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Feb. 2023
Translated version

Maintenance Manual

TB20J Plus/TB660J Plus
TB20J Plus T4

CE ANSI AS/NZS SP EAC UKCA 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 and 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 comply with local regulations.

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To Users

Thank you for choosing and using the machine of **Hunan Sinoboom Intelligent Equipment Co., Ltd.**

Use this machine only to transport tools to work locations and for performing tasks on the work platform. Only authorized personnel who have received appropriate training on MEWP can operate this machine. Before using the machine, carefully read and fully understand this manual and strictly follow its relevant instructions. Different countries, regions or governments may have different regulations for the operation of the machine, which may conflict with the manual, and in such case, the stricter operation regulations should be followed. Our company will not be liable for any adverse consequences arising from the failure to operate and use the machine in accordance with this manual or other relevant regulations.

This manual provides necessary safety precautions and maintenance instructions for users. This manual covers the basic configuration information of one or more models. Please refer to the information applicable to your machine model. Consider this manual as a part of the machine, and always keep the manual with the machine. Without the written permission of Sinoboom, do not copy, spread, sell or alter the manual.

Due to continuous improvement and upgrading of product design and different product models covered, some charts and texts in the manual may be not applicable to your machine. Our company reserves the right to revise the manual due to technical improvement, and the manual is subject to change without further notice. Please contact Sinoboom or its authorized agent for the latest manual.

Please go to www.sinoboom.com.cn to download your desired Operation Manual, Maintenance Manual and Parts Manual.

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

Manual Revision History:

REV	DATE	DESCRIPTION
A	Feb. 2021	Original issue
B	Jun. 2022	Revised manual, added description of hydraulic generator, Weichai and Yuchai engines.
C	Nov. 2022	Revised manual, implemented the BS EN 280-1:2022 standard requirements, revised the logic description of drive speed selector switch, etc.
D	Feb. 2023	Comprehensively revised manual

Applicable Models

The manual is applicable to machines with the following models and serial numbers:

Model	Metric Trade ID	Imperial Trade ID	Serial No.
TB20J Plus	TB20J Plus	TB660J Plus	0505000310 to present
TB20J Plus T4	TB20J Plus T4	/	0505000310 to present

Note:

- Check the machine model and serial number on the machine nameplate, and whose position can be found in the ***Diagram of Decals Positions*** section of the Operation Manual.
- Product model is indicated on the nameplate for distinction of products with different main parameters.
- Product trade identification is indicated on marketing materials and machine decals for distinction of products with different main parameters, and can be classified as metric type and imperial type: the metric trade identification is applicable to the 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.
- In the text, TB20J Plus T4 is referred to as TB20J Plus.

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1 SAFETY WARNING SYMBOLS AND SIGNS

The safety warning symbols used on the machine and in the manuals have the following meanings:

Safety warning symbol. This symbol is used to alert you to potential hazards. Please observe all safety instructions that follow the symbol to avoid possible injuries.

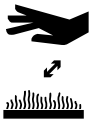
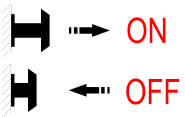
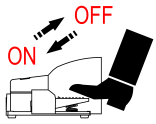
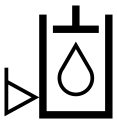
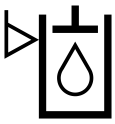
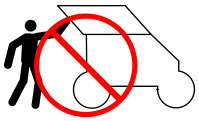
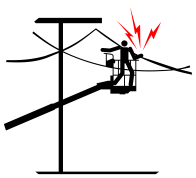
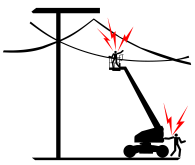
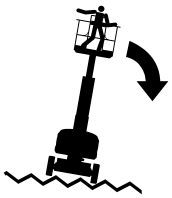
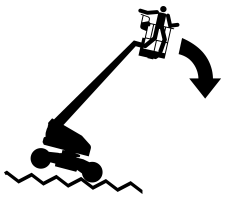
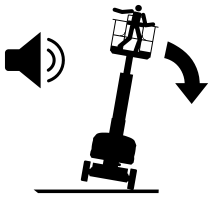
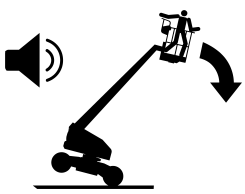
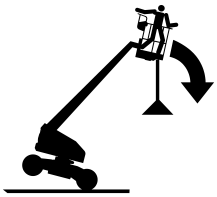
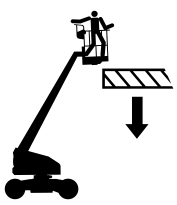
DANGER
Indicates an imminently hazardous situation that, if not avoided, *will* result in death or serious injury.

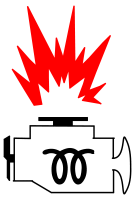
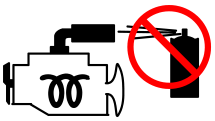
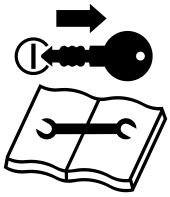
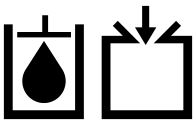
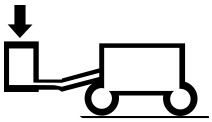
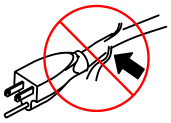
WARNING
Indicates an imminently hazardous situation that, if not avoided, *could* result in death or serious injury.

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

NOTICE
Indicates information directly or indirectly related to personal safety, machine damage, or property loss.

The safety signs used on the machine and in the manuals have the following meanings:

Read maintenance manual	Anchor point only for 1 person	Wind speed	Chemical burns hazard	Wedge the wheel
Read operation manual	Add lubricant	Crushing hazard-Please wear work shoes	Danger of hot, high-pressure fluid sprays	Wind
Noise level	Burns hazard	 Keep a safe distance from high temperatures	 Pull out-ON Press-OFF	Alarm sounds
 Depress-ON Release-OFF	 Hydraulic oil level-low level	 Hydraulic oil level-high level	Temperature	Replace with tires of the same specification
 Only trained maintenance personnel can access the compartment	 Electrocution hazard on platform	 Electrocution hazard on the ground and platform	 Tipping hazard-Avoid uneven ground	 Tipping hazard-Avoid uneven ground
 Tipping hazard-Never use machine in strong, gusty wind	 Tipping hazard-Never use machine in strong, gusty wind	Tipping hazard-Never push or pull objects outside platform	 Tipping hazard-Never suspend objects from platform	Tip-over hazard-Never place ladders and scaffolding on platform
				

Collision hazard-Keep extended platform away from obstacles below when lowering platform	Collision hazard-Keep head away from overhead obstacles when raising platform	Crushing hazard-Keep hands away from overhead obstacles when raising platform	Fall hazard-Never climb on guardrails of platform	Fall hazard-Never climb on boom
Keep away from rotating platform	 Engine preheating explosion hazard	 Never use ether or other starting additives for machines with glow plug	Fuel explosion hazard	Wear protective clothing and glasses
 Only professional maintenance personnel can perform maintenance	Side force	Electrocution hazard	Battery explosion hazard	No fire
No smoking	Lifting point	Lashing point	Tire-to-ground load	 Hydraulic oil filler
 Platform carrying capacity	 Do not use damaged cords	Tool or weight	Fast/high speed	Slow/low speed
Horn				

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2 MAINTENANCE SAFETY PRECAUTIONS

2.1 GENERAL

This chapter covers safety precautions that must be taken when servicing the mobile elevating work platform. Before carrying out any repair work, the maintenance personnel must carefully read and understand all warnings and precautions, and follow the maintenance instructions in this manual to perform all necessary maintenance on the mobile elevating work platform.

⚠ WARNING

Without the written permission of Hunan Sinoboom Intelligent Equipment Co., Ltd., it is forbidden to alter or modify the machine.

2.2 INSTRUCTIONS BEFORE MAINTENANCE

Requirements for Maintenance Personnel

The maintenance personnel are responsible for maintaining the machine and ensuring its safe use and normal operation. Before inspecting and maintaining this machine, the maintenance personnel should read, understand and comply with all applicable regulations and requirements of employers, local authorities and governments related to the application of this machine, and read and fully understand this manual.

The maintenance personnel shall:

- obtain appropriate qualification or authorization
- be experienced professional technicians or engineers
- be familiar with the machine being repaired and its hazards
- receive appropriate training, including but not limited to training on the use of special equipment
- be familiar with the safety precautions and related operating procedures for maintaining this machine

NOTICE

- *Only authorized personnel who have received appropriate training and obtained qualifications can repair this machine.*
- *People who have consumed alcohol or taken medicine, those who are overtired or depressed, and those who are physically unwell are prohibited from repairing the machine.*

Precautions before Maintenance

Before machine inspections and maintenance and during maintenance, maintenance personnel must be careful and take measures to avoid dangerous situations. Those measures include, but are not limited to, the following:

1. Choose an appropriate place for maintenance.
   - Always park the machine on level, firm ground for maintenance, and ensure that the maintenance site is clean and unobstructed.
   - If the machine uses the engine as the main power source, ensure that the maintenance site is open and well ventilated. The exhaust gases from the engine contain chemicals that may cause suffocation or poisoning, so forced ventilation measures must be taken if it is necessary to start the engine in a restricted indoor area. A hose can be connected to the exhaust pipe to discharge the exhaust gases to the outside, and the doors and windows shall be opened for air circulation.
2. Choose appropriate safety protective devices.
   - The maintenance personnel must find out various potential hazards that may arise during the inspection and maintenance work, and select appropriate safety protective devices according to the maintenance work and work place conditions, such as safety helmets, protective masks, protective gloves, goggles, protective clothing, safety belts and safety shoes.
   - Before carrying out inspection and maintenance work, check and ensure that the protective devices are not damaged and are used correctly.
   - Safety protective devices must be inspected

regularly and replaced if any damage is found.

3. Choose appropriate repair tools.
   - Before conducting any inspection and maintenance work, the maintenance personnel shall prepare appropriate tools as required by the work, such as wrench, screwdriver, pliers, multimeter, pressure gauge, lubrication device, jack and lifting equipment.
   - While choosing a jack or lifting equipment, confirm whether its carrying capacity can meet the requirements of use. Refer to the ***Weight of Major Components*** section to select the device with sufficient load capacity.
   - Service tools must be kept clean and in good condition.
4. Lock the wheels after the machine is parked to prevent the machine from rolling.
5. Do not perform inspection and maintenance work while the machine is started.
   - Before performing inspection and maintenance work, make sure the machine is turned off and remove the key. A “No Operation” warning sign can be placed next to the ground controller and platform controller, or the main power switch can be pressed to prevent unrelated personnel from inadvertently starting the machine.

   ⚠ WARNING

   If an unrelated person inadvertently starts the machine during inspection or maintenance, it may cause machine damage or personal injury.

   - If inspection or maintenance work must be carried out while the machine is started, at least two people should work together. One person must stand in front of the turntable controller panel or platform controller panel so as to turn off the machine at any time if necessary, another person shall carry out inspection or maintenance work, and they shall maintain close contact with each other.
6. Before maintaining electrical components, always press the main power switch.
7. Before carrying out inspection and maintenance work, clean the machine. Prevent dust or debris from getting into the machine parts during maintenance and affecting machine performance.

Please strictly follow the above requirements during the maintenance process. In addition, take other measures to ensure safety during the maintenance process as appropriate for the actual environment.

2.3 MAINTENANCE SAFETY

Unsafe Maintenance Hazard

⚠ WARNING

- Before performing any adjustment or service operations, power off all control units and ensure that all moving parts are securely secured and free from accidental movement.
- Before performing any adjustment or service operations, ensure that the boom is stowed, and do not work under the raised platform/boom. If anyone needs to work under the raised platform/boom, the platform and boom must be supported with appropriate safety supports.
- When lifting or moving heavy parts of the machine, use equipment with sufficient capacity, and never place heavy objects in unstable positions after moving.
- When machine parts are lifted by other equipment, ensure that there are no people under and around the equipment.
- When striking the brass rod with a mallet, make sure to wear goggles.
- If you need to replace parts, use the original parts designated by Sinoboom.
- Do not wash the machine with water. The machine contains many electronic components such as solenoid valves and sensors, which may fail or work poorly after water ingress. If water washing is necessary, please turn off the main power switch firstly, and dry the machine thoroughly before turning on the power.
- Make sure the machine is turned off before using flushing equipment (such as high-pressure water gun) to clean the machine. It is forbidden to direct the water or vapor ejected from the flushing equipment at the electrical components, otherwise short circuit or electric shock may result.
- After maintenance, clean the spilled hydraulic oil thoroughly and do not spill the hydraulic oil on the ground.

⚠ WARNING

- After maintenance, immediately wash any hydraulic oil on the skin.
- Waste hydraulic fluids, fuels, coolants and refrigerants should be recycled or disposed as per local regulations.

High Temperature and High Pressure Hazards

⚠ WARNING

- Some parts may have high surface temperature when the machine is running or after the machine has running for some time, which may cause burns through skin contact. Do not touch any hot parts!
- It is forbidden to repair or tighten hydraulic hoses or seals while the machine is live or when the oil system is under pressure.
- Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and ensure that the hydraulic oil is completely cooled down.
- Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.
- It is forbidden to check the hydraulic leakage point by hand. Use a piece of cardboard or stiff paper to find leaks, and wear gloves to protect your hands from hydraulic fluid sprays.
- Do not operate the machine in case of hydraulic oil or air leaks. Oil or air leaked from the hydraulic system may penetrate and burn the skin.
- It is forbidden to plug leaking hydraulic oil by hand. If there is a leak, the pressure of the hydraulic system should be released first, and the maintenance should be carried out after the hydraulic oil has cooled down.
- If you are injured by ignoring the dangers of high temperature and high pressure, seek immediate medical attention. If treatment is not carried out immediately, serious complications can result.

Welding and Polishing Operation Hazards

⚠ WARNING

- Welding, grinding and polishing operations must follow the appropriate local safety operating procedures.
- Before performing welding, grinding and polishing operations, the machine should be powered off, and ensure that the wires or cables are connected correctly.
- Do not use the machine as a ground wire during welding and grinding operations.
- Always make sure that all power tools are completely placed within the perimeter of the platform. Do not hang the wires of power tools on the guardrail of the platform or in any work area outside the platform, or hang the power tools directly with wires.

Fire and Explosion Hazards

⚠ WARNING

- Do not operate the machine, charge the battery or refuel the machine in places where potentially flammable or explosive gases may be present.
- Refueling and charging should be carried out in a well-ventilated place without flames, sparks, and other hazards that may cause fire or explosion.
- For machines powered by an engine, do not refuel the machine while the engine is running.
- Never spray ether into the engine with a glow plug (if the machine is equipped with an engine).
- Never touch the battery terminals or cable clamps with tools that can generate sparks.
- Only approved non-flammable cleaning solutions should be used on the machine.

Battery Hazard

⚠ WARNING

- Be sure to read and follow the battery manufacturer's recommendations on proper battery use and maintenance procedures.
- Non-professionals should not repair and maintain the battery system, otherwise it may cause personal injury or damage to the battery system.

- Non-professionals should not modify parameters, detection lights, etc. during the operation of the battery system, otherwise it may cause personal injury or damage to the battery system.

- Always wear goggles, protective gloves and protective clothing, and remove all rings, watches and other accessories before servicing the battery. Contact with live circuits may result in death or serious injury.

- Before replacing the battery, be sure to select an appropriate number of personnel and appropriate lifting methods.

- It is forbidden to modify the battery system without approval to avoid serious accidents.
- When maintaining electrical components, the battery should be disconnected.
- Never connect tools or other metal objects between the two binding posts of the battery.
- The battery charger can only be connected to a grounded three-wire AC power outlet. Please make sure the charger is working properly before charging. Do not connect the battery directly into a power outlet.
- In the use of the battery, if there is any abnormal conditions such as heating, deformation, leakage, peculiar smell or smoke, the battery must be stopped from use immediately and such conditions must be reported to the relevant maintenance personnel in time.
- Batteries contain sulfuric acid and can produce explosive

⚠ WARNING

mixtures of hydrogen and oxygen. Keep any materials (including cigarette/smoking materials) that can cause sparks or flames away from batteries to prevent explosion.

- Never touch the battery terminals or cable clamps with tools that can generate sparks.
- Never charge the battery in direct sunlight. The battery should be charged in a well-ventilated place.

⚠ CAUTION

- Avoid battery acid spillage or contact with unprotected skin. If battery acid spills, use water mixed with bicarbonate (baking soda) to neutralize the acid. In case of contact with battery acid, rinse the acid off immediately with plenty of water and seek medical attention promptly.
- Always keep the battery upright. If the battery is placed on its side or diagonally, liquid may spill out of the battery.
- End-of-life batteries may cause danger, so please do not discard them at will. Please contact the battery recycling company if you need to scrap batteries.

NOTICE

- Please use the charger provided by the manufacturer to charge the battery.
- The charging process must be complete, and frequent intermittent charging can damage the battery.
- The battery is only applicable for the mated equipment supplied together at delivery, so do not use the battery for other purposes.
- Do not reverse the positive and negative poles of the battery for use.
- Do not short-circuit the positive and negative poles of the battery system.

NOTICE

- **It is forbidden to place other objects and tools on the battery to prevent short circuit in the battery.**
- **It is forbidden to tap, throw or step on the battery, or hit it with sharp parts.**
- **Do not immerse the battery in water, acidic, alkaline or salty solutions, and protect the battery from rain.**
- **The battery should be fully charged immediately after each use of the machine, and then the machine power switch should be turned off.**

NOTICE

Battery over-discharge (continued use of battery with level of less than 10%) or battery under-voltage caused by long-term non-charging (battery with level of less than 10% not charged for more than three days), resulting in battery capacity attenuation and failure, shall not be covered by the warranty.

2.4 CONSIDERATIONS AFTER MAINTENANCE

1. Check the machine functions so that faults such as oil leakage or poor operation can be detected as early as possible.
2. After maintenance, all maintained parts must be checked for abnormal operation, oil leakage, loose bolts and other problems.
3. The safety protective device needs to be restored or reinstalled, and if necessary, be recalibrated.
4. After maintenance, clear up the tools and equipment for maintenance, remove the replaced parts and loose objects, and clean up the site.
5. Record inspections and maintenance as required.

NOTICE

All maintenance work should include mandatory confirmation that the machine is operating properly.

⚠ WARNING

- **It is forbidden to dump waste liquids at will. Waste liquids should be discharged into appropriate containers.**
- **Waste hydraulic fluids, fuels, coolants and refrigerants should be recycled or disposed as per local regulations.**

3 TECHNICAL CHARACTERISTICS

3.1 MACHINE SPECIFICATIONS

Table 3-1 TB20J Plus specifications

ITEM	TB20J Plus (METRIC)	TB660J Plus (IMPERIAL)
Product Category		
Power type	Diesel engine-powered	
Outrigger type	Oscillating outrigger	
DIMENSION		
Max. platform height	20m	65ft 7in
Max. working height	22m	72ft 2in
Max. horizontal reach (restricted/ unrestricted)	14.6m/16.1m	47ft 11in/52ft 10in
Max. horizontal working envelope (restricted/unrestricted)	15.2m/16.7m	49ft 10in/54ft 9in
Overall length (stowed)	9.99m	32ft 9in
Overall length (transport)	8.12m	26ft 8in
Overall width (stowed)	2.49m	8ft 2in
Overall width (transport)	2.49m	8ft 2in
Overall height (stowed)	2.79m	9ft 2in
Overall height (transport)	2.77m	9ft 1in
Wheelbase	2.49m	8ft 2in
Ground clearance	0.46m	1ft 6in
Platform dimension (L×W×H)	Options 1.45m×0.85m×1.1m 1.83m×0.85m×1.1m 2.44m×0.91m×1.1m	Options 4ft 9in×2ft 9in×3ft 7in 6ft×2ft 9in×3ft 7in 8ft×3ft×3ft 7in
PERFORMANCE		
Rated platform load capacity (restricted/unrestricted)	454kg/300kg	1000lb/661lb
Max. number of allowed people on the platform (restricted/unrestricted)	3 persons/2 persons	
Drive speed (stowed)	0 ~ 4.8km/h	0 ~ 3mph
Drive speed (raised)	0 ~ 1.1km/h	0 ~ 0.68mph
Gradeability (4WD)	45%	
Turntable rotation (angle/continuity)	360°/continuous	
Platform rotation angle	160°	

Table 3-1 TB20J Plus specifications(Continued)

ITEM	TB20J Plus (METRIC)	TB660J Plus (IMPERIAL)
Max allowable tilt angle	5°	
Turning radius (inside/outside)	2.4m/5.55m	7ft 10in/18ft 3in
Turntable tail-swing	1.45m	4ft 9in
Tire (spec/type)	355/55D625 (foam-filled) 36×14-20 (solid)	
Max. operating noise level	82dB	
IP rating	IP65	
Max total vibration value of the platform	2.5m/s²	
Max root-mean-square value of the weighted acceleration of the entire machine	0.5m/s²	
POWER		
Drive×steer	4WD×2WS	
Engine (power/rpm/spec/brand/emission standard)	43kW/2500rpm/QSF2.8t3NA60/Cummins/China T3 36.4kW/2600rpm/D2.9 L4/Deutz/EU T5 36.4kW/2600rpm/D2.9 L4 T4f/Deutz/EPA T4 55.4kW/2400rpm/TD2011 L04i/Deutz T3 36.8kW/2500rpm/WP3.2/Weichai/China T4 36.8kW/2200rpm/YCF3050/Yuchai T4	
Hydraulic tank capacity	180L	39.6gal (UK)/47.6gal (US)
Oil capacity of hydraulic tank	150L	33.0gal (UK)/39.6gal (US)
Diesel tank capacity	160L	35.2gal (UK)/42.3gal (US)
Hydraulic system pressure	28MPa	4061psi
Battery (voltage, capacity)	12V, 220Ah	
System voltage	12VDC	
Control voltage	12VDC	
WEIGHT		
Gross weight	11900kg	26235lb
GROUND BEARING DATA		
Max. tire load	6740kg	14859lb
Pressure against ground	674kPa	97.8psi
ENVIRONMENT		
Max. allowable side force (restricted/unrestricted)	400N	90lbf
Max. allowable wind speed	12.5m/s	28mph
Max. allowable altitude	1000m	3280ft
Allowable ambient temperature	-10℃ ~ 40℃	14℉ ~ 104℉

Table 3-1 TB20J Plus specifications(Continued)

ITEM	TB20J Plus (METRIC)	TB660J Plus (IMPERIAL)
Max. allowable relative humidity	90%	
Storage environment	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.	

Note:
a) The platform height plus the operator height (taken as 2m [6ft 7in]) is the working height.
b) The maximum horizontal reach plus the arm length of the operator (taken as 0.6m [1ft 11in]) is the maximum horizontal working envelope.
c) The ground bearing data is approximate, without considering different options, thus it is applicable only in adequately safe conditions.
d) In different areas, hydraulic oil, engine oil, coolant, fuel and lubricant should be added in accordance with the environmental temperature.
e) In cold weather, auxiliary devices are needed to start the machine.
f) Rated platform load capacity refers to the maximum allowable load on the platform, including the weight of persons, materials, tools, accessories and other objects.

3.2 SPECIFICATIONS OF MAJOR COMPONENTS

Engine

Table 3-2 Deutz D 2.9L4

Type	Water-cooled
Number of Cylinders	4
Bore	92mm (3.6in)
Stroke	110mm (4.3in)
Total Displacement	2.9L 0.64gal (Imperial) 0.77gal (US)
Compression Ratio	17:1
Firing Order	1-2-4-3
Output	36.4kW@2600rpm
Max Torque	147Nm (108ft-lb)@1600rpm
Cooling System Capacity	3.3L 0.73gal (Imperial) 0.87gal (US)
Engine Oil Capacity	8.9L 1.96gal (Imperial) 2.35gal (US)
Low RPM	1500rpm
High RPM	2200rpm

Table 3-3 Cummins QFS2.8t3NA60

Type	Water-cooled
Number of Cylinders	4
Bore	94mm (3.7in)
Stroke	100mm (3.9in)
Total Displacement	2.8L 0.62gal (Imperial) 0.74gal (US)
Compression Ratio	16.7:1
Firing Order	1-2-4-3
Output	43kW@2500rpm
Max Torque	186Nm (137ft-lb)@1100–1500rpm
Cooling System Capacity	3.5L 0.77gal (Imperial) 0.92gal (US)
Engine Oil Capacity	8L 1.76gal (Imperial) 2.11gal (US)
Low RPM	1600rpm
High RPM	2200rpm

Table 3-4 Deutz TD 2011 L04 i

Type	Water-cooled
Number of Cylinders	4
Bore	96mm (3.78in)

Table 3-4 Deutz TD 2011 L04 i (Continued)

Stroke	125mm (4.9in)
Total Displacement	3.68L 0.81gal (Imperial) 0.97gal (US)
Compression Ratio	17:1
Firing Order	1-3-4-2
Output	55.4kW@2400rpm
Max Torque	240Nm (177ft-lb)@1800rpm
Cooling System Capacity	3.3L 0.73gal (Imperial) 0.87gal (US)
Engine Oil Capacity	8.9L 1.96gal (Imperial) 2.35gal (US)
Low RPM	1500rpm
High RPM	2200rpm

Table 3-5 Weichai WP3.2

Type	In-line, air-cooled, 4-stroke
Number of Cylinders	4
Bore	98mm (3.86in)
Stroke	105mm (4.13in)
Total Displacement	3.17L 0.70gal (Imperial) 0.84gal (US)
Compression Ratio	18:1
Firing Order	1-3-4-2
Output	36.8kW@2500rpm
Max Torque	200Nm (147.5 ft-lb)@1400–1700rpm
Cooling System Capacity	5L 1.10gal (Imperial) 1.32gal (US)
Engine Oil Capacity	9.14L 2.01gal (Imperial) 2.41gal (US)
Idle Speed	750±20rpm

Table 3-6 Yuchai YCF3050

Type	In-line, air-cooled, 4-stroke
Number of Cylinders	4
Bore	96mm (3.78in)
Stroke	103mm (4.06in)
Total Displacement	2.982L 0.66 gal (Imperial) 0.79 gal (US)
Compression Ratio	17.5:1
Firing Order	1-3-4-2
Output	36.8kW@2200rpm
Max Torque	210Nm (154.9 ft-lb)@1500rpm
Cooling System Capacity	4L 0.88gal (Imperial) 1.06gal (US)
Engine Oil Capacity	8.5L 1.87gal (Imperial) 2.25gal (US)
Idle Speed	900–950rpm

Reducer

Table 3-7 Travel reducer (PN.204020000026)

Model	IFT007T2B048A
Maximum output torque	7000Nm (5163ft-lb)
Brake torque	250Nm (184ft-lb)
Starting pressure	1.8-2MPa (261-290psi)
Maximum withstand voltage	25MPa (3626psi)
Speed ratio	47.6

Table 3-8 Slewing reducer (PN.204020000002)

Model	IHKN6B56E
Output torque	5040Nm (3717ft-lb)
Output RPM	14.3rmp
Input torque	107Nm (79ft-lb)
Input PPM	800rmp
Transmission	56

Table 3-8 Slewing reducer (PN.204020000002) (Continued)

ratio	
Static brake torque (without back pressure)	200Nm (147.5ft-lb)
Starting oil pressure	1.8MPa (261psi)

Motor

Table 3-9 Cycloid motor (PN.202020000005)

Model	255060A6312BAAAA
Rated RPM	890rpm
Maximum output torque	138Nm (102ft-lb)
Rated pressure	15.5MPa (2250psi)

Table 3-10 Travel motor (PN.202020000024)

Model	HM3V38NS2RNNF1430
Type	Plunger motor
Displacement	38cc/r
Allowable pressure	21MPa (3046psi)
Rated RPM	3600rpm (with maximum displacement)

Battery

Table 3-11 Maintenance-free storage battery (PN.203100000061)

Rated voltage	12V
Capacity	110Ah
Cold starting current	925CCA@–18℃ (0℉)
Reserve capacity	190min

Hydraulic Pump

Table 3-12 Open-circuit variable-displacement pump (PN.202010003068)

Type	Plunger pump
Maximum displacement	45cc/r
Rated pressure	320bar
Switch-off pressure	220bar
Rated RPM	2700rpm

Table 3-13 Closed-circuit variable-displacement pump (PN.202010000054)

Type	Plunger pump
Displacement	45.9cc/r
Rated pressure	280bar
Throttle blipping pressure	21.5bar
Rated RPM	3000rpm

3.3 FUNCTION SPEED

Table 3-14

ITEM	TIME
Raise the main boom	65 ~ 75s
Lower the main boom	65 ~ 75s
Rotate the turntable (360°)-stowed	78 ~ 86s
Rotate the turntable (360°)-fully extended	139 ~ 179s
Extend the main boom	58 ~ 66s
Retract the main boom	53 ~ 62s
Rotate the platform (160°)	18 ~ 22s
Level the platform upward	50 ~ 60s
Level the platform downward	40 ~ 50s
Raise the jib boom	32 ~ 38s
Lower the jib boom	22 ~ 28s
Max drive speed (30m [98.4ft])-stowed	20 ~ 25s
Max drive speed (30m [98.4ft])-operating	88 ~ 108s

Table 3-14 (Continued)

ITEM	TIME
Brake distance at maximum drive speed	0.8 ~ 1.2m (2.62 ~ 3.9ft)

a) The function speed depends on the start and end point of the movement rather than the controls/ switches.
b) The test results of drive speed vary with tires of different specifications.
c) All the speed tests should be conducted from the platform controller. The test results will differ if tested from the ground controller.
d) All the tests should be conducted with the hydraulic oil temperature higher than 50 ~ 60℃ (122 ~ 140℉). If the hydraulic oil temperature is too low, the test results will be affected.

Test requirements:

Raise/lower the main boom : With the main boom fully retracted, raise the main boom from the lowest to the highest and lower the main boom from the highest to the lowest for two times.

Rotate the turntable : With the boom centered, rotate the turntable through two full cycles.

Extend/retract the main boom : With the main boom fully raised, extend the main boom from fully retracted to fully extended position, and retract the main boom from fully extended to fully retracted position. Test twice.

Rotate the platform : With the platform horizontal, rotate the platform from the leftmost to the rightmost, and rotate the platform from the rightmost to the leftmost. Test twice.

Raise/lower the jib : With the platform horizontal, raise the jib boom from the lowest to the highest, and lower the jib boom from the highest to the lowest. Test twice.

Drive-stowed : With the machine on level surface, switch to high engine speed and high drive speed, and push the drive handle to maximum travel distance to drive forward and reverse for 30m respectively. Test twice.

Drive-operating : With the machine on level surface, switch to high engine speed, and push the drive handle to maximum travel distance to drive forward and reverse for 30m respectively. Test twice.

Brake distance : With the machine on level surface, switch to high engine speed, and push the drive handle to maximum travel distance.

3.4 WEIGHT OF MAJOR COMPONENTS

⚠ WARNING

- **Never attempt to move heavy components without the assistance of mechanical equipment.**
- **It is forbidden to place heavy components in an unstable position.**

Table 3-15

Component	Metric (kg)	Imperial (lb)
Chassis assembly	3072	6773
Turntable assembly	5350	11795
Boom assembly	2502	5516
Base boom	496	1093
First telescopic boom	318	701
Second telescopic boom	217	478
Jib boom assembly	188	414
Platform (large-sized)	190	419
Platform (middle-sized)	160	353
Platform (small-sized)	150	331
Main boom telescopic cylinder	211	465
Main boom upward leveling cylinder	39	86

Table 3-15 (Continued)

Component	Metric (kg)	Imperial (lb)
Main boom downward leveling cylinder	37	82
Main boom lift cylinder	220	485
Jib boom cylinder	34	75
Swing cylinder	41	90
Counterweight	3200	7500
Slewing reducer	105	231
Slewing bearing	128	282
Slewing motor	8.5	19
Travel reducer	51	112
Travel motor	16	35
Tire assembly	200	441
Engine-Cummins QSF2.8t3NA60	234	516
Engine-Deutz D2.9L4	254	560
Engine-Deutz TD2011L04i	254	560
Engine-Weichai WP3.2	270	595
Engine-Yuchai YCF3050	280	617
Engine assembly	510	1124
Hydraulic generator (Australia)	127	280
Hydraulic generator (North America)	79	174
Note: The weight of certain components will vary with the options configured on the machine.		

3.5 PRESSURE REQUIREMENTS

Table 3-16

Movement	Maximum pressure
Steer	18MPa (2611psi)
Upward/downward platform leveling	24MPa (3481psi)
Extend boom tube	14.5MPa (2103psi)
Lower boom tube	19MPa (2756psi)
Rotate turntable	15MPa (2176psi)
Generator	14MPa (2031psi)

3.6 OIL REQUIREMENTS

NOTICE

- *Please choose appropriate oil according to the ambient temperature and local regulations, and the use of unqualified oil will damage the machine components.*
- *Oils of different grades or viscosities should not be mixed. The oil to be added must have the same grade and viscosity as that of the oil being used by the machine.*
- *If special oil is required by the environments or users, please contact Sinoboom.*

⚠ WARNING

- **Before filling oil, wait until the temperature of the machine drops to room temperature, otherwise it may cause splashes, burns or other personal injury.**
- **It is strictly forbidden to use inferior oils. The use of inferior oils will bring damage to the machine, and the resulting failure will not be guaranteed by Sinoboom.**

Hydraulic Oil

The hydraulic oil filled when the machine leaves the factory is generally L-HV32 or L-HM46 or other hydraulic oil required by customers. The environment temperature varies from region to region, so choose the hydraulic oil suitable for your region as suggested by the following table.

Table 3-17

Applicable environment temperature	amer	Mobil	Shell	Castrol
0℃ ~ 40℃ (32℉ ~ 104℉)	L-HM46	DTE 10 Excel 46	S2M46	Hyspin AWH-M46
-25℃ ~ 25℃ (-13℉ ~ 77℉)	L-HV32	DTE 10 Excel 32	TELLUS-S3VE32	Hyspin HVI-32
> 40℃ (104℉)	L-HM68	DTE 10 Excel 68	S2M68	Hyspin AWH-M68
< -30℃ (-22℉)	Special oil to be determined.			

Gear Oil

The machine uses industrial gear oil with the viscosity grade of 75W-90.

Fuel Oil

⚠ WARNING

- **The machine should be refueled in a well-ventilated place with no flames, sparks, and other hazards that may cause fire or explosion.**
- **Do not refuel the machine while the engine is running.**

This machine uses diesel oil as the fuel, and the diesel oil filled in the factory is generally 0# diesel, which is suitable for use in areas with ambient temperature above 4℃ (39.2℉). The diesel oil has been basically emptied when the machine leaves the factory, and the user needs to fill diesel oil with appropriate grade according to the ambient temperature and emission regulations. The following table shows the recommended ambient temperature for different grades of diesel oil:

Table 3-18

Grade	Recommended ambient temperature
5#	Above 8℃ (46.4℉)
0#	Above 4℃ (39.2℉)
-10#	Above -5℃ (23℉)
-20#	Above -14℃ (39.2℉)
-35#	Above –29℃ (6.8℉)
-50#	Above -44℃ (-47.2℉)

NOTICE

Please go to a certified gas station to purchase qualified fuel oil. It is recommended prepare an oil storage tank with fuel filter and store the fuel oil in the tank for more than two days to precipitate impurities and water before use.

Engine Oil

The engine oil filled in the factory is generally 15W-40 oil of CJ-4 grade, which is suitable for use in areas with temperature range of -15℃ ~40℃ (5 ~ 104℉). If the ambient temperature is beyond the applicable range, please select other appropriate engine oil.

The ambient temperature varies from region to region, please choose the oil viscosity grade that suits your region according to the recommendations in the table below.

Table 3-19

Viscosity grade	Recommended ambient temperature
0W-30	-35 ~ 0℃ (-31 ~ 32℉)
5W-40	-25 ~ 30℃ (-13 ~ 86℉)

Table 3-19 (Continued)

Viscosity grade	Recommended ambient temperature
15W-40	-15 ~ 40℃ (5 ~ 104℉)
20W-50	0℃ ~ 50℃ (32 ~ 122℉)

Coolant

The coolant filled in the factory is generally -18℃ premixed coolant, which is suitable for use in areas with ambient temperature above -18℃ (-0.4℉). If the ambient temperature is beyond the applicable range, select other appropriate coolants.

The environment temperature varies from region to region, so please choose the coolant applicable to your region according to the recommendations in the table below.

Table 3-20

Coolant type	Recommended ambient temperature
-18℃ premixed coolant	Above -18℃ (-0.4℉)
-37℃ premixed coolant	Above -37℃ (-34.6℉)
Mixed coolant with 50% ethylene glycol anti-freeze and 50% water	-32℃ ~ 0℃ (-25.6 ~ 32℉)
Mixed coolant with 60% ethylene glycol anti-freeze and 40% water	-54℃ ~ -32℃ (–65.2 ~ 25.6℉)

3.7 TORQUE SPECIFICATIONS

Special Torque Requirements

Please refer to the table below for some special torque requirements:

Table 3-21 Special torque requirements

No.	Description	Torque value
1	Wheel fastening nut	300Nm (221ft-lb)
2	Travel reducer fastening bolt	300Nm (221ft-lb)
3	Slewing reducer fastening bolt	450Nm (332ft-lb)
4	Slewing bearing fastening bolt	300Nm (221ft-lb)
5	Slewing cushion valve fastening bolt	26Nm (19ft-lb)
6	Counterweight fastening bolt	730Nm (538ft-lb)
7	Cable fastening nut M8	9 ~ 11Nm (6.6 ~ 8.1ft-lb)
8	Cable fastening nut M10	18 ~ 23Nm (13.2 ~ 17ft-lb)
9	Wire rope adjusting nut	112Nm (82.68ft-lb)
10	Swing cylinder fastening bolt	100Nm (74ft-lb)
11	Swing cylinder fastening nut	630Nm (465ft-lb)

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 3-22 Fastener torque specifications-Metric

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

Table 3-22 Fastener torque specifications-Metric (Continued)

Nominal diameter (mm)	Pitch (mm)	Class 8.8	Class 10.9	Class 12.9
	1.5	500Nm (369ft-lb)	650Nm (479ft-lb)	770Nm (568ft-lb)
22	2.5	600Nm (443ft-lb)	800Nm (590ft-lb)	980Nm (723ft-lb)
	2	650Nm (479ft-lb)	850Nm (627ft-lb)	1050Nm (774ft-lb)
24	3	750Nm (553ft-lb)	1050Nm (774ft-lb)	1250Nm (923ft-lb)
	2	800Nm (590ft-lb)	1100Nm (811ft-lb)	1300Nm (959ft-lb)
27	3	1150Nm (848ft-lb)	1500Nm (1106ft-lb)	1800Nm (1327ft-lb)
30	3.5	1500Nm (1106ft-lb)	2000Nm (1475ft-lb)	2400Nm (1770ft-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 3-23 Fastener torque specifications-Unified Thread Standard (UNC)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
1/4-20	7/16"	10Nm (7ft-lb)	14Nm (10ft-lb)
5/16-18	1/2"	21Nm (15ft-lb)	29Nm (21ft-lb)
3/8-16	9/16"	37Nm (27ft-lb)	51Nm (38ft-lb)
7/16-14	5/8"	60Nm (44ft-lb)	82Nm (60ft-lb)
1/2-13	3/4"	90Nm (66ft-lb)	130Nm (96ft-lb)
9/16-12	13/16"	130Nm (96ft-lb)	180Nm (133ft-lb)
5/8-11	15/16"	178Nm (131ft-lb)	250Nm (184ft-lb)
3/4-10	1-1/8"	315Nm (232ft-lb)	445Nm (328ft-lb)
7/8-9	-	509Nm (375ft-lb)	715Nm (527ft-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 3-24 Fastener torque specification-Unified Thread Standard bolts (UNF)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
1/4-28	7/16"	11.5Nm (8ft-lb)	16Nm (11ft-lb)
5/16-24	1/2"	23Nm (17ft-lb)	32Nm (24ft-lb)
3/8-24	9/16"	41Nm (30ft-lb)	58Nm (43ft-lb)
7/16-20	5/8"	65Nm (48ft-lb)	92Nm (68ft-lb)
1/2-20	3/4"	100Nm (74ft-lb)	145Nm (107ft-lb)
9/16-18	13/16"	145Nm (107ft-lb)	200Nm (148ft-lb)
5/8-18	15/16"	200Nm (148ft-lb)	280Nm (207ft-lb)

Table 3-24 Fastener torque specification-Unified Thread Standard bolts (UNF) (Continued)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
3/4-16	1-1/8"	350Nm (258ft-lb)	495Nm (365ft-lb)
7/8-14	-	560Nm (413ft-lb)	780Nm (575ft-lb)

Hydraulic Hose Torque

The hydraulic hose must be removed or installed as per the following torque.

Table 3-25 Hydraulic Hose Torque

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

Hydraulic Fitting Torque

The hydraulic fitting with metric thread must be removed or installed as per the following torque.

Table 3-26 Hydraulic Fitting Torque-Metric

Thread size	Installed to aluminum	Installed to steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring
L (light-duty)			
M10×1	18±1Nm (13±1ft-lb)	20±2Nm (15±2ft-lb)	18±1Nm (13±1ft-lb)
M12×1.5	30±2Nm (22±2ft-lb)	35±2Nm (26±2ft-lb)	30±2Nm (22±2ft-lb)
M14×1.5	42±3Nm (31±2ft-lb)	48±4Nm (35±3ft-lb)	35±2Nm (26±2ft-lb)
M16×1.5	55±4Nm (41±3ft-lb)	60±4Nm (44±3ft-lb)	40±3Nm (30±3ft-lb)
M18×1.5	75±5Nm (55±4ft-lb)	75±5Nm (55±4ft-lb)	45±3Nm (33±4ft-lb)
M22×1.5	90±6Nm (66±4ft-lb)	130±8Nm (96±6ft-lb)	60±4Nm (44±3ft-lb)

Table 3-26 Hydraulic Fitting Torque-Metric (Continued)

Thread size	Installed to aluminum	Installed to steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring
M27×2	120±8Nm (89±6ft-lb)	185±12Nm (136±9ft-lb)	100±7Nm (74±5ft-lb)
M30×2	140±8Nm (103±6ft-lb)	245±15Nm (181±11ft-lb)	135±8Nm (100±6ft-lb)
M33×2	180±10Nm (133±7ft-lb)	320±20Nm (236±15ft-lb)	160±10Nm (118±7ft-lb)
M42×2	240±15Nm (177±11ft-lb)	450±25Nm (332±18ft-lb)	210±13Nm (155±10ft-lb)
M48×2	280±20Nm (207±15ft-lb)	540±30Nm (398±22ft-lb)	260±15Nm (192±11ft-lb)
S (heavy-duty)			
M12×1.5	33±2Nm (24±2ft-lb)	43±3Nm (32±2ft-lb)	35±2Nm (26±2ft-lb)
M14×1.5	42±3Nm (31±2ft-lb)	50±4Nm (37±3ft-lb)	45±3Nm (33±2ft-lb)
M16×1.5	55±4Nm (41±3ft-lb)	75±5Nm (55±4ft-lb)	55±4Nm (41±3ft-lb)
M18×1.5	75±5Nm (55±4ft-lb)	95±6Nm (70±4ft-lb)	70±5Nm (52±4ft-lb)
M22×1.5	90±6Nm (66±4ft-lb)	140±8Nm (103±6ft-lb)	100±10Nm (74±7ft-lb)
M27×2	120±8Nm (89±6ft-lb)	185±12Nm (136±9ft-lb)	160±10Nm (118±7ft-lb)
M30×2	140±8Nm (103±6ft-lb)	245±15Nm (181±11ft-lb)	210±13Nm (155±10ft-lb)
M33×2	180±10Nm (133±7ft-lb)	320±20Nm (236±15ft-lb)	260±15Nm (192±11ft-lb)
M42×2	240±15Nm (177±11ft-lb)	450±25Nm (332±18ft-lb)	330±20Nm (243±15ft-lb)
M48×2	280±20Nm (207±15ft-lb)	540±30Nm (398±22ft-lb)	420±25Nm (310±18ft-lb)

The hydraulic fitting with British Standard Pipe (BSP) thread must be removed or installed as per the following torque.

Table 3-27 Hydraulic Fitting Torque-British Standard Pipe (BSP)

Thread size	Installed to aluminum	Installed to steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring
L (light-duty)			
G1/8A	20±1Nm (15±1ft-lb)	20±1Nm (15±1ft-lb)	-
G1/4A	35±2Nm (26±2ft-lb)	40±2Nm (30±2ft-lb)	-
G3/8A	50±3Nm (37±2ft-lb)	75±5Nm (55±2ft-lb)	-
G1/2A	75±5Nm (55±2ft-lb)	95±6Nm (70±4ft-lb)	-
G3/4A	120±8Nm (89±6ft-lb)	185±12Nm (136±9ft-lb)	-
G1A	180±10Nm (133±7ft-lb)	320±20Nm (236±15ft-lb)	-
G1-1/4A	240±15Nm (177±11ft-lb)	450±25Nm (332±18ft-lb)	-
G1-1/2A	280±20Nm (207±15ft-lb)	540±30Nm (398±22ft-lb)	-
S (heavy-duty)			
G1/4A	40±3Nm (30±2ft-lb)	43±3Nm (32±2ft-lb)	-
G3/8A	55±3Nm (41±2ft-lb)	85±5Nm (63±4ft-lb)	-
G1/2A	80±5Nm (59±4ft-lb)	120±8Nm (89±6ft-lb)	-

Table 3-27 Hydraulic Fitting Torque-British Standard Pipe (BSP) (Continued)

Thread size	Installed to aluminum	Installed to steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring
G3/4A	120±8Nm (89±6ft-lb)	185±12Nm (136±9ft-lb)	-
G1A	180±10Nm (133±7ft-lb)	320±20Nm (236±15ft-lb)	-
G1-1/4A	240±15Nm (177±11ft-lb)	450±25Nm (332±18ft-lb)	-
G1-1/2A	280±20Nm (207±15ft-lb)	540±30Nm (398±22ft-lb)	-

The hydraulic fitting with Unified Thread Standard (UNC/UNF) thread must be removed or installed as per the following torque.

Table 3-28 Hydraulic Fitting Torque-Unified Thread Standard (UNC/UNF)

Thread size	Installed to aluminum	Installed to steel
	O-ring	O-ring
L (light-duty)		
7/16-20	21±2Nm (15±2ft-lb)	21±2Nm (15±2ft-lb)
9/16-18	34±2Nm (25±2ft-lb)	35±2Nm (26±2ft-lb)
11/16-12	40±3Nm (30±2ft-lb)	50±4Nm (37±3ft-lb)
3/4-16	50±3Nm (37±2ft-lb)	65±4Nm (48±3ft-lb)
7/8-14	75±5Nm (55±4ft-lb)	110±8Nm (81±6ft-lb)
1-1/16-12	110±8Nm (81±6ft-lb)	140±10Nm (103±7ft-lb)
1-5/16-12	160±10Nm (118±7ft-lb)	210±15Nm (155±11ft-lb)
S (heavy-duty)		
7/16-20	21±2Nm (15±2ft-lb)	23±2Nm (17±2ft-lb)
9/16-18	34±2Nm (25±2ft-lb)	40±3Nm (30±2ft-lb)
11/16-12	40±3Nm (30±2ft-lb)	65±4Nm (48±3ft-lb)
3/4-16	50±3Nm (37±2ft-lb)	80±6Nm (59±4ft-lb)
7/8-14	75±5Nm (55±4ft-lb)	125±10Nm (92±7ft-lb)
1-1/16-12	110±8Nm (81±6ft-lb)	185±15Nm (136±11ft-lb)
1-5/16-12	160±10Nm (118±7ft-lb)	280±20Nm (207±15ft-lb)

4 MAINTENANCE INSTRUCTIONS

4.1 INSPECTION AND PREVENTATIVE MAINTENANCE SCHEDULE

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

It is quite important to establish and implement a comprehensive inspection and preventive maintenance schedule. This manual outlines the frequent inspection and maintenance works recommended by Hunan Sinoboom Intelligent Co., Ltd. Consult your national, regional or local regulations for aerial work platforms. The frequency of the inspection and maintenance must be increased as required by the environment, requirements and frequency of usage.

Pre-delivery Inspection

The pre-delivery inspection shall be performed by qualified Sinoboom equipment mechanics.

The pre-delivery inspection shall be performed before each sale, lease or rental delivery.

Refer to the ***Inspection and Preventative Maintenance Schedule*** for items requiring this inspection. Refer to the corresponding section of this manual to perform the inspection and maintenance procedures.

Pre-operation Inspection

Before each start of work, restart of work and change of user, and after each maintenance operation, the pre-operation inspection must be performed. Refer to the Pre-operation Inspection section of the Operation Manual for the detailed information. The Operation Manual must be entirely read and understood before performing the pre-operation inspection.

Frequent Inspection

The frequent inspection shall be performed by qualified Sinoboom equipment mechanics.

The frequent inspection shall be performed for each machine in service for 3 months or 150 hours (whichever comes first) or out of service for more than 3 months. The frequency of this inspection must be increased as required by the environment, requirements and frequency of usage.

The items included in the frequent inspection are the same as those in the pre-delivery inspection.

Annual Machine Inspection

An annual machine inspection must be performed once a year and 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 and training, has successfully demonstrated the ability and proficiency to service, repair and maintain the subject Sinoboom product model.

Refer to the ***Inspection and Preventive Maintenance Schedule*** for items requiring this inspection, and refer to the corresponding section of this manual to perform inspection and maintenance procedures.

Preventive Maintenance

The preventive maintenance operation shall be performed by qualified Sinoboom equipment mechanics. The frequency of the inspection and maintenance must be increased as required by the environment, requirements and frequency of usage.

Refer to the ***Inspection and Preventative Maintenance Schedule*** for items requiring this inspection. Refer to the corresponding section of this manual to perform the inspection and maintenance procedures.

Responsible Persons and Qualifications for Performing Inspection and Maintenance

Table 4-1

Inspection Type	Inspection Frequency	Primary Responsible Persons	Service Qualifications
Pre-operation Inspection	Before each start of work, restart of work and change of user, and after each maintenance operation	User or operator	Properly trained user or operator
Pre-delivery Inspection	Before each sale, lease or rental delivery	Owner, dealer or user	Qualified Sinoboom mechanic
Frequent Inspection	In service for 3 months or 150 hours (whichever comes first) or out of service for more than 3 months	Owner, dealer or user	Qualified Sinoboom mechanic
Annual Machine Inspection	Once a year and no later than 13 months from the date of the prior annual machine inspection	Owner, dealer or user	Factory-trained service technician
Preventive Maintenance	At intervals specified in the ***Inspection and Preventative Maintenance Schedule***	Owner, dealer or user	Qualified Sinoboom mechanic

Inspection and Preventative Maintenance Schedule

Perform inspection and preventive maintenance for the items in the table below at prescribed intervals. The intervals of inspection and maintenance are calculated based on the months elapsed since the machine has been put into service or the “cumulative working time” on the ground controller display (whichever comes first).

The inspection cycle is based on the use of machine under normal working conditions, and the cycle should be shortened accordingly if the machine is used in harsh working conditions.

Table 4-2 Inspection and Preventative Maintenance Schedule

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Chassis assembly			
Chassis	2	2	2
Tire	1, 2	1, 2	1, 2
Drive hub	1, 2	1 , 2 ,	1, 2
Tire fastener	1[50]	1[50]	1[50]
Drive motor	1, 6	1, 6	1, 6
Travel reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11
Steering component	1, 2	1, 2	1, 2
Outrigger, telescopic shaft	1, 2, 3	1, 2, 3	1, 2, 3

Table 4-2 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Bearing	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Turntable assembly			
Turntable	2	2	2
Slewing bearing	1[50] , 2 , 6 , 12	1[50] , 2 , 6 , 12	1[50] , 2 , 6 , 8 , 12
Slewing reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11
Central rotary joint	6	6	6
Slewing motor	1, 6	1, 6	1, 6
Turntable pin	1, 2, 3	1, 2, 3	1, 2, 3
Turntable cover assembly	1, 2, 3	1, 2, 3	1, 2, 3
Hydraulic generator (if equipped)	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]
Boom assembly			
Boom weldment	1, 2	1, 2	1, 2
Hose, wire rope bracket	1, 2	1, 2	1, 2
Pulley and slide assembly	1, 2	1, 2	1, 2
Bearing	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Cover or protective guard (if equipped)	1, 2	1, 2	1, 2
Cable track and wire rope system	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5
Pivot pin and retaining ring	1, 2	1, 2	1, 2
Platform assembly			
Guardrail	2	2	2
Access gate	1, 2, 3	1, 2, 3	1, 2, 3
Floor	2	2	2
Swing cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Safety belt lashing point	1, 2, 7	1, 2, 7	1, 2, 7
Power system			
Engine idle speed, RPM and throttle valve	1, 3	1, 3	1, 3
Fuel oil	6	6	6
Engine oil	6	6, 11	6, 11
Cooling system	1, 2, 5, 6, 7	1, 2, 5, 6, 7	1, 2, 5, 6, 7, 11
Fuel filter	1, 5	1, 5, 11	1, 5, 11
Air filter	1, 6, 11	1, 6, 11	1, 5, 6, 11

Table 4-2 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Oil filter	1, 5	1, 5, 11	1, 5, 11
Intake/exhaust system	1, 6	1, 6	1, 6
Charging function	1, 3	1, 3	1, 3
Belt	2, 3	2, 3	1, 2, 3
Fuel tank, tank cover, vent hole	1, 2, 6	1, 2, 6	1, 2, 6
Auxiliary power system	1, 3, 10	1, 3, 10	1, 3, 10
Hydraulic system			
Hydraulic pump	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Oscillating cylinder exhausting	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic valve	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Counterbalance valve locking check	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic connecting pin and retaining ring	1, 2	1, 2	1, 2
Hydraulic hose, pipeline and fitting	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic tank, cap and vent	1, 2, 3, 5, 6	1, 2, 3, 5, 6	1, 2, 3, 5, 6
Hydraulic oil high-pressure filter	1, 5, 6	1, 5, 6, 11[50]	1, 5, 6, 11[50]
Hydraulic oil	5, 6	5, 6	5, 6, 11
Electrical system			
Electrical wiring, connector	1, 2	1, 2	1, 2
Battery	1, 2, 6, 9, 12	1, 2, 6, 9, 12	1, 2, 6, 9, 12
Electrolyte	6	6	6
Charging function	3	3	3
Instrument, meter, switch, lamp, horn	1, 3	1, 3	1, 3
Functions and controls			
Platform controller	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Ground controller	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Function control lock, protective device and brake	1, 3, 10	1, 3, 10	1, 3, 10
Foot switch	1, 3, 10	1, 3, 10	1, 3, 10
Emergency stop button (turntable and platform)	1, 3, 10	1, 3, 10	1, 3, 10
Limit switch and main power switch	1, 3, 10	1, 3, 10	1, 3, 10

Table 4-2 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	**Semiannually[3]**	**Annually[4]**
Overload limit system	1, 3, 10	1, 3, 10	1, 3, 10
Tilt alarm device	1, 3, 10	1, 3, 10	1, 3, 10
Drive brake	1, 3, 10	1, 3, 10	1, 3, 10
Rotation brake	1, 3, 10	1, 3, 10	1, 3, 10
Other inspection items			
Operation Manual in the manuals storage box	10	10	10
All decals/labels complete, clear and secure	10	10	10
Annual inspection date of the machine	/	/	10
No unapproved changes or additions	10	10	10
All safety publications included	10	10	10
General structural components and welds	2	2	2
All fasteners, pins, protective guards and covers	1, 2	1, 2	1, 2
Grease and lubricating to specifications	10	10	10
Functional test of all systems	10	10	10
Paint and appearance	5	5	5
Inspection date stamped on the chassis	/	/	12
Notify Sinoboom of machine ownership	/	/	12

Table 4-2 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Note: [1] Before each sale, lease or shipment; [2] In service for 3 months or 250 hours; or out of service for more than 3 months; [3] In service for 6 months or 500 hours; [4] Once a year and no later than 13 months from the date of the prior annual machine inspection; [50] The first inspection work shall be performed after the machine has been in service for 50 hours for the first time. This only happens once in the service life of the machine; [250] The first inspection work shall be performed after the machine has been in service for 250 hours for the first time. This only happens once in the service life of the machine; [NO.1] Before the machine is put into service for the first time, or before the first use after the oscillating cylinder or counterbalance valve is replaced.			
Performance code: **1.** Check for correct installation (accurate position, firmly installed, tightened according to the specified torque) **2.** Visual inspection for damage (cracks, cracked welds, deformation, wear, corrosion, excessive wear, gouges, abrasions and exposed threads) **3.** Check for normal function **4.** Return to neutral position or “off” position normally (the self-reset switch can return to neutral position or “off” position after released) **5.** Clean and free of foreign objects **6.** Check for correct sealing, leaking and level **7.** Labels complete, clear and secure **8.** Check for appropriate tolerances **9.** Fully charged **10.** Validation/Execution **11.** Replace the oil or filter element **12.** Correctly lubricated			

4.2 GENERAL MAINTENANCE INSTRUCTIONS

Safety and Operating Standards

Before adjusting and repairing the machine, the following precautions should be taken:

1. Cut off the power source to make the machine unable to start, and have the machine marked.
2. All controls should be turned off to avoid accidental actuation of the operating system.
3. If possible, lower the work platform to the lowest position; if not possible, ensure that the work platform will not fall.
4. Before loosening or removing the hydraulic components, the hydraulic oil pressure in the hydraulic lines should be released.

Some maintenance work may require the machine to be in a state other than those described in 1-4 above, and such work should be carried out in accordance with the specific safety measures listed in the Operation Manual and this manual.

During machine maintenance, personal safety should always be put first. Always take the weight of the parts into consideration and never attempt to move heavy parts without the assistance of mechanical equipment. It is forbidden to place heavy objects in an unstable position. Before lifting any machine parts, ensure the parts are sufficiently supported.

Cleaning

1. The most important point to extend the service life of the machine is to avoid dirt or impurities entering the critical parts of the machine. Protective measures have been taken for the machine to prevent such ingress. Protective plates, covers, seals, and filters are installed to keep the air, fuel and oil supply clean. However, in order to ensure that protective measures function properly, they should be maintained at the prescribed interval.
2. When air, fuel, or oil lines are disconnected, adjacent areas, openings and fittings should be cleaned. And immediately cover all openings to prevent foreign objects from entering.
3. During repair or maintenance, all components should be cleaned and inspected, and all piping and openings should be made clear. Cover all parts to keep them clean. All parts must be clean before installation. New parts should be stored in containers before use.

Components Disassembly and Installation

1. A safe and reasonable plan should be developed for the installation of machine components based on this manual and the site conditions.
2. The personnel carrying out the disassembly and installation should have appropriate ability, and should be able to use safety protection devices correctly.
3. Before installation, qualified personnel should inspect the ground, all concealed foundations and anchors, or there should be reliable documentation proving that the manufacturer's requirements are met.
4. The wind speed at the installation site should not be greater than 8.3m/s (18.6mph).
5. Before installation, check the site conditions such as power supply, foundation and track to make sure the installation requirements are met.
6. All components should be inspected prior to installation to verify they are in good condition.
7. High-strength bolts should be tightened in strict accordance with the requirements of this manual.
8. Acceptance of machine installed on site shall meet the following requirements:
   1) Relevant inspections and functional tests should be carried out to confirm that the machine has been installed correctly, that specific functional requirements are fulfilled and that all safety components are operating properly.
   2) Static and dynamic load tests should meet the relevant standards.
   3) Before putting the machine into service, the qualified person shall issue a handover certificate confirming the integrity of the machine. All test/inspection results should be recorded and an inspection report should be prepared (including the inspector's name, title and company and inspection date).
9. Machine disassembly should also meet the safety requirements for installation.
10. If mechanical assistance is required when disassembling the machine, reasonable lifting points, spreaders and lifting equipment should be selected as required by this manual and site conditions. Use adjustable lifting devices whenever possible. All spreaders (chains, slings, etc.) should be parallel to each other and perpendicular to the tip of the part being lifted whenever possible.
11. If a component with the assembly angle relative to the support less than 90° needs to be removed, take special care since the eye bolt or similar bracket cannot provide adequate supporting force in such case.
12. If certain component is difficult to remove, check that all nuts, bolts, cables, brackets, wiring, etc. have been removed, and that adjacent components are not blocking removal.

Components Disassembling and Reassembling

When disassembling or reassembling a component, follow the steps one by one. If the disassembly or assembly of one component has not been completed, do not proceed with another component. Always review the disassembly or assembly operation to make sure nothing is missing. No adjustments (unless recommended) may be made without prior approval.

Storage

Please follow the recommendations below to ensure the best performance of cylinders and avoid corrosion due to long-term storage (indoor/outdoor):

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

Scrap of Structural Parts

- When certain major structural part fails to meet the requirements for safe use due to corrosion, wear and other reasons, it should be repaired or reinforced; otherwise it should be scrapped.
- When certain stressed structural part is permanently deformed and cannot be repaired, it should be scrapped.
- When certain major stressed structural part loses overall stability and cannot be repaired, it must be scrapped.
- When certain structural part or weld is cracked, the cause should be analyzed and reinforcing measures should be taken as appropriate for the force and cracks. Continued use is only allowed if the structural part and weld meet the original design requirements, or they should be scrapped.

Pressure-fit Parts

When assembling pressure-fit parts, use anti-seize or molybdenum disulfide-based compounds to lubricate the mating surface.

Bearing

1. After a bearing is removed, cover it to avoid dust and abrasives. Use non-flammable cleaning solvent to clean bearings and allow them to dry in the shade. Compressed air can be used, but do not rotate the bearings.
2. If the races and balls (or rollers) have pits, notches or burn marks, the bearing should be scrapped.
3. If the bearing is still serviceable, apply a coat of oil and wrap it with clean paper (or wax paper). Do not unwrap reusable bearings or new bearings until they are ready for installation.
4. Before installation, lubricate new or serviceable bearings. When pressing the bearing into the retainer or bore, pressure should be applied on the outer race. If the bearing is to be mounted to a shaft, pressure should be applied to the inner race.

Gaskets

Check if the hole in the gasket is aligned with the opening in the mating part. If a handmade gasket is required, use gasket material or stock of equivalent material and thickness. Make sure to cut a hole in the correct position, as unsealed gaskets can cause serious system damage.

Bolt Use and Torque Application

NOTICE

Self-locking fasteners such as nylon inserts and thread locking nuts must not be reinstalled after removal.

1. When reinstalling locking fasteners, a new replacement should always be used. Use bolts with appropriate length. If the bolt is too long, it may be pressed against the adjacent part before tightening its head to the part to be mounted; If the bolt is too short, it will not have enough threads to bite and secure the parts. The replacement bolt must have the same or equivalent size as the original bolt.
2. In addition to the specific torque requirements given in this manual, standard torque values should be used on heat-treated bolts, studs, and steel nuts in accordance with recommended factory practice (see ***Page 20, Fastener Torque Specifications***).

Hydraulic Pipeline and Electrical Wiring

When unplugging or removing hydraulic lines and electrical wires from the machine, the hydraulic lines and electrical wires and their sockets should be clearly marked, so that their reinstallation will be correct.

Hydraulic Hose and Fitting Tightening Procedures

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; if not, clean the hose and fitting before installation.
2. If the seal is to be replaced, lubricate the replacement seal before installation.
3. For installation, align the fitting, hose and hose nut, and tighten the nut with the torque specified in ***Page 22, Hydraulic Hose Torque*** and ***Page 22, Hydraulic Fitting Torque***. Once the tightening torque of the fitting or hose exceeds the specified value, its seal cannot be reused.
4. After installation, test all machine functions and inspect the hose, fitting and related components for leaks.

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 pin and female pin.
- Avoiding electrical failure due to low conductivity between the pins in humid environment.

The following instructions should be observed to apply the insulating silicone grease to the electrical connections. Those instructions apply 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

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 outside the connector to prevent short circuit. Besides, the joint between the male connector and female connector should also been applied with silicone grease. Other joints that may allow ingress 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 solvents is superior to that of water, the conditions above are mostly likely to happen when using pressure cleaning method to clean the machine.

3. Silicone grease should be applied to each contact of the connectors for battery box 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.

Lubrication

The relevant components should be lubricated at defined intervals using the lubricant with the quantity, type and grade as recommended in this manual. If the recommended lubricant is not available, contact local supplier to purchase the recommended or other satisfactory lubricant.

Hydraulic System

1. Contaminants are the primary hazard to the hydraulic system. Contaminants can enter the hydraulic system in various ways, such as improper use of hydraulic oil, moisture, grease, metal chips, sealing elements and sand entering the system during maintenance, or cavitation of the hydraulic pump due to insufficient system preheating or leakage of pump supply (suction) lines.
2. Oil in cloudy color indicates a high moisture or air content, which contributes to organic growth, leading to oxidation or corrosion. In such case, drain the waste oil in the hydraulic system, and fill with clean hydraulic oil after rinsing the hydraulic system.
3. Frequently check the filter for the presence of metal particles. Because hydraulic components are designed and manufactured to very tight tolerances, even a small amount of contaminants entering the system can cause wear or damage to hydraulic components and often lead to malfunction during machine operation. Hydraulic system filters should be inspected, cleaned or replaced as needed at required intervals.
4. Keep the hydraulic system clean. After disconnecting the hydraulic lines, seal the pipeline ports immediately to prevent contaminants from entering the hydraulic system. If signs of metal or rubber particles are found in the hydraulic system, the hydraulic oil should be drained immediately and the entire system flushed.

NOTICE

Metal particles may appear in the hydraulic oil or filter of the new machine due to wear of hydraulic components.

5. Disassemble or reassemble parts on clean work surfaces. Clean all metal parts using a non-flammable cleaning solvent. Lubricate parts as needed to facilitate assembly.
6. Hydraulic oils of different brands or types should not be mixed. Because they may contain different essential additives or may have different oil viscosity. It is recommended to use high-quality mineral oil with the viscosity that is suitable for the operating environment temperature of the machine.
7. Unless expressly stated in this manual, the filter element must be replaced at least once a year or every 1000 working hours, and the replacement interval should be shorter in harsh working conditions.If hydraulic oil needs to be changed, use hydraulic oil meeting or exceeding the type and specification requirements in this manual. If the hydraulic oil with same type as that supplied with the machine is not available, consult local supplier to help you select the appropriate hydraulic oil. Do not mix petroleum with synthetic base oil.

8. Take all precautions to keep the hydraulic oil clean. If hydraulic oil must be poured from the original vessel into another vessel, ensure that the vessel is kept clean and does not contain any contaminants. Make sure to clean the filter screen and replace the filter element when changing the hydraulic system hydraulic oil.
9. After the machine is shut down, carry out proper preventive maintenance measures, thoroughly check all hydraulic components, piping, fittings, etc., and check each system for functionality before putting the machine into service again.

Battery

Wash the battery with non-metallic brush and sodium bicarbonate aqueous solution, and then rinse with clean water. After cleaning, allow the battery to dry completely, and apply the battery terminals with anti-corrosion compound.

Pins and Composite Bearing

1. The connecting pin should be removed and inspected in case any of the following defects is found:
   - Excessively tilted joint
   - Noise originating from the joint during operation
2. The composite bearing should be replaced in any of the following conditions:
   - Frayed or separated fiber on the sleeve surface
   - Cracked or damaged sleeve housing
   - Bearing moved or rotated into the housing
   - Debris embedded in the sleeve surface.
3. Replace the pivot pin after any of the following is detected (properly clean the pivot pin before inspection):
   - Wear in the bearing area
   - Flaking, pealing, scratches or abrasions on the pivot pin surface
   - Rusty pivot pin in the bearing area
4. Reassemble the connecting pin and composite bearing
   - Blow off the dirt and debris on the housing. Remove any foreign objects on the bearing and housing.
   - Clean the bearing and pivot pin with a cleaning agent to remove all grease and oil. The composite bearing uses dry coupling which does not require lubrication.
   - During installation and operation, inspect the pivot pin to ensure that there are no burrs, nicks or abrasions that could damage the bearing.

4.3 MAJOR MODIFICATION AND REPAIR

A major modification/repair is a modification/repair made to the entire machine or its parts that affects the stability, strength or performance of the machine.

Each time the machine owner/company makes a major modification/repair to the machine, it should be recorded using the ***Major Modification/Repair Record*** in the attachment to this manual. Keep the record properly until the machine is taken out of service, or as required by the machine owner/company.

Major modifications/repairs to the machine must be performed by a qualified service technician. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the ***Inspection and Preventative Maintenance Schedule*** . After all the inspection and verification results are good, the machine can be put back into service.

5 CHASSIS AND TURNTABLE ASSEMBLY

5.1 CHASSIS AND TURNTABLE SYSTEM

Chassis Tilt Sensing System

The chassis tilt sensing system measures the angle of the chassis relative to the horizontal level by means of a level sensor mounted in the left turntable cover. The chassis tilt indicator on the platform display panel indicates if the chassis inclination exceeds the maximum allowable tilt angle. When the chassis tilt sensing system detects that the chassis inclination exceeds the maximum allowable tilt angle, the chassis tilt indicator will flash, all movements will be blocked (in the operating position), the boom will be allowed to retract and lower and the turntable will be allowed to rotate slowly (in the non-operating position).

Travel Drive System

This machine adopts four-wheel drive. The four-wheel drive system consists of one closed-circuit variable-displacement pump, four variable-displacement plunger motors, four travel reducers and one travel control valve. The drive speed depends on the closed-circuit variable-displacement pump, engine speed and motor displacement. Full-time control is applied for traction control. The drive function is limited by the position of the boom tube. See ***Page 35, Travel Speed Reduction System*** for details.

Travel Speed Reduction System

When the boom is in the operating position, the travel speed of the machine is automatically limited to the operating speed.

Reverse Drive Confirmation System

The reverse drive confirmation system warns the operator of the situation that may cause the machine to travel and steer in the direction opposite to the travel direction of the joystick. The reverse position indicator on the platform controller indicates such situation. When the boom is positioned between the two rear wheels, the system does not impose any restrictions on the travel of the machine. If the boom is positioned beyond any rear wheel while the machine is traveling, the reverse position indicator will flash, and the machine's driving and steering functions will be blocked. To restore the driving and steering functions, press the reverse position travel drive switch on the platform controller, then the reverse position indicator will be lit, indicating that the driving and steering direction of the machine is opposite to the travel direction of the joystick.

Outrigger Oscillating System

If the machine is equipped with oscillating function, it must have outrigger oscillating system. Both the front axle and rear axle are connected to the chassis by shaft, and the telescoping action of the oscillating cylinders on both sides of the front axle is controlled by the oscillating multi-way valves behind the chassis. If there is relative displacement between the chassis and the rear axle, the oscillating multi-way valve will be triggered and start to control the oscillating cylinder to perform corresponding telescoping action. This action does not require auxiliary electrical components for detection, nor does it be subject to any conditions, and oscillating in all working conditions can be achieved. So, the machine’s four wheels can always contact with the ground even when driving on rough and uneven ground, which greatly improves the trafficability and operating comfort.

5.2 TIRE ASSEMBLY

Check Tires and Rims

Check the tires and rims daily and replace the tire if any of the following defects is found:

- The tire is severely cracked, broken, deformed or has other abnormalities.
- The tire ply has a smooth, uniform cut with a total length of more than 75mm (3in).

- The tire ply has a crack or fissure that exceeds 25mm (1in) in either direction.
- The tire has a perforation with the diameter of over 25mm (1in).
- The tire has a large bulge.
- The wear extent of the tire's off-ground support surface exceeds 25%.

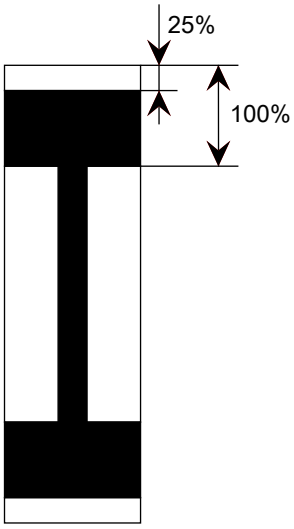


Fig 1

Check Wheel Fasteners

The wheel fasteners should be tightened before the machine is put into service for the first time and after each tire is removed. Check and tighten the wheel fasteners to the specified torque every 3 months or 250 working hours.

Replacement Requirements

⚠ WARNING

- **The tires and rims on the machine have been designed and selected according to the overall performance and load stability requirements of the machine, so their models, rim width, installation center surface, diameter, etc. must not be changed, otherwise it may result in an unsafe condition regarding stability.**
- **Use the special wheel nut that suits the rim bolt. The wheel nuts must be installed and maintained with the proper tightening torque to prevent loose rims, broken studs and tire detachment from the axle. Be sure to only use the nut that matches the cone angle of the wheel.**

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

- With the ply rating/rated load capacity and dimension equal to or greater than the original.
- With the tire tread contact width equal to or greater than the original.
- With the wheel diameter, width and offset dimensions equal to the original.
- Approved for the application by the tire manufacturer (including intended purposes, maximum drive speed and maximum tire load, etc.).
- Due to the size difference between different tire brands, both tires on the same axle should be of the same brand.

NOTICE

Unless specifically approved by Sinoboom, do not replace foam-filled tires with pneumatic tires.

Replace Tires

⚠ WARNING

Tighten the nut to the proper torque to prevent the tire from loosening. Use a torque wrench to tighten the fastener, if you don't have a torque wrench, use a socket wrench to tighten the fastener and then immediately have a service station or dealer to tighten the fastener to the correct torque. Over-tightening will cause the bolts to break or permanently deform the bolt holes in the tires.

The correct steps to replace a tire are as follows:

1. Make sure the machine is in stowed position.
2. Press the main power switch and disconnect all power sources (such as battery charger) connected to the machine.
3. Use a wrench to loosen but do not remove the tire retaining nut.
4. Use a jack with sufficient load capacity to lift the machine frame to the appropriate height so that the tire assembly is off the ground.
5. Remove the tire retaining nuts and bolts alternately, and then remove the tire.
6. Align the mounting hole of the new tire with the corresponding mounting hole in the frame.
7. After applying Loctite 272 threadlocking adhesive to

the bolts and nuts, install the bolt and nuts sequentially.

8. Tighten all nuts by hand first to prevent loosening of the bolts and nuts. Never apply lubricant to threads or nuts.
9. Then tighten the nuts step by step in the order as shown below. Please refer to the recommended torque in the table below for tightening.

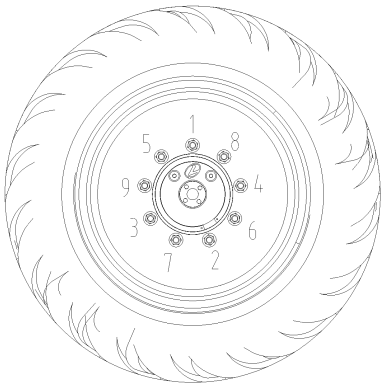


Fig 2 Diagram of wheel nuts tightening sequence

Table 5-1 Table of wheel nuts tightening torque

First step	Second step	Third step
150Nm (110ft-lb)	240Nm (177ft-lb)	300Nm (221ft-lb)

5.3 TRAVEL DRIVE DEVICE

The travel drive device is mainly composed of the travel reducer and travel motor.

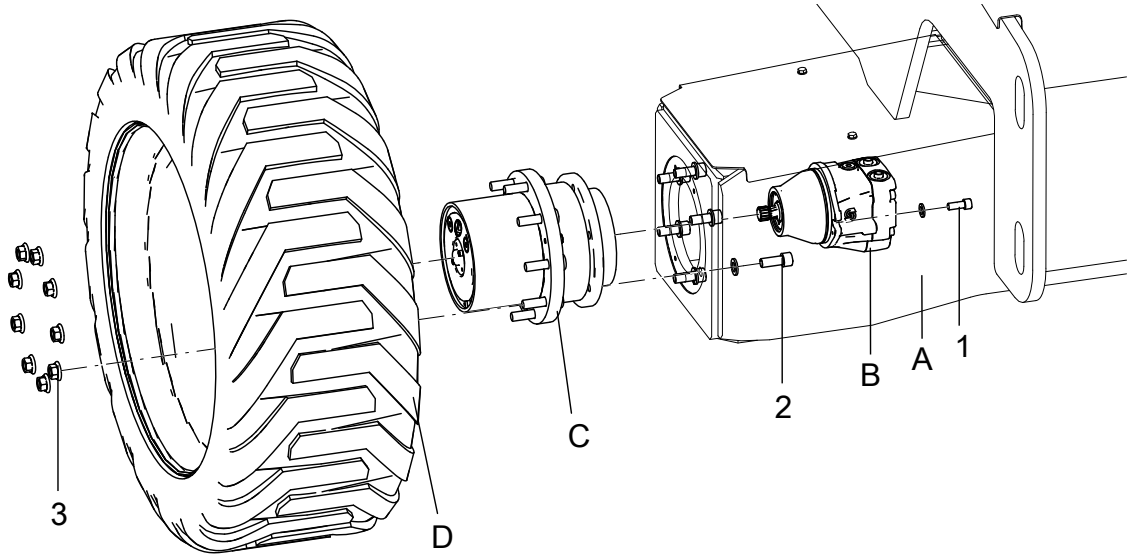


Fig 3 Diagram of travel drive device

Table 5-2 Travel drive device

No.	Description
A	Outrigger
B	Travel motor

Table 5-2 Travel drive device (Continued)

C	Travel reducer
D	Tire

Check Disengaged Drive Hub Cap

The drive hub in the travel drive device can be engaged and disengaged. The two positions can be achieved by obversely mounting and reversely mounting the drive hub cap, as shown below.

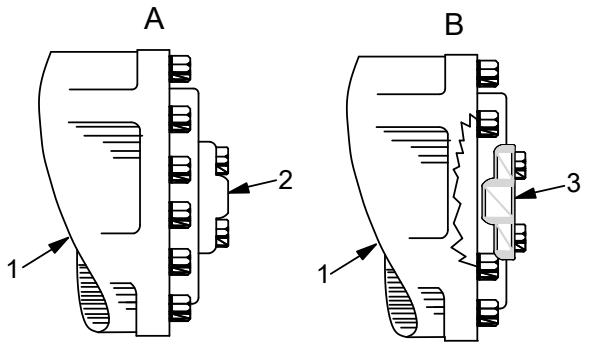


Fig 4

A Drive hub engaged B Drive hub disengaged

1. Drive hub
2. Disengage drive hub cap (obversely mounted)
3. Disengage drive hub cap (reversely mounted)

The drive hub must be engaged for the machine to work normally. To ensure the normal and safe operation of the machine, it's recommended to visually check the drive hub cap before work.

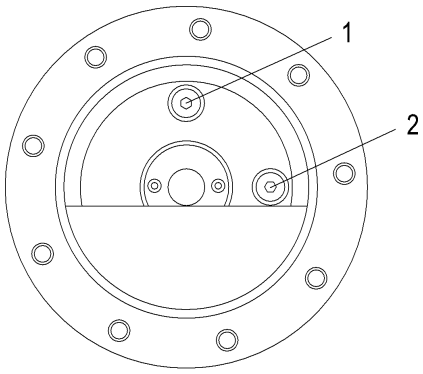
The drive hub must be disengaged for the machine to be towed or dragged. To ensure safety, check and ensure that the drive hub is disengaged before towing or dragging, and return the drive hub to its original position once the towing or dragging is completed.

For the detailed procedures of obversely mounting and reversely mounting the drive hub cap as well as towing and dragging, refer to the ***Emergency Towing*** in the Operation Manual.

Check Oil Level in Travel Reducer

The travel reducer with inappropriate gear oil level will lead to reduced machine performance and even component damage. It's recommended to check the oil level in travel reducer every 3 months or after 250 working hours.

1. Drive the machine to rotate the reducer to the position with one oil port at the top (as shown below).
2. Remove the oil plug from the oil port 2, and check the oil level in the reducer, which should be even with the oil port.
3. Add oil as needed, until the oil level is even with the oil port 2.
4. Check the oil level in other travel reducers by repeating the above steps.



1. Oil port 1
2. Oil port 2

Fig 5 Diagram of checking oil level in travel reducer

Replace Gear Oil in Travel Reducer

Regularly replacing the gear oil in travel reducer is vital to maintaining machine performance and extending service life of the machine. It's recommended to replace the gear oil in travel reducer every year or after 1000 working hours.

Replace the gear oil in travel reducer by draining waster oil and filling with clean oil as follows:

Drain waste oil:

1. Drive the machine to rotate the reducer to the position with one oil port at the bottom.
2. Place a suitable vessel under the oil port at the bottom of reducer.
3. Remove the oil plug from the oil port at the bottom to drain the gear oil in the travel reducer to the vessel.
4. Reinstall the oil plug.

Fill with clean oil:

1. Drive the machine to rotate the reducer to the position with one oil port at the top (as shown above).
2. Remove the oil plug from the oil port 1 and oil port 2.
3. Add new gear oil to the oil port #1 until the oil level is even with the oil port #2 (refer to ***Oil Requirements*** for viscosity grade).
4. Reinstall the oil plug.
5. Clean up the gear oil spills during the process.

Disassembly and Installation

Disassembly

1. Make sure the machine is in stowed position.
2. Press the main power switch and disconnect all power sources (such as battery charger) connected to the machine.
3. Place a jack of sufficient capacity under the chassis side to be removed.
4. Remove the tires and place them in an appropriate area using suitable lifting equipment.
5. Mark and disconnect the hydraulic pipelines on the travel motor and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
6. Remove the travel motor after removing the mounting bolts and washers at position #1.
7. Use suitable lifting equipment to support the travel reducer.
8. Remove the mounting bolts and washers from the travel reducer at position #2, and slowly remove the travel reducer from the outrigger with the assistance of lifting equipment.

NOTICE

Each of the four reducers on the chassis is installed in different directions. Mark the direction of each reducer brake oil port before removing the reducer for the convenience of future installation. The position of brake oil port is as indicated by the arrow in the below figure of ***Travel Reducer Brake Oil Port*** *.*

Installation

1. Use suitable lifting equipment to support the outriggers.
2. Align the reducer brake oil port with the marked direction.
3. Fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts one by one on the outrigger.
4. Tighten the bolts with a torque wrench according to the specified torque.
5. After installation, fill appropriate amount of industrial gear oil with the viscosity grade of 75W-90 as needed.
6. Install an O-ring on the motor brake oil port, mesh the motor spline shaft with the inner teeth of the reducer, and slowly rotate the motor housing to align the motor oil port with the brake oil port on the reducer and align the motor mounting groove with the mounting hole on the reducer.
7. Fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install and pre-tighten the bolts one by one.
8. Tighten the bolts with a torque wrench according to the specified torque.
9. Connect the hydraulic hoses.

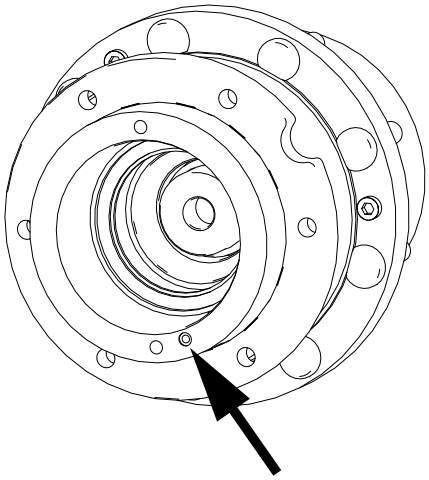


Fig 6 Travel reducer brake oil port

5.4 SLEWING MECHANISM

The slewing mechanism, installed on the turntable, is mainly composed of a slewing bearing, slewing reducer and slewing motor, and acts as the drive device for slewing action of the machine. The inner ring of the slewing bearing is connected to the turntable by bolts, and the outer ring meshes with the pinion on the slewing reducer. The slewing reducer is driven by the motor to realize the rotation of the slewing bearing engaged, so as to rotate the turntable.

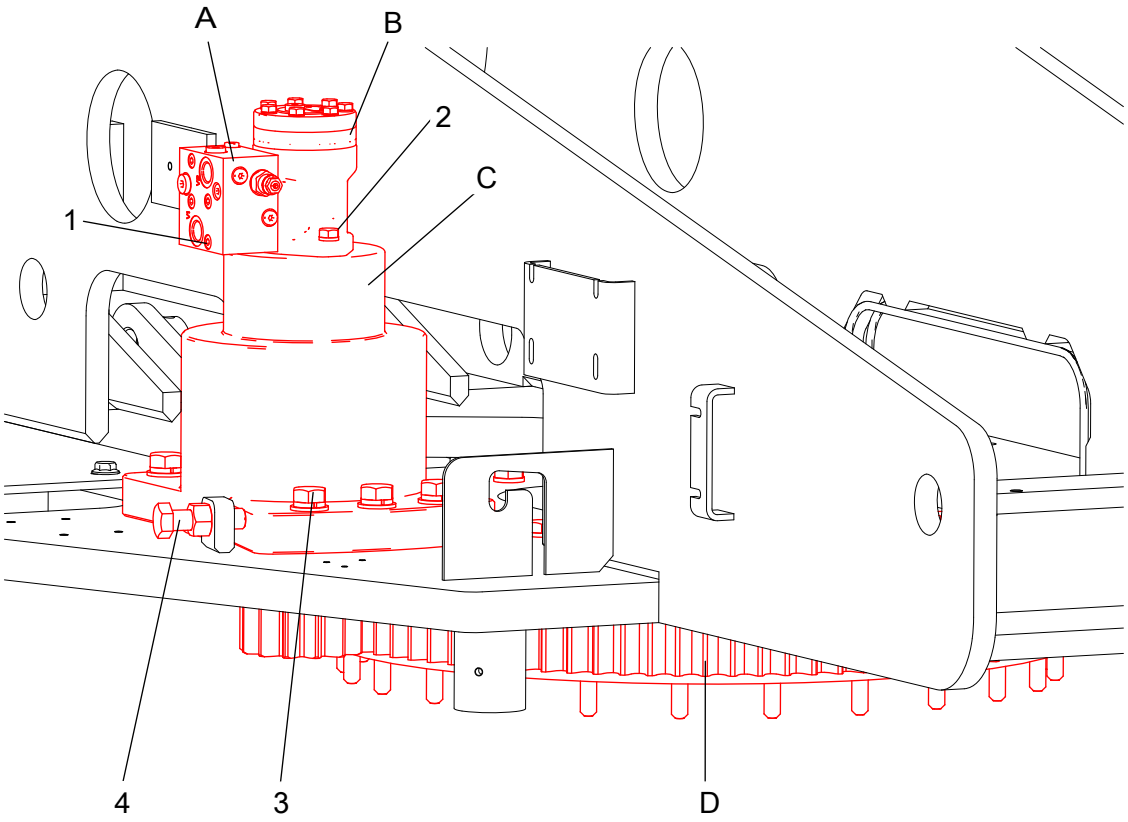


Fig 7 Diagram of slewing mechanism

Table 5-3 Slewing mechanism

No.	Description
A	Slewing cushion valve
B	Slewing motor
C	Slewing reducer
D	Slewing bearing

Check Oil Level in Slewing Reducer

The slewing reducer with inappropriate gear oil level will lead to reduced machine performance and even component damage. It's recommended to check the oil level in slewing reducer every 3 months or after 250 working hours.

1. Open the left turntable cover to locate the slewing reducer.
2. Remove the oil filler plug from the reducer, and check the oil level, which should be even with the oil port.
3. Remove the oil inlet plug from the brake, and check the oil level, which should be even with the oil port.
4. Add oil as needed, until the oil level is even with the oil port.

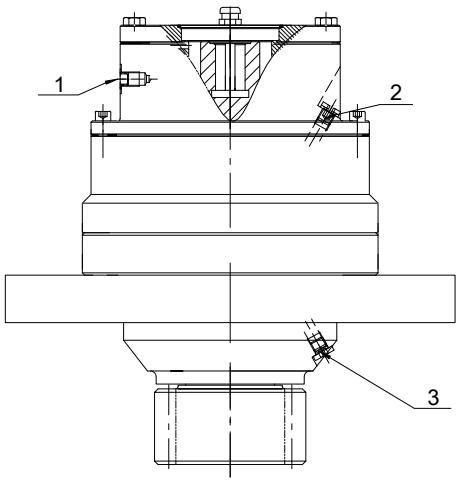


Fig 8 Position of slewing reducer oil ports

Table 5-4 Description of slewing reducer oil ports

No.	Description
1	Brake oil inlet
2	Oil filler
3	Oil outlet

Replace Gear Oil in Slewing Reducer

Regularly replacing the gear oil in slewing reducer is vital to maintaining machine performance and extending service life of the machine. It's recommended to replace the gear oil in slewing reducer every year or after 1000 working hours.

Drain waste oil:

1. Open the left turntable cover to locate the slewing reducer.
2. Place a suitable vessel under the oil outlet of the slewing reducer.
3. Remove the oil outlet plug to drain the gear oil in the reducer to the vessel.
4. Install the oil outlet plug.

Fill with clean oil:

1. Remove the oil filler plug from the reducer, add new industrial gear oil with the viscosity grade of 75W-90 to the oil filler until the oil level is even with the oil port, and install the oil filler plug.
2. Remove the oil filler plug from the brake, add new industrial gear oil with the viscosity grade of 75W-90 to the oil filler until the oil level is even with the oil port, and install the oil filler plug.
3. Clean up the gear oil spills during the process.

Lubricate Slewing Bearing

Regular lubrication of slewing bearing is essential to maintain machine uptime and extend service life. Failure to lubricate the slewing bearing regularly may lead to abnormal operation of the machine and accelerated component damage. It is recommended to lubricate the slewing bearing every 3 months or 250 hours of operation, and when the machine is operated in multiple shifts or exposed to harsh environments, the lubrication frequency and amount of lubricant should be increased accordingly.

1. As shown in the figure below, connect the slewing bearing and the grease nipple with a hose.
2. Position the oil gun nozzle on the grease nipple and fill with ZL-3 lithium-based grease which will be transported to the turntable slewing bearing through the hose.
3. Then, rotate the turntable by 100-130mm (4-5in) each time until the whole slewing bearing is fully lubricated.
4. Apply lubricating grease on the outer gear of the slewing bearing and the gear on the slewing reducer evenly with a brush.
5. Remove excess grease.

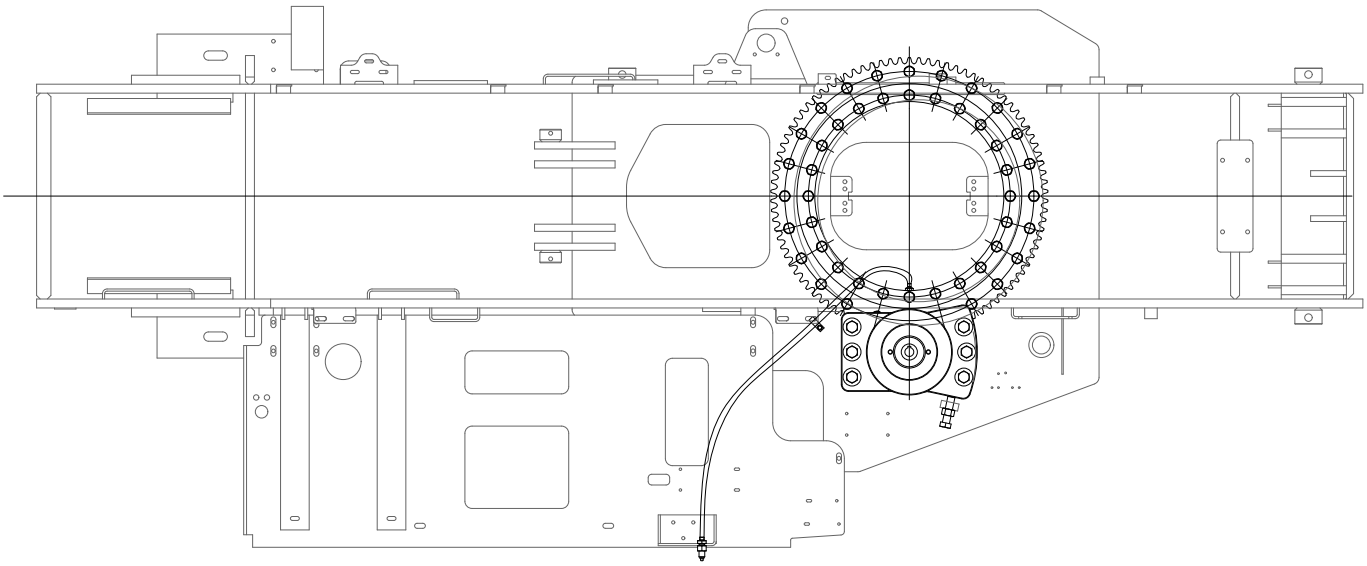


Fig 9 Diagram of lubricating slewing bearing remotely

Inspect Slewing Bearing Bolts

It is recommended to check the slewing bearing bolts after the first 50 hours of operation, and every 3 months or 250 hours of operation thereafter.

If any bolt is found to be missing or slack, replace it with a new bolt, apply Loctite 272 threadlocking adhesive to the bolt thread and tighten the bolt with the torque specified in the ***Torque Specifications*** section. After replacing and tightening the slewing bearing bolt, re-inspect the bolt for tightness.

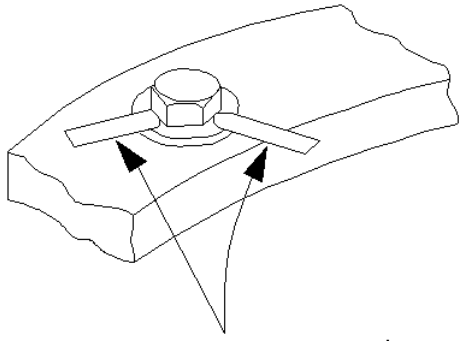


Fig 10 Instruction for inserting feeler gauge

Check the connecting bolt between the chassis and the slewing bearing

1. Adjust the machine to the position as shown in the Figure ***(b)*** below.
2. Locate the connecting bolt between the chassis and the slewing bearing.
3. As indicated by ***Page 42, Instruction for inserting feeler gauge***, insert the 0.04mm (0.0016in) feeler gauge between the bolt and washer in the quadrant opposite to the turntable counterweight.
4. Make sure that the feeler gauge will not penetrate under the bolt head to the bolt shank.
5. Rotate the turntable 90° to check the bolts in the next quadrant.
6. Rotate the turntable 90° again until all bolts have been inspected.

Check the connecting bolts between the turntable and the slewing bearing

1. Adjust the machine to the position as shown in the Figure ***(b)*** below.
2. Locate the connecting bolt between the turntable and the slewing bearing.
3. As indicated by ***Page 42, Instruction for inserting feeler gauge***, insert the 0.04mm (0.0016in) feeler gauge between the bolt and washer in the semi-circle opposite to the turntable counterweight.
4. Make sure that the feeler gauge will not penetrate under the bolt head to the bolt shank.
5. Adjust the machine to the position as shown in the Figure ***(a)*** below.
6. As indicated by ***Page 42, Instruction for inserting feeler gauge***, insert the 0.04mm (0.0016in) feeler gauge between the bolt and washer in the other semicircle (turntable counterweight).
7. Make sure that the feeler gauge will not penetrate under the bolt head to the bolt shank.

Fig 11 Checking slewing bearing connecting bolts (a)

1. Main boom fully extended;
2. Main boom horizontal.

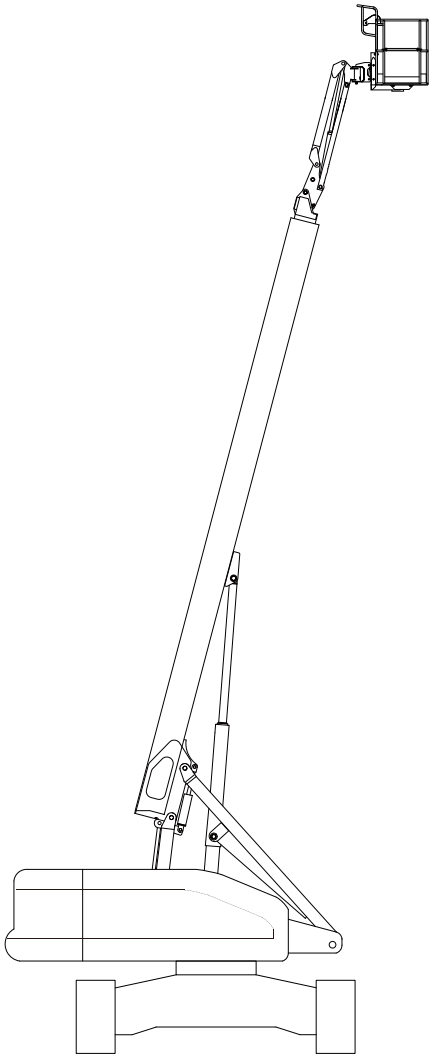


Fig 12 Checking slewing bearing connecting bolts (b)

1. Main boom fully retracted;
2. Boom tube fully elevated;

Adjust Gear Backlash of Slewing Mechanism

1. Make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).
2. Loosen the fastening bolt at position #3 securing the slewing reducer and turntable.
3. Push the slewing reducer mounting disc towards the slewing bearing as much as possible, so that the slewing reducer gears enter the slewing bearing gear ring.
4. Loosen the locking nut at position #4 and turn the adjusting bolt there.
5. Measure the gear backlash between the slewing reducer and the slewing bearing with a feeler gauge, and repeatedly adjust the adjusting bolt at position #4 until the gear backlash is within 0.15-0.25mm (0.006–0.01in).
6. Hold the adjusting bolt at position #4, and tighten the locking nut there.
7. Tighten the fastening bolt at position #3 securing the slewing reducer and the turntable.

Disassembly and Installation

Disassemble slewing drive device

1. Make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).
2. Mark and disconnect the hydraulic pipelines on the slewing drive device and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Remove the slewing cushion valve from the slewing motor after disassembling the slewing cushion valve fastening bolt at position #1.
4. Remove the slewing motor after disassembling the fastening bolt at position #2 connecting the slewing motor and slewing reducer.
5. Loosen the locking nut and adjusting bolt at position #4.
6. Remove the slewing reducer after disassembling the fastening bolt at position #3 connecting the slewing reducer and the turntable.

Install slewing drive device

1. Make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).
2. Remove foreign objects and burrs on the mounting surface and gears of the slewing reducer.
3. Position the slewing reducer on the mounting surface of the turntable, and measure the gear backlash relative to the slewing bearing with a feeler gauge which should be kept within 0.15-0.25mm (0.006-0.01in).

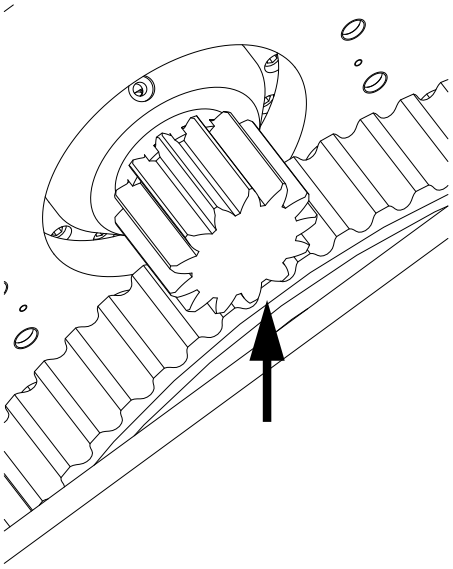


Fig 13 Gear backlash

4. If the measured gear backlash exceeds the specified value, adjust the gear backlash to the specified value with the adjusting bolt and locking nut at position #4, and the specific method is described in ***Adjust Slewing Mechanism Gear Backlash*** .
5. Apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install the bolts at position #3 one by one to secure the slewing reducer and the turntable, and then pre-tighten the bolts diagonally.
6. Ensure that the slewing reducer fits perfectly to the turntable mounting surface.
7. Tighten the bolts diagonally with a wrench.
8. Fill the slewing reducer with gear oil to cover the gear surface.
9. Clean the mounting surface of the slewing reducer, and match the slewing motor pivot pin with the reducer pin hole.
10. Turn the motor housing so that the bolt hole on the slewing motor is aligned with that on the reducer. Apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install and tighten the bolts at position #2 according to the specified torque.
11. Match the bolt hole on the slewing cushion valve with the mounting hole on the slewing motor, apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install and tighten the bolts at position #1 according to the specified torque (refer to the ***Torque Specifications***).

Install slewing bearing

1. Use suitable lifting equipment to lift the slewing bearing to the chassis mounting surface.
2. Check the clearance between the slewing bearing mounting surface and the chassis mounting surface with a feeler gauge, ensuring the clearance ≤ 0.2mm (0.008in).
3. Using the special high-strength washers for high-strength bolts, fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts to the outer ring of the slewing bearing.
4. Then tighten the bolts in the sequence shown in the following diagram and follow the steps in the table below.
5. Rotate the inner ring of the slewing bearing by hand to ensure smooth movement.
6. Remove the lifting equipment from the slewing bearing.
7. Rotate the inner ring of slewing bearing so that the soft belt area on the inner ring and that on the outer ring are symmetrically distributed with the slewing bearing as the center.
8. Use suitable lifting equipment to lift the turntable to the slewing bearing mounting surface.
9. Using the special high-strength washers for high-strength bolts, fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts to the inner ring of the slewing bearing.
10. Then tighten the bolts in the sequence shown in the following diagram and follow the steps in the table below.

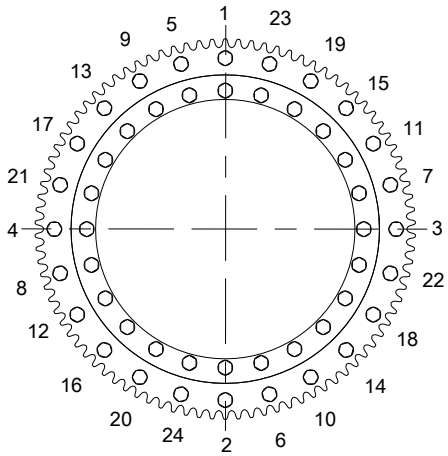


Fig 14 Tightening sequence of slewing bearing bolts

Table 5-5 Table of slewing bearing bolt tightening torques

First step	Second step	Third step
160Nm (118ft-lb)	270 Nm (199ft-lb)	300Nm (221ft-lb)

5.5 COUNTERWEIGHT

⚠ WARNING

Counterweights are essential to maintain the stability of the machine. Do not modify or remove counterweights without the manufacturer's written authorization. Improperly assembled counterweights may cause the machine to tip over, causing serious injury, death, or machine damage.

Disassembly

1. Adjust the machine to the stowed position and make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).
2. Use suitable lifting equipment to provide reliable support for the boom and prevent the machine from tipping after the counterweight is removed.
3. Use suitable lifting equipment to support the counterweight.
4. Remove the bolts securing the counterweight to the turntable.
5. Slowly remove the counterweight with the aid of the lifting equipment.

Installation

1. Use suitable lifting equipment to lift the counterweight to the installation position on the turntable.
2. Align the mounting hole of the counterweight with that of the turntable structure.
3. Apply Loctite 272 threadlocking adhesive to the fastening bolt threads and counterweight threads, and install the bolts one by one.
4. Confirm that the bolts are tightened with the correct torque, refer to the ***Torque Specifications*** section for the tightening torque.

5.6 HYDRAULIC GENERATOR

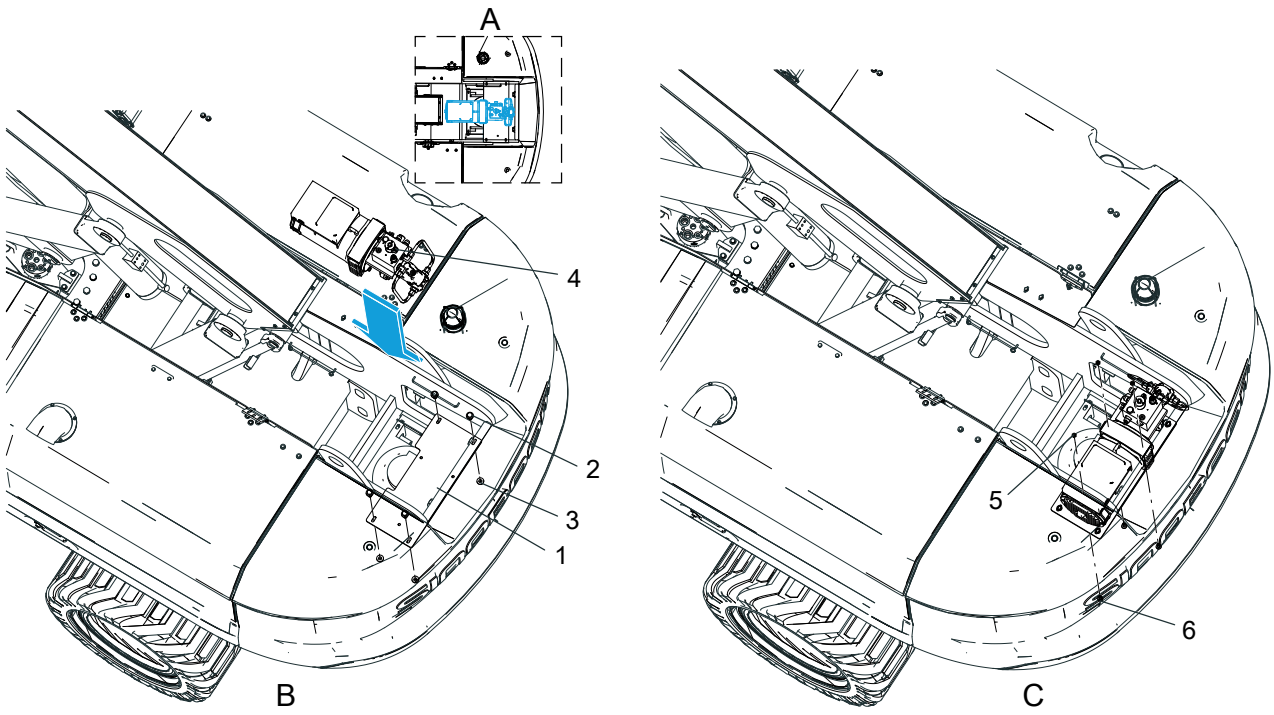


Fig 15 Diagram of installing hydraulic generator

Installation

The hydraulic generator is optional, so please find out whether the machine can be installed with a hydraulic generator firstly.

1. Raise the boom tube about 45° to leave enough space for the installation of the hydraulic generator.

⚠ WARNING

If the boom is not lifted by lifting equipment, do not work under the platform or boom.

2. Install the mounting plate #1 of the hydraulic generator and secure it with bolt #2 and nut #3.
3. Use suitable lifting equipment to lift the hydraulic generator #4 above the turntable counterweight, and adjust the orientation (refer to the placement position in the dotted box A in the figure above) so that the hydraulic generator can enter the turntable structure smoothly.

⚠ WARNING

Always check the position of the hydraulic generator during the installation process to ensure that the hydraulic generator does not interfere with other parts of the machine.

4. Then, rotate the hydraulic generator 90° to adjust its direction (refer to the position C in the figure above).
5. Align the mounting holes of hydraulic generator with the mounting holes in the mounting plate #1.
6. Install and secure the hydraulic generator with bolt #5 and nut #6.

Debugging

After the hydraulic generator is installed, the machine needs to be debugged as follows:

1. Start the engine, and after the engine operates stably, move the hydraulic generator switch to warm up the hydraulic system until the oil temperature exceeds 45°C (113°F).
2. Measure whether the output voltage of the generator meets the requirements of use. If the output voltage is less than the required voltage, the motor runs too slow; if the output voltage is too high, the motor runs too fast.
3. The speed of the motor depends on the input flow rate, so the output voltage can be used to determine whether the motor flow rate is appropriate. The position of the flow valve is shown by the arrow in the figure below. Adjust the valve clockwise to decrease the flow rate, or counterclockwise to increase the flow rate. Adjust the flow valve based on the output voltage until the output voltage meets the requirements of use in your region.

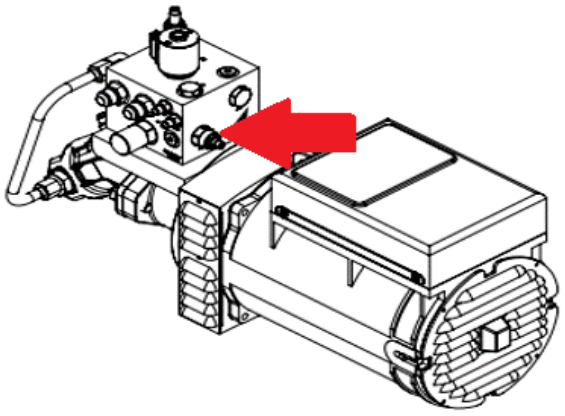


Fig 16 Diagram of flow valve

NOTICE

If the flow valve is fully opened, but the voltage still can not meet the requirements of use, the reason may be that:

- *The hydraulic system does not warm up sufficiently, so the oil temperature has not reached the required temperature. Wait for the oil temperature to rise above 45°C (113°F), then determine the output flow based on the actual output voltage, and adjust the flow valve until the voltage reaches the requirements of use;*
- *The pump LS set pressure is too low, resulting in insufficient output flow of the pump, so the LS set pressure needs to be increased.*

4. After the voltage is adjusted, run the machine with or without load for about 30min. If the motor makes a buzzing sound or the pump outlet hose vibrates at certain frequency, the pump LS set pressure value is not suitable and needs to be decreased. Turn the screw in the figure below clockwise to increase the LS set pressure value, or counterclockwise to decrease the LS set pressure value.

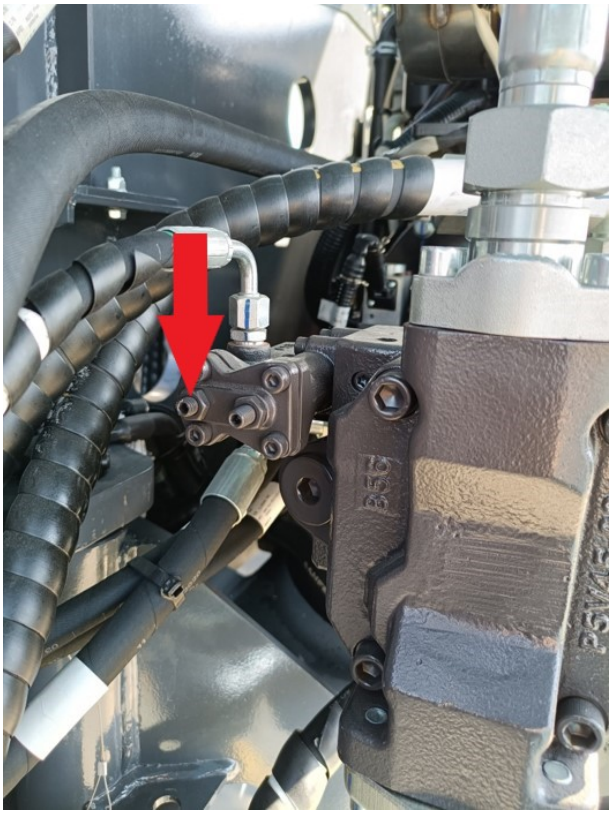


Fig 17 Position of LS set pressure adjusting screw

NOTICE

Adjusting the LS set pressure will affect the time of boom movement, so please contact Sinoboom after-sales personnel for the operation.

⚠ WARNING

Electrocution hazard. The output voltage of generators in North America is 208/120V normally, while the output voltage of generators in Australia is 230V normally. Electric shock may cause serious personal injury or death. The debugging personnel should be extra careful during operation, and follow national or local electrical safety regulations and precautions to avoid possible electric shock hazard.

5.7 BATTERY

⚠ WARNING

- **Before removing the battery, the charger power supply and the working power of the whole machine must be cut off.**
- **Except professionals, other people shall not disassemble the battery case; otherwise it may cause system damage.**

1. Place the machine in a ventilated and spark-free environment.
2. Open the right turntable cover to locate the batteries.
3. Mark and disconnect the harness connection on the negative terminal of the battery, and then disconnect the harness connection on the positive terminal of the battery.
4. Fasten the battery with the sling of appropriate lifting equipment and remove it from the machine.

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6 BOOM AND PLATFORM ASSEMBLY

6.1 BOOM AND PLATFORM SYSTEM

Broken Wire Rope Detection System

This machine is equipped with 3-section proportionally-driven telescopic boom tube. The first telescopic boom is directly driven by a telescopic cylinder. The second telescopic boom is driven by a separate wire rope system which is equipped with a spare wire rope, allowing the operator to continue using the machine in the event of one wire rope broken. The retracting wire rope is mounted on the outside of the boom for easy detection of failure. While the extending wire rope depends on the broken rope detection system to warn the operator of wire rope failure in time. The system uses proximity sensors to detect unwanted movement of the wire rope to determine whether the wire rope is faulty. When the proximity sensor detects unwanted movement of the wire rope, the broken rope detection result will be displayed on the display of the ground controller, and an alarm will be triggered. Then the boom will be restricted from extending and raising, but be allowed to retract and lowering. The operator should take necessary measures to correct the fault.

Platform Control Enable System

The platform control system uses time-dependent support circuits to limit the time availability of active or enabled controllers. The foot switch must be depressed before any movement can be performed. When the foot switch is depressed, the controller will be activated and the operator can perform any movements within 7s. The controller will remain enabled as long as the operator keeps operating any functions until 7s after the last function stops. When the controller is active, the indicator on the platform display panel will light up. After the set time, the illuminated indicator will turn off and the controller will turn off or be disabled. To continue to operate the machine, the controller must be re-enabled to start the timing system again. To activate the timing system again, follow these steps: release all control buttons, handles, and foot switch, and then depress the foot switch again.

Transport Position Sensing System

The transport position sensing system detects the position of the boom tube by means of the angle sensor and length sensor on the boom head (near the turntable). When the angle sensor detects that the boom tube is raised more than 15° above the horizontal, or the length sensor detects that the boom tube extends more than 1.2m (3.9ft), the machine is considered as in operating position, otherwise, it is considered as in non-operating position. The position of the jib boom is not taken into account.

This system is used to control the drive speed reduction system.

Load Sensing System

The load sensing system on this machine detects the load on the platform through the load cell installed at the connection between the platform and the boom tube. The overload indicator on the platform display panel indicates if the platform load has exceeded the rated load. When the load sensing system detects that the platform load exceeds the rated load, the overload indicator will flash, and all movements of the machine will be restricted in the KG (overload limit) mode; while in other modes, the telescopic boom will be allowed to retract, the turntable can rotate slowly, and the boom can be lowered after the telescopic boom is fully retracted. After the excess load is removed, the overload indicator will go out and all machine movements will be resumed.

6.2 PLATFORM AND JIB BOOM

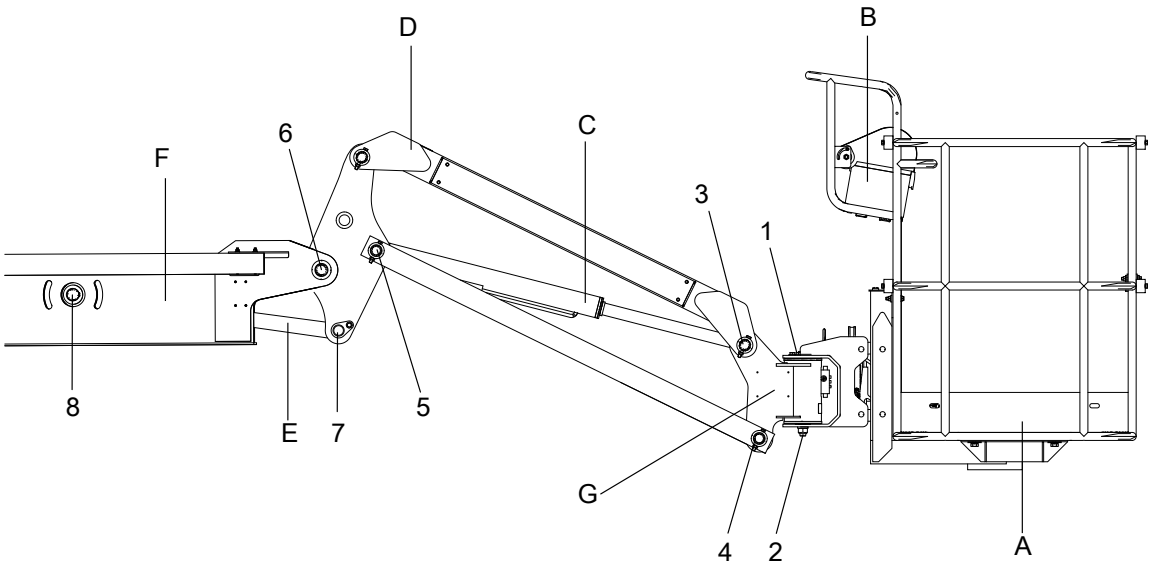


Fig 1 Diagram of platform and jib boom structure

Table 6-1 Description of platform and jib boom structure

No.	Description
A	Platform
B	Platform controller
C	Jib boom lift cylinder
D	Jib boom
E	Upward leveling cylinder
F	Boom tube
G	Swing cylinder

Platform Controller

Disassembly

⚠ WARNING

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

1. Make sure the machine is in stowed position.
2. Turn off the machine and press the emergency stop button on the platform controller and ground controller.
3. Mark and disconnect the harness connections on the platform controller.
4. Remove the fastening bolts on the bottom of the platform controller.
5. Slowly remove the platform controller.

Installation

Follow the reverse order of the disassembly procedures.

Platform Assembly

Disassembly

1. Remove the platform controller from the platform.
2. Remove the foot switch on the platform.
3. Use suitable lifting equipment to support the work platform.
4. Remove the fastening bolt #1 at the swing cylinder and the nut at the pivot pin #2.
5. Knock out the pivot pin #2 with a brass rod and mallet.
6. Slowly remove the platform assembly with the aid of the lifting equipment.

Installation

Follow the reverse order of the disassembly procedures.

Note: Make sure that the bolt at the position #1 and the nut at the position #2 of the swing cylinder have been tightened with the correct torque. Refer to the ***Torque Specifications*** section for the tightening torque.

Jib Boom Assembly

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), ensure that the hydraulic pressure of all hydraulic lines is released and that the hydraulic oil is completely cooled down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.**

Remove jib boom assembly

1. Adjust the main boom to horizontal, and remove the platform assembly.
2. Support the jib boom and upward leveling cylinder with suitable lifting equipment.
3. Mark and disconnect the hydraulic pipelines on the jib boom and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
4. Remove the bolt at the pivot pin #7 of the upward leveling cylinder, and knock out the pivot pin #7 with a brass rod and mallet.
5. Remove the bolt and nut at the pivot pin #6, and knock out the pivot pin #6 with a brass rod and mallet.
6. Slowly remove the jib boom assembly with the aid of the lifting equipment.

Remove jib boom lift cylinder

1. Support the jib boom lift cylinder with suitable lifting equipment.
2. Remove the bolt and nut at the pivot pin #3 and knock out the pivot pin #3 with a brass rod and mallet.
3. Remove the bolt and nut at the pivot pin #5 and knock out the pivot pin #5 with a brass rod and mallet.
4. With the assistance of lifting equipment, slowly remove the jib boom lift cylinder from the jib boom.

⚠ WARNING

When disassembling the cylinder, take care to prevent damage caused by the cylinder falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Inspection

- Inspect the jib boom pivot pin for wear, scratches, deformation or other damage. Replace the pivot pin if necessary.
- Check the inner diameter of the pivot pin bearing for scratches, deformation, wear or other damage. Replace the bearing if necessary.
- Check the connecting pin of jib boom lift cylinder for wear, scratches, deformation or other damage. Before installation, ensure that the surface of the pin has received protective treatment. Replace the pin if necessary.
- Check the inner diameter of the platform swing cylinder bearing for scratches, deformation, wear or other damage. Replace the bearing if necessary.
- Check all threaded parts for elongation, thread deformation, torsion or other damage. Replace the part if needed.
- Check all structures of the jib boom assembly for deformation, cracks, weld separation or other damage. Replace the structure if necessary.

Installation

Follow the reverse order of the disassembly procedures.

Swing Cylinder

Check the swing cylinder fasteners

The swing cylinder fasteners are essential for the normal and safe operation of the machine. It is recommended to check the swing cylinder fasteners every 3 months or 250 hours of operation.

1. Make sure the machine is in stowed position. Locate the swing cylinder at the connection of platform and boom.
2. Check if the bolts at positions #1 and #2 of the cylinder are tightened with the correct torque. Refer to the ***Torque Specifications*** section for the tightening torques.
3. If any fastener is replaced, make sure to tighten the fastener with the torque as indicated in the ***Torque Specifications*** section and apply Loctite 272 threadlocking adhesive.

Disassembly

1. Remove the platform assembly.
2. Mark and disconnect the hydraulic pipelines on the swing cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Support the swing cylinder with suitable lifting equipment.
4. Remove the fastening bolts and nuts at the pivot pins #3 and #4 of the swing cylinder.
5. Knock out pivot pins #3 and #4 with a brass rod and mallet.

6. Slowly remove the swing cylinder with the aid of the lifting equipment.

Installation

Follow the reverse order of the disassembly procedures.

Upward Leveling Cylinder

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), ensure that the hydraulic pressure of all hydraulic lines is released and that the hydraulic oil is completely cooled down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.**

Disassembly

1. Adjust the main boom and jib boom to horizontal, and extend the main boom slightly until the connecting pivot pin at the tail of the cylinder is accessible and easy to be removed.
2. Mark and disconnect the hydraulic pipelines on the upward leveling cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Use suitable lifting equipment to support the platform and jib boom assembly.
4. Remove the fastening bolt at pivot pin #7 at the piston rod end of the upward leveling cylinder. Do not move the pivot pin at this time.
5. Remove the retaining ring at shaft #8. Do not move the shaft at this time.
6. Use suitable lifting equipment to support the piston rod head of the upward leveling cylinder to protect the piston rod from damage.
7. Knock out pivot pin #7 and shaft #8 with a brass rod and mallet.
8. With the assistance of lifting equipment, slowly remove the upward leveling cylinder from the main boom.

⚠ WARNING

When disassembling the cylinder, take care to prevent damage caused by the cylinder falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Installation

Follow the reverse order of the disassembly procedures.

6.3 BOOM

Cable Track Assembly

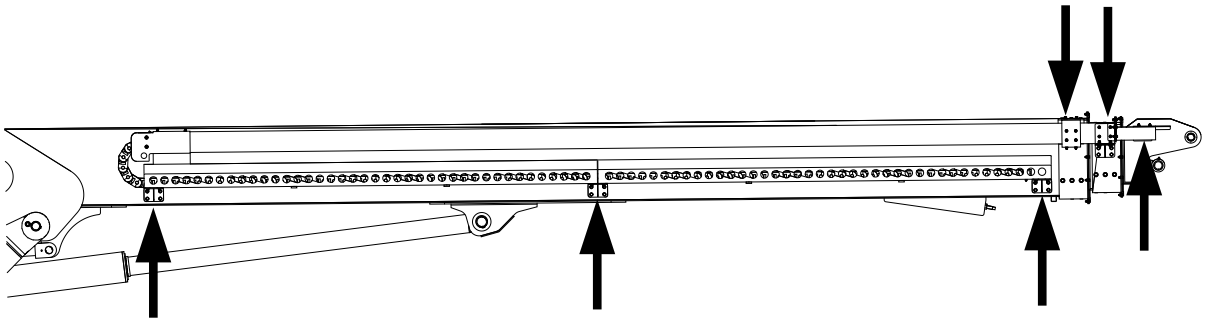


Fig 2 Fastening bolts on cable track assembly

Disassembly

1. Make sure the machine is in stowed position.
2. Mark and disconnect the harness connections on the cable track assembly.
3. Mark and disconnect all hydraulic pipelines from the cable track guide to the platform and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
4. Remove the hydraulic pipelines and wiring harnesses from the cable track guide.
5. Support the cable track assembly along the length with suitable lifting equipment.
6. Remove the fastening bolts indicated by the arrows above.
7. Take appropriate preventive measures and slowly remove the cable track assembly from the boom tube with the aid of the lifting equipment.
8. To disassemble the cable track separately, simply

remove the fastening bolts at both ends of the cable track.

Inspection

- Check all threaded parts for elongation, thread deformation, torsion or other damage. Replace the part if needed.
- Check all structures of the cable track assembly for deformation, cracks, weld separation or other damage. Replace the structure if necessary.

Installation

Follow the reverse order of the disassembly procedures.

Downward Leveling Cylinder

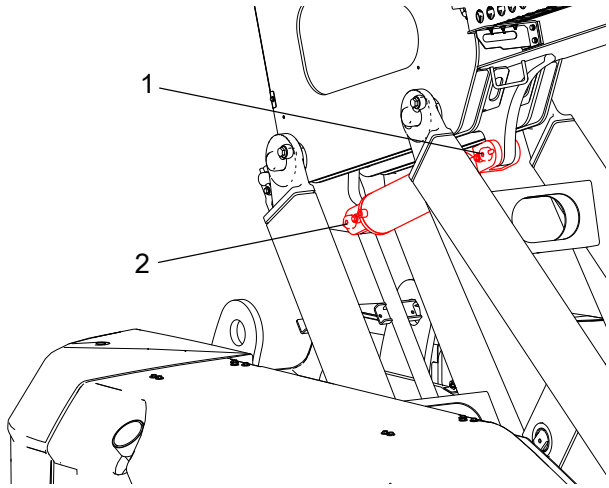


Fig 3 Downward leveling cylinder

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and ensure that the hydraulic oil is completely cooled down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.**

Disassembly

1. Raise the boom tube slightly until the downward leveling cylinder is accessible and can be easily removed.
2. Mark and disconnect the hydraulic pipelines on the downward leveling cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Support the downward leveling cylinder with suitable lifting equipment.
4. Remove the retaining bolt at the pivot pin #1, and knock out the pivot pin #1 with a brass rod and mallet.
5. Remove the retaining bolt at the pivot pin #2, and knock out the pivot pin #2 with a brass rod and mallet.
6. Slowly remove the downward leveling cylinder with the aid of the lifting equipment.

⚠ WARNING

When disassembling the cylinder, take care to prevent damage caused by the cylinder falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Installation

Follow the reverse order of the disassembly procedures.

Lift Cylinder

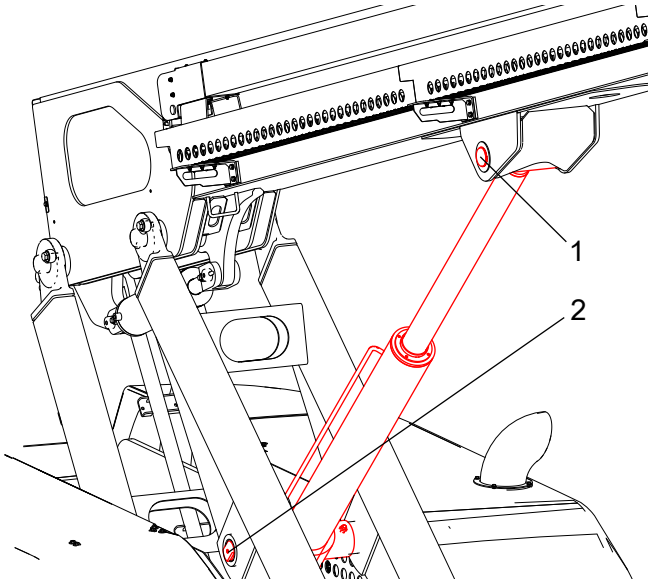


Fig 4 Lift cylinder

Disassembly

⚠ WARNING

- **Before disassembling the lift cylinder, rotate the boom tube to be parallel to the travel direction of the chassis, and make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).**
- **Before disassembling the lift cylinder, place solid and reliable rigid brackets under the counterweight for support, otherwise the machine may tip over, causing serious personal injury and machine damage.**

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and ensure that the hydraulic oil is completely cooled down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.**

1. Raise the boom tube slightly until the lift cylinder is accessible and can be easily removed.
2. Support the boom tube assembly at its approximate center position with suitable lifting equipment (with the lifting capacity not less than 5t/11023lb) to prevent it from falling during disassembly.
3. Mark and disconnect the hydraulic pipelines on the lift cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
4. Support the two ends of the lift cylinder with suitable lifting equipment.
5. Remove the retaining ring at the pivot pin #1 connecting the lift cylinder with the boom tube, and knock out the pivot pin #1 with a brass rod and mallet.
6. Remove the bolt and nut at the pivot pin #2, and knock out the pivot pin #2 with a brass rod and mallet.
7. Slowly remove the lift cylinder with the aid of the lifting equipment.
8. Slowly lower the boom tube to stowed position with the aid of the lifting equipment.

⚠ WARNING

When disassembling the cylinder, take care to prevent damage caused by the cylinder falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Installation

Follow the reverse order of the disassembly procedures.

Main Boom Assembly

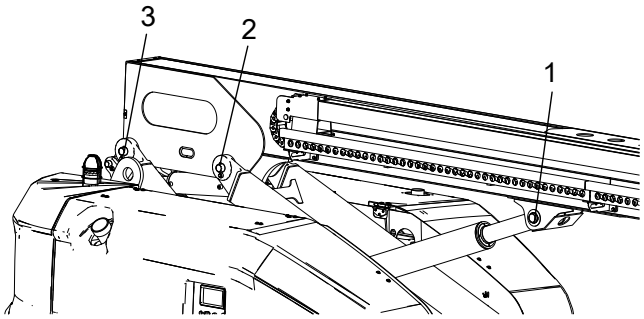


Fig 5 Main boom assembly

Disassembly

⚠ WARNING

- **Before disassembling the main boom assembly, rotate the boom tube to be parallel to the travel direction of the chassis, and make sure the turntable is locked (if equipped with a rotary pin, make sure the rotary pin is locked).**
- **Before disassembling the main boom assembly, place solid and reliable rigid brackets under the counterweight for support, otherwise the machine may tip over, causing serious personal injury and machine damage.**

1. Make sure to remove the platform assembly, jib boom assembly and upward leveling cylinder.
2. Raise the boom tube slightly until the lift cylinder is accessible and the main boom assembly can be easily removed.
3. Mark and disconnect the harness connections on the main boom assembly.
4. Mark and disconnect all hydraulic pipelines on the main boom assembly and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
5. Use suitable lifting equipment (with the lifting

capacity not less than 5t/11023lb) to support the main boom tail (near the platform).

6. Use suitable lifting equipment to provide reliable support for the main boom lift cylinder.
7. Remove the retaining ring at the pivot pin #1 connecting the lift cylinder with the boom tube, and knock out the pivot pin #1 with a brass rod and mallet.
8. Use suitable lifting equipment (with the lifting capacity not less than 5t/11023lb) to support the main boom head (near the turntable).
9. Remove the bolt and stop pin at the pivot pins #2 and #3 connecting the main boom assembly with the support boom.
10. Knock out the pivot pins #2 and #3 with a brass rod and mallet.
11. With the assistance of the lifting equipment, slowly remove the main boom assembly from the turntable and carefully place it on a suitable support.

Installation

Follow the reverse order of the disassembly procedures.

Boom Slider

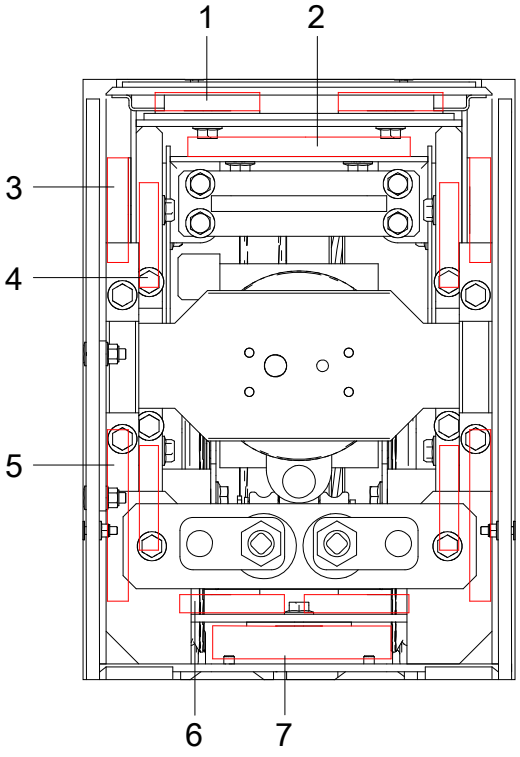


Fig 6 Diagram of sliders at boom head

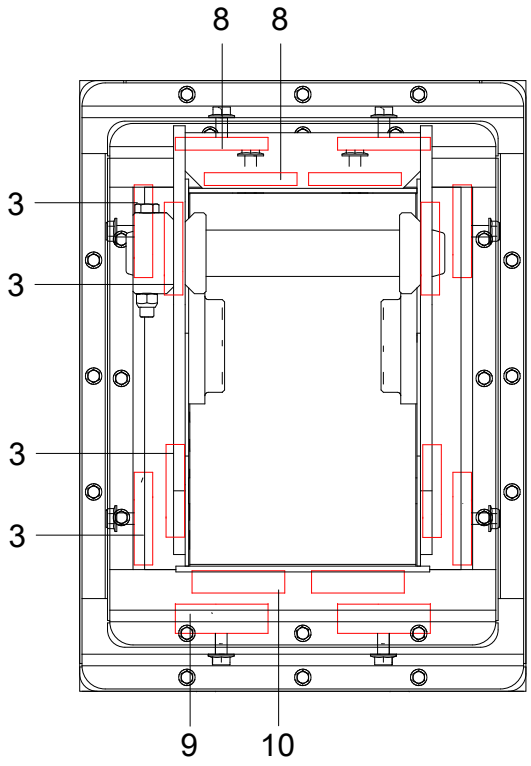


Fig 7 Diagram of sliders at boom tail

Table 6-2 Boom slider thickness

No.	Slider thickness
1	18mm (0.71in)
2	18mm (0.71in)
3	20mm (0.79in)
4	16mm (0.63in)
5	22mm (0.87in)
6	20mm (0.79in)
7	25mm (0.98in)
8	16mm (0.63in)
9	28mm (1.10in)
10	23mm (0.91in)

The boom slider is essential for the safe operation of the machine. As a friction pair will develop between each slider and the telescopic boom surface, improper slider gaskets or continued use of extremely worn sliders may result in component damage and unsafe operation. It is recommended to check the boom slider thickness once a year or after 1000 hours of operation.

1. Remove the cover plate from the head of the main boom (near the turntable) or the nylon brush at the tail of the main boom (near the platform).

2. Measure the thickness of each slider at the head and tail of the main boom.
3. If the telescopic cylinder has sliders, measure the slider thickness after the telescopic cylinder is removed.
4. Compare the measured thickness value of each slider with the value specified in the above table, and replace the slider assembly in time if the wear extent of the slider is greater than or equal to 3mm (0.118in).

NOTICE

The disassembled slider cannot be reused and must be replaced with a new slider assembly.

Telescopic Wire Rope

⚠ WARNING

When extending/retracting the boom tube, all boom segments should extend/retract together at the same speed. In case of any abnormality, there may be a delay in movement and loose wire ropes. Before using the machine each time, extend/retract each boom segment. If there is any abnormality, immediately lower the platform to the stowed position, turn off the machine, and have the wire rope inspected and repaired by qualified service technicians.

NOTICE

The telescopic wire ropes have sharp edges, and touching the wire ropes with bare hands can cause serious injury.

Check wire ropes and pulleys

The telescopic wire ropes are used to extend and retract the boom tube. In order to ensure that the boom extending and retracting are smooth, without shaking and abnormal noise, it is recommended to check the wire ropes and pulleys every quarter or after 250 hours of operation.

1. Remove the cover at the boom tail.
2. Perform the following checks on the wire rope:
   - Check the rope for wear, breakage, corrosion or entanglement, and check the pulley for excessive wear or damage. Replace the wire rope and pulley if necessary.

     Note: The wire rope and pulley must be replaced together. Before installing the wire rope, the wire rope needs to be lubricated.
   - Check the wire rope pulley bearing for wear, scratches or damage. Replace the bearing if necessary.
   - Check the wire rope for foreign debris. If any, clean it up immediately.
   - Check the relative position between the wire rope and pulley. If the wire rope is outside the pulley, adjust the wire rope to the correct position.
   - Manually deflect the wire rope to check the tension of the wire rope. Appropriately tensioned wire ropes should be unable or difficult to move. If the wire rope is inappropriately tensioned, adjust it according to the method below.
3. After checking and making sure there are no problems, install the cover to the boom tail.
4. Start the machine from the ground controller and extend the boom approximately 0.6m (2ft).
5. Retract the boom tube and check the movement of the 2nd and 3rd boom segments. The retraction displacement of the 2nd boom segment should not exceed 1/2 of that of the 3rd boom segment.

Adjust the tension of wire rope

1. Adjust the boom to horizontal and extend it 1.5-1.8m (5ft-6ft).
2. Remove the locking nut from the wire rope fixture.
3. As shown in the figure below, clamp the threaded end (platform end) of the retracting wire rope with a tool to prevent rotation.

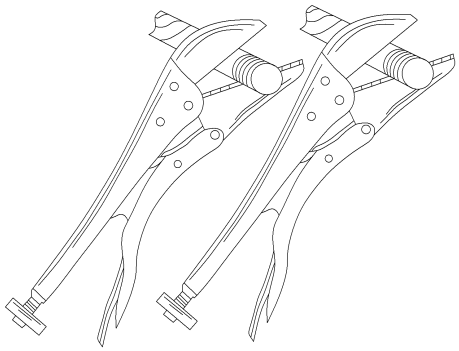


Fig 8

NOTICE

Do not clamp the threads.

4. Install the adjusting nut on the retracting wire rope.
5. Using a wrench, alternately tighten the adjusting nuts on the two retracting wire ropes to the torque in the ***Torque Specifications*** of the manual.
6. Retract the boom to the extended length of 0.6-0.9m (2ft-3ft).
7. Clamp the threaded end (turntable end) of the

extending the wire rope with a tool to prevent rotation.

8. Install the adjusting nut on the extending wire rope.
9. Using a wrench, alternately tighten the adjusting nuts on the two extending wire ropes to the torque in the ***Torque Specifications*** of the manual.
10. Fully retract the boom tube, ensuring that the boom position dimensions are within the specified range of “A” and “B” in the figure below.
11. Reattach the locking nut to the wire rope fixture and remove all clamps.
12. Check whether each boom segment functions properly.

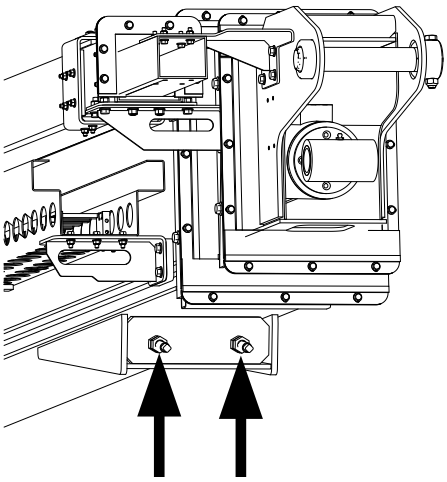


Fig 9 Positions of locking nuts on retracting wire rope

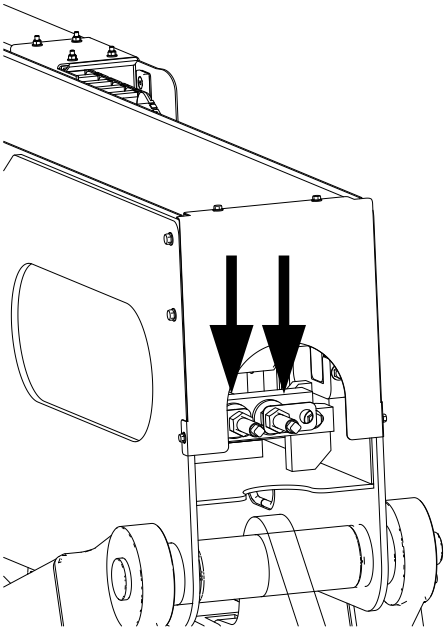


Fig 10 Positions of locking nuts on extending wire rope

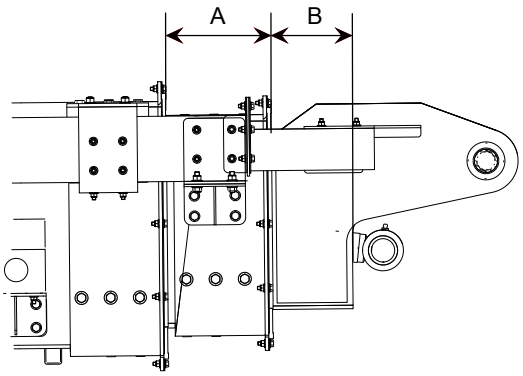


Fig 11 Boom position tolerance

A: 180±15mm (7.1±0.6in)

B: 145±15mm (5.7±0.6in)

Telescopic Cylinder

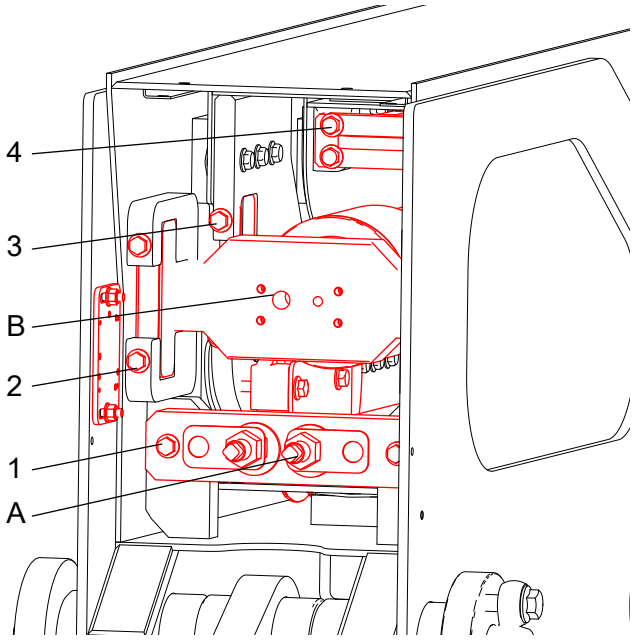


Fig 12 Telescopic mechanism

A Extending wire rope B Telescopic cylinder

Disassembly

1. Adjust the boom tube to fully retracted position and slightly raise the main boom to horizontal position.
2. Remove the cover plate from the head of the main boom (near the turntable).
3. Use suitable lifting equipment to support the boom tube.
4. Mark and disconnect the hydraulic pipelines on the telescopic cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
5. Remove the bolt at position #1 that secures the extending wire rope to the base boom.
6. Remove the bolt at position #2 that secures the telescopic cylinder to the base boom, and remove the stopper and gasket there.
7. Remove the bolt at position #3 that secures the telescopic cylinder to the first telescopic boom, and remove the stopper and gasket there.
8. Remove the bolt at position #4 that secures the extending wire rope to the second telescopic boom.
9. Use suitable lifting equipment to support the front end of the telescopic cylinder and carefully and slowly pull the cylinder along with the extending wire rope out of the main boom head.

NOTICE

When pulling the telescopic cylinder out of the main boom, take extra care to avoid damaging other parts of the boom tube.

10. Before the telescopic cylinder is fully pulled out of the main boom, adjust the lifting equipment to provide sufficient support for the entire cylinder.
11. With the assistance of the lifting equipment, slowly remove the cylinder from the main boom and carefully place it on a suitable support.

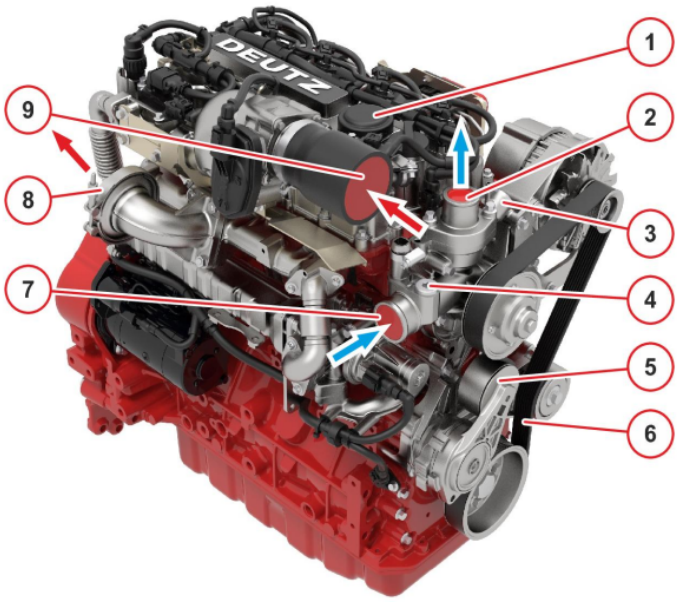
Installation

Follow the reverse order of the disassembly procedures.

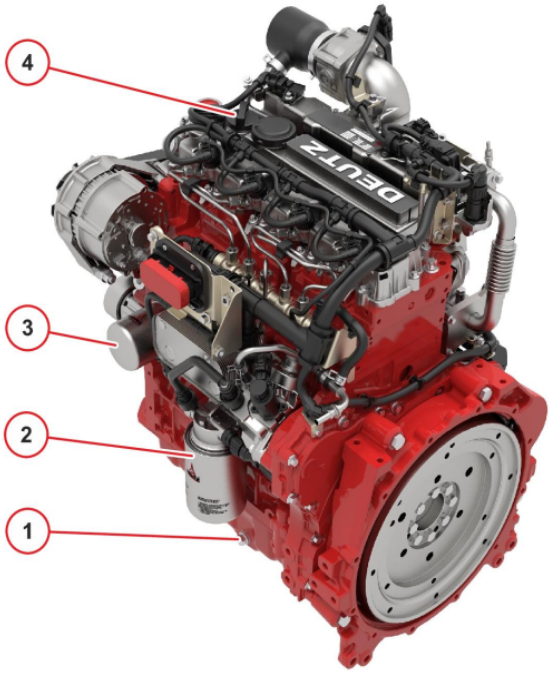
7 POWER SYSTEM

The machine is powered by one of the following engines and equipped with auxiliary power system. This manual only provides brief maintenance instructions of the engines. For detailed instructions, please refer to the engine maintenance manual provided with the machine.

7.1 DEUTZ D2.9L4



1. Crankcase ventilation
2. Coolant outlet
3. Coolant supply flow to the cab heating
4. Coolant return flow from the cab heating
5. Tensioning pulley
6. V-ribbed belt
7. Coolant inlet
8. Air outlet
9. Air inlet



1. Engine oil drain plug
2. Fuel filter
3. Engine oil spare filter
4. Engine oil filler port

Fuel System

Check the Fuel Level

The fuel level can be checked from the energized ground controller display or platform controller display.

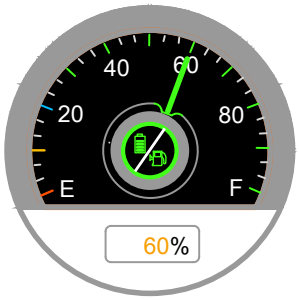


Fig 1 Fuel level (ground controller)

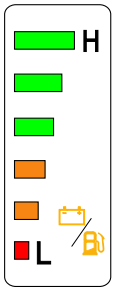


Fig 2 Fuel level (platform controller)

Fill the Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Requirements*** , and never overfill the tank.

⚠ WARNING

- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replace the Fuel Filter Element

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.

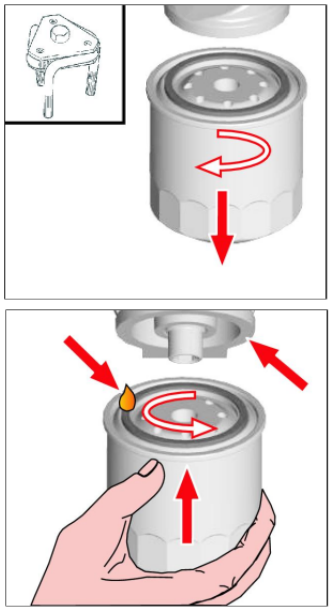


Fig 3 Diagram of replacing fuel filter element

1. If twist protection is installed (optional), remove the clamp first.
2. Place an appropriate oil-collecting vessel under the fuel filter.
3. Use a special tool to loosen and unscrew the filter element.
4. Collect the drained fuel.
5. Wipe the sealing surface of the filter carrier with clean, non-fiber cloths.
6. Apply a thin layer of oil to the sealing surface of the new filter.
7. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 10-12Nm (7-9ft-lb).
8. Secure the clamp on the twist protection (optional).
9. Vent the fuel line.

Replace and Drain the Fuel Pre-filter

It is recommended to drain the fuel pre-filter daily and replace the fuel pre-filter element every 6 months or after 500 hours of operation.

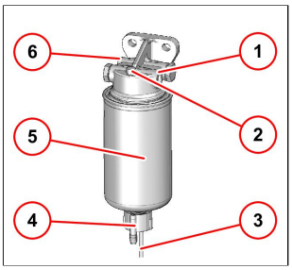


Fig 4 Fuel pre-filter

1. Fuel transfer pump
2. Venting bolt
3. Electrical connection for level sensor
4. Drain valve
5. Filter element
6. Fuel supply from fuel tank

Empty water tank:

1. Turn off the engine.
2. Place an appropriate oil-collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve to allow the liquid to flow out completely.
5. Mount the drain valve.
6. Connect the cable connectors.

Replace the fuel pre-filter:

1. Turn off the engine.
2. Close the fuel shut-off valve to disconnect the fuel supply to the engine (with high-lying tank).
3. Place an appropriate oil-collecting vessel under the drain valve.
4. Disconnect the cable harness.
5. Open the drain valve to allow all liquid to flow out.
6. Remove the filter element.
7. Clean any dirt off the sealing surface of the new filter element and opposite side of the filter head with clean, non-fiber cloths.
8. Apply a thin layer of oil to the sealing surface of the new filter element.
9. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 17-18Nm (12.5-13.3ft-lb).
10. Mount the drain valve.
11. Open the fuel shut-off valve to vent the fuel lines.

Vent the Fuel Lines

NOTICE

Failure to vent the fuel lines may bring damage to the high-pressure pump of the injection system.

The fuel lines is vented through the electric fuel supply pump.

Note: To avoid false fault messages, do not attempt to start the fuel system while venting.

1. Ignition: Turn on the electronic fuel supply pump for 20 seconds to vent the fuel lines and build up the required fuel pressure.
2. Wait until the fuel supply pump is disconnected from the control unit.
3. Turn off the ignition.
4. Repeat the above steps at least 4 times until the fuel lines are fully vented.

Lubrication System

Check the Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Remove the oil dipstick from the engine and wipe the dipstick with non-fiber cleaning cloths.
4. Put the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Change the Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.

2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Open the drain valve to allow the oil to flow out.

> **⚠ WARNING**
>
> **Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.**

5. Install the drain valve after the oil is fully drained.
6. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
7. Warm up the engine so that the engine oil reaches approximately 80°C (176°F) and then shut down the engine.
8. Check the oil level, which should be in the proper position.

Replace the Engine Oil Filter Element

It is recommended to replace the engine oil filter element every 6 months or after 500 hours of operation.

> ***NOTICE***
>
> *Do not pre-fill the filter, or the filter may be contaminated.*

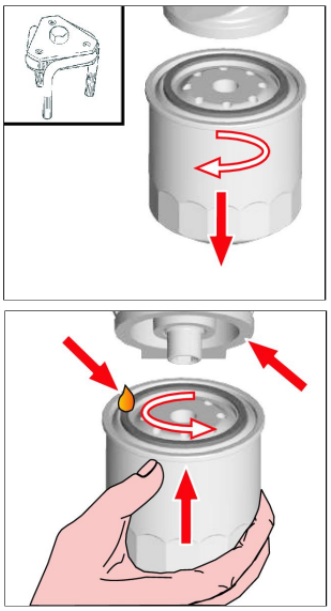


Fig 5 Diagram of replacing engine oil filter element

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Use a special tool to loosen and unscrew the filter element.
3. Collect the drained fuel.
4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 10-12Nm (7-9ft-lb).

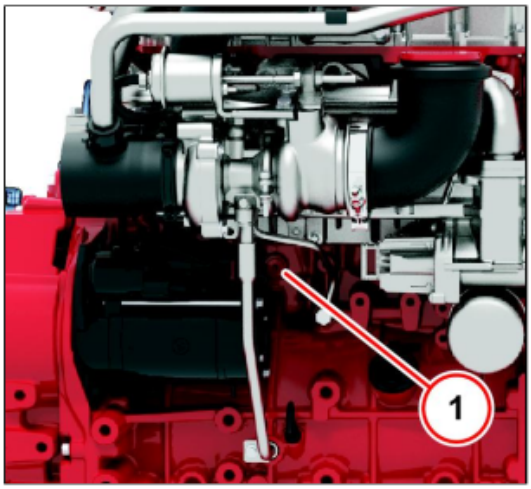
Cooling System

It is recommended to replace the coolant every year or after 1000 hours of operation.

Check the Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. After the coolant temperature drops below 50°C (122°F), slowly open the coolant filler cap to check the coolant level.
4. The coolant level should be between the MIN and MAX marks on the box body.
5. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Empty the Cooling System



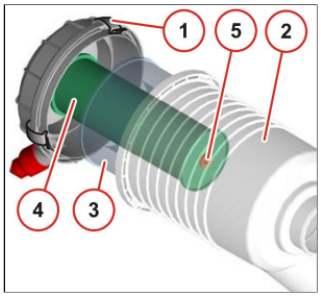
1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C /122°F), carefully open the cooler locking cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the locking screw #1 inside the crankcase.
4. Drain the coolant.

5. Install the locking screw #1 with a new sealing ring.
6. Install the cooler locking cap.

Fill with Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C /122°F), carefully open the coolant filler cap.
2. If necessary, loosen the venting screw on the cooler.
3. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
4. Install the coolant filler cap.
5. Run the engine to operating temperature.
6. Turn off the engine.
7. Check the coolant level in the cooled engine.

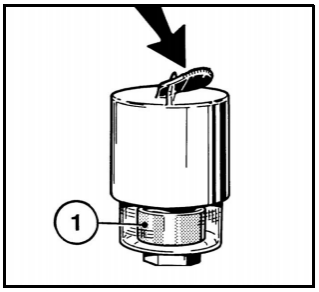
Intake System



1. Clamping yoke
2. Filter hood
3. Filter element
4. Safety cartridge
5. Hex bolt

Fig 6 Air filter

Air Filter Service Indicator



1. Red field

Fig 7 Air filter service indicator

Clean or replace the filter as indicated by the service indicator or service gauge mounted on the air filter intake pipe. Cleaning or replacement is required when:

- The yellow indicator of the service switch flashes with the engine running;
- The red field of the service indicator is fully visible.

After maintenance, push the reset button of the service gauge. The service indicator is ready for operation again.

Maintain the Air Filter

1. Lift up the clamping yoke.
2. Remove the filter hood and pull out the filter element.
3. Check the filter element:
   1) Blow out with dry compressed air (max. 0.5MPa/72.5psi) from the inside to the outside if soiling is only slight;
   2) Renew if heavily soiled.

Replace the Safety Cartridge of Air Filter

It is recommended to replace the safety cartridge of air filter every 3 months or after 250 hours of operation, or as indicated by the status indicator.

NOTICE

Never clean the safety cartridge.

1. Unscrew the hex bolt and pull out the safety cartridge.
2. Install a new safety cartridge and screw on the hex bolt.
3. Install the filter element, mount the filter hood and secure it with the clamping yoke.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspect the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned

- Come off
- Glazed or hardened

If the belt is not properly tensioned, it should be adjusted:

Press firmly the belt midpoint of the longest extension between two pulleys, and the proper deflection is 10-15mm (0.4-0.6in).

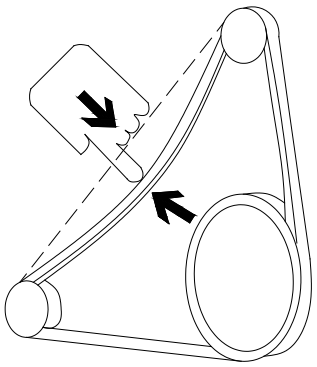
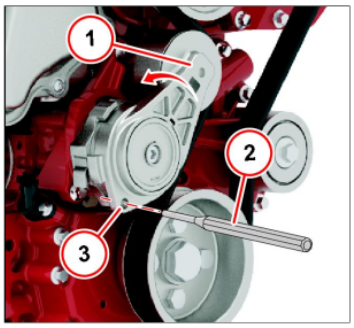


Fig 8 Belt deflections

Replace the V-ribbed Belt

It is recommended to replace the V-ribbed belt every 2 years or after 2000 hours of operation.



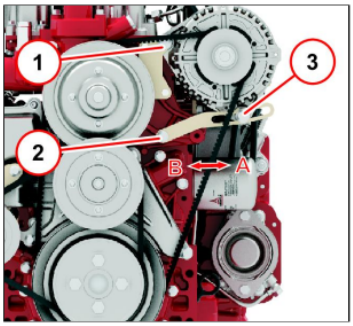
1. Tensioning pulley
2. Retaining pin
3. Assembly bore

Fig 9 Engine V-ribbed belt

1. Press tensioning pulley with socket wrench in the direction of the arrow until the retaining pin can be fixed in the assembly bore. The V-ribbed belt is now tension-free.
2. First pull the V-ribbed belt off the tensioning pulley.
3. Mount new V-ribbed belt.
4. Retain the tensioning pulley using the pin wrench and remove the retaining pin.
5. Tension the V-ribbed belt using the tensioning pulley and socket wrench. Check whether the V-ribbed belt is correctly in its guide.

Replace the V-belt

It is recommended to replace the generator V-belt every 2 years or after 2000 hours of operation.



1. Screw
2. Screw
3. Screw

Fig 10 Generator V-belt

1. Loosen all screws and locking nuts.
2. Move the generator in direction B until the V-belt slackens.
3. Remove the belt and install a new belt.
4. Move the generator in direction A until the V-belt is properly tensioned.
5. Check the tension of the V-belt.
6. Tighten all screws and locking nuts again.

Clean the Engine

The following causes of contamination make cleaning the engine necessary:

- High dust content in the air
- Chaff and chopped straw in the area of the engine
- Coolant leaks
- Lubricating oil leakage
- Fuel leaks

Because of the different application conditions, cleaning depends on the degree of soiling.

Cleaning with compressed air

Blowing dirt off or out. Always blow the cooler and cooling fins from the exhaust air side to the fresh air side.

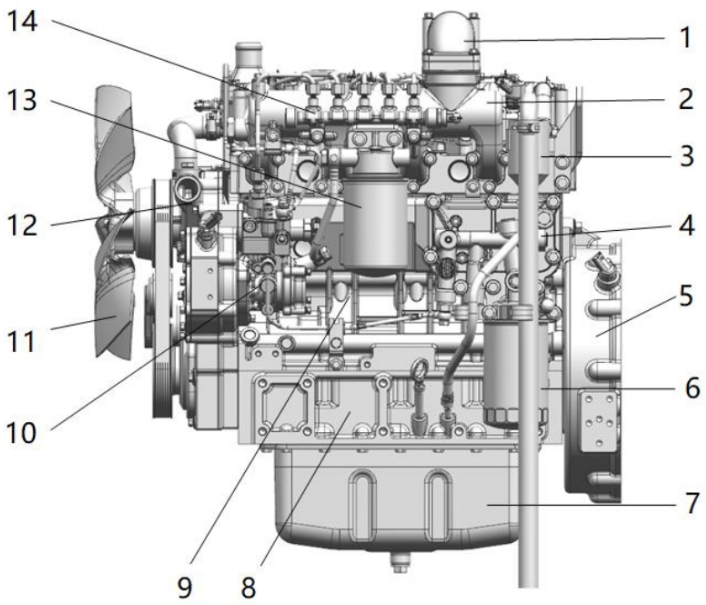
Cleaning with cold cleaner

- Spray the engine with cold cleaner and leave it for about 10 minutes to take effect.
- Spray the engine clean with a high pressure water jet.
- Warm up the engine so that the water residues evaporate.

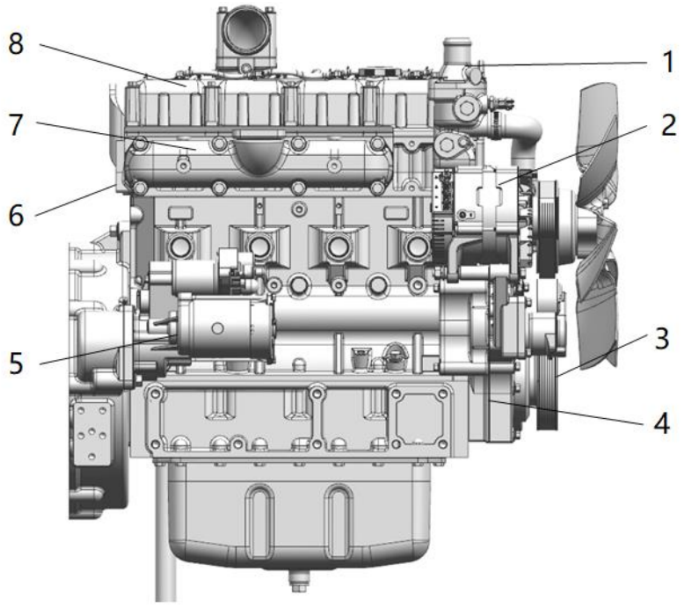
Cleaning with a high pressure cleaner

- Clean the engine with a steam jet with the maximum spray pressure of 6MPa (870psi), the maximum steam temperature of 90℃ (194℉), and the distance at least 1m (3.3ft).
- Warm up the engine so that the water residues evaporate.
- Always clean the cooler and cooling fins from the exhaust air side to the fresh air side.

7.2 YUCHAI YCF30



1. Intake connecting pipe
2. Intake pipe
3. Oil-gas separator
4. Engine oil cooler
5. Flywheel housing
6. Oil filter
7. Oil pan
8. Crankcase
9. Cylinder block
10. Fuel injection pump
11. Fan
12. Water pump
13. Diesel filter
14. Common rail pipe



1. Thermostat cover
2. Generator
3. Crankshaft Pulley
4. Gear housing and cover
5. Starter
6. Cylinder head
7. Exhaust pipe
8. Cylinder head cover

Fuel System

Check the Fuel Level

The fuel level can be checked from the energized ground controller display or platform controller display.

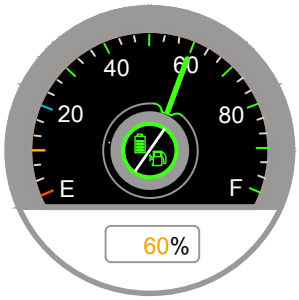


Fig 11 Fuel level (ground controller)

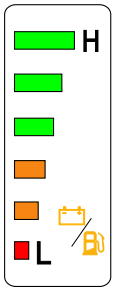


Fig 12 Fuel level (platform controller)

Fill the Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Requirements*** , and never overfill the tank.

⚠ WARNING

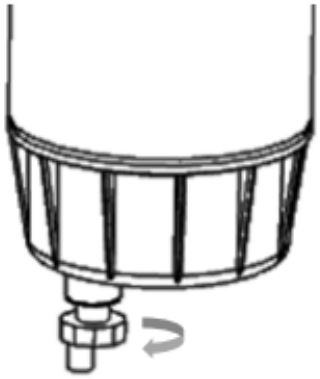
- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replace the Fuel Filter Element

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.

Replace and Drain the Fuel Pre-filter

It is recommended to drain the fuel pre-filter daily and replace the fuel pre-filter element every 6 months or after 500 hours of operation.



Empty the fuel pre-filter:

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve to allow the liquid to flow out completely.
5. Mount the drain valve.
6. Connect the cable connectors.

Replace the fuel pre-filter:

1. Turn off the engine.
2. Close the fuel shut-off valve to disconnect the fuel supply to the engine (with high-lying tank).
3. Place an appropriate oil-collecting vessel under the drain valve.
4. Disconnect the cable harness.
5. Open the drain valve to allow all liquid to flow out.
6. Remove the filter element.
7. Clean any dirt off the sealing surface of the new filter element and opposite side of the filter head with clean, non-fiber cloths.
8. Apply a thin layer of oil to the sealing surface of the new filter element.
9. Screw on the new element by hand until the gasket is touching, then tighten it with proper torque.
10. Mount the drain valve.
11. Open the fuel shut-off valve to vent the fuel lines.

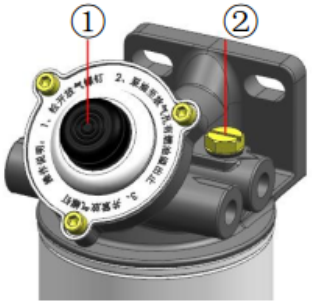
Vent the Fuel Lines

NOTICE

Failure to vent the fuel lines may bring damage to the high-pressure pump of the injection system.

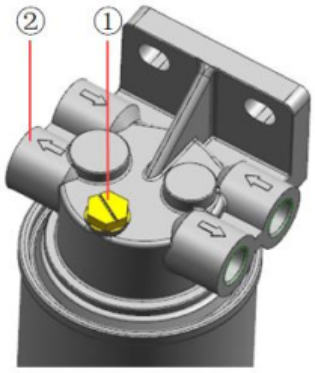
The fuel lines is vented through the electric fuel supply pump. If the pre-filter is of integrated electronic fuel transfer pump structure, this operation is not necessary.

To avoid false fault messages, do not attempt to start the fuel system while venting.



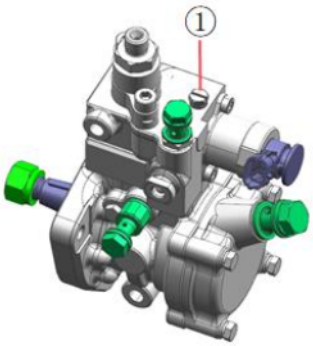
1. Hand pump (on pre-filter)
2. Venting screw

Fig 13 Fuel pre-filter



1. Venting screw
2. Oil outlet connection

Fig 14 Fuel fine filter



1. Venting screw

Fig 15 Fuel injection pump

1. Loosen the venting screw on the pre-filter, press the hand pump on the pre-filter, and tighten the venting screw on the pre-filter when there is continuous bubble-free fuel flowing out of the venting screw.
2. Loosen the venting screw on the fine filter (if there is

no venting screw, loosen the oil outlet connection of the fine filter), press the hand pump on the pre-filter, tighten the venting screw (or oil outlet connection) on the fine filter when there is continuous bubble-free fuel flowing out of the venting screw (or fine filter oil outlet).

Note: The oil outlet on the fine filter is generally indicated by an arrow, and what needs to be loosened is the connection with the oil pipe.

3. Loosen the venting screw on the fuel injection pump, press the hand pump on the pre-filter, and tighten the venting screw on the fuel injection pump after there is continuous bubble-free fuel flowing out of the venting screw.
4. Continuously press the hand pump on the pre-filter to keep more fuel flowing into the injection pump.
5. After the engine starts, it is recommended to run the engine at idle speed for 2min-3min, and then run it at 60%-80% of the rated speed for 3min-5min to fully empty the air in the fuel line.

Lubrication System

Check the Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Remove the oil dipstick from the engine and wipe the dipstick with non-fiber cleaning cloths.
4. Put the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Change the Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Open the drain valve to allow the oil to flow out.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

5. Install the drain valve after the oil is fully drained.
6. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
7. Warm up the engine so that the engine oil reaches approximately 80°C (176°F) and then shut down the engine.
8. Check the oil level, which should be in the proper position.

Replace the Engine Oil Filter Element

It is recommended to replace the engine oil filter element every 6 months or after 500 hours of operation.

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Use a special tool to loosen and unscrew the filter element.
3. Collect the drained fuel.
4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Screw on the new filter by hand until the gasket is touching, then tighten it with proper torque.

Cooling System

It is recommended to replace the coolant every year or after 1000 hours of operation.

Check the Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are

horizontal.

3. After the coolant temperature drops below 50°C (122°F), slowly open the coolant filler cap to check the coolant level.
4. The coolant level should be between the MIN and MAX marks on the box body.
5. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Empty the Cooling System

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.

Fig 16 Pressure cap on the radiator

2. Place an appropriate container under the discharge outlet.
3. Loosen the drain valve on the engine oil cooler.

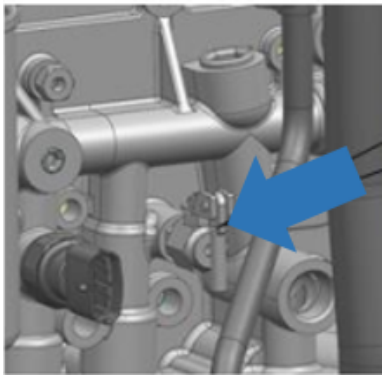


Fig 17 Drain valve on the engine oil cooler

4. Drain the coolant.
5. Reinstall the pressure cap and drain valve.

Fill with Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.
2. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
3. Install the coolant filler cap.
4. Run the engine to operating temperature.
5. Turn off the engine.
6. Check the coolant level in the cooled engine.

Intake System

Filtration Principle of Air Filter

- **Primary filter:** air director (to make the air form a vortex and remove dirt through the dust bag after the dust settles to the bottom under the action of gravity and centrifugal force).
- **Secondary filter:** main filter element (as major filtration, with the filtration rate of more than 95%).
- **Third-stage filter:** safety filter element (as auxiliary filtration while preventing foreign matter from entering).

Air Filter Service Indicator

The user can find out the air filter blockage by checking the air resistance indicator installed on the intake pipe behind the air filter, and when the indication window of the air resistance indicator changes from green to red under normal conditions, it indicates that the air intake resistance exceeds the limit value and the filter needs to be cleaned or replaced.

Air Filter Maintenance

It is recommended to maintain the air filter every 3 months or after 250 hours of operation.

Air filter housing: Remove the dust in the filter cavity, air director and dust bag, and do not throw the air director away without recognizing its function.

Main filter element: Remove the dust from the surface of the filter element with a brush, then blow the element with compressed air (pressure of 0.4-0.6MPa/58-87psi) from the inside to the outside.

Safety filter element: clean it by hand patting and avoid blowing with air.

Replace the Air Filter Element

It is recommended to replace the air filter element every 3 months or after 250 hours of operation, or replace the entire filter after maintenance of the air filter for 3-4 times.

Before installing the element, check if the sealing gasket is damaged or missing. For tightening, first rotate the element to make it positioned in place, and ensure airtightness to avoid air flow short-circuit.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspect the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

Check the tension of the belt frequently during use to ensure the belt is properly tensioned. If the belt is too loose, it will reduce the transmission efficiency and decrease the speed of the water pump, fan and generator, affecting the cooling effect, while the vibration generated will cause unnecessary wear of the belt and pulley. If the belt is too tight, it will shorten the service life of the belt, bearings and other parts.

Belt deflection detection: Generally, when a force of 40–50N (9–11lbf) is applied between two pulleys, the belt will deflect 3-5mm (0.1-0.2in).

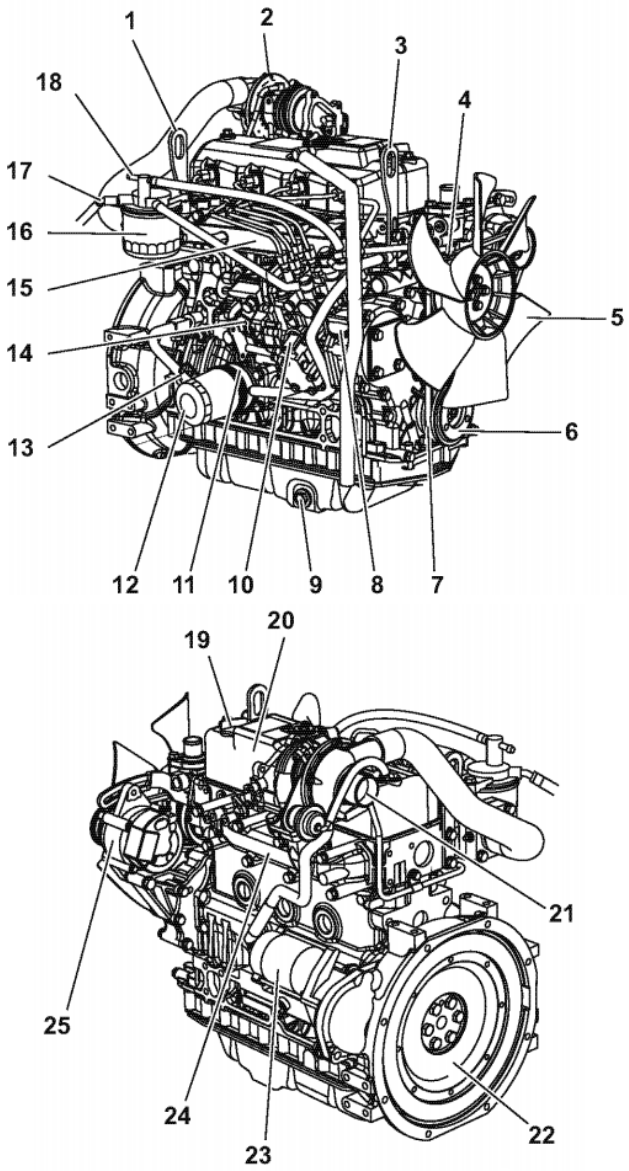
Replace the Belt

It is recommended to replace the belt every 2 years or after 2000 hours of operation.

NOTICE

For applications with multiple belts, the entire set of drive belts needs to be replaced, and replacing only one belt in a set will make the new belt bear more loads, because the old belt has been stretched, and the additional load will be applied to the new belt, causing the new belt to break.

7.3 YANMAR 4TNV88-BDFLTC



1. Lifting eye (flywheel end)
2. Turbocharger[1]
3. Lifting eye (engine cooling fan end)
4. Engine coolant pump
5. Engine cooling fan
6. Crankshaft V-pulley
7. V-belt
8. Side filler port (engine oil)
9. Drain plug (engine oil)[2]
10. Fuel injection pump
11. Engine oil cooler
12. Engine oil filter
13. Dipstick (engine oil)
14. Governor lever
15. Intake manifold
16. Fuel filter
17. Fuel inlet
18. Fuel return to fuel tank
19. Top filler port (engine oil)
20. Rocker arm cover
21. Air intake port (from air cleaner)
22. Flywheel
23. Starter motor
24. Exhaust manifold
25. Alternator

[1]Do not apply to this model.

[2]Engine oil drain plug location may vary based on oil pan options.

Fuel System

Check the Fuel Level

The fuel level can be checked from the energized ground controller display or platform controller display.

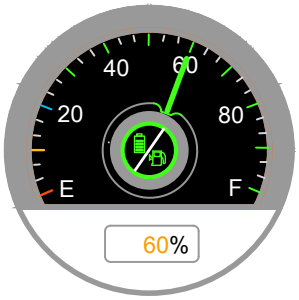


Fig 18 Fuel level (ground controller)

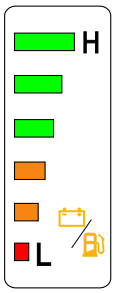


Fig 19 Fuel level (platform controller)

Fill the Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Requirements*** , and never overfill the tank.

⚠ WARNING

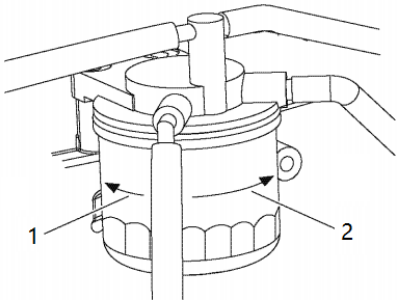
- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replace the Fuel Filter Element

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.



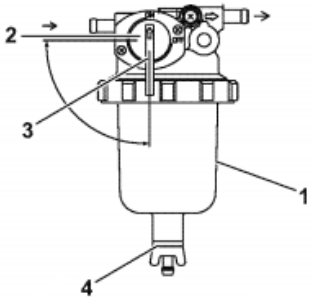
1. To the left
2. To the right

Fig 20 Fuel filter

1. Stop the engine and allow it to cool.
2. Close the fuel cock of the fuel filter.
3. Remove the fuel filter using a filter wrench to turn it to the left. When removing the fuel filter, carefully hold it to prevent the fuel from spilling. Wipe up all spilled fuel.
4. Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter.
5. Install the new fuel filter. Hand-tighten it to the right until it comes in contact with the mounting surface. Use a filter wrench to tighten it.
6. Open the fuel cock of the fuel filter.
7. Prime the fuel system.
8. Check for fuel leaks.

Drain and Clean the Fuel Pre-filter

It is recommended to drain the fuel pre-filter daily and replace the fuel pre-filter element every 6 months or after 500 hours of operation.



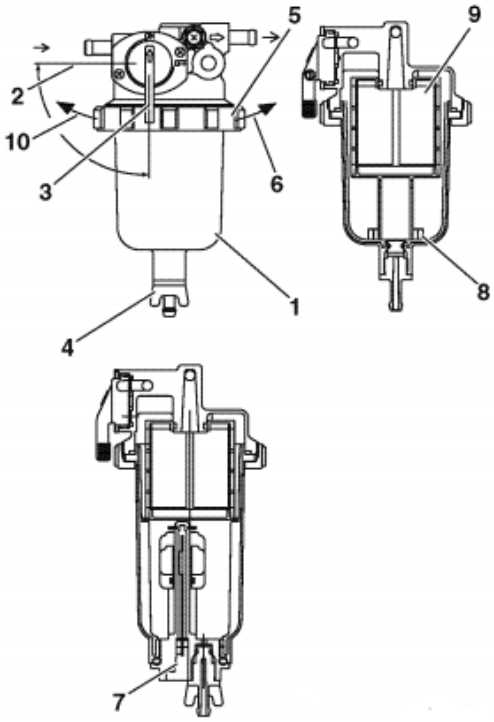
1. Fuel pre-filter
2. Closed
3. Fuel cock
4. Drain plug

Fig 21 Fuel pre-filter

Empty the fuel pre-filter:

1. Turn off the engine.
2. Place an appropriate oil-collecting container under the drain plug.
3. Close the fuel cock.
4. Loosen the drain plug to allow the liquid to flow out completely. (if no water flows out after the drain plug is loosened, loosen the venting screw on the top of the fuel pre-filter by turning it counterclockwise 2-3 turns with a screwdriver. Ensure to tighten the venting screw after draining).
5. Hand-tighten the drain plug.
6. Open the fuel cock.
7. Prime the fuel system.
8. Check for fuel leaks.

Clean the fuel pre-filter:



1. Cup
2. Closed
3. Fuel cock
4. Drain plug
5. Retaining ring
6. To the right
7. Sense wire
8. Float ring
9. Filter element
10. To the left

Fig 22

1. Place an appropriate oil-collecting container under the cup.
2. Close the fuel cock.
3. Loosen the drain plug to allow the liquid to flow out completely.
4. Turn the retaining ring to the left and remove the cup. If equipped, disconnect the sensor wire from the cup before removing the cup.
5. Carefully hold the cup to prevent fuel from spilling.
6. Remove the float ring from the cup. Pour the contaminants into the container and dispose of it properly.
7. Clean the element and inside cup. Replace the element if it is damaged.
8. Install the element and O-ring in the bracket.
9. Position the float ring in the cup.
10. Check the condition of the O-ring. Replace it if necessary.
11. Install the cup to the bracket by tightening the retaining ring to the right.
12. Close the drain plug. Reconnect the sensor wire if equipped.
13. Open the fuel cock.
14. Prime the fuel system.
15. Check for fuel leaks.

Lubrication System

Check the Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Remove the oil dipstick from the engine and wipe the dipstick with non-fiber cleaning cloths.
4. Put the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Change the Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Remove one of the oil filter covers in the figure below to ventilate the engine crankcase for easier oil drainage.

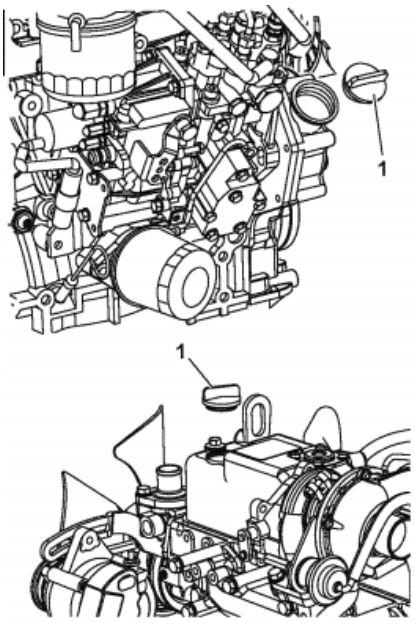


Fig 23

5. Open the drain valve to allow the oil to flow out.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

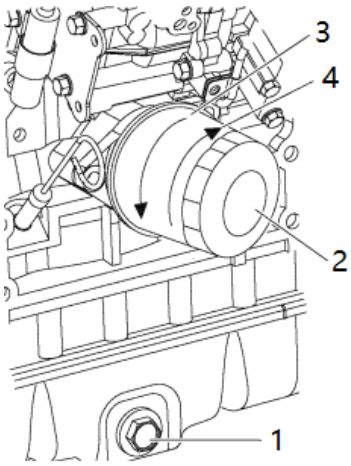
6. Install the drain valve after the oil is fully drained.
7. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
8. Warm up the engine by running it for 5 minutes and check for engine oil leaks.
9. After the engine is warm, shut it off and let it sit for 10 minutes.
10. Recheck the engine oil level.
11. Add engine oil to the engine oil filler port as needed until the level is between the upper and lower lines shown on the dipstick.
12. Install the oil filter cover.

Replace the Oil Filter Element

It is recommended to replace the engine oil filter element every 6 months or after 500 hours of operation.

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.



1. Drain plug
2. Engine oil filter
3. Counterclockwise
4. Clockwise

Fig 24

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Turn the engine oil filter counterclockwise using an oil filter wrench.
3. Collect the drained fuel.
4. Wipe the mounting surface of the oil filter with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Screw on a new filter clockwise by hand until the gasket is touching, then tighten it with an oil filter wrench.
7. Add new engine oil to the engine as necessary.

8. Warm up the engine by running it for 5 minutes and check for engine oil leaks.
9. After the engine is warm, shut it off and let it sit for 10 minutes.
10. Recheck the engine oil level.
11. Add engine oil to the engine oil filler port as needed until the level is between the upper and lower lines shown on the dipstick.

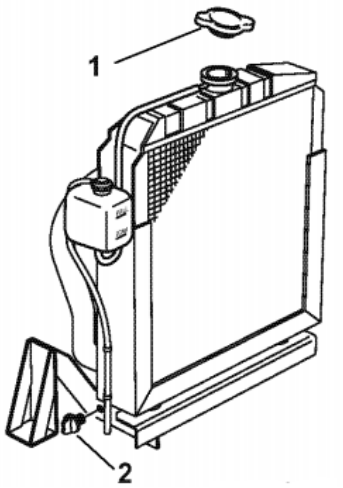
Cooling System

It is recommended to replace the coolant every year or after 1000 hours of operation.

Check the Cooling System

1. When the engine is cold, the coolant level in the tank should be at or slightly above the LOW (COLD) mark on the coolant reserve tank.
2. If the coolant level is at the FULL (HOT) mark when the engine is cold, the coolant will expand when it becomes hot and possibly spray out of the overflow hose.
3. Check the radiator hoses for cracks, abrasions, cuts or other damage. Replace if necessary.

Empty the Cooling System



1. Radiator cap
2. Drain plug

Fig 25 Radiator

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the radiator cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the drain plug at the bottom of the radiator.
4. Drain the engine coolant.
5. Drain the coolant from the engine block.
   1) On models not equipped with an oil cooler, remove the coolant drain plug from the engine block.

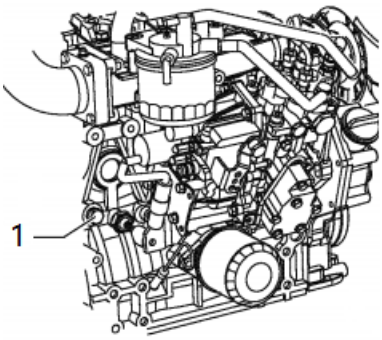


Fig 26 Coolant drain plug

   2) On models equipped with an oil cooler, remove the coolant hose at the oil cooler.

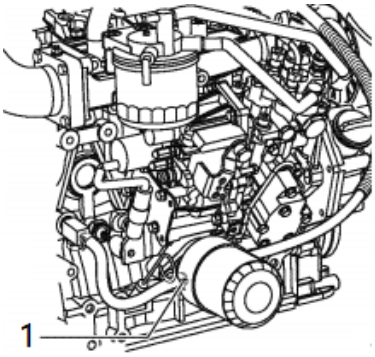
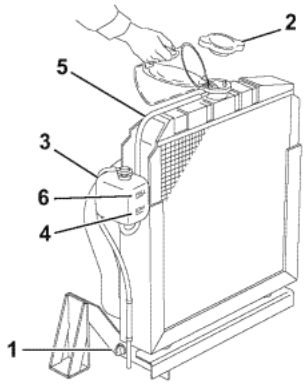


Fig 27 Coolant hose

6. After draining the engine coolant, flush the radiator and engine block to remove any rust, scale and contaminants.
7. Then reinstall and tighten the drain plug in the radiator. Reinstall and tighten the engine block drain plug or reconnect the coolant hose at the oil cooler.

Fill with Coolant



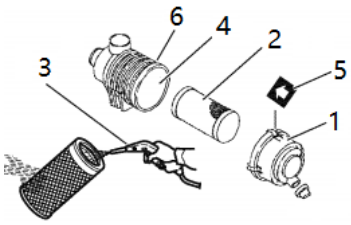
1. Drain plug
2. Radiator cap
3. Reserve tank
4. LOW (COLD) mark
5. Hose connecting the reserve tank to the radiator
6. FULL (HOT) mark

Fig 28

1. Check to be sure the radiator drain plug is installed and tightened. Also make sure the coolant drain plug in the cylinder block is closed and the coolant hoses are installed at the oil cooler.
2. Remove the radiator cap by turning it counterclockwise.
3. Pour the engine coolant slowly into the radiator until it is even with the lip of the engine coolant filler port. Make sure that air bubbles do not develop as you fill the radiator.
4. Reinstall the radiator cap. Align the tabs on the back side of the radiator cap with the notches on the engine coolant filler port. Press down and turn the cap clockwise.
5. Remove the cap of the reserve tank, and fill it to the LOW (COLD) mark. Reinstall the cap.
6. Check the hose that connects the reserve tank to the radiator. Be sure it is securely connected and there are no cracks or damage. If the hose is damaged, engine coolant will leak out instead of going into the reserve tank.
7. Run the engine until it reaches operating temperature. Check the level of engine coolant in the reserve tank. When the engine is running and the engine coolant is at normal temperature, the coolant level in the reserve tank should be at or near the FULL (HOT) mark. If the coolant is not at the FULL (HOT) mark, add coolant to the reserve tank to bring the coolant level to the FULL (HOT) mark.

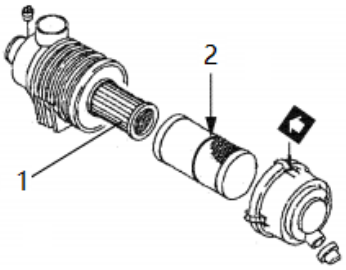
Intake System

Clean the Air Filter Element



1. Air filter cover
2. Element
3. Compressed air
4. Air filter housing
5. Arrow on the cover
6. Outer housing

Fig 29 Typical air filter (single element)



1. Inner element
2. Red line on the outer element

Fig 30 Typical air filter (double element)

1. Unlatch and remove the air filter cover.
2. Remove the element (outer element if equipped with two elements).
3. Blow air through the element from the inside out using 0.29-0.49MPa (42-71psi) compressed air to remove the particulates. Use the lowest possible air pressure to remove the dust without damaging the element.
4. If the air filter is equipped with a double element, only remove and replace the inner element if the engine lacks power or the dust indicator actuates (if equipped).

   Note: The inner element should not be removed when cleaning or replacing the outer element. The inner element is used to prevent dust from entering the engine while servicing the outer element.
5. Replace the element with a new one if the element is damaged, excessively dirty or oily.
6. Clean inside of the air filter cover.
7. Reinstall the element into the air filter housing.

   Note: If there is a red line in the outer element, reinsert the element until the overlap position of red line and end face of the air filter housing.

8. Reinstall the air filter cover, making sure you match the arrow on the cover with the arrow on the housing.
9. Latch the air filter cover to the housing.

Replace the Air Filter Element

It is recommended to replace the air filter element every 3 months or after 250 hours of operation.

When replacing the element, clean the inside of the air filter case.

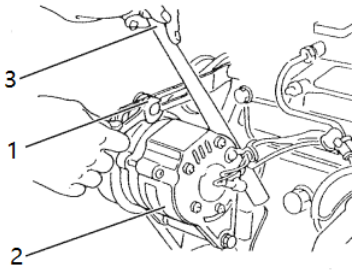
If the air filter is equipped with a double element, only remove and replace the inner element if the engine lacks power or the dust indicator actuates (if equipped). This is in addition to replacing the outer element.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Adjust the Belt Tension



1. Adjusting bolt
2. Alternator
3. Pry bar

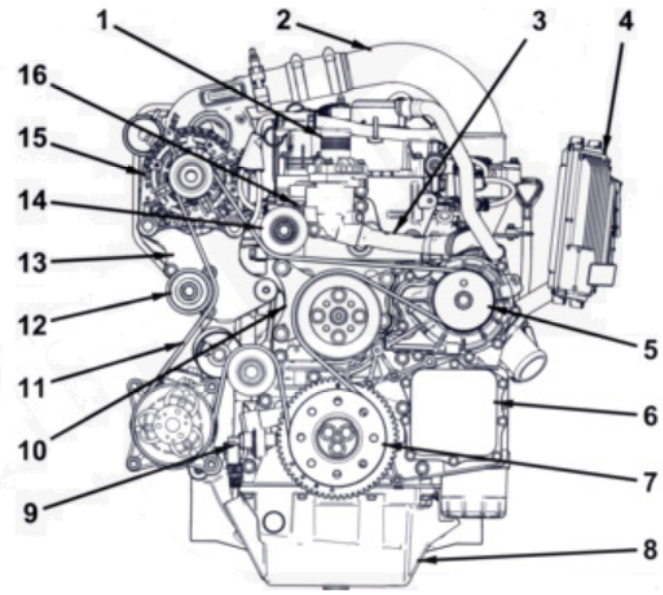
Fig 31

1. Loosen the adjusting bolts and related bolts and/or nuts.
2. Then move the alternator with a pry bar.
3. Tighten the belt to the desired tension.
4. There must be clearance between the belt and the bottom of the pulley groove. If there is no clearance between the belt and the bottom of the pulley groove, replace the belt.
5. After adjusting, run the engine for 5 minutes or more. Check the tension again.

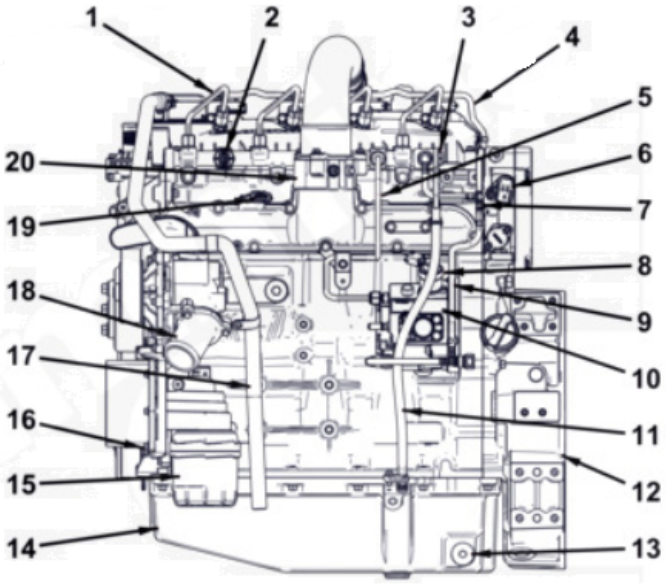
Replace the V-ribbed Belt

It is recommended to replace the V-ribbed belt every 2 years or after 2000 hours of operation.

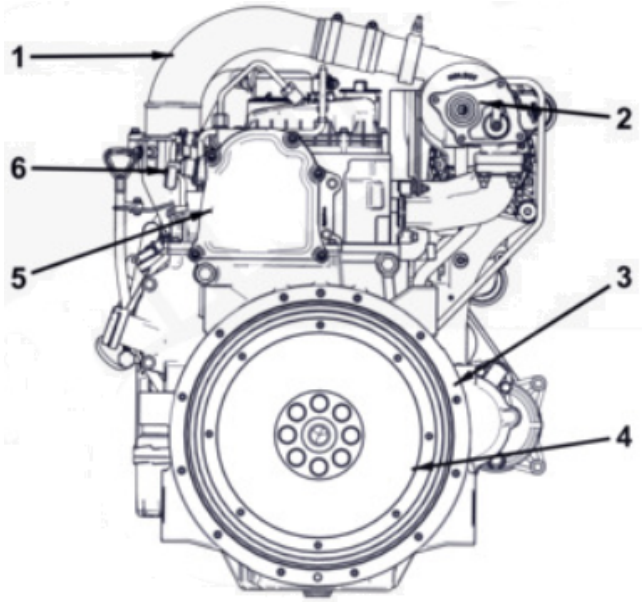
7.4 CUMMINS QSF2.8



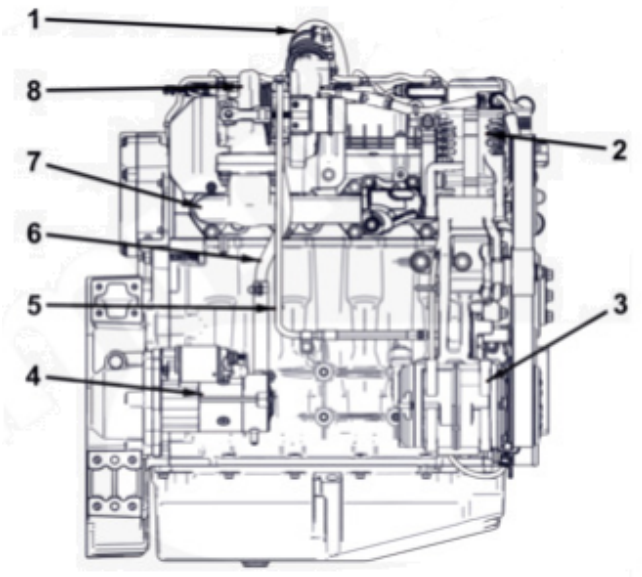
1. Coolant outlet connection
2. Air crossover tube
3. Thermostat housing pipeline
4. Engine control module (ECM)
5. Pump drive device
6. Front gear housing cover
7. Crankshaft pulley
8. Oil pan
9. Crankshaft position sensor
10. Fan hub bracket
11. Fan belt
12. Belt tensioner
13. Charger mounting bracket
14. Idler pulley
15. Charger
16. Coolant temperature sensor



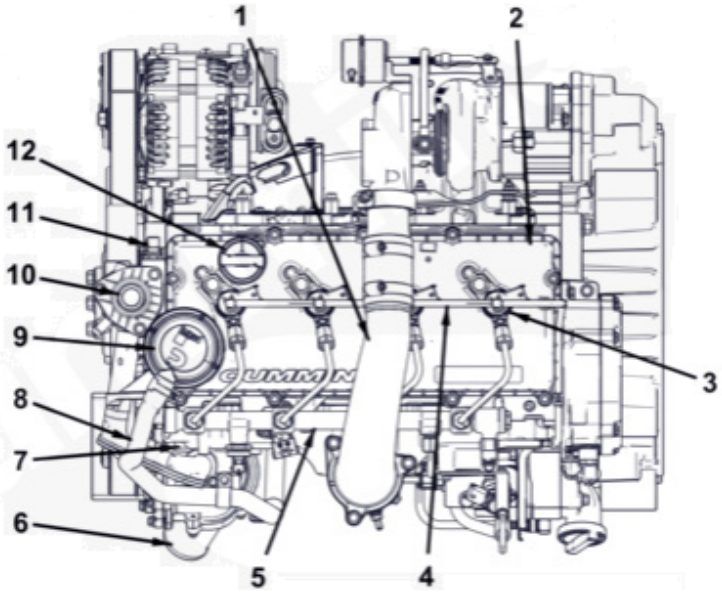
1. High-pressure fuel supply to oil injector
2. Fuel rail pressure sensor
3. Fuel rail pressure-reducing valve
4. Fuel rail return pipe
5. High-pressure fuel supply to fuel rail
6. Camshaft position sensor
7. Connecting fuel return pipe
8. Fuel pump actuator
9. Fuel pump return pipe
10. High-pressure fuel pump
11. Engine oil gauge (dipstick)
12. Flywheel housing
13. Drain plug
14. Oil pan
15. Oil filter
16. Crankshaft position sensor
17. Crankcase breather pipe
18. Water inlet connection
19. Intake air temperature/pressure sensor
20. Intake connection



1. Air crossover tube
2. Exhaust outlet connection
3. Flywheel housing
4. Flywheel
5. Overhead camshaft sprocket housing cover
6. Camshaft position sensor



1. Air crossover tube
2. Charger
3. Refrigerant compressor (optional)
4. Starting motor
5. Turbocharger oil supply pipe
6. Turbocharger oil return pipe
7. Exhaust manifold
8. High level-mounted turbocharger



1. Air crossover tube
2. Rocker arm housing cover
3. Fuel injector
4. Fuel injector return pipe
5. High-pressure fuel rail
6. Water inlet connection
7. Coolant temperature sensor
8. Crankcase breather pipe
9. Crankcase breather
10. Water outlet connection
11. Coolant temperature sensor
12. Engine oil filling port

Fuel System

Check the Fuel Level

The fuel level can be checked from the energized ground controller display or platform controller display.

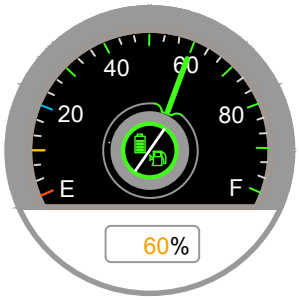


Fig 32 Fuel level (ground controller)

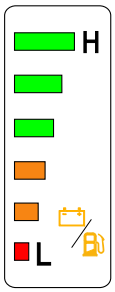


Fig 33 Fuel level (platform controller)

Fill the Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Requirements*** , and never overfill the tank.

⚠ WARNING

- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replace the Fuel Filter Element

NOTICE

- *Do not pre-fill the fuel filter on the pressure side. Pre-filling the pressure-side fuel filter can cause debris to enter the fuel system and damage fuel system components.*
- *After installing the fuel filter, the fuel system must be filled.*
- *Tightening the filter too tightly can cause thread distortion, or bring damage to the filter element gasket or filter tank.*

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.

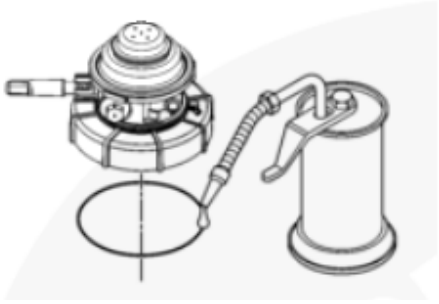


Fig 34

1. Disconnect the battery.
2. If necessary, disconnect the fuel heater wire harness.
3. Disconnect the fuel pipe.
4. Loosen the top of the fuel filter housing and remove the O-ring and fuel filter element.
5. Lubricate the O-ring with clean oil.
6. Install the new fuel filter element into the fuel filter housing.
7. Reinstall the top of the fuel filter housing and tighten it by hand.
8. Connect the fuel pipe.
9. If necessary, connect the fuel heater wire harness.
10. Connect the battery.
11. Vent the fuel line.

Drain the Fuel-water Separator

It is recommended to drain the fuel-water separator daily.

Drain the tank-type fuel-water separator:

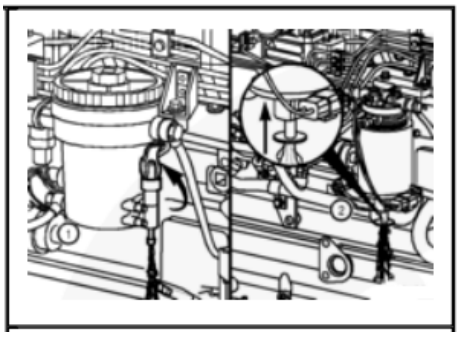


Fig 35

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Lift the drain valve lever up until all liquid is drained from the drain pipe.
5. Drain the water from the separator until clean fuel is seen.
6. Push the drain valve up until all liquid is drained from the drain pipe.
7. Connect the cable connectors.

Drain the spin-on fuel-water separator:

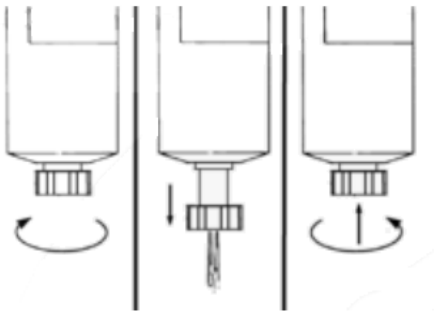


Fig 36

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve until all liquid is drained from the drain pipe.
5. Drain the water from the separator until clean fuel is seen.
6. Lift the drain valve up and rotate it clockwise until tightened by hand.
7. Connect the cable connectors.

Vent the Fuel Lines

NOTICE

Failure to vent the fuel lines may bring damage to the high-pressure pump of the injection system.

The fuel lines is vented through the electric fuel supply pump.

To avoid false fault messages, do not attempt to start the fuel system while venting.

1. Ignition: Turn on the electronic fuel supply pump for 20 seconds to vent the fuel lines and build up the required fuel pressure.
2. Wait until the fuel supply pump is disconnected from the control unit.
3. Turn off the ignition.

4. Repeat the above steps at least 4 times until the fuel lines are fully vented.

Lubrication System

Check the Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Remove the oil dipstick from the engine and wipe the dipstick with non-fiber cleaning cloths.
4. Put the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Change the Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, run the engine until the coolant reaches approximately 60°C (140°F), and then turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Remove the drain plug to drain the oil. Make sure to remove all oil and suspended dirt from the engine.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

5. Clean and inspect the threads and sealing surfaces of the drain plug. If damaged, replace the O-ring with a new one.

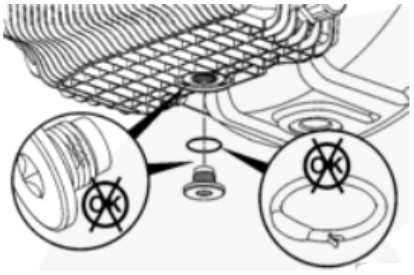


Fig 37

6. Reinstall the drain plug after the oil is fully drained.
7. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
8. Idle the engine and check the drain plug for leakage.
9. Turn off the engine. Wait about 5 minutes for the oil to flow back from the upper parts of the engine.
10. Check the oil level, which should be in the proper position.

Replace the Engine Oil Filter Element

It is recommended to replace the engine oil filter element every 6 months or after 500 hours of operation.

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Disassemble the oil filter with special tools.
3. Collect the drained fuel.
4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Fill the filter with clean oil.
7. Mount the filter on the oil filter bracket.
8. Screw on the filter by hand until the gasket is touching, then tighten it.
9. Idle the engine and check the oil filter gasket for leakage.

Cooling System

It is recommended to replace the coolant every year or after 1000 hours of operation.

Check the Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Check the coolant level, which should be between

the upper mark and lower mark.

4. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Empty the Cooling System

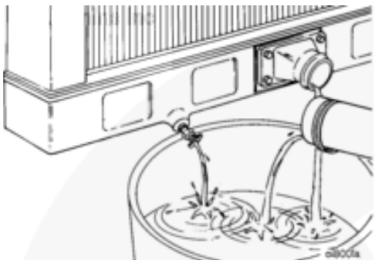


Fig 38

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the radiator cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the drain plug at the bottom of the radiator.
4. Drain the engine coolant.
5. Install the drain plug.

Fill with Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.
2. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
3. Reinstall the pressure cap.
4. Run the engine to operating temperature.
5. Turn off the engine.
6. Check the coolant level in the cooled engine.

Intake System

Check the Intake Pipe

Visually inspect the intake pipe daily for signs of wear, damaged pipelines or loose clamps that could damage the engine. If necessary, replace the damaged pipe and tighten the loose clamp to ensure that the air system does not leak.

Check the clamp and hose of the intake pipe for corrosion, which may allow the corrosive and dirt to enter the air intake system. If necessary, disassemble and clean the system.

Check the Resistance of Air Filter

Mechanical resistance indicator

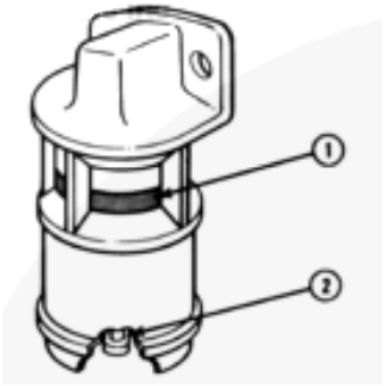


Fig 39

Note: Do not remove the felt washer of the indicator. The felt washer is used to absorb moisture.

The mechanical resistance indicator indicates if the resistance for air to go through the dry air filter is too high. The indicator can be mounted on the air filter outlet or the dashboard. As dirt accumulates in the filter element, the red mark (1) in the window will gradually rise. After replacing the filter element, press the reset button (2) to reset the indicator.

Vacuum indicator

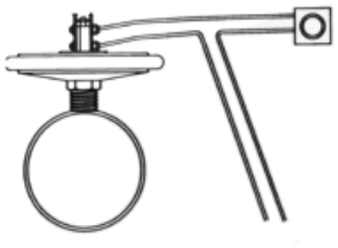


Fig 40

The resistance or vacuum indicator should be installed as close as possible to the turbocharger inlet to obtain actual resistance. When the air resistance is too high, the vacuum switch will activate the alarm indicator on the dashboard.

Mechanical indicator for industrial gas

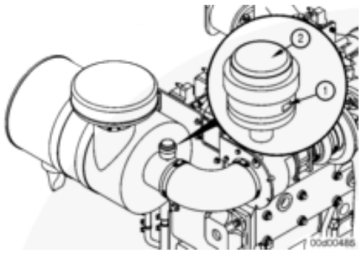


Fig 41

The mechanical resistance indicator indicates if the resistance for air to go through the dry air filter is too high. The indicator can be mounted on the air filter outlet. As dirt accumulates in the filter element, the red mark (1) in the window will gradually rise. After replacing the filter element, press the reset button (2) to reset the indicator.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspect the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

If the belt is not properly tensioned, it should be adjusted:

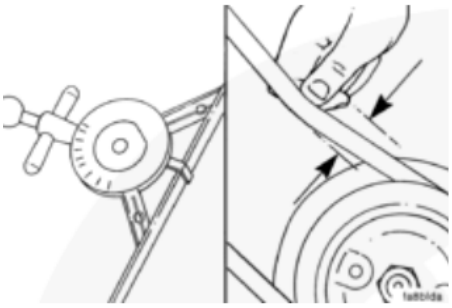


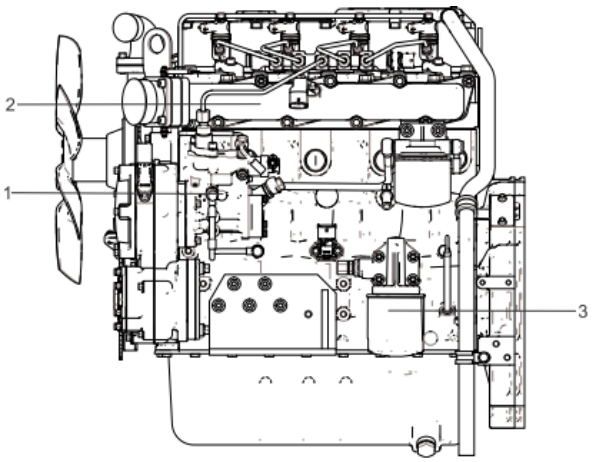
Fig 42

1. Check the belt tension at its center.
2. Refer to the chart of engine belt tension to select the correct test gauge and tension value based on the width of the belt used.
3. Use alternative method (deflection method) to apply a force of 110N (25lbf) on the V-belt between two pulleys to check the belt tension. If the deflection of the pulley center distance per foot exceeds the belt thickness, the belt tension must be adjusted.

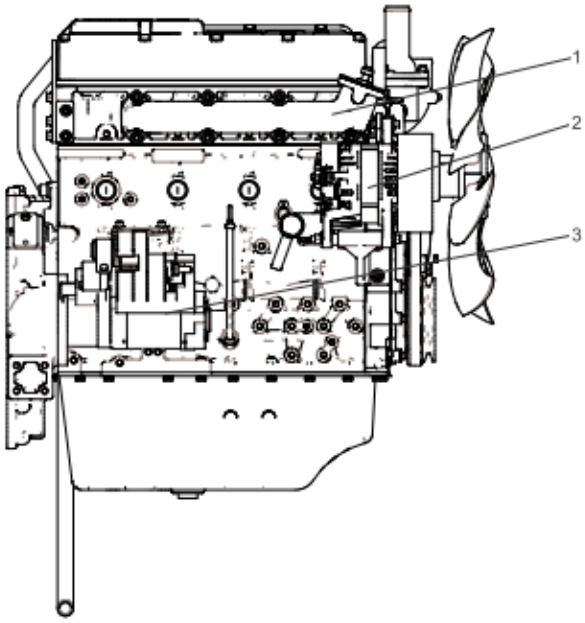
Replace the V-ribbed Belt

It is recommended to replace the V-ribbed belt every 2 years or after 2000 hours of operation.

7.5 WEICHAI WP3.2



1. Fuel injection pump
2. Intake pipe
3. Oil filter



1. Exhaust pipe
2. Generator
3. Starter

Fuel System

Check the Fuel Level

The fuel level can be checked from the energized ground controller display or platform controller display.

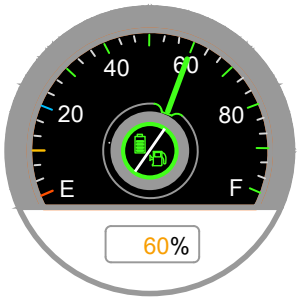


Fig 43 Fuel level (ground controller)

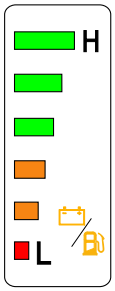


Fig 44 Fuel level (platform controller)

Fill the Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Requirements*** , and never overfill the tank.

⚠ WARNING

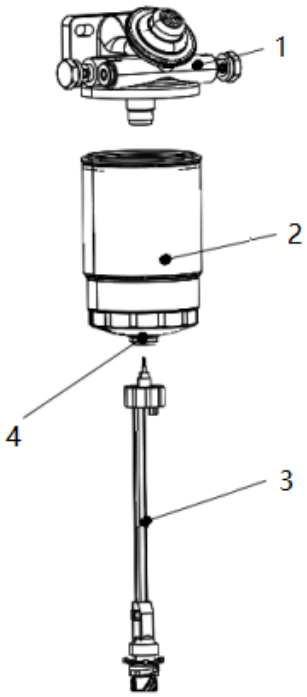
- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replace the Fuel Filter and its Element

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.



1. Fuel filter bracket
2. Primary filter element
3. Water level sensor
4. Waterproof port

Fig 45 Fuel filter

1. Turn off the engine.
2. Remove the old fuel filter element and remove the water collector on the primary filter if it is still usable.
3. Lubricate the seal.
4. Screw on the filter by hand until the seal is connected to the connector.
5. Continue tightening the filter by hand until the filter is securely seated (approximately 3/4 turn).
6. Perform leakage test.

Vent the Fuel Lines

NOTICE

Failure to vent the fuel lines may bring damage to the high-pressure pump of the injection system.

To avoid false fault messages, do not attempt to start the fuel system while venting.

1. Open the fuel tank valve and loosen the venting screw on the fuel pre-filter.
2. Press the hand pump on the fuel pre-filter to vent the fuel system.
3. Tighten the venting screw.

Lubrication System

Check the Engine Oil Level

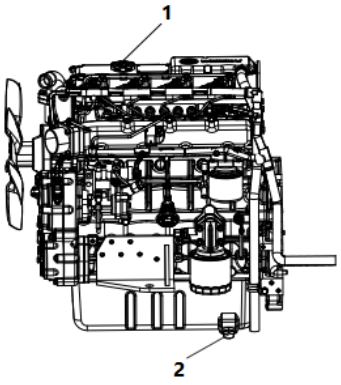
1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Remove the oil dipstick from the engine and wipe the dipstick with non-fiber cleaning cloths.
4. Put the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Change the Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*



1. Filler cap
2. Drain plug

Fig 46

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.

4. Remove the drain plug at the bottom of the oil pan.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

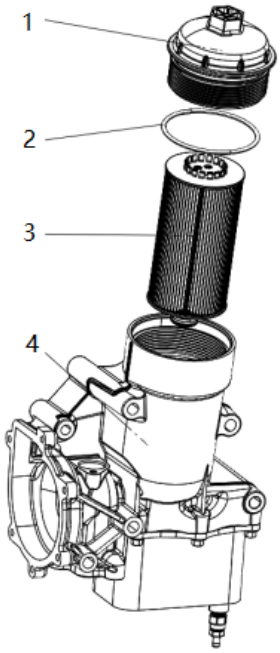
5. Screw on the drain plug after the oil is fully drained.
6. Open the filler cap, and fill with engine oil from the oil filler port.
7. Make sure the oil level reaches the specified level on the dipstick before reinstalling the filler cap.
8. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
9. Warm up the engine so that the engine oil reaches approximately 80°C (176°F) and then shut down the engine.
10. Check the oil level, which should be in the proper position.

Replace the Oil Filter or its Element

NOTICE

Do not pre-fill the filter, or the filter may be contaminated.

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.



1. Filter cover
2. O-ring
3. Filter element
4. Filter bracket

Fig 47 Oil filter

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Screw out the filter cover about 10-15mm (0.4-0.6in) (when a small hole is exposed on the filter cover, it has been screwed out about 10mm/0.4in), leave it for 3-4min, wait for the dirty engine oil to flow to the oil pan, and remove the filter cover (normally the filter element will be removed together).
3. Remove the filter element from the filter cover, and remove the O-ring on the filter cover. Install a new O-ring, and apply oil to the surface of the O-ring. Screw the new filter element into the groove of the filter cover, and apply oil to the small O-ring at the bottom of the filter element.
4. Install the filter cover together with the filter element to the filter bracket, and tighten the filter cover according to the torque requirements marked on the filter cover.
5. Start the engine to check for oil leakage.

NOTICE

- *The filter element and filter cover must be assembled together before installed on the filter bracket.*
- *Unqualified diesel or oil filter elements can lead to premature wear of bushings in parts such as crankshafts, increasing the risk of excessive emissions.*

Cooling System

It is recommended to replace the coolant every year or after 1000 hours of operation.

Check the Coolant Level

NOTICE

Before opening the filler port cover, make sure to press the exhaust button to prevent injury by hot coolant with the engine warmed.

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. After the coolant temperature drops below 50°C (122°F), slowly open the coolant filler port cover to check the coolant level.

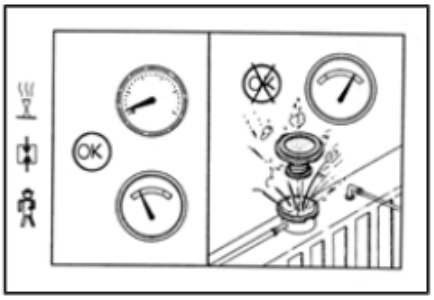


Fig 48 Coolant filler port cover

4. The coolant level should be between the MIN and MAX marks on the box body.
5. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Empty the Cooling System

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C /122°F), carefully open the cooler locking cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the engine drain plug.
4. Drain the coolant.
5. Reinstall the drain plug.

Fill with Coolant

NOTICE
Add coolant during the process in time to keep the coolant level no lower than the lower mark line on the expansion tank.

1. After the engine and radiator have cooled sufficiently (the temperature drops below 50°C/122°F), carefully unscrew the expansion tank pressure cap.
2. Fill with correct coolant slowly according to the ***Oil Requirements*** until the coolant level in the expansion tank reaches the upper mark line and drops slowly.
3. Keep the expansion tank pressure cap open, start the engine and idle it until the coolant level does not drop any more, and fill with coolant to the upper mark line.
4. Close the expansion tank pressure cap and keep running the engine until the thermostat reaches the opening temperature (reference for the thermostat to open: the pipeline between the upper tank on the radiator and the thermostat becomes significantly hot) and the coolant level does not drop any more. For rapid heating and venting, this operation should be performed with the engine running at high speed intermittently in situ.
5. Add coolant to the upper mark line and close the expansion tank pressure cap to complete filling process.

Intake System

Check the Hermetic Sealing

Check whether the intake hose is aged and cracked, and whether the clamp is loose. Tighten or replace parts if necessary to ensure the tightness of the air intake system.

Check and Replace the Air Filter Element

It is recommended to replace the air filter element every 3 months or after 250 hours of operation, or as indicated by the service indicator. When the intake resistance indicator gives an alarm (turns red), turn off the machine and maintain the outer element of the air filter.

Radial sealing air filter

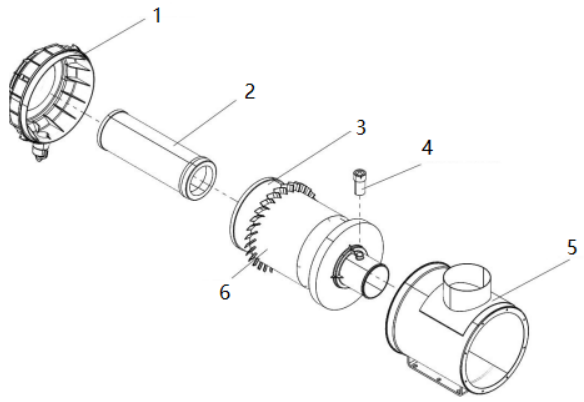


Fig 49 Radial sealing air filter

1. Air filter back cover
2. Safety filter element
3. Main filter element
4. Air filter service indicator
5. Air filter housing
6. Air director

NOTICE

Pay attention to protect the inside the filter element during maintenance to avoid impurities entering the filter element during maintenance.

1. Check the air filter service indicator, and maintain the air filter when the indicator becomes red.
2. Open the air filter back cover clip, remove the back cover, shake the main filter element up and down, and remove the main filter element horizontally.
3. Check whether there is dust in the old filter element and on the surface of the safety filter element. If there is dust, the filter layer must be broken, and the filter element must be replaced.
4. Blow the outer element with 0.5MPa (72.5psi) clean air from the inside to the outside. Do not move the safety filter element during maintenance. If cleaning is not possible, it is recommended to replace the filter element.
5. Check if the air director inside the housing is properly installed: push the air director to the bottom of the housing, and turn the air director to ensure it is properly installed.
6. Reinstall the cleaned outer filter element into the air filter and press the filter element inward.
7. Reinstall the back cover of the air filter, check whether the sealing ring in the bottom cover has come off or damaged. When installing the back cover, the dust exhaust valve should be positioned vertically downward, push the back cover to contact with the housing, and clamp the back cover and the housing with a clamping jaw.

NOTICE

Check whether the dust exhaust valve of the back cover is blocked, deformed or cracked to ensure that the dust exhaust valve is working normally.

8. After the maintenance is completed, press the reset button on the service indicator to return to the green state.

NOTICE

- *When cleaning the main filter element, the safety filter element should not be cleaned and should be installed on the machine at all times. The safety filter element should only be replaced when the main filter element is replaced.*
- *It is forbidden to blow the outer filter element from the outside to the inside. If there is lots of dust on the outer surface of the filter element, remove the dust by hand patting. The inner filter element (safety filter element) must not be disassembled and cleaned, and must be replaced together with the outer filter element.*
- *If the service indicator still gives an alarm after cleaning the safety filter element, try to change the main filter element and the safety filter element.*

93 dust filter

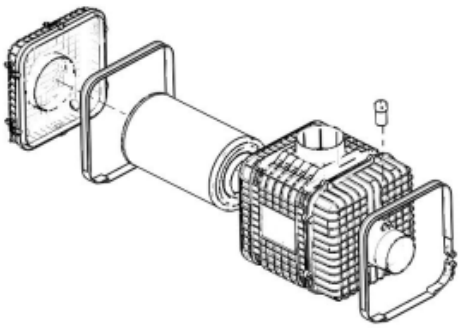


Fig 50 93 dust filter

NOTICE

- *When turning off the machine for inspection, the dust can be removed in time through the dust exhaust valve which should be replaced in time if it is damaged or lost.*
- *Never operate the engine without equipped an air filter, or dust and impurities entering the engine may cause premature engine wear.*

1. Loosen all the clips connecting the back cover to the housing, then remove the back cover and clean all dust from the back cover.
2. Turn the yellow sealing cap counterclockwise and remove it, and then the outer filter element will be visible.
3. Grasp the back cover lug of the outer filter element with hand and pull the outer filter element out from the cavity inside the air filter housing.
4. Maintain the outer filter element according to the air filter maintenance instructions.
5. Before reinstalling the outer filter element, clean the dust in the cavity of the filter and its thread with a brush or cloth to ensure that the thread is smooth and prevent dust from entering the inside of the outer filter element.
6. Reinstall all parts in reverse order correctly to ensure the filter is sealed and that no parts are missed.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspect the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

If the belt is not properly tensioned, it should be adjusted:

1. If a belt tension tester is available: Use the belt tension tester to measure the belt pretension and running tension. For correct belt pretension and running tension, please refer to the chart of engine belt tension.
2. If a belt tension tester is unavailable: Press down or pull up the belt by hand in the middle of two pulleys with the force of 10kg (22lb), and take the belt span length as 200mm (7.9in) for calculation. Estimate the tension by referring to the chart of engine belt tension reference value, and refer to the chart of engine belt tension for the correct running tension.

   Note: If the belt span length is not equal to 200mm (7.9in), estimate the tension reference value by proportional increase or decrease.

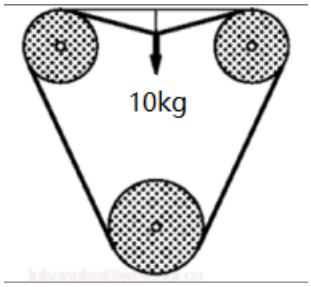


Fig 51

Replace the V-ribbed Belt

It is recommended to replace the V-ribbed belt every 2 years or after 2000 hours of operation.

Clean the Engine

1. After warming up the engine, drain the engine oil, clean the oil filter, and add anti-rust oil. Drain the fuel and add anti-rust oil again.
2. Drain the coolant and add coolant containing rust inhibitor.
3. Start the engine and idle it for 15-25min.
4. Fill with clean oil, fuel and coolant.
5. Take care to protect other parts.

7.6 AUXILIARY POWER SYSTEM

The auxiliary power system relies on two 12V batteries in parallel to provide power for a 12V DC motor which drives the gear pump to work. When the main power source fails, the auxiliary power system can be used to lower the operator in the platform to the ground. The auxiliary power system cannot be used as the main power source to drive the travel function, but can be used to return the machine to the stowed position in a short time.

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8 HYDRAULIC SYSTEM

8.1 LAYOUT OF HYDRAULIC ELEMENTS

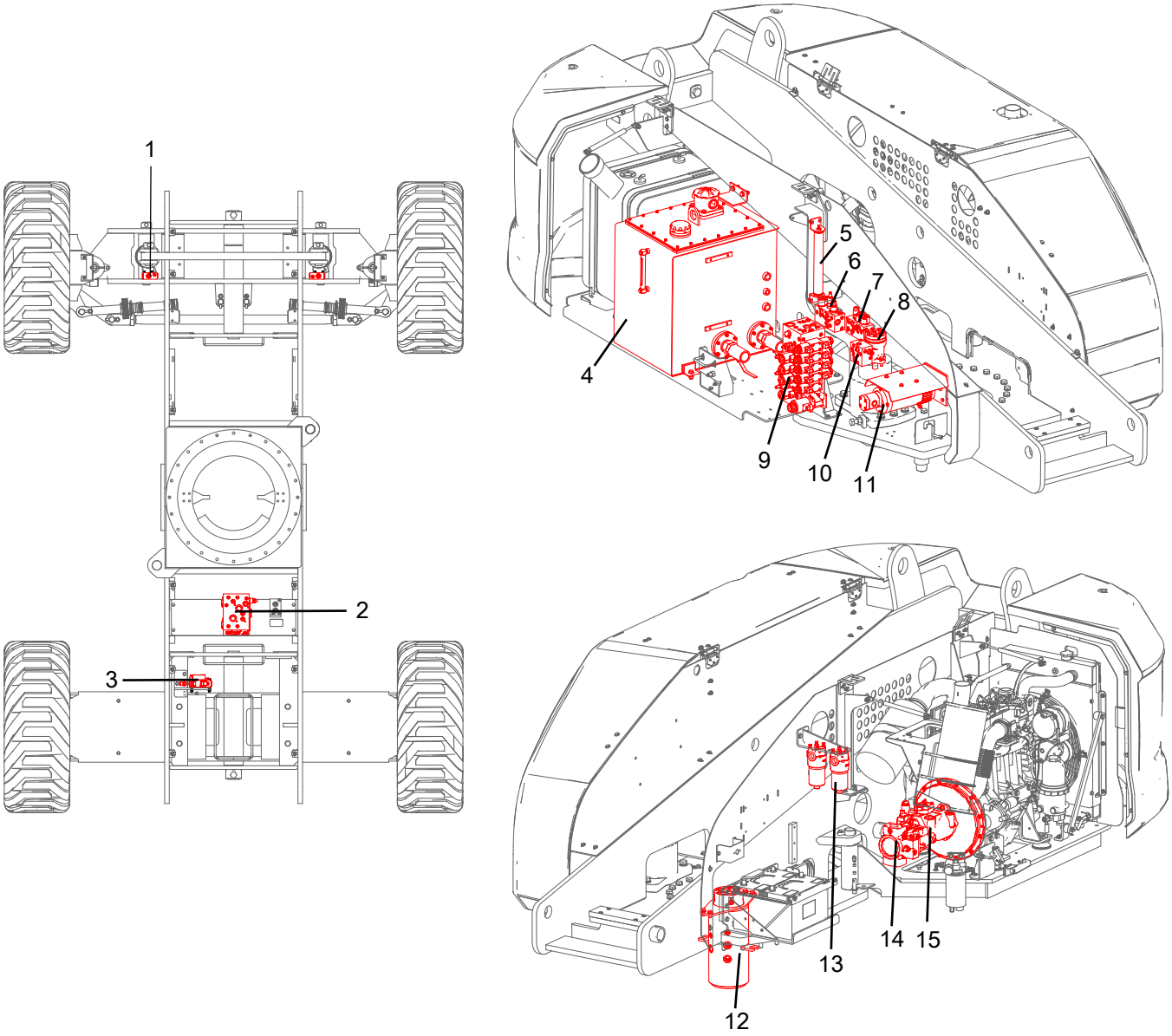


Fig 1

Table 8-1

1. Oscillation counterbalance valve	**6.** Oscillation control valve	**11.** Power unit
2. Travel control valve	**7.** Brake & two-speed control valve	**12.** Central rotary joint
3. Oscillation multi-way valve	**8.** Cycloid motor	**13.** High-pressure filter

Table 8-1 (Continued)

4. Hydraulic tank	**9.** Boom function manifolds	**14.** Open-circuit variable displacement pump
5. Accumulator	**10.** Slewing cushion valve	**15.** Closed-circuit variable displacement pump

8.2 FUNCTION VALVES

Boom Function Manifolds (PN.202040003176)

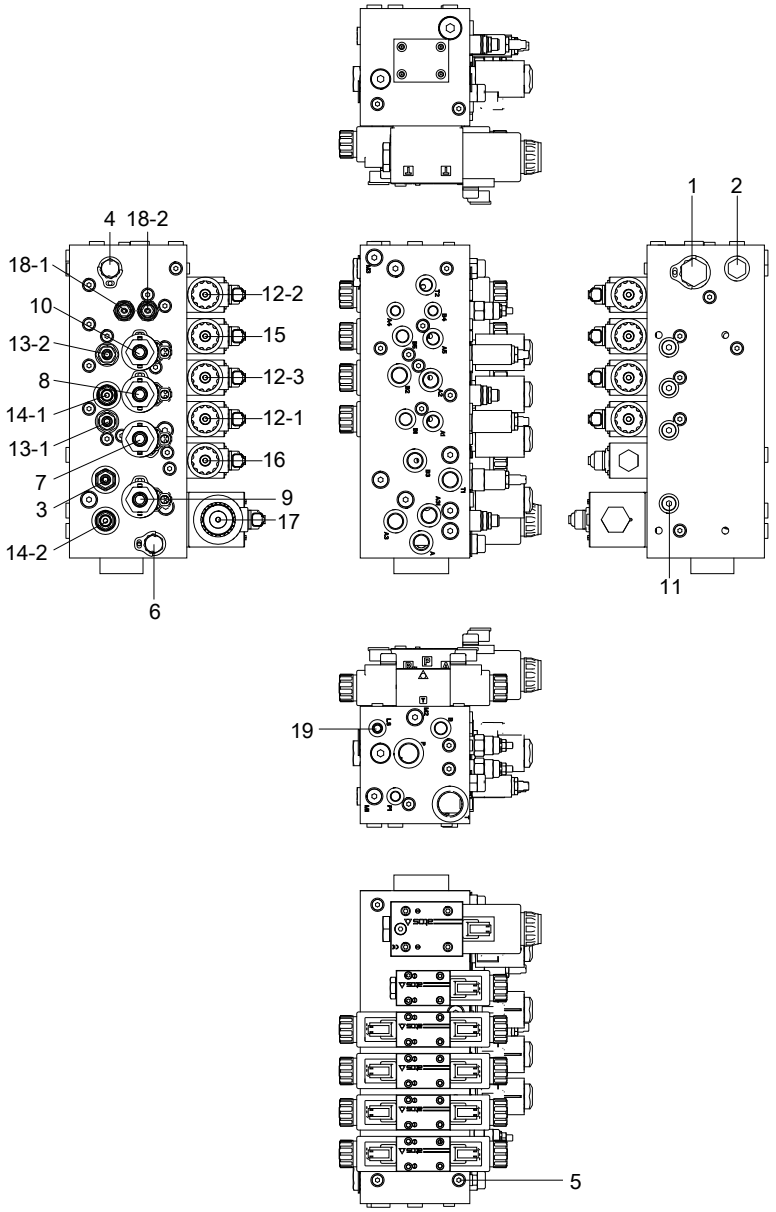


Fig 2 Boom function manifolds (PN.202040003176)

Table 8-2 Boom function manifolds (PN.202040003176)

No.	Name	Torque	Function
1	Check valve	85–95Nm (63-70ft-lb)	Keep oil flowing in one direction
2	Check valve	40–45Nm (30-33ft-lb)	Keep oil flowing in one direction
3	Overflow valve	33.9Nm (25ft-lb)	Control system pressure
4	Compensation valve	27.1Nm (20ft-lb)	Release pressure for power unit

Table 8-2 Boom function manifolds (PN.202040003176) (Continued)

No.	Name	Torque	Function
5	Counterbalance valve	34–41Nm (25–30ft-lb)	Keep the load balanced
6	Flow valve	27.1Nm (20ft-lb)	Release LS feedback pressure
7	Electric proportional flow valve	36.7Nm (27ft-lb)	Control turntable slewing speed
8	Electric proportional flow valve	40.6Nm (30ft-lb)	Control boom lifting\lowering speed
9	Electric proportional flow valve	40.6Nm (30ft-lb)	Control boom telescoping speed
10	Electric proportional flow valve	36.7Nm (27ft-lb)	Control platform leveling and steering speed as well as jib movement speed
11	Check valve	26–28Nm (19–21ft-lb)	Keep oil flowing in one direction
12–1	6-way Y-type gate valve	8Nm (6ft-lb)	Control turntable slewing direction
12–2	6-way Y-type gate valve	8Nm (6ft-lb)	Control platform leveling direction
12–3	6-way Y-type gate valve	8Nm (6ft-lb)	Control boom lifting\lowering direction
13	Overflow valve	25.8-28.5Nm (19-21ft-lb)	Control turntable slewing pressure
14–1	Overflow valve	55–65Nm (41–48ft-lb)	Limit lowering pressure
14–2	Overflow valve	55–65Nm (41–48ft-lb)	Limit boom extending pressure
15	6-way O-type gate valve	8Nm (6ft-lb)	Control steering direction
16	6-way solenoid valve	8Nm (6ft-lb)	Control boom telescoping direction
17	10-way solenoid valve	15Nm (11ft-lb)	Control boom telescoping direction

Slewing Cushion Valve (PN.202040003061)

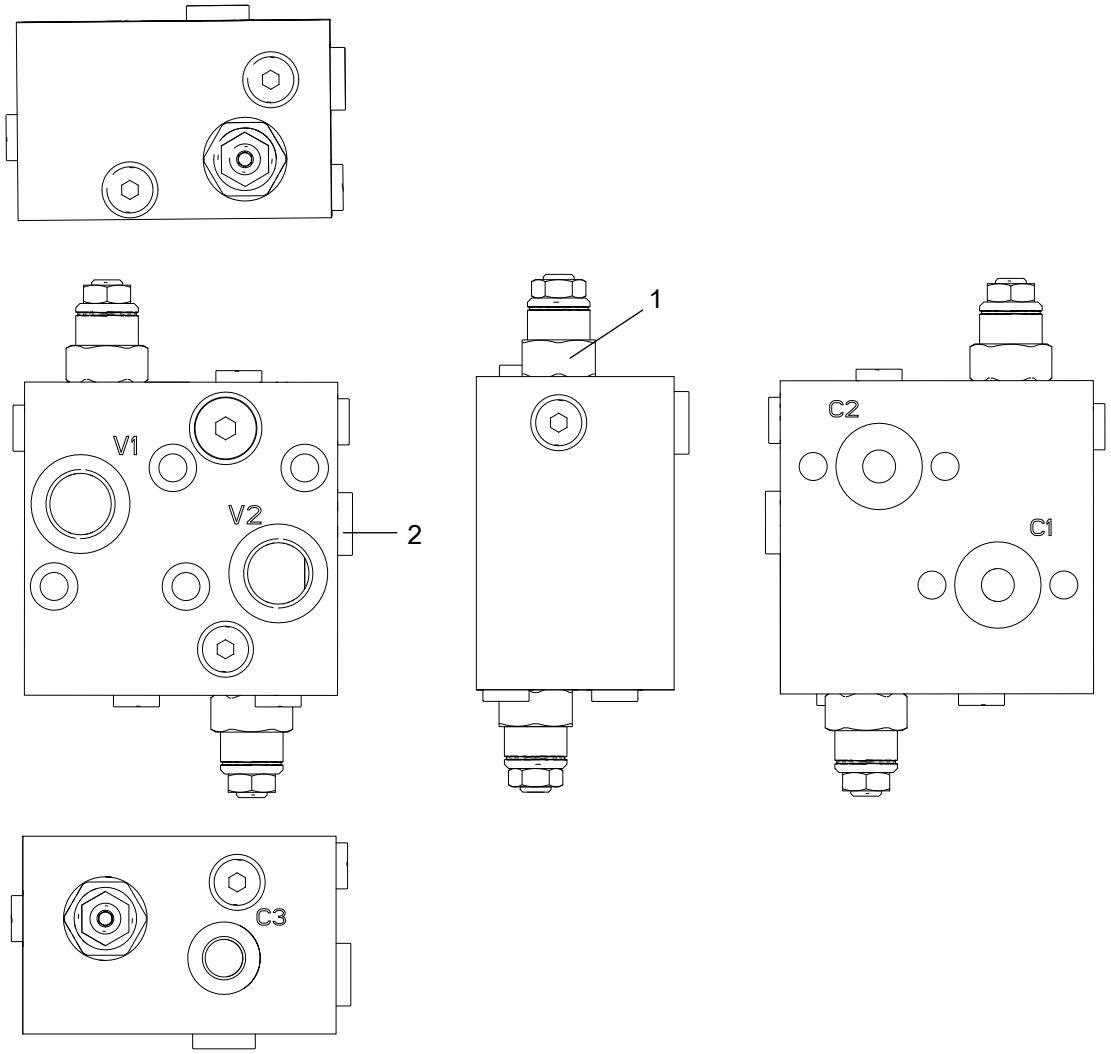


Fig 3 Slewing cushion valve (PN.202040003061)

Table 8-3 Slewing cushion valve (PN.202040003061)

No.	Name	Torque	Function
1	Counterbalance valve	40 ~ 45Nm (30 ~ 33ft-lb)	Keep the load balanced
2	Shuttle valve	\	Change oil lines

Brake & Two-speed Control Valve (PN.202040000006)

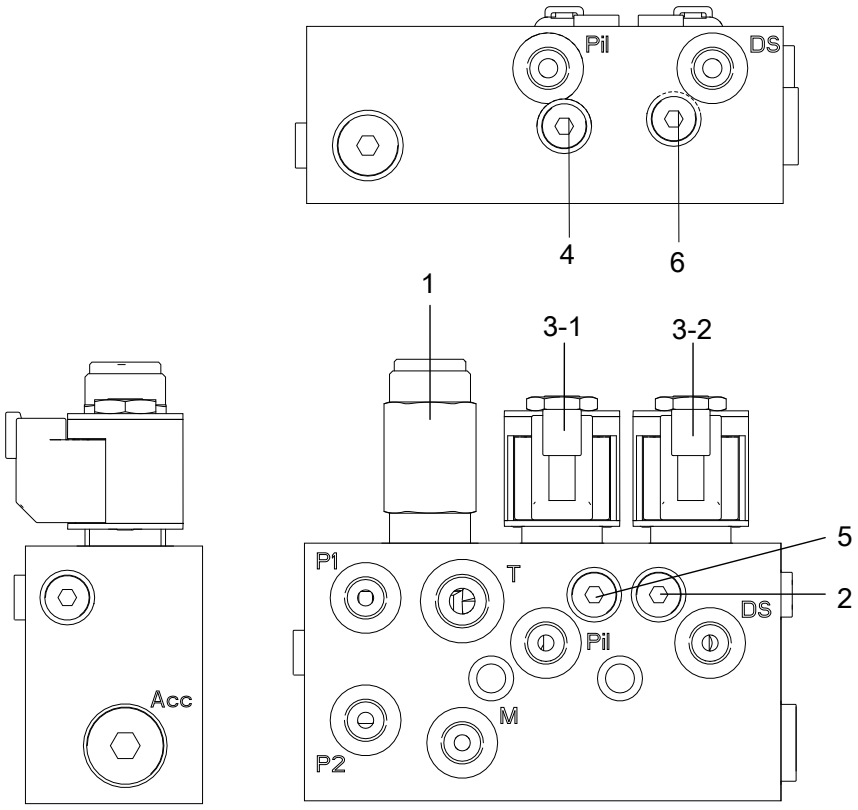


Fig 4 Brake & two-speed control valve (PN.202040000006)

Table 8-4 Brake & two-speed control valve (PN.202040000006)

No.	Name	Torque	Function
1	Pressure reducing valve	33.9Nm (25ft-lb)	Control pressure of brake and high & low speed
2	Damper	\	\
3–1	Solenoid valve	27.1Nm (20ft-lb)	Control braking
3–2	Solenoid valve	27.1Nm (20ft-lb)	Control high & low speed switching
4	Damper	\	\
5	Damper	\	\
6	Damper	\	\

Travel Control Valve (PN.202040000153)

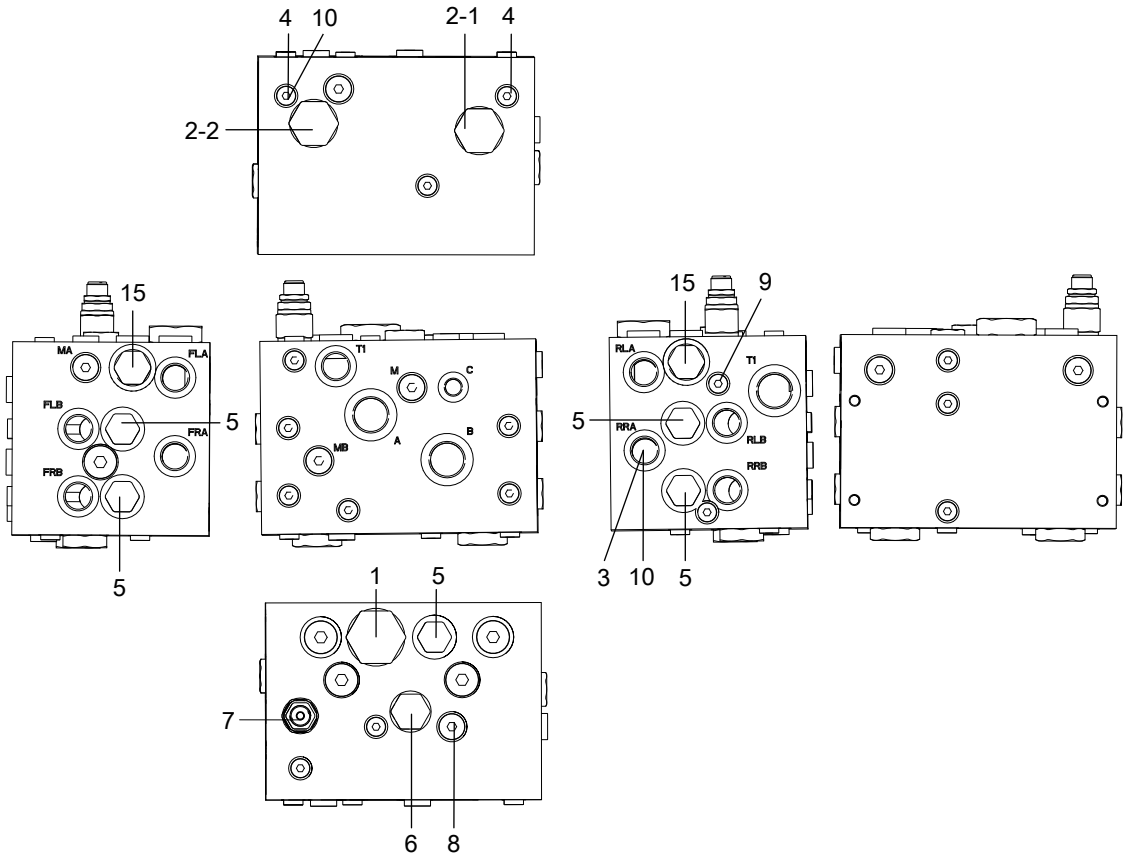


Fig 5 Travel control valve (PN.202040000153)

Table 8-5 Travel control valve (PN.202040000153)

No.	Name	Torque	Function
1	Flow divider/ combiner valve	133 ~ 138Nm (98 ~ 102ft-lb)	Control flow
2-1	Flow divider/ combiner valve	99 ~ 104Nm (73 ~ 77ft-lb)	Control flow for front wheel traveling
2–2	Flow divider/ combiner valve	99 ~ 104Nm (73 ~ 77ft-lb)	Control flow for rear wheel traveling
3	Damper	5Nm (4ft-lb)	\
4	Damper	5Nm (4ft-lb)	\
5	Check valve	40 ~ 45Nm (30 ~ 33ft-lb)	Keep oil flowing in one direction
6	Flush valve	33 ~ 35Nm (24 ~ 26ft-lb)	Drain oil on the low-pressure side
7	Overflow valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control travel pressure
8	Shuttle valve	12 ~ 15Nm (9 ~ 11ft-lb)	Change oil lines
9	Damper	5Nm (4ft-lb)	\
10	Damper	5Nm (4ft-lb)	\
11	Check valve	55 ~ 65Nm (41 ~ 48ft-lb)	Keep oil flowing in one direction

Oscillation Control Valve (PN.202040003039)

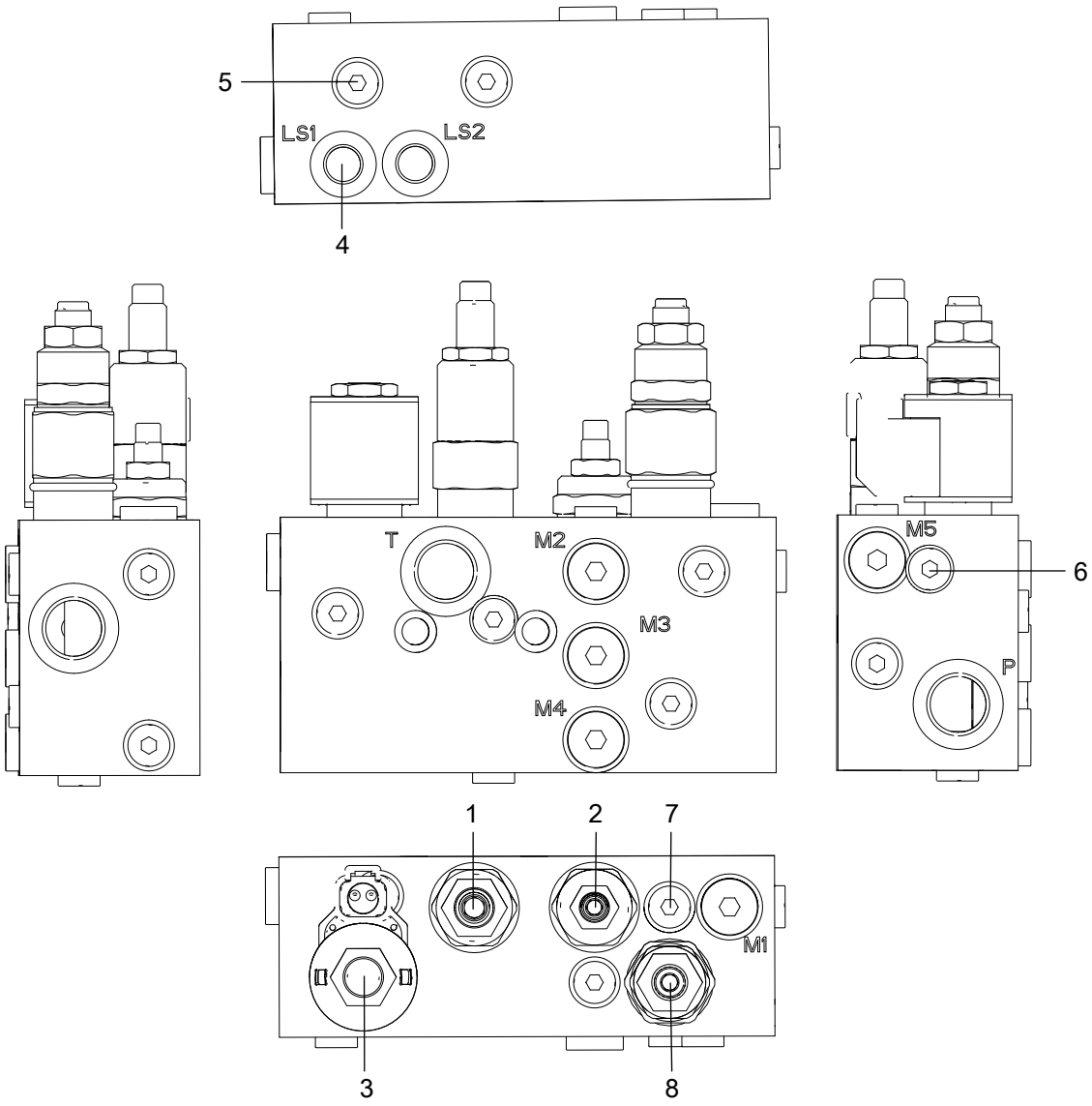


Fig 6 Oscillation control valve (PN.202040003039)

Table 8-6 Oscillation control valve (PN.202040003039)

No.	Name	Torque	Function
1	Pressure reducing valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control oscillation pressure
2	Flow valve	33.9Nm (25ft-lb)	Control flow for fuel lines
3	Solenoid valve	40Nm (30ft-lb)	Control oscillation
4	Shuttle valve	12 ~ 15Nm (9 ~ 11ft-lb)	Change oil lines
5	Damper	5Nm (9ft-lb)	\
6	Damper	5Nm (9ft-lb)	\

Table 8-6 Oscillation control valve (PN.202040003039) (Continued)

No.	Name	Torque	Function
7	Damper	5Nm (9ft-lb)	\
8	Pilot-operated valve	45 ~ 50Nm (33 ~ 37ft-lb)	Limit the maximum pressure for oscillation system

Two-section Platform Valve (PN.202040000329)

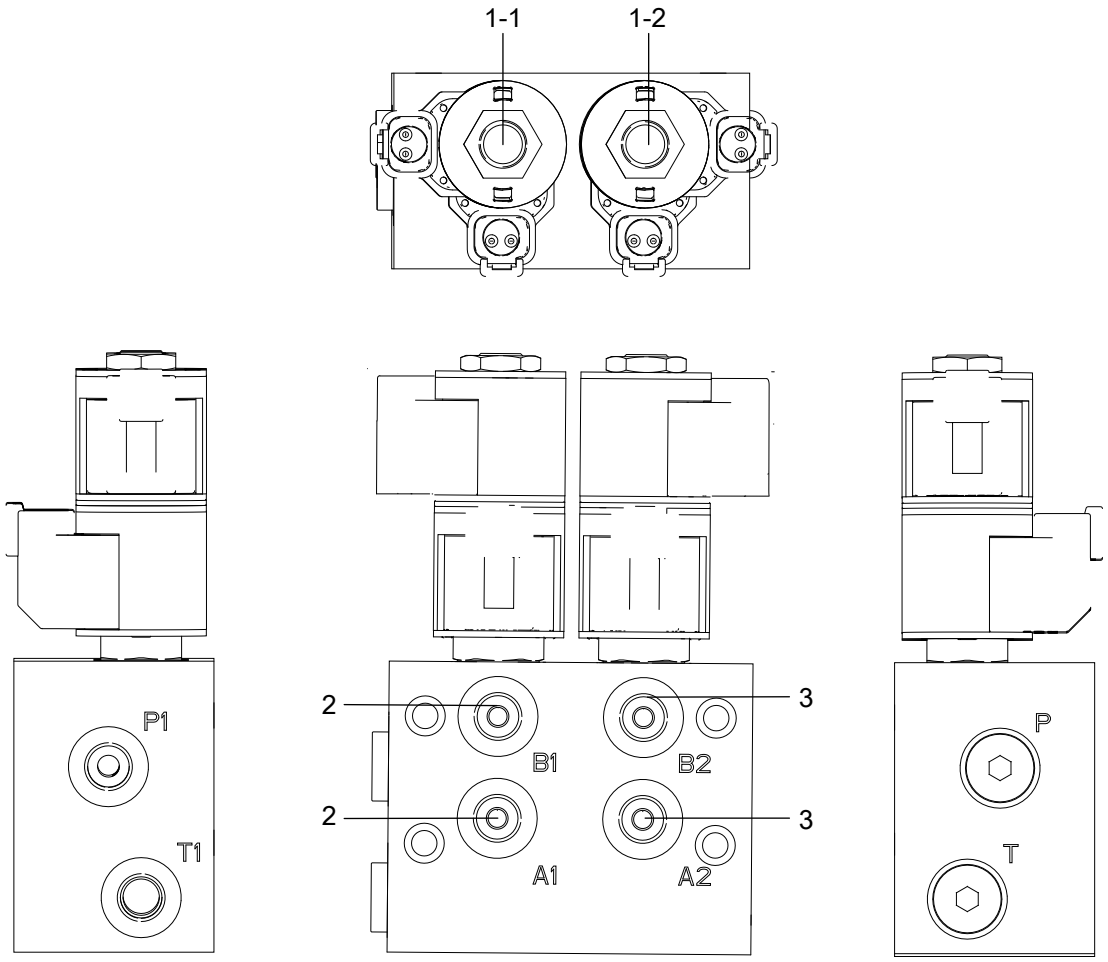


Fig 7 Two-section platform valve (PN.202040000329)

Table 8-7 Two-section platform valve (PN.202040000329)

No.	Indication	Torque	Function
1–1	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of jib luffing movement
1–2	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of platform swing
2	Damper	5Nm (9ft-lb)	\
3	Damper	5Nm (9ft-lb)	\

Two-section Platform Valve (PN.202040000329)

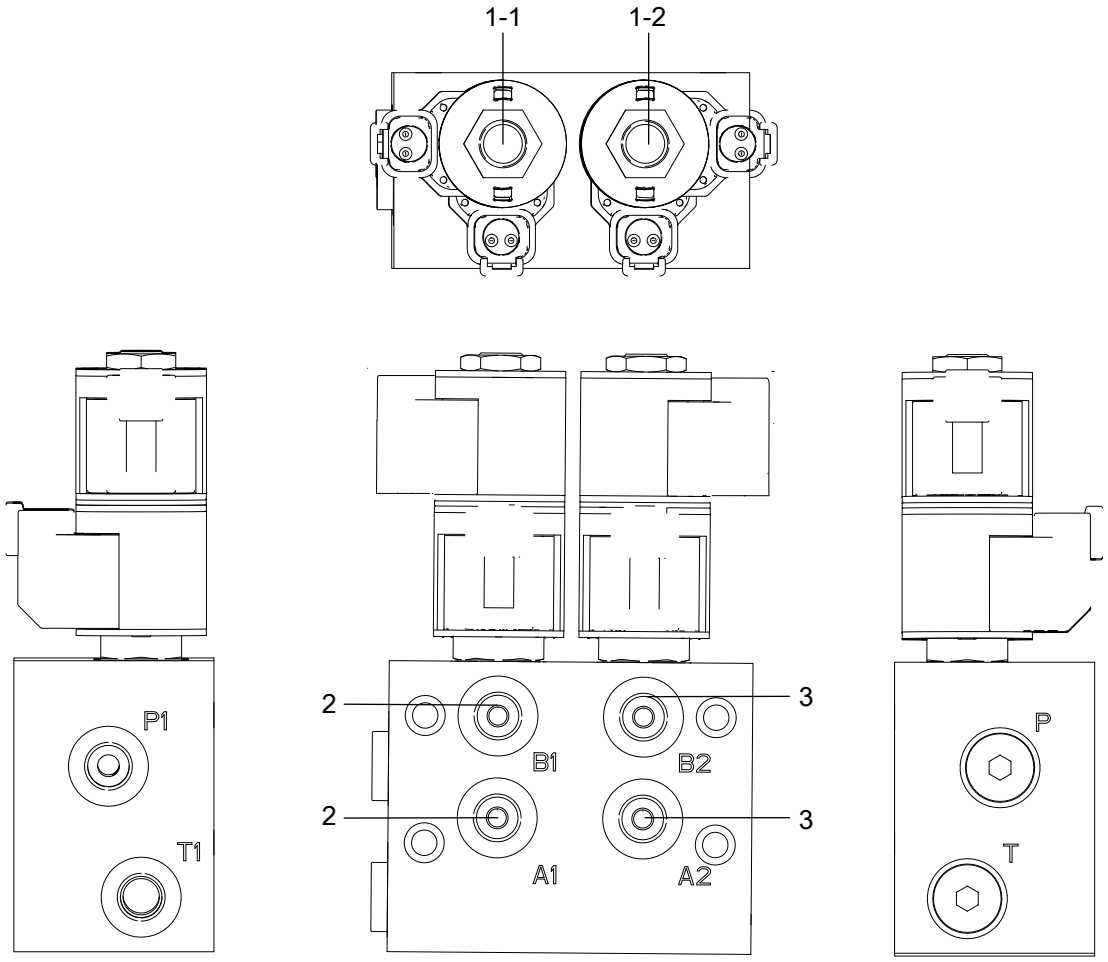


Fig 8 Two-section platform valve (PN.202040000329)

Table 8-8 Two-section platform valve (PN.202040000329)

No.	Indication	Torque	Function
1–1	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of jib luffing movement
1–2	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of platform swing
2	Damper	5Nm (9ft-lb)	\
3	Damper	5Nm (9ft-lb)	\

Oscillation Counterbalance Valve (PN.202040003032)

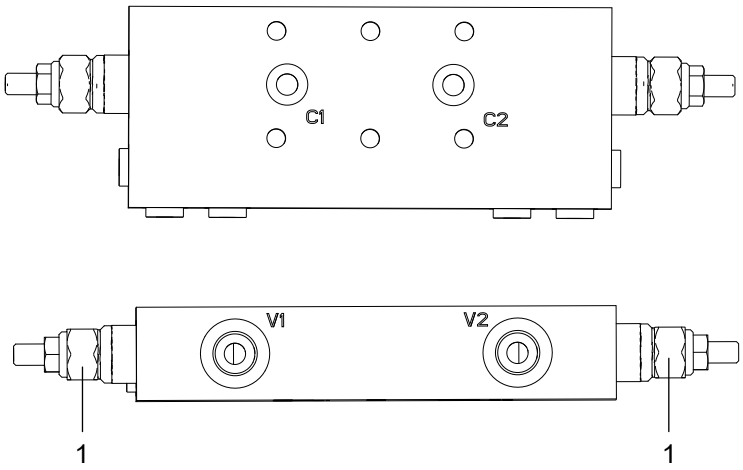


Fig 9 Oscillation counterbalance valve (PN.202040003032)

Table 8-9 Oscillation counterbalance valve (PN.202040003032)

No.	Indication	Torque	Function
1	Counterbalance valve	40 ~ 45Nm (30 ~ 33ft-lb)	Keep the load balanced

Leveling Counterbalance Valve (PN.202040000011)

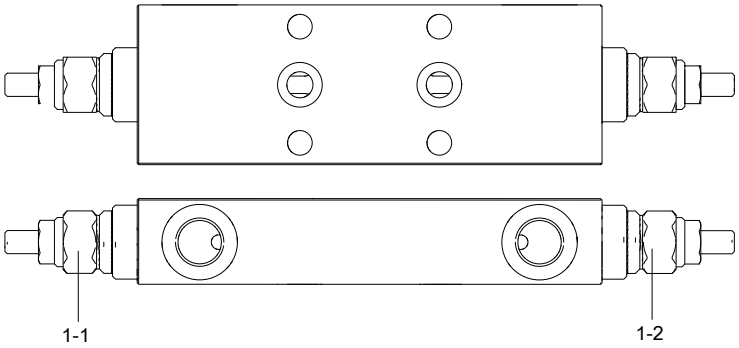


Fig 10 Leveling counterbalance valve (PN.202040000011)

Table 8-10 Leveling counterbalance valve (PN.202040000011)

No.	Name	Torque	Function
1	Counterbalance valve	70 ~ 75Nm (52 ~ 55ft-lb)	Keep the load balanced

Telescopic Counterbalance Valve (PN.202040003126)

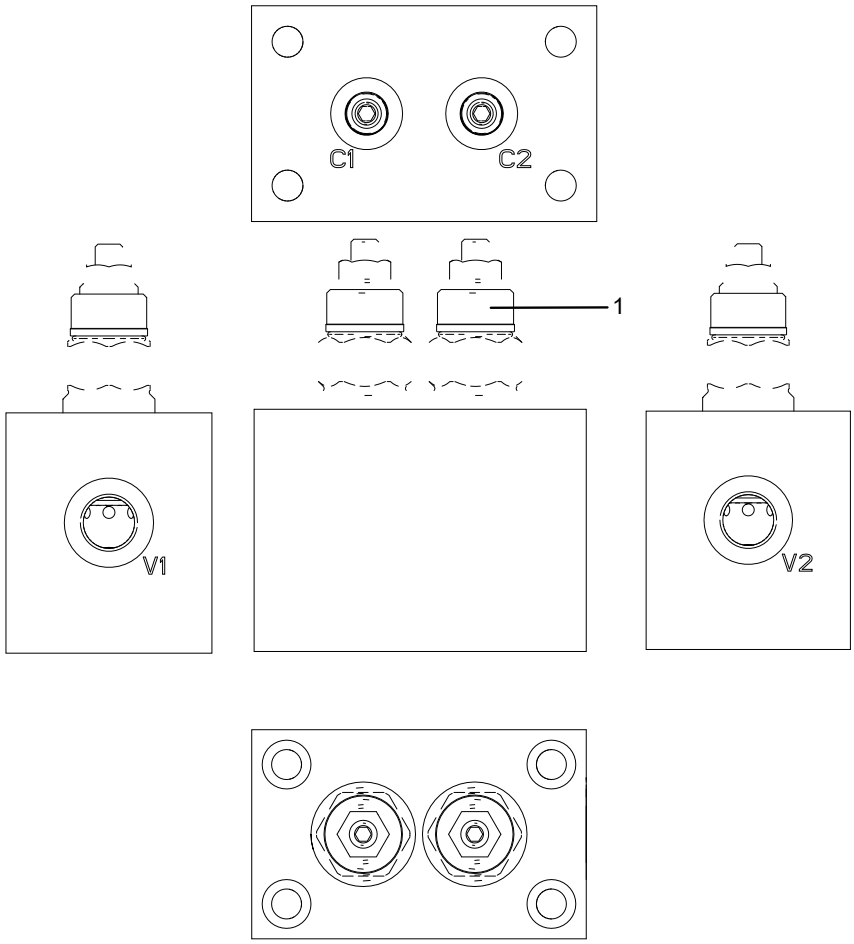


Fig 11 Telescopic counterbalance valve (PN.202040003126)

Table 8-11 Telescopic counterbalance valve (PN.202040003126)

No.	Name	Torque	Function
1	Counterbalance valve	45-50Nm (33-37ft-lb)	Keep the load balanced

Luffing Counterbalance Valve (PN.202040000377)

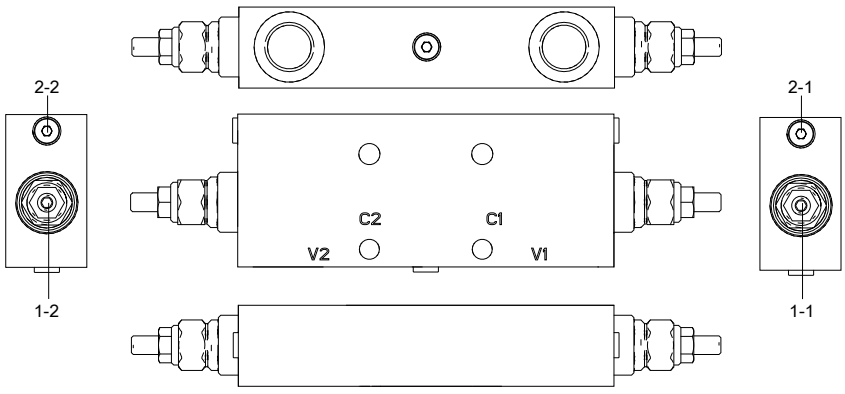


Fig 12 Luffing counterbalance valve (PN.202040000377)

Table 8-12 Luffing counterbalance valve (PN.202040000377)

No.	Name	Torque	Function
1	Counterbalance valve	70 ~ 75Nm (52 ~ 55ft-lb)	Keep the load balanced
2	Damper	5Nm (4ft-lb)	\

8.3 HYDRAULIC OIL

Check Oil Level

Maintaining the hydraulic oil at the right level is essential for the normal operation of the machine. If the hydraulic oil level is too high, the oil will overflow from the oil tank during the operation of the machine; if the hydraulic oil level is too low, the oil pump will have entrained air during the operation of the machine and hydraulic components will be damaged.

1. Make sure the boom is in stowed position.
2. Open the left turntable cover and visually inspect the side of the hydraulic tank. The hydraulic oil level should be within the scale line range of level indicator in the tank.
3. If necessary, fill with correct hydraulic oil according to the ***Oil Requirements*** , and do not overfill the tank.
4. Check the hydraulic tank body and joints for leakage.

Check the Cleanliness of Hydraulic Oil

Check the hydraulic oil, and if any of the following conditions are found, replace the hydraulic oil:

- The hydraulic oil is milky white and cloudy.
- The hydraulic oil is black.
- Take some hydraulic oil and check it in the sun to find there are luminous metal spots, or rub the hydraulic oil with two fingers to find there are metal particles obviously.
- The hydraulic oil stinks.

Replace Hydraulic Oil

It is recommended to replace the hydraulic oil every year or after 1000 hours of operation. The replacement interval should be shorter in harsh working environments.

NOTICE

Every time the hydraulic oil is replaced, the hydraulic tank suction filter must also be replaced.

1. Turn off the machine and make sure the hydraulic oil has cooled to room temperature.
2. Open the left turntable cover and locate the hydraulic tank.
3. Close the hydraulic shut-off valve located on the side of the tank.

4. Place an appropriate oil-collecting container under the drain plug at the bottom of the tank.
5. Remove the drain plug at the bottom of the tank to drain all the oil into the container.
6. Install the drain plug.
7. Disconnect and plug the hydraulic tank suction pipe and return pipe.
8. Remove the cover from the tank after removing the upper cover fastening bolts of the hydraulic tank.
9. After cleaning the inside of the tank with a neutral solvent, open the drain plug to drain the solvent.
10. After the hydraulic tank is dry, install the cover and connect the suction pipe and return pipe to the hydraulic oil tank.
11. Fill with correct hydraulic oil according to the ***Oil Requirements*** , and never overfill the tank.

8.4 HYDRAULIC TANK

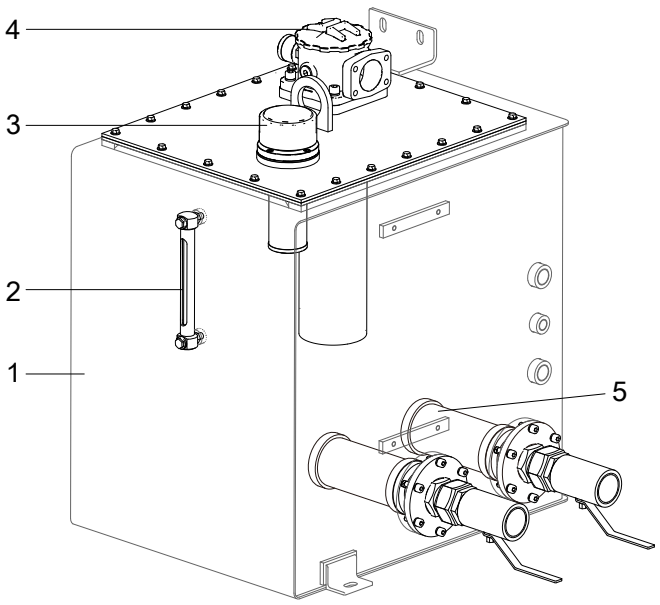


Fig 13 Schematic diagram of hydraulic tank structure

Table 8-13 Hydraulic tank structure

No.	Description
1	Tank body
2	Level indicator
3	Air filter
4	Return filter
5	Suction Filter

Air Filter

It is recommended to clean the hydraulic tank air filter every 3 months or after 250 hours of operation, and replace it every 6 months or after 500 hours of operation. The replacement interval should be shorter in harsh working environments.

The steps to check and clean the air filter are as follows:

1. Turn off the machine.
2. Locate the air filter on the top of the hydraulic tank.
3. Remove the air filter.
4. Check the hydraulic tank air filter: air should pass through the air filter smoothly.
5. If the air cannot pass through the air filter smoothly, clean the air filter with a neutral solvent and then blow dry with an air gun.
6. Check the air filter again until the air can pass through the air filter smoothly.
7. Install the air filter back onto the tank.

Return Filter

It is recommended to replace the hydraulic tank return filter element after the first 50 hours of operation and every 3 months or 250 hours of operation thereafter. The replacement interval should be shorter in harsh working environments.

1. Turn off the machine.
2. Open the left turntable cover to locate the return filter on the top of the hydraulic tank.
3. Remove the return filter.
4. Loosen the cover at the top of the filter and remove the filter element.
5. Apply a thin film of oil to the gasket of the new return filter element.
6. Clean the return filter housing, install a new element and then reinstall the return filter.
7. Clean the hydraulic oil spilled during the process.
8. Start the machine from the ground.
9. Check the return filter and related components for leakage.

Suction Filter

It is recommended to replace the hydraulic tank suction filter screen every year or after 1000 hours of operation. The replacement interval should be shorter in harsh working environments.

Every time the hydraulic oil is replaced, the hydraulic tank oil suction filter screen should also be replaced.

8.5 HYDRAULIC OIL HIGH-PRESSURE FILTER

It is recommended to replace the hydraulic oil high-pressure filter element after the first 50 hours of operation and every 3 months or 250 hours of operation thereafter. The replacement interval should be shorter in harsh working environments.

1. Turn off the machine.
2. Open the turntable cover and locate the high-pressure filter.
3. Place an appropriate oil-collecting vessel under the high-pressure filter.
4. Use a wrench to remove the filter housing.
5. Remove the filter element from the housing.
6. Check the seal on the mounting surface of the housing and, if necessary, replace the seal.
7. Install a new filter element into the housing and tighten it securely.
8. Clean the hydraulic oil spilled during the process.
9. Start the machine from the ground.
10. Check the high-pressure filter and related components for leakage.

8.6 OSCILLATING CYLINDER EXHAUSTING

Perform oscillating cylinder exhausting before the machine is put into service for the first time, and after the oscillating cylinder or counterbalance valve is replaced.

1. Make sure the machine is in stowed position.
2. Place a 120mm (4.7in) beveled wooden block in front of the machine.
3. Drive machine to make the left front wheel moving onto the wooden block and then moving off the wooden block.
4. Drive machine to make the right front wheel moving onto the wooden block and then moving off the wooden block.
5. Repeat steps 3 and 4 until the left/right oscillating cylinders are exhausted successfully.
6. Perform a counterbalance valve locking check.

8.7 OSCILLATION FUNCTION CHECK

A counterbalance valve locking check shall be performed after oscillating cylinder exhausting. The oscillating function must be checked every 3 months or 250 hours of operation, or after any system components is replaced, or when abnormal system operation is found.

Check Counterbalance Valve Locking

It is recommended to check the counterbalance valve locking before the machine is put into use for the first time, and every 3 months or 250 hours of operation thereafter. If any hydraulic component such as oscillating cylinder or counterbalance valve is replaced later, the counterbalance valve must also be checked for locking.

1. Place a 120mm (4.7in) beveled wooden block in front of the machine.
2. Extend the boom appropriately to place the machine in operating position.
3. Drive machine to make the left front wheel moving onto the wooden block.
4. Slowly rotate the turntable about 90° to the right.
5. Then, the reverse position indicator will be on. Move the corresponding function switch to adjust the boom horizontal and fully extended.
6. Check the oscillating cylinder: the oscillating cylinder on the stressed side shall not retract.
7. Retract the boom completely.
8. After moving the reverse position travel switch, drive the machine off the wooden block.
9. The auxiliary personnel on the ground check whether the left front wheel or right rear wheel is still off the ground and remains raised.
10. Slowly rotate the turntable to the center position (between two drive wheels).
11. To drive the machine forward or backward, release the left front wheel oscillating cylinder to make the wheel descends to the ground and fits tightly with the ground.
12. Repeat the above steps to check the right front wheel oscillating cylinder.
13. If the oscillating cylinder works abnormally, ask qualified maintenance personnel to correct the fault before further operation.

Check Tie Rod of Oscillation Multi-way Valve

Visually check whether the tie rod of oscillation multi-way valve is properly tightened.

Test Oscillating Outrigger Function

1. Make sure the boom is in stowed position.
2. Place a 120mm (4.7in) beveled wooden block in front of the machine.
3. Drive machine to make the right steering wheel moving onto the wooden block.
4. The auxiliary personnel check the other three wheels on the ground, and the tires should all be in close contact with the ground.
5. Drive the machine off the wooden block.
6. Drive machine to make the left steering wheel moving onto the wooden block.
7. The auxiliary personnel check the other three wheels on the ground which should all be in close contact with the ground.
8. Drive the machine off the wooden block.
9. Place a 120mm (4.7in) beveled wooden block in front of each steering wheel of the machine.
10. Drive machine to make the two steering wheels moving onto the wooden blocks.
11. The auxiliary personnel check the other two wheels on the ground which should all be in close contact with the ground.

8.8 INSPECT CYLINDER DRIFT

The cylinder will drift down due to leakage, and the drift is normal within a certain range. In order to ensure the normal operation of the machine, it is recommended to conduct drift inspection on the platform every 3 months or after 250 hours of operation to determine whether cylinder drift inspection is required.

Fully extend the main boom and place the rated load on the platform to measure the drift from the platform to the ground with the machine powered off. If the platform drifts down more than 50mm (1.97in) in 10 minutes, carry out cylinder drift inspection as per the following procedures.

1. Place the cylinder in an environment with stable ambient temperature.
2. Make the cylinder apply normal cylinder load to the platform.
3. Measure drift at cylinder piston rod with a calibrated dial indicator.
4. The maximum allowable drift for cylinders with different bores is shown in the table below. If the measured value is less than the maximum allowable drift, the cylinder is working normally. If the measured value is greater than the maximum allowable drift, it indicates that the cylinder is not working normally. Contact qualified service technicians for inspection and repair.

Table 8-14 Maximum allowable drift for different cylinder bore

Cylinder bore diameter (mm/in)	Maximum allowable drift in 10 minutes (mm/in)
63/2.48	0.96/0.037
80/3.15	0.63/0.025
100/3.94	0.39/0.015
125/4.92	0.23/0.009
160/6.30	0.14/0.006
180/7.09	0.13/0.005
200/7.87	0.10/0.0038
220/8.66	0.08/0.0030

NOTICE

The data is based on cylinder leakage of 6 drops per minute. Since the hydraulic oil expands with heat and contracts with cold, the test value of cylinder drift may have a tolerance of 7/10000 for each temperature change of 1℃.

8.9 HYDRAULIC SYMBOLS

Table 8-15

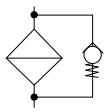
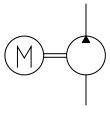
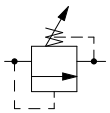
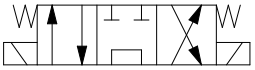
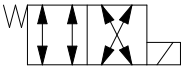
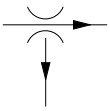
Symbol	Description
	Filter
	Brake
	Emergency power unit

Table 8-15 (Continued)

Symbol	Description
	Hydraulic motor
	Overflow valve
	3-position 4-way solenoid directional valve
	2-position 4-way solenoid directional valve
	Pressure gradient control valve
	Check valve

8.10 HYDRAULIC SCHEMATIC DIAGRAM

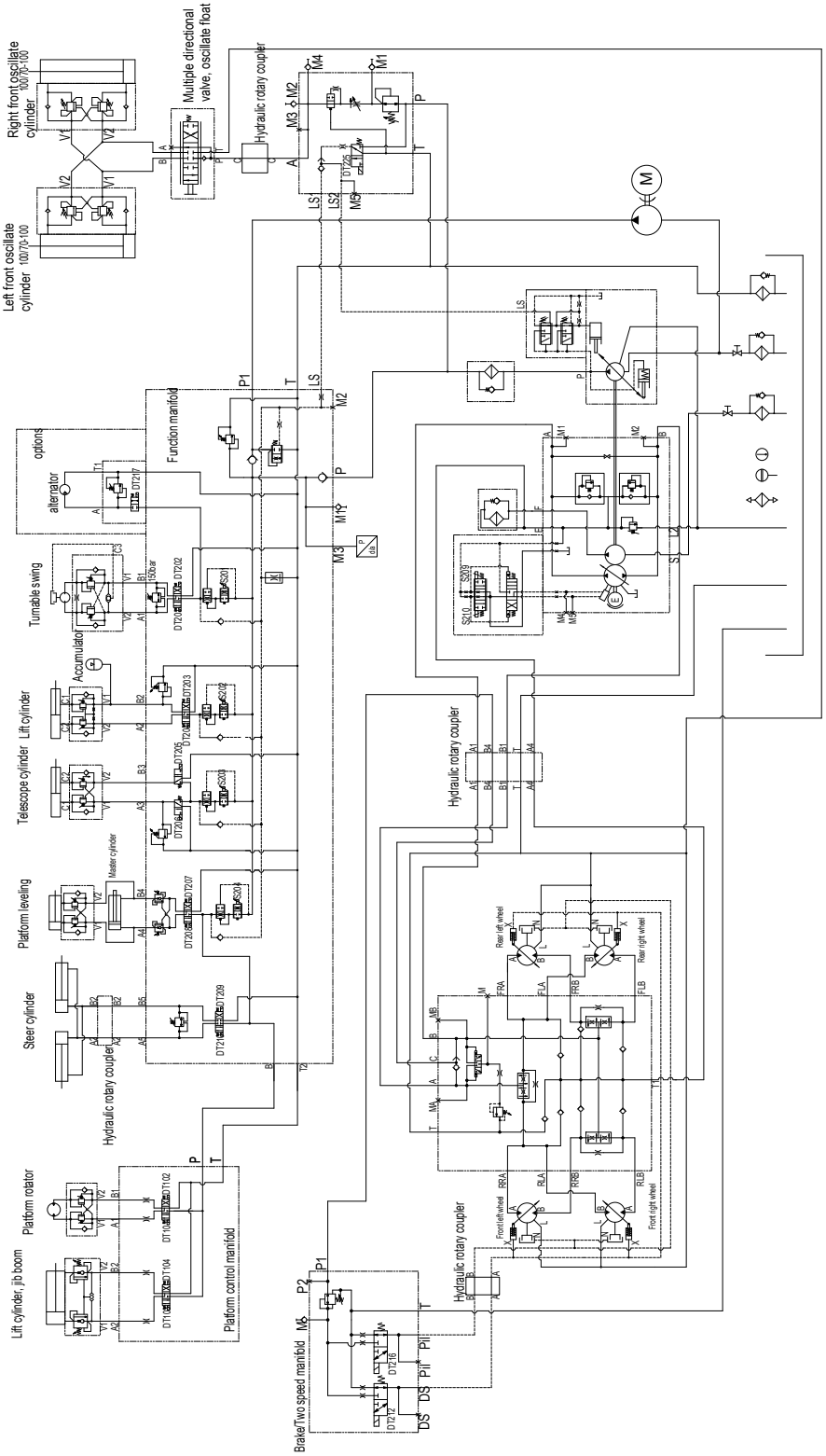


Fig 14 Hydraulic schematic diagram

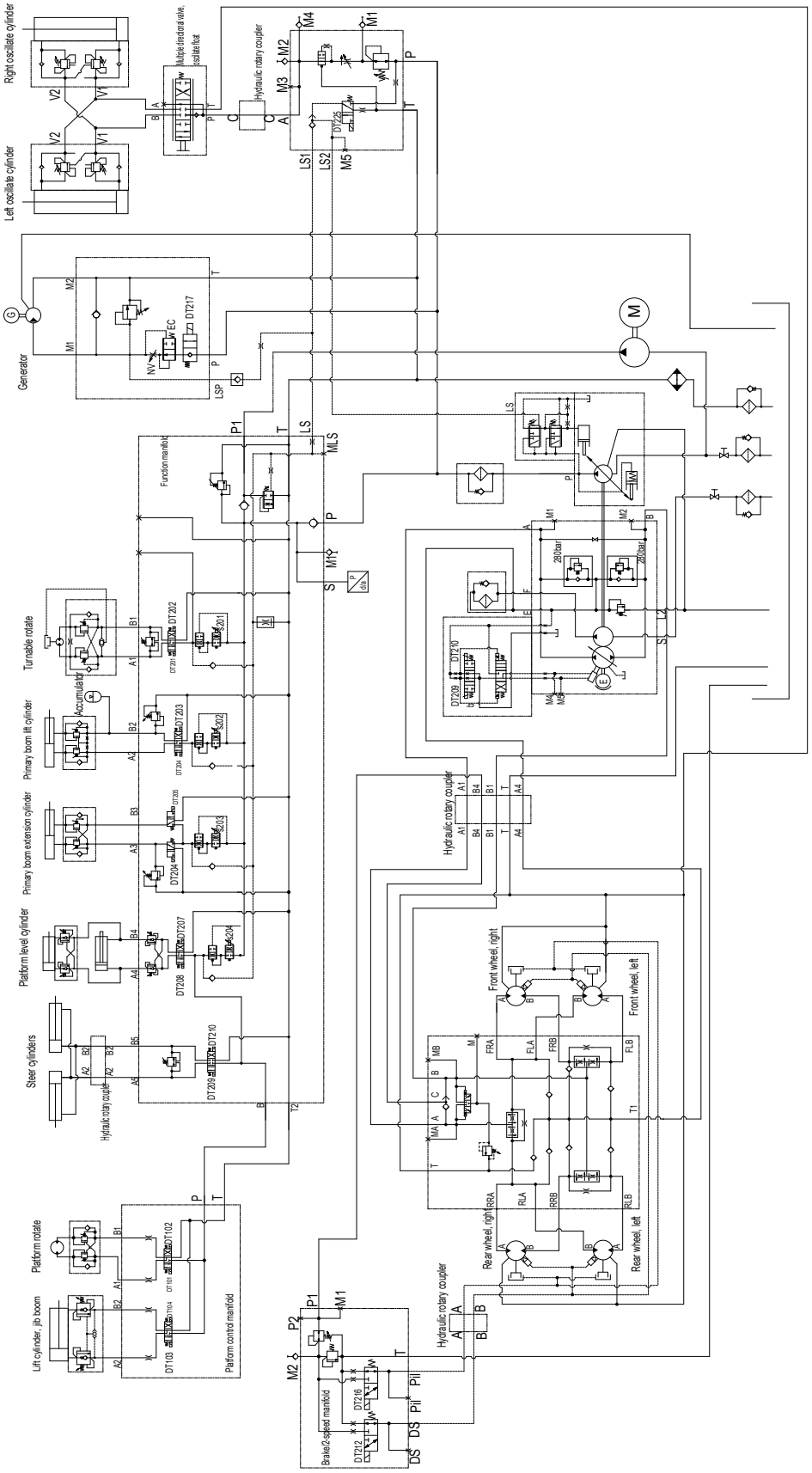


Fig 15 Hydraulic schematic diagram (equipped with hydraulic generator)

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9 ELECTRICAL SYSTEM

Two 12V lead-acid batteries in parallel provide power for the engine, emergency pump and electrical control system. The batteries are charged through the DC generator in the engine. A main power switch is used to protect the control system.

The maintenance of electrical equipment is essential for the proper and safe operation of the machine. If continuing to use the machine with electrical components damaged or corroded, it may lead to unsafe operation or serious personal injury.

9.1 BATTERY

The batteries used include 3 types: lead acid battery, lead acid maintenance-free battery and lithium battery, and the latter two batteries do not need maintenance.

Inspection

Battery condition will affect machine performance and operation, and the following checks should be performed on the battery at specified intervals.

- Check the battery level. The battery should not be discharged more than 80% of the total capacity, and should be charged immediately after each discharge.
- Check the harness retaining nuts between the battery cells. Make sure that the retaining nuts are tightened with the correct torque, and refer to the ***Torque Specifications*** section for the tightening torques.
- Check the battery harness connections. Make sure that the battery harness connections are firmly connected and not corroded, and the positive and negative poles are not reversed.

NOTICE

Improper connection may result in reduced performance and damaged terminals, fusion, or even fire.

- Check whether the inside and outside paint of the battery is damaged. If any damage is found, repair the paint immediately to protect the outer box insulation and avoid corrosion.
- Check the battery box for water accumulation. If any, blot up the accumulated water immediately.
- Clean the area around the battery regularly. Use cloths or brushes to regularly clean the top, terminals and connections of the battery with mixed liquid of baking soda and water, dry it with cloths after cleaning, and apply a thin layer of petroleum jelly or add terminal protectors to prevent cleaning solution from entering the battery.

NOTICE

Adding terminal protectors and anti-corrosion sealants will prevent the battery terminals and cables from corrosion.

The instructions below are applicable only for batteries requiring maintenance. Before performing inspection, please fully charge the battery and hold it still for 24 hours to equalize the battery cells.

1. Wear protective clothing, protective gloves and protective glasses.
2. Remove the battery vent cover.
3. Top up the hydrometer and drain it two or three times, and then take a sample from the battery electrolyte with the hydrometer.
4. Measure the specific gravity of all battery cells in sequence and note down the readings.
5. If the ambient temperature is above 27℃ (80℉), add 0.004 to calibrate the specific gravity reading for every 5℃ (40℉) higher; if the ambient temperature is below 27℃ (80℉), reduce 0.004 to calibrate the specific gravity reading for every 5℃ (40°F) lower.
   - Result 1: if the specific gravity reading of all battery cells is 1.250 or higher, and the reading difference between any two cells is less than 0.050, proceed with the next step.
   - Result 2: if the specific gravity reading of one or more battery cells is below 1.250, it indicates that the battery is running low and needs charging. After charging, measure the specific gravity reading, if it meets the Result 1, proceed with the next step.
   - Result 3: If the specific gravity reading difference between any two cells in the battery pack exceeds 0.050, equalize the battery pack and hold it still for 6 hours before re-measurement of the specific gravity readings. If satisfying the Result 1, proceed with the next step.

NOTICE

If the Result 1 cannot be met even after several attempts, the battery may have malfunctions.

6. Check the battery electrolyte level. Make sure the electrolyte level is at the right height and add distilled water to the required level if needed.
7. Install the battery vent cover.

Adding Water

NOTICE

- *For lead-acid batteries (requiring maintenance), the electrolyte level should be checked after each charging, and if the level is found to be low, add water in time.*
- *The water shall be added after charging. Adding water before charging may cause acid overflow during charging.*

- For batteries equipped with an automatic water refilling system, when the electrolyte is at the lowest level with the battery fully charged (the white dot of the battery observation hole is not at the top), add water immediately. It is recommended to use an automatic water refilling machine for refilling, with the operation steps as follows:
  1. Open the bucket cover of the water refilling machine.
  2. Add deionized water.
  3. Put back the bucket cover and connect the water refilling plug.
  4. Connect the quick connector between the water refilling machine and the battery and turn on the power switch to start automatic water refilling.
  5. After water refilling is completed, the automatic water refilling system will automatically stop.
  6. Turn off the power switch and disconnect the water refilling plug to complete water refilling.
- If the battery is not equipped with an automatic water refilling system, check the electrolyte level after charging. If the level is lower than the allowable height (the white dot of the battery observation hole is not at the top), wear gloves to add conforming distilled water or deionized water to the standard level (1-2cm above the minimal level of the water filler plug). Never add any acid solution.

Equalization

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

NOTICE

- *Verify whether the battery is flooded/wet battery.*
- *To prevent battery damage, the battery must be equalized after a storage period of up to three months from the date of delivery.*

1. Check the electrolyte level height to ensure that the level meets the specified requirements.
2. Verify that 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 specific gravity of all battery cells, and stop the charging in equalization mode if the specific gravity doesn't increase any more.

Storage

- Fully charge the battery before storage.
- The battery should be stored in cool and dry environment (temperature 10℃-25℃/50–77℉, RH < 90%), and charged every 3 months using the charger provided by the manufacturer.
- Disconnect the main power switch to eliminate potential hazards that could 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 state of charge, specific gravity and open-circuit voltage is shown in the following table.

Table 9-1

State of charge (%)	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

Table 9-1 (Continued)

State of charge (%)	Specific gravity	Open-circuit voltage (V)		
		Battery cell	6V	12V
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 charging 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℃/90℉): Direct exposure of the battery to heat sources should be avoided during battery storage, and the battery self-discharges faster at high temperatures. If storing the battery in hot summer months, monitor the specific gravity or voltage more frequently (approximately every 2-4 weeks).
- Storage in cold environments (below 0℃/32℉): Avoid placing batteries in places where the temperature is expected to reach the freezing point during storage, as batteries may freeze at low temperatures if not fully charged. If the battery is to be stored in the icy winter months, the battery must be fully charged.

NOTICE

Do not store the battery more than 6 months in hot or cold environments.

9.2 FAULT CODES DESCRIPTION

In case of failure, query the fault code on the fault inquiry interface of the ground controller.

Machine Fault Codes

Table 9-2 Machine fault codes description

Fault code	Description	Cause	Solution
01	Platform communication fault	Abnormal communication between platform and ground controllers	Check the signal lines between platform and ground controllers, and ensure the power supply is normal.
02	Drive controller communication fault	Abnormal communication between drive and ground controllers	Check the signal lines between ground and drive controllers, and ensure the power supply is normal.
03	Turntable tilt alarm	Turntable tilt alarm	Check whether the machine tilts exceeding 5°or the level switch becomes disconnected
04	Overload alarm	Overload alarm	Check whether the platform load exceeds the rating.
05	Weighing sensor fault	Weighing sensor fault	Check whether the weighing sensor functions properly.
06	Drive joystick error	Drive joystick data error	Check the drive joystick data
07	Steer joystick error	Steer joystick data error	Check the steer joystick data
08	Main boom luffing joystick error	Main boom luffing joystick data error	Check the main boom luffing joystick data

Table 9-2 Machine fault codes description (Continued)

09	Slewing joystick error	Slewing joystick data error	Check the slewing joystick data
10	Telescoping joystick error	Telescoping joystick data error	Check the telescoping joystick data
11	Jib rotation joystick error	Jib rotation joystick data error	Check the jib rotation joystick data
12	Hydraulic system pressure sensor error	Hydraulic system pressure sensor error	Check whether the hydraulic system pressure sensor functions properly
13	Level switch fault	Level switch fault	Check whether the level switch functions properly
14	Lift controller communication fault	Lift controller communication fault	Check the signal lines between platform and drive controllers, and ensure the power supply is normal.
15	Footswitch or enable switch 7-second limit alarm	Footswitch or enable switch 7-second limit alarm	Check whether the foot switch or enable switch function properly
16	Obstacle detection alarm	Obstacle detection alarm	Check whether the obstacle detection switch functions properly
17	Drive controller error alarm	Drive controller error alarm	Check the drive controller for error
18	Lift controller error alarm	Lift controller error alarm	Check the lift controller for error
19	Heavy load alarm	Heavy load alarm	Check the platform load and the actual measurement of sensor AD value
20	Envelope alarm	Envelope alarm	Check the boom position and the actual measurement of sensor AD value
21	Broken rope alarm	Broken rope alarm	Check the wire ropes of boom and the wiring of proximity switch
22	Weighing sensor comparison error	Weighing sensor comparison error	Check the actual values and AD values of weighing sensor 1 and 2, and check the wiring
23	Platform tilt alarm	Platform tilt alarm	Check whether the platform tilt angle exceeds the limit
24	Solenoid clutch fault	Solenoid clutch fault	Check whether the solenoid clutch functions properly or the wiring harness is disconnected
25	Turntable slewing left solenoid valve error	Turntable slewing left solenoid valve error	Check the wiring of turntable slewing left solenoid valve
26	Turntable slewing right solenoid valve fault	Turntable slewing right solenoid valve fault	Check the wiring of turntable slewing right solenoid valve
27	Main boom extending solenoid valve fault	Main boom extending solenoid valve fault	Check the wiring of main boom extending solenoid valve
28	Main boom retracting solenoid valve fault	Main boom retracting solenoid valve fault	Check the wiring of main boom retracting solenoid valve
29	Main boom lifting solenoid valve fault	Main boom lifting solenoid valve fault	Check the wiring of main boom lifting solenoid valve

Table 9-2 Machine fault codes description (Continued)

30	Main boom lowering solenoid valve error	Main boom lowering solenoid valve error	Check the wiring of main boom lowering solenoid valve
31	Articulated boom lifting solenoid valve fault	Articulated boom lifting solenoid valve fault	Check the wiring of articulated boom lifting solenoid valve
32	Articulated boom lowering solenoid valve fault	Articulated boom lowering solenoid valve fault	Check the wiring of articulated boom lowering solenoid valve
33	Steer left solenoid valve fault	Steer left solenoid valve fault	Check the wiring of steer left solenoid valve
34	Steer right solenoid valve fault	Steer right solenoid valve fault	Check the wiring of steer right solenoid valve
35	Platform swing left solenoid valve fault	Platform swing left solenoid valve fault	Check the wiring of platform swing left solenoid valve
36	Platform swing right solenoid valve fault	Platform swing right solenoid valve fault	Check the wiring of platform swing right solenoid valve
37	Platform leveling up solenoid valve fault	Platform leveling up solenoid valve fault	Check the wiring of platform leveling up solenoid valve
38	Platform leveling down solenoid valve fault	Platform leveling down solenoid valve fault	Check the wiring of platform leveling down solenoid valve
39	Jib up solenoid valve fault	Jib up solenoid valve fault	Check the wiring of jib up solenoid valve
40	Jib down solenoid valve fault	Jib down solenoid valve fault	Check the wiring of jib down solenoid valve
41	Function enable valve fault	Function enable valve fault	Check the wiring of function enable valve
42	Main boom anti-fall valve fault	Main boom anti-fall valve fault	Check the wiring of main boom anti-fall valve
43	Drive enable valve fault	Drive enable valve fault	Check the wiring of drive enable valve
44	Brake valve fault	Brake valve fault	Check the wiring of brake valve
45	Slewing enable valve fault	Slewing enable valve fault	Check the wiring of slewing enable valve
46	Front pump unloading valve fault	Front pump unloading valve fault	Check the wiring of front pump unloading valve
47	Rear pump unloading valve fault	Rear pump unloading valve fault	Check the wiring of rear pump unloading valve
48	Electrically proportional relief valve fault	Electrically proportional relief valve fault	Check the wiring of electrically proportional relief valve
49	Articulated boom angle sensor comparison error	Articulated boom angle sensor comparison error	Check whether the articulated boom angle sensor is correctly installed
50	Articulated boom angle sensor fault	Articulated boom angle sensor fault	Check the wiring of articulated boom angle sensor

Table 9-2 Machine fault codes description (Continued)

51	Main boom angle sensor comparison error	Main boom angle sensor comparison error	Check whether the main boom angle sensor is correctly installed
52	Main boom angle sensor fault	Main boom angle sensor fault	Check the wiring of main boom angle sensor
53	Articulated boom relative angle sensor comparison error	Articulated boom relative angle sensor comparison error	Check whether the articulated boom relative angle sensor is correctly installed
54	Articulated boom relative angle sensor fault	Articulated boom relative angle sensor fault	Check the wiring of articulated boom relative angle sensor
55	Main boom relative angle sensor comparison error	Main boom relative angle sensor comparison error	Check whether the main boom relative angle sensor is correctly installed
56	Main boom relative angle sensor fault	Main boom relative angle sensor fault	Check the wiring of main boom relative angle sensor
57	Low battery level alarm	Low battery level alarm	Check whether the battery voltage is too low
58	Front right steer sensor fault	Front right steer sensor fault	Check the wiring of front right steer sensor
59	Clutch fault	Clutch fault	Check whether the clutch can be properly engaged or the sensor is correctly wired.
60	Low fuel level fault	Low fuel level fault	Check whether the fuel level is too low or the sensor is correctly wired.

Engine Fault Codes

For the description of fault codes, please refer to the engine maintenance manual provided with the machine.

9.3 BASIC TROUBLE SHOOTING

Table 9-3 Table of faults and solutions

Fault	Cause	Solution
Power indicator not ON	Machine is not powered on.	The key switch is in the neutral position. The emergency stop button on the platform controller or the ground controller is pressed. The platform controller is malfunctioning or failure to power off the platform controller after downloading program. The ground controller is malfunctioning or failure to power off the ground controller after downloading program.
	CAN equipment offline	Inspect whether the leads of the power supply and communication are inserted properly and reliably. Inspect whether all pins of the Deutsch plugs for the platform controller and ground controller connecting cables are wired according to the drawing. Inspect whether the platform controller plug or the plug of the connecting cable between the platform controller and ground controller are in good contact.

Table 9-3 Table of faults and solutions (Continued)

Fault	Cause	Solution
		Inspect whether the platform controller is malfunctioning. Inspect whether the Deltatech plug of ground controller is firmly and correctly connected.
Tilt alarm always sounding while in level status	The level switch is not connected or faulty.	Inspect whether the level switch is inserted properly and firmly. Inspect whether the level switch is malfunctioning.
Platform failed to be leveled	Electrical failure	Check the wiring and control program
	Function solenoid problem	Check the function solenoid, adjust the pressure or replace the function solenoid
	Cylinder or pipeline leakage	Check the pipeline and connectors for leakage. Check the cylinder or its seal for leakage.
Platform leveling with no response	Electrical failure	Check the wiring and control program
	Low hydraulic system oil level	Check the hydraulic oil level
	Function solenoid problem	Check the function solenoid, adjust the pressure or replace the function solenoid
	Oil lines blocked	Check the oil lines
	Slave cylinder failure	Repair or replace the cylinder
	Pump damaged	Replace the pump
Boom movement switches on platform controller with no response	The switch is not in correct position	The key switch is in neutral position. The ground controller is in ground control position. The emergency stop button on the ground controller or platform controller is pressed.
	Boom function switch not enabled with the foot switch depressed	Depress the foot switch again
	Boom function switch failure	Repair or replace the control switch, and perform system test
	Lift, luffing cylinder holding valve failure	Repair or replace the holding valve
	Bypass valve malfunctioning	Repair or replace the valve, check the wiring diagram or perform system test
	Low hydraulic system oil level	Check the hydraulic oil level
	Supply pipelines in valve housing or hydraulic pump restricted or damaged	Clean or replace the pipeline
	Directional valve malfunctioning	Repair or replace the valve
	Lift, luffing cylinder failure	Repair or replace the cylinder
Boom movement switches on ground controller with no response	The switch is not in correct position	The key switch is in neutral position. The ground controller is in platform control position. The emergency stop button on the ground controller or platform controller is pressed.

Table 9-3 Table of faults and solutions (Continued)

Fault	Cause	Solution
	Boom function switch failure	Repair or replace the control switch, and perform system test
	Lift, luffing cylinder holding valve failure	Repair or replace the holding valve
	Bypass valve malfunctioning	Repair or replace the valve, check the wiring diagram or perform system test
	Low hydraulic system oil level	Check the hydraulic oil level
	Supply pipelines in valve housing or hydraulic pump restricted or damaged	Clean or replace the pipeline
	Directional valve malfunctioning	Repair or replace the valve
	Lift, luffing cylinder failure	Repair or replace the cylinder
Turntable failed to rotate to certain direction	Hydraulic pipeline or connector blocked	Clean, repair or replace the pipeline or connector
	Directional valve malfunctioning	Clean, repair or replace the directional valve
	Foreign matters squeezed between the rotation motor pinion and rotation gear	Clean foreign matters and check the gear for wear
	Malfunctioning rotation control handle	Clean, repair or replace the rotation control handle
Turntable rotating to the left/right abnormally	Low hydraulic system oil level	Check the hydraulic oil level
	Insufficient lubricating for rotation gear or rotation motor pinion	Lubricate the gear as needed
	Abnormal rotation motor function	Repair or replace the rotation motor
	Worn rotation gear or rotation motor pinion	Replace the worn gear
	Throttle valve blocked	Clean or replace the throttle valve
Chassis failed to steer	Function solenoid failure or low steer pressure	Check the function solenoid and adjust the pressure
	Cylinder failure	Clean, repair or replace the cylinder
	Low hydraulic system oil level	Check the hydraulic oil level
	Pump with no pressure oil output	Check the pump for damage
Travel control with no response	The switch is not in correct position	The key switch is in neutral position. The ground controller is in ground control position. The emergency stop button on the ground controller or platform controller is pressed.
	Electrical failure	Check the wiring and control program
	Damaged travel motor	Replace the travel motor

Table 9-3 Table of faults and solutions (Continued)

Fault	Cause	Solution
	Pump damaged	Replace the pump
	Invalid brake release valve	Check the valve for blocking and leakage.
	Insufficient brake release pressure	Adjust the brake release pressure
Forward function failed while with no warning	Forward traveling function is malfunctioning.	Check whether the PWM plug of the ground controller is inserted correctly and securely. Check whether the connection of the forward valve is normal. Inspect whether the ground controller is malfunctioning.
Backward function failed while with no warning	Backward traveling function is malfunctioning.	Check whether the PWM plug of the ground controller is inserted correctly and securely. Check whether the connection of the forward valve is normal. Inspect whether the ground controller is malfunctioning.
Tilt warning	The level switch is abnormal	The level switch air bubble is not in the middle position. The level switch is not connected properly or firmly. The ground controller is malfunctioning.
No overload warning	Weight sensor not calibrated for rated load or calibrated with wrong lift height	The sensor is not calibrated. The wiring of the load sensor is incorrect. The sensor is malfunctioning.
Machine travels and then stops intermittently	The battery level is low/the calibration is incorrect	Re-calibrate the parameters. The battery is out of power, not as indicated by the battery gauge.
Parameters after setting could not be saved successfully after several attempts.	Abnormal storage	The parameters exceed the limit. Ground controller malfunctioning.

9.4 ELECTRICAL SYMBOLS

Table 9-4

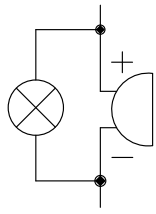
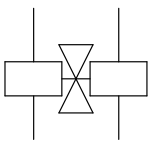
Symbol	Description
	Buzzer
	Valve

Table 9-4 (Continued)

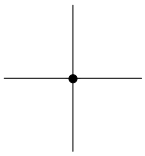
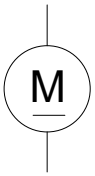
Symbol	Description
	Two lines connected
	Motor

Table 9-4 (Continued)

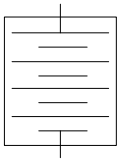
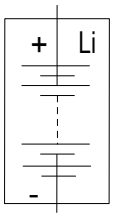
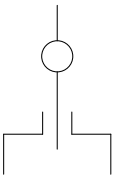
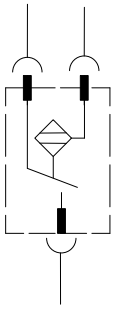
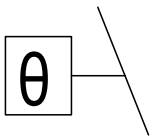
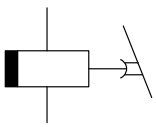
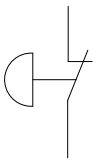
Symbol	Description
	Storage battery
	Lithium battery
	Toggle switch
	Level switch
	Oil temperature switch
	Delay relay
	Main power switch

Table 9-4 (Continued)

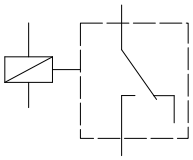
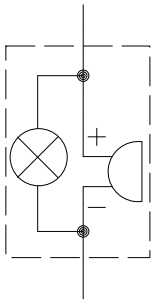
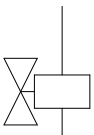
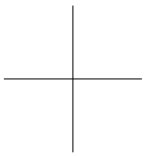
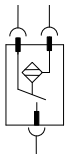
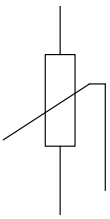
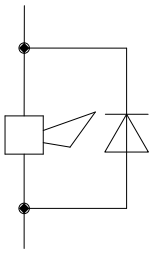
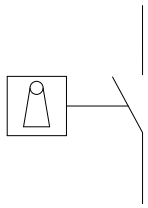
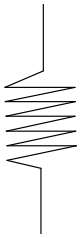
Symbol	Description
	Relay
	Warning light
	Valve
	Two lines not connected
	Proximity switch/ Pressure sensor
	Fuel level sensor
	Horn

Table 9-4 (Continued)

Symbol	Description
	Key switch
	Preheating wire

9.5 ELECTRICAL SCHEMATIC DIAGRAM

Electrical Schematic Diagram of Turntable

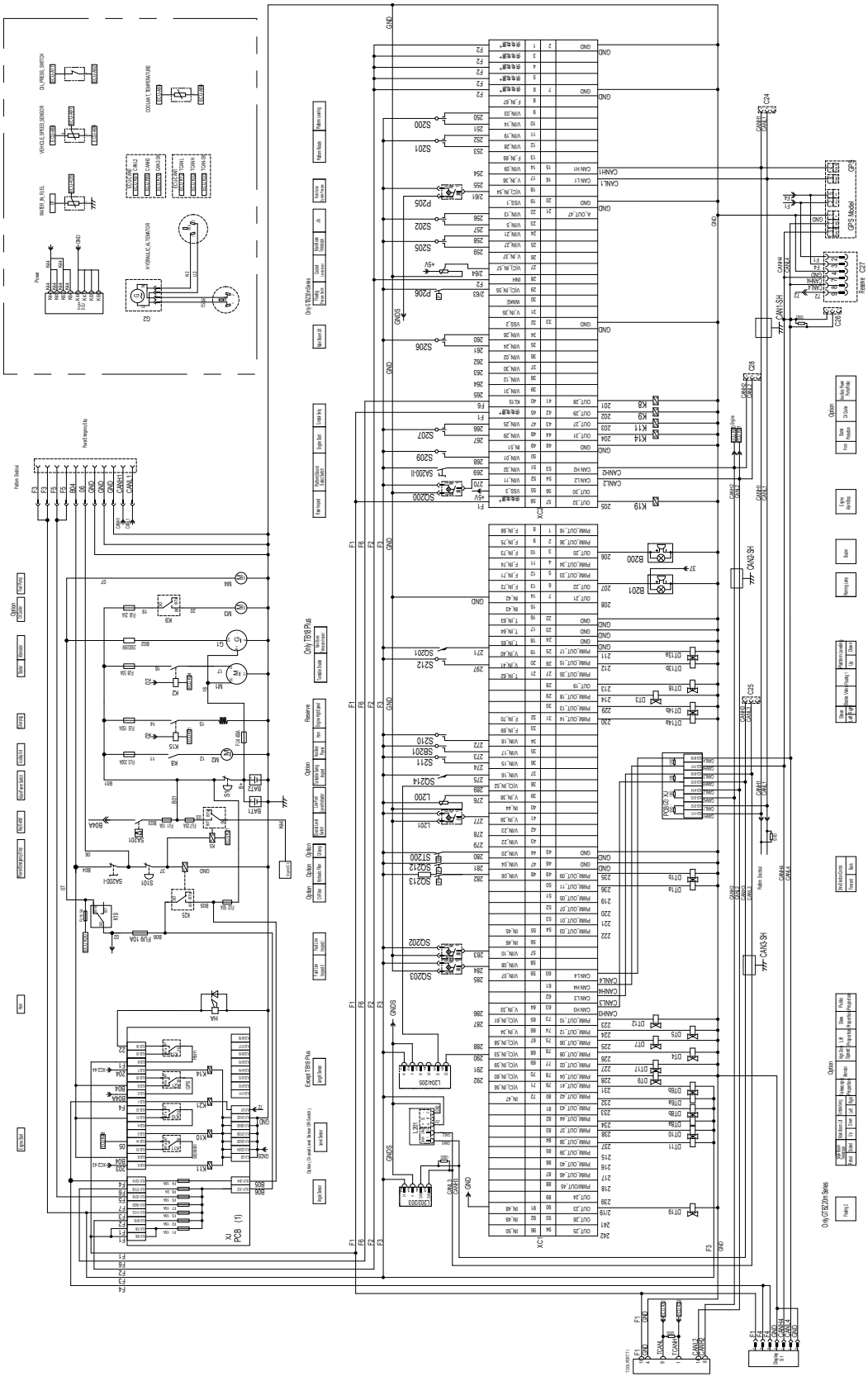


Fig 1 Electrical schematic of turntable (WEICHAI WP3.2/China IV)

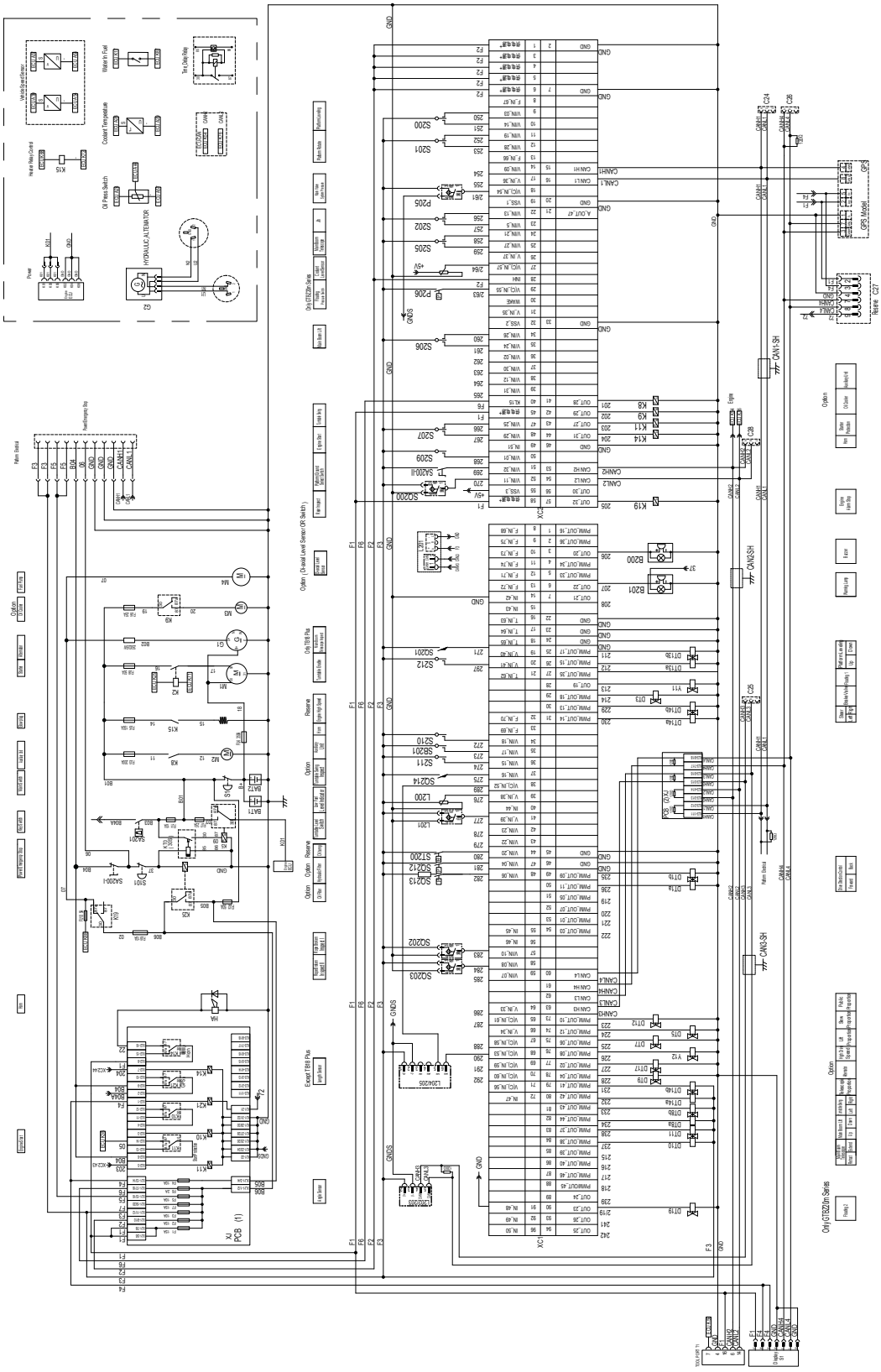


Fig 2 Electrical schematic of turntable (Yuchai YCF3050/China IV)

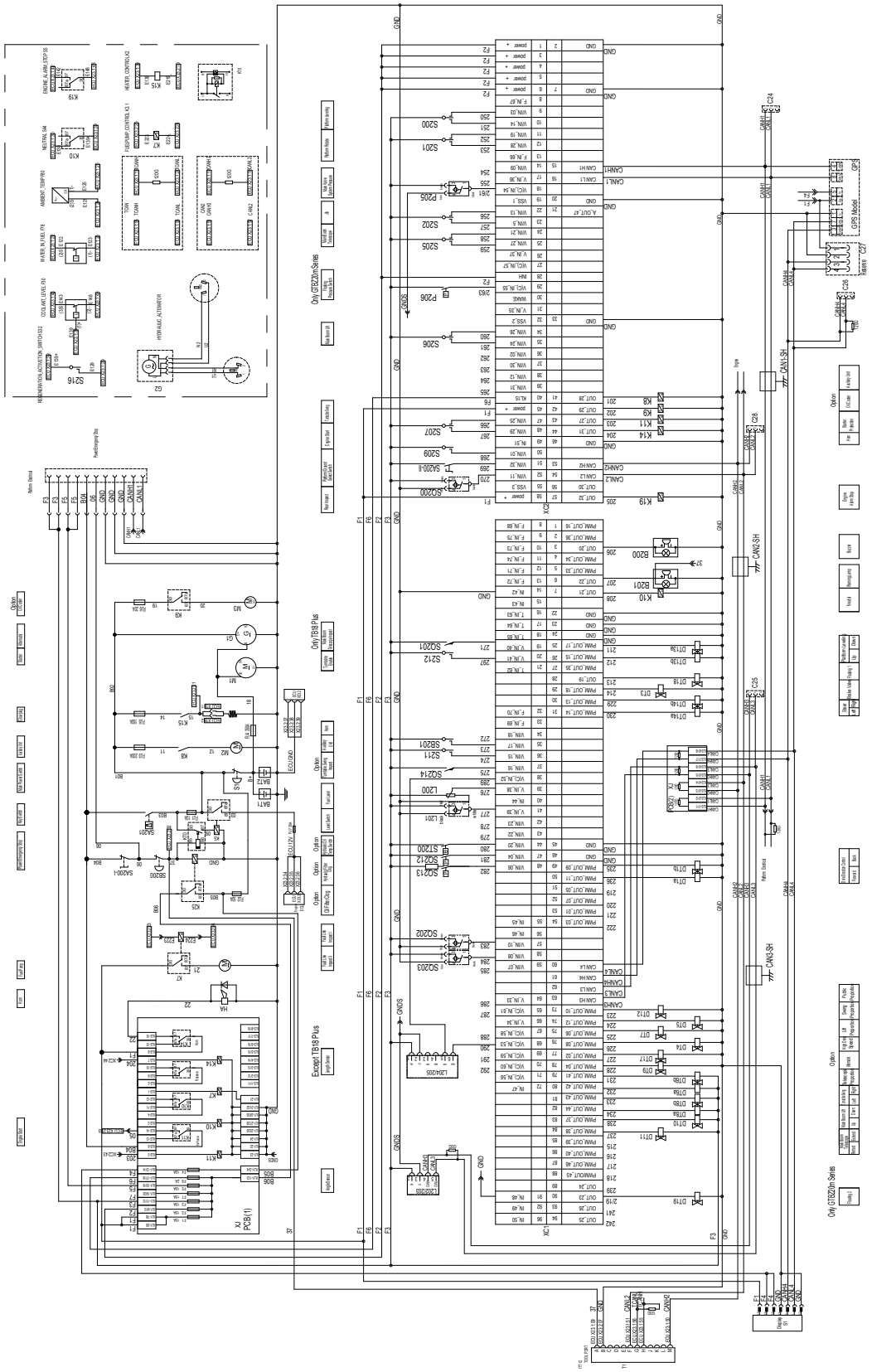


Fig 3 Electrical schematic of turntable (Deutz D2.9 L4/EU Stage V)

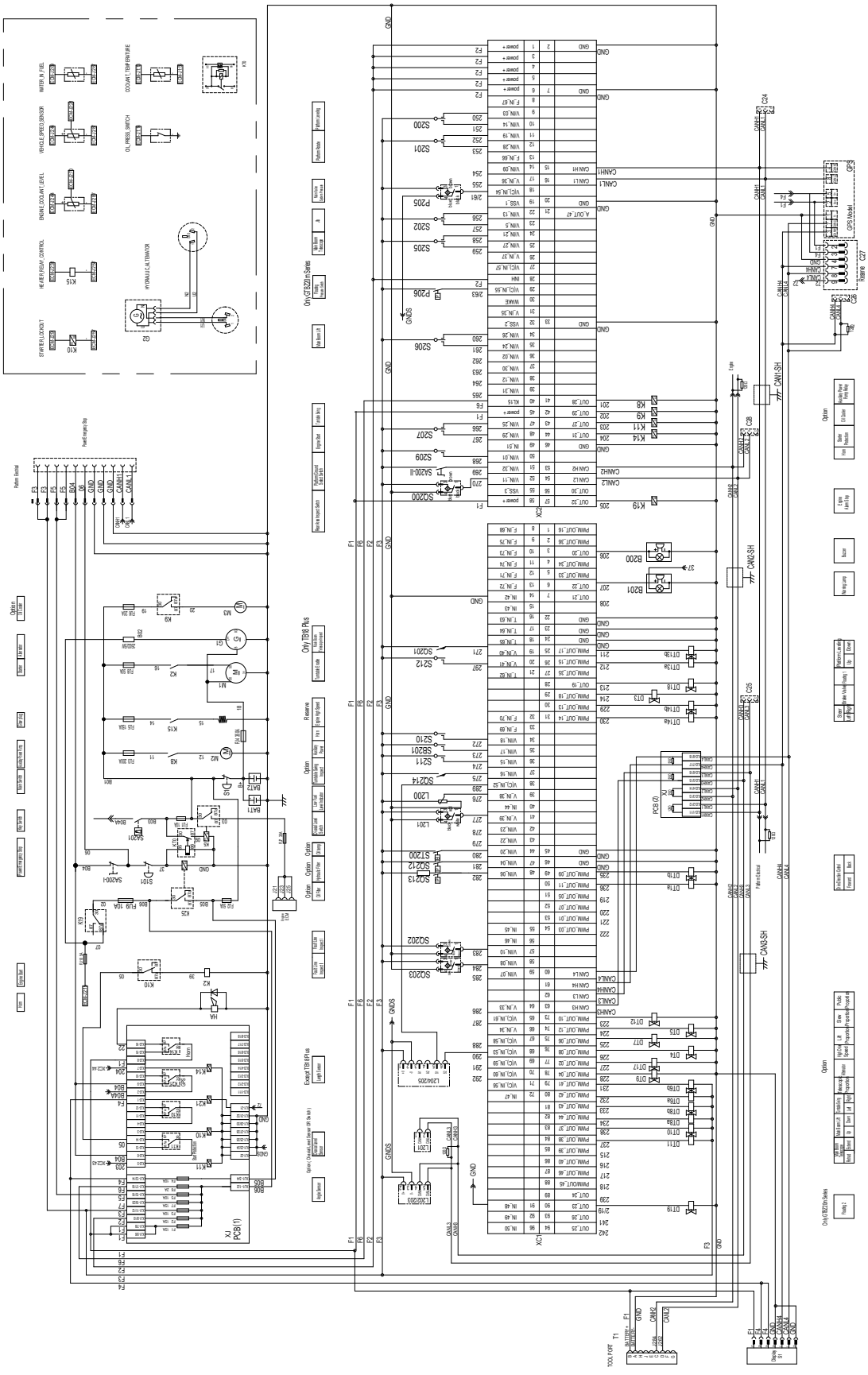


Fig 4 Electrical schematic of turntable (Cummins QSF2.8/China III, with Cummins hydraulic generator)

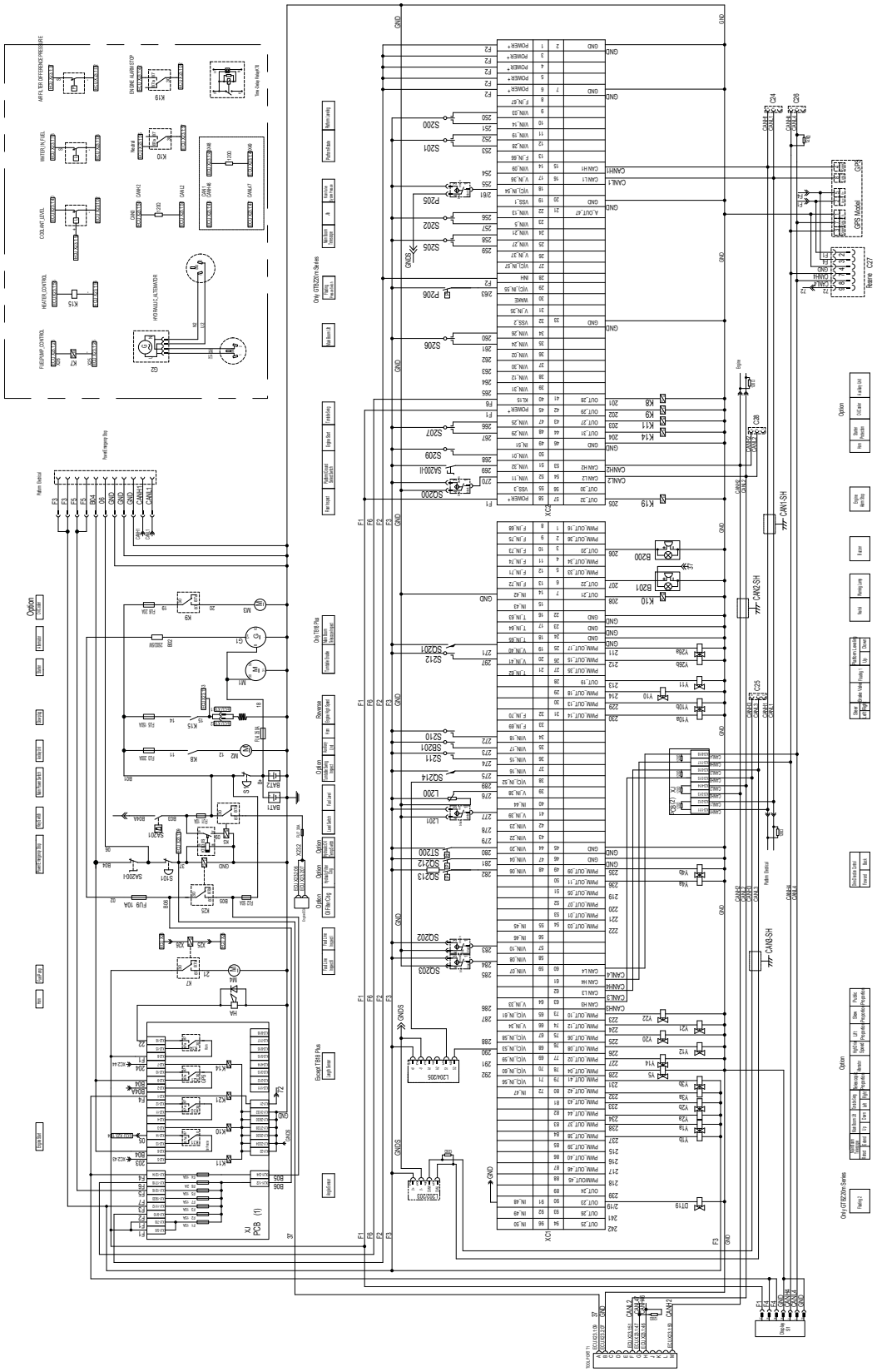


Fig 5 Electrical schematic of turntable (Deutz D2.9 L4/EPA T4, with Deutz hydraulic generator)

Electrical Schematic Diagram of Platform

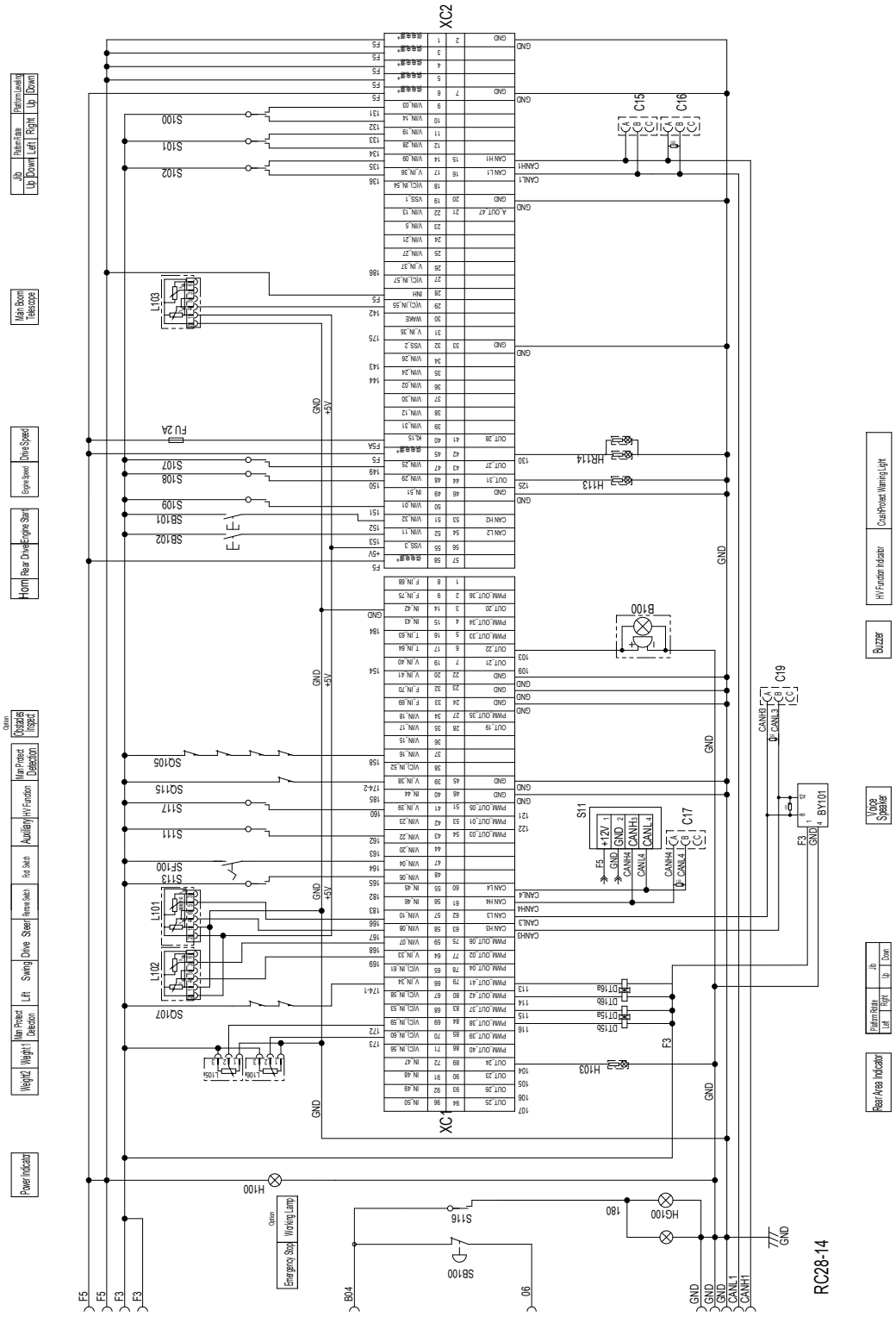


Fig 6 Electrical schematic of platform (WEICHAI WP3.2, Yuchai YCF3050/China IV)

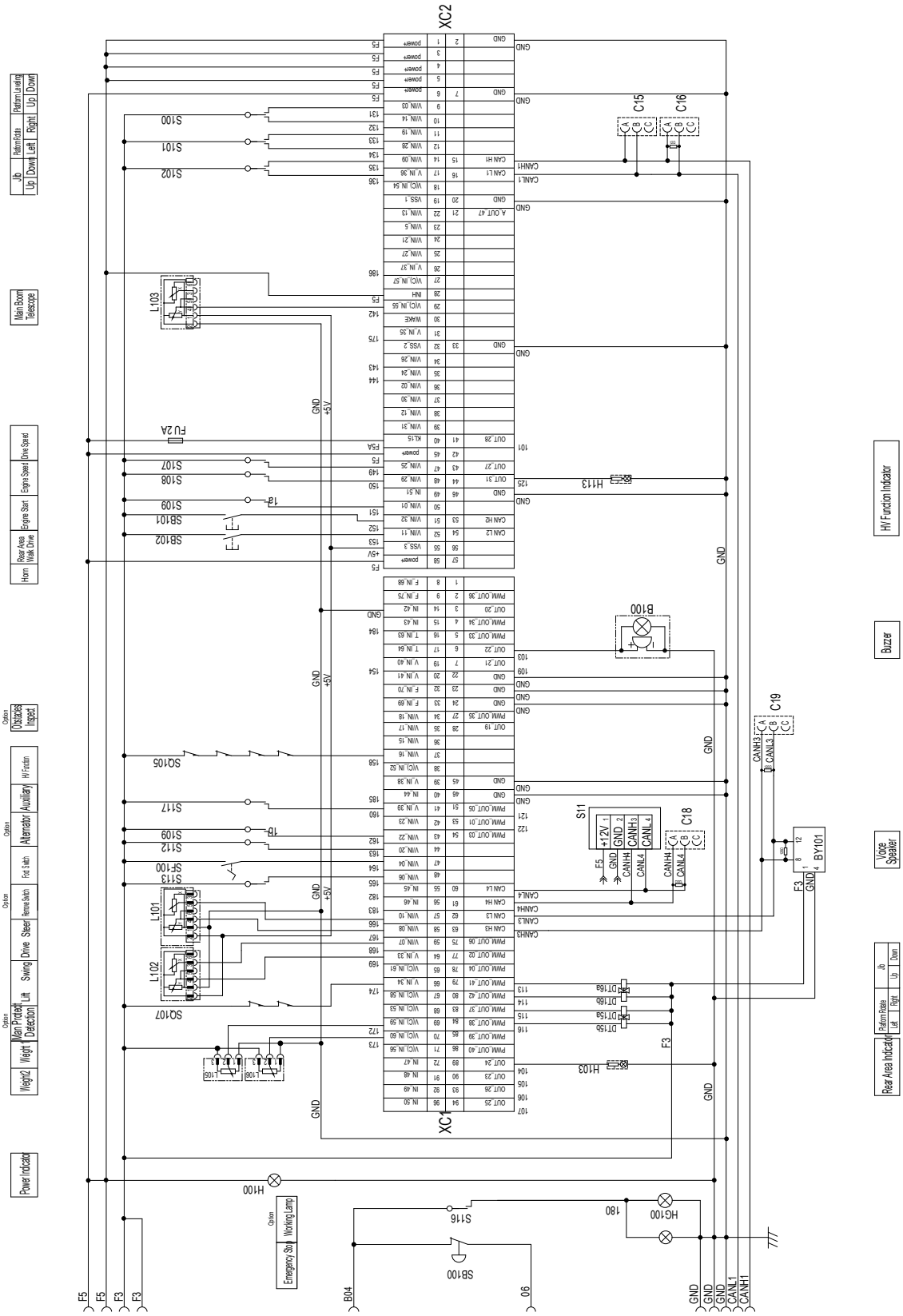


Fig 7 Electrical schematic of platform (Cummins QSF2.8/China III, Deutz D2.9 L4/EPA Tier 4/Euro Phase V, with hydraulic generator)

Electrical Schematic Diagram of Engine

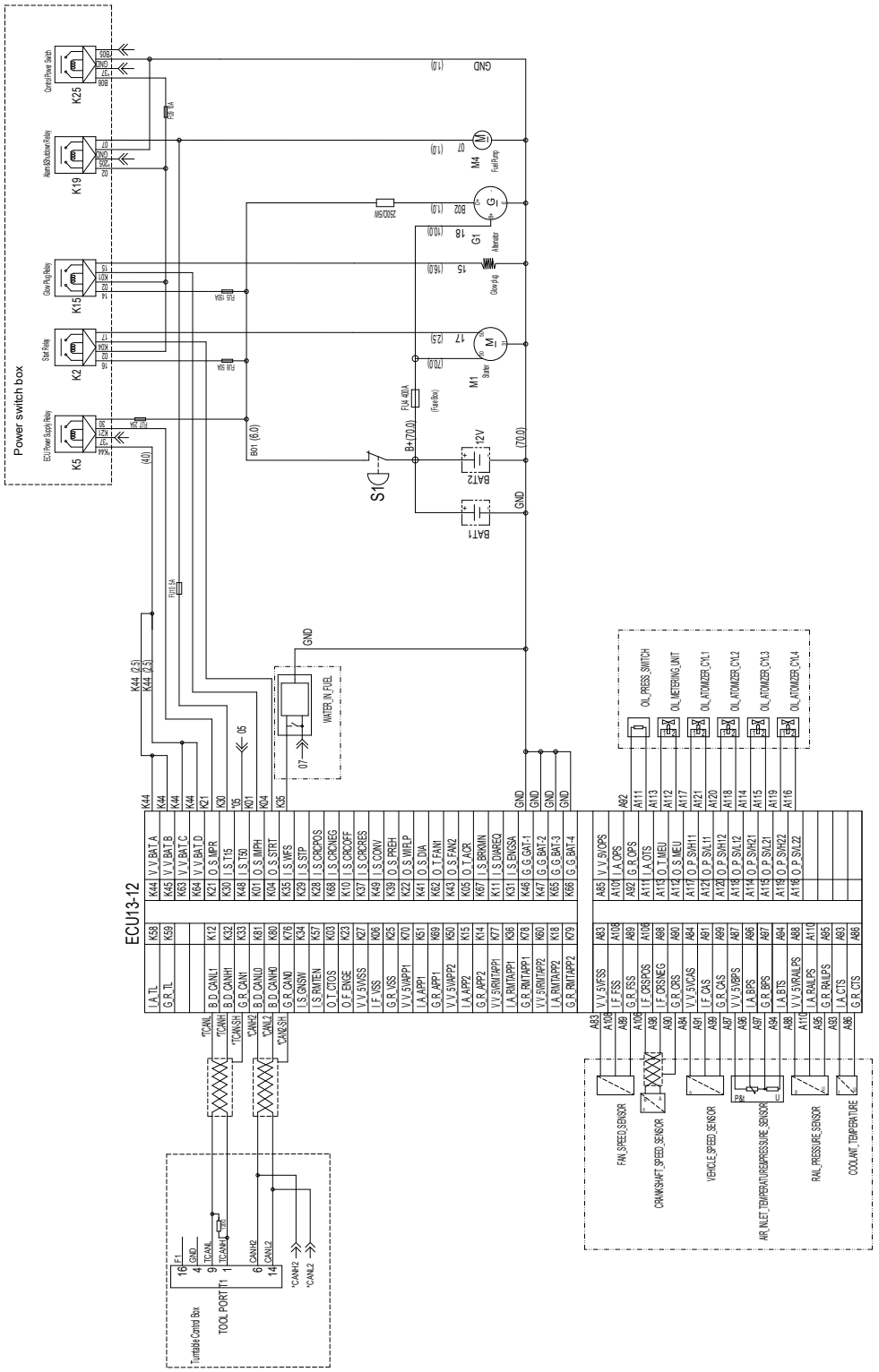


Fig 8 Electrical schematic of engine (WEICHAI WP3.2/China IV)

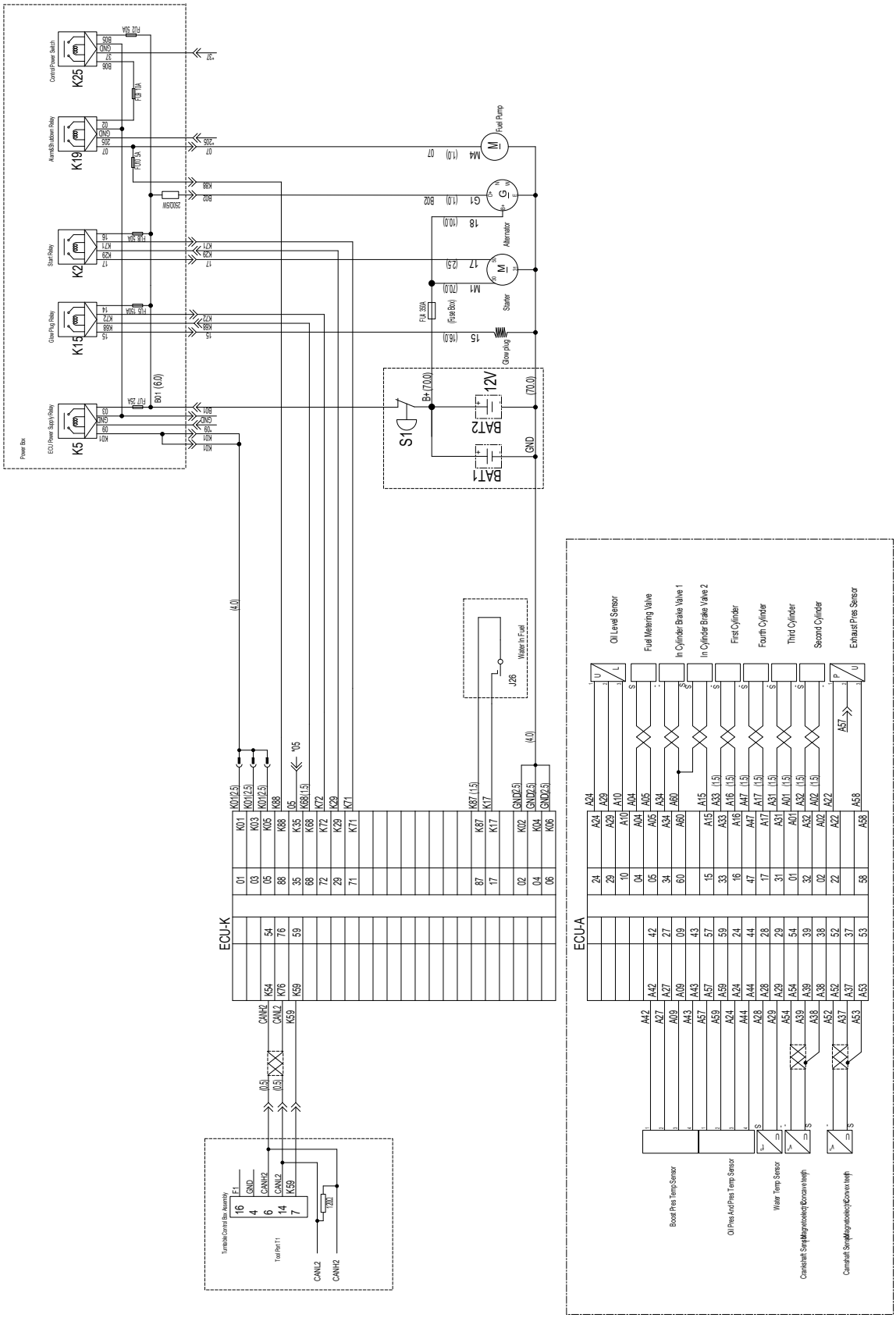


Fig 9 Electrical schematic of engine (Yuchai YCF3050/China IV)

Electrical Schematic of Hydraulic Generator

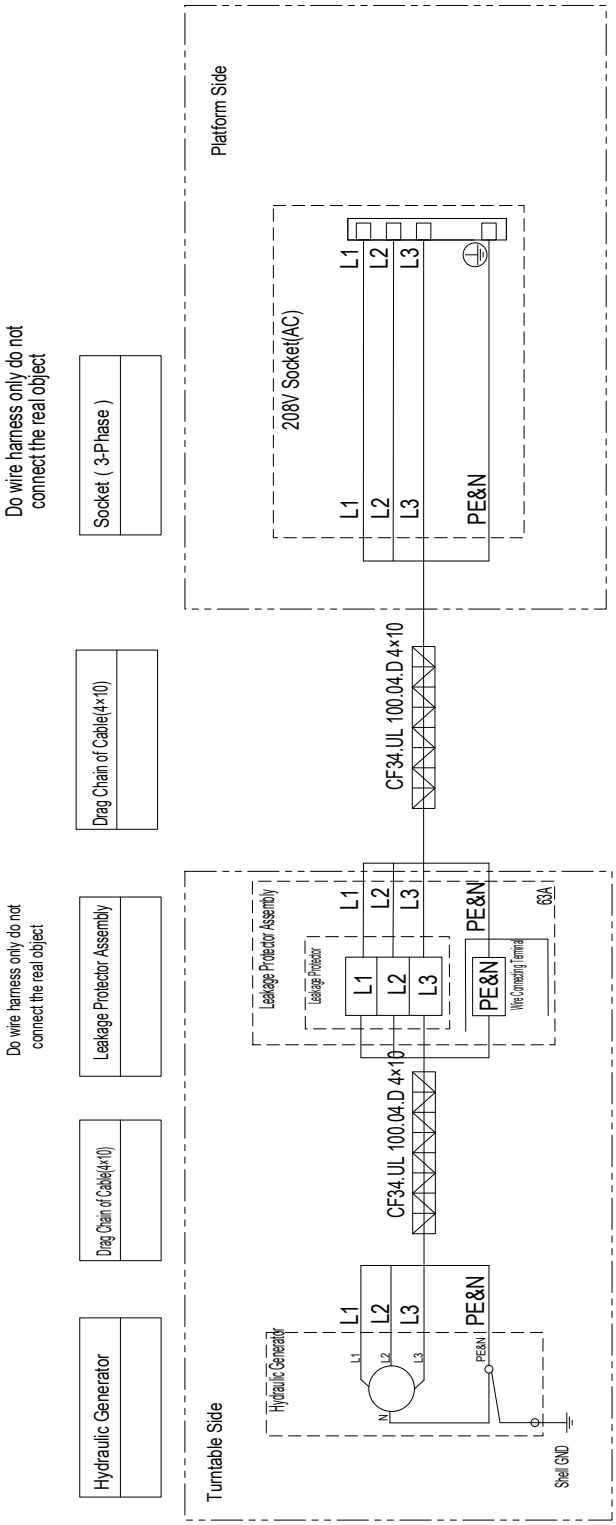


Fig 10 Electrical schematic of hydraulic generator (North America)

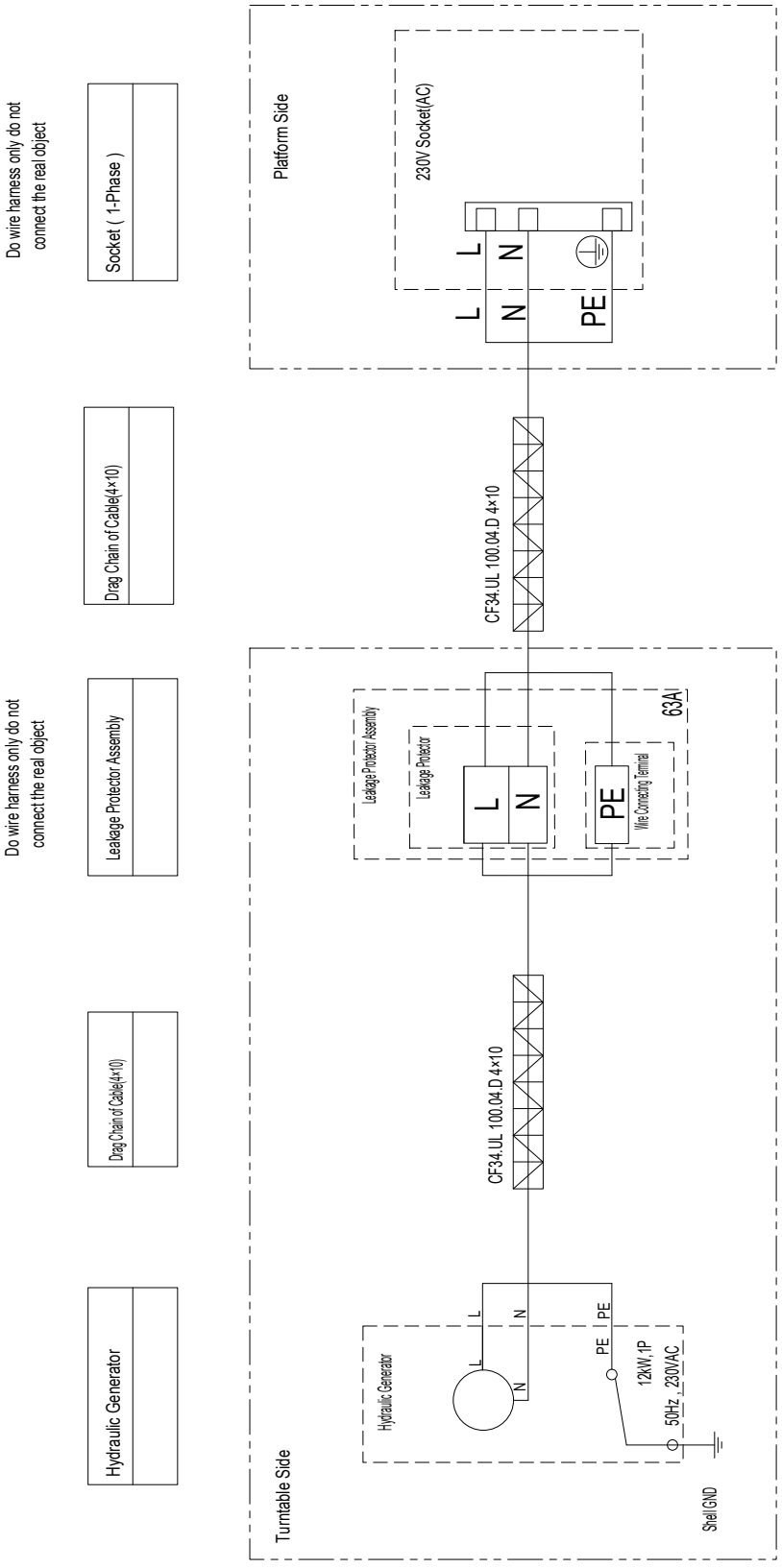


Fig 11 Electrical schematic of hydraulic generator (Australia)

10 FUNCTIONS AND CONTROLS

10.1 DRIVE FUNCTION

Driving at reasonable speed is essential for ensuring machine safety. The drive function should respond quickly and smoothly under the control of the operator. The machine should travel without shaking, shocks and abnormal noise over the controllable speed range. To ensure that the drive unit runs smoothly and keeps good condition, it is recommended to check the drive function every 3 months or after 250 hours of operation.

Select flat, level, unobstructed and solid ground to perform the following tests with the platform carrying one person and stowed:

1. Mark two straight lines with the distance of 30m (98.4ft) on the ground as the test start and stop lines.
2. Start the machine.
3. Depress the foot switch.
4. Slowly push the travel/steer control handle forward to the full drive position.
5. Move the high/low engine speed selector switch on the platform controller to switch the engine speed to high speed (if the machine is equipped with an engine).
6. Push the high/low travel speed selector switch on the platform controller upwards to switch the travel speed to high speed.
7. When the front wheel contacts with the test start line, press the timer to start timing.
8. Keep the machine running at high speed until the contact point between the front wheel and the ground reaches the test stop line, and stop timing.
9. Calculate the travel speed with the measured data and compare it with the specified maximum travel speed in the stowed position.

NOTICE

If the above calculation result exceeds the maximum travel speed in the stowed position by 10%, immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

10.2 BRAKING FUNCTION

Proper braking function is essential for the safe operation of the machine. The braking device should respond quickly and smoothly without any abnormal noise under the control of the operator. To ensure that the brake device works smoothly and keep good condition, it is recommended to check the brake device every 3 months or after 250 hours of operation.

The braking distance of the machine controlled within the normal range is an important indicator of the normal braking function of the machine. Select flat, level, unobstructed and solid ground to perform the following tests with the platform carrying one person and stowed:

1. Check to make sure the drive hub cap is engaged.
2. Mark a test line on the ground as a reference.
3. Start the machine.
4. Depress the foot switch.
5. Slowly push the travel/steer control handle forward to the full drive position.
6. Move the high/low engine speed selector switch on the platform controller to switch the engine speed to high speed (if the machine is equipped with an engine).
7. Push the high/low travel speed selector switch on the platform controller upwards to switch the travel speed to high speed.
8. When the front wheel contacts with the test line, quickly release the travel/steer control handle.
9. Measure the vertical distance between the test line and the contact point between the front wheel and the ground, which is the braking distance.
10. Compare the measured distance with specified braking distance at full travel speed.

NOTICE

If the measured distance exceeds the specified maximum braking distance, immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

10.3 TILT PROTECTION FUNCTION

The proper functioning of the tilt sensing system is essential for the safe operation of the machine. It is recommended to check the tilt sensing system every 3 months or after 250 hours of operation.

Select flat, level, unobstructed and solid ground to perform the following tests:

In the non-operating position:

1. Start the machine.
2. Push the level switch in the X (left-right)/Y (front-rear) direction by more than 5°. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and no actions will be restricted.
3. Place two wooden blocks with the dimensions shown in the table below before the two wheels on the left (or right) side of the machine and drive the machine onto these two blocks. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and no actions will be restricted.
4. Drive the machine off the wooden block and remove the wooden block.
5. Place two wooden blocks with the dimensions shown in the table below before the two front (or rear) wheels of the machine and drive the machine onto these two blocks. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and no actions will be restricted.
6. Drive the machine off the wooden block and remove the wooden block.

In the operating position:

1. Start the machine.
2. Push the level switch in the X (left-right)/Y (front-rear) direction by more than 5°. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
3. Place two wooden blocks with the dimensions shown in the table below before the two wheels on the left (or right) side of the machine and drive the machine onto these two blocks. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
4. Adjust the boom tube to the non-operating position, drive the machine off the wooden blocks and remove the wooden blocks.
5. Place two wooden blocks with the dimensions shown in the table below before the two front (or rear) wheels of the machine and drive the machine onto these two blocks. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
6. Adjust the boom tube to the non-operating position, drive the machine off the wooden blocks and remove the wooden blocks.

NOTICE

If the machine operation cannot be accurately restricted during the test, please immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

Table 10-1 Wooden block dimension

Wooden block position	Length	Width	Height
Left (or right) wheel	750mm (2.46ft)	250mm (0.82ft)	188mm (0.62ft)
Front (or rear) wheel	750mm (2.46ft)	250mm (0.82ft)	218mm (0.72ft)

10.4 MAXIMUM WORKING ENVELOPE LIMIT FUNCTION

The system detects the position of the boom tube by means of the angle sensor and length sensor on the boom head (near the turntable). When the system detects the boom in the maximum position, the boom movement will be restricted.

The maximum working envelope limit function is essential for the safe operation of the machine, which may affect the stability of the machine. It is recommended to check the maximum working envelope limit function every 3 months or after 250 hours of operation.

NOTICE

If the machine operation cannot be accurately restricted during the test, please immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

Horizontal Reach Restriction

A length sensor is used to measure the boom extension length and limit the boom from further extending when the boom length exceeds the maximum horizontal reach.

0kg < platform load≤300kg (661lb)

1. Start the machine from the ground controller.
2. Move the main boom luffing switch and the jib boom luffing switch (if equipped) to adjust the main boom and jib boom (if equipped) horizontal.
3. Move the main boom telescoping switch to extend the main boom.
4. When the boom extends to 16.1m (52ft) as shown on the ground controller display (distance from the center of the slewing bearing to the outermost side of the platform), the buzzers in the ground controller and platform controller should sound, the main boom cannot extend any more nor lift/descend, but can be retracted, and the turntable is allowed to rotate.
5. Move the main boom telescoping switch to fully retract the main boom.

300kg (661lb) < platform load≤454kg (1000lb)

1. Start the machine from the ground controller.
2. Move the main boom luffing switch and the jib boom luffing switch (if equipped) to adjust the main boom and jib boom (if equipped) horizontal.
3. Move the main boom telescoping switch to extend the main boom.
4. When the boom extends to 14.6m (47ft 11in) as shown on the ground controller display (distance from the center of the slewing bearing to the outermost side of the platform), the buzzers in the ground controller and platform controller should sound, the main boom cannot extend any more nor lift/descend, but can be retracted, and the turntable is allowed to rotate.
5. Move the main boom telescoping switch to fully retract the main boom.

Luffing Angle Restriction

The angle sensor is used to measure the luffing angle of the boom tube. When the boom is elevated/lowered beyond the allowable angle range, the angle sensor will stop the boom from further elevating/lowering.

1. Start the machine from the ground controller.
2. Move the main boom luffing switch to adjust the main boom to horizontal position, and move the jib boom luffing switch (if equipped) to adjust the jib boom to the highest position.
3. Move the main boom luffing switch to elevate/lower the main boom.
4. When the main boom is raised to the upper limit of luffing angle (73°±1° shown on the ground controller display), the boom should be prevented from further rising.
5. When the main boom is lowered to the lower limit of luffing angle (-15°±1° shown on the ground controller display), the boom should be prevented from further lowering.
6. Move the boom telescoping switch and main boom luffing switch to adjust the machine to the stowed position.

NOTICE

The maximum allowable tolerance of the angle sensor should not exceed 0.5° in the measurement range.

10.5 OVERLOAD LIMIT FUNCTION

The rated load capacity of the platform is clearly specified in the ***Machine Specifications*** section of this manual, and if the platform is overloaded, the machine operation should be limited.

The proper functioning of the overload limit system is essential for the safe operation of the machine, because its malfunction may affect the stability of the machine. It is recommended to check the overload limit function every 3 months or after 250 hours of operation.

Select flat, level, unobstructed and solid ground to perform the following tests with the platform unloaded:

1. Start the machine.
2. Fully raise and lower the boom and retract and extend the boom twice separately to ensure that the machine has no obvious shaking and abnormalities, and is properly lubricated.
3. After lowering the platform to the stowed position, gradually apply load to the platform according to the

rated load capacity of the platform.

NOTICE

If the machine operation cannot be accurately restricted during the test, please immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

The test results should be as follows if the overload limit system works normally:

Table 10-2

Mode	Test results
KG mode	**With platform capacity restricted:** When the load on the platform does not exceed 454kg (1000lb), the platform can be elevated to the highest position. When the load on the platform exceeds 454kg (1000lb), the buzzer will sound, the overload indicator light will flash, the display will indicate overload, and all functions will be disabled. After the excess load is removed, all functions will be resumed. **With platform capacity unrestricted:** When the load on the platform does not exceed 300kg (661lb), the platform can be elevated to the highest position. When the load on the platform exceeds 300kg (661lb), the buzzer will sound, the overload indicator light will flash, the display will indicate overload, and all functions will be disabled. After the excess load is removed, all functions will be resumed.
Non-KG mode	**With platform capacity restricted:** When the load on the platform does not exceed 454kg (1000lb), the platform can be elevated to the highest position. When the load on the platform exceeds 454kg (1000lb), the buzzer will sound, the overload indicator light will flash, the display will indicate overload, and certain functions will be disabled. But the boom can be retracted, and lowered after fully retracted, and the turntable can rotate slowly. After the excess load is removed, all functions will be resumed. **With platform capacity unrestricted:** When the load on the platform does not exceed 300kg (661lb), the platform can be elevated to the highest position. When the load on the platform exceeds 300kg (661lb), the buzzer will sound, the overload indicator light will flash, the display will indicate overload, and certain functions will be disabled. But the boom can be retracted, and lowered after fully retracted, and the turntable can rotate slowly. After the excess load is removed, all functions will be resumed.

11 CONTROL SYSTEM

DANGER

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.

WARNING

Unsafe Operation Hazard

- **The machine has been commissioned before delivery. It's forbidden to modify the system settings and update the program without authorization from Sinoboom.**

  Due to different machine configurations, certain descriptions below may be inapplicable to your machine. In case of any operational questions when operating the machine as per the manual, please stop operation and contact Sinoboom after-sales personnel in time.

- **Incorrect operation may result in death, serious injury or machine damage.**

NOTICE

PCU, ECU, sensors, etc. are precisely adjusted and protectively treated 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 Rexroth control system equipped with the Rising display.

11.1 DISPLAY INTERFACE

The system interface is as shown in the figure below:

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

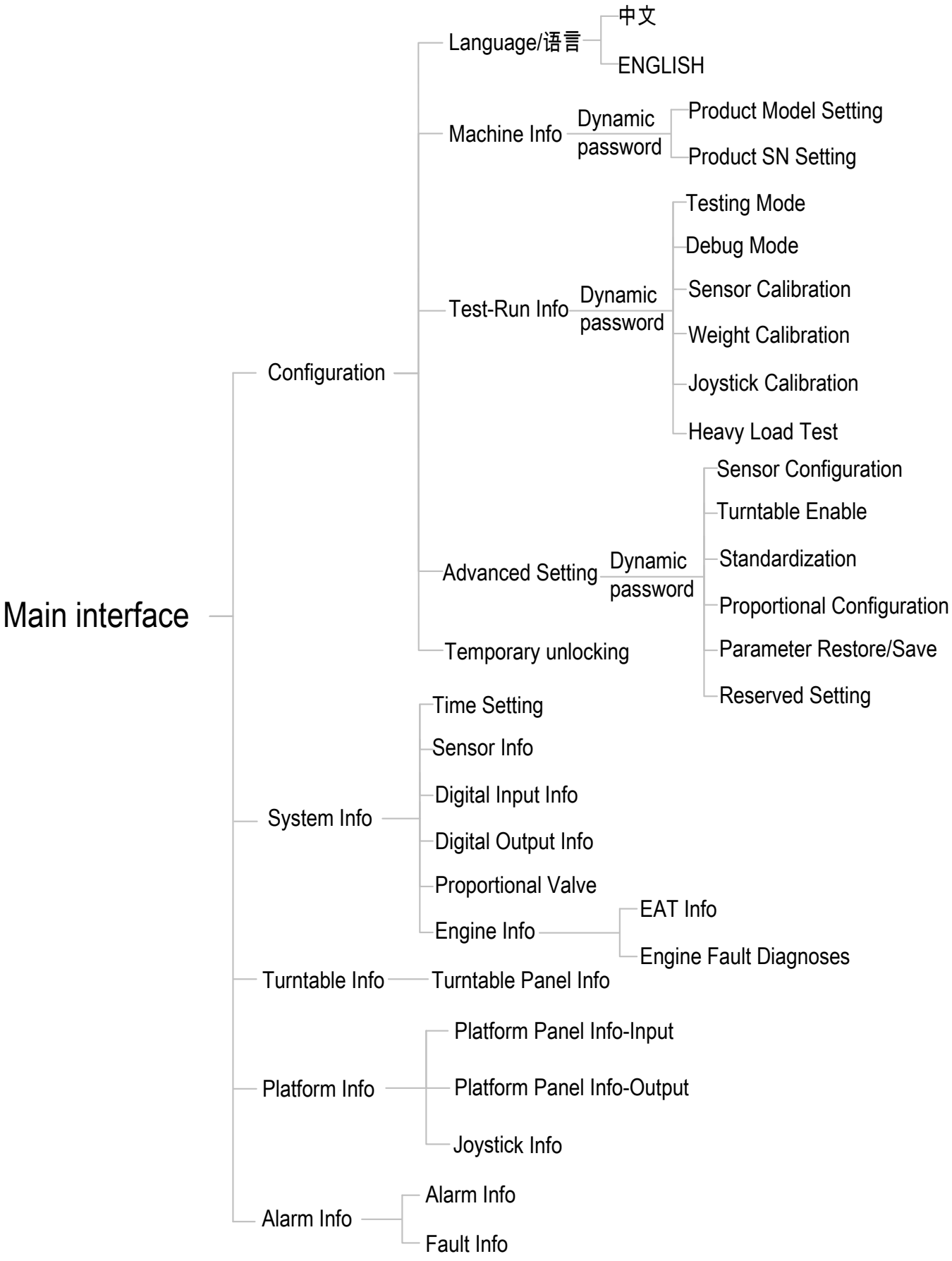


Fig 1 Display interface navigation diagram

11.2 MAIN INTERFACE AFTER BOOTING

Turn the ground/platform selector switch on the ground controller to the ground control position, pull out the emergency stop button to the ON position, and turn the key switch to the ON position, and the system will be powered on.

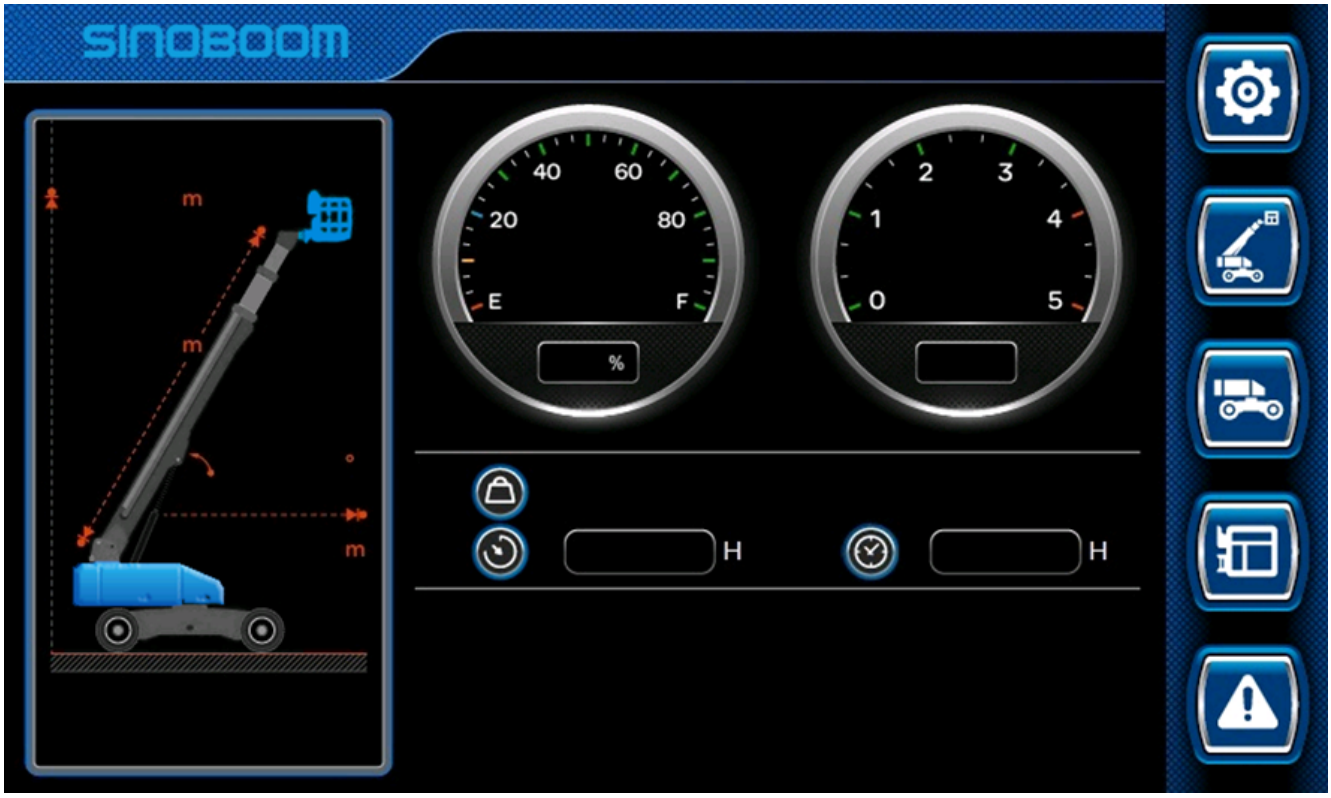


Fig 2 Main interface after booting

11.3 DESCRIPTION OF ICON FUNCTIONS

Table 11-1

Icon	Description	Icon	Description
	Configuration		Left/Right arrow key
	Turntable panel information		Increase key

Table 11-1 (Continued)

	System information		Decrease key
	Platform information		Return key
	Alarm information		Enter key
	Up arrow key		Previous page
	Down arrow key		Enter/next page
	Right arrow key		Press and hold the icon for 3s to save the current page parameters and jump to the next page /Press the icon to directly jump to the next page
	Left arrow key		Press and hold the icon for 3s to save the current page parameters and return to the previous menu /Press the icon to directly return to the previous menu
	Up/Down arrow key		

11.4 LANGUAGE SETTING

1. Press on the main interface to enter CONFIGURATION Interface.

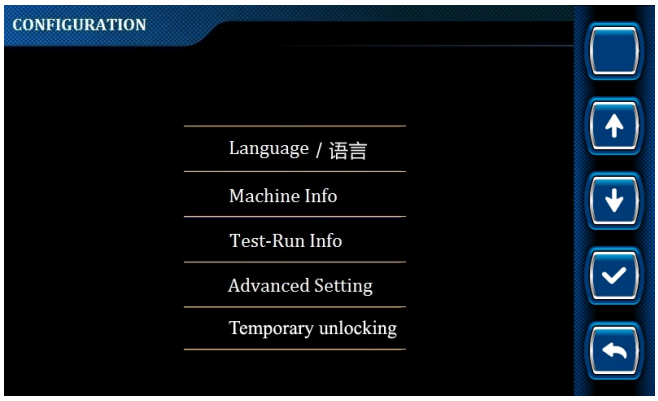


Fig 3 CONFIGURATION Interface

2. Select Language through and , and press to enter LANGUAGE Interface.

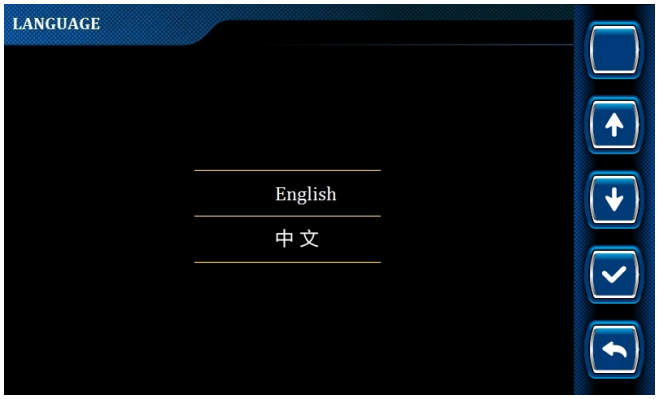


Fig 4 LANGUAGE Interface

3. Select 中文 or English through ↑ and ↓, and press and hold ✓ for 3s to complete language setting.
4. Press ↩ successively to return to the main interface, and power off the machine as required.

11.5 TEST-RUN INFORMATION

1. Press ⚙ on the main interface to enter CONFIGURATION interface.
2. According to the navigation diagram of display interface, enter TEST-RUN INFO interface by pressing ↑, ↓ and ✓.

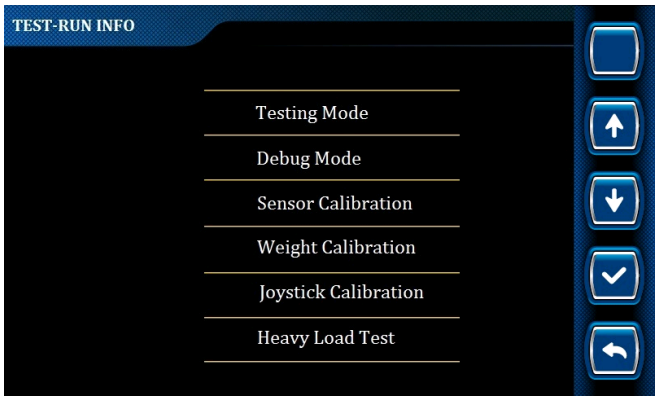


Fig 5 TEST-RUN INFO Interface

Sensor Calibration

- This operation is to calibrate sensors other than the weighing sensor (its calibration method will be described in detail in the subsequent ***weight calibration***).
- If the machine is equipped with a dual-channel sensor, only 1 channel is needed to be selected for maximum value and minimum value calibration.

1. On the TEST-RUN INFO interface, select Sensor Calibration through ↑ and ↓ and enter SENSOR CALIBRATION interface by pressing ✓.

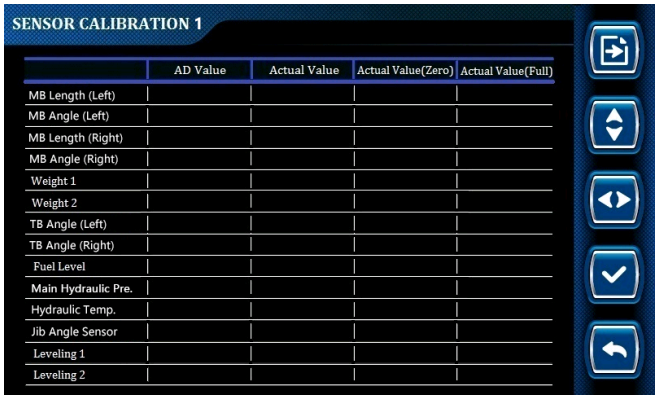


Fig 6 SENSOR CALIBRATION 1 interface

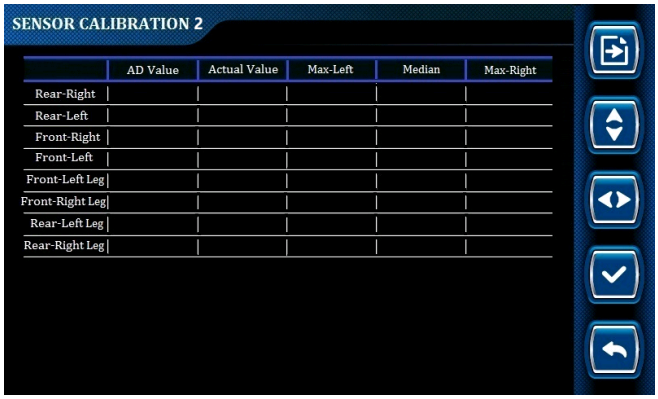


Fig 7 SENSOR CALIBRATION 2 interface

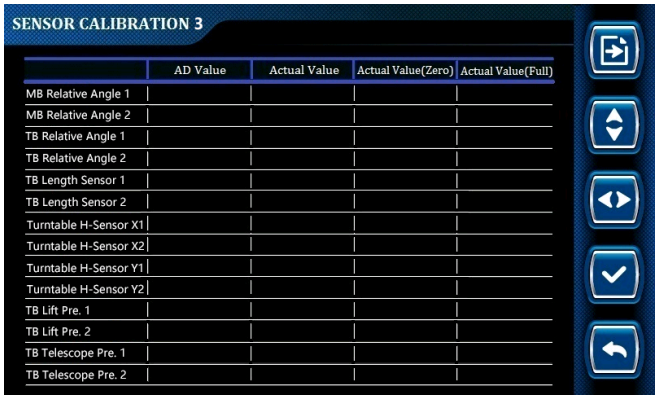


Fig 8 SENSOR CALIBRATION 3 interface

2. On the SENSOR CALIBRATION interface, select the position to be calibrated through ↑ and ↓ (there will be the flashing ● before the selected option), press and hold ✓ for 3s to complete the calibration (the icon before the selected option is

switched from to , indicating calibration succeeded, and the corresponding actual value will be changed).

3. If re-calibrating the parameters at this position is required, press to return to the TEST-RUN INFO interface, then re-enter the SENSOR CALIBRATION interface, and repeat the previous step.
4. Press successively to return to the main interface, and power off the machine as required.

Weight Calibration

1. Make sure that no heavy objects are placed on the platform and that the platform is stable without shaking.
2. Enter the TEST-RUN INFO interface.
3. On the TEST-RUN INFO interface, select Weight Calibration through and , and press to enter the WEIGHT CALIBRATION interface.

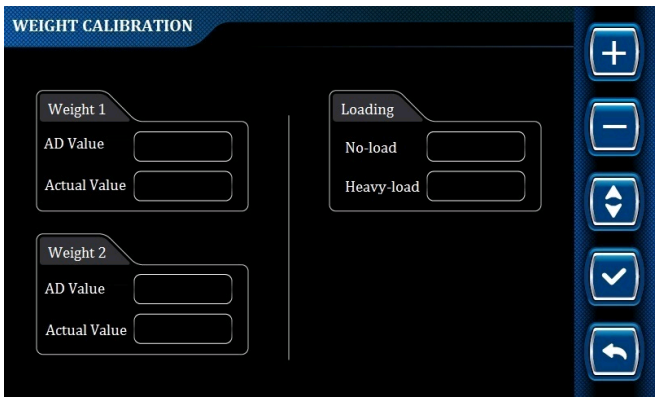


Fig 9 WEIGHT CALIBRATION interface

4. On the WEIGHT CALIBRATION interface, select No-load in the Loading column on the right side of the display screen through , adjust the value to 0 through and , and press and hold for 3s to complete the no-load calibration.
5. Place a heavy object with the weight equal to the rated load of the machine on the platform, and ensure that the platform is stable without shaking.
6. Select Heavy-load in the Loading column on the right side of the display screen through , adjust the value to the weight value of the heavy object on the platform through and , and press and hold for 3s to complete the heavy-load calibration (the actual weight value on the left side of the corresponding display screen is equal to the weight value of loads on the platform).
7. If re-calibration is required, press to return to the TEST-RUN INFO interface, then re-enter the WEIGHT CALIBRATION interface, and repeat the previous step.
8. Press successively to return to the main interface, and power off the machine as required.

- If the machine is equipped with a dual-channel sensor, when pressing and holding for no-load and heavy-load calibration, the weight of two channels will be calibrated at the same time.

Joystick Calibration

1. On the TEST-RUN INFO interface, select Joystick Calibration through and , and press to enter the JOYSTICK CALIBRATION interface.

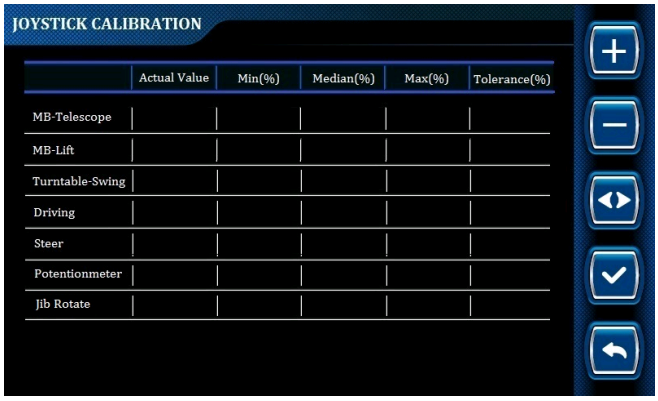


Fig 10 JOYSTICK CALIBRATION interface

2. On the JOYSTICK CALIBRATION interface, select the joystick option to be calibrated through , change the tolerance through and , and press to save the value and complete the calibration (the icon before the selected option will be changed from to , indicating calibration succeeded; there will be the icon on the interface when tolerance value is saved.)
3. If re-calibration is required, press to return to the TEST-RUN INFO interface, then re-enter the JOYSTICK CALIBRATION interface, and repeat the previous step.
4. Press successively to return to the main interface, and power off the machine as required.

11.6 ADVANCED SETTING (TOPIC)

DANGER

Personnel who have not been professionally trained and authorized by Sinoboom are not allowed to modify the advanced setting (including sensor configuration, turntable enable, standardization, proportional configuration, parameter restore/save and reserved setting); otherwise they will be responsible for the consequences.

1. Press on the main interface to enter CONFIGURATION interface.
2. According to the navigation diagram of display interface, enter Advanced Setting interface (password required) by pressing , and successively.

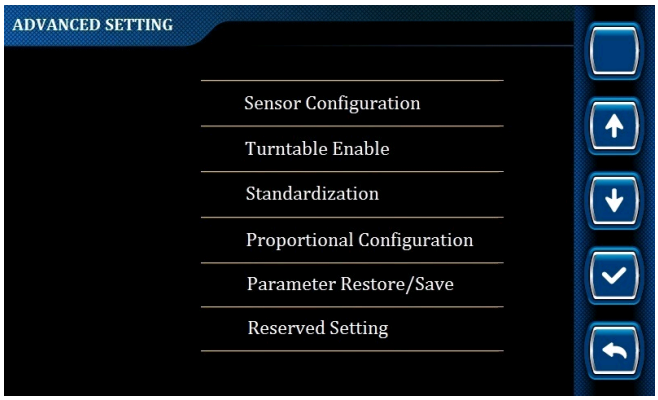


Fig 11 ADVANCED SETTING interface

Sensor Configuration

- The sensor configuration is mainly used to turn on/off switches or sensors on the machine.
- The configuration of switches is subject to the actual machine configurations.

1. On the ADVANCED SETTING interface, select Sensor Configuration through and , and press to enter SENSOR CONFIGURATION interface.

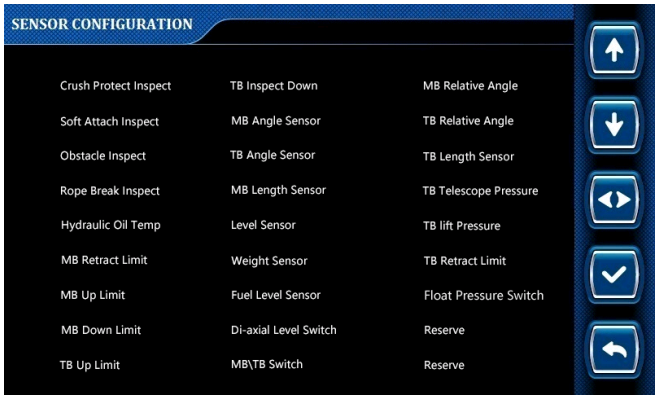


Fig 12 SENSOR CONFIGURATION interface

2. On the SENSOR CONFIGURATION interface, select the desired item through , , and , and press to turn on/off the selected item.
3. Press successively to return to the main interface, and power off the machine as required.

Turntable Enable

1. On the ADVANCED SETTING Interface, select Turntable Enable through and , and press to enter TURNTABLE ENABLE Interface.

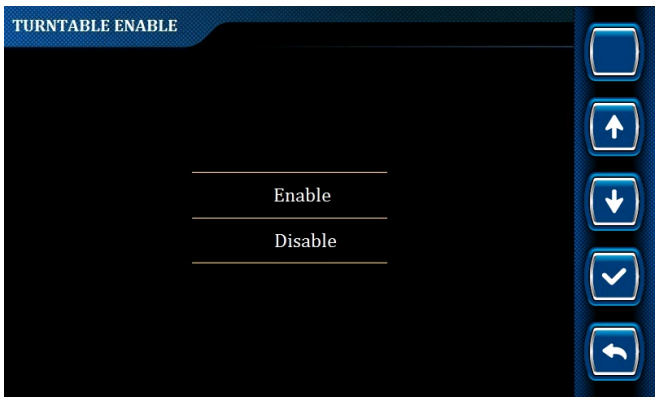


Fig 13 TURNTABLE ENABLE Interface

2. On the TURNTABLE ENABLE Interface, select Enable or Disable through and , and press and hold for 3s to confirm the setting (there will be the icon before the selected option after successful setting).
3. To re-select the option, press to return to the ADVANCED SETTING Interface, re-enter the TURNTABLE ENABLE Interface, and repeat the above steps.
4. Press successively to return to the main interface, and power off the machine as required.

Standardization

1. On the ADVANCED SETTING interface, select Standardization through and , and press to enter STANDARDIZATION interface.

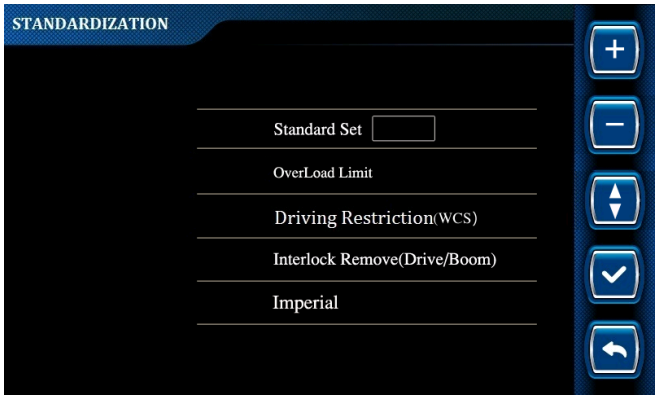


Fig 14 STANDARDIZATION interface

2. **Standard setting:** On the STANDARDIZATION interface, select Standard Set option through , change the value through and , and press and hold for 3s to confirm the setting (there will be the icon before the selected option after successful setting).
   - After changing the value to “0” and confirming the setting, the program will not implement any standard restrictions.
   - After changing the value to “1” and confirming the setting, the program will implement the restrictions of CE standard, and the icon of CE standard (CE) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “2” and confirming the setting, the program will implement the restrictions of ANSI standard, and the icon of ANSI standard (ANSI) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “3” and confirming the setting, the program will implement the restrictions of CSA standard, and the icon of CSA standard (CSA) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “4” and confirming the setting, the program will implement the restrictions of AS standard, and the icon of AS standard (AS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “5” and confirming the setting, the program will implement the restrictions of KCS standard, and the icon of KCS standard (KCS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “6” and confirming the setting, the program will implement the restrictions of JIS standard, and the icon of JIS standard (JIS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “7” and confirming the setting, the program will implement the restrictions of EAC standard, and the icon of EAC standard (EAC) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “8” and confirming the setting, the program will implement the restrictions of UKC standard, and the icon of UKC standard (UKC) will be displayed in the upper right corner of the Home interface.
3. **Overload limit setting:** On the STANDARDIZATION interface, select Overload Limit option through , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the KG icon (KG) will be displayed in the upper right corner of the main interface.
4. **Drive Limit (WCS) setting:** On the STANDARDIZATION interface, select Driving Restriction (WCS) option through , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the DR icon (DR) will be displayed in the upper right corner of the main interface.
5. **Interlock remove (drive/boom) setting:** On the STANDARDIZATION interface, select Interlock Remove (Drive/Boom) option through , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the D/B icon (D/B) will be displayed in the upper right corner of the main interface.
6. To re-select the test option, press to return to the ADVANCED SETTING interface, re-enter the STANDARDIZATION interface, and repeat the above steps to select the desired option.
7. Press successively to return to the main interface, and power off the machine as required.

- In KG mode, when the platform is overloaded, a series of actions of the machine in operating position will be restricted. The difference between KG mode and non-KG mode can be found in the ***Functions and Controls*** section in the maintenance procedures of this Manual.
- In DR mode, the driving function of the machine in operating position will be restricted.
- In D/B mode, the driving function and boom actions can be performed at the same time.

Proportional Configuration

1. On the ADVANCED SETTING interface, select Proportional Configuration through ↑ and ↓, and press ✓ to enter PROPOR. CONFIG 1 interface.

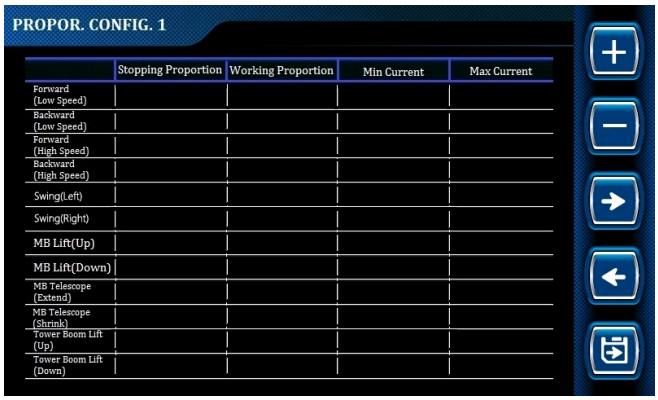


Fig 15 PROPOR. CONFIG 1 interface

2. On the PROPOR. CONFIG 1 interface, select the parameter to be adjusted through → and ← (the selected option will be flashing), change the selected parameter value through + and −, press and hold ⏎ for 3s to save the parameters on the current page and jump to PROPOR. CONFIG 2 interface (there will be the icon ✓ in the top middle of the interface after successful saving), or press ⏎ to jump to PROPOR. CONFIG 2 interface without saving the parameters on the current page.

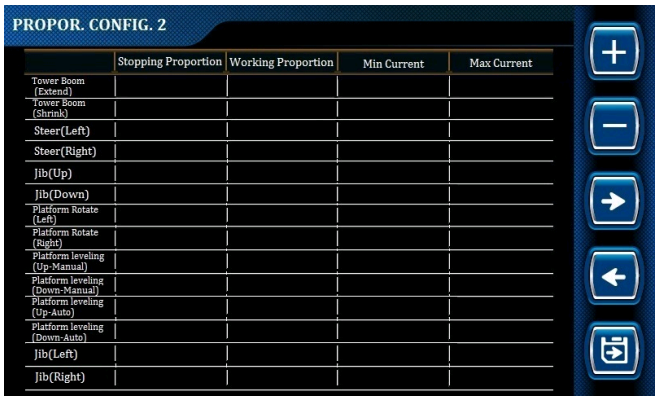


Fig 16 PROPOR. CONFIG 2 interface

3. Similarly, on the PROPOR. CONFIG 2 interface, follow the above operations to change the parameters requiring adjustment, and jump to the PROPOR. CONFIG 3 interface.

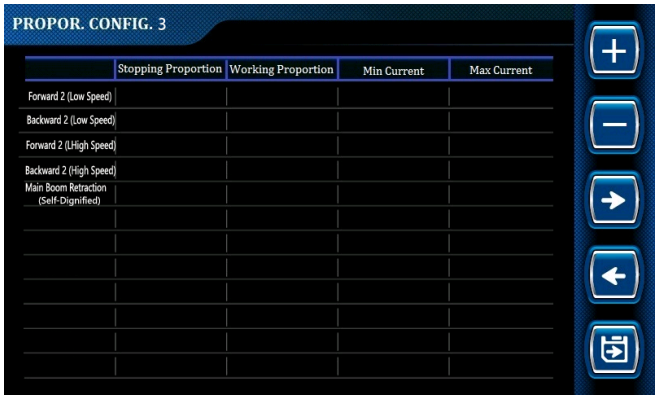


Fig 17 PROPOR. CONFIG 3 interface

4. Similarly, on the PROPOR. CONFIG 3 interface, follow the above operations to change the parameters requiring adjustment, and jump to the PROPOR. CONFIG 4 interface.

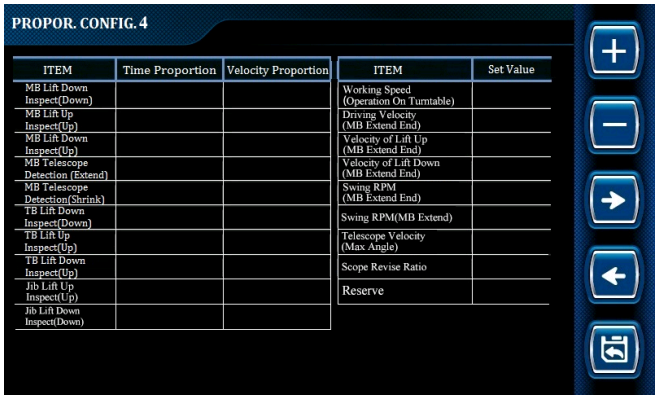


Fig 18 PROPOR. CONFIG 4 interface

5. On the PROPOR. CONFIG 4 interface, follow the above operations to change the parameters requiring adjustment. Press and hold ⏎ for 3s to save the parameters on the current page and return to the previous ADVANCED SETTING interface, or press ⏎ to return to the previous ADVANCED SETTING interface without saving the parameters on the current page.

6. Press ↩ successively to return to the main interface, and power off the machine as required.

Note:

The maximum current, minimum current, working proportion, and stopping proportion are only valid for actions controlled by proportional valves. For actions not controlled by proportional valves, please adjust the working proportion and stopping proportion to within 10, or the action response will be delayed.

- Minimum current: refers to the starting current of actions, which affects the starting of actions and micro-motion performance. The minimum current should

be set to a value that allows the action to just get started, and it can be identified through the debug mode.

- Maximum current: refers to the maximum current of actions. If it is too low, the speed of actions will be affected, and if it is too high (exceeding the full-open current of the proportional valve), the buffering performance of actions will be affected.
- Working proportion: refers to the starting buffer slope of actions. The smaller the proportion value, the bigger the starting buffer slope and the shorter the time required; the larger the proportion value, the smaller the starting buffer slope and the longer the required time. This parameter can be used to improve the starting hysteresis and starting impact performance of actions.
- Stopping proportion: refers to the stopping buffer slope of actions. The smaller the proportion value, the bigger the stopping buffer slope and the shorter the time required; the larger the proportion value, the smaller the stopping buffer slope and the longer the time required. This parameter can be used to improve the stopping hysteresis and stopping impact performance of actions.
- Time proportion: omitted.
- Speed proportion: used to adjust the target current of action buffering. The smaller the proportion value, the lower the target current and the slower the action; the larger the proportion value, the higher the target current and the faster the action. This parameter can be used to adjust the action speed in the buffer zone.

Table 11-2 Description of items on PROPOR. CONFIG 4 interface

No.	Item	Description	Applicable models
1	MB Lift Down Inspect (Down)	To set the time and speed proportion of main boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the main boom is positioned at an angle smaller than the set value.	TB, AB
2	MB Lift Up Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the main boom is positioned at an angle bigger than the set value.	TB, AB
3	MB Lift Down Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-down. Condition of fully raising: up limit switch is triggered or the main boom is positioned at an angle bigger than the set value.	TB, AB
4	MB Telescope Detection (Extend)	To set the time and speed proportion of main boom when fully extended. Condition of fully extending: the extended length is bigger than the set value.	TB
5	MB Telescope Detection (Shrink)	To set the time and speed proportion of main boom when fully retracted. Condition of fully retracting: the retracting limit switch is triggered or the extended length is smaller than the set value.	TB, AB
6	TB Lift Down Inspect (Down)	To set the time and speed proportion of articulated boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the articulated boom is positioned at an angle smaller than the set value.	AB
7	TB Lift Up Inspect (Up)	To set the time and speed proportion of articulated boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the articulated boom is positioned at an angle bigger than the set value.	AB
8	TB Lift Down Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-down.	AB

Table 11-2 Description of items on PROPOR. CONFIG 4 interface(Continued)

		Condition of fully raising: up limit switch is triggered or the articulated boom is positioned at an angle bigger than the set value.	
9	Jib Lift Up Inspect (Up)	To set the time and speed proportion of jib boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the jib boom is positioned at an angle bigger than the set value.	TB, AB
10	Jib Lift Down Inspect (Up)	To set the time and speed proportion of jib boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the jib boom is positioned at an angle smaller than the set value.	TB, AB
11	Working Speed (Operation on Turntable)	To set the speed of turntable rotation.	TB, AB
12	Driving Velocity (MB Extend End)	To set the travel speed with the main boom fully extended.	TB
13	Velocity of Lift Up (MB Extend End)	To set the luffing-up speed with the main boom fully extended (max angle).	TB
14	Velocity of Lift Down (MB Extend End)	To set the luffing-down speed with the main boom fully extended (max angle).	TB
15	Swing RPM (MB Extend End)	To set the rotation speed with the main boom fully extended (max angle).	TB
16	Swing RPM (MB Extend)	To set the rotation speed with the main boom extended. Condition: the retracting limit switch disengages or the main boom is longer than 1.2m.	AB
17	Telescope Velocity (Max angle)	To set the extending/retracting speed with the main boom at the max angle.	TB
18	Scope Revise Ratio	To slightly adjust the operating range of telescopic boom (not used yet).	TB
Notes: All parameters can be adjusted within 0-100.			

Parameter Restore/Save

1. On the ADVANCED SETTING interface, select Parameter Restore/Save through and , and press to enter PARAMETER RESTORE/SAVE interface.

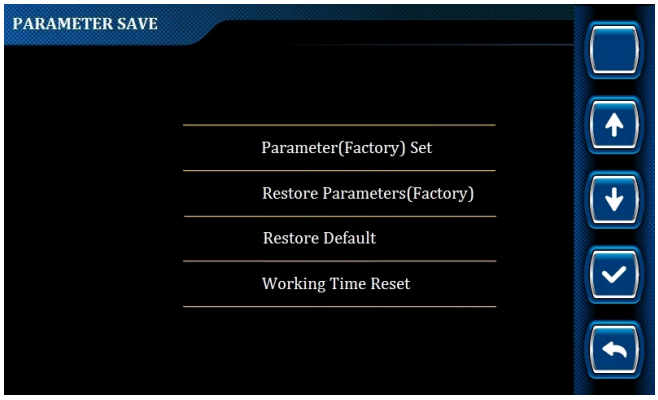


Fig 19 PARAMETER RESTORE/SAVE interface

2. On the PARAMETER SAVE interface, select the desired function through and , (there will be the

icon before the selected option), press and hold for 3s to confirm the selection (there will be the icon before the selected option after confirmation).

3. Press successively to return to the main interface, and power off the machine as required.

Note:

- Parameter (factory) set: used to save the current parameters as factory parameters and the original factory parameters will be overwritten. Please use this function with caution.
- Restore parameters (factory): used to restore the current parameters to the factory parameters and the current parameters will be overwritten. Please use this function with caution.
- Restore default: used to restore the current parameters to the default parameters and the current parameters will be restored. This function shall be used with caution and generally only used in the initial installation and debugging (requiring a password to restore the default parameters).
- Working time reset: used to clear the total working time (after clearing, the total working time is about 36.5h). Please use this function with caution.

11.7 SYSTEM INFORMATION

On the main interface, press to enter SYSTEM INFO interface.

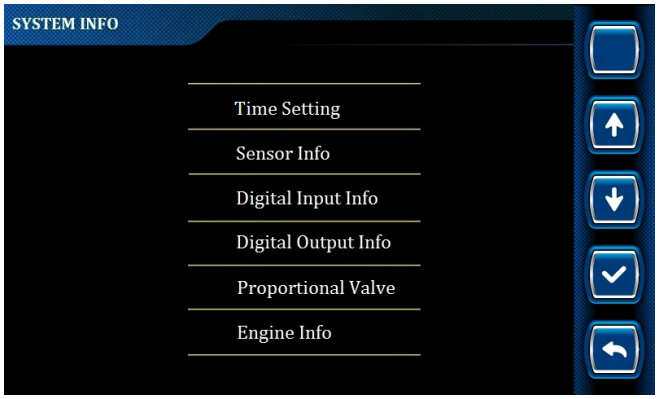


Fig 20 SYSTEM INFO interface

Time Setting

1. On the SYSTEM INFO interface, select Time Setting through and , and press to enter TIME SETTING interface.

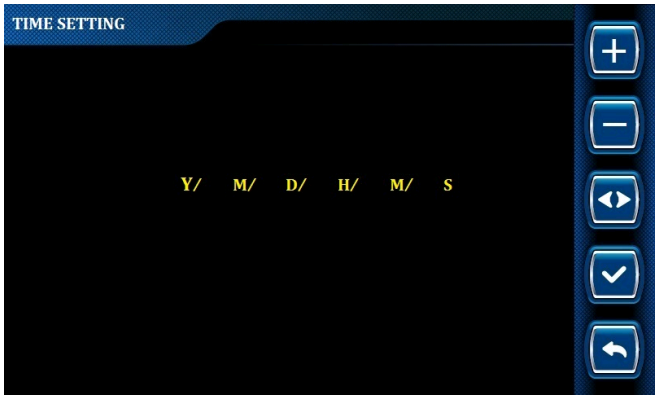


Fig 21 TIME SETTING interface

2. On the TIME SETTING interface, select the desired setting option (the selected option will be flashing) through , change the value through and , and press to confirm the changing (there will be the icon at the top of the interface).
3. Press successively to return to the main interface, and power off the machine as required.

Sensor Information

- The sensor information option is mainly used to query the actual value of the sensor configured on the machine, thus determining whether each sensor is working normally.
- The configuration of switches is subject to the actual machine configurations.

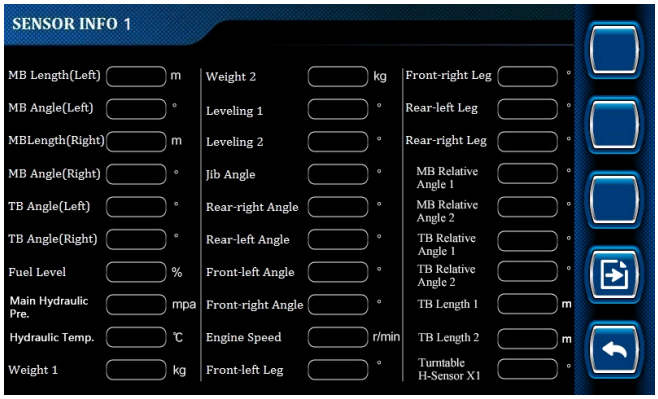


Fig 22 SENSOR INFO 1

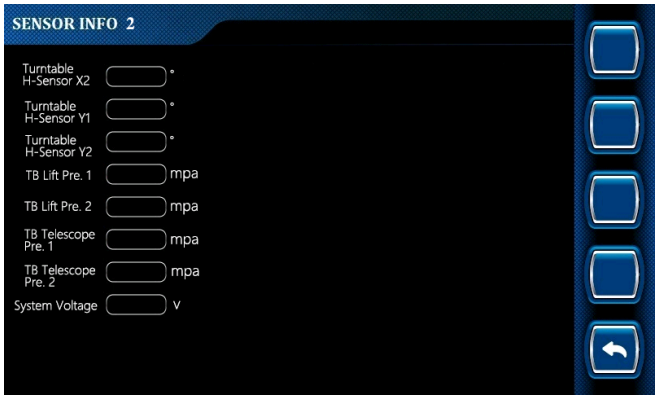


Fig 23 SENSOR INFO 2

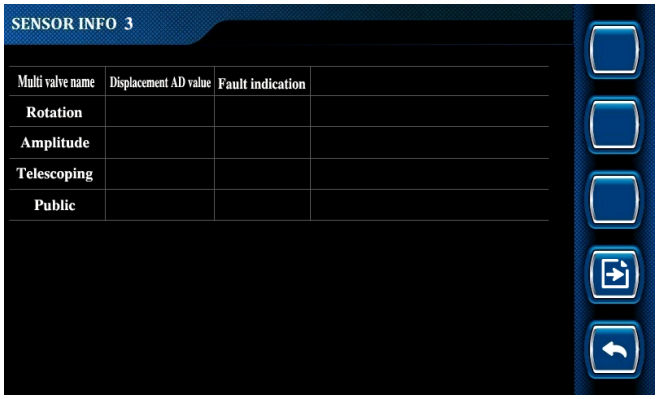


Fig 24 SENSOR INFO 3

Digital Input Information

- The digital input information option is mainly used to query the signal detection status of detection switches (such as travel switches and proximity switches) configured on the machine (the icon before the option means that the switch has detected a signal, and the icon before the option means that the switch has not detected a signal), thus determining whether the detection switches are working normally and whether the working state of the machine meets the requirements.
- The configuration of switches is subject to the actual machine configurations.

Fig 25 Input Info interface

Digital Output Information

- The digital output information option is mainly used to query the output status of the relays, switching valves and other output points configured on the machine (the icon before the option means that an output is detected, and the icon before the option means that no output is detected), thus assisting in determining the trouble causes.
- The configuration of output points is subject to the actual machine configuration.

Fig 26 OUTPUT INFO 1 interface

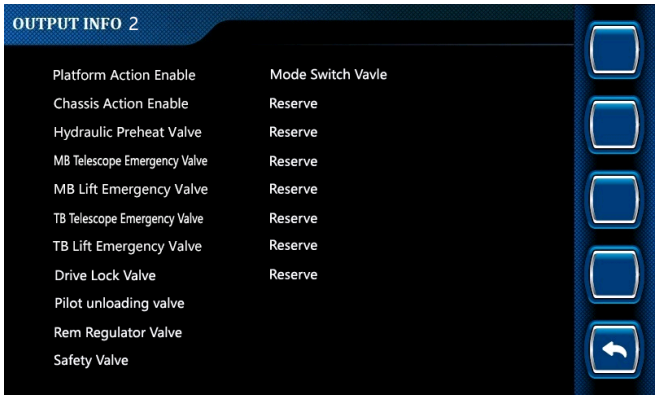


Fig 27 OUTPUT INFO 2 interface

Proportional Information

- The proportional information option is mainly used to query the output status of the proportional valve output points configured on the machine, thus assisting in determining the trouble causes.
- The configuration of proportional valves is subject to the actual machine configuration.

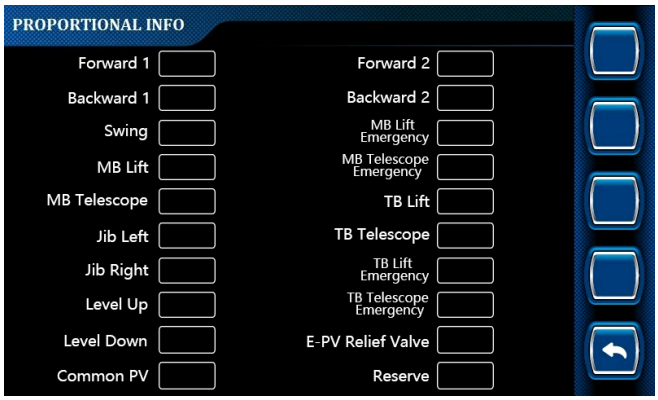


Fig 28 PROPORTIONAL INFO interface

Engine Information

This section is applicable to models equipped with an engine.

- The engine information option is mainly used to query the status and fault information of the engine configured on the machine, so as to determine whether the engine is working normally.
- The configuration of engine is subject to the actual machine configuration.

1. On the SYSTEM INFO interface, select Engine Info through and , and press to enter ENGINE INFO interface.

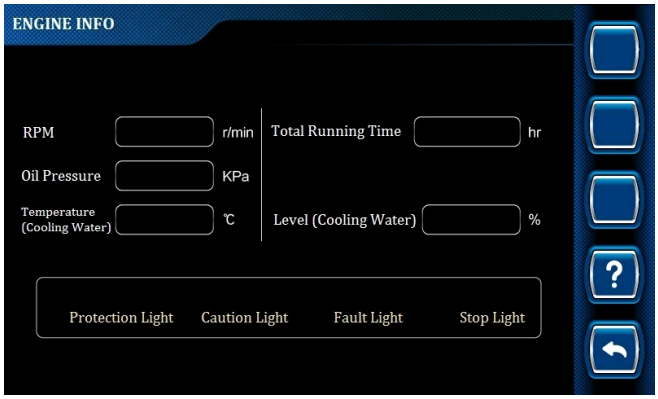


Fig 29 ENGINE INFO interface

2. On the ENGINE INFO interface, users can query the engine RPM, oil pressure, temperature (cooling water), total running time, level (cooling water), protection light, caution light, fault light and stop light.
3. On the ENGINE INFO interface, press EAT to enter EAT INFO interface.
   1) If the machine does not need EAT, the status indicator will be off.

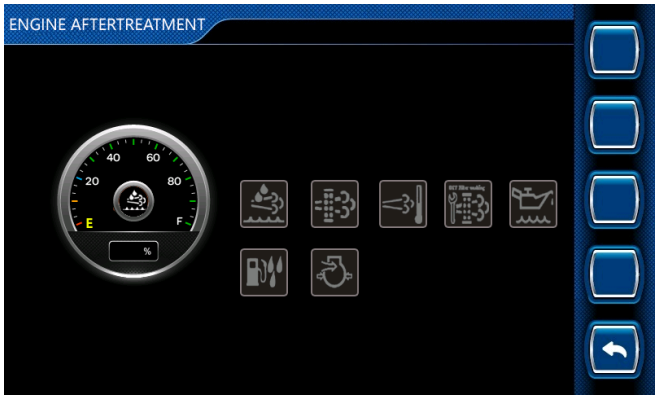


Fig 30 EAT INFO interface (without requiring EAT)-Equipped with Deutz engine

   2) For machines requiring EAT, if a yellow warning appears on the EAT INFO interface, and the status indicator light flashes, please perform EAT as indicated by the flashing indicator light as soon as possible.

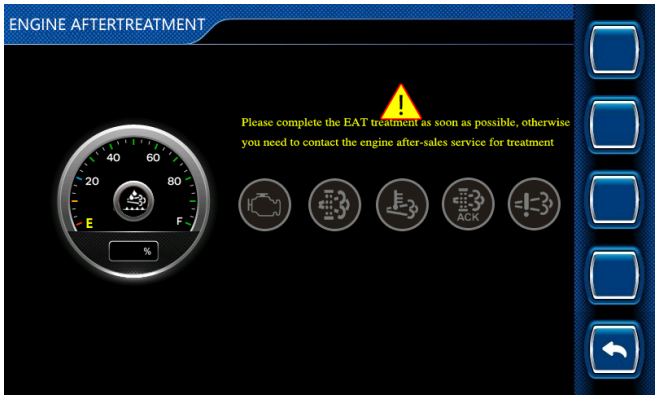


Fig 31 EAT INFO interface (with EAT not started)- Equipped with Yuchai or Yanmar engine

Fig 32 EAT INFO interface (with EAT started)- Equipped with Deutz engine

3) If EAT is not completed within the specified time, a red warning will appear on the EAT INFO interface, and the status indicator light will be on. At this time, it is necessary to contact the engine manufacturer for EAT.

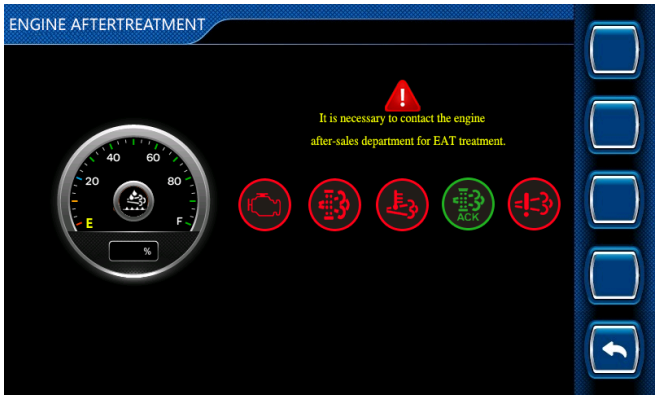


Fig 33 EAT INFO interface (with EAT started)- Equipped with Yuchai or Yanmar engine

Table 11-3 Description of indicator lights for Deutz engine

No.	Indicator light	Status	Description	Symbol
1	SCR fault warning indicator light	Off	SCR system is working normally	
		Solid on	SCR system is faulted	
2	DEF level indicator light	Off	DEF level is normal	
		Solid on	DEF level is too low	
3	Standstill regeneration indicator light	Off	Standstill regeneration is not performed or requested	
		Solid on	Standstill regeneration is being performed	
		Slow flashing	Standstill regeneration is requested	
		Fast flashing	Standstill regeneration is requested, but since the operator has ignored the request for a long time, the standstill regeneration can only be completed through the DEUTZ diagnostic tool.	

Table 11-3 Description of indicator lights for Deutz engine (Continued)

4	Standstill regeneration/high temperature indicator light	Off	Exhaust system temperature is normal	
		Solid on	Exhaust system temperature is abnormal	
5	DPF replacing required due to excessive ash content	Off	Ash content is normal	
		Solid on	Ash content is excessive	
6	Oil replacing required due to cumulative regeneration time being too long	Off	Cumulative regeneration time is within the normal range	
		Solid on	Oil replacing is required due to cumulative regeneration time being too long	

Table 11-4 Description of indicator lights for Yuchai & Yanmar engines

No.	Indicator light	Status	Description	Symbol
1	Engine malfunction indicator light	Off	Engine works normally	
		Solid on	Engine malfunctions	
2	Regeneration request indicator light (Yanmar)	Off	Regeneration is not requested and needs not to be performed	
		Solid on	Regeneration is requested, with a reminder that regeneration must be performed	
	DPF regeneration reminder indicator light (Yuchai)	Off	Regeneration is not performed or requested	
		Solid on	The carbon content in DPF is too high, so it is recommended to perform parked regeneration	
		Slow flashing	Since the carbon content in DPF is too high, perform parked regeneration or service regeneration immediately	
		Fast flashing	Since DPF is heavily clogged, perform service regeneration immediately	
3	High exhaust temperature indicator light	Off	Exhaust system is at normal temperature	
		Solid on	Exhaust system temperature exceeds the set limit	
4	Regeneration execution indicator light	Off	Regeneration execution is inactive	
		Solid on	Regeneration function is being executed	
5	NCD indicator light (Yanmar only)	Off	NCD is not working	
		Solid on	NCD is working	
6	Regeneration prohibiting indicator light (Yuchai only)	Off	Conditions prohibiting active regeneration do not exist	
		Solid on	ECU receives the set status of regeneration prohibiting switch, and active regeneration can't be performed	

Note:

- When regeneration request indicator light

flashes, a yellow warning will appear on the EAT INFO interface.

- When regeneration request indicator light is solid on, a red warning will appear on the EAT INFO interface.
- When regeneration execution indicator light (green) is solid on, it indicates that regeneration is being performed at this time.

4. On the ENGINE INFO interface, press to enter ENGINE FAULT DIAGNOSES interface.

Fig 34 ENGINE FAULT DIAGNOSES interface

5. Press to query the detailed description of the main fault codes. For detailed fault descriptions, please refer to the ***Fault Code Description*** in the Maintenance Manual or the engine maintenance manual provided with the machine.
6. Press successively to return to the main interface, and power off the machine as required.

11.8 TURNTABLE PANEL INFORMATION

- The turntable panel information option is mainly used to query the input status of switches on the ground controller panel, so as to check whether the circuit from the switches to the controller, input signal, etc. are normal, thus assisting in determining the trouble causes.
- The configuration of switches on the turntable panel is subject to the actual machine configuration.

On the main interface, press to enter the TURNTABLE PANEL INFO interface (the icon before the option means that the switch has input, and the icon before the option means that the switch has no input).

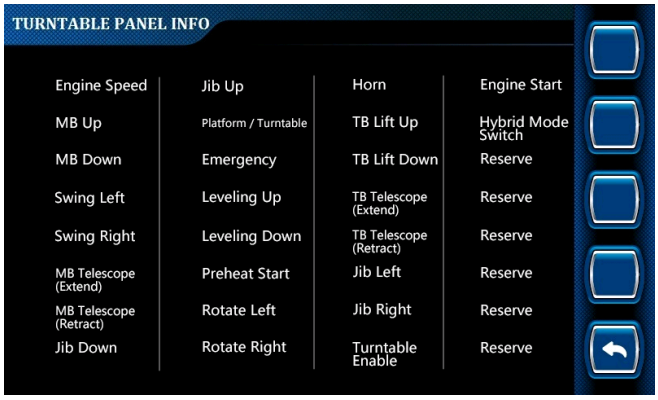


Fig 35 TURNTABLE PANEL INFO interface

11.9 PLATFORM INFORMATION

- The platform information option is mainly used to query the input and output status of switches on the platform controller panel and the status of joystick on the platform controller, so as to check whether the circuit from the switches to the controller, input signal, etc. are normal, thus assisting in determining the trouble causes.
- The configuration of switches and joystick on the platform panel is subject to the actual machine configuration.

1. On the main interface, press to enter the PLATFORM PANEL INFO interface to check the input status of switches on the platform controller panel (the icon before the option means that the switch has input, and the icon before the option means that the switch has no input). Press to check the output status of switches on the platform controller panel (the icon before the option means that the switch has output, and the icon before the option means that the switch has no output).

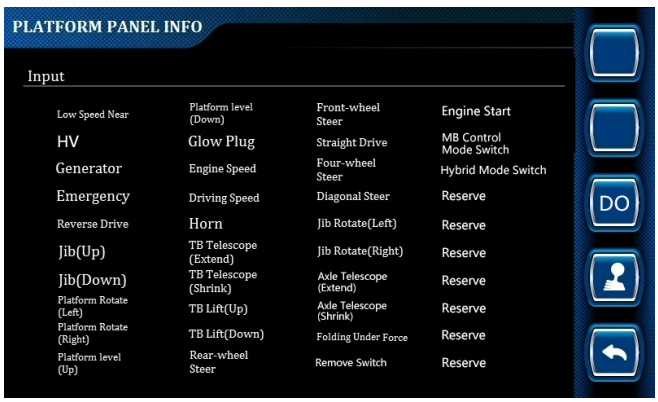


Fig 36 PLATFORM PANEL INFO interface-input

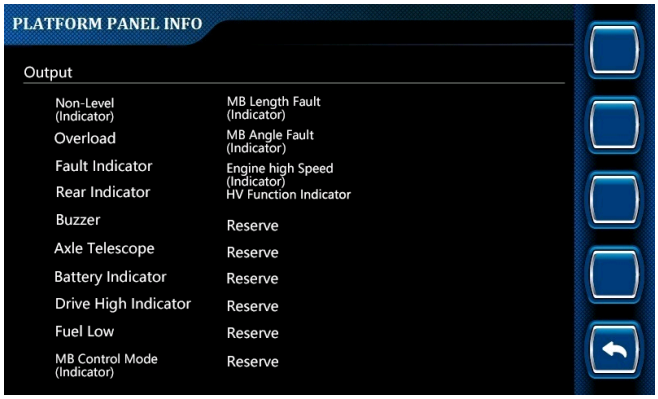


Fig 37 PLATFORM PANEL INFO interface-output

2. On the PLATFORM PANEL INFO interface, press to enter the JOYSTICK INFO interface to query the actual value of joystick/potentiometer, so as to check whether the position status of joystick/potentiometer is normal.

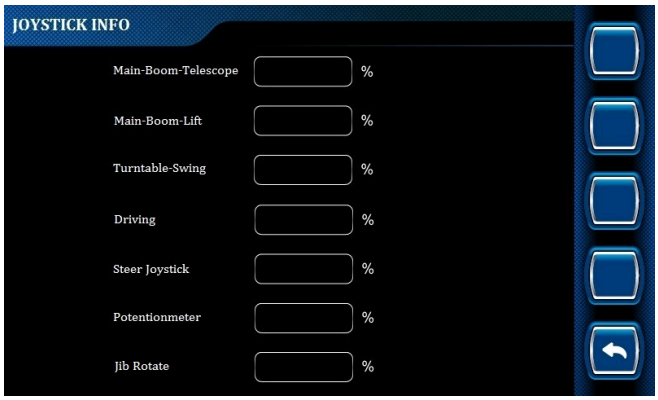


Fig 38 JOYSTICK INFO interface

3. Press successively to return to the main interface, and power off the machine as required.

11.10 ALARM INFORMATION

The alarm information option is mainly used to query the alarm or fault status of the control system, so as to determine the cause of fault and facilitate troubleshooting.

1. On the main interface, press to enter the ALARM INFO interface. (indicates that the CAN communication is normal, indicates the CAN communication alarm, and indicate other alarms, and indicate no input).

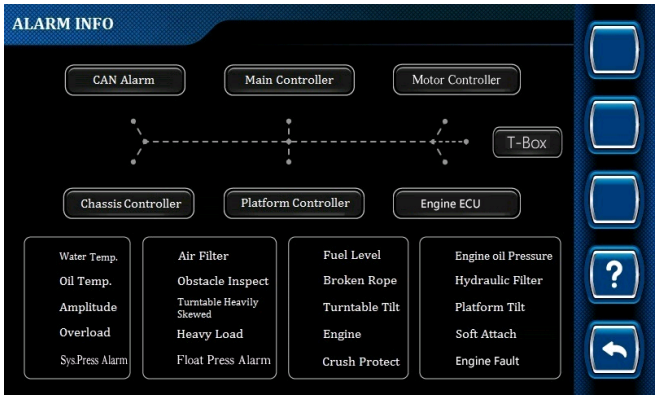


Fig 39 ALARM INFO interface

2. On the ALARM INFO interface, press to enter FAULT INFO interface.

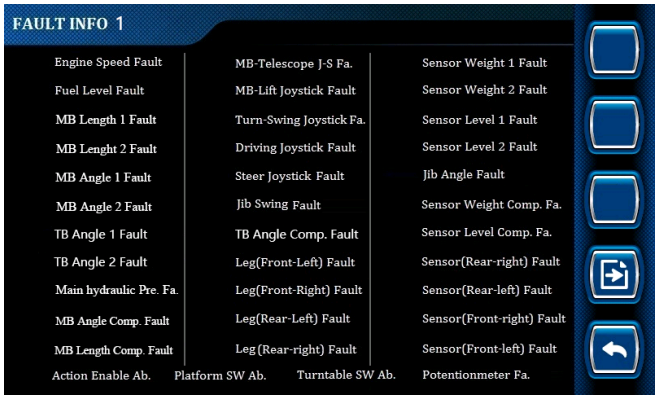


Fig 40 FAULT INFO interface 1

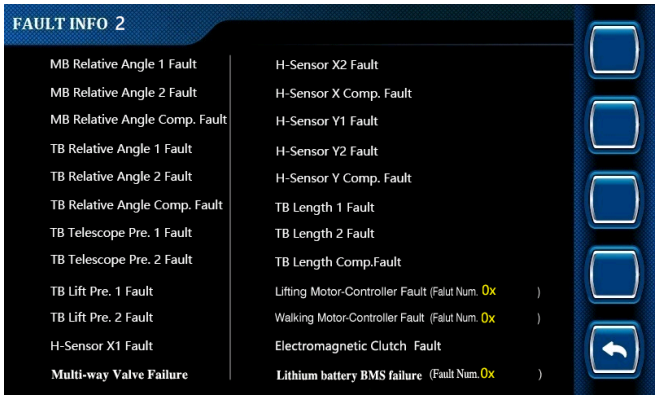


Fig 41 FAULT INFO interface 2

3. For the detailed description of faults codes of the lifting motor and travel motor controllers, please refer to the ***Motor Controller Fault Codes*** in the Maintenance Manual (if the machine is equipped with a motor controller).

4. Lithium battery BMS fault Info: Press to enter Lithium Battery BMS Fault Info interface to check the description of lithium battery BMS fault codes.

For the detailed fault description, please see ***Lithium Battery BMS Fault Codes*** section in the Maintenance Manual (if the machine is equipped with any lithium battery).

5. Press successively to return to the main interface, and power off the machine as required.

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12 OPTIONS

12.1 ANTI-PINCH DEVICE

Self-propelled boom-supported elevating work platforms are designed to transport people, tools and materials to aerial workplaces. When the operator stands on the platform to operate the machine with the back facing the telescoping direction of the boom and the head facing the elevating direction of the boom, due to failure to notice obstacles behind or overhead in time or accidental operation, life-threatening dangers may result. The anti-pinch device can protect the operator by preventing the operator from being pinched.

⚠ WARNING

Unsafe Operation Hazard

- **Except for designated models and corresponding markets, it is forbidden to install the anti-pinch device on other Sinoboom products or any models in other markets.**
- **Before using the anti-pinch device, the safety rules and all operating instructions should be read, understood and observed. This manual should always be kept with the anti-pinch device as a part of it.**

Device Components

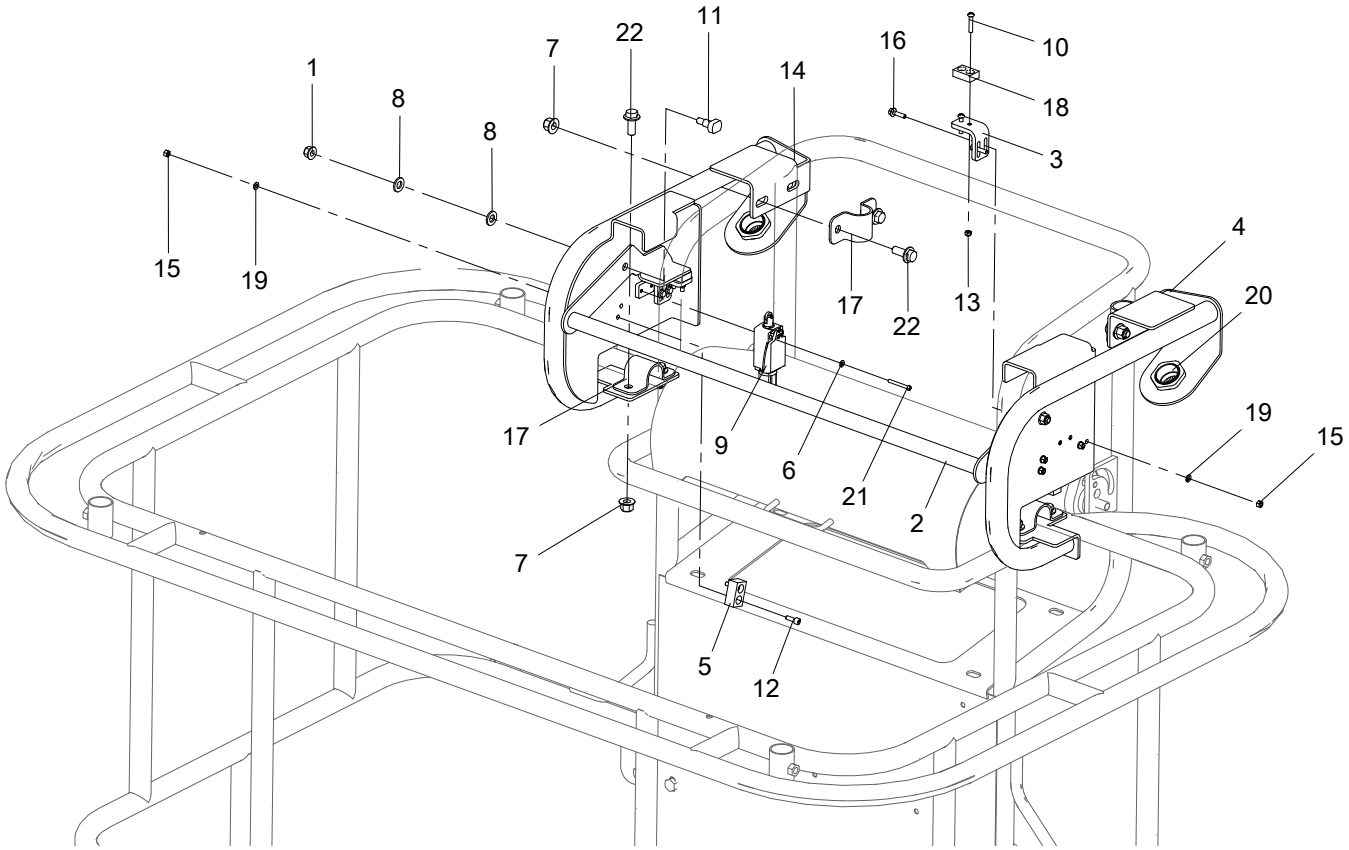

Fig 1

Table 12-1

No.	Part Number	Part Name	Quantity	Comment
1	215030000108	Nut M8-8-ZnD GB/T 6183	2	
2	105070043011	Support	1	
3	105070043028	Foldable plate	2	
4	105070043030	Support	1	
5	103010013495	Cushion block	2	
6	215040000031	Washer 4-A2 GB/T 97.1	4	
7	215030000109	Nut M10-8-ZnD GB/T 6183	8	
8	215040000035	Washer 10-200HV-ZnD GB/T 97.1	4	
9	203060003031	Travel switch (Schneider)	2	
10	215020000113	Screw M5×25-A2-70 GB/T 818	4	
11	105070043031	Bolt	2	
12	215020000007	Screw M5×16-A2-70 GB/T 70.1	4	
13	215030000091	Nut M5-8-A2-70 GB/T 6184	4	
14	105070043032	Support	1	
15	215030000003	Nut M5-A2-70 GB/T 6170	8	

Table 12-1 (Continued)

No.	Part Number	Part Name	Quantity	Comment
16	215010000256	Bolt M5×20-8.8-ZnD GB/T 5789	4	
17	105029043013	Plate	4	
18	209990003011	Magnet	2	
19	215040000032	Washer 5-A2 GB/T 97.1	12	
20	203050003058	Strobe light	2	
21	215020000212	Screw M4×35-A2-70 GB/T 818	4	
22	215010000238	Bolt M10×25-8.8-ZnD GB/T 5789	8	

Installation and Removal

⚠ WARNING

Unsafe Operation Hazard

Except for designated models and corresponding markets, it is forbidden to install the anti-pinch device on other Sinoboom products or any models in other markets.

Installation instructions

1. Position the support (#4 or #14) at the mounting position on the platform railing, align the support with the mounting hole on mounting plate #17, and use bolts and nuts to secure the support to the platform railing. Install the support on the other side of the platform in the same way.
2. Align the foldable plate #3 with the mounting holes on the left and right supports, tighten it with bolts, washers and nuts, and install the magnet #18 on the foldable plate.
3. Then align the support #2 with the mounting holes on the left and right supports, and make the foldable plates on both sides of support #2 attracted by magnets, and tighten it with bolts, washers and nuts.
4. Install the cushion block #5 on the left and right supports in turn, and tighten it with screws, washers and nuts.
5. Install the travel switch #9 on the left and right supports in turn, and tighten it with screws and washers.
6. Install the strobe light #20 on the left and right supports in turn.
7. Connect the anti-pinch harness.

Removal instructions

Disassemble the anti-pinch device in the reverse order of the installation instructions.

Instructions for Use

1. Under normal circumstances, the foldable plates on both sides of support #2 will be attracted by the magnets below.
2. Press down the railing of support #2 so that the foldable plates on both sides detach from the magnets and cock up, and the travel switch will be disconnected, the left and right strobe lights will flash, and all functions on the platform controller will be disabled.
3. Depress the foot switch while flipping the release switch on the platform controller, and the boom can be retracted and lowered, and the turntable can rotate slowly.
4. To enable the boom extending and elevating functions, lift the railing of support #2 up until the foldable plates on both sides are re-attracted by the magnets and the strobe light goes out.

12.2 PLATFORM PIPE SUPPORT DEVICE

Self-propelled boom-supported elevating work platforms are designed to transport people, tools and materials to aerial workplaces. When pipes need to be transported to aerial workplaces, they can be placed on the pipe support device and then transported after secured to the device.

⚠ WARNING

Unsafe Operation Hazard

- **Except for designated models and corresponding markets, it is forbidden to install the pipe support device on other Sinoboom products or any models in other markets.**
- **Before using the pipe support device, the safety rules and all operating instructions should be read, understood and observed. This manual should always be kept with the pipe support device as a part of it.**

Device Components

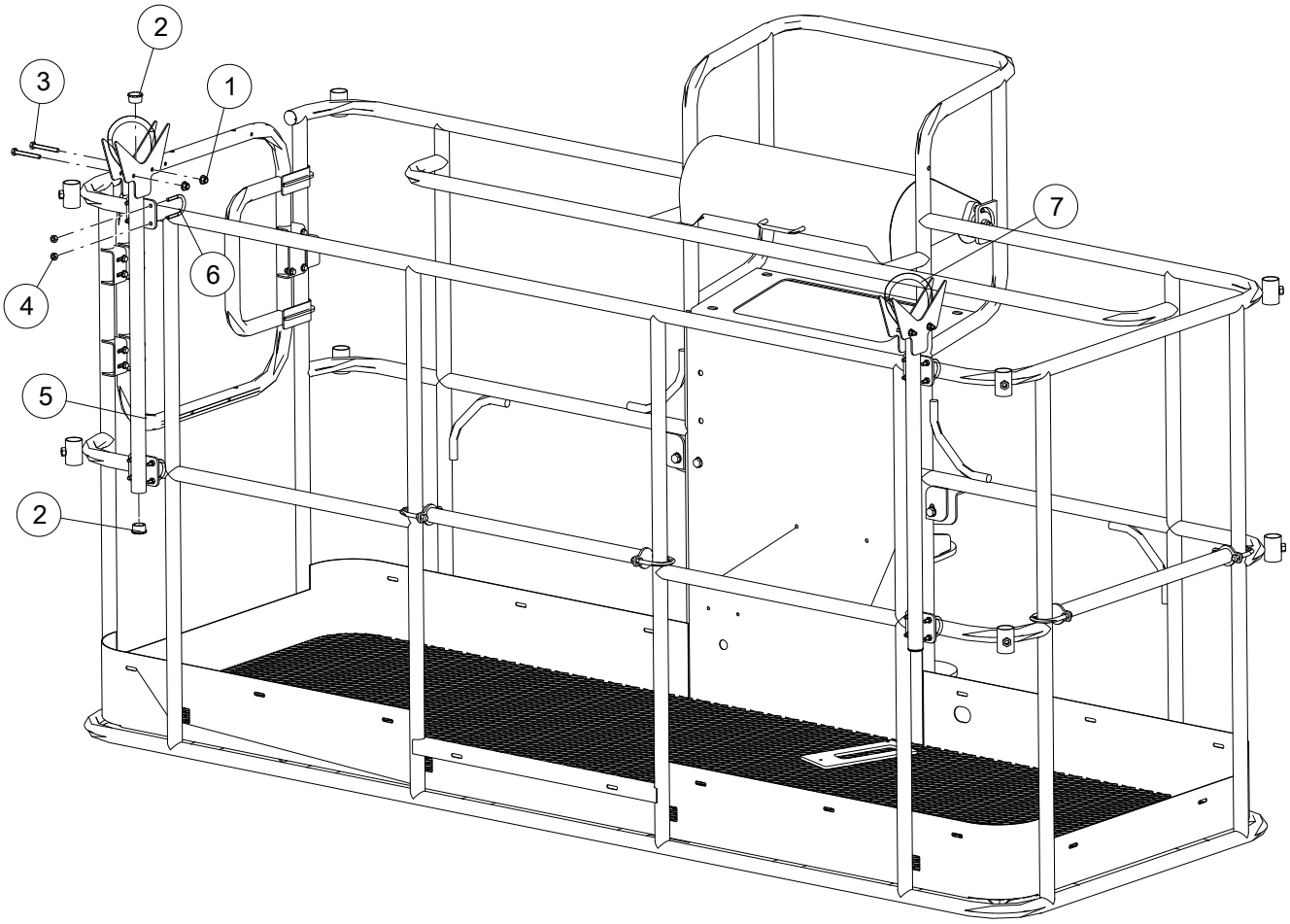

Fig 2

Table 12-2

No.	Part Number	Part Name	Quantity	Comment
1	215030000107	Nut M6-8-ZnD GB/T 6183	4	
2	105064043177	Pipe seal	4	
3	215010000055	Bolt M6×50-A2-70 GB/T 5783	4	
4	215030000004	Nut M6-A2-70 GB/T 6170	18	
5	105064043123	Pipe support weldment	1	
6	105064043020	U-bolt	8	
7	\	Strap 400mm*25mm	2	

Installation and Removal

The pipe support device consists of two pipe supports which are mounted to both sides of the guardrail with U-bolts and hex nuts.

⚠ WARNING

Unsafe Operation Hazard

Except for designated models and corresponding markets, it is forbidden to install the pipe support device on other Sinoboom products or any models in other markets.

⚠ WARNING

Unsafe Operation Hazard

- **Read and understand the following safety rules before proceeding to the next step.**
- **The installation of the pipe support device shall not interfere with the normal operation of the platform controller.**
- **The installation of the pipe support device shall not block the entrance and exit of the platform.**
- **Before installing the pipe support device, ensure that the platform remains level.**

Installation instructions

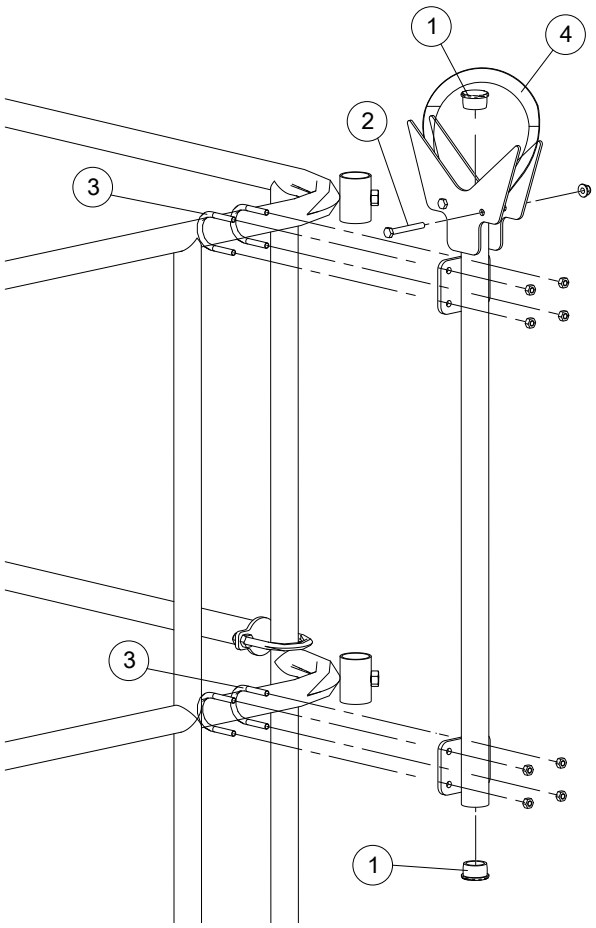

Fig 3

1. Install the upper and lower pipe seals of the pipe support weldment.
2. Secure the welded plate above the pipe support weldment with bolts.
3. Roughly fix the pipe support at its mounting position on one side of the platform, and then fix the pipe support from top to bottom sequentially: make the U-bolt inside pass through the platform guardrail, align it with the pipe support mounting hole, and then fix it with a hex nut. Install the pipe support on the other side of the platform in the same way.
4. Fasten the pipe with strap to make it more securely mounted on the platform.

Removal instructions

Disassemble the pipe support device in the reverse order of the installation instructions.

Instructions for Use

⚠ WARNING

Tipping Hazard

- **The weight of the pipe support assembly and the load on the pipe support will reduce the rated load capacity of the platform, so the pipe support device and its load must be taken into account in the total load of the platform.**
- **When the weight of the pipe support device and the load on the pipe support is too heavy, the maximum number of allowed people on the platform needs to be reduced.**

Table 12-3

Maximum load capacity of pipe support device	100kg (220lbs)
Weight of pipe support assembly	6kg (13lbs)

After the pipe support device is installed, follow the below instructions for use:

1. Ensure that the pipe support device has been installed exactly as required and has been secured to the platform guardrail.
2. Place the load on the pipe support device, ensuring that the load is parallel with the platform in terms of length.
3. Ensure that the load center is on the same level as the center of the pipe support device.
4. Use the straps equipped with the device to secure the load to the two pipe supports.
5. Gently push and pull the load to ensure that the load is securely secured to the pipe supports.
6. When the machine is working, ensure that the load is always firmly placed.

12.3 GLASS PANEL BRACKET DEVICE

Self-propelled boom-supported elevating work platforms are designed to transport people, tools and materials to aerial workplaces. When panels need to be transported to aerial workplaces, they can be placed on the glass panel bracket device and then transported after secured to the device.

⚠ WARNING

Unsafe Operation Hazard

- **Except for designated models and corresponding markets, it is forbidden to install the glass panel bracket device on other Sinoboom products or any models in other markets.**
- **Before using the glass panel bracket device, the safety rules and all operating instructions should be read, understood and observed. This manual should always be kept with the glass panel bracket device as a part of it.**

Device Components

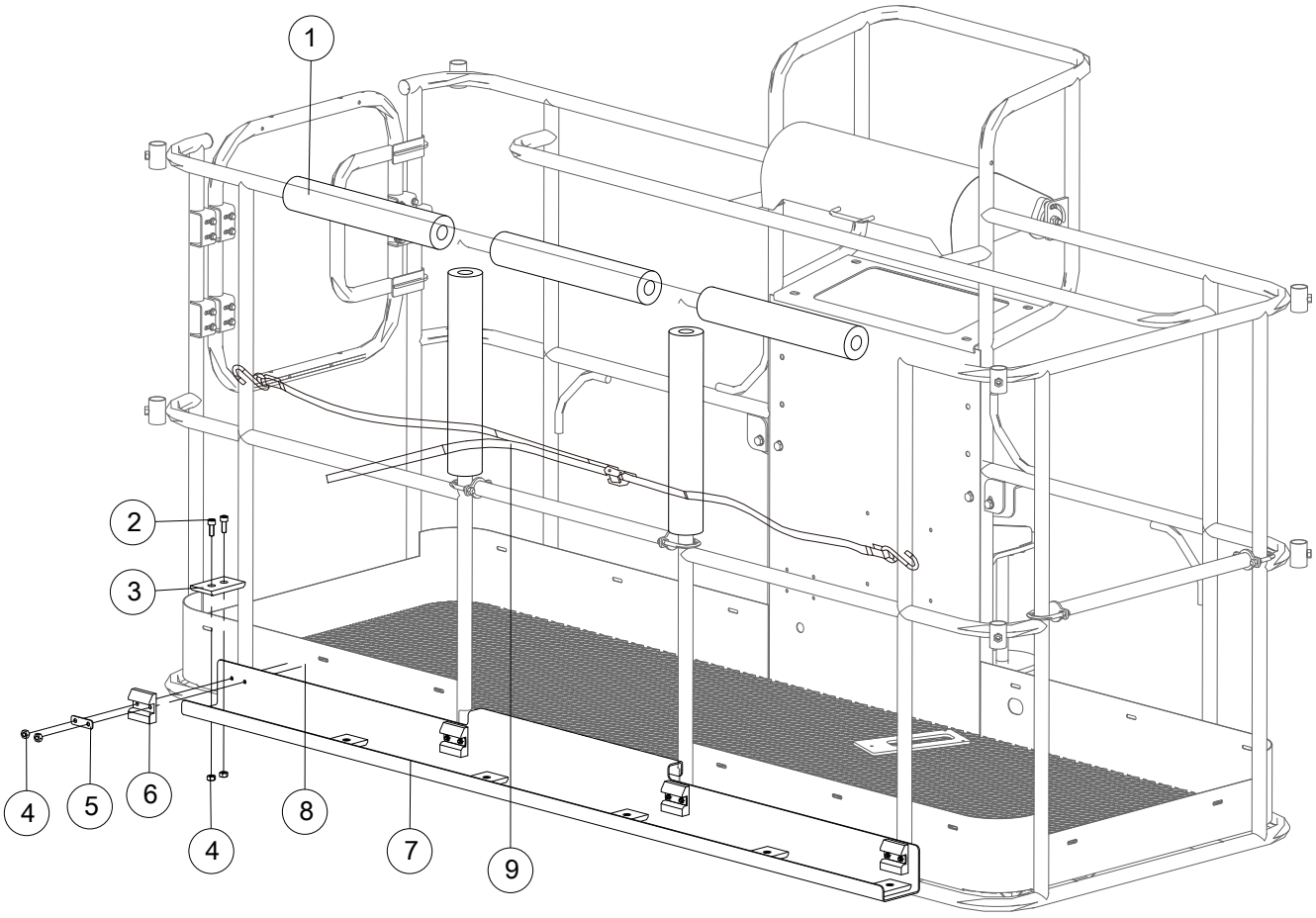

Fig 4

Table 12-4

No.	Part Number	Part Name	Quantity	Comment
1	216030003000	Anti-collision hose	5	
2	215020000011	Screw M6×16-A2-70 GB/T 70.1	12	
3	105064043024	Cushion block	6	
4	215030000004	Nut M6-A2-70 GB/T 6170	20	
5	105064043178	Cushion plate	4	
6	105064043136	Vertical cushion block	4	
7	105064043017	Mounting plate	1	
8	105064043020	U-bolt	4	
9	\	Strap 3000mm*25mm	1	

Installation and Removal

⚠ WARNING

Unsafe Operation Hazard

Except for designated models and corresponding markets, it is forbidden to install the glass panel bracket device on other Sinoboom products or any models in other markets.

Installation instructions

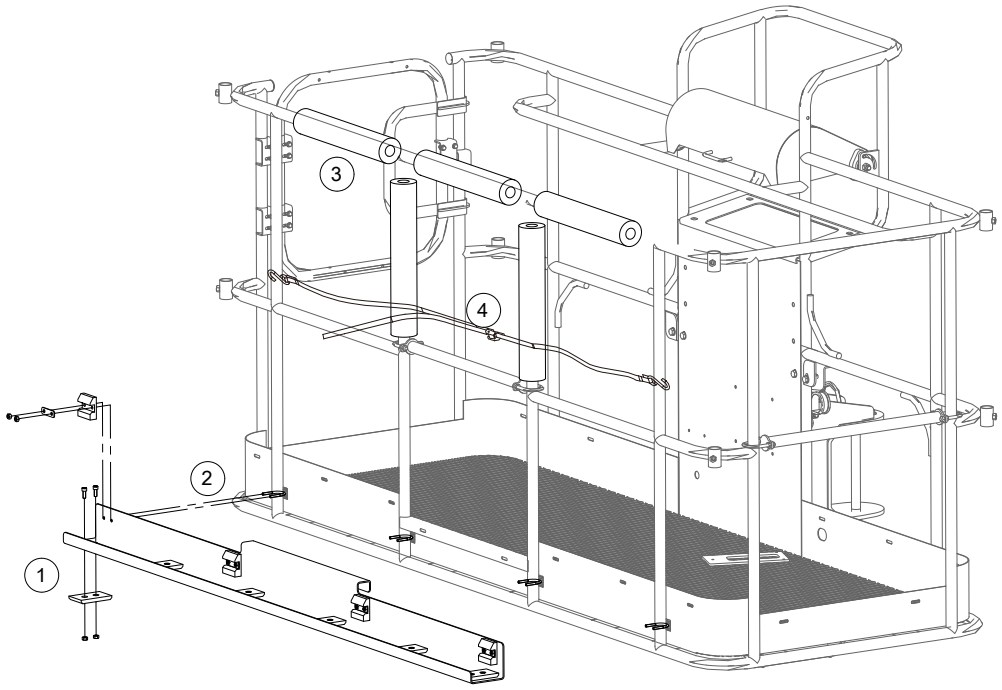

Fig 5

1. Install the cushion block with bolts and nuts sequentially on the mounting plate of the glass panel bracket device.
2. After roughly fixing the mounting plate at its mounting position, align the U-bolt with the mounting hole of the mounting plate and vertical cushion block, and fix it using the cushion plate and nut. Install other mounting plates sequentially at the locations as shown in the figure above.
3. Install the anti-collision hose on the platform guardrail.
4. Fasten the strap to the guardrail so that the mounting plate is more securely mounted on the platform.

Removal instructions

Disassemble the glass panel bracket device in the reverse order of the installation instructions.

Instructions for Use

⚠ WARNING

Tipping Hazard

- **When the wind speed in the working environment exceeds 12.5m/s (28mph), please do not use the glass panel bracket device.**
- **The weight of the glass panel bracket device and the load on the glass panel bracket will reduce the rated load capacity of the platform, so the glass panel bracket device and its load must be taken into account in the total load of the platform.**
- **When the weight of the glass panel bracket device and the load on the glass panel bracket is too heavy, the maximum number of allowed people on the platform needs to be reduced.**
- **The area of the glass panel will increase the machine's area exposed to the wind, which will reduce the stability of the machine.**
- **Only use the glass panel bracket device when the machine is on flat, solid ground.**

Table 12-5

Maximum load capacity of glass panel bracket device	115kg (253.5lbs)
Weight of glass panel bracket device	15.2kg (33.5lbs)
Maximum allowable wind speed	12.5m/s (28mph)
Maximum allowable area for carrying glass panel	0.17㎡ (1.83sq.ft)
Maximum allowable vertical height for carrying glass panel	1.2m (3ft 11in)

1. Ensure that the glass panel bracket device is installed exactly as required and secured to the platform.
2. Place the load on the glass panel bracket, ensuring that the load is parallel with the glass panel bracket in terms of length.
3. Ensure that the load center is on the same level as the center of the glass panel bracket.
4. Use straps to secure the load to the platform.
5. Gently push and pull the load to ensure that the load is securely secured to the platform.
6. When the machine is working, ensure that the load is always firmly placed.

NOTICE

Make sure to maintain an appropriate distance between the load and the gate bar to prevent the gate bar from causing scratching, squeezing and other damage to the load.

12.4 PLATFORM FENCE DEVICE

There are two types of platform fence devices: half-height platform fence device and full-height platform fence device. This device can effectively prevent tools or other objects in the platform from falling.

⚠ WARNING

Unsafe Operation Hazard

- **Except for designated models and corresponding markets, it is forbidden to install the platform fence device on other Sinoboom products or any models in other markets.**
- **Before using the platform fence device, the safety rules and all operating instructions should be read, understood and observed. This manual should always be kept with the platform fence device as a part of it.**

Device Components

Half-height platform fence device components

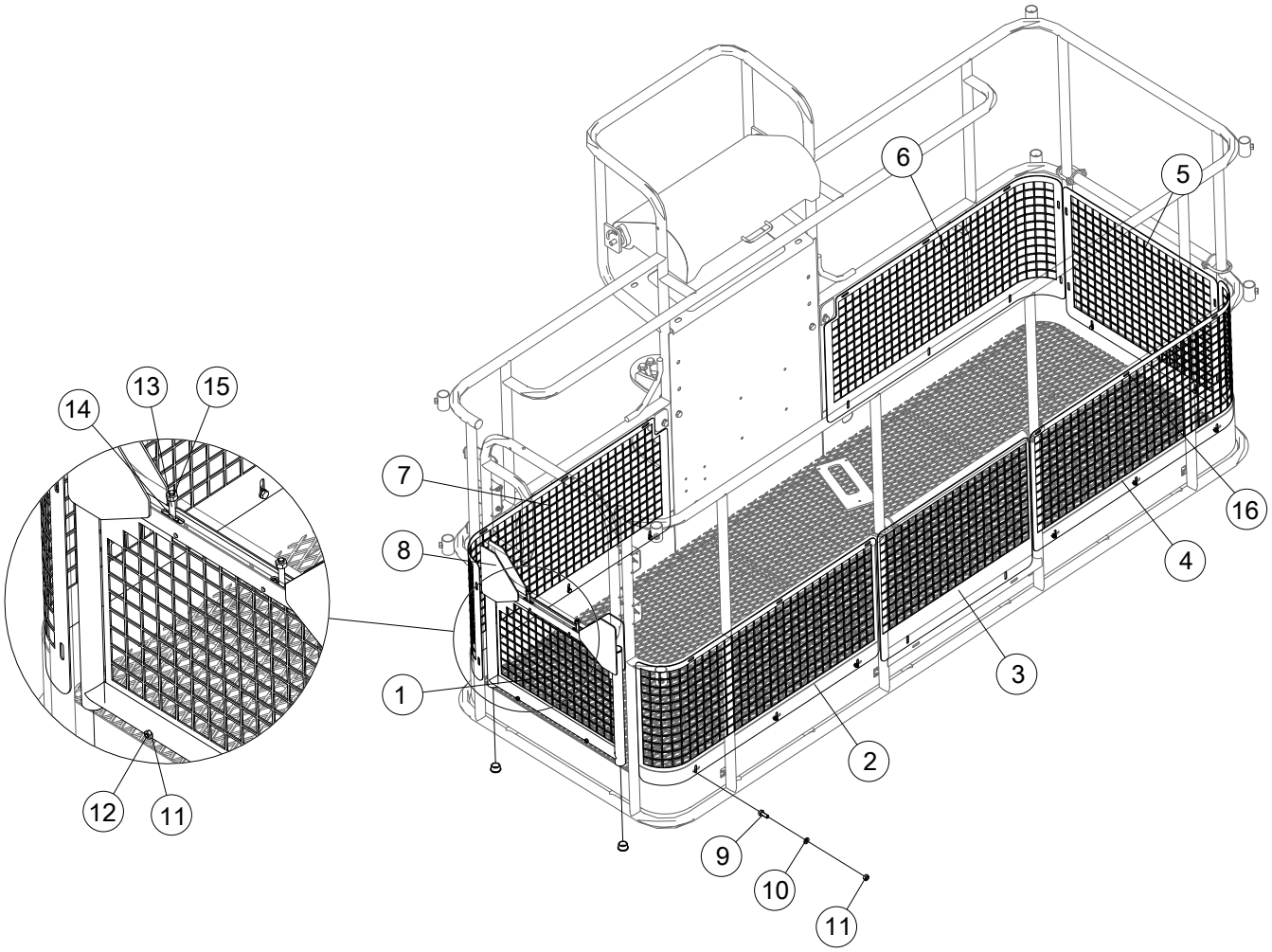

Fig 6

Table 12-6

No.	Part Number	Part Name	Quantity	Comment
1	105064043107	Lower side fence plate	1	
2	105064043027	Fence plate 1	1	
3	105064043176	Fence plate 5	1	
4	105064043175	Fence plate 6	1	
5	105064043028	Fence plate 2	1	
6	105064043030	Fence plate 3	1	
7	105064043031	Fence plate 4	1	
8	105064043103	Lower gate frame weldment	1	

Table 12-6 (Continued)

No.	Part Number	Part Name	Quantity	Comment
9	215010000050	Bolt M6×16-A2-70 GB/T 5783	16	
10	215040000033	Washer 6-A2 GB/T 97.1	18	
11	215030000004	Nut M6-A2-70 GB/T 6170	18	
12	215010000054	Bolt M6×40-A2-70 GB/T 5783	2	
13	215010000062	Bolt M8×45-8.8-ZnD GB/T 5783	2	
14	215040000034	Washer 8-200HV-ZnD GB/T 97.1	2	
15	215030000005	Nut M8-8-ZnD GB/T 6170	2	
16	\	Nylon cable tie	\	

Full-height platform fence device components

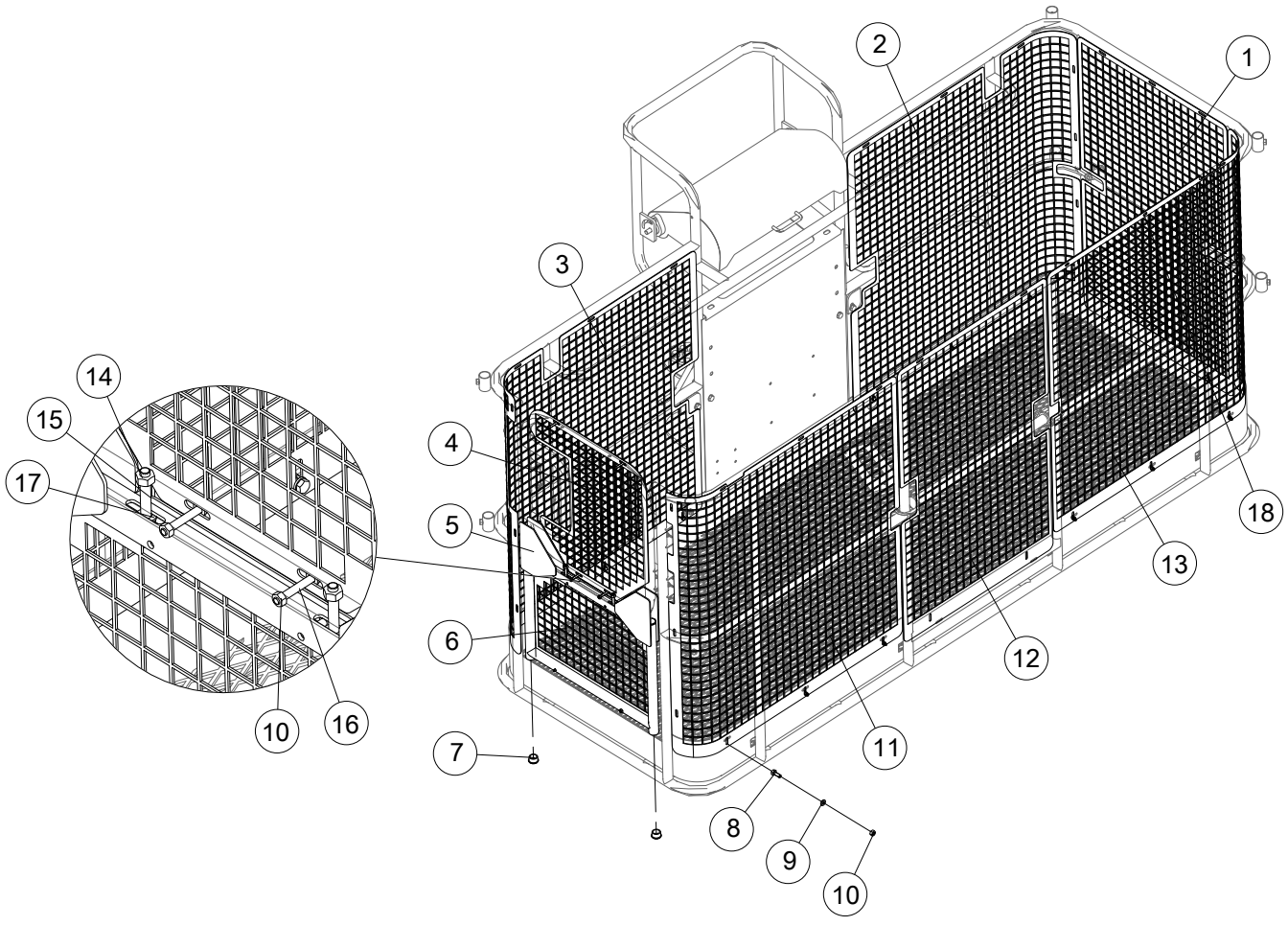

Fig 7

Table 12-7

No.	Part Number	Part Name	Quantity	Comment
1	105064043106	Side fence plate	1	
2	105064043109	Front right fence plate	1	
3	105064043110	Front left fence plate	1	
4	105064043114	Upper side fence plate	1	
5	105064043103	Lower gate frame weldment	1	
6	105064043107	Lower side fence plate	1	
7	105064043177	Pipe seal	4	
8	215010000050	Bolt M6×16-A2-70 GB/T 5783	17	
9	215040000033	Washer 6-A2 GB/T 97.1	23	
10	215030000004	Nut M6-A2-70 GB/T 6170	23	
11	105064043108	Rear left fence plate	1	
12	105064043112	Rear fence plate	1	
13	105064043118	Rear right fence plate	1	
14	215030000005	Nut M8-8-ZnD GB/T 6170	2	
15	215010000062	Bolt M8×45-8.8-ZnD GB/T 5783	2	
16	215010000054	Bolt M6×40-A2-70 GB/T 5783	6	
17	215040000034	Washer 8-200HV-ZnD GB/T 97.1	2	
18	\	Nylon cable tie	\	

Installation and Removal

⚠ WARNING

Unsafe Operation Hazard

- **Except for designated models and corresponding markets, it is forbidden to install the platform fence device on other Sinoboom products or any models in other markets.**
- **The platform fence device can only be installed on machines equipped with platform revolving gate.**

Installation instructions

1. Install the gate frame weldment at the platform revolving gate.

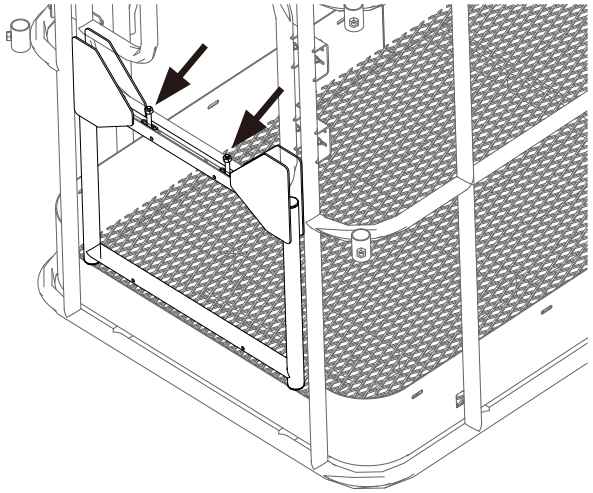

Fig 8

2. Half-height platform fence device: Install each fence component on the platform in turn according to the figure below, with the lower part ① of the fence fixed by bolts, and the upper part ② and the side ③ fixed by nylon cable ties or bolts.

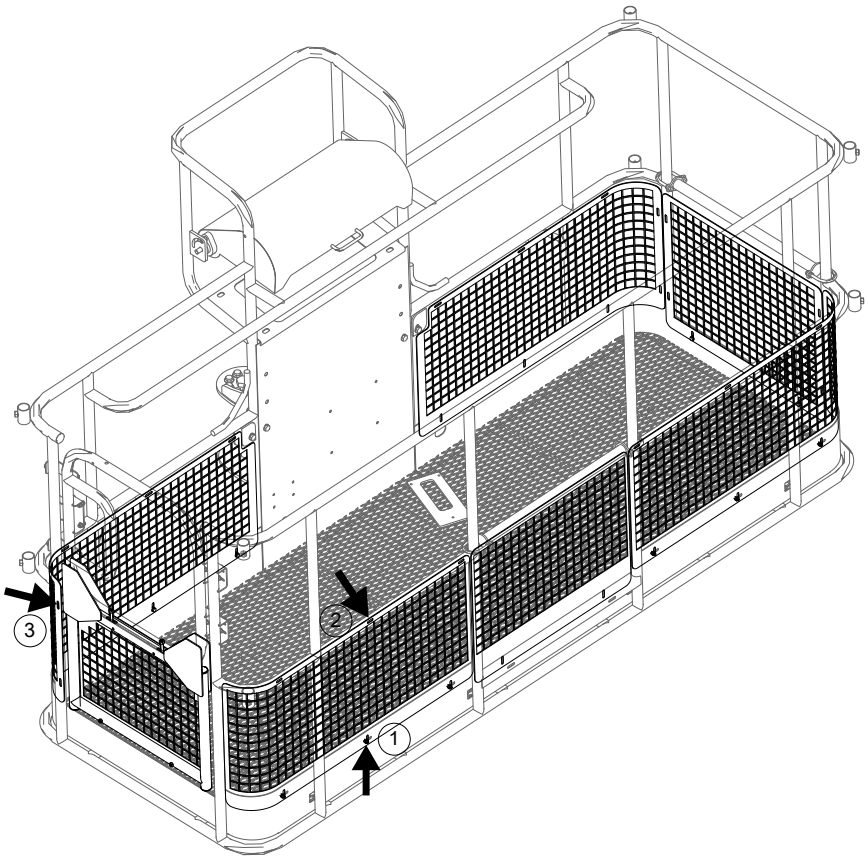

Fig 9

3. Full-height platform fence device: Install each fence component on the platform in turn according to the figure below, with the lower part ① of the fence fixed by bolts, and the upper part ② and the side ③ fixed by nylon cable ties or bolts.

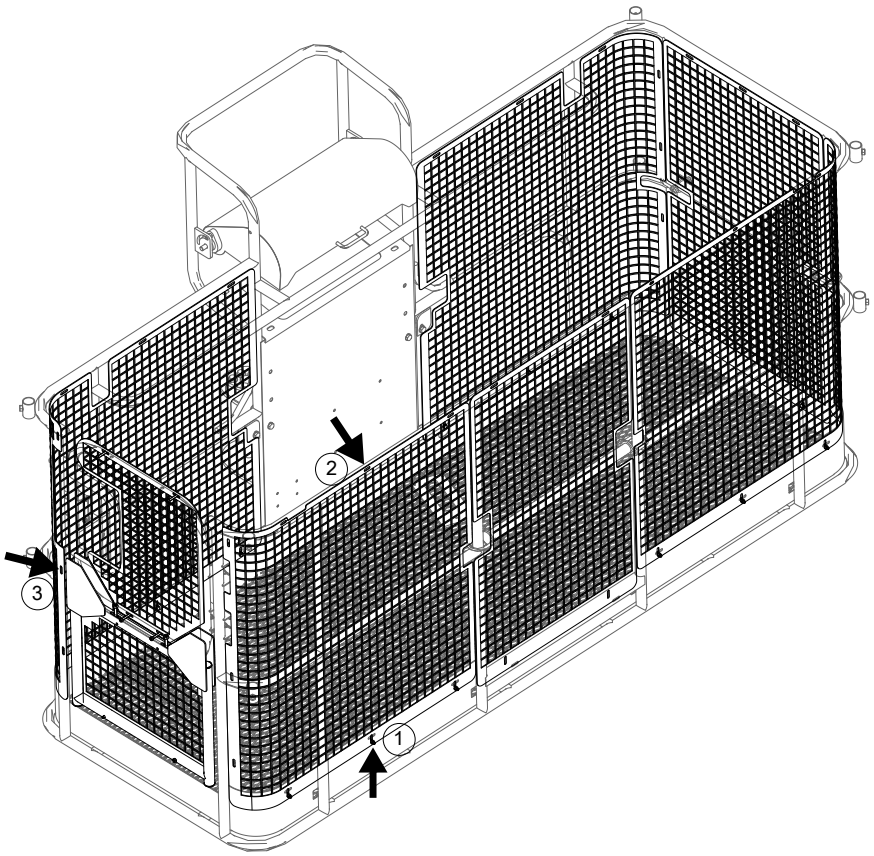

Fig 10

Removal instructions

Disassemble the platform fence device in the reverse order of the installation instructions.

Instructions for Use

- Once the fence device is installed, access can only be made from the side of the platform revolving gate.
- Once the fence device is installed, it is forbidden to install other auxiliary devices, such as pipe support device and glass panel bracket device.

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13 APPENDIX

13.1 MAJOR MODIFICATION AND REPAIR RECORD

Major Modification and Repair Record			
Model			
Serial No.			
Date	**Modified/Repaired Item**	**Machine Status after Change**	**Repairman**

Major Modification and Repair Record			

Note:

1. A major modification/repair is a modification/repair made to the entire machine or its parts that affects the stability, strength or performance of the machine.
2. A major modification/repair to the machine should be documented with the form below. 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 Inspection and Preventative Maintenance Schedule. After all the inspection and verification results are good, the machine can be put back into service.

13.2 INSPECTION AND PREVENTATIVE MAINTENANCE SCHEDULE

Perform inspection and preventive maintenance for the items in the table below at prescribed intervals. The intervals of inspection and maintenance are calculated based on the months elapsed since the machine has been put into service or the “cumulative working time” on the ground controller display (whichever comes first).

The inspection cycle is based on the use of machine under normal working conditions, and the cycle should be shortened accordingly if the machine is used in harsh working conditions.

Table 13-1 Inspection and Preventative Maintenance Schedule

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Chassis assembly			
Chassis	2	2	2
Tire	1, 2	1, 2	1, 2
Drive hub	1, 2	1 , 2 ,	1, 2
Tire fastener	1[50]	1[50]	1[50]
Drive motor	1, 6	1, 6	1, 6
Travel reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11
Steering component	1, 2	1, 2	1, 2
Outrigger, telescopic shaft	1, 2, 3	1, 2, 3	1, 2, 3
Bearing	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Turntable assembly			
Turntable	2	2	2
Slewing bearing	1[50] , 2 , 6 , 12	1[50] , 2 , 6 , 12	1[50] , 2 , 6 , 8 , 12
Slewing reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11

Table 13-1 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Central rotary joint	6	6	6
Slewing motor	1, 6	1, 6	1, 6
Turntable pin	1, 2, 3	1, 2, 3	1, 2, 3
Turntable cover assembly	1, 2, 3	1, 2, 3	1, 2, 3
Hydraulic generator (if equipped)	1, 3, 6, 10NO.1	1, 3, 6, 10NO.1	1, 3, 6, 10NO.1
Boom assembly			
Boom weldment	1, 2	1, 2	1, 2
Hose, wire rope bracket	1, 2	1, 2	1, 2
Pulley and slide assembly	1, 2	1, 2	1, 2
Bearing	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Cover or protective guard (if equipped)	1, 2	1, 2	1, 2
Cable track and wire rope system	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5
Pivot pin and retaining ring	1, 2	1, 2	1, 2
Platform assembly			
Guardrail	2	2	2
Access gate	1, 2, 3	1, 2, 3	1, 2, 3
Floor	2	2	2
Swing cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Safety belt lashing point	1, 2, 7	1, 2, 7	1, 2, 7
Power system			
Engine idle speed, RPM and throttle valve	1, 3	1, 3	1, 3
Fuel oil	6	6	6
Engine oil	6	6, 11	6, 11
Cooling system	1, 2, 5, 6, 7	1, 2, 5, 6, 7	1, 2, 5, 6, 7, 11
Fuel filter	1, 5	1, 5, 11	1, 5, 11
Air filter	1, 6, 11	1, 6, 11	1, 5, 6, 11
Oil filter	1, 5	1, 5, 11	1, 5, 11
Intake/exhaust system	1, 6	1, 6	1, 6
Charging function	1, 3	1, 3	1, 3
Belt	2, 3	2, 3	1, 2, 3
Fuel tank, tank cover, vent hole	1, 2, 6	1, 2, 6	1, 2, 6

Table 13-1 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Auxiliary power system	1, 3, 10	1, 3, 10	1, 3, 10
Hydraulic system			
Hydraulic pump	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Oscillating cylinder exhausting	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic valve	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Counterbalance valve locking check	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic connecting pin and retaining ring	1, 2	1, 2	1, 2
Hydraulic hose, pipeline and fitting	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic tank, cap and vent	1, 2, 3, 5, 6	1, 2, 3, 5, 6	1, 2, 3, 5, 6
Hydraulic oil high-pressure filter	1, 5, 6	1, 5, 6, 11[50]	1, 5, 6, 11[50]
Hydraulic oil	5, 6	5, 6	5, 6, 11
Electrical system			
Electrical wiring, connector	1, 2	1, 2	1, 2
Battery	1, 2, 6, 9, 12	1, 2, 6, 9, 12	1, 2, 6, 9, 12
Electrolyte	6	6	6
Charging function	3	3	3
Instrument, meter, switch, lamp, horn	1, 3	1, 3	1, 3
Functions and controls			
Platform controller	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Ground controller	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Function control lock, protective device and brake	1, 3, 10	1, 3, 10	1, 3, 10
Foot switch	1, 3, 10	1, 3, 10	1, 3, 10
Emergency stop button (turntable and platform)	1, 3, 10	1, 3, 10	1, 3, 10
Limit switch and main power switch	1, 3, 10	1, 3, 10	1, 3, 10
Overload limit system	1, 3, 10	1, 3, 10	1, 3, 10
Tilt alarm device	1, 3, 10	1, 3, 10	1, 3, 10
Drive brake	1, 3, 10	1, 3, 10	1, 3, 10
Rotation brake	1, 3, 10	1, 3, 10	1, 3, 10
Other inspection items			

Table 13-1 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Operation Manual in the manuals storage box	10	10	10
All decals/labels complete, clear and secure	10	10	10
Annual inspection date of the machine	/	/	10
No unapproved changes or additions	10	10	10
All safety publications included	10	10	10
General structural components and welds	2	2	2
All fasteners, pins, protective guards and covers	1, 2	1, 2	1, 2
Grease and lubricating to specifications	10	10	10
Functional test of all systems	10	10	10
Paint and appearance	5	5	5
Inspection date stamped on the chassis	/	/	12
Notify Sinoboom of machine ownership	/	/	12

Table 13-1 Inspection and Preventative Maintenance Schedule (Continued)

Items	Intervals		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Note: [1] Before each sale, lease or shipment; [2] In service for 3 months or 250 hours; or out of service for more than 3 months; [3] In service for 6 months or 500 hours; [4] Once a year and no later than 13 months from the date of the prior annual machine inspection; [50] The first inspection work shall be performed after the machine has been in service for 50 hours for the first time. This only happens once in the service life of the machine; [250] The first inspection work shall be performed after the machine has been in service for 250 hours for the first time. This only happens once in the service life of the machine; [NO.1] Before the machine is put into service for the first time, or before the first use after the oscillating cylinder or counterbalance valve is replaced.			
Performance code: **1.** Check for correct installation (accurate position, firmly installed, tightened according to the specified torque) **2.** Visual inspection for damage (cracks, cracked welds, deformation, wear, corrosion, excessive wear, gouges, abrasions and exposed threads) **3.** Check for normal function **4.** Return to neutral position or “off” position normally (the self-reset switch can return to neutral position or “off” position after released) **5.** Clean and free of foreign objects **6.** Check for correct sealing, leaking and level **7.** Labels complete, clear and secure **8.** Check for appropriate tolerances **9.** Fully charged **10.** Validation/Execution **11.** Replace the oil or filter element **12.** Correctly lubricated			

Always for Better Access Solutions

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