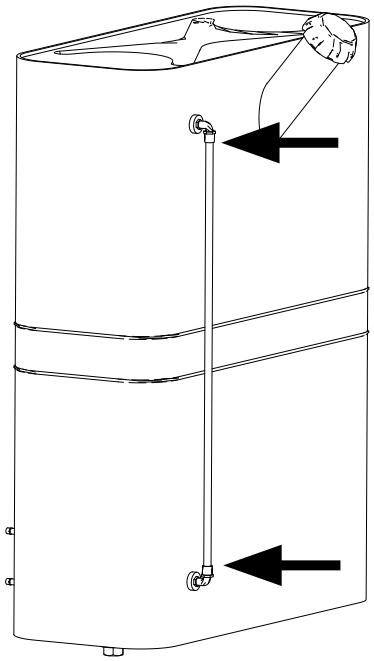


Figure 5-2

3. If the fuel level is below the MIN position, add fuel before resuming work.
4. Ensure the fuel tank body and ports are free of leakage.
5. The engine must be off when adding fuel.
6. Open the cap of fuel tank, add fuel as needed. Never overfill the tank, it is recommended to add to 50%–100% of the tank capacity.

Table 5-6

DIESEL GRADE	RECOMMENDED AMBIENT TEMP
5#	Lowest temperature 8℃ or higher
0#	Lowest temperature 4℃ or higher
-10#	Lowest temperature -5℃ or higher
-20#	Lowest temperature -14℃ or higher
-35#	Lowest temperature –29℃ or higher
-50#	Lowest temperature -44℃ or higher

NOTICE

- *The diesel has been drained off basically before delivery, so the customer should add diesel of appropriate grade to suit the operating ambient temperature and the governing emission regulations.*
- *Do not add mixed diesel of different grades.*
- *The light fuel may affect the fuel economy or damage the combustion components.*
- *It is recommended to use the diesel with sulphur content less than 5000ppm.*
- *It is recommended to use the diesel with min. cetane number of 45 at operating temperatures below 0℃ and min. cetane number of 40 at operating temperatures over 0℃. When the cetane number of the diesel in use is less than the recommended number, it may lead to startup failure, instable running or large amount of white smoke.*
- *The max cloud point and pour point of the diesel must be 6℃ less than the lowest operating ambient temperature.*

⚠ WARNING

EXPLOSION AND FIRE HAZARD

- **Do not mix the diesel with gasoline, alcohol or their mixture.**
- **Do not add diesel when the engine is running.**

⚠ WARNING

DAMAGED MACHINE HAZARD

Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirts or water. The dirts or water entering the combustion system can cause severe damage to the fuel pump and injectors.

A-7 Inspect Fuel Leakage

Inspecting fuel leakage is vital to safe and normal machine operation. If a fuel leak is not discovered and corrected in a timely manner, it will pose hazardous situations.

NOTICE

Shut off the engine before inspection.

⚠ WARNING

EXPLOSION AND FIRE HAZARD

- **Diesel is an inflammable material. This procedure must be performed outdoors in well-vented area and far away from flames.**
- **Ensure that a conforming fire extinguisher is readily accessible when performing this inspection procedure.**

Inspect for diesel spills, drippings or residues in the following areas：

- Fuel tank, piping and fittings
- Fuel pump and fuel filter
- Fuel injection system

⚠ WARNING

EXPLOSION AND FIRE HAZARD

If fuel leakage is discovered, immediately forbid any other personnel from entering the area or operating the machine, and repair the leakage as soon as possible.

A-8 Inspect Engine Oil Level

NOTICE

Turn off the engine before inspection.

The appropriate engine oil level is vital to maintaining the engine performance and extending its service life, otherwise it will damage the engine parts. Through the daily check the inspector can know about the changes on engine oil level which may indicate a system distress with the engine.

1. Turn the ground/platform select switch to ground control.
2. Pull out the emergency stop button at ground controls to ON position.
3. Move the engine preheat switch and idle for 2 minutes.
4. Switch off the engine, and 5 minutes later open the engine cover.
5. Remove the engine dipstick to inpsect the engine oil level.
6. The engine oil level should be between the FULL and ADD marks.
7. Add engine oil as needed. Do not overfill. It is recommended to use engine oil equivalent to or higher than CH-4 with viscosity grade of 15W-40.

Table 5-7

VISCOSITY	RECOMMENDED AMBIENT TEMP
0W-30	-35℃ ~ 0℃
5W-40	-25℃ ~ 30℃
15W-40	-15℃ ~ 40℃
20W-50	0℃ ~ 50℃

NOTICE

- *The engine oil filled by the factory is generally CH-4 with viscosity 15W-40, suitable for regions with ambient temperature range of 15℃ ~ 40℃. If the operating ambient temperature is outside of the range, please change the engine oil as appropriate.*
- *The muti-grade engine oil can provide excellent lubrication under high-temperature operating condition, reduce the sediments, and improve the engine low-temperature start performance and durability.Also, the multi-grade engine oil plays an important role in fullfilling the machine with the emission standards.*
- *Do not mix the engine oils of different grades.*
- *It is recommended that the sulphated ash content not exceed 1%, otherwise it will damage the air valve or piston, and lead to excessive consumption of engine oil.*
- *The use of high-quality engine oil in conjunction with suitable oil filter and change interval is very critical to maintaining engine performance and extending service life. If the oil or oil filter is not changed as recommended, there will be sediments, contaminants or wear incurred which will shorten the engine service life.*

A-9 Inspect Engine Intake System

Inspecting the engine intake system is vital to good engine performance and extending service life.

NOTICE

Shut off the engine before inspection.

1. Inspect whether the engine intake tube is damaged or extruded flat, or getting loose. If such conditions occur, the dust or debris may enter the engine.
2. Tighten or replace parts, if needed, to assure the intake system free from leakage.

NOTICE

Even if a tiny amount of dust or debris gets inside the engine, it will result in severe wear of piston ring and increased exhaust. Be sure to keep the intake system clean and free of leakage.

A-10 Inspect Engine Belt

Maintaining the engine belt in good condition is vital to good machine performance and service life. The machine should not continue operation with the engine belt being loose or deficient, or it will result in component damage.

NOTICE

Shut off the engine before inspection.

Inspect the engine belt for：

- Crack or breakage
- Wear or misalignment
- Peeling-off
- Glazing or hardening
- Improper tensioning (press at the middle position of the mostly extended belt between the pulleys to check the tensioning condition, the press-down of belt should not exceed 13mm [0.5 in.].)

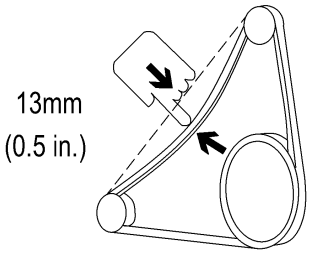


Figure 5-3

Replace the engine belt immediately if the above conditions occur.

NOTICE

The engine manufacturor recommends the drive belt not be applied with belt oil or anti-slipping agent.

A-11 Inspect Fuel Filter (Fuel-Water Separator)

NOTICE

Shut off the engine before inspection.

Inspecting the fuel filter (fuel-water separator) is vital to proper functioning of engine. Failure to perform this inspection procedure will result in engine working improperly or component damage.

⚠ WARNING

EXPLOSION AND FIRE HAZARD

- **Diesel is an inflammable material. This procedure must be performed outdoors in well-vented area and far away from flames.**
- **Ensure that a conforming fire extinguisher is readily accessible when performing this inspection procedure.**

1. Open the engine cover.
2. Locate the fuel filter (fuel-water separator).

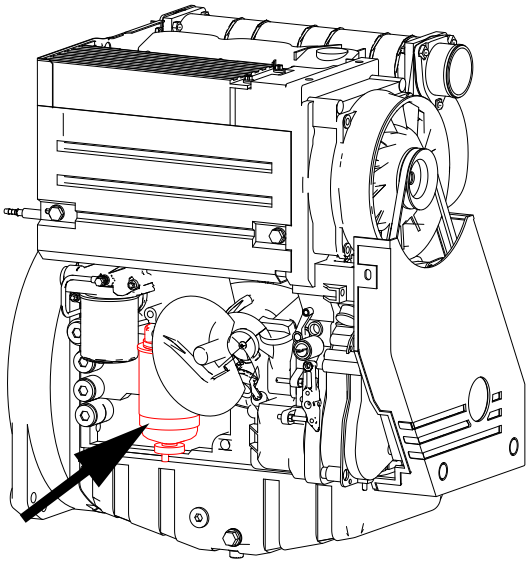


Figure 5-4 Deutz D2011 L03i fuel filter

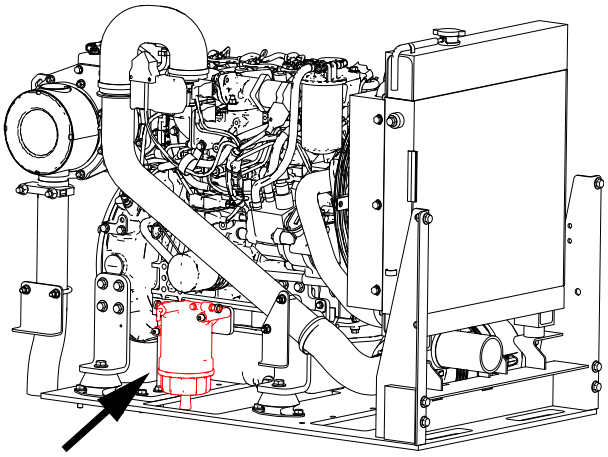


Figure 5-5 Yanmar 4TNV88C-DFLT fuel-water separator

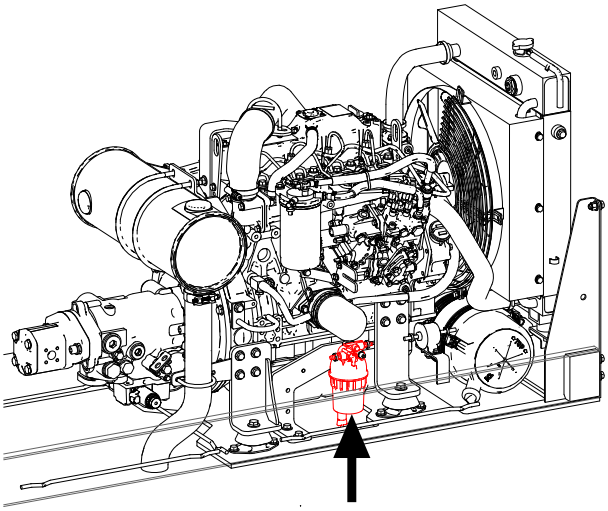


Figure 5-6 Yanmar 4TNV88-BDFLTC fuel-water separator

3. Loosen the plug of drain valve at the bottom, and drain the water into a suitable vessel until the fuel flows out.

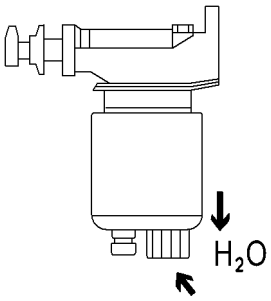


Figure 5-7

4. Tighten the valve plug.
5. Clean up the spilled fuel.
6. Start the engine from the ground controller and inspect the fuel filter (fuel–water separator) for leakage.

A-12 Inspect Cooling Fan

Inspecting cooling fan is vital to normal functioning of engine and extending service life.

NOTICE

Shut off the engine before inspection.

1. Open the engine cover.
2. Locate the cooling fan of engine.
3. Inspect the cooling fan for：

- Cracks
- Tilting or loosening
- Abrasion

4. Please replace immediately if any of the above conditions occurs.

A-13 Inspecting Coolant Level (Water-cooled Engine)

The appropriate coolant level is vital to maintaining the engine performance and extending its service life, otherwise it will damage the engine parts. Through the daily check the inspector can know about the changes on coolant level which may indicate a system distress with the engine.

⚠ WARNING

HIGH TEMPERATURE AND PRESSURE HAZARDS

Before inspecting the coolant level, allow the coolant to cool down to room temperature, and slowly open the cover to release the pressure.

NOTICE

Turn off the engine before inspection.

1. Turn off the engine, and remove the engine cover after verifying the engine have cooled dowm.
2. Open the cover of coolant box over the radiator to inspect the coolant level.

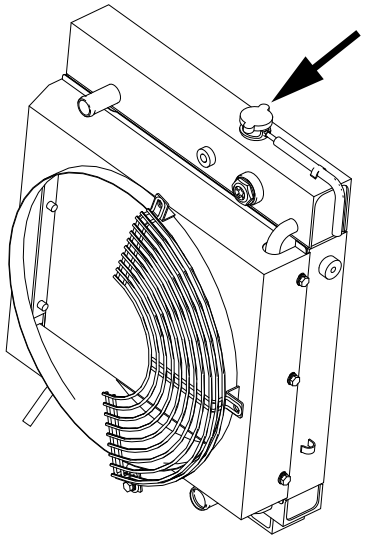


Figure 5-8

3. The coolant level should be at the fill inlet of the coolant box.
4. Add coolant as needed. Do not overfill. It is recommended to choose the -18℃ ready-mix coolant or the ethylene glycol(ethylene and propene) in ratio mix with water. The water quality must meet the requirements as listed in the table below.

Table 5-8

COOLANT TYPE	RECOMMENDED AMBIENT TEMP
-18℃ ready-mix coolant	-18℃ or higher
-37℃ ready-mix coolant	-37℃ or higher
50% ethylene glycol and 50% water mixed coolant	-32℃ ~ 0℃
60% ethylene glycol and 40% water mixed coolant	-54℃ ~ -32℃

NOTICE

- *Do not apply sealing additive to the cooling system, otherwise it will cause blockage to the low-fludity area, radiator and engine oil cooler, or damage the water pump sealing.*
- *Do not apply soluable engine oil to the cooling system, otherwise it will corrode the brass and copper, damage the surface of heat exchanger, sealings and hose.*
- *The water added into the coolant must meet the requirements of calcium and magnesium less than 170ppm, chlorine less than 40ppm and sulphur less than 100ppm. Excessive calcium and magnesium can lead to scale formation, and excessive chloride and sulfate can corrode the cooling system.*

A-14 Functional Tests

Testing each machine function is vital to safe machine operation. If any function operates improperly, it will pose dangers to safe operation. Ensure any function operates smoothly and reliably, without shaking, sharp or unusual noise.

⚠ WARNING

UNSAFE OPERATION HAZARD

Be sure to observe the instructions and safety rules noted in this manual and *Operation Manual*, otherwise it may lead to death or severe injury.

Before performing the functional tests:

1. Select a firm, smooth and level test surface.
2. Ensure the test surface is free of obstructions.
3. Ensure the battery is properly connected.
4. For the specific procedure for functional tests, please reference the **Pre-operation Function Test** section in the ***Operation Manual***. Before performing the functional test, ensure that the safety rules in the Operation Manual are fully read and understood.

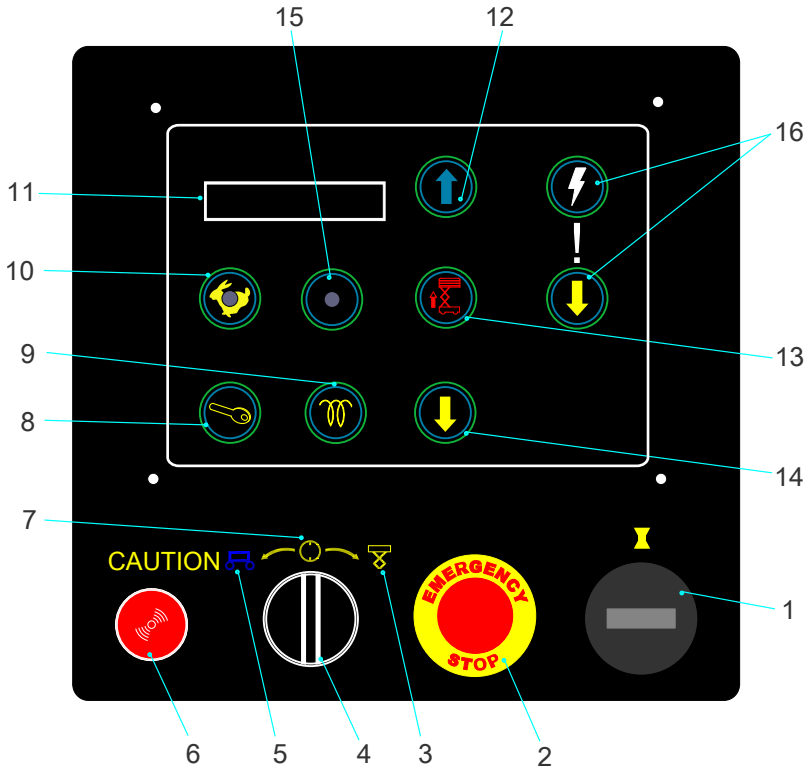


Figure 5-9 Ground controller (DTC system)

Table 5-9

1. Hour meter	**7.** Neutral position	**13.** Platform up/down enable switch
2. Emergency stop button	**8.** Engine start switch	**14.** Platform down switch
3. Platform position	**9.** Glow plug switch	**15.** Overload indicator light
4. Key switch (Ground/Platform select switch)	**10.** Engine speed select switch (with indicator light)	**16.** Emergency lowering switch
5. Ground position	**11.** LCD screen	
6. Buzzer	**12.** Platform up switch	

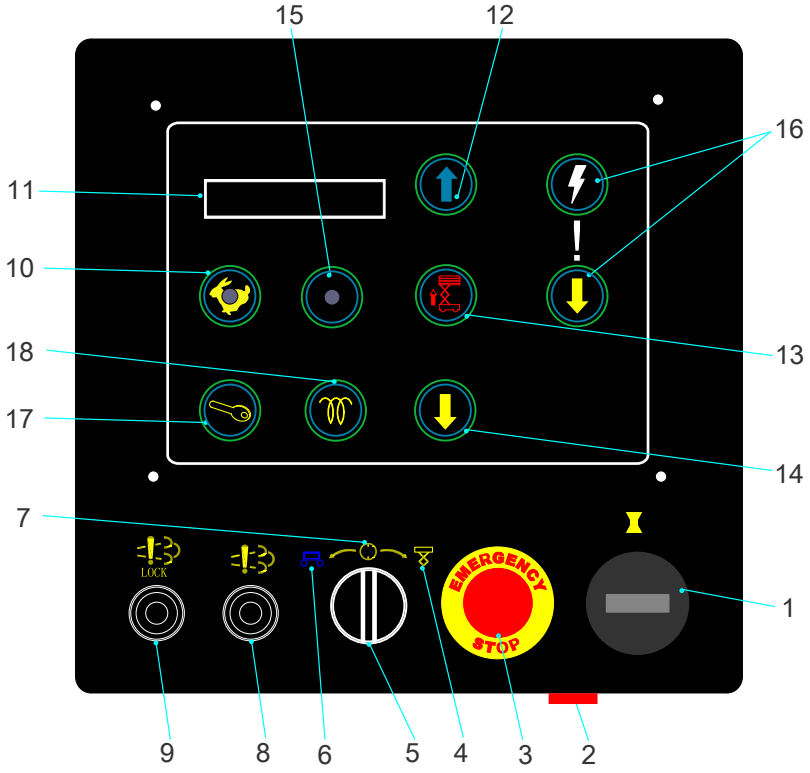


Figure 5-10 Ground controller (DTC system)-for EU Stage 5 engines

Table 5-10

1. Hour meter	**7.** OFF position	**13.** Platform up/down enable switch
2. Buzzer	**8.** Regen request switch	**14.** Platform down switch
3. Emergency stop button	**9.** Regen interlock switch	**15.** Overload indicator light
4. Platform position	**10.**Engine speed select switch (with indicator light)	**16.** Emergency lowering switch
5. Key switch (Ground/Platform select switch)	**11.**LCD screen	**17.** Engine start switch
6. Ground position	**12.** Platform up switch	**18.** Glow plug switch

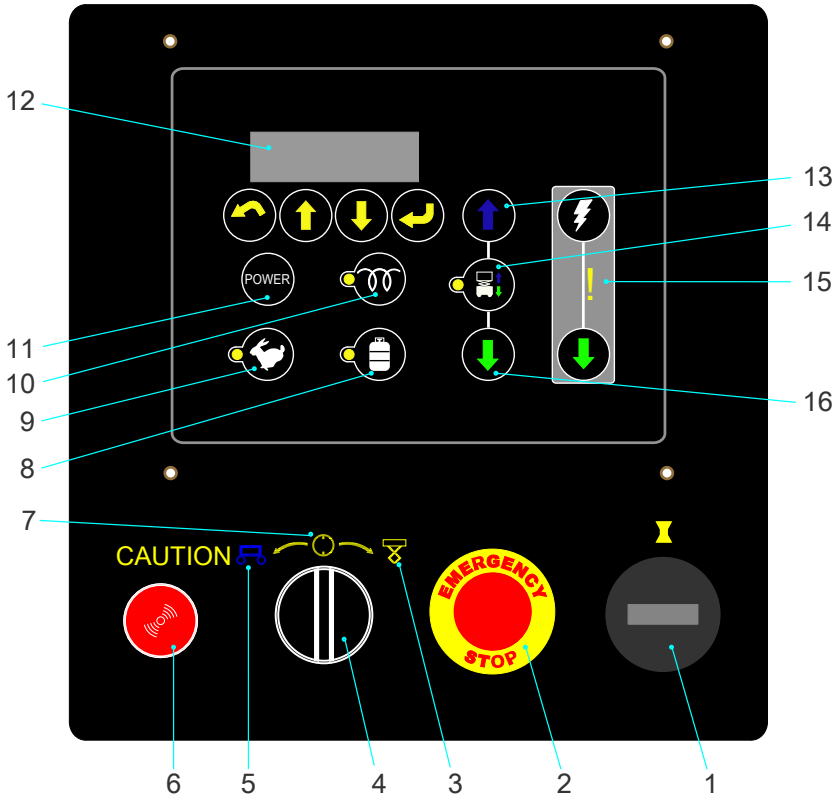


Figure 5-11 Ground controller (Sinoboom control system)

Table 5-11

1. Hour meter	**7.** Neutral position	**13.** Platform up switch
2. Emergency stop button	**8.** Natural gas switch (not used)	**14.** Platform up/down enable switch
3. Platform control position	**9.** Engine speed select switch	**15.** Emergency lowering combination switch
4. Key switch (Ground/Platform select switch)	**10.** Glow plug switch	**16.** Platform down switch
5. Ground control position	**11.** Ignition switch	
6. Buzzer	**12.** LED screen	

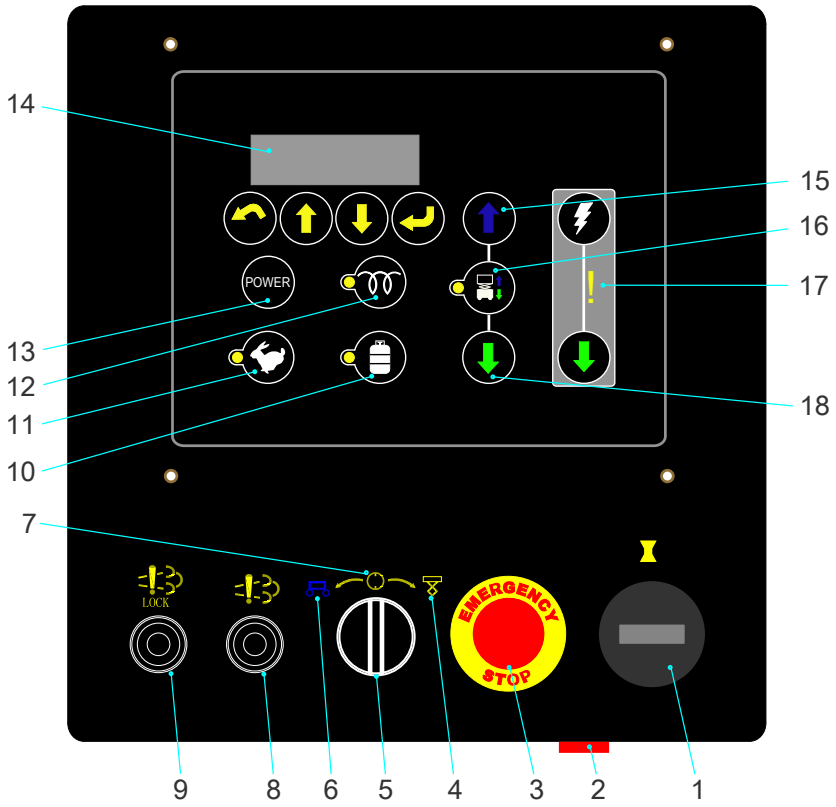


Figure 5-12 Ground controller (Sinoboom control system)-for EU Stage V engines

Table 5-12

1. Hour meter	**7.** Neutral position	**13.** Ignition switch
2. Emergency stop button	**8.** Regeneration request switch	**14.** LED screen
3. Platform control position	**9.** Regeneration interlock switch	**15.** Platform up switch
4. Key switch (Ground/Platform select switch)	**10.** Natural gas switch (not used)	**16.** Platform up/down enable switch
5. Ground control position	**11.** Engine speed select switch	**17.** Emergency lowering combination switch
6. Buzzer	**12.** Glow plug switch	**18.** Platform down switch

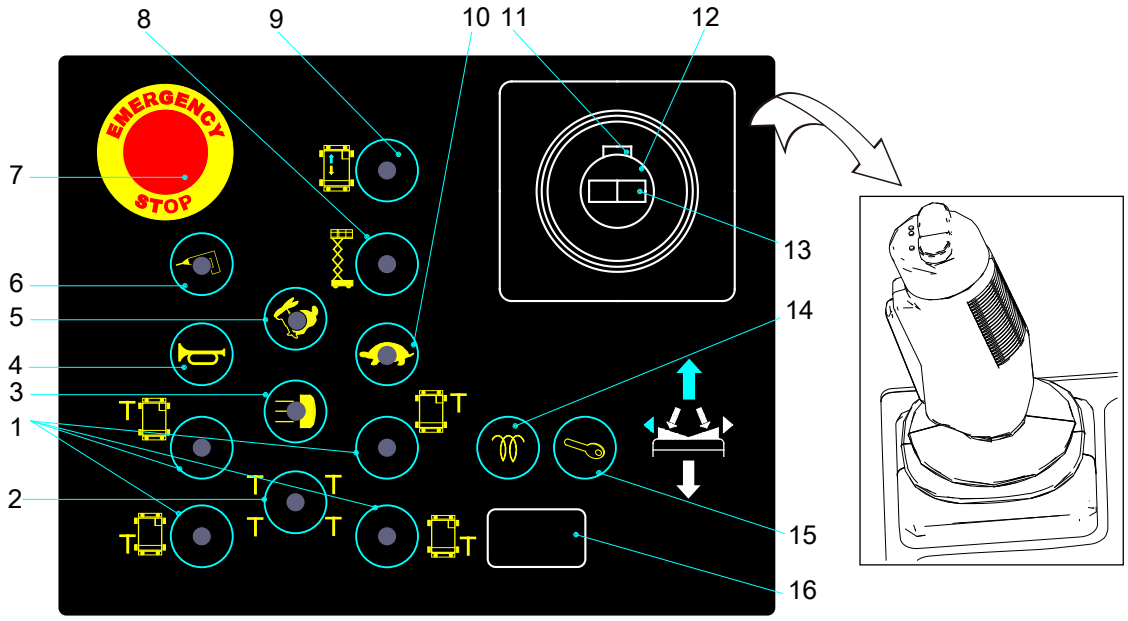


Figure 5-13 Platform controller (DTC system)

Table 5-13

1. Individual outrigger level switch	**7.** Emergency stop button	**13.** Steer thumb rocker switch
2. Outrigger self-level switch	**8.** Platform up/down enable switch (-with indicator light)	**14.** Glow plug switch
3. Lighting switch (optional)	**9.** Drive switch (with indicator light)	**15.** Engine start switch
4. Horn button	**10.** Drive speed select switch (with indicator light)	**16.** LCD screen
5. Engine speed select switch (with indicator light)	**11.** Enable switch	
6. Generator switch (if equipped)	**12.** Drive/lift proportional control joystick	

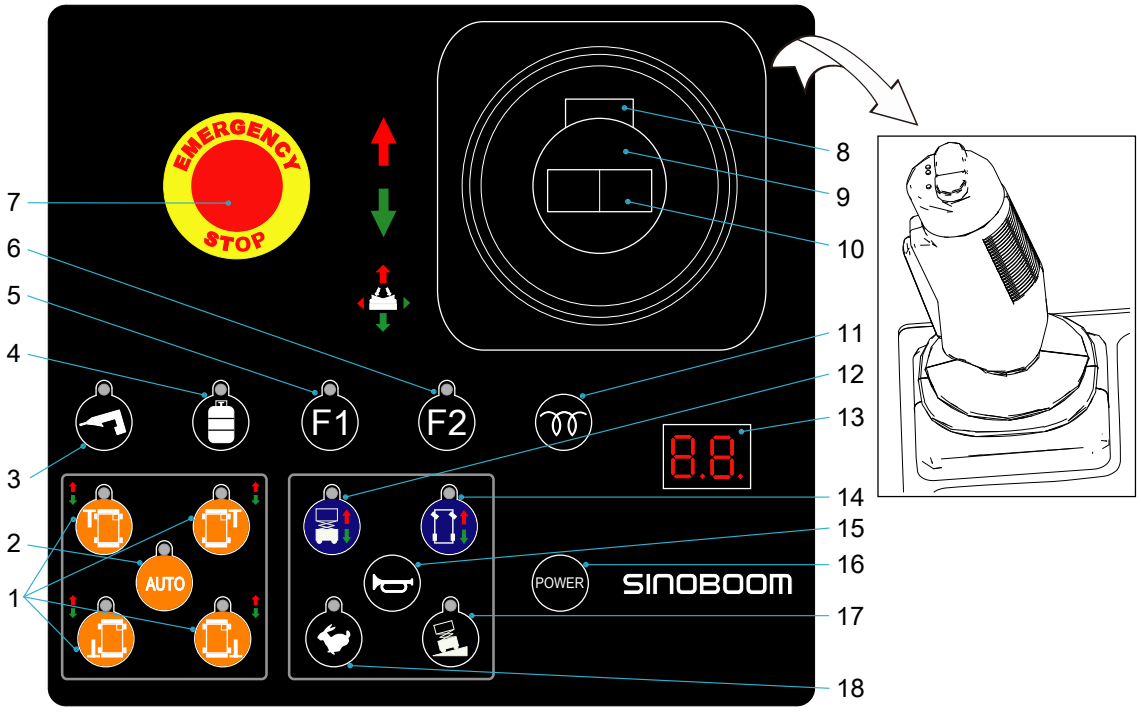


Figure 5-14 Platform controller (Sinoboom control system)

Table 5-14

1. Individual outrigger level switch	**7.** Emergency stop button	**13.** LED screen
2. Outrigger self-level switch	**8.** Enable switch	**14.** Drive & steer enable switch
3. Hydraulic generator switch (not used)	**9.** Drive/lift proportional control joystick	**15.** Horn button
4. Natural gas switch (not used)	**10.** Steer thumb rocker switch	**16.** Ignition switch
5. Not used	**11.** Glow plug switch	**17.** Climbing mode enable switch
6. Not used	**12.**Platform up/down enable switch	**18.** Engine speed select switch

A-15 Perform Maintenance after 30 Days

Perform maintenance on a new machine after the machine is operated for 30 days or 50 hours. After performing the 30-day maintenance, continue performing maintenance as scheduled.

Perform the following procedures：

- B-2 Inspect rims, tires and fasteners
- B-11 Inspect drive reducer oil level

CHECKLIST B PROCEDURES

B-1 Inspect Electrical Wiring

Maintaining electrical wiring in good condition is vital to safe operation and good machine performance. Continued use of the machine with damaged electrical wiring or in corrosive environment will cause severe injury. Before operating the machine, make sure to replace or repair the damaged or corroded electrical wires.

⚠ WARNING

ELECTROCUTION HAZARD

Before inspecting the electrical wires, make sure to disconnect the battery and the charger on the AC outlet. Contact with hot or live circuits could result in death or serious injury.

1. Inspect the following areas for damage or corrosion：
   - Engine wiring harness
   - Scissor arm harness
   - Power unit harness
   - Ground controller
   - Platform controller
   - Battery harness
   - Chassis harness
2. Ensure each adjustable connector is tight and the sensor wiring free of damage.

B-2 Inspect Rim, Tire and Fasteners

Good maintenance of rims and tires is vital to safe machine operation. The machine might tip over if the rim or the tire has problems. Repair any problems with the rims and tires before operating the machine.

The machine is equipped with solid tires that do not need to be inflated.

1. Inspect the tires on a daily basis for damage or excessive wear. If any of the following condition occurs, immediately remove the machine from service and replace tires or tire assembly (including rims). For the requirements and procedure for the replacement, please reference ***Tires and Rims, page 6-4***.
   - Play separation of tires, i.e., circumferential rips or lamination occurring to in between the rubbers.
   - Detachment from rims: the rubber comes off from the steel rims.
   - Rubber surface locally peeling off in lumps.
   - Rubber cracks in radial direction.
   - Rubber worn to the wear mark.
2. Inspect the lug nuts are torqued to specificion (265Nm[195.3ft-lb]).

NOTICE

Tighten the lug nuts prior to the first use or after each tire removal, inspect and retorque every 3 months or 150 hours of operation.

B-3 Inspect Hydraulic Oil

Inspecting and replacing the hydraulic oil is important for the proper operation of the machine and the extension of service life. The machine may be unable to operate properly if the hydraulic oil becomes unclean, and the hydraulic parts may be damaged if using contaminated oil. Replace the hydraulic oil often, especially when the service environment is very harsh.

NOTE: Due to wear and tear on the mesh components, metal particles may appear in the hydraulic oil or filter of the new machine.

⚠ WARNING

BURN HAZARD

Before maintaining the hydraulic system, allow the hydraulic oil to cool to room temperature.

Replace the hydraulic oil if any of the following conditions exist.

- The hydraulic oil is milky white and cloudy.
- The hydraulic oil is blackened.
- Obtain a sample of the hydraulic oil and inspect it under sunlight for glowing metals. Or rub the oil between two fingers to determine if it contains metal particles.
- The hydraulic oil has an abnormal smell.

See ***D-3 Replace Hydraulic Oil, page 5-32*** for replacement steps.

B-4 Inspect Cooling System

Inspecting cooling system on a regular basis is vital to proper operation of engine and extending service life.

⚠ WARNING

BURN HAZARD

Be cautious of the heated parts of engine. Bodily contact with them may result in severe burn.

NOTICE

Shut off the engine before inspection.

- Inspect the cooling system for leakage or loose connections.
- Inspect all hoses for crack, abrasion, free of getting flattened, and clamps tightly secured.
- Ensure the cooling fins are not blocked by debris.

B-5 Replace Fuel filter Element (Fuel-Water Separator)

Replacing fuel filter (fuel-water separator) element on a regular basis is vital to proper operation of engine and extending service life. A dirty or blocked filter may cause the machine to work improperly, and continued operation may result in component damage. The fuel filter (fuel-water separator) element should be replaced at increased frequency if the machine uses fuel of inferior quality or operates in humid environment.

NOTICE

Shut off the engine before inspection.

⚠ WARNING

EXPLOSION AND FIRE HAZARD

- **Diesel is an inflammable material. This procedure must be performed outdoors in well-vented area and far away from flames.**

- **Ensure that a conforming fire extinguisher is readily accessible when performing this inspection procedure.**

1. Open the engine cover.
2. Locate the fuel filter (fuel-water separator).

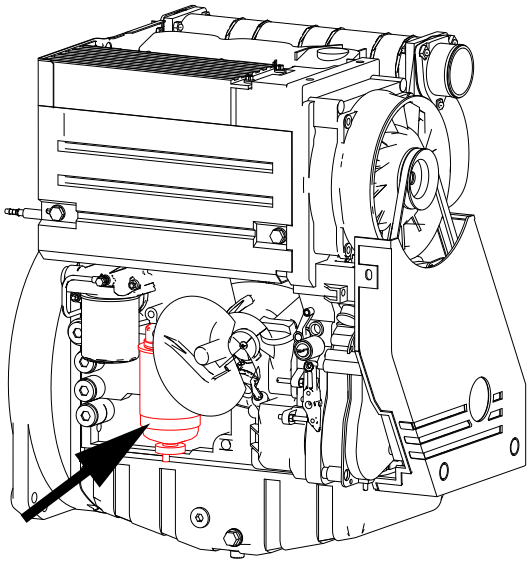


Figure 5-15 Deutz D2011 L03i fuel filter

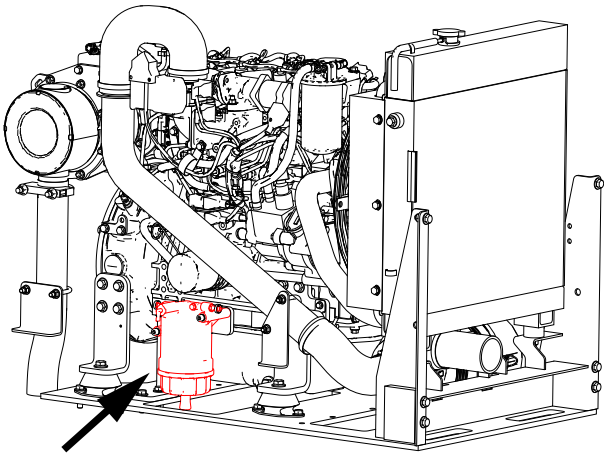


Figure 5-16 Yanmar 4TNV88C-DFLT fuel-water separator

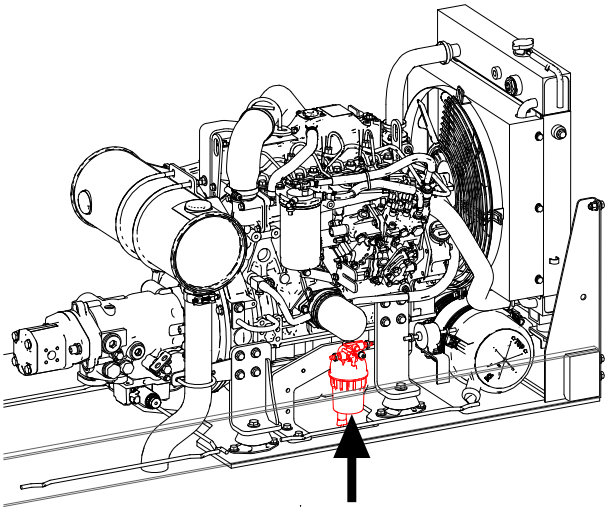


Figure 5-17 Yanmar 4TNV88-BDFLTC fuel-water separator

3. Disconnect the fuel flow from the fuel tank to the fuel filter (fuel-water separator).
4. Loosen the valve plug over the fuel filter (fuel-water separator).
5. Place a suitable vessel under the fuel filter (fuel-water separator).
6. Remove the drain plug at the bottom to drain the water and the remaining fuel into the vessel.
7. Remove the fuel filter (fuel-water separator) element, replace with a new one and install it.
8. Tighten the plug.
9. Clean up the spilled fuel.
10. Start the engine from the ground controller and inspect the fuel filter for leakage.

B-6 Inspect Air filter of Hydraulic Tank

Keeping the breather cap of hydraulic tank in well-ventilated condition is vital to normal operation of hydraulic pump and extending service life. Dirty or blocked air filter of hydraulic tank may cause the hydraulic pump to suction improperly, and continued operation may result in component damage. The air filter of hydraulic tank should be inspected more often in hostile operating environment.

NOTICE

Shut off the engine before inspection.

1. Open the front cover on the right side, and locate the hydraulic tank.
2. Remove the air filter from hdraulic tank.

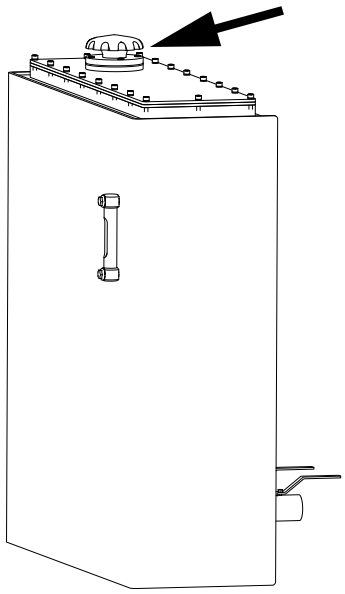


Figure 5-18

3. Check the air filter element
4. The air should pass through the air filter smoothly.
5. If the air has difficulty in passing through the air filter, observe the following steps to clean the air filter.
6. Use neutral solvent to clean the air filter, then blow dry and repeat the Step 2.
7. Install the air filter back to the hydraulic tank.

B-7 Replace High-Pressure Filter Element

Replacing high-pressure filter on a regular basis is vital to proper machine operation and extending service life. A dirty or blocked filter could cause the machine to work improperly, and continued operation may result in component damage. The high-pressure filter should be replaced more often in hostile operating environment.

⚠ WARNING

BURN HAZARD

Be cautious of hot hydraulic oil. Bodily contact with hot hydraulic oil may result in severe burn.

NOTICE

Shut off the engine before inspection.

There are 3 high-pressure filters altogether installed on the machine, one located at the engine, the other two inside the front door on the left side.

1. The high-pressure filter at the engine is located as below.

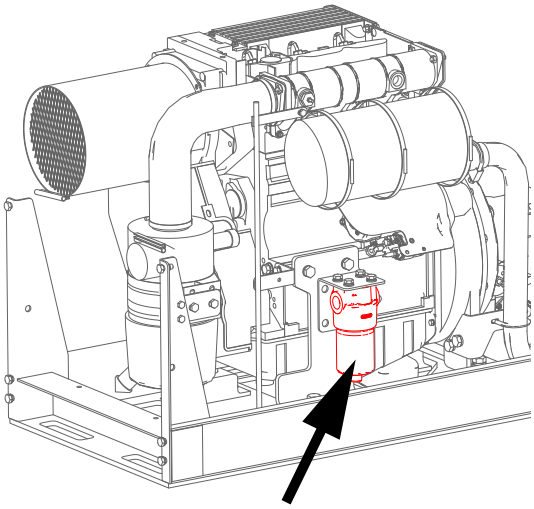


Figure 5-19 Deutz D2011 L03i high-pressure filter

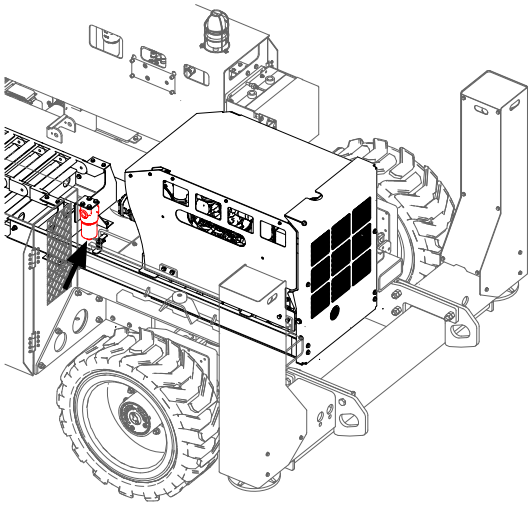


Figure 5-20 Yanmar high-pressure filter

2. The high-pressure filters inside the front door are located as below.

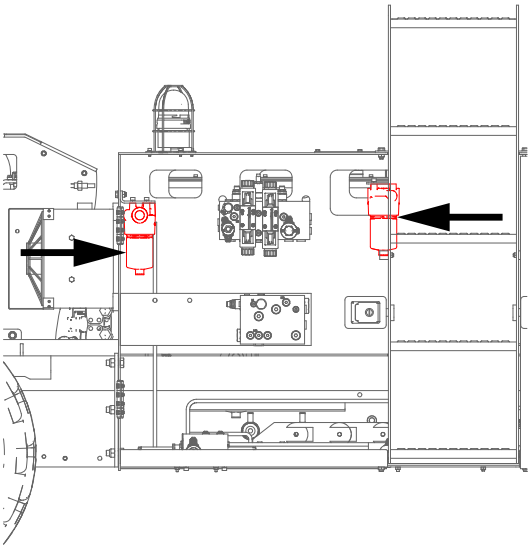


Figure 5-21

3. Place a suitable vessel under the filter.
4. Remove the filter from the mounting bracket.

> **⚠ WARNING**
>
> HIGH-PRESSURE HAZARD
>
> 
>
> **Slowly remove the hydraulic elements to reduce the oil pressure. High-pressure oil may penetrate the skin. Should any injury occur, go to a doctor at once.**

5. Replace the filter element as needed.
6. Clean up the spilled hydraulic oil.
7. Start the engine from the ground controller.
8. Inspect the high-pressure filter and relevant components for leakage.

B-8 Replace Engine Air Filter Element

> ***NOTICE***
>
> *Shut off the engine before inspection.*

Inspecting the engine air filter is vital to proper engine operation. Failure to perform this inspection procedure will result in engine malfunction and component damage.

1. Open the engine cover and locate the engine air filter.

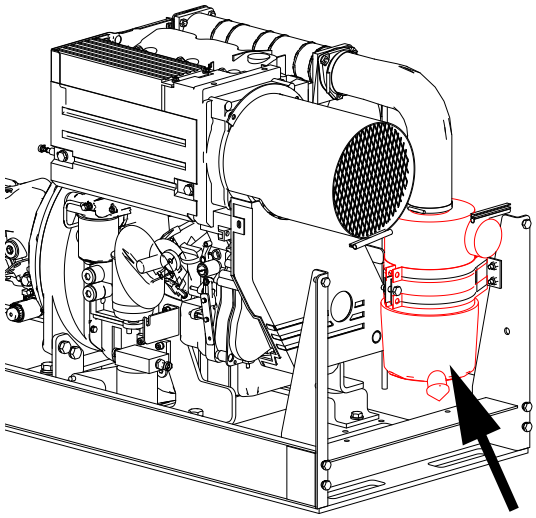


Figure 5-22 Deutz D2011 L03i air filter

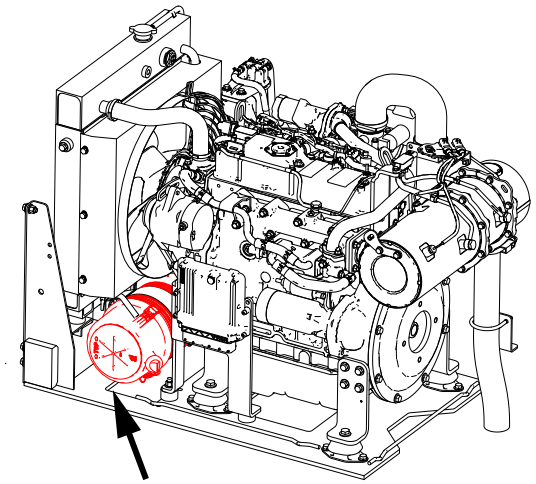


Figure 5-23 Yanmar 4TNV88C-DFLT air filter

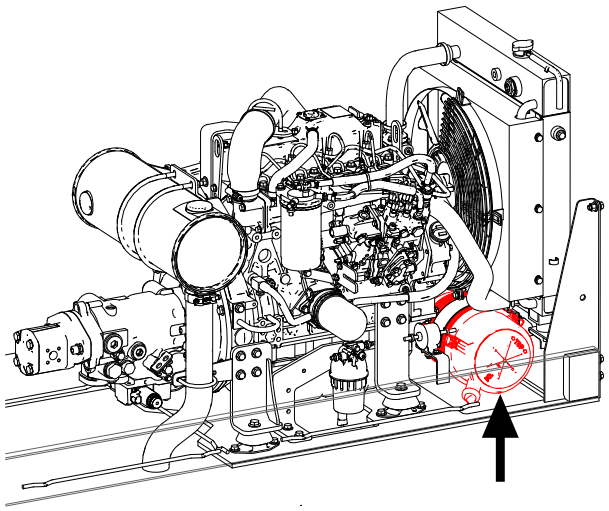


Figure 5-24 Yanmar 4TNV88-BDFLTC air filter

2. Loosen the clip at the end cap of air filter, and remove the end cap.
3. Remove the air filter element.
4. Use a wet cloth to scrub the inside of filter housing and end cap.
5. Inspect the filter element for contamination or blockage. Replace the filter element if needed.
6. Install the filter element.
7. Install the end cap back to the filter and secure the clip.

B-9 Inspect the Battery

The condition of the battery affects the performance of the machine. Improper levels of battery electrolyte or damaged cable and wiring may harm battery parts and may pose dangerous conditions.

⚠ WARNING

ELECTROCUTION HAZARD

- **Contact with live circuits may cause death or serious injury. Always wear goggles, protective gloves and protective clothing.**
- **Remove all rings, watches or other jewelry**

⚠ WARNING

CHEMICAL BURN HAZARD

- **Avoid battery acid spillage or contact with unprotected skin. If the battery acid comes into contact with the skin, wash it immediately with plenty of water and seek medical attention immediately.**
- **In case of battery acid spillage, use water mixed with baking soda to neutralize the acid.**

- Check the battery level. The discharged capacity shall not exceed 80% of the total capacity of the battery. Charge the battery immediately after each discharging.

- Ensure the battery cells are wired reliably with the locking nuts torqued to the specifications as below:

Nut type	Torque
M8	9 ~ 11Nm (6.6 ~ 8.1ft-lb)
M10	18 ~ 23Nm (13.2 ~ 17ft-lb)

NOTICE

Improper connection may cause reduced performance, damaged terminals, fusions and even fires.

- Ensure the battery negative and positive poles are correctly connected.
- Ensure the battery connections are not corroded.
- Check the battery electrolyte level is proper (for lead-acid battery requiring maintenance).
- Check the battery box for accumulated water, if any, clear the water.
- Check the internal and external paint of battery for damage, if any, touch up the damaged paint immediately to prevent corrosion and keep the box insulated.

NOTE: Add terminal protectors and antiseptic sealants to help eliminate corrosion of the battery terminals and cables.

B-10 Inspect Engine Exhaust System

Inspecting engine exhaust system is vital to proper engine operation and extending service life.

NOTICE

Shut off the engine before inspection.

1. Inspect whether the engine exhaust pipe is damaged or crushed flat.
2. Inspect whether the exhaust pipe is tightly connected.
3. Inpsect whether the muffler shows signs of heating fatigue or possiblity of interal malfunction.
4. Inspect the catalytic converter for blockage.
5. Tighten or replace parts, if needed, to ensure the exhaust system is free of leakage.

B-11 Inspect Drive Reducer Oil Level

Inappropriate gear oil level of drive reducers will reduce the machine performance, and continued use could result in component damage.

1. Drive the machine to rotate the reducer until one bolt at top and the other one at 90 degrees, as shown in the figure below.

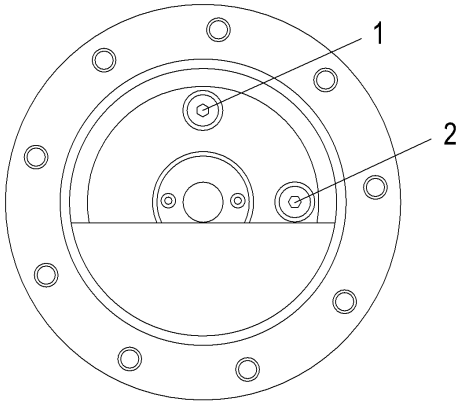


Figure 5-25

2. Remove the bolt #2, and check the oil level.
3. The oil level should be even with the bolt hole.
4. If necessary, add oil to the bolt hole.
5. Remove the bolt #1, add gear oil to the bolt hole #1 until the oil level is even with that of the bolt hole #2.
6. Install the bolts back.
7. Clean up the gear oil spills during the inpection.
8. Perform this inspection procedure to all drive reducers of the machine.

B-12 Test Oscillate Outriggers

NOTICE

Do not stand in the platform but on the ground to perform this testing using platform controller.

The oscillate outriggers enables the machine to drive on uneven surfaces with 4 tires in close contact with the ground, thus improving the traction performance and stability.

- With the machine in stowed position:
  1. Start the machine from the platform controller and select the high idle speed.
  2. Drive the machine to allow the left steer wheel to stand on a 10cm (3.9in) high block or kerb.
  3. The other 3 wheels should come in close contact with the ground.

4. Drive the machine to allow the right steer wheel to stand on a 10cm (3.9in) high block or kerb.
5. The other 3 wheels should come in close contact with the ground.

- With the machine in operating position:

1. Start the machine from the platform controller and select the high idle speed.
2. Using the platform lift function, raise the platform until the lower limit switch disengages.
3. Drive the machine to allow the left steer wheel to stand on a 10cm (3.9in) high block or kerb.
4. The other 3 wheels should come in close contact with the ground.
5. Drive the machine to allow the right steer wheel to stand on a 10cm (3.9in) high block or kerb.
6. The other 3 wheels should come in close contact with the ground.

B-13 Test Drive Speed

With the machine in stowed position:

1. Turn the Ground/Platform select switch on ground controller to Platform.
2. Pull out the emergency stop buttons on ground and platform controllers to ON position.
3. Press the engine start switch on platform controller.
4. Press the drive switch.
5. Hold the joystick enable switch and slowly deflect forward the joystick to full stroke.
6. Press the drive high/low speed switch on platform controller to select the high drive speed.
7. The max drive speed of the machine in stowed position is 6.1±0.6Km/h (3.79±0.37mph), or the drive time for 40m (131 ft) is 19 ~ 23s.
8. Hold the joystick enable switch and slowly deflect forward the joystick to full stroke.
9. Press the drive high/low speed switch on platform controller to select the low drive speed.
10. The max drive speed of the machine in stowed position is 1.1±0.1Km/h (0.68±0.06mph), or the drive time for 20m (65.6 ft) is 53 ~ 64s.

With the machine in operating position:

1. Turn the Ground/Platform select switch on ground controller to Platform.
2. Pull out the emergency stop buttons on ground and platform controllers to ON position.
3. Press the engine start switch on platform controller.
4. Press the platform lift switch.
5. Hold the joystick enable switch and slowly deflect forward the joystick to raise the platform, and release the joystick when the lower limit switch disengages.
6. Press the drive switch.
7. Hold the joystick enable switch and slowly deflect forward the joystick to full stroke.
8. Press the drive high/low speed switch on platform controller to select the high drive speed.
9. The max drive speed of the machine is 1.1±0.1Km/h (0.68±0.06mph), or the drive time for 20m (65.6 ft) is 53 ~ 64s.
10. Hold the joystick enable switch and slowly deflect forward the joystick to full stroke.
11. Press the drive high/low speed switch on platform controller to select the low drive speed.
12. The max drive speed of the machine in stowed position is 1.1±0.1Km/h (0.68±0.06mph), or the drive time for 20m (65.6 ft) is 53 ~ 64s.

NOTICE

if the machine drive speed exceeds the test results above, immediately tag and remove the machine from service.

B-14 Test Tilt Protection System

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Don't put your hands and arms close to positions where they may get squeezed.**
- **If the safety arm is not in the proper position, don't work under the platform or near the scissor arm.**

NOTICE

Do not stand on the platform but on the ground using the platform controller to perform this test.

1. Position the machine on a level, firm surface. Start the machine, and the green indicator light on the level sensor should illuminate.
2. With the machine in stowed position, place 2 wooden blocks near the two front or rear wheels, then drive the machine upon the wooden blocks.

The wooden block dimension (L×W×H) is 100×50×150mm (4in×2in×5.9in).

3. Switch from drive to platform lift function, and raise the platform until the lower limit switch disengages, the red indicator light on the level sensor will illuminate with the alarm sounding, and further lifting and driving is restricted.
4. Lower the platform to the stowed position, the alarm will stop sounding, and the machine function limit is cancelled.
5. Drive the machine off and remove the wooden blocks.
6. With the machine in stowed position (outrigger retracted), place 2 wooden blocks near the two wheels on the left or right side, then drive the machine upon the wooden blocks. The wooden block dimension (L×W×H) is 100×50×70mm (4in×2in×2.76in).
7. Switch from drive to platform lift function, and raise the platform until the lower limit switch disengages, the red indicator light on the level sensor will illuminate with the alarm sounding, and further lifting and driving is restricted.
8. Lower the platform to the stowed position, the alarm will stop sounding, and the machine function limit is cancelled.
9. Drive the machine off and remove the wooden blocks.
10. With the machine in stowed position (outrigger extended), place 2 wooden blocks near the two wheels on the left or right side, then drive the machine upon the wooden blocks. The wooden block dimension (L×W×H) is 100×50×28mm (4in×2in×1.1in).
11. Switch from drive to platform lift function, and raise the platform until the lower limit switch disengages, the red indicator light on the level sensor will illuminate with the alarm sounding, and further lifting and driving is restricted.
12. Lower the platform to the stowed position, the alarm will stop sounding, and the machine function limit is cancelled.
13. Drive the machine off and remove the wooden blocks.

B-15 Test Brake Distance

Proper brake action is vital to safe machine operation. The drive brake function should operate smoothly, free of hesitation, jerking or unusual noise, otherwise the machine should be removed from service.

Note: The machine must be positioned on level firm surfaces clear of obstructions before performing this procedure.

NOTICE

The brake must be able to hold the machine on any slope it is able to climb.

With the machine in stowed position:

1. Turn the Ground/Platform select switch on the ground controller to Platform;
2. Pull out the emergency stop buttons on platform and ground controllers to ON position;
3. Push the engine start switch.
4. Push the drive high/low speed select switch on the platform controller to select the high speed position;
5. Push the drive enable switch.
6. Hold the enable switch on the joystick and slowly deflect the joystick to full drive speed position;
7. Quickly release the joystick after the full drive speed is reached;
8. Measure the braking distance of the machine.

   Result: braking distance≤1.2m (3ft 11in).

With the machine in operating position:

1. Turn the Ground/Platform select switch on the ground controller to Platform;
2. Pull out the emergency stop buttons on platform and ground controllers to ON position;
3. Push the engine start switch;
4. Push the lift enable switch;
5. Hold the enable switch on the joystick and slowly deflect the joystick to raise the platform, and release the joystick when the lower limit switch disengages.
6. Push the drive enable switch;
7. Hold the enable switch on the joystick and slowly deflect the joystick to full drive speed position;
8. Quickly release the joystick after the full drive speed is reached;
9. Measure the braking distance of the machine.

   Result: braking distance≤0.15m (5.9in).

CHECKLIST C PROCEDURES

C-1 Replace Fuel Filter Element

Regularly replacing fuel filter element is vital to good engine performance and extending service life. A dirty or blocked filter may fail the engine and continued use

may result in component damage. The filter element should be replaced more often if operating the machine in hostile environment.

⚠ WARNING

EXPLOSION AND FIRE HAZARD

- Diesel is an inflammable material. This procedure must be performed outdoors in well-vented area and far away from flames.

- Ensure that a conforming fire extinguisher is readily accessible when performing this inspection procedure.

NOTICE

Shut off the engine before inspection.

1. Open the engine cover, and locate the fuel filter;

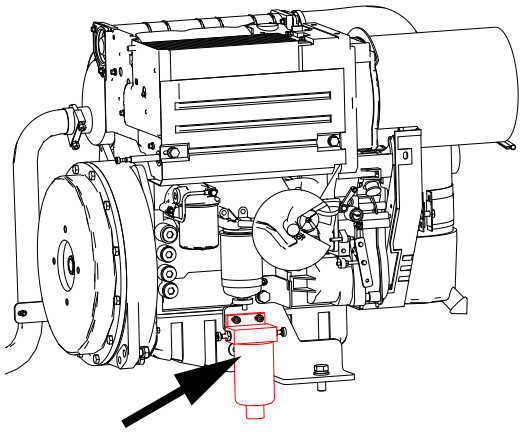


Figure 5-26 Deutz D2011 L03i fuel filter

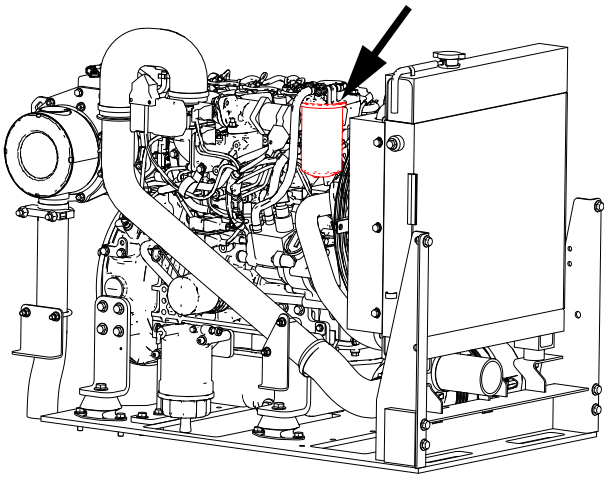


Figure 5-27 Yanmar 4TNV88C-DFLT fuel filter

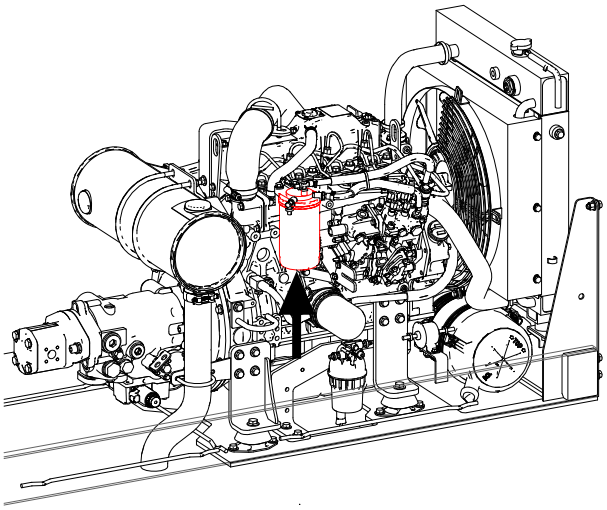


Figure 5-28 Yanmar 4TNV88-BDFLTC fuel filter

2. Disconnect and cap the line between fuel tank and fuel filter;
3. Remove the fuel filter element;
4. Clean the inside of filter head;
5. Add clean fuel to the new filter element, and lubricate the seal ring with clean fuel and install it to the filter head;
6. Clean up the spilled fuel in performing the procedure.

C-2 Replace Engine Oil

NOTICE

The engine oil filter must also be replaced after replacing the engine oil. Replace the oil with engine started to circulate the oil more smoothly and avoid contamination.

1. Turn the Ground/Platform select switch to Ground position.
2. Pull out the emergency stop button on the ground controller to ON.
3. Press the engine start switch to run the engine at idle speed for 2 minutes.
4. Shut off the engine.
5. Open the drain valve to drain the engine oil.

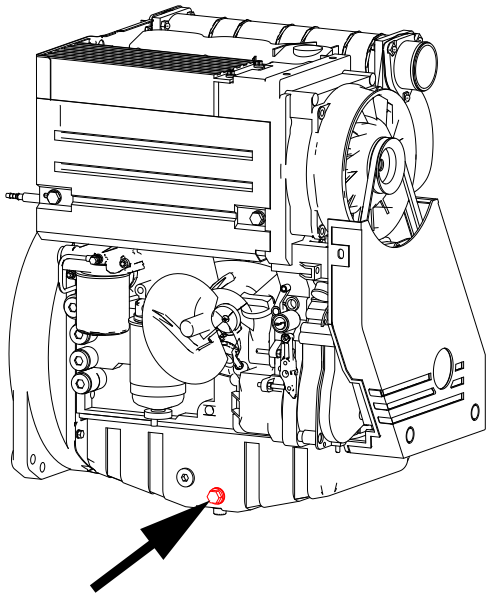


Figure 5-29 Deutz D2011 L03i oil discharge outlet

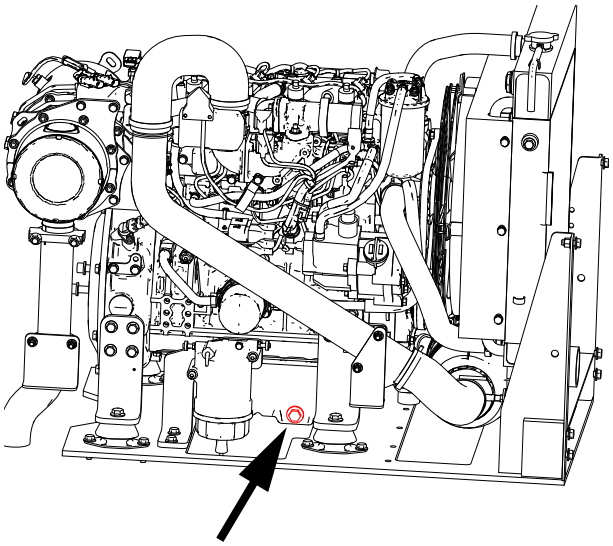


Figure 5-30 Yanmar 4TNV88C-DFLT drain plug

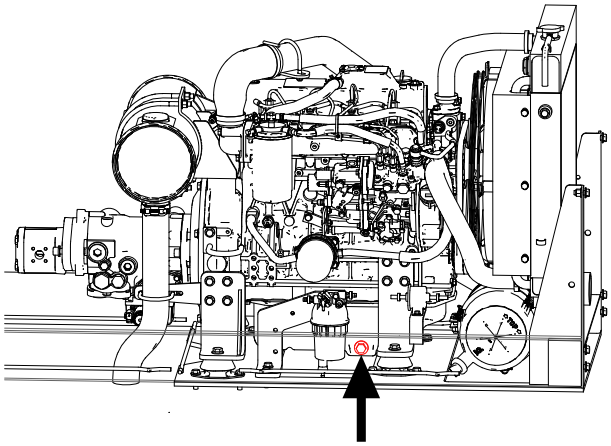


Figure 5-31 Yanmar 4TNV88-BDFLTC drain valve

⚠ WARNING

BURN HAZARD

Do not come in contact with the hot engine oil when draining to avoid burns.

NOTICE

The waste engine oil should be collected in a suitable vessel for disposal or recycling. The waste engine oil should be treated in compliance with the environment laws or regulations.

6. Close the drain valve.
7. Add new engine oil. For the recommended viscosity grade of the engine oil, please reference ***A-8 Inspect Engine Oil Level, page 5-9***.

C-3 Replace Engine Oil Filter

NOTICE

Replace the engine oil filter each time the engine oil is replaced.

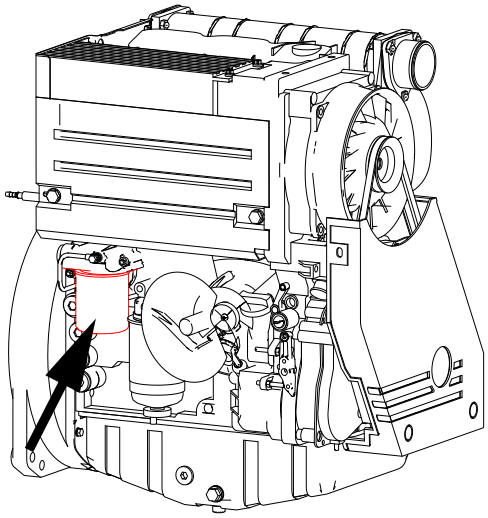


Figure 5-32 Deutz D2011 L03i oil filter

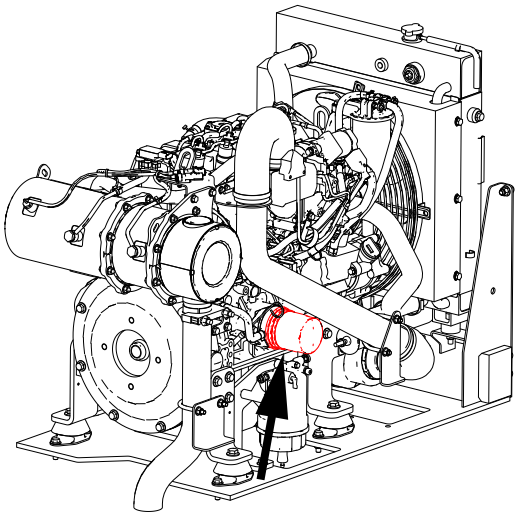


Figure 5-33 Yanmar 4TNV88C-DFLT oil filter

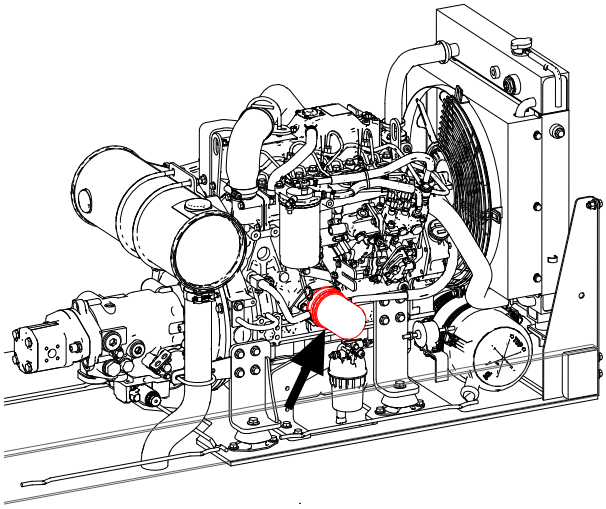


Figure 5-34 Yanmar 4TNV88-BDFLTC oil filter

1. Clean the areas around the filter.
2. Remove and discard the seal ring of the engine oil filter.
3. Thoroughly clean the residues on the seal surface of the filter support.
4. Apply clean engine oil to the rubber washer of the new engine filter.
5. Mount the new filter.
6. For the engine oil level inspection procedure, please reference ***A-8 Inspect Engine Oil Level, page 5-9***.
7. Inspect the engine oil filter element to make sure no leakage occurs.

C-4 Test Weighing System

The platform weighing system is optional. Make sure your machine has this protection function before checking this function.

1. Park the machine on flat, level and firm ground. Lubricate the bearings and sliding slots.
2. Using the ground controller, lift and lower the platform without load for two cycles, the machine should operate without shaking or other abnormities.
3. With the platform raised by about 1m, gradually add loads to the platform.

Table 5-15

Mdoels	Test Results
1323RD	When the weight does not exceed 680 kg (1499 lb), ensure that the platform is able to rise to the highest position. When the platform load is greater than or equal to 816 kg (1799 lb), the platform lifting height should be no greater than 3.2±0.5m (10ft 6in±1ft 8in).
1623RD	When the weight does not exceed 680 kg (1499 lb), ensure that the platform is able to rise to the highest position. When the platform load is greater than or equal to 816 kg (1799 lb), the platform lifting height should be no greater than 3.2±0.5m (10ft 6in±1ft 8in).

NOTICE

When the temperature of hydraulic oil is low, the viscosity will increase, which will have a significant impact on the pressure detection. If the environmental temperature difference between the place of the end customer of the machine and the place of machine manufacturer factory is ≧10℃ (50°F), or if the hydraulic oil temperature is lower than 15℃ (59°F), an alarm failure will occur when the rated load is lower than the standard rated load (the "OL" symbol appears on the platform controller screen or the ground controller screen), please re-calibrate the weighing sensor.

C-5 Inspect Carbon Brush of Motor

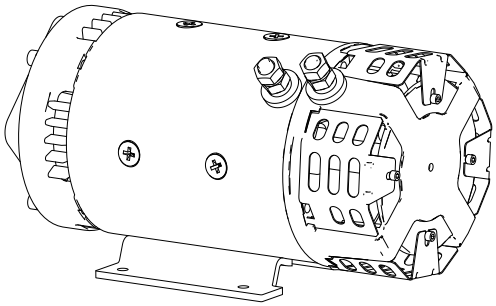


Figure 5-35

Inspecting and replacing carbon brush

1. Remove the bolts on the back cover of motor.
2. Remove the back cover.
3. Remove the bolts from the back end cap.
4. Remove the mounting bolts of brush.
5. Use a hook to pull out the spring, and press and hold to take out the old brush.
6. Check the brush for wear, if the brush becomes damaged or gets close to or less than the min. length, please replace the brush. Take out the brush, clean the brush box, and put the new brush into the brush box.
7. Put down the spring to press the brush tight.
8. Move the brush, ensure the brush can move freely inside the brush box.
9. Install the brush mounting bolts.
10. Install the bolts of back end cap.
11. Install the back cover.

NOTICE

After the new motor is installed, idle the motor to fit in the arc surface of brush so that the brush comes in well contact with the reverser.

Cleaning the slide ring

1. Visually inspect the slide ring, which should color dark brown in normal condition.
2. If the slide ring gets corroded or the surface gets uneven, please remove the belt, turn the axle by hand to clean. Use sand paper to clean the slide ring so that less material will be removed.
3. If the slide ring is deeply dented, replace with a new one instead of cleaning.

C-6 Inspect Raising Limit Switch

1. Place the machine on a flat, level and firm surface.
2. Operating from the ground controller, raise the platform to full height.
3. Measure the platform height (distance from the ground to platform floor):

Table 5-16

Model	Test Result
1323RD	13.1±0.1 m (43ft±4in)
1623RD	16.2±0.1 m (53.1ft±4in)

C-7 Inspect Staged Lowering

1. Place the machine on a flat, level and firm surface.
2. Operating from the platform controller, raise the platform to full height.
3. Lower the platform to approx. 3±0.3m (9ft 10in±1ft) off the ground, and then the machine will stop lowering automatically. Release the joystick and return it to OFF position, and re-activate the lowering function on the platform controller. 5s later, the platform will continue lowering.

CHECKLIST D PROCEDURES

D-1 Replace Drive Reducer Gear Oil

Regularly replacing drive reducer gear oil is vital to good machine performance and extending service life of the reducer.

1. Drive the machine to rotate the reducer to the position with one bolt at the bottom, as shown in the figure below.

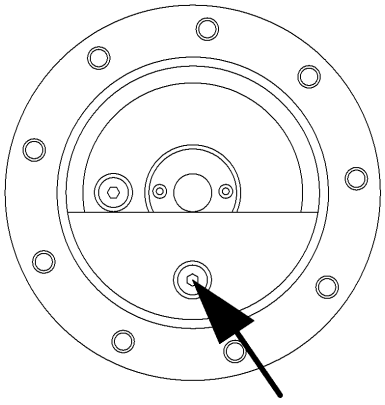


Figure 5-36

2. Place a suitable vessel under the bolt as indicated by the arrow in the figure.
3. Remove the bolt as indicated.
4. Fully drain the drive reducer gear oil to the vessel.
5. Mount back the loosened bolt.
6. Drive the machine to rotate the reducer until one bolt is at top and the other is at 90 degrees.

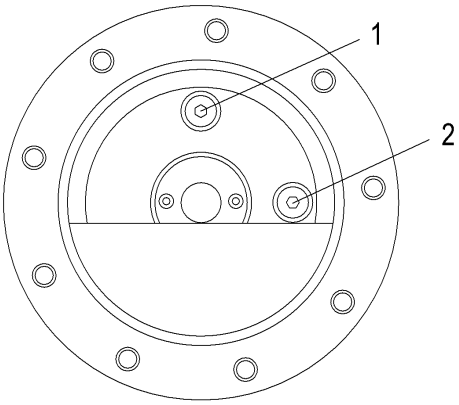


Figure 5-37

7. Remove the #1 and #2 bolts as indicated.
8. Add new gear oil to the port #1 until the oil level is even with that of the port #2.
9. Mount back the bolts.
10. Clean up the oil spills in performing the inspection procedure.
11. Perform the same procedure on all drive reducers of the machine.

D-2 Inspect Scissor Arm Sliders

Proper maintenance of the sliders connecting scissor arm to the chassis and platform is vital to safe machine operation. The sliders serve as friction pair by sliding on the channel steel surface of the chassis and platform. Unsuitable sliders or continued use of old sliders may result in component damage or hazardous situtations.

NOTICE

The scissor arm umst be fully retracted before performing this procedure.

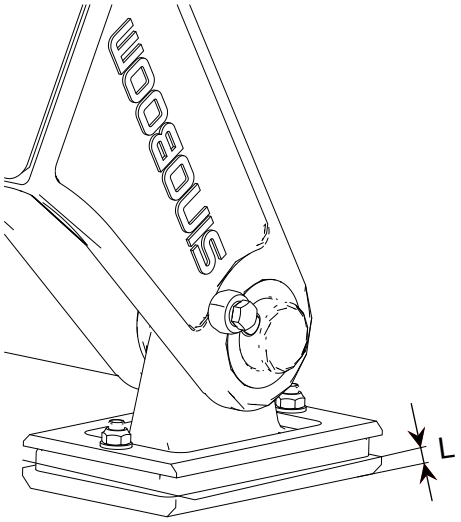


Figure 5-38

1. Measure the thickness L of sliders on the chassis (-Reference size：12mm [0.47in]).
2. When the wear degree of any slider exceeds 3mm [0.12in] (L<9mm [0.35in]), replace all sliders on the chassis.
3. Measure the thickness L of sliders on the chassis (-Reference size：12mm [0.47in]).
4. When the wear degree of any slider exceeds 3mm [0.12in] (L<9mm [0.35in]), replace all sliders on the platform.

D-3 Replace Hydraulic Oil

Regularly replacing hydraulic oil is vital to good machine performance and extending service life. Unclean oil may cause the machine to work poorly and continued use may result in hydraulic component damage. It's recommended to replace the hydraulic oil every year or every 1,000 hours. Particularly harsh working condition requires the oil change to be performed more frequently.

⚠ WARNING

BURN HAZARD

Before servicing the hydraulic system, allow the hydraulic oil to cool down to room temperature.

NOTICE

The inspection must be performed with the engine stopped.
Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 1-8****.*

1. Open the right-front chassis door, and locate the hydraulic tank.
2. Close the hydraulic cut-off valve located on the side of the tank.
3. Remove the drain plug at the bottom of the hydraulic tank to drain the hydraulic oil into a suitable container. For the hydraulic tank capacity, please see ***Machine Specifications, page 1-1***. After the hydraulic oil is fully drained, re-install the drain plug.

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic elements to reduce the oil pressure. High-pressure oil may penetrate the skin. Should any injury occur, go to a doctor at once.

4. Disconnect and plug the suction hose.
5. Disconnect and plug the return hose.
6. Remove the retaining screw of the hydraulic tank, and remove the hydraulic tank.
7. Rinse out the inside of the tank using a mild solvent, and remove the drain plug to discharge the solvent.
8. After the hydraulic tank dries up, install the hydraulic tank to the machine, and connect the suction hose and return hose to the hydraulic tank.
9. Add new hydraulic oil as needed.

D-4 Replace Hydraulic Tank Suction Filter

Regularly replacing hydraulic tank suction filter is vital to good machine performance and extending service life. Dirty hydraulic oil may cause the machine to function improperly and continued use may result in hydraulic component damage. Extremely dirty condition

requires the oil changes to be performed more frequently.

When performing the procedure, the hydraulic tank suction filter must also be replaced.

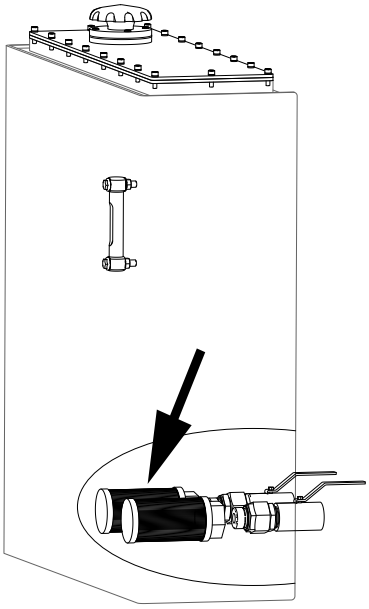


Figure 5-39

D-5 Inspect Scissor Arm Bearings

Proper maintenance of scissor arm bearings is vital to safe machine operation. Continued use of old bearings may result in componnent damage or hazardous situations.

NOTCIE
The scissor arm must be fully retracted before performing this procedure.

1. Use a feeler gauge to measure the fitting clearance between the pin and bearing.
2. If the fitting clearance exceeds 0.3 mm (0.011 in) or the bearing is in service for over 10 yerars, the bearing must be replaced.

This Page Intentionally Left Blank

6 REPAIR

⚠ WARNING

Repair procedures must be performed by qualified, trained and competent personnel in a properly equipped workshop.

Replace or repair damaged components immediately. Do not operate the machine with known damaged components.

Be sure the machine is properly maintained before operating it.

Before starting the machine:

- **Read, understand and follow all safety rules and instructions in this manual.**
- **Read all procedures and specifications completely.**
- **Unless otherwise specified, perform all maintenance procedures per the following:**
  - **Park the machine on flat, level and firm ground.**
  - **Be sure the platform is fully retracted.**
  - **Turn the key switch to the "OFF" position and remove the key.**
  - **Chock all wheels.**

PLATFORM COMPONENTS

Platform Controller

⚠ WARNING

ELECTROCUTION HAZARD

Before performing this procedure, be sure to disconnect the battery and the charger on AC outlet. Contact with live conductors may result in death or serious injury.

NOTICE

Perform this procedure with the machine in stowed position.

1. Disconnect external power supply, and push in the emergency stop buttons on the platform and ground controllers to OFF position.
2. Locate the cable connected to the bottom of the platform controller.
3. Disconnect and tag the cable from the bottom of the pltaform controller.
4. Remove the platform controller and mounting bracket.
5. Move the platform controller and mounting bracket away from the machine.

Platorm Assembly

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection while tapping the brass drift with a wooden hammer.

1. Remove the platform controller from the platform.
2. Raise the platorm to a certain height until the scissor arm and the pins connecting the scissor arm and platform are accessible.
3. Set up the safety prop.
4. Using an appropriate lifting device, fasten the straps to the four lifitng points as shown in the Figure below.

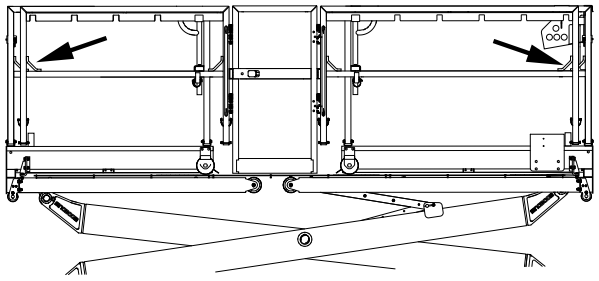


Figure 6-1

5. Remove the bolts at the pins connecting the scissor and the platform.

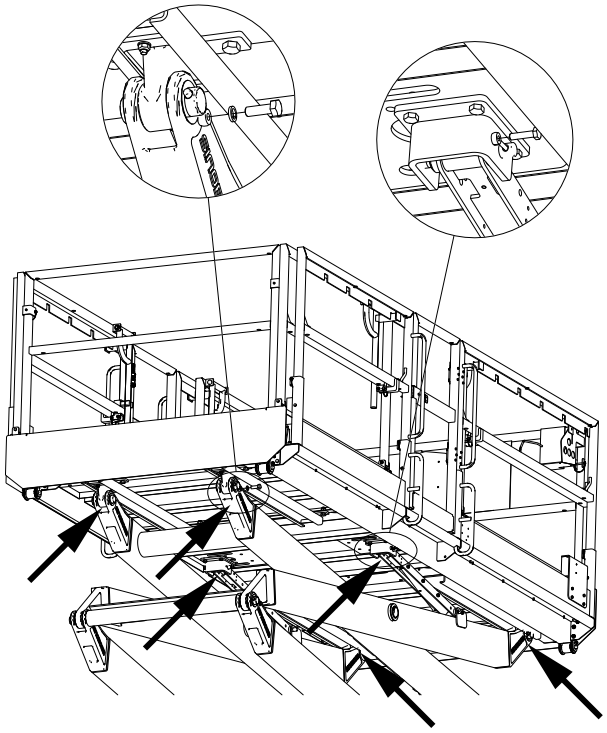


Figure 6-2

6. Tap the connecting pins out using brass drift and wooden hammer.
7. Using the lifting device, slowly move the platform away from the machine.

Extension Platform

⚠ WARNING

CRUSH HAZARD

When removing the extension platform from the machine, the extension platform may lose balance and fall down if not properly supported or secured to the forklift.

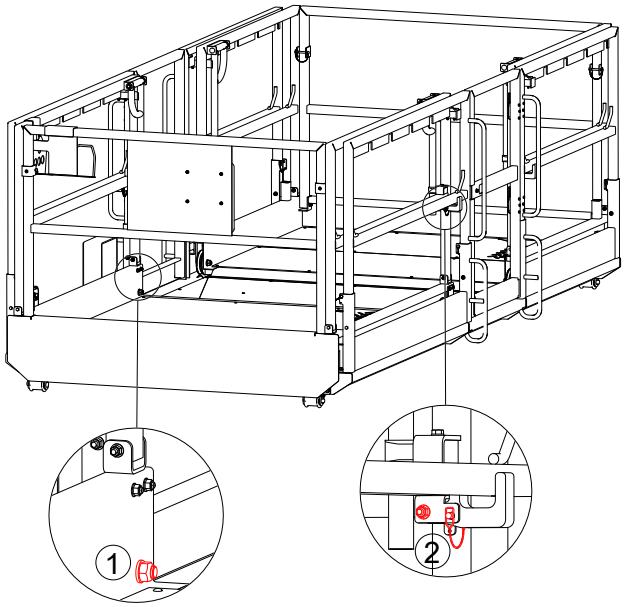


Figure 6-3

1. Remove the retaining fasteners from the rollers on both sides of the extension platform, and then remove the rollers, as shown by position #1 in the figure above.
2. Remove the retaining fasteners from the limit stops on both sides of the extension platform, and then remove the limit stops, as shown by position #2 in the figure above.
3. Align the fork of forklift with the bottom of extension platform to support the extension platform to be removed.
4. Carefully slide the extension platform out to remove it from the machine.

SCISSOR COMPONENTS

Scissor Arm Assembly

1. Remove the platform.
2. Disconnect the cables and pipes connecting chassis and scissor arm.

NOTICE

Before re-installingtheremovedhosesandfittings,checkwhet-herthesealsonthehosesandfittingsarebrokenormi-ssing;ifanysealisdamagedormissing,replacethes-ealwithnewone,orreplacethehoseassemblyandfit-tingsdirectly.Wheninstallinghosesandfittings,tight-en them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 1-8****.*

3. Using an appropriate lifting device, fasten the straps to the scissor arm assembly.
4. Remove the chassis guardrail.

   Remove the retaining fasteners at the pins connecting the guide rod of scissor arm and the chassis.

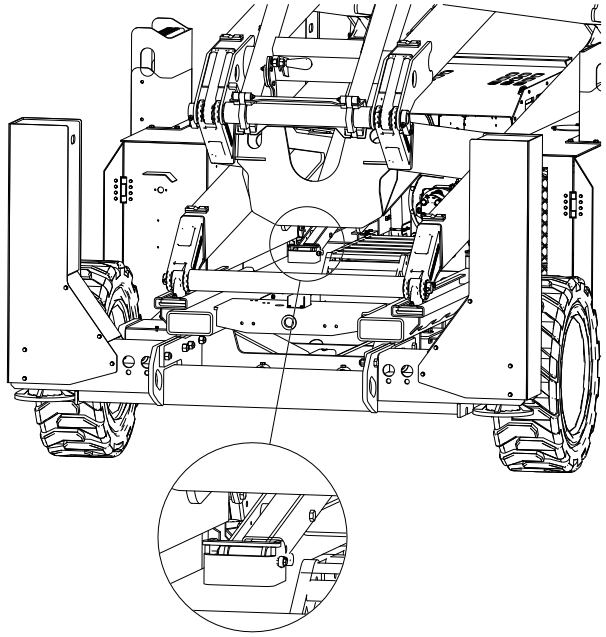


Figure 6-4

5. Pull out the pins with auxiliary tools.

⚠ WARNING

CRUSH HAZARD

Do not allow your hands, or other parts of your body, or clothes contact with the moving parts of machine.

6. Move the lifting device horizontally to detach the slider from the channel.
7. After all sliders become detached from the channels, exercise extreme cautions to lift the scissor arm assembly away from the chassis.

Lift Cylinder

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic components to reduce hydraulic oil pressure. High hydraulic oil pressure could penetrate the skin. Seek medical attention immediately if hurt.

1. Raise the scissor arm until the safety arm is fully enagaged.
2. Set up the safety arm and properly lower the platform such that the safety arm can adequately support the scissor arm.
3. Attach the straps of a lifting device to the scissor arm assembly.
4. Disconnect and cap the hydraulic hoses and fittings from the hydraulic cylinder.

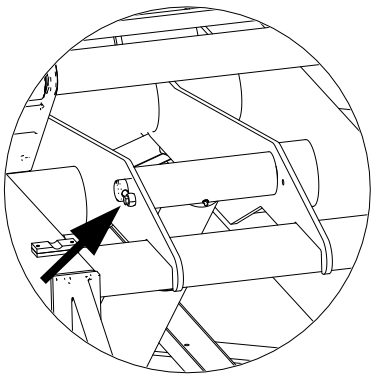


Figure 6-5

5. Remove the retaining bolts and dowel pins from the guide sleeve of cylinder rod.
6. Remove the retaining bolts and dowel pins connecting the cylinder end and the scissor arm.

NOTICE

Exercise extreme caution when removing the cylinder. Do not allow the cylinder to drop and become damaged.

7. Tap the pins out using brass drift and wooden hammer.

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection while tapping the brass drift with wooden hammer.

8. Carefully pull out the cylinder.

CHASSIS COMPONENTS

Tires and Rims

Replacing tires and rims

Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends the replacement tires be of the same size, ply rating and brand as the original tires. For the part number of a specific machine model, please reference the Parts Manual. If the replacement tires are not as Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends, the following requirements of tires should be met：

1. Ply rating/rated load and dimension equal to or greater than original.
2. Tire tread contact width equal to or greater than original.
3. Wheel diameter, width and offset dimensions equal to the original.
4. Approved for the application by the tire manufacturer (including intended purposes, maximum drive speed and maximum tire load, etc.).
5. Due to size variations between different tire brands, both tires on the same axle should be of the same brand.

⚠ WARNING

UNSAFE OPERATION HAZARD

The tires and rims installed on each product model have been designed for stability requirements. Size changes such as rim width, center piece location, diameter, etc., without written factory recommendations, may result in an unsafe condition regarding stability.

Installing tires and rims

It is extremely important to apply and maintain proper wheel mounting torque.

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Use the wheel nuts that suit the rim bolts. The wheel nuts must be installed and maintained at the proper torque to prevent loose wheels, broken studs and possible dangerous separation of wheels from the axle. Make sure to only use the nuts matching the cone angle of the wheel.**
- **Tighten the lug nuts to the proper torque to prevent wheels from coming loose. Use a torque wrench to tighten the fasteners. If you do not have a torque wrench, tighten the fasteners with a socket wrench, then immediately have a service garage or dealer tighten the lug nuts to the proper torque. Over-tightening will result in breaking the studs or permanently deforming the mounting stud holes in the wheels.**

The proper procedure for attaching wheels is as follows:

1. First apply the threadlocker Loctite 272 to the nuts, then hand tighten all nuts to prevent loosening. Do not use a lubricant on threads or nuts.
2. Tighten the nuts in the sequence as shown below.

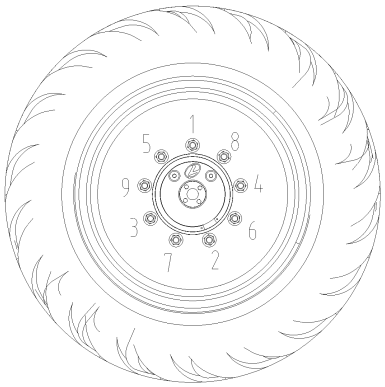


Figure 6-6

3. The tightening of the nuts should be done in stages. Following the recommended sequence, tighten nuts per wheel torque as listed in the table below.

Table 6-1

1st Stage	2nd Stage	3rd Stage
30Nm (96ft-lb)	210Nm (155ft-lb)	265Nm (195ft-lb)

NOTICE

Wheel nuts should be torqued prior to first use of machine and after each wheel removal. Check the torque every 3 months or 150 hours of operation.

Reducer and Drive Motor

The reducer and drive motor act not only the role of driving the machine but also the role of securing the rear wheel. Before removing the reducer and motor, secure the machine on a suitable structure or support the machine by a jack of ample capacity.

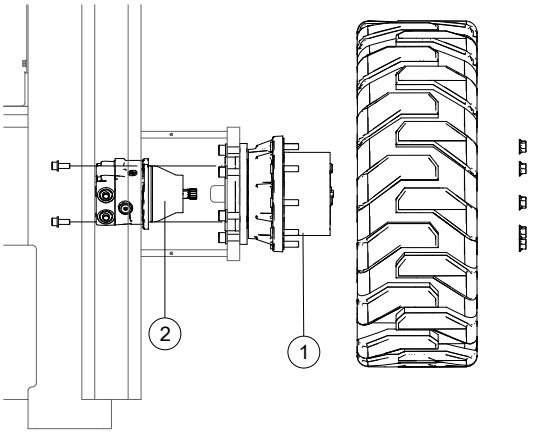


Figure 6-7

No.	Description
1	Reducer
2	Drive motor

Removal of reducer and drive motor

1. Place the machine on a solid, level surface.
2. Place a jack of sufficient capacity under the side of chassis to be removed. Lift the jack to make the wheels off the ground.
3. Remove the nuts securing the wheel to the reducer. Use a suitable lifting device to remove the wheel.
4. Tag, disconnect and plug the hydraulic hoses to the drive motor.
5. Remove the bolts and washers securing the drive motor to the reducer, and remove the drive motor.
6. Remove the bolts and washers securing the reducer to the outriggers, and remove the reducer.

Installation of reducer and drive motor

1. Use a lifting device with sufficient capacity to support the outrigger.
2. Align the reducer brake oil port with the nick of outrigger.
3. Fit the washer with the mounting surface, apply threadlocker Loctite 272 to the bolts, and install the bolts in turns.
4. Tighten the bolts with a torque wrench.
5. After all bolts are installed, add appropriate amount of gear oil.
6. Clean the mounting surface, lift the motor and align it with the reducer: the motor spline shaft in mesh with the inner gear of reducer, and the motor mounting slot aligned with the reducer mounting screw.
7. Apply the threadlocker Loctite 272 to the bolts and torque the bolts after pre-tightening.
8. Attach the hydraulic hoses.
9. Install the wheel.

Steer Cylinder

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic components to reduce hydraulic oil pressure. High hydraulic oil pressure could penetrate the skin. Seek medical attention immediately if hurt.

NOTICE

When re-installing, torque the hoses and fittings to specifications as shown in ***Hydraulic Hose and Fitting Specifications, page 1-8*** *.*

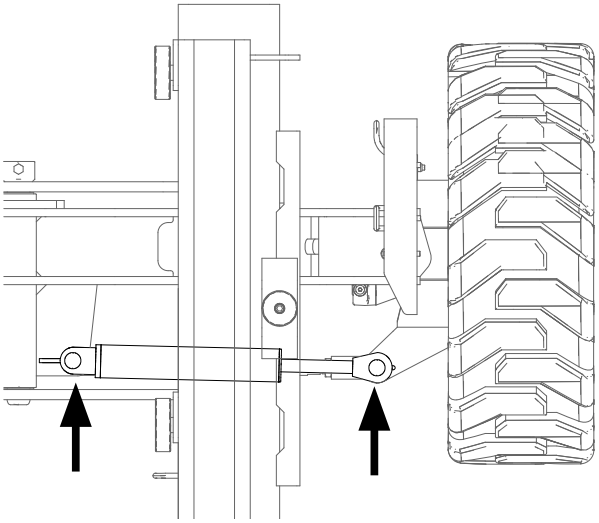


Figure 6-8

1. Tag, disconnect and plug the hoses and fittings to the steer cylinder.
2. Remove the cotter pin at the pivot pin connecting the steer cylinder and disc to the outrigger, and remove the pivot pin.

> ***NOTICE***
>
> *Exercise extreme caution when removing the cylinder. Do not allow the cylinder to drop and become damaged.*

3. Remove the steer cylinder from the machine.

Steer Linkage

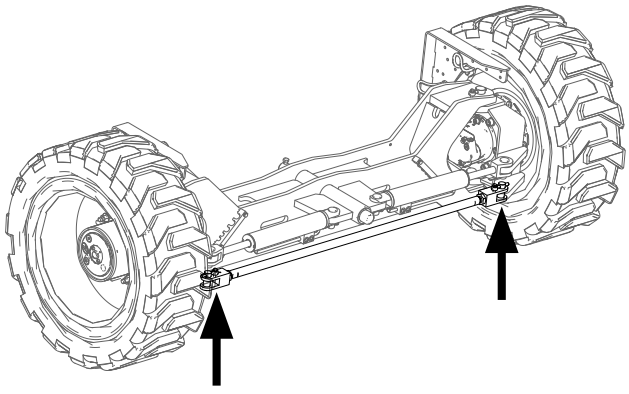


Figure 6-9

1. Remove the dowel pin, bolt and washer at the pin connecting the steer linkage and the disc.
2. Using a brass drift and wooden hammer, tap the pin out.

> **⚠ WARNING**
>
> **MOVING OBJECT HAZARD**
>
> 
>
> **Wear goggles while tapping the brass drift with a wooden hammer.**

3. Remove the steer linkage from the machine.

Oscillate Cylinder

> **⚠ WARNING**
>
> **HIGH-PRESSURE HAZARD**
>
> 
>
> **Slowly remove the hydraulic components to reduce hydraulic oil pressure. High-pressure hydraulic oil could penetrate the skin. Seek medical attention immediately if hurt.**

> ***NOTICE***
>
> *When re-installing, torque the hoses and fittings to specifications as shown in* ***Hydraulic Hose and Fitting Specifications, page 1-8****.*

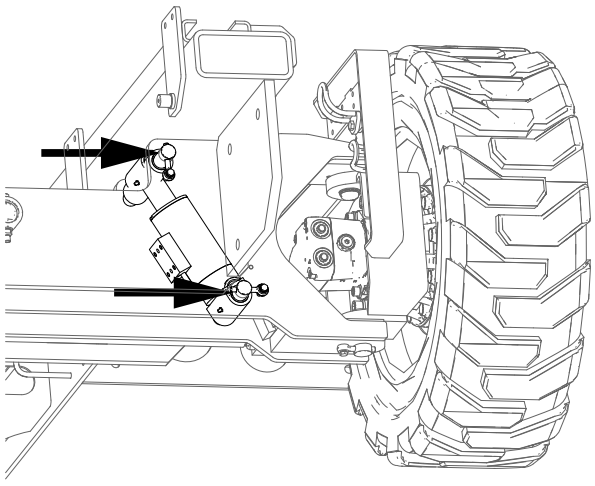


Figure 6-10

1. Tag, disconnect and plug the hoses and fittings to the oscillate cylinder.
2. Secure the non-steer wheels, and place a jack under the oscillate cylinder side to be removed.
3. Remove the dowel pin, bolt and washer at the pin connecting the oscillate cylinder to the chassis and front outriggers.

NOTICE

Exercise extreme caution when removing the cylinder. Do not allow the cylinder to drop and become damaged.

4. Using a brass drift and wooden hammer, tap the pin out.

⚠ WARNING

MOVING OBJECT HAZARD

Wear goggles while tapping the brass drift with a wooden hammer.

5. Remove the oscillate cylinder from the machine.

Ground Controller

1. Open the rear door on the left side of chassis;
2. Remove the butterfly screw and open the ground control panel;
3. Tag and disconnect the cables to the ground controller;
4. Remove the retaining bolts and nuts between ground controller and door.
5. Remove the ground controller.

HYDRAULIC SYSTEM

Layout of Hydraulic Elements

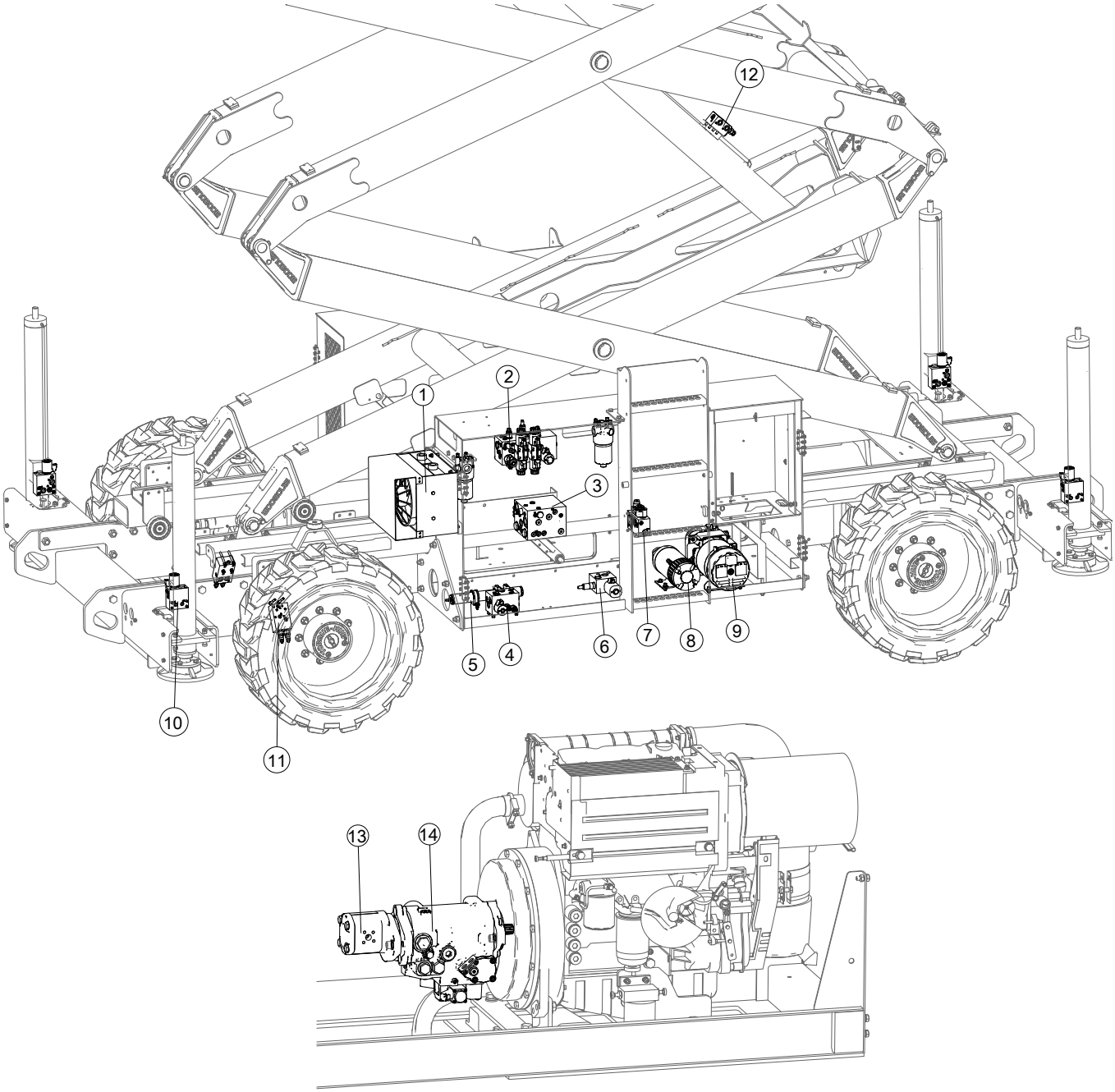


Figure 6-11

Table 6-2

1. Oil cooler	**6.** Generator control manifold	**11.** Bi-directional counterbalance valve
2. Lift control valve	**7.** Brake/2–speed control valve	**12.** Uni-directional counterbalance vavle

3. Drive control valve	**8.** Powrer unit	**13.** Gear pump
4. Oscillate control vavle	**9.** Hydraulic generator	**14.** Closed-ciruit variable displacement pump
5. Accumulatora	**10.** Outrigger control valve	

Hydraulic Tank

⚠ WARNING

BURN AND HIGH-PRESSURE HAZARDS

- **Avoid bodily contact while the hydraulic system is still at a high temperature. The hot hydraulic oil may cause severe injury.**

- **Ensure the hydraulic oil has cooled down before removing the hydraulic tank.**

NOTICE

The engine must be shut off before performing this procedure.
The hoses and fittings must be re-installed and torqued to specifications as shown in ***Hydraulic Hose and Fitting Specifications, page 1-8****.*

1. Open the front door on the right side of chassis, and locate the hydraulic tank.
2. Shut off the hydraulic cutoff valve at either side of the tank.
3. Remove the drain plug at the bottom, and drain the oil into a suitable vessel. For the hydraulic tank capacity, please reference.

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic components to reduce hydraulic oil pressure. High hydraulic oil pressure could penetrate the skin. Seek medical attention immediately if hurt.

4. Tag, disconnect and plug the hoses and fittings to the hyraulic tank.
5. Loosen the retaining bolts and remove the hydraulic tank from the machine.

Note: Before re-intsalling the hydraulic tank, be sure to clean and inspect it for cracks or other damages.

Hydraulic Pump

Hydaulic pump is linked to the engine to serve as power source for the hydraulic system.

NOTICE

When re-installing, torque the hoses and fittings to specifications as shown in ***Hydraulic Hose and Fitting Specifications, page 1-8*** *.*

⚠ WARNING

BURN AND HIGH-PRESSURE HAZARDS

Allow the hydraulic components to cool to room temperature before performing service. Loosen the hydraulic hoses and fittings slowly to relieve pressure.

Inspecting hyrdaulic gear pump

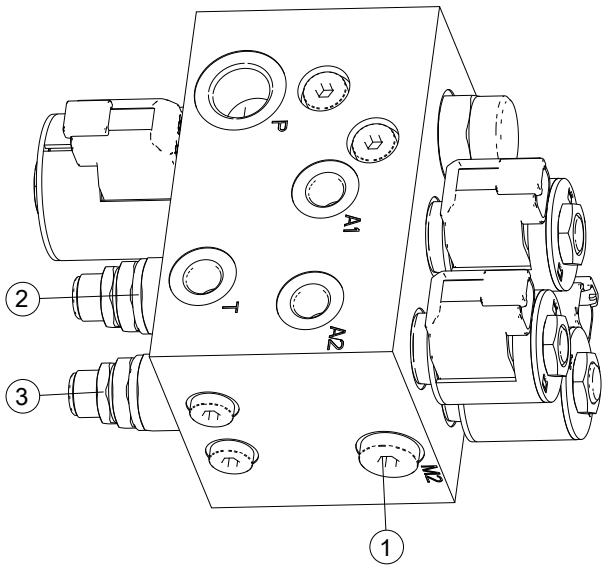


Figure 6-12 Oscillate control valve

Table 6-3

No.	Description	Torque Value
1	Pressure testing port #3	\
2	Oscillate high-pressure relief valve	45 Nm (33.2 ft-lb)
3	Oscillate low-pressure relief valve	45 Nm (33.2 ft-lb)

1. Remove the plug of the pressure testing port 3# at the oscillate control valve, and install the pressure testing joint.
2. Connect the pressure gauge (range 40MPa) to the pressure testing jonit.
3. Turn the Ground/Platform select switch on the ground controller to Platform.
4. Pull out the emergency stop buttons on both ground and platform controllers to ON position.
5. Disconnect the left and right oscillate solenoids and wiring harness.
6. Remove the platform controller, and drive the machine at low speed or reverse, mark the pressure readout of the gauge, the value should be among 23.7 ~ 24.3Mpa.
7. If the pressure value is not within the range, adjust the pressure of oscillate high-pressure relief valve.
   - Use an hex wrench to hold the oscillate high-pressure relief valve and loosen the nut.
   - Using a hex wrench, adjust the relief valve pressure, turn clockwise to increase or counterclockwise to decrease until the pressure reaches 23.7 ~ 24.3Mpa.

NOTICE

If the pressure remains invariable, it indicates that the pump needs to be serviced or replaced.

   - Using a hex wrench, hold the ocillate high-pressure valve and meanwhile tighten the nut upon.
   - Repeat the Step 6 to verify the pressure of reducing valve.
   - Re-wire the harness as originally wired.
8. Remove the pressure gauge.
9. Remove the pressure testing joint, and re-install the plug.

Removing hydraulic pump

1. Tag, disconnect and plug the hydraulic hoses to the pump, and cap the fittings on the pump.
2. Loosen the bolts and carefully remove the pump from the machine.

NOTICE

It is important that, after replacing the hydraulic pump, the lift speed and drive speed of the machine must be reset to the factory defaults.

Function Valves

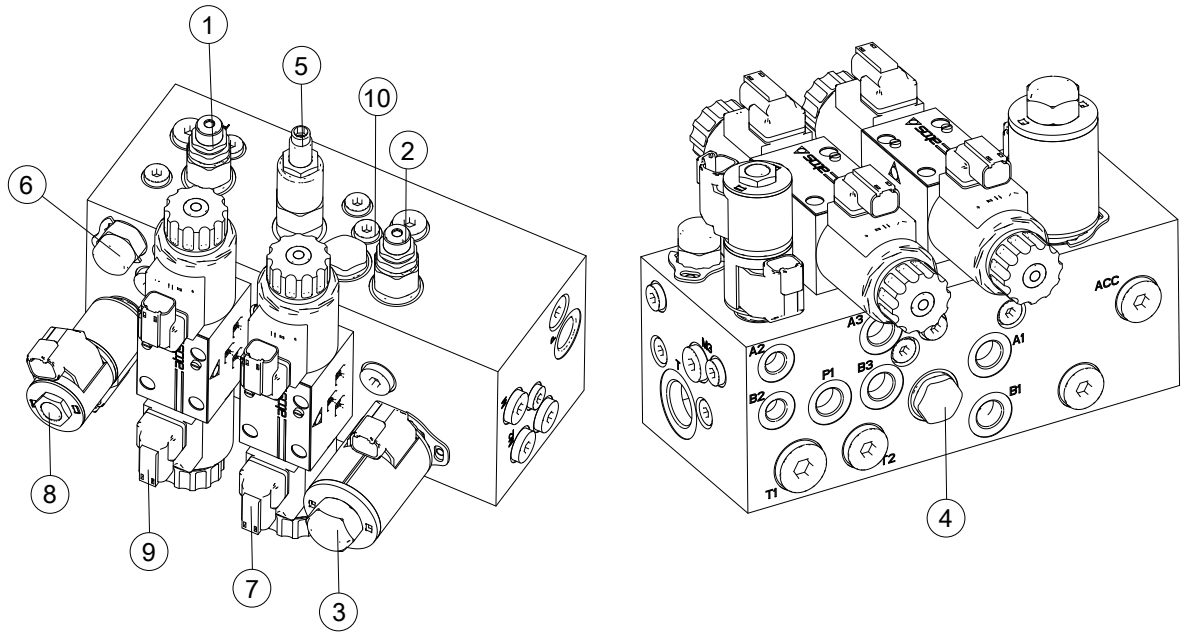


Figure 6-13 Lift control valve

Table 6-4 Lift control valve

No.	Name	Function	Torque Value
1	Relief valve	To control emergency power unit pressure	60 Nm (44.3 ft-lb)
2	Relief valve	To control lift pressure	60 Nm (44.3 ft-lb)
3	Proportional flow valve	To control the flow of circuit	47Nm (34.7 ft-lb)
4	Check valve	To keep the hydraulic fluid flowing in a single direction	60 Nm (44.3 ft-lb)
5	Pressure reducing valve	To control the steer/outrigger pressure	34 Nm (25 ft-lb)
6	Flow control valve	To control the flow of circuit	27 Nm (20 ft-lb)
7	6–way Y-type gate valve	To control the lift direction	8 Nm (6 ft-lb)
8	Solenoid valve	To control the steer direction	27 Nm (20 ft-lb)
9	6–way O-type plate valve	To control the outrigger direction	8 Nm (6 ft-lb)
10	M8 damper	\	5 Nm (3.7 ft-lb)

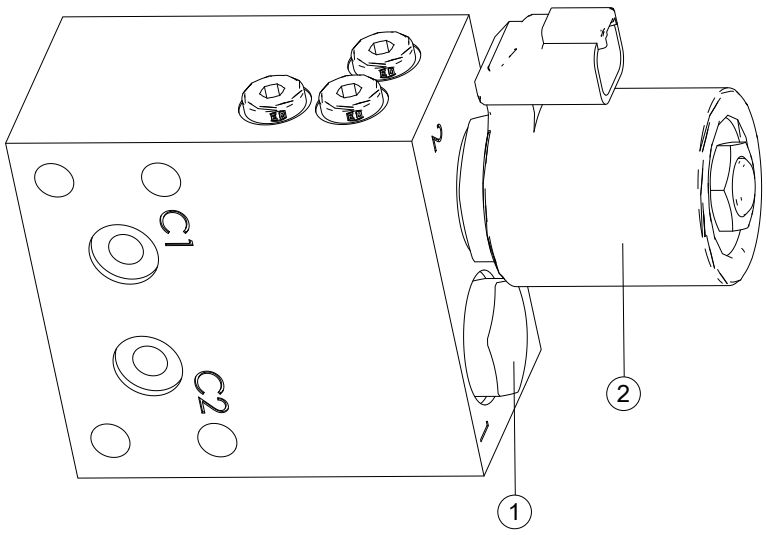


Figure 6-14 Outrigger control valve

Table 6-5 Outrigger control valve

No.	Name	Function	Torque Value
1	2–way 2–position solenoid valve	To control outrigger direction	27 Nm (20 ft-lb)
2	Hydraulically driven check valve	To control outrigger direction	35 Nm (25.8 ft-lb)

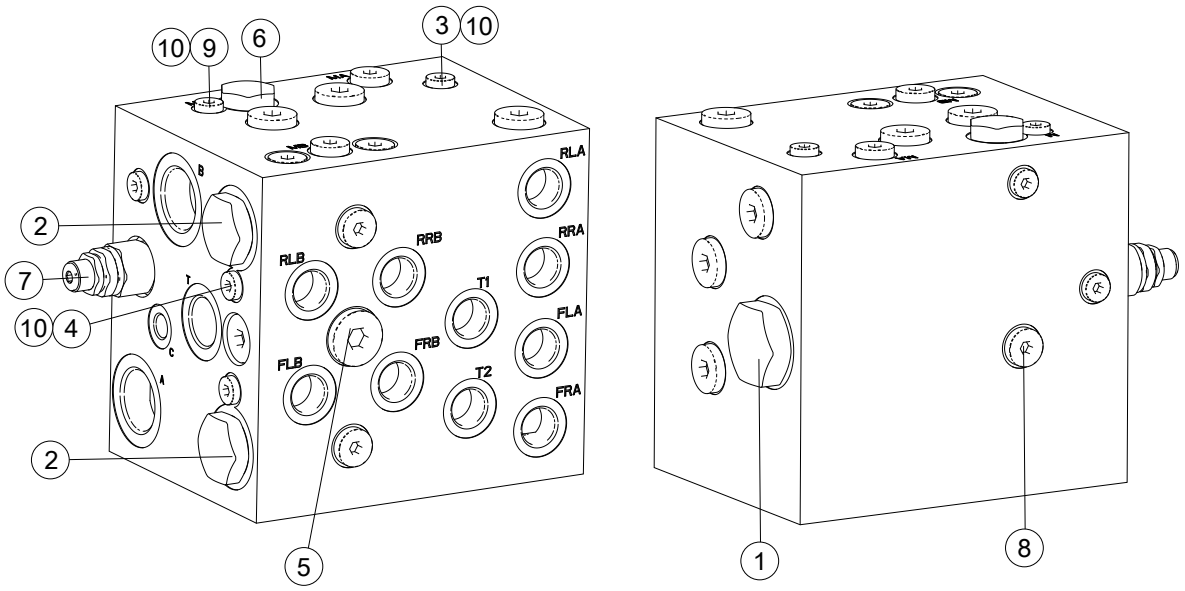


Figure 6-15 Drive control valve

Table 6-6 Drive control valve

No.	Name	Function	Torque Value
1	Flow divider and combiner valve	To control drive flow	135 Nm (76.8 ft-lb)
2	Flow divider and combiner valve	To control drive flow	104 Nm (76.8 ft-lb)
3	Damper	\	5 Nm (3.7 ft-lb)
4	Damper	\	5 Nm (3.7 ft-lb)
5	Check valve	To keep the fluid flowing in a single direction	10 Nm (7.4 ft-lb)
6	Flush valve	To replace the fluid in drive system	35 Nm (25.8 ft-lb)
7	Relief valve	To control the flushing pressure	45 Nm (33.2 ft-lb)
8	Shuttle valve	To select the circuit	14 Nm (10.3 ft-lb)
9	Damper	\	5 Nm (3.7 ft-lb)
10	Damper	\	5 Nm (3.7 ft-lb)

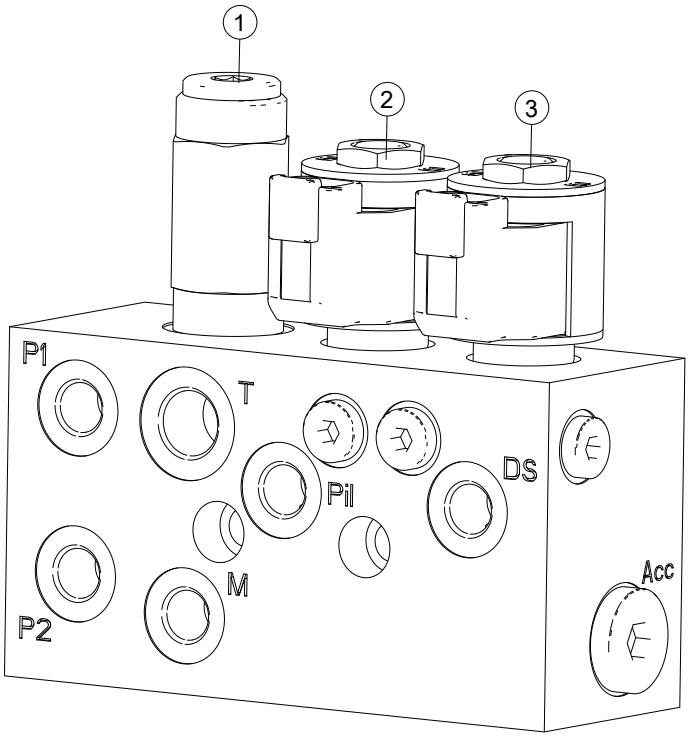


Figure 6-16 2–speed/brake valve

Table 6-7 2–speed/brake valve

No.	Name	Function	Torque Value
1	Pressure reducing valve	To control the brake/2–speed pressure	34 Nm (25 ft-lb)
2	3–way 2–position solenoid valve	To control the 2–speed direction	27 Nm (20 ft-lb)
3	3–way 2–position solenoid valve	To control the brake direction	27 Nm (20 ft-lb)

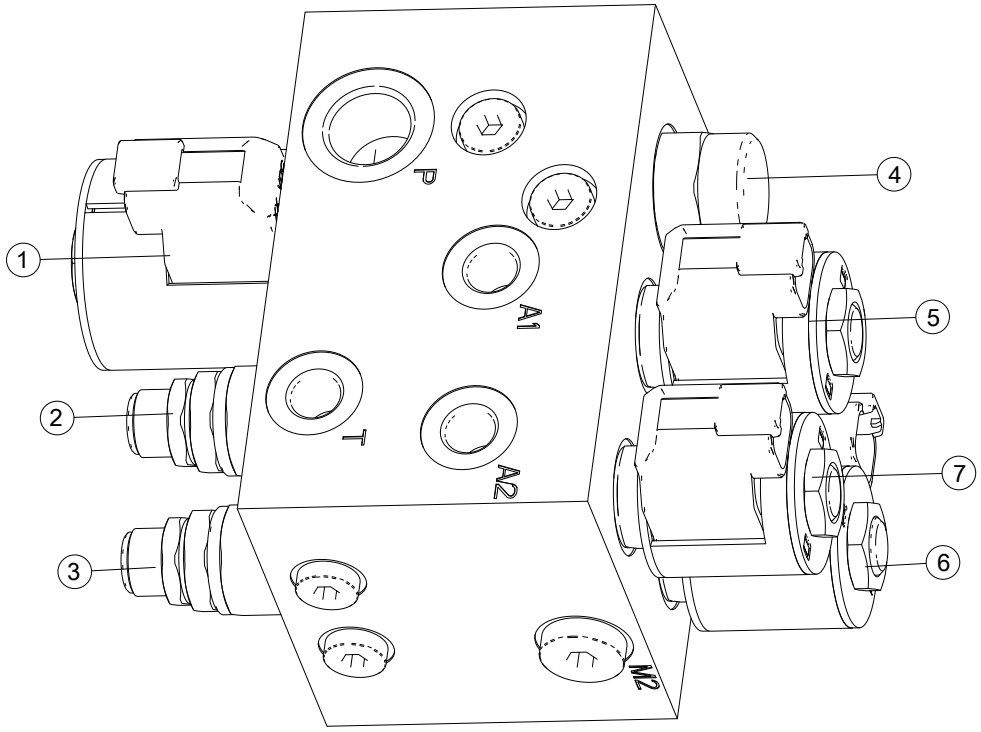


Figure 6-17 Oscillate control valve

Table 6-8 Oscillate control valve

No.	Name	Function	Torque Value
1	2–way 2–position solenoid valve	To control oscillate function	34 Nm (25 ft-lb)
2	Relief valve	To control oscillate high pressure	45 Nm (33.2 ft-lb)
3	Relief valve	To control oscillate low pressure	45 Nm (33.2 ft-lb)
4	Flow control valve	To control the flow of circuit	34 Nm (25 ft-lb)
5	3–way 2–position solenoid valve	To control the left oscillation	27 Nm (20 ft-lb)
6	2–way 2–position solenoid valve	To select oscillate high/low pressure	27 Nm (20 ft-lb)
7	3–way 2–position solenoid valve	To control the right oscillation	27 Nm (20 ft-lb)

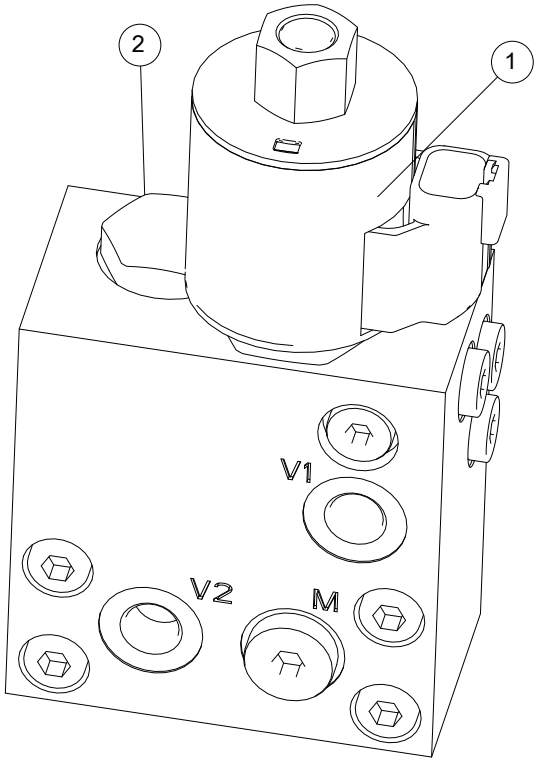


Figure 6-18 Outrigger solenoid valve

Table 6-9 Outrigger solenoid valve

No.	Name	Function	Torque Value
1	2–way 2–position solenoid valve	To control the outrigger direction	27 Nm (20 ft-lb)
2	Hydraulically-driven check valve	To control the outrigger direction	34 Nm (25 ft-lb)

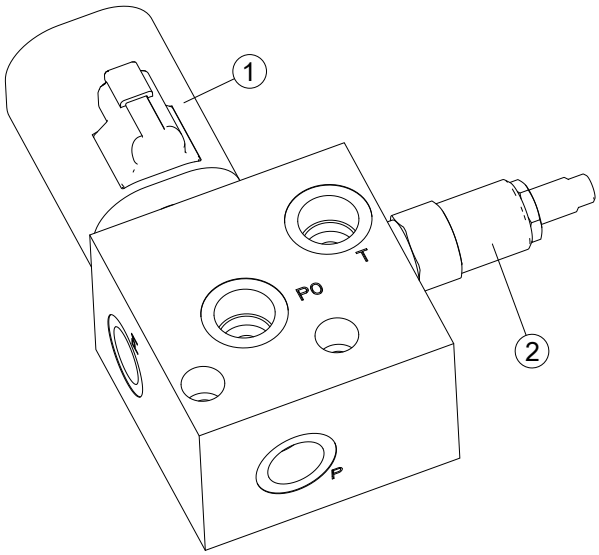


Figure 6-19 Generator control valve

Table 6-10 Generator control valve

No.	Name	Function	Torque Value
1	Solenoid valve	To control the connection of generator oil circuit	74.5 Nm (54.9 ft-lb)
2	Relief valve	To control the pressure of generator oil circuit	33.9 Nm (25 ft-lb)

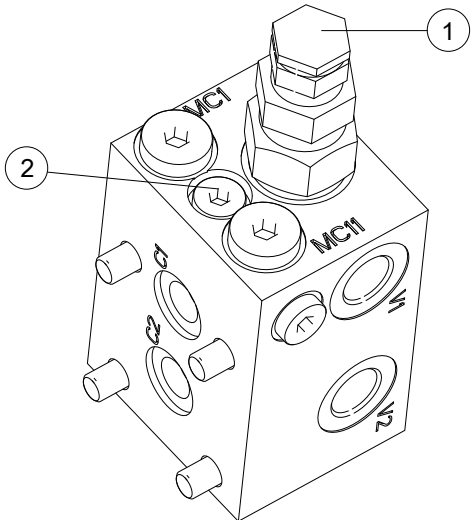


Figure 6-20 Unidirectional counterbalance valve

Table 6-11 Unidirectional counterbalance valve

No.	Name	Function	Torque Value
1	Counterbalance valve	To keep the load balanced	55 ~ 65Nm (40.6 ~ 47.2 ft-lb)
2	Damper	\	5 Nm (3.7 ft-lb)

Regulating Hydraulic Valve Pressure

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Regulating the pressure improperly may result in machine damage, severe injury or death.**
- **Do not set the pressure higher or lower than the specified.**
- **After the valve pressure is set, make sure to verify the value to root out any mistakes.**
- **The relief valve pressure of all machines has been set before delivery. Do not modify the pressure unless approved.**

NOTICE

The machine must be in stowed position before performing this procedure.

Adjusting the lift relief valve pressure

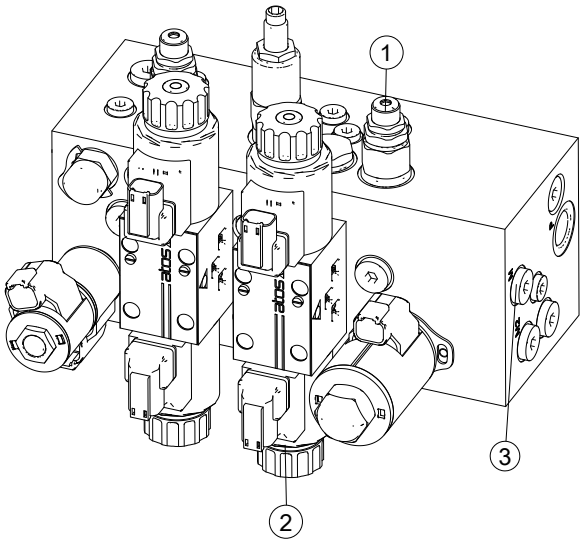


Figure 6-21

Table 6-12

No	Name	Torque Value
1	Lift relief valve	60 Nm (44.3 ft-lb)
2	Lift direction control valve	8 Nm (6 ft-lb)
3	Pressure testing port #1	\

1. Remove the plug of the pressure testing port #1 at the lift control valve, the install the pressure detection joint.
2. Connect the pressure gauge (range: 40MPa) to the pressure testing joint.
3. Remove the coil from the lift direction control valve, but do not disconnect the coil harness.
4. Turn the Ground/Platform select switch on the ground controller to Ground position.
5. Pull out the emergency stop buttons on both ground and platform controllers to ON position.
6. Use the ground controller to raise the platform, and the platform will not be raised. Record the pressure gauge reading, which should be 20 ~ 21Mpa.
7. If the pressure value is not as specified, adjust the lift releif valve pressure as follows:
   - Use a wrench to hold the lift relief valve and loosen the nut.
   - Use a hex wrench to adjust the relief valve pressure. Turn the valve clockwise to increase the pressure or counterclockwise to decrease the pressure, until the pressure is 20 ~ 21Mpa.
   - Using a hex wrench, hold the lift relief valve and meanwhile tighten the locking nut on the valve.
   - Repeat Step 6 to verify the relief valve pressure.
8. Re-install the coil to its original position.
9. Remove the pressure gauge.
10. Remove the pressure testing joint, and re-install the plug.

Adjusting steer/outrigger reducing valve pressure

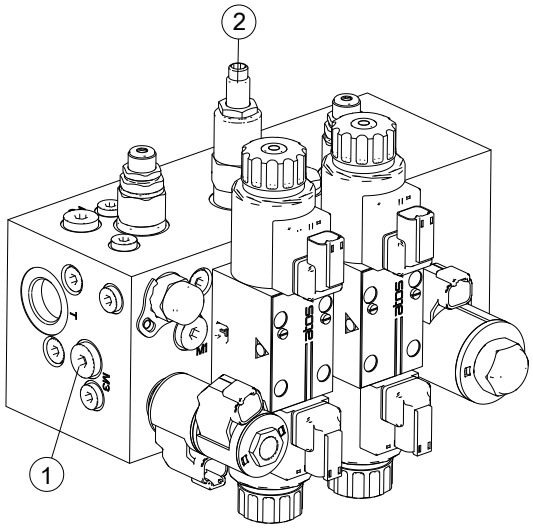


Figure 6-22

Table 6-13

No	Name	Torque Value
1	Pressure testing port #2	\
2	Steer/outrigger reducing valve	34 Nm (25 ft-lb)

1. Remove the plug of the pressure testing port 2# at steer/outrigger reducing valve, and install the pressure testing joint.
2. Connect the pressure gauge (range 40MPa) to the pressure testing joint.
3. Turn the Ground/Platform select switch on the ground controller to the Platform position.
4. Pull out the emergency stop buttons on both ground and platform controller to the ON position.
5. Remove the platform controller to operate the machine on the ground. Fully retract the outrigger and keep the machine stable. Then note down the pressure gauge reading, which should be 14.5 ~ 15.5Mpa.
6. If the pressure value is not as specified, adjust the steer/outrigger reducing valve pressure as follows:
   - Use a wrench to hold the steer/outrigger reducing valve and loosen the nut.
   - Use a hex wrench to adjust the reducing valve pressure. Turn the valve clockwise to increase the pressure or counterclockwise to decrease the pressure, until the pressure is 14.5 ~ 15.5Mpa.
   - Using a hex wrench, hold the steer/outrigger reducing valve and meanwhile tighten the locking nut on the valve.
   - Repeat Step 5 to verify the reducing valve pressure.
7. Remove the pressure gauge.
8. Remove the pressure testing joint, and re-install the plug.

Note: The pressure of steer cylinder and that of outrigger cylinder are controlled by the same reducing valve, i.e. the steer pressure and outrigger pressure are the same, so the operation of fully retracting outrigger can be replaced by the operation of steering tire to the far left or far right for pressure regulating.

Adjusting oscillation relief valve pressure

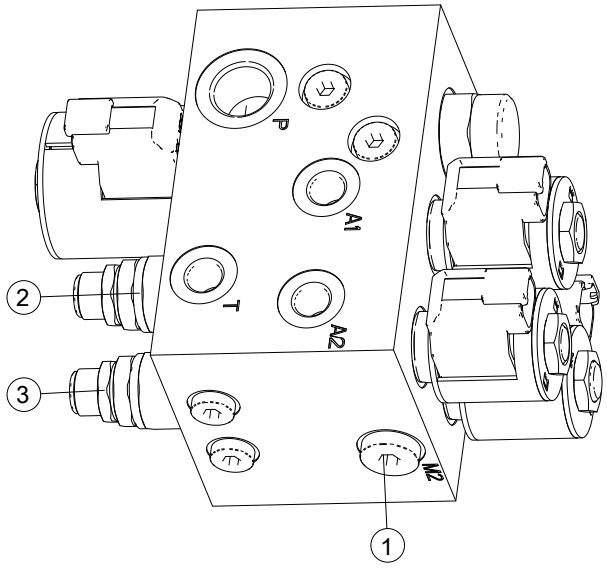


Figure 6-23

Table 6-14

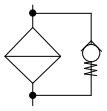
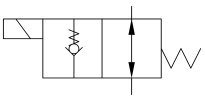
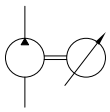
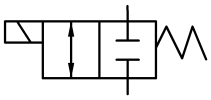
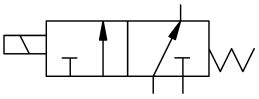
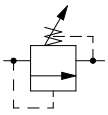
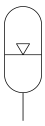
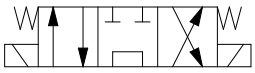
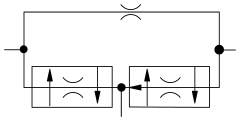
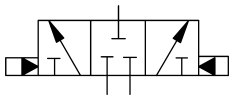
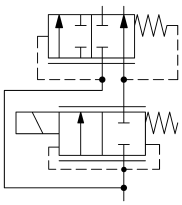
No	Name	Torque Value
1	Pressure test port #3	\
2	Oscillation high-pressure relief valve	45 Nm (33.2 ft-lb)
3	Oscillation low-pressure relief valve	45 Nm (33.2 ft-lb)

1. Remove the plug of the pressure testing port 3# at oscillation control valve, and install the pressure testing joint.
2. Connect the pressure gauge (range 40MPa) to the pressure testing joint.

3. Turn the Ground/Platform select switch on the ground controller to Platform position.
4. Pull out the emergency stop buttons on both ground and platform controllers to ON position.
5. Remove the platform controller to operate the machine on the ground. Drive the machine forward or backward at low speed, and note down the pressure gauge reading, which should be 5.7 ~ 6.3Mpa.
6. If the pressure value is not as specified, adjust the oscillation low-pressure relief valve pressure as follows:
   - Use a wrench to hold the oscillation low-pressure relief valve and loosen the nut.
   - Use a hex wrench to adjust the relief valve pressure. Turn the valve clockwise to increase the pressure or counterclockwise to decrease the pressure, until the pressure is 5.7 ~ 6.3Mpa.
   - Using a hex wrench, hold the oscillation low-pressure relief valve and meanwhile tighten the locking nut on the valve.
   - Repeat Step 5 to verify the relief valve pressure.
7. Disconnect the harness of left oscillation coil, right oscillation coil and oscillation coil.
8. Remove the platform controller to operate the machine on the ground. Drive the machine forward or backward at low speed, and note down the pressure gauge reading, which should be 23.7 ~ 24.3Mpa.
9. If the pressure value is not as specified, adjust the oscillation high-pressure relief valve pressure as follows:
   - Use a wrench to hold the oscillation high-pressure relief valve and loosen the nut.
   - Use a hex wrench to adjust the relief valve pressure. Turn the valve clockwise to increase the pressure or counterclockwise to decrease the pressure, until the pressure is 23.7 ~ 24.3Mpa.
   - Using a hex wrench, hold the oscillation high-pressure relief valve and meanwhile tighten the locking nut on the valve.
   - Repeat Step 8 to verify the relief valve pressure.
10. Connect the harness to the original position.
11. Remove the pressure gauge.
12. Remove the pressure testing joint, and re-install the plug.

Hydraulic Symbols

Table 6-15

Symbol	Description	Symbol	Description
	Filter		Gear pump
	Brake		2–position 2–way solenoid directional valve
	Power unit		2–position 2–way solenoid directional valve
	Hydraulic motor		2–position 3–way solenoid directional valve
	Relief valve		Accumulator
	3–position 4–way solenoid directional vavle		Flow divider/combiner valve
	Check valve		Flush valve
	Proportional flow valve		

Hydraulic Schematic

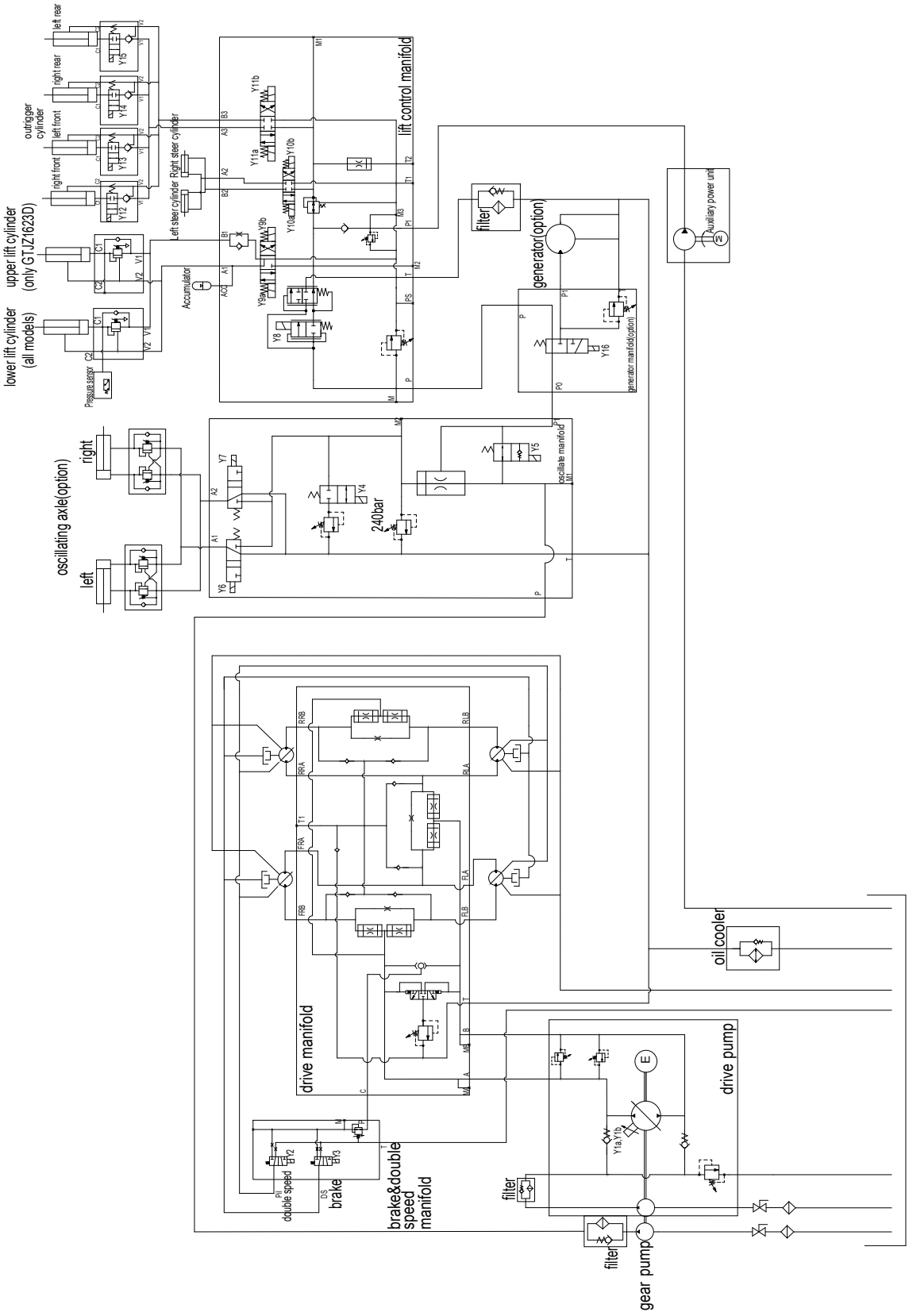


Figure 6-24 Hydraulic Schematic

ELECTRICAL SYSTEM

DTC Control System

⚠ WARNING

UNSAFE OPERATION HAZARD

- **All operations in this section must be performed by qualified personnel who have been professionally trained and authorized by Sinoboom, otherwise the consequences will be at your own risk.**
- **The machine has been commissioned before delivery. It's forbidden to modify the system settings and update the program without authorization from Sinoboom.**
- **Incorrect operation may result in death, serious injury or machine damage.**

NOTICE

PCU, ECU, sensors, etc. are precisely adjusted and protected before delivery. Therefore, personnel who have not been professionally trained and authorized by Sinoboom shall not disassemble their housings, otherwise moisture and dust will enter the internal mechanism and normal operation will not be guaranteed.

This section is applicable to DTC-D100 and DTC-K110 control systems.

ECU main interface

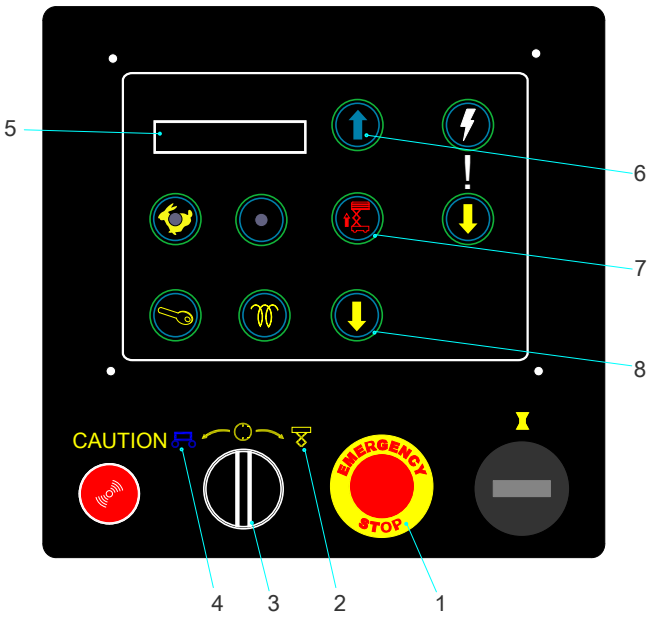


Figure 6-25 ECU main interface

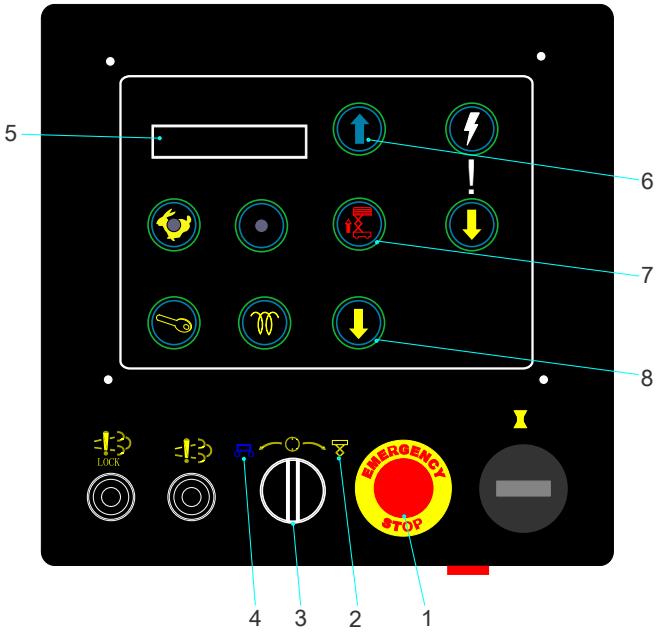


Figure 6-26 ECU main interface (EU Stage V engines)

1. Emergency stop button

2. Platform control position

3. Key switch (ground/platform control select switch)

4. Ground control position

5. Screen

6. PgUp key

7. Enter key

8. PgDn key

1. Turn the key switch on the ground controller to Ground control position, and pull out the emergency stop button on both the platform controller and ground controller to “ON” position. Make sure the screen is illuminated.
2. Firstly, “Software Rev 03 SINO023 Diesel” will be displayed after normal start-up.

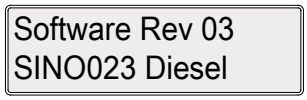


Figure 6-27

3. Then, “System Ready” will be displayed to prepare for normal operation.

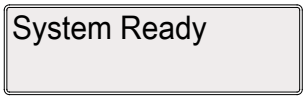


Figure 6-28

4. Press the PgUp key and PgDn key simultaneously on the ECU panel while powering up the machine to enter the ECU menu selection mode. Select and enter different function interfaces by pressing the PgUp key, PgDn key and Enter key. The system interface is described in the figure below:

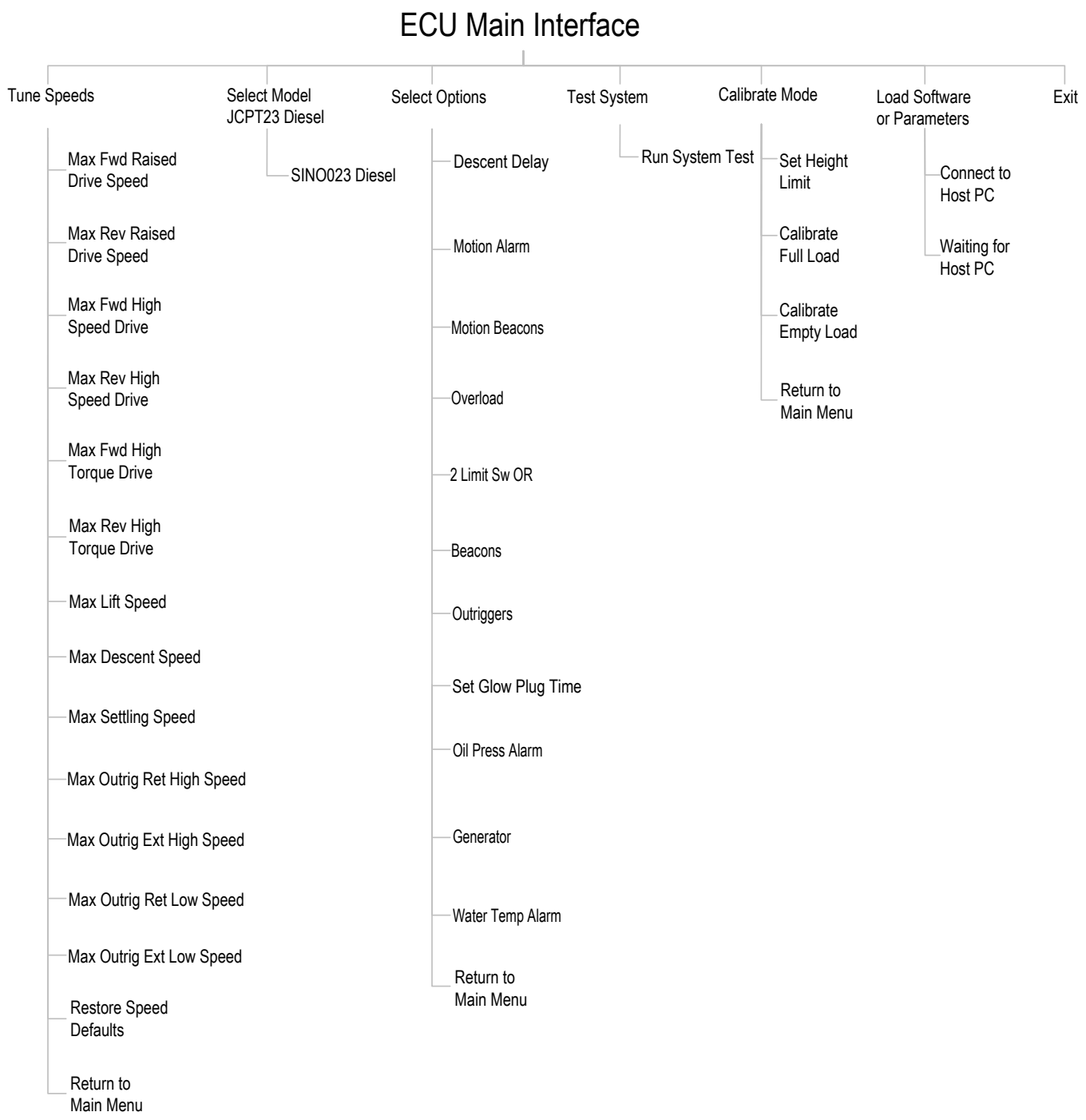


Figure 6-29 System interface description

Update program

Note: Updating the program will restore all system settings commissioned by the original machine owner/ user/Sinoboom to the original settings set by the control system manufacturer. Therefore, it is prohibited to update the program without the authorization of Sinoboom. If you need to update the program, please contact Sinoboom after-sales personnel.

Tune Speed

In the “Tune Speeds” menu, the Max Fwd Raised Drive Speed, Max Rev Raised Drive Speed, Max Fwd High Speed Drive, Max Rev High Speed Drive, Max Fwd High Torque Drive, Max Rev High Torque Drive, Max Lift Speed, Max Descent Speed, Max Settling Speed, Max Outrig Ret High Speed, Max Outrig Ext High Speed, Max Outrig Ret Low Speed, Max Outrig Ext Low Speed and Restore Speed Defaults options can be set.

Select Model

In the “Select Model” menu, the machine model can be selected. Currently, there is only SINO023 Diesel model.

Select Options

In the “Select Options” menu, the Descent Delay, Motion Alarm, Motion Beacons, Overload, 2 Limit Sw OR, Beacons, Outriggers, Set Glow Plug Time, Oil Press Alarm, Generator, Water Temp Alarm functions can be turned on or off.

Note: The Set Option menu is subject to the actual machine configuration.

Test System

In the “Test System” menu, the system can be tested. When “No Faults Detected” is displayed on the screen, no fault is detected in the system test.

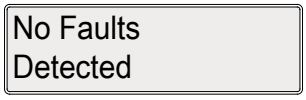


Figure 6-30

Calibrate joystick

Ensure the joystick is in neutral position before power-on.

Calibrate weight and height

NOTICE

- *The height calibration will be carried out automatically while the weight calibration is performed.*
- *Weight calibration includes no-load calibration and full-load calibration. Please complete the calibration with the ECU panel within one cycle as per the following procedures.*

- No-load calibration (& height calibration)

1. Lower the platform to the stowed position, and ensure that the space above the platform allows the platform to be safely raised to the maximum height.
2. Make sure no heavy objects are placed on the platform.
3. After entering the ECU menu selection mode, select and enter Calibration Mode interface by pressing the PgUp key and PgDn key, and press the Enter key for confirmation.

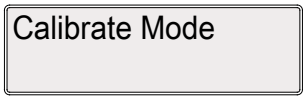


Figure 6-31

4. Press the PgDn key to find the desired option. When the screen displays “Calibrate Empty Load”, press the Enter key for confirmation to start automatic no-load calibration.

Figure 6-32

5. The platform will rise and descend for two times automatically: rise to the highest position and descend to the stowed position (the first and second ascending and descending movements are for static calibration and dynamic calibration respectively).
6. When the screen displays “No-Load Calibration Complete!” or “Empty Load Calibration Complete!”, the no-load calibration (& height calibration) is successfully done.

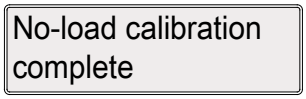


Figure 6-33 No-load calibration complete (DTC-D100)

Figure 6-34 Empty load calibration complete (DTC-K110)

7. After the no-load calibration is complete, push in the emergency stop button and power off the machine.

- Full-load calibration

1. Place heavy objects with the same weight as the rated load of the machine on the platform.
2. Select and enter Calibrate Full Load interface, and press the Enter key for confirmation to start automatic full-load calibration.

Figure 6-35

3. The platform will rise and descend for two times automatically: rise to the highest position and

descend to the stowed position (the first and second ascending and descending movements are for static calibration and dynamic calibration respectively).

4. When the screen displays “Full Load Calibration Complete!”, the full-load calibration is successfully done.

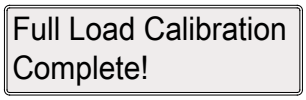


Figure 6-36

5. After the full-load calibration is complete, push in the emergency stop button and power off the machine.

Sinoboom Control System

⚠ WARNING

UNSAFE OPERATION HAZARD

- **All operations in this section must be performed by qualified personnel who have been professionally trained and authorized by Sinoboom, otherwise the consequences will be at your own risk.**
- **The machine has been commissioned before delivery. It’s forbidden to modify the system settings and update the program without authorization from Sinoboom.**
- **Incorrect operation may result in death, serious injury or machine damage.**

NOTICE

PCU, ECU, sensors, etc. are precisely adjusted and protected before delivery. Therefore, personnel who have not been professionally trained and authorized by Sinoboom cannot disassemble their housings, otherwise moisture and dust will enter the internal mechanism and normal operation will not be guaranteed.

This section is applicable to Sinoboom system.

ECU main interface

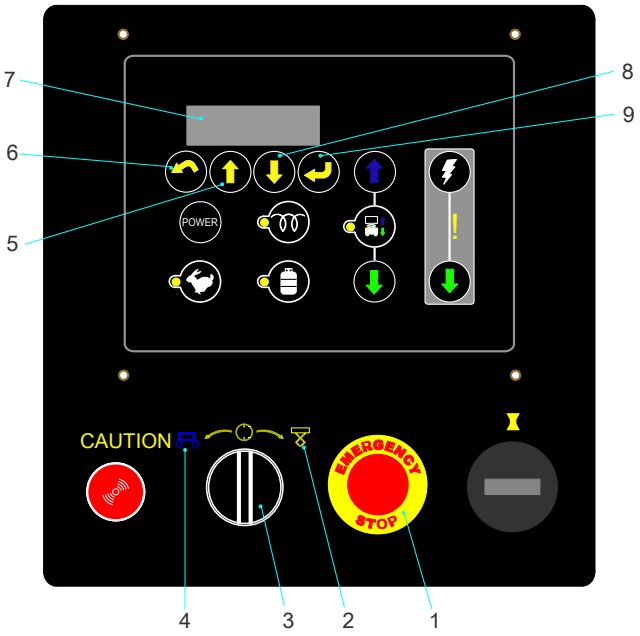


Figure 6-37 ECU main interface

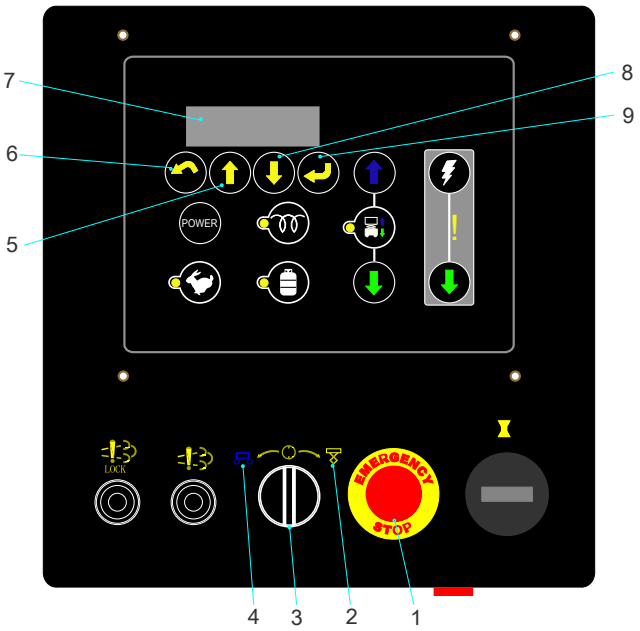


Figure 6-38 ECU main interface (EU Stage V engines)

1. Emergency stop button	**6.** Esc key
2. Platform control position	**7.** Screen
3. Key switch (ground/platform control select switch)	**8.** PgDn key

4. Ground control position **9.** Enter key

5. PgUp key

1. Turn the key switch on the ground controller to Ground control position, and pull out the emergency stop button on both the platform controller and ground controller to “ON” position. Make sure the screen is illuminated.

2. Firstly, “System Loading…” will be displayed on the screen after normal start-up.

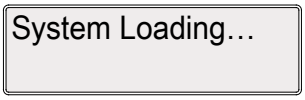


Figure 6-39

3. Then, “星邦智能高空作业平台” (Sinoboom Intelligent Aerial Work Platform) will be displayed on the screen.

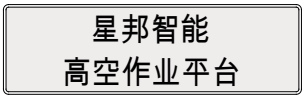


Figure 6-40

4. Lastly, the angles in the X-axis and Y-axis of the chassis will be displayed.

Figure 6-41

5. Press the Enter key on the ECU main interface of ground controller to enter the ECU menu selection mode. Select and enter different function interfaces by pressing the PgUp key, PgDn key and Enter key. The system interface is described in the figure below:

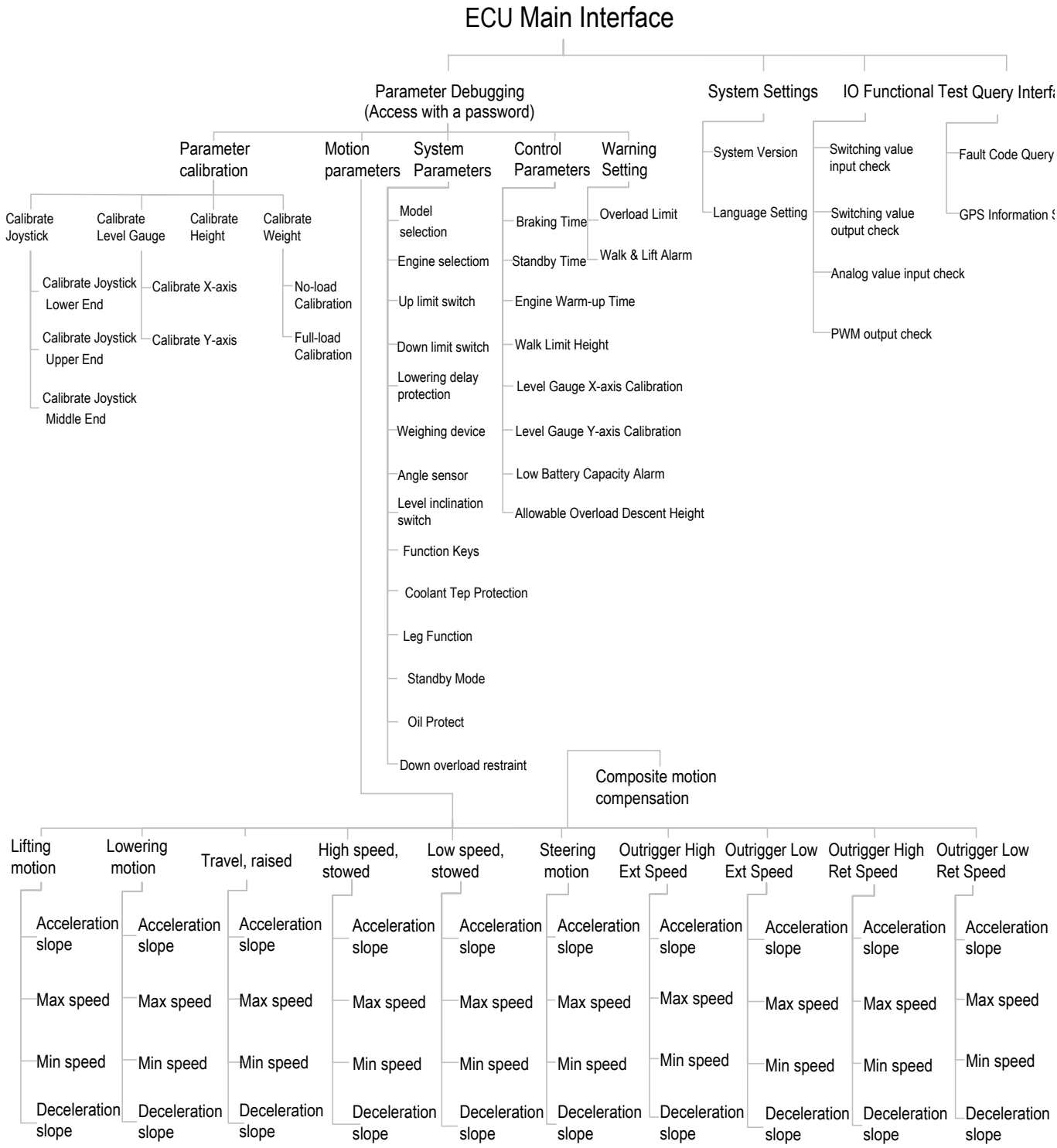


Figure 6-42 System interface description

Note: some interfaces can only be accessed with a password (the password can only be provided to personnel professionally trained and authorized by Sinoboom).

Update program

1. Prepare a 4-32GB USB flash disk, and format its file system into FAT32 format.
2. Upload the ECU program to the root directory of the USB flash disk: ECU_MAIN.bin.

   Note: please contact Sinoboom after-sales personnel to get the program.
3. Turn off the machine, and insert the USB flash disk into the program updating port (protected by a rubber plug) at the back of ECU.

4. Press and hold the Esc key on the ECU panel while powering up the machine. Release the Esc key 5s after power-on, and the program will be updated automatically.
5. After the program is updated, power off the machine.

Checking program version

- After entering the ECU menu selection mode, enter System settings interface, and select System version to check the current program version.

Language setting

- In the Language setting menu of System settings, the displayed language can be switched.

Functional configuration

In the Functional configuration menu of Parameter debugging interface, the model parameter and engine brand of the machine can be selected, and the up limit switch, down limit switch, lowering delay switch, weighing device, angle sensor, level inclination switch, function keys, coolant temperature protection, outrigger function, engine oil pressure protection and down overload restraint can be switched on or off.

Control parameters

In the Control parameters menu of Parameter debugging interface, the parameters of level gauge X-axis warning, level gauge Y-axis warning, low battery capacity alarm value, allowable overload lowering height, walk limit height, engine preheat time, standby time, brake time can be set.

Note:

- The angle setting value is in 0.1°.
- The height setting value is in 0.1m.
- The battery capacity setting value is in %.
- The setting value of engine preheating time is in seconds (s), the setting value of standby time is in minutes (min), and the setting value of braking time is in milliseconds (ms).

Warning parameters

In the Warning parameters menu of Parameter debugging interface, the overload limit and Walk & lift alarm functions can be turned on or off.

Motion parameters

In the Motion parameters menu of Parameter debugging interface, the motion parameters of lifting motion, lowering motion, steering motion, raised travel speed, high speed (stowed) and low speed (stowed) can be set.

Query Interface

In the Query Interface, users can query the fault codes and GPS information service of the machine (for the causes and solutions of fault codes, please refer to ***Fault Code Description*** section of this manual).

Calibrate joystick

NOTICE

- *Calibrating joystick includes calibrating joystick upper end, middle end and lower end. Please perform the calibration with the ECU panel within one cycle as per the following procedures.*
- *Ensure the joystick is in neutral position before power-on. If the joystick is in neutral position, it doesn't need to be calibrated.*

1. Enter the ECU menu selection mode.
2. Calibrate joystick upper end: push the joystick to the uppermost end and hold it, select and enter the Calibrate joystick upper end interface (as shown in the figure below), and then press and hold the Enter key. When "OK" is prompted in the lower right corner of the screen, the joystick upper end is successfully calibrated. Press the Esc key to return to the Calibrate joystick interface.

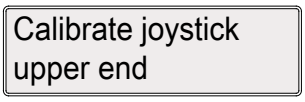


Figure 6-43

3. Calibrate joystick middle end: push the joystick to the middle end and hold it, select and enter the Calibrate joystick middle end interface (as shown in the figure below), and then press and hold the Enter key. When "OK" is prompted in the lower right corner of the screen, the joystick middle end is successfully calibrated. Press the Esc key to return to the Calibrate joystick interface.

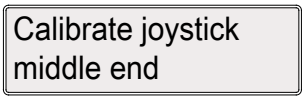


Figure 6-44

4. Calibrate joystick lower end: push the joystick to the lowermost end and hold it, select and enter the Calibrate joystick lower end interface, and then press and hold the Enter key. When "OK" is prompted in the lower right corner of the screen, the joystick lower end is successfully calibrated.

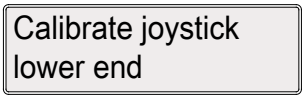


Figure 6-45

5. Return to the main interface by pressing the Esc key, and power off the machine as needed.

Calibrate height

1. Lower the platform to the stowed position, and ensure that the space above the platform allows the platform to be safely lifted to the maximum height.
2. Make sure no heavy objects are placed on the platform.
3. After entering the ECU menu selection mode, select and enter Calibrate height interface, and press the Enter key.

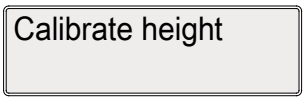


Figure 6-46

4. The platform will automatically rise to the highest position, and then descend to the stowed position.
5. When the screen displays “Height calibration done”, the height calibration is successfully done.

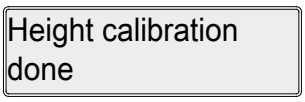


Figure 6-47

6. Return to the main interface by pressing the Esc key, lower the platform to the stowed position, and power off the machine as needed.

Calibrate weight

NOTICE

- *To ensure the accuracy of weight calibration, please perform height calibration before weight calibration.*
- *Weight calibration includes no-load calibration and full-load calibration. Please complete the calibration with the ECU panel within one cycle as per the following procedures.*

- No-load calibration

1. Lower the platform to the stowed position, and ensure that the space above the platform allows the platform to be safely lifted to the maximum height.
2. Make sure no heavy objects are placed on the platform.
3. After entering the ECU menu selection mode, select and enter No-load calibration interface, and press the Enter key to start automatic calibration.

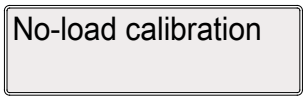


Figure 6-48

4. The platform will rise and descend twice automatically: rise to the highest position and descend to the stowed position.
5. When the screen displays “No-load calibration complete”, the no-load calibration is successfully done.

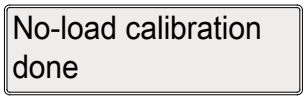


Figure 6-49

6. Return to the Calibrate weight interface by pressing the Esc key.

- Full-load calibration

1. Place heavy objects with the same weight as the rated load of the machine on the platform.
2. Select and enter Full-load calibration interface, and press the Enter key to start automatic calibration.

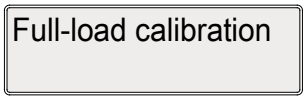


Figure 6-50

3. The platform will rise and descend twice automatically: rise to the highest position and descend to the stowed position.
4. When the screen displays “Full-load calibration complete”, the full-load calibration is successfully done.

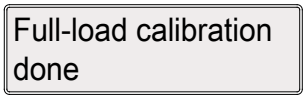


Figure 6-51

5. Return to the main interface by pressing the Esc key, and power off the machine as needed.

Fault Code Description

In case of machine malfunctions, please enter the fault display interface at the ground controller to check the fault codes.

Table 6-16 DTC system

PCU Fault Code	GCU Display	Description	Solution
01	01 Internal ECU Fault	Main system fault	Replace ECU
02	02 Platform ECU Fault	Fault in communication between ground and platform controllers	Check wiring, if no problem, replace the ground and platform controllers respectively to determine where the fault arises.
08	08 Floating Coil Left Fault	Fault in the left floating solenoid valve coil	Check wiring, replace solenoid valve if needed
09	09 Floating Coil Right Fault	Fault in the right floating solenoid valve coil	Check wiring, replace solenoid valve if needed
14	14 Angle Sensor Fault	Angle sensor fault	Check wiring and sensor
15	15 Pressure Sensor Fault	Pressure sensor fault	Check wiring and sensor
20	20 Chassis Start Sw Fault	Fault in chassis start switch at start-up	Check the switch and wiring
21	21 Chassis Choke Sw Fault	Glow plug switch ON at start-up	Check the switch and wiring
22	22 Chassis Up Sw Fault	Lift switch ON at start-up	Check the switch and wiring
23	23 Chassis Enable Sw Fault	Enable switch ON at start-up	Check the switch and wiring
24	24 Chassis Down Sw Fault	Lowering switch ON at start-up	Check the switch and wiring
25	25 Left Turn Switch Fault	Platform left turn switch ON at start-up	Check the switch, replace platform controller if needed
26	26 Right Turn Switch Fault	Platform right turn switch ON at start-up	Check the switch, replace platform controller if needed
27	27 Drive Enable Sw Flt	Platform enable switch ON at start-up	Check the switch, replace platform controller if needed
28	28 Off Neutral Drive Joystick	Platform joystick not in neutral position at start-up	Check the switch, replace platform controller if needed
31	31 Platform Choke Sw Fault	Platform preheat switch ON at start-up	Check the switch, replace platform controller if needed
32	32 Platform Start Sw Fault	Platform start switch ON at start-up	Check the switch, replace platform controller if needed
33	33 Left Front Outrig Sw Flt	LF outrigger switch ON at start-up	Check the switch, replace platform controller if needed
34	34 Right Front Outrig Sw Flt	RF outrigger switch ON at start-up	Check the switch, replace platform controller if needed
35	35 Left Rear Outrig Sw Flt	LR outrigger switch ON at start-up	Check the switch, replace platform controller if needed

PCU Fault Code	GCU Display	Description	Solution
36	36 Right Rear Outrig Sw Flt	RR outrigger switch ON at start-up	Check the switch, replace platform controller if needed
37	37 Auto Level Switch Fault	Auto-level switch ON at start-up	Check the switch, replace platform controller if needed
42	42 9M Limit Switch Fault	9m limit switch fault	Check 9m limit switch, down limit switch and the wiring
43	43 Outrig Not Extended	Outrigger not deployed	Deploy outriggers or lower the platform
44	44 Float Limit Switch Fault	Floating detection switch fault	Check the switch and the wiring
52	52 Func Prop Coil Fault	Proportional valve coil fault	Check wiring, replace solenoid valve if needed
54	54 Up Coil Fault	Lift valve coil fault	Check wiring, replace solenoid valve if needed
55	55 Down Coil Fault	Lowering valve coil fault	Check wiring, replace solenoid valve if needed
56	56 Right Turn Coil Fault	Right turn valve coil fault	Check wiring, replace solenoid valve if needed
57	57 Left Turn Coil Fault	Left turn valve coil fault	Check wiring, replace solenoid valve if needed
58	58 Brake Coil Fault	Brake valve coil fault	Check wiring, replace solenoid valve if needed
60	60 Forward 1 Coil Fault	Forward valve coil 1 fault	Check wiring, replace solenoid valve if needed
61	61 Reverse 1 Coil Fault	Reverse valve coil 1 fault	Check wiring, replace solenoid valve if needed
66	66 Low Oil Pressure	Low oil pressure fault	Check wiring, replace pressure sensor if needed
67	67 High Coolant Temperature	High coolant temperature fault	Check wiring, replace temperature sensor if needed
68	68 Low ECU Voltage	Low voltage fault	Check wiring and battery, replace battery if needed
69	69 Low Engine RPM	Low engine RPM fault	Check engine and wiring
70	70 High Engine RPM	High engine RPM fault	Check engine and wiring
72	72 Engine Fault	Engine fault	Check the engine
PF	73 Pls Parked Regeneration	Enter parked regeneration mode	Prompt
74	74 Engine preheating	Engine is preheating	Prompt
75	75 Inhibit Regeneration	Inhibit parked regeneration	Prompt
76	76 Engine Communication Fault	Engine communication fault	Check the wiring
77	77 Engine Regenerating	Engine is undergoing regeneration	Prompt

PCU Fault Code	GCU Display	Description	Solution
81	81 Left Front Otrg Coil Flt	Fault in the LF outrigger solenoid valve coil	Check wiring, replace solenoid valve if needed
82	82 Left Rear Otrg Coil Flt	Fault in the LR outrigger solenoid valve coil	Check wiring, replace solenoid valve if needed
83	83 Right Front Otrg Coil Flt	Fault in the RF outrigger solenoid valve coil	Check wiring, replace solenoid valve if needed
84	84 Right Rear Otrg Coil Flt	Fault in the RR outrigger solenoid valve coil	Check wiring, replace solenoid valve if needed
85	85 Outrigger Ext Coil Flt	Fault in the outrigger extend solenoid valve coil	Check wiring, replace solenoid valve if needed
86	86 Outrigger Ret Coil Flt	Fault in the outrigger retract solenoid valve coil	Check wiring, replace solenoid valve if needed
90	90 Regeneration Interlock	Regeneration interlock switch turned off	Prompt
91	91 High Speed Coil Fault	Fault in high speed solenoid valve coil	Check wiring, replace solenoid valve if needed
93	93 Drive Fwd Prop Coil Fault	Fault in forward proportional valve coil	Check wiring, replace solenoid valve if needed
94	94 Drive Rev Prop Coil Fault	Fault in reverse proportional valve coil	Check wiring, replace solenoid valve if needed
OL	OL Platform Overload	Platform overload fault	Check platform loads
LL	LL Platform Tilt	Chassis tilt	Adjust the outriggers to make the chassis level
CH		Prompt of ground control position selected	Prompt

Table 6-17 Sinoboom control system

Fault Code	Fault	Cause and Solution
E002	System Communication Fault	Cause: Interrupted communication between controller and PCU. Solution: 1. check if the wiring connecting the ECU controller with the PCU handle is disconnected; 2. check if the plugs of ECU controller and PCU handle is well connected.
SL	Standby Mode	Not a fault.
E008	Left Floating Solenoid Valve Fault	Check the wiring.
E009	Right Floating Solenoid Valve Fault	Check the wiring.
E014	Angle Sensor Fault	Check the wiring.
E015	Pressure Sensor Fault	Check the wiring.
E020	Chassis Start Switch Fault at Start-up	ECU button error.

Fault Code	Fault	Cause and Solution
E025	Platform Left Turn Button Fault at Start-up	ECU button is pressed down at power-on.
E026	Platform Right Turn Button Fault at Start-up	Check the button and its wiring.
E027	Platform Enable Button Fault at Start-up	Check the button and its wiring.
E028	Joystick Not In Neutral at Start-up	Check the button and its wiring.
E031	Platform Preheat Button ON at Start-up	Check the button and its wiring.
E032	Platform Start Button ON at Start-up	Check the button and its wiring.
E033	LF Outrigger Switch ON at power-on	Check the button and its wiring.
E034	RF Outrigger Switch ON at power-on	Check the button and its wiring.
E035	LR Outrigger Switch ON at power-on	Check the button and its wiring.
E036	RR Outrigger Switch ON at power-on	Check the button and its wiring.
E037	Platform Auto-level Button ON at Power-on	Check the button and its wiring.
E043	Outrigger Deploy Fault	Check the wiring.
E044	Floating Enable Solenoid Valve Fault	Check the wiring.
E045	Floating Accumulator Solenoid Valve Fault	Check the wiring.
E054	Lift Solenoid Valve Fault	Check the wiring.
E055	Lowering Solenoid Valve Fault	Check the wiring.
E056	Right Turn Solenoid Valve Fault	Check the wiring.
E057	Left Turn Solenoid Valve Fault	Check the wiring.
E066	Engine Oil Pressure Fault	Check the wiring.
E067	High Coolant Temperature	Check the wiring.
E081	LF Outrigger Solenoid Valve Fault	Check the wiring.
E082	LR Outrigger Solenoid Valve Fault	Check the wiring.
E083	RF Outrigger Solenoid Valve Fault	Check the wiring.
E084	RR Outrigger Solenoid Valve Fault	Check the wiring.
E085	Outrigger Extend Solenoid Valve Fault	Check the wiring.
E086	Outrigger Retract Solenoid Valve Fault	Check the wiring.
E090	GPS Lock I pre-warning	GPS information

Fault Code	Fault	Cause and Solution
E091	GPS Lock II pre-warning	GPS information
E092	GPS Lock II	GPS information
E093	GPS Lock III pre-warning	GPS information
E094	GPS Lock III	GPS information
E0OL	Overloaded Platform Fault	Platform is overloaded. Check the platform loads.
E0LL	Chassis Tilt	Chassis is tilt. Adjust the outriggers to make the chassis level.

Use and Maintenance of Battery

The battery falls into 3 types: lead acid, lead acid maintenance-free and lithium batteries. The lithium battery and lead acid maintenance-free battery are free of maintenance.

⚠ WARNING

FIRE AND EXPLOSION HAZARD

- **Batteries contain sulfuric acid and generate explosive mixtures of hydrogen and oxygen gases. Keep any device that may produce sparks or flames (- including cigarettes/smoking materials) away from the battery to prevent explosion.**
- **Do not touch the battery terminals or cable clips with tools that may produce sparks.**

⚠ WARNING

ELECTROCUTION HAZARD

- **Contact with hot circuits may cause serious injury or death. Be sure to wear goggles, gloves and protective clothing.**
- **Remove all rings, watches and other accessories.**

⚠ WARNING

CHEMICAL BURN HAZARD

- **Avoid spilling battery acid on unprotected skin or unprotected skin in contact with battery acid. Seek medical attention immediately if the skin comes in contact with battery acid .**
- **If the battery acid escapes, please use baking soda to neutralize the acid.**

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Strictly follow the manufacturer's recommendations on how to properly use and maintain the battery.**

- **Cut off the battery main switch if the battery is not to be used for an extended period.**
- **The waste battery may pose danger, so do not discard batteries at will. If it needs to be scrapped, contact a battery recycling company.**
- **Except for the professionals, do not perform a systematic maintenance or service to the battery, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not tamper with the settings or service a signal light, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not remove the battery housing, otherwise it may cause damage to the battery system.**

NOTICE

It will not be covered by the warranty if the battery attenuates or fails due to customer's overuse (-continued use after battery level less than 10%) or battery out of charge for a long time (not timely charged for 3 days or longer when the battery level less than 10%).

Inspection

See the ***Inspect the Battery*** section in this manual.

Cleaning

1. Clean the top, terminals and connections of the battery with a cloth or brush and mixed solution of sodium bicarbonate and water. Do not let the cleaning solution enter the battery.
2. Clean the top, terminals and connections with water and wipe them dry with a cloth. Apply a thin layer of petroleum jelly to the terminals or use terminal protector.
3. Keep the area around the battery clean and dry.

Charging

See the ***Charging the Battery*** section of Operation Manual.

Equalizing

Equalization is the deliberate process of overcharging the flooded/wet battery after it has been fully charged. Equalize the battery only when the specific gravity of battery is low (less than 1.25) or the scope (0.030) of the specific gravity is wide after the battery is fully charged.

Note：

- Verify whether the battery is flooded/wet battery.
- To prevent battery damage, the battery must be equalized within a maximum of 3 months storage after delivery.

1. Inspect the electrolyte level height to ensure a proper electrolyte level.
2. Verify all vent caps are properly secured to the battery.
3. Set the charger to equalization mode.
4. Charge the battery in equalization mode.

   The battery will bleed air in the equalization process (forming bubbles).
5. Remove the vent cap every hour to measure the gravity of all battery cells, if the gravity doesn't increase, stop the charging in equalization mode.

Storage

- Fully charge the battery before storage.
- The battery should be stored in cool and dry environment (temperature 10℃~25℃, RH less than 90%), and charge the battery every 3 months using the charger provided by the manufacturer.
- Disconnect the power-off plug to prevent potential parasitic loading, which may cause electrical leakage of the battery.
- The battery will self-discharge gradually during storage. Monitor the specific gravity or the voltage every 4 ~ 6 weeks. The comparison of the charging state with specific gravity and open-circuit voltage is shown in the following table.

Table 6-18

Percentage Charging (%)	Specific Gravity	Open-Circuit Voltage (V)		
		Battery Cell	6V	12V
100	1.277	2.122	6.37	12.73
90	1.258	2.103	6.31	12.62
80	1.238	2.083	6.25	12.50
70	1.217	2.062	6.19	12.37
60	1.195	2.040	6.12	12.24
50	1.172	2.017	6.05	12.10
40	1.148	1.993	5.98	11.96
30	1.124	1.969	5.91	11.81
20	1.098	1.943	5.83	11.66
10	1.073	1.918	5.75	11.51

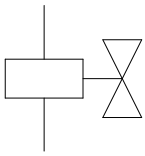
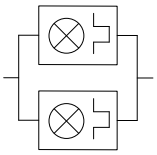
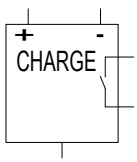
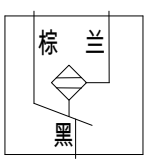
- Recharge the battery in quick mode when the battery level is 70% or lower.
- Recharge the battery before use after removing it from storage.
- Storage in hot environments (above 32°C [90°F]): During storage, do not expose the battery directly to the heat source. The self-discharge process will accelerate in warmer temperatures. If storing the battery in hot temperatures or during hot weather, monitor the specific gravity or the voltage more frequently (about every 2 - 4 weeks).
- Storage in cold environments (below 0°C [32°F]): During storage, do not store the battery in a place with an estimated temperature reaching the freezing point; if the battery has not been fully charged, it may freeze in cold temperatures. If storing the battery in cold temperatures or during cold weather, **fully charge** the battery. This point is very important.

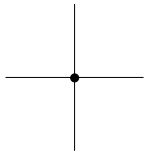
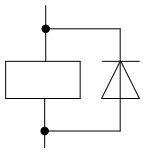
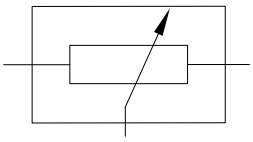
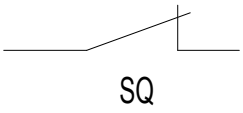
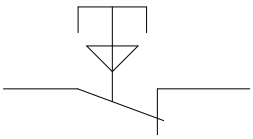
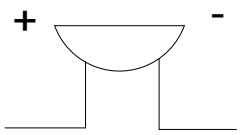
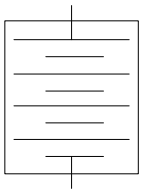
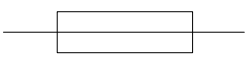
NOTICE

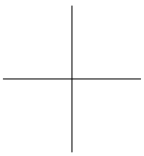
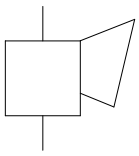
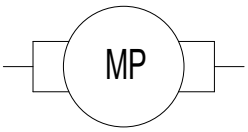
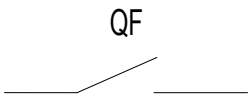
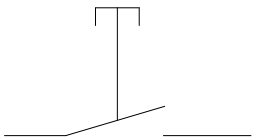
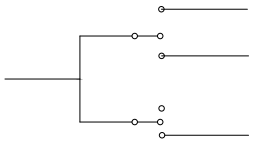
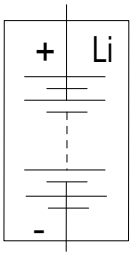
- *Do not store more than 6 months in hot or cold environment.*
- *It will not be covered by the warranty if the battery attenuates or fails due to customer's overuse (-continued use after battery level less than 10%) or battery out of charge for a long time (not timely charged for 3 days or longer when the battery level less than 10%).*

Electrical Symbols

Table 6-19

Symbol	Description	Symbol	Description
	Solenoid coil		Warning lamp
	Charger		Level switch

Symbol	Description
	Two lines connected
	Relay
	Sensor
	Limit switch
	Emergency stop button
	Buzzer
	Storage battery
	Fuse

Symbol	Description
	Two lines non-connected
	Horn
	Pump control motor
	Power off button
	Button
	Key switch
	Lithium battery

Electrical Schematic

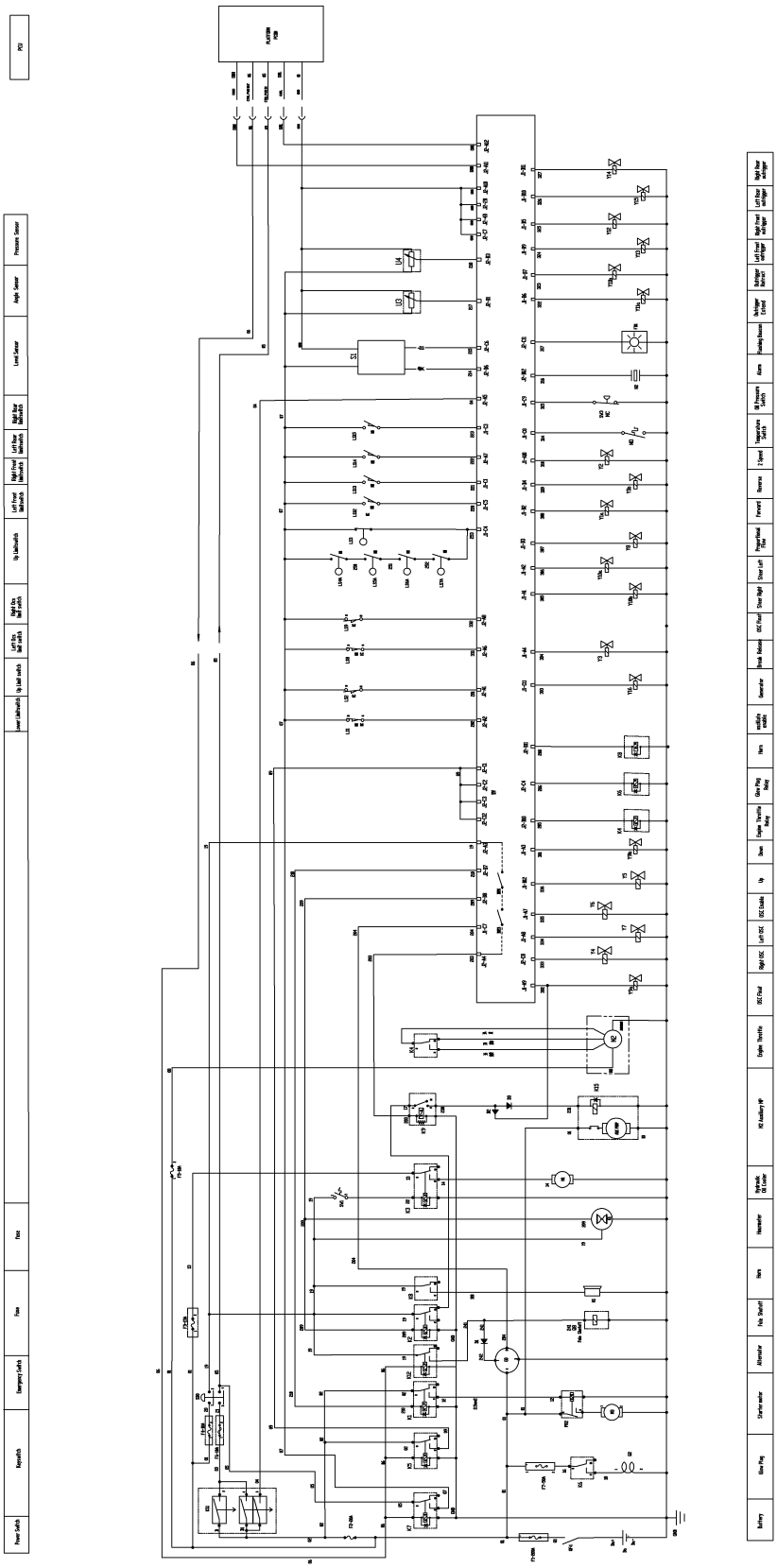


Figure 6-52 Electrical schematic (Deutz Euro Tier 3)

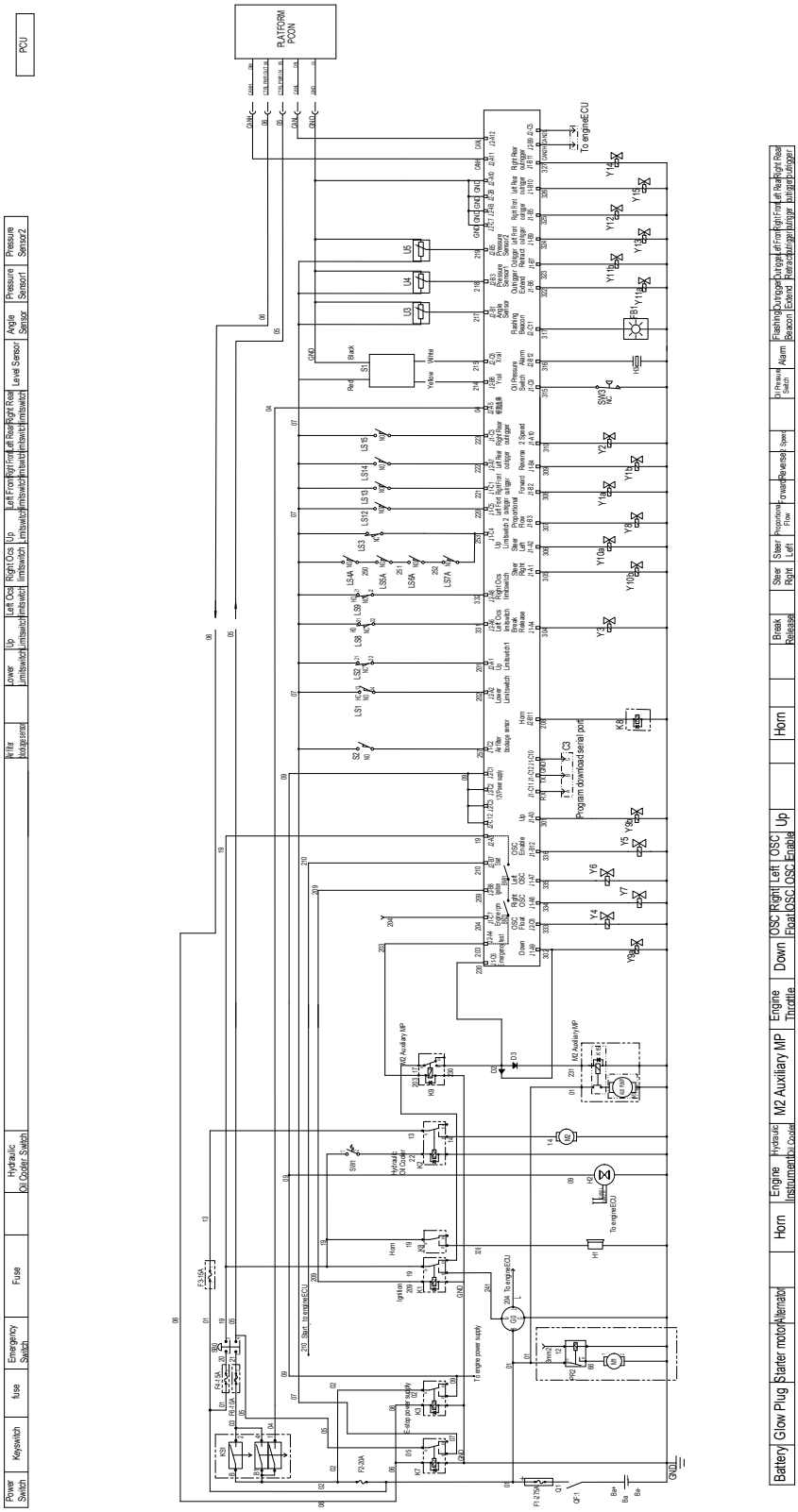


Figure 6-53 Electrical schematic（ Yanmar Euro Tier 5 ）

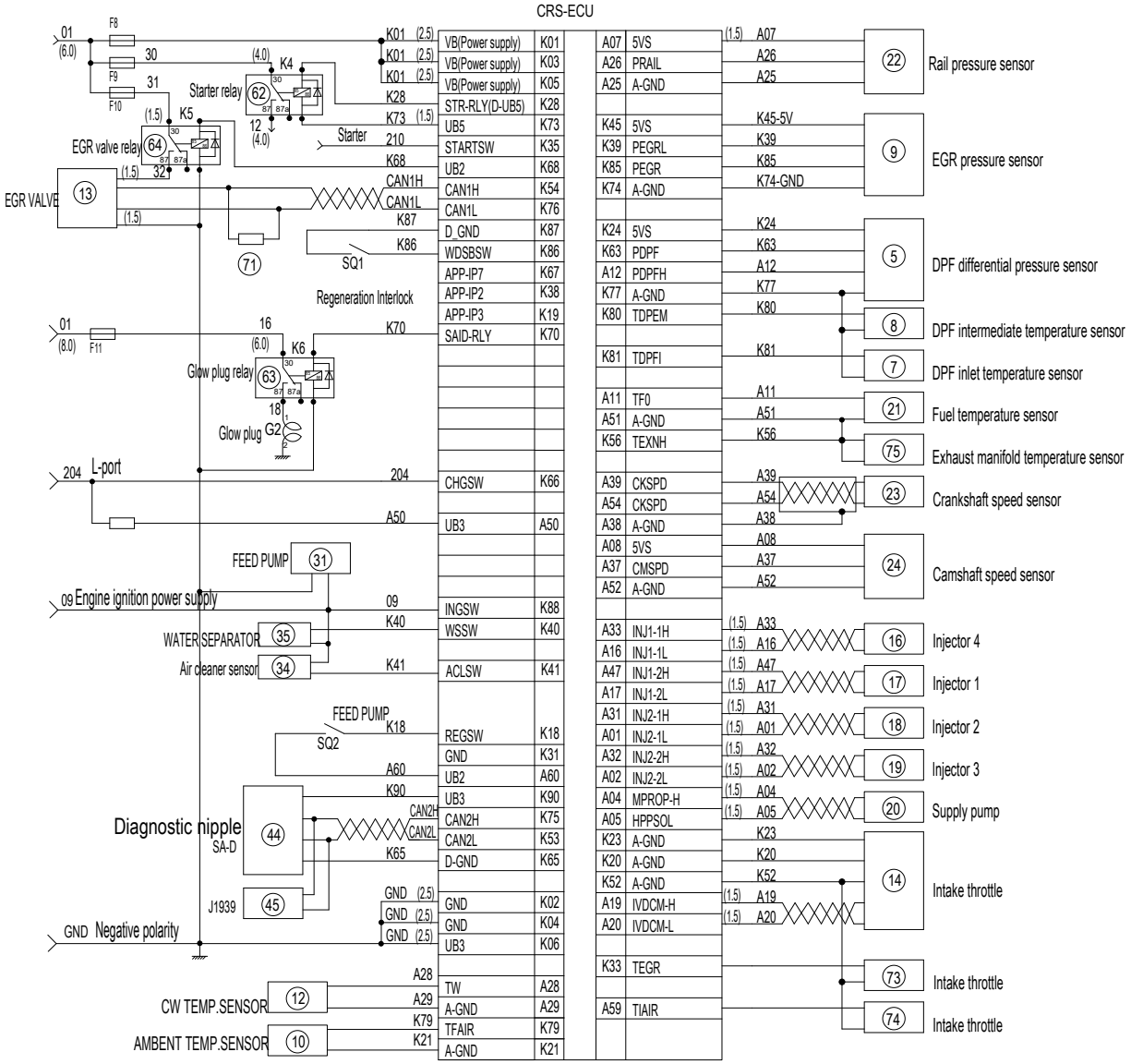


Figure 6-54 Electrical schematic (Yanmar EU Tier 5)

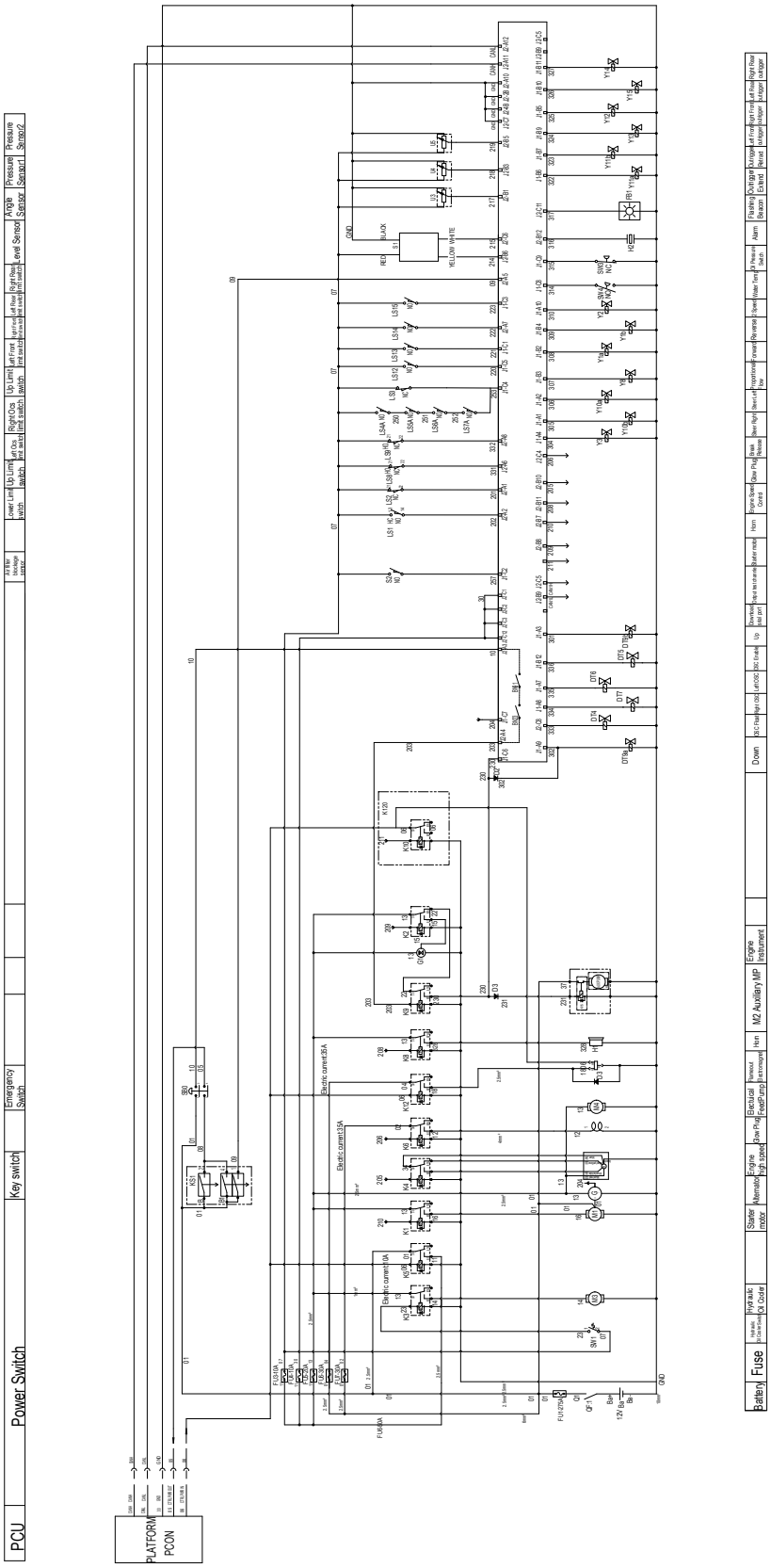


Figure 6-55 Electrical schematic (Yanmar China Tier 3)

APPENDIX 1: PREPARE THE WORK RECORD BEFORE DELIVERY

PREPARE THE WORK RECORD BEFORE DELIVERY			
Model			
Serial No.			
Inspection Item	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/Machine Has Been Repaired**
Pre-operational Inspection			
Maintenance Procedure			
Functional Inspection			
Machine Buyer/ Renter			
Inspector Signature			
Inspector Title			
Inspector Company			

NOTE:

1. Prepare the machine before delivery, which includes performing a pre-delivery inspection, following maintenance procedures and performing functional inspections.
2. Use the table to record the results. After each section is complete, mark the appropriate box.
3. Record the inspection results. If any inspection results are "NO", the machine must be stopped, and re-inspected after repair is completed and the box marked "inspection" must be checked.

This Page Intentionally Left Blank

APPENDIX 2: REPAIR & INSPECTION REPORT

REPAIR & INSPETION REPORT					
Model					
Serial No.					
Checklist A Procedures					
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**	
A-1 Inspect All Manuals					
A-2 Inspect All Decals					
A-3 Inspect Damaged, Loose or Lost Parts					
A-4 Inspect Hydraulic Oil Level					
A-5 Inspect Hydraulic Oil Leakage					
A-6 Inspect Fuel Level					
A-7 Inspect Fuel Leakage					
A-8 Inspect Engine Oil Level					
A-9 Inspect Engine Intake System					
A-10 Inspect Engine Belt					
A-11 Inspect Fuel Filter					
A-12 Inspect Cooling Fan					
A-13 Inspect Coolant Level (Water-cooled Engine)					
A-14 Functional Tests					
A-15 Perform Maintenance after 30 Days					
Checklist B Procedures					
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**	
B-1 Inspect Electrical Wiring					
B-2 Inspect Rim, Tire and Fasteners					

REPAIR & INSPETION REPORT				
B-3 Inspect Hydraulic Oil				
B-4 Inspect Cooling System				
B-5 Replace Fuel filter				
B-6 Inspect Air filter of Hydraulic Tank				
B-7 Replace High-Pressure Filter Element				
B-8 Replace Engine Air Filter Element				
B-9 Inspect the Battery				
B-10 Inspect Engine Exhaust System				
B-11 Inspect Drive Reducer Oil Level				
B-12 Test Oscillate Outriggers				
B-13 Test Drive Speed				
B-14 Test Tilt Protection System				
B-15 Test Brake Distance				
Checklist C Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**
C-1 Replace Fuel Filter Element				
C-2 Replace Engine Oil				
C-3 Replace Engine Oil Filter				
C-4 Test Weighing System				
C-5 Inspect Carbon Brush of Motor				
C-6 Inspect Raising Limit Switch				
C-7 Inspect Staged Lowering				
Checklist D Procedures				
Items	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/ Machine Has Been Repaired**	**Problem Description**
D-1 Replace Drive Reducer Gear Oil				

REPAIR & INSPETION REPORT				
D-2 Inspect Scissor Arm Sliders				
D-3 Replace Hydraulic Oil				
D-4 Replace Hydraulic Tank Suction Filter				
D-5 Inspect Scissor Arm Bearing				

User	
Inspector Signature	
Inspection Date	
Inspector Title	
Inspector Company	

NOTES:

1. The Repair & Inspection Report shall include the inspection form of each regular inspection.
2. Duplicate the Repair & Inspection Report template for each inspection. Store the completed forms for 10 years or until the machine is no longer in use or as required by machine owner/company/custodian.
3. Use the form to record the results. After one item is complete, mark the appropriate box.
4. Record the inspection results. If any inspection item is marked as "NO", the machine must be stopped and re-inspected after repair is completed, and the box marked “REPAIRED” shall be checked.

Select the appropriate inspection procedure based on the inspection type.

This Page Intentionally Left Blank

APPENDIX 3: MAJOR MODIFICATION AND REPAIR RECORD

Major Modification and Repair Record					
Model					
Serial No.					
Date	**Problem Description**	**Modification/Repair Item**	**Machine Status af-ter Change**	**Repairman's Company and Position**	**Repair-man Signature**

Note:

1. A major modification/repair is a modification/repair made to all or part of a machine that affects the stability, strength or performance of the machine.
2. Use this form to record major modifications/repairs made to the machine. Keep the form properly until the machine is taken out of service, or as requested by the machine owner/company.
3. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the maintenance and inspection report.
4. If the inspection result of each item in the Maintenance and Inspection Report is "YES", the "Machine Status after Modification/Repair" in the form will be "Good" and the machine can be used. If either inspection result is "NO", the machine must be re-inspected after the repair is completed until the machine is in "Good" condition before continuing to use the machine.

Always for Better Access Solutions

Hunan Sinoboom Intelligent Equipment Co., Ltd.

No.128, East Jinzhou Avenue, Ningxiang High-tech Industrial Park, Changsha, Hunan, China

0086-0731-87116222 (Sales) & 0086-0731-87116333 (Service)
sales@sinoboom.com
www.sinoboom.com

North American Subsidiary

Sinoboom North American LLC

310 Mason Creek Drive
unit #100
Katy, TX 77450, US
Tel: (281) 729–5425
E-mail: info@sinoboom.us

Europe Subsidiary

Sinoboom B.V.

Nikkelstraat 26, NL-2984 AM Ridderkerk,
The Netherlands
Tel: +31 180 225 666
E-mail: info@sinoboom.eu

Korea Subsidiary

Sinoboom Korea Co., Ltd.

95, Docheong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Tel: 010–8310–8026
E-mail: ka1@sinoboom.com

Australia Subsidiary

Sinoboom Intelligent Equipment Pty Ltd.

50/358 Clarendon St, South Melbourne
VIC 3205, Australia
E-mail: au@sinoboom.com

Singapore Subsidiary

Star Access Solutions Pte. Ltd.

112 Robinson Road #03-01 Robinson 112
Singapore 068902

Poland Subsidiary

Sinoboom Poland sp. z o.o.

Ul. Bolesława Krzywoustego 74A
61-144 Poznań, Poland