

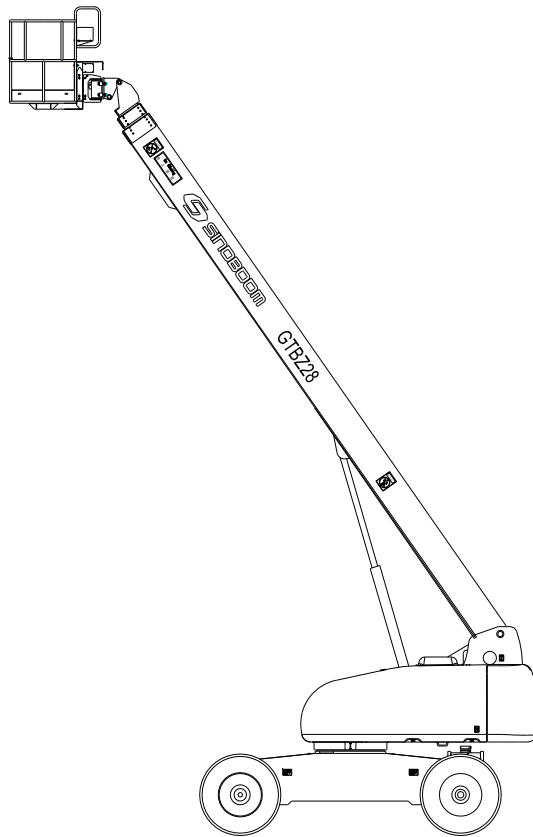


Hunan Sinoboom Heavy Industry Co., Ltd.

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## Service Manual

### GTBZ-28



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## Importance

You shall read, understand and obey the related safety rules and operator's manual before any maintenance or repair procedures are to be done on the GTBZ28.

This manual is for GTBZ28.

This manual is to provide detailed maintenance instruction for the owner and manufacturer of the product and solutions and procedures to the faults inspection and maintenance for the qualified servicemen.

It shall first know the basic information about the mechanism, hydraulic and electricity to carry out the maintenance procedures; and some particular skills, tools, lifting devices and suitable work places will be required for some maintenance procedures meanwhile. Thus, it is recommended to maintenance and repair the product in the assigned service centers by Sinoboom.

Sinoboom will greatly provide you with the accurate information and excellent service. However, it is Sinoboom's policy to constantly improve our products and the technical specifications may vary without notice, so please update your maintenance books timely.

Sinoboom encourages the readers to inform us the defects and provide the solutions and we will carefully consider all the opinions and make it as the reference for the maintenance books the other manuals revise and updating.

Please be free to contact Sinoboom if you get any question for Sinoboom products.

### Contact information

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## Safety rules



### Danger

It will cause death or badly injury if you do not obey and instructions in this manual and other related operator's manuals.

It should be noticed of many unsafe operations referred in this operator's manual for the maintenance and repair procedures.

Do NOT operate, unless:

- You have already known and practiced the rules for safe operation in this manual.
- You should read, understand and obey
  - the instruction and safety rule by the manufacturer
  - the safety and workplace rules for the users
  - the applicable governmental regulations
- You should get the suitable tools, lifting devices and workplace.

## Personnel Safety

Every work staff on or around the machine should be aware of the possible potential safety hazards. What is the most important is that personnel safety and to continuously and safely operate the machine

Carefully read all the procedures. The meanings of the labels used in this manual and on the machine are as following:



**▲ DANGER**

**Safety warning**---- to indicate the potential personnel injury existed. It should obey all the safety instructions in the label, to avoid the possible personnel injury or death occurred.

**▲ WARNING**

**Red**----to indicate the emergency dangers. It will cause death or badly injury if not avoided.

**Orange**----to indicate the potential dangers existed. It will

cause death or badly injury if not avoided.

## ▲ CAUTION

**Yellow with safety warning**---to indicate the potential dangers existed. It may cause slight or moderate personnel injury if not avoided.

## CAUTION

**Yellow without safety warning**----to indicate potential dangers existed. It may cause damage if not avoided.

## NOTICE

**Green**----to indicate operation or maintenance information.



To indicate that it should wear the safety glasses and other protective work jacks.



To indicate the potential dangers, such as: mobile parts, freely rotating or loose parts, and raised or moving heavy objects. Remember to wear the thick working shoes.

## Workplace Safety



Be sure that all the sparks, flame and lighted cigarettes are far away from the inflammable or explosive materials, such as the battery and engine fuel. It shall be equipped with the qualified extinguishers.



Keep all the tools and workplaces in good condition for the use and ensure the workplaces clean to avoid impurities or pieces fall into the components, which may cause damages to the machine.



Be sure that all the forklifts, cranes or other lifting, supporting devices have the enough supporting and lifting capacity. It should only use the intact wire ropes and belts with the enough load capacity.



To process the used fuel and other liquids properly with authorized containers. Please protect the environment from pollution.



Be sure that your workplaces and the work areas are well-ventilated and in good light conditions.



Be sure that disposable fasteners (such as cotter pins and lock nuts etc.) will not be used repeatedly. To repeat using may result in parts invalidation.



## Product Specification Description

### GTBZ28

Stowed dimension	
Length	12.4m
Width	2.75m
Height	2.8m
Weight	16300kg
Ground clearance	0.33m
Working dimension	
Platform height max.	28.1m
Working height max.	30.1m
Horizontal reach max.	20.1m
Load capacity max.	480kg
Turntable tailswing	1.18m
Wheelbase	3m
Turning radius(outside)	6.07m
Turning radius(inside)	2.46m
Turntable rotation	360° continuous
Platform rotation	160°
Allowable side force max.	400N
Control voltage	24V DC
<b>Platform size</b>	
Length	1.83m
Width	0.76m
<b>Tire</b>	
diameter	1105mm
width	297mm
<b>Liquid volume</b>	
Hydraulic tank volume	170L
Hydraulic system volume(tank included)	270L
Fuel tank volume	125L
Allowable noise max. at normal working hours	82dB(A)

Travel speed(stowed)	0~5.2km/h
Travel speed (raised or extended)	0~1.1km/h
Travel speed(extended fully)	0~0.65km/h
Gradeability	30%
Boom working speed(controlled on the platform)	

Boom extended	110~130s (As the boom extended much longer, it will automatically control the extend/stow speed.)
Boom stowed	110~130s (As the boom extended much longer, it will automatically control the extend/stow speed.)
Boom raised(boom stowed fully)	81~90s
Boom raised(Boom extended>1.2m)	81~90s (the longer the boom extended, the more time needed)
Boom descend(boom stowed)	81~90s
Boom descend(boom stowed>1.2m)	81~90s (the longer the boom extended, the more time needed)

### Hydraulic system description

Hydraulic oil	L-HM46
Drive pump	
Drive pump	Two-way variable plunger pump
Flow(2200r/min)	100L/min
Drive force max.	280bar
Slippage pump	
Type	Gear pump
Flow(2200 r/min)	30.5L/min
Slippage pump force	19.5bar
Function valve	
Function safety valve force	210 bar
Overflow valve force for boom extended	124bar
Travel drive valve	
Brake starting pressure	17.2 bar
Drive motor	
Flow	12cc to 45cc
Function pump	
Type	Series gear pump
Flow (pump 1)	20cc
Flow (pump 1) (2200r/min)	44L/min
Flow (pump 2)	5cc
Flow (pump 2) (2200r/min)	11L/min

Auxiliary pump	
Type	Series gear pump
Flow (pump 1)	2.5cc
Flow (pump 1) (2500r/min)	6.25L/min
Flow (pump 2)	1.0cc
Flow (pump 2) (2500r/min)	2.5L/min
Auxiliary pump overflow pressure	
Pump 1	210bar
Pump 2	210bar
Hydraulic filter	
High pressure filter	PLF-H110×3P
The bypass pressure of the high pressure filter	6bar
Hydraulic oil tank return filter	RFA-250×3F-Y
the bypass pressure of the oil return filter	4bar

## Engine Description

Cummins B3.3-C80 Engine	
Displacement	3.3L
Cylinder amount	4
Horsepower (kW)	56@2200r/min
Burning order	1-2-4-3
Compression ratio	18.5:1
Compression pressure The lowest compression pressure is at least 75% of the highest one.	
Low rotating speed—no load	1300 r/min
High rotating speed—no load	2350 r/min
Fuel inlet	0.35mm
Fuel outlet	0.50mm
Lubricating oil system	
Fuel pressure	5.88par
Fuel capacity	8.0L

Fuel viscosity requirement	
Below 32°F/0°C	0W
-13°F to 68°F -25°C to 20°C	5W-20
10°F to 104°F -12°C to 40°C	10W-30
14°F to 122°F -10°C to 50°C	15W-40
Over 23°F/-5°C	20W-50
Fuel requirement	
Grade (Summer)	Diesel
No.:2-D	
Grade (Winter) Operating temp is below 0°C, use the special Winter fuel.	
Engine output	55A, 24V
Battery system	
Type	12V series
Quantity	2
Cooling system	
Engine capacity	4.5L
Fan belt bias	9 到 12mm

Lovel 1004-4Z27 Engine	
Displacement	3.99L
Cylinder amount	4
Horsepower(KW)	58@2200r/min
Compression ratio	16.5:1
Burning order	1-3-4-2
Low rotating speed—no load	1250 r/min
High rotating speed—no load	2200 r/min
Fuel inlet	0.20mm
Fuel outlet	0.45mm
Lubricating oil system	
Fuel pressure	3.45par
Fuel capacity	8.4L
Fuel viscosity requirement	
Below 32°F/0°C	0W
-13°F to 68°F/-25°C to 20°C	5W-20
10°F to 104°F/-12°C to 40°C	10W-30
14°F to 122°F/-10°C to	15W-40

50°C	
Over 23°F/-5°C	20W-50
Fuel requirement	
Grade (Summer)	Diesel
No.:2-D	
Grade (Winter) Operating temp is below 0°C,use the special Winter fuel.	
Engine output	55A, 24V
Battery system	
Type	12V series
Quantity	2
Cooling system	
Engine capacity	9L
Fan belt bias	18.9L
Battery system	9 to 12mm

## Instructions for Hydraulic Hoses and Couplings Installation

This machine is equipped with the o-rings hydraulic hoses and couplings on the surface. When removing or equipping them, it shall be removed or equipped the hoses and couplings according to the stipulations in the manuals.

Instruction for the hydraulic hoses and couplings installation		
Couplings		
Dash size	Installing into.....	Torque (Nm)
-4	Aluminum	14.9
	Steel	21.7
-6	Aluminum	31.2
	Steel	47.5
-8	Aluminum	54.2
	Steel	81.3
-10	Aluminum	93.6
	Steel	142.4
-12	Aluminum	126.1
	Steel	190
-16	Aluminum	188.5
	Steel	284.7
-20	Aluminum	233.2
	Steel	352.5
-24	Aluminum	282
	Steel	427.1

Instruction for the hydraulic hoses and couplings installation	
Hose	
Dash size	Torque Nm
-4	24.4
-6	36.6
-8	54.2
-10	85.4
-12	122
-16	162.7
-20	190
-24	223.7

### Torque procedure

1. Replace the O-ring. The O-ring must be replaced anytime the seal has been broken. The O-ring cannot be re-used if the coupling or hose end has been tightened beyond finger tight.
2. Lubricate the O-rings before the installation.
3. Be sure that the seal o-rings on the surface are properly settled and fixed.
4. Position the tube and nut squarely on the face seal end of the fitting and tighten the nut finger tight.
5. Tighten the nut or fitting to the appropriate torque per given size as shown in the table above.
6. Operate all the machine functions and inspect the hoses, couplings and other related parts to make sure no leakage occurred.

## Theory of Operation

### The power source

GTBZ28 is driven by any diesel engines below:

Cummins B3.3 60kW and LOVOL 1004-4Z27 58kW

The auxiliary power is provided by a 24V battery drive hydraulic pump.

## Hydraulic system

All machine functions are performed by the hydraulic system. The hydraulic system is divided into two groups: Boom/Steer functions and Drive functions.

Boom/Axle functions are powered by a series section gear pump, rated at 44 L/min and 11L/min. When the engine is running, this pump supplies hydraulic fluid under pressure to the function valve, where the directional and flow control valves are located. To protect from over-pressurization of the Boom/Axle system, the overflow valve of the axle extended and stowed valve is set at 210 bar, the overflow valve of the function valves at 206.8 bar and the overflow valve of the platform valve at 206.8bar.

Drive functions are powered by a bi-directional, variable output piston pump rated at 100 L/min. Two overflow valves are used to prevent over-load of the closed loop drive system.

The boom lift cylinder, boom extend cylinder, platform leveling slave cylinder, platform rotator and jib boom cylinder incorporate counterbalance valves to prevent boom or platform movement in the event of a hydraulic line failure.

## Electrical system

It is used two 12V series batteries in the system, to start the engine, auxiliary pump and the controller which drives the three control functions of the boom and engine. The batteries are charged by the AC generator driven by the engine.

## Machine controls

The machine is equipped with operational controls which are found in two locations: the ground control and the platform control.

All the controllers are exchanged data through a high-speed data bus. For example, the data input from the platform controller are transported to the drive controller as the multi-signals through the high-speed data bus.

## Safety measures

The controllers are provided the signals by a series of access switches and limit switches which decide and identify the parameters of the safety operation to the machine. Moreover, there is another safety system which adopting sensing, which would cut off the partial functions of the controllers if improper operations occurred.

## Scheduled Maintenance Procedures

### Observe and Obey

- Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.
- Scheduled maintenance inspections shall be completed daily, quarterly, annually and every 2 years and it should be recorded on the Maintenance Inspection Report.

### **⚠WARNING**

Failure to perform each procedure as presented and scheduled may cause death, serious injury or substantial machine damage.

- Immediately tag and remove from service a damaged or failed machine.
- Repair any machine damage or failure before operating machine.
- Keep all the machine inspections records for three years.
- It shall be completed the quarter inspections to the machines with no maintenance service during three months.

Unless otherwise specified, perform each procedure with the machine in the following configuration:

- ◆ Machine parked on a flat, level surface
- ◆ Boom in the stowed position
- ◆ Turntable rotated with the boom between the non-steering wheels
- ◆ Turntable secured with the turntable rotation lock pin
- ◆ Key switch in the “OFF” position with the key removed
- ◆ Wheels chocked

### About this section

This section contains detailed procedures for each scheduled maintenance inspection. Each procedure includes a description, safety warnings and step-by-step instructions.

Each procedure includes a description, safety warnings and step-by-step instructions.



## Labels illustrations



**Safety alert symbol**—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

**▲ DANGER**

**Red**—to indicate the presence of an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**▲ WARNING**

**Orange**—to indicate the presence of a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**▲ CAUTION**

**Yellow with safety alert symbol**—to indicate the presence of a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION**

**Yellow without safety alert symbol**—to indicate the presence of a potentially hazardous situation which, if not avoided, may result in property damage.

**NOTICE**

**Green**—to indicate operation or maintenance information.

## Maintenance labels illustrations

**NOTICE**

The following symbols have been used in this manual to help communicate the intent of the instructions. When one or more of the symbols appear at the beginning of a maintenance procedure, it conveys the meaning below:



Indicates that tools will be required to perform this procedure.



Indicates that new parts will be required to perform this procedure.



Indicates that a cold engine will be required to perform this procedure.



Indicates that a warm engine will be required to perform this procedure.



Indicates that dealer service is required to perform this procedure.

## Maintenance timetable

There are five types of maintenance inspections that must be performed according to a schedule— daily, quarterly, six months, annual, and two year. The Scheduled Maintenance Procedures Section and the Maintenance Inspection Report have been divided into five subsections—A, B, C, D and E. Use the following chart to determine which group(s) of procedures are required to perform a scheduled inspection.

Inspection	Table or Checklist
Daily or every 8 hours	A
Quarterly or every 250 hours	A+B
Six month or every 500 hours	A+B+C
Annual or every 1000 hours	A+B+C+D
Two year or every 2000 hours	A+B+C+D+E

## Maintenance inspection report

The maintenance inspection report contains checklists for each type of scheduled inspection.

Make copies of the Maintenance Inspection Report to use for each inspection. Store the completed forms for three years.

## Procedures A

### A-1 Check all the manuals

Maintaining the operator's and safety manuals in good condition is essential to safe machine operation. Manuals are included with each machine and should be stored in the container provided in the platform. An illegible or missing manual will not provide safety and operational information necessary for a safe operating condition.

1. Check to be sure that the storage container is present and in good condition.

2. Check to make sure that the operator's, responsibilities and safety manuals are present and complete in the storage container in the platform.
3. Examine the pages of each manual to be sure that they are legible and in good condition.
4. Always return the manuals to the storage container after use.

## NOTICE

Please contact SINOBOOM if replacement manuals are needed.

### A-2 Check all the labels.

Maintaining all of the safety, instructional decals and placards in good condition is mandatory for safe machine operation. Decals alert operators and personnel to the many possible hazards associated with using this machine. They also provide users with operation and maintenance information. An illegible decal will fail to alert personnel of a procedure or hazard and could result in unsafe operating conditions.

- 1、 Refer to the labels section in the Sinoboom GTBZ28 Operator's Manual and use the label list and illustrations to determine that all labels are in place.
- 2、 Check all decals for legibility and damage. Replace any damaged or illegible decal immediately.

## NOTICE

Please contact SINOBOOM if replacement manuals are needed.

### A-3 Check the damaged and loosen or missing parts



Daily machine condition inspections are essential to safe machine operation and good machine performance. Failure to locate and repair damage, and discover loose or missing parts may result in an unsafe operating condition.

Observe the whole machine to check the damaged and improperly installed or missing parts including:

- ◆ Electrical components, wiring and electrical cables
- ◆ Hydraulic hoses, power units, fittings, cylinders and manifolds
- ◆ Fuel and hydraulic tanks
- ◆ Drive and turntable motors and drive hubs
- ◆ Boom wear pads and the extend / stowed wear pads
- ◆ Dents and damage to the machine

- ◆ Tires and wheels
- ◆ Engine and related components
- ◆ Limit switches and horn
- ◆ Alarm and beacon
- ◆ Nuts, bolts and other fasteners
- ◆ Platform entry mid-rail and gate
- ◆ Structural components and cracks in welds
- ◆ Compartment covers and latches

#### A-4 Check the engine oil level



Maintaining the proper engine oil level is essential to good engine performance and service life. Operating the machine with an improper oil level can damage engine components.

#### **NOTICE**

Check the oil level with the engine off.

- 1、 Check the engine oil dipstick and fill it when necessary

Cummins Engine

Result: The oil level should be between the mark L and H.

LOVOL Engine

Result: The oil level should be within the two marks on the dipstick.

#### A-5 Check the engine coolant level



Maintaining the engine coolant at the proper level is essential to engine service life. Improper coolant level will affect the engine's cooling capability and damage engine components. Daily checks will allow the inspector to identify changes in coolant level that might indicate cooling system problems.

- 1、 Check the coolant liquid level and fill it when necessary.

Result: the coolant liquid level is with the normal range.

**⚠WARNING**

The coolant liquid in the tank is under high pressure and getting hot. Beware of hot engine parts and coolant when opening the covers and filling the liquid.

**A-6 Check the engine belt**

Maintaining the engine belt is essential to good engine performance and service life. The machine will not operate properly with a loose or defective belt and continued use may cause component damage.

**⚠WARNING**

Do not check while the engine is running. Remove the key to secure from operation.

**⚠CAUTION**

Beware of hot engine components. Contact with hot engine components may cause severe burns.

- 1、 Remove the engine pivot plate retaining bolts. Swing the engine pivot plate away from the machine to access the front engine access cover mounting fasteners.
- 2、 Inspect the engine belt for:
  - ◆ Cracking
  - ◆ Glazing
  - ◆ Separation
  - ◆ Breaks
- 3、 Replace the belts immediately if any damage is found.
- 4、 Inspect the engine belt for:
  - ◆ Cracking
  - ◆ Glazing
  - ◆ Separation
  - ◆ Breaks
- 5、 Replace the belts immediately if any damage is found.
- 6、 Swing the engine pivot plate back to its original position
- 7、 Install the two engine pivot plate retaining bolts.

**⚠ WARNING**

It may cause death or badly injury if it is not installed the fasten bolts to lock the engine.

**A-7 Check the engine coolant tank**

Maintaining the engine coolant tank is essential to good engine performance and service life. The machine will not operate properly with a loose or defective tank and continued use may cause component damage.

**⚠ WARNING**

Do not check while the engine is running which may cause the body injury.

**⚠ CAUTION**

Beware of hot engine components. Contact with hot engine components may cause severe burns.

- 1、 Open the covers of the side turntable on the engine and find the engine coolant tank.
- 2、 Inspect the engine belt for:
  - ◆ broken
  - ◆ rivets loosen
  - ◆ blades tilted or loosen
- 3、 Check whether the coolant tank is stably installed. Tighten the fasten bolts on the coolant tank.
- 4、 Replace the coolant tank immediately if any damage is found.

**A-8 Check the fuel filter/water separator**

Proper maintenance of the fuel filter/water separator is essential for good engine performance. Failure to perform this procedure can lead to poor engine performance and component damage.

**⚠ DANGER**

Engine fuels are combustible. Perform this procedure in an open, well ventilated area away from heaters, sparks, flame and lighted tobacco. Always have an approved fire extinguisher within easy reach.

**NOTICE**

It shall complete this procedure much more often if it is under the wet working condition or plenty of fuel oil is found around.

**NOTICE**

Perform this procedure with the engine off.

- 1、 Open the engine side turntable cover and locate the fuel filter/water separator.
- 2、 Loosen the drain plug located at the bottom of the bowl.
- 3、 Allow the water to drain into a suitable container until fuel starts to come out.
- 4、 Tighten the vent plug.
- 5、 Clean up any fuel that may have spilled.
- 6、 Start the engine from the ground controls and check the fuel filter/water separator and vent plug for leaks.

**A-9 Check the engine air filter**

Maintaining the engine air filter in good condition is essential to good engine performance and service life. Failure to perform this procedure can lead to poor engine performance and component damage.

**Perform this procedure with the engine off.**

- 1、 Open the engine side cover and remove the retaining ring from the end cap of the air filter canister. Clean it if necessary.
- 2、 Remove the end cap from the air cleaner canister.
- 3、 Remove the filter element.
- 4、 Clean the inside of the canister and the gasket with a damp cloth.
- 5、 Inspect the filter element. If needed, blow out from inside out using low pressure dry compressed air, or tap dust out taking care not to damage the element.
- 6、 Install the air filter element.
- 7、 Install the end cap onto the canister. Install and tighten the retaining ring.

**A-10 Check the engine fuel leakage**

Failure to detect and correct fuel leakage will result in an unsafe condition. An explosion or fuel fire may cause death or serious injury.

**Danger:** Engine fuels are combustible. Inspect the machine in an open, well ventilated area away from heaters, sparks, flame and lighted tobacco. Always have an approved fire extinguisher within easy reach.

1、Visually check the following areas:

Fuel tank, solenoid shutoff valve, hoses and fittings, fuel pump, fuel filter, fuel injection pump, fuel injector.

### **⚠ DANGER**

No any other people are allowed to enter this area and operate the machine if any fuel leakage is found. Repair the leakage promptly.

## **A-11 Check the hydraulic oil level**



Maintaining the hydraulic oil at the proper level is essential to machine operation. Improper hydraulic oil levels can damage hydraulic components. Daily checks allow the inspector to identify changes in oil level that might indicate the presence of hydraulic system problems.

### **NOTICE**

It shall be performed this procedure as the boom is in the load position.  
1、Visually inspect the sight gauge located on the side of the hydraulic oil tank.

### **NOTICE**

The hydraulic oil level should be below the top 19mm of the level gauge.

## **A-12 Check the hydraulic leakage**



Detecting hydraulic fluid leaks is essential to operational safety and good machine performance. Undiscovered leaks can develop into hazardous situations, impair machine functions and damage machine components.



1、 Inspect for hydraulic oil puddles, dripping or residue on or around the following areas:

- ◆ Hydraulic oil tank—filter, pipe joint, tubing, auxiliary power unit
- ◆ Engine—pipe joint, tubing, pump, filter
- ◆ all the hydraulic cylinders
- ◆ all the hydraulic manifolds
- ◆ the booms
- ◆ rotary bearing
- ◆ drive chassis
- ◆ ground area around the machine

### A-13 Check the hydraulic filter indicator



Maintaining the hydraulic tank filter in good condition is essential to good system performance and safe machine operation. The filter condition indicator will show when the hydraulic flow is bypassing a clogged filter. If the filter is not frequently checked and replaced, impurities will remain in the hydraulic system and cause component damage.

#### **NOTICE**

There are all together five hydraulic tank filter: two are suction oil filter on the side tank; one are oil return filter; the rest are high pressure filter.

- 1、 Start the engine from the platform controls.

#### **Oil return filter**

- 2、 Move the engine speed control switch to high idle (rabbit symbol).
- 3、 Inspect the filter condition indicator.

Result: The filter should be operating with the plunger in the green area. If the display shows the plunger in the red area, this indicates that the hydraulic filter is being bypassed and the filter should be replaced

#### **High pressure filter**

#### **NOTICE**

The high pressure filters are installed beside the engine and the filter indicator should be the top of other filters.

- 4、 Inspect the filter condition indicator

Result: The filter should be operating with the plunger in the green area. If the display shows the plunger in the red area, this indicates that the hydraulic filter is being bypassed and the filter should be replaced

## A-14 Check the Battery

### NOTICE

Sinoboom requires that this procedure be performed every 125 hours.



Proper battery condition is essential to good engine performance and operational safety. Improper fluid levels or damaged cables and connections can result in engine component damage and hazardous conditions.

### ⚠WARNING

Contact with hot or live circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

Batteries contain acid. Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda and water.

- 1、 Put on protective clothes and eye wear.
- 2、 Be sure that the battery cable connections are free of corrosion.
- 3、 Be sure that the battery hold downs and cable connections are tightly connected.
- 4、 Be sure that the leads of the battery separator are tightly connected.
- 5、 Remove the battery vent caps and check the specific gravity of each battery cell with a hydrometer.

Result: If any battery cell displays a specific gravity of less than 1.086, the battery must be replaced.

- 6、 Check the battery acid level of each cell. If needed, replenish with distilled water to the bottom of each battery fill tube. Do not overfill.
- 7、 Install the battery vent caps.

## A-15 Test the Platform and Ground Controls

Testing the machine functions and the Emergency Stop buttons for malfunctions is essential for safe machine operation. An unsafe working condition exists if any function fails to operate properly or either Emergency Stop button fails to stop all the machine functions and shut off the engine. Each function should activate, operate smoothly and be free of hesitation, jerking and unusual noise.

Result: boom should be stowed.

### **Test the ground control**

1. Turn key switch to the ground control.
2. Free the function starting button and press boom and platform function button.

Result: boom and platform have no function operated moves.

### **Test the platform control**

3. Turn the key switch to platform control.
4. Loosen foot switch.
5. Press each functional control handle and turn ON/OFF button or button.

Result: No jib boom and platform should be operated.

6. Press down foot switch
7. Press down each function control handle and turn ON/OFF or button.

Result: all boom and platform functions should be operated properly.

## **A-16 Test the auxiliary power operation**

Detection of auxiliary power system malfunctions is essential for safe machine operation. An unsafe working condition exists if the auxiliary powered functions do not operate in the event of a main power loss. When operating the machine on engine power, selecting auxiliary power will stop the engine immediately. Auxiliary power is designed for short term use only, and excessive use will result in battery drain and component damage.

### **NOTICE**

Operate this move with engine off.

- 1、 Turn the key switch to ground control and pull out the Emergency Stop button to the ON position.
- 2、 Simultaneously hold the auxiliary power toggle switch ON and activate each boom function toggle switch.

Result: All boom functions should operate.

- 3、 Turn the key switch to platform control.
- 4、 Press down the foot switch.
- 5、 Simultaneously hold the auxiliary power toggle switch ON and activate each function controller or toggle switch.

Result: All boom functions should operate.

## A-17 Check the engine fastener



### NOTICE

The engine manual requires that operate this procedure after using the machine in 40 hours

Proper screwing the engine fastener is essential to the normal and safe work. Loosing fastener or screwing improperly may cause damage to the engine components and dangerous condition.

- 1、 Remove the standing bolts on engine pivot plate and swing it to make engine separate from the engine.
- 2、 Screw all surface fastener. Toque: 12Nm
- 3、 Screw all intake clamps. Toque: 12Nm
- 4、 Screw all intake valve standing bolts. Toque: 23Nm.
- 5、 Screw all vent valve fastener bolts. Toque: 40Nm.
- 6、 Screw engine install bolts. Toque between engine and pivot plate bolts: 73Nm; toque between pivot plate and turntable bolts: 273Nm.
- 7、 Swing engine pivot plate to turn engine back to its original condition.
- 8、 Install standing bolts to lock engine.

### ⚠WARNING

It may cause death and severe damage if no standing bolt lock is installed.

## Procedures B

### B-1 Check the water tank



Maintaining the water tank in good condition is essential for good machine performance. Operating a machine with water tank broken or leak may result in engine damage. Also, restricting air flow through the water tank will affect the performance of the cooling system. Frequent check on water tank can make inspector know the change of the

water tank condition, and discover the problems in cooling system.

**⚠WARNING**

Check with engine off. Take down the operating keys.

**⚠CAUTION**

Beware of hot engine components. Contact with hot engine components may result in severe burns.

- 1、 Remove the standing bolts on engine pivot plate and swing it to make engine separate from the engine.
- 2、 Check the water tank for leak or physical damage.
- 3、 Clean up impurities and other unidentified subjects.
- 4、 Swing the engine pivot plate to turn back engine to its original condition.
- 5、 Install standing bolt to lock engine.

**⚠WARNING**

It may cause death and severe damage if no standing bolt lock is installed.

## B-2 Check the Oil Cooler



Maintaining the oil cooler in good condition is essential for good engine performance. Operating a machine with damaged oil cooler may result in engine damage. Also, restricting air flow through the oil cooler will affect the performance of the cooling system.

**⚠WARNING**

Do not inspect while the engine is running. Remove the key to secure from operation.

**⚠CAUTION**

Beware of hot engine components. Contact with hot engine components may result in severe burns.

- 1、 Remove the fasteners from the engine side cover, and then remove the cover.
- 2、 Inspect the oil cooler for leaks and physical damage.
- 3、 Clean the oil cooler of debris and foreign material.

### B-3 Check engine belt



Maintaining the engine belt is essential to good engine performance and service life. The machine will not operate properly with a loose or defective belt and continued use may cause component damage.

#### **⚠WARNING**

Do not inspect while the engine is running. Remove the key to secure from operation.

#### **⚠CAUTION**

Beware of hot engine components. Contact with hot engine components may cause severe burns.

- 1、 Remove the engine pivot plate retaining bolts. Swing the engine pivot plate away from the machine.
- 2、 Check engine belt for:
  - ◆ Cracking
  - ◆ Glazing
  - ◆ Separation
  - ◆ Breaks
- 3、 Replace belt if any damage is found.
- 4、 Rotate engine pivot plate to renew engine.
- 5、 Install standing bolt to lock engine.

#### **⚠WARNING**

It may cause death or severe damage if no standing bolt is installed to lock engine.

### B-4 Replace the fuel filter/water separator element



Replacing the fuel filter and water filter core are essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and

continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

**⚠ DANGER**

Engine fuels are combustible. Replace the fuel filter in an open, well ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

**NOTICE**

Extremely dirty conditions and poor fuel quality may require that the filter be replaced more often.

**NOTICE**

Perform this procedure with the engine off.

- 1、 Disconnect and plug the fuel supply hose from the fuel tank to the fuel filter/water separator head.
- 2、 Loosen the vent plug located on the fuel filter/ water separator head.
- 3、 Place a suitable container under the filter bowl.
- 4、 Loosen the drain plug located at the bottom of the bowl. Completely drain the fuel.
- 5、 Rotate the filter element counterclockwise and remove it from the filter head.
- 6、 Install the filter bowl onto the new filter element.
- 7、 Apply a thin layer of fresh oil on the filter or element.
- 8、 Apply a thin layer of oil onto the element gasket.
- 9、 Install the filter/bowl assembly onto the filter head. Tighten the drain plug and vent plug.

**NOTICE**

Before bleeding the system, fill the fuel tank.

- 10、 Tighten the head bolt.
- 11、 Tighten the vent plug.
- 12、 Clean up any diesel fuel that may have spilled during the installation procedure.
- 13、 Use a permanent ink marker to write the date and number of hours from the hour meter on the filter element.
- 14、 Connect the fuel hose from the fuel tank to the fuel filter/water separator. Tighten the clamp.

## B-5 Replace the engine air filter element



Maintaining the engine air filter in good condition is essential to good engine performance and service life. Failure to perform this procedure can lead to poor engine performance and component damage.

**NOTICE** Perform this procedure with the engine off.

- 1、 Press on the surroundings of the air cleaner cover with fingers simultaneously to open the output valve.
- 2、 Release the latches on the air cleaner cap. Remove the end cap from the air cleaner canister.
- 3、 Remove the filter element.
- 4、 Use a damp cloth to wipe the filter sealing surface and the inside of the outlet tube. Make sure that all contaminant is removed before the filter is inserted.
- 5、 Install the new filter element.
- 6、 Install the end cap on the canister and secure.

## B-6 Replace the engine air breather



Maintaining the engine air filter in good condition is essential to good engine performance and service life. Failure to perform this procedure can lead to poor engine performance and component damage.

**NOTICE** Perform this procedure with the engine off.

- 1、 Inspect air line for flaw, pipe clip looseness, tiny hole etc.,which may result in ash and pieces into the engine.
- 2、 Screw or replace spares to make sure that no leak in the breath system if necessary.

## B-7 Check the Exhaust System



Maintaining the exhaust system is essential to good engine performance and service life. Running the engine with a damaged or leaking exhaust system can cause



component damage and unsafe operating conditions.

**⚠ WARNING** Do not inspect while the engine is running. Remove the key to secure from operation.

**NOTICE** Beware of hot engine components. Contact with hot engine components may cause severe burns.

#### Cummins & Lovol engine:

- 1、 Be sure that all bolts are tight.
- 2、 Inspect all welds for cracks.
- 3、 Inspect for exhaust leaks.

#### B-8 Replace the hydraulic tank return filter



Replacement of the hydraulic tank return filter is essential for good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

**⚠ CAUTION** Beware of hot oil. Contact with hot oil may cause severe burns.

**NOTICE** Perform this procedure with the engine off.

- 1、 Unfold ground control turntable covers and find return filter.
- 2、 Place a suitable container under the hydraulic tank return filter.
- 3、 Remove the filter with an oil filter wrench.
- 4、 Apply a thin layer of fresh oil to the new oil filter gasket.
- 5、 Install the new filter and tighten it securely by hand.
- 6、 Install the now drive motor and tighten it securely by hand.
- 7、 Clean up any oil that may have spilled during the installation procedure.
- 8、 Use a permanent ink marker to write the date and number of hours from the hour meter on the oil filter.
- 9、 Start the engine from the ground controls.

- 10、Inspect the filter and related components to be sure that there are no leaks.

## B-9 Replace the hydraulic tank oil suction filter



Replacement of the hydraulic tank oil suction filter is essential for good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

### **CAUTION**

Beware of hot oil. Contact with hot oil may cause severe burns.

### **NOTICE**

Perform this procedure with the engine off.

- 1、Unfold ground control side turntable cover.
- 2、Remove filter by spanner.
- 3、Replace filter if necessary.
- 4、Install a new filter.

## B-10 Replace High Pressure Filter



Replacement of the hydraulic tank high pressure filter is essential for good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

### **CAUTION**

Beware of hot oil. Contact with hot oil may cause severe burns.

### **NOTICE**

Perform this procedure with the engine off.

- 1、Unfold ground control turntable covers and find the high pressure filter.
- 2、Place a suitable container under the filter.
- 3、Remove the filter with mounting frame.
- 4、Replace filter element if necessary.

- 5、 Clean up any oil that may have spilled during the installation procedure.
- 6、 Use a permanent ink marker to write the date and number of hours from the hour meter on the filter.
- 7、 Start the engine from the ground controls.
- 8、 Inspect the filter and related components to be sure that there are no leaks.

## B-11 Check the Electrical Wiring

Maintaining electrical wiring in good condition is essential to safe operation and good machine performance. Failure to find and replace burnt, chafed, corroded or pinched wires could result in unsafe operating conditions and may cause component damage.

**⚠WARNING** Contact with hot or live circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 1、 Inspect the following areas for burnt, chafed, corroded and loose wires:
  - ◆ Engine wiring harness
  - ◆ Ground controller wiring box
  - ◆ Turntable valve wiring
- 2、 Start the engine from the platform controls.
- 3、 Turn key switch to ground control and raise boom to above the turntable.

**⚠WARNING** Do not touch by finger or get close to the cylinders and all moving parts when the boom is decreased.

- 4、 Stop Engine.
- 5、 Loose boom chain cover fastener and chain cover.
- 6、 Inspect the chain areas for burnt, chafed, corroded and loose wires.
- 7、 Install boom chain and fastening bolts.
- 8、 Start engine and lower jig boom to load position.
- 9、 Stop the engine.
- 10、 Inspect the following areas for burnt, chafed, corroded and loose wires:
  - ◆ Platform controller wiring box
  - ◆ Platform valve wires

## B-12 Confirm the Proper Brake Configuration



Proper brake configuration is essential to safe operation and good machine performance.

The hydraulic brake devices are attached in the drive torque hubs of this machine.

Check each drive hub disconnect cap to be sure it is in the engaged position.

## B-13 Check the Tires and Wheels (including lug nut torque)



Maintaining the tires and wheels in good condition is essential to safe operation and good performance. Tire and/or wheel failure could result in a machine tip-over. Component damage may also result if problems are not discovered and repaired in a timely fashion.

### NOTICE

The tires equipped on this machine are foam filled and do not need air added to them.

- 1、 Check all tire treads and sidewalls for cuts, cracks, punctures and unusual wear.
- 2、 Check each wheel for damage, bends and cracked welds.
- 3、 Check each lug nut for proper torque.

## B-14 Check the oil Level in drive torque hub



Improper oil level in the hubs will cut down the machine performance. Keep using will cause damage to components.

### Drive torque hub

- 1、 Drive machine to rotate reducer and make the upper plug on the top, and the other is vertical to the upper one.
- 2、 Remove the horizontal plug and check the oil level.

Result: the oil level is at the same level as the bottom of the plug.

- 3、 Remove the upper plug and add oil if necessary, Make the new oil surface reaches the end of the vertical plug.
- 4、 Install the oil plug properly.
- 5、 Repeat the above procedures on other drive reducer.

### Turntable return torque hub

#### NOTICE

Turntable return reducer is below the turntable ground control side covers. Remove covers before performing the procedure.

- 1、 Open the ground control side covers.
- 2、 Remove the plug below the brake equipment and check the oil level.

Result: the oil level reaches the end of the plug.

- 3、 Add oil till the oil level reaches the end of the plug.
- 4、 Install the plug.

### B-15 Test the Key Switch

Flexible functioning of key switch is essential for safe machine operation. Unworkign for the key switch may be caused danger machine operation.

There is one main key switch and one key switch on the machine.

The main key switch use on the power source.

1. Put the key switch to the "ON" position.

Result: the power indicate lamp light, the engine could be started.

2. Put the key switch to the "OFF" position

Result: The power indicate lamp put out, open the engine start switch, the engine could not start.

### B-16 Test the emergency stop buttons

Properly functioning Emergency Stop buttons are essential for safe machine operation. An improperly operating Emergency Stop button will fail to shut off power and stop all machine functions, resulting in a hazardous situation for ground and platform personnel.

#### NOTICE

Selecting and operating the ground controls will override the platform controls, including the platform Emergency Stop button.

- 1、 Start the engine from the ground controller.
- 2、 Push in the Emergency Stop button to the OFF position.

Result: The engine should stop and no machine function should be operated.

- 3、 Start the engine from the platform controller.
- 4、 Push in the Emergency Stop button to the OFF position.

Result: The engine should stop and no machine function should be operated.

## NOTICE

The ground control Emergency Stop button will stop all machine operation, even if the key switch is switched to platform control.

### B-17 Test the platform self-leveling

Automatic platform self-leveling throughout the full cycle of boom raising and lowering is essential for safe machine operation. The platform is maintained at level by the platform leveling slave cylinder which operates in a closed loop hydraulic circuit with the master cylinder located at the base of the boom. A platform self-leveling failure creates an unsafe working condition for platform and ground personnel.

- 1、 Start the engine from the platform controls and extend boom.
- 2、 Turn key switch to ground control.
- 3、 Press function starting button and stow boom fully.
- 4、 Press function starting button and use platform level up and down button to adjust platform to horizontal position.
- 5、 Press function starting button and raise the boom to maximum angle.

Result: platform should be horizontal and the dip angle should be no more than 2°

## NOTICE

If the dip angle is over the allowable range, alarm will sound and the level indicator light will start flashing on ground control. Leveling button will only move on the leveling direction until the platform is horizontal. Make sure that platform is horizontal and the indicator light is off.

- 6、 Press the function button to lay down the boom to the lowest position.

Result: the platform should always keep the horizontal level and the tilt level shall be within 2°.

**NOTICE**

If the dip angle is over the allowable range, alarm will sound and the level indicator light will start flashing on ground control. Leveling button will only move on the leveling direction until the platform is horizontal. Make sure that platform is horizontal and the indicator light is off.

**B-18 Test the horn**

The function of a horn is essential to safe machine operation. The horn is activated at the platform controls and sounds at the ground as a warning to ground personnel. An improperly functioning horn will prevent the operator from alerting ground personnel of hazards or unsafe conditions.

- 1、 Turn the key switch to platform controls and pull out the Emergency Stop button to the ON position at both the ground and platform controls.
- 2、 Push down the horn button at the platform controls.

Result: The horn should sound.

**NOTICE**

If necessary, the horn can be adjusted to obtain the loudest volume.

**B-19 Test the foot switch**

A properly functioning foot switch is essential to safe machine operation. Machine functions should activate and operate smoothly as long as the foot switch is pressed down, and promptly stop when the foot switch is released. An improperly functioning foot switch can cause an unsafe working condition and endanger platform and ground personnel.

The engine should not start if the foot switch is pressed down

- 1、 Turn the key switch to platform controls and pull out the Emergency Stop button to the “ON” position at both the ground and platform controls.
- 2、 Press down the foot switch and attempt to start the engine by moving the start toggle switch to either side.

Result: the engine should not be started.

- 3、 Do not press down the foot switch and attempt to start the engine.
- 4、 Do not press down the foot switch and operate the machine functions.

Result: the machine functions will not be performed.

- 5、 Press down the foot switch.
- 6、 Press down the functions control joysticks, slide switches and buttons.

Result: all the functions should be normally performed.

## B-20 Test the Engine Idle Select selection.

A properly operating engine idle select switch is essential to good engine performance and safe machine operation.

**Low idle** (turtle symbol) allows operators simultaneously operate boom and/or drive function. This setting maintains a consistent high idle.

**High idle** activated by the foot switch (rabbit symbol) should be used for normal machine operation. This setting activates high idle only when the foot switch is pressed down.

- 1、 Turn the key switch to platform controls
- 2、 Pull out the Emergency Stop button to the “ON” position at both the ground and platform controls.
- 3、 Start the engine from the ground controller.
- 4、 Press the high idle select button (rabbit symbol)

Result: the engine turns to high idle speed.

- 5、 Release high idle button.

Result: Engine turns to low idle speed.

- 6、 Turn key switch to platform control.
- 7、 Hold the function enable toggle switch in the low idle (turtle symbol).

Result: the engine turns to low idle.

- 8、 Press engine idle speed choose button until foot switch activate high idle (rabbit symbol) is chosen.

Result: the engine does not turn to high idle.

9. Press foot switch.

Result: the engine should turn to high idle.

## B-21 Check driving to the Load Position



Proper drive enable system operation is essential to safe machine operation. Drive function should be comply with the operation by operators quickly and smoothly, without hesitation, abnormal and loud noise.

- 1、 Swing key switch to the ground control. Turn the emergency stop button on the platform and ground control to “ON” position.



Result: Light will flash.

- 2、 Press down the function starting and boom down button and hold on for a while then release.

Result: the alarm will sound when pressing down boom down button.

- 3、 Turn the key switch to the platform controller.

Result: light will flash.

- 4、 Press down foot switch and move the boom control handle to boom-down position. Hold on for a while then release.

Result: the alarm should sound when the control handle moves to the boom-down position.

- 5、 Press down foot switch and move drive control handle away from the central. Hold on for a while and release. Move drive control handle away from the central at the opposite position, hold on for a while and release.

Result: the alarm should sound when the control handle away from the central.

## B-22 Test raised or extended position



Proper drive function movement is essential to safe machine operation. The drive function should respond quickly and smoothly to operator control. Drive performance should also be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.

### **NOTICE**

To choose a test area that is firm, level and free of obstructions.

- 1、 Start the engine from the platform controls.
- 2、 Move the engine idle select toggle switch to foot switch activated high idle (rabbit and foot switch symbol).
- 3、 Raise boom until engine rpm switch turns to low idle.

## B-23 Check the fuel tank cap venting systems



Free-breathing fuel tank caps are essential for good machine performance and service life. A dirty or clogged tank cap may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the caps be inspected more often.

**⚠ DANGER**

Engine fuels are combustible. Perform this procedure in an open, well ventilated area away from heaters, sparks, flame and lighted tobacco. Always have an approved fire extinguisher within easy reach.

**NOTICE**

Perform this procedure with the engine off.

- 1、 Remove the cap from the fuel tank.
- 2、 Check for proper venting.

Result: Air passes through the fuel tank cap.

## Procedures C

### C-1 Clean the fuel pump strainer



Cleaning the fuel pump strainer is essential for good engine performance and service life. A dirty or clogged strainer may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions or not operating the machine for extended periods of time may require that the strainer be cleaned more often.

**⚠ DANGER**

Engine fuels are combustible. Perform this procedure in an open, well ventilated area away from heaters, sparks, flame and lighted tobacco. Always have an approved fire extinguisher within easy reach.

**NOTICE**

Perform this procedure with the engine off.

- 1、 Disconnect and plug up the fuel hose between the fuel tank and fuel filter/water separator.
- 2、 Remove the fastener on the engine pivot plate and rotate it away from the machine.
- 3、 Insert standing fastener on engine pivot plate.
- 4、 Find fuel pump.

- 5、 Remove fastener bolt from fuel pump cover and carry down the cover and sealed ring.
- 6、 Carry down trap valve.
- 7、 Use neutral liquid to clean the inner pump carefully.
- 8、 Use neutral liquid to clean trap valve, sealed ring and pump cover.
- 9、 Install the trap valve and sealed ring on pump.

Install the pump cover and screw bolts.

## C-2 Replace the fuel filter element



Replacing the diesel fuel filter element is essential for good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may required that the filter be replaced more often.

### **⚠ DANGER**

Engine fuels are combustible. Perform this procedure in an open, well ventilated area away from heaters, sparks, flame and lighted tobacco. Always have an approved fire extinguisher within easy reach.

### **NOTICE**

Perform this procedure with the engine off. And immediately clean up any fuel that may have spilled during this procedure.

- 1、 Post decal and disconnect and plug up the fuel hose between the connection of fuel tank and fuel filter.
- 2、 Remove the fastener on the engine pivot plate and rotate it away from the machine.
- 3、 Insert standing fastener on engine pivot plate.
- 4、 Find fuel filter and thoroughly clean the outside surfaces of the fuel filter assembly.
- 5、 Remove the element and dispose of properly.
- 6、 Clean the inside surfaces of the filter head and the bottom cover.
- 7、 Lightly lubricate the upper seal and the o-ring with clean diesel fuel and install them into the filter head.
- 8、 Clean up any fuel that may have spilled during this procedure.
- 9、 Install the element.

### C-3 Check the Engine coolant density



Check the engine coolant is essential to good engine performance and service life. Old or dirty coolant may cause the engine to perform poorly and continued use may cause engine damage.

#### **CAUTION**

Beware of hot engine parts and coolant. Contact with hot engine parts and/or coolant may cause severe burns.

#### **NOTICE**

Perform this procedure with platform on horizontal ground.

#### **NOTICE**

Perform this procedure with the engine off.

- 1、 Put on protective clothes and eye wear.
- 2、 Operate engine to make coolant liquid circling in coolant system.
- 3、 Turn off the engine.
- 4、 Make sure that engine is cool to below 60°C.

#### **NOTICE**

Beware of hot coolant. Contact with hot engine parts and/or coolant may cause severe burns.

- 5、 Remove the radiator input cap and check any damage on it. Replace it if necessary.
- 6、 Drain some coolant to suitable container from coolant system.
- 7、 Use professional coolant density gauge to check the temperature and density.
- 8、 Adjust coolant mixture to make engine temperature up to -37°C if necessary.
- 9、 Install the radiator input cap.

### C-4 Check the boom extended / stowed wire rope



#### **NOTICE**

Boom extended/stowed wire rope is used for extend and stow the three booms. Check boom wire rope for any unidentified subjects. Damage and/or adjusting abnormal condition is essential to the safe

and normal machine operation. Boom extend and stow function should be operated steadily and free of hesitation and loud, abnormal noise.

## NOTICE

Operate these procedures with engine off and boom at the load position.

- 1、 Remove the cover plate on the end of the boom.
- 2、 Observe wire rope and other components from:
  - ◆ Worn or broken wire rope bunch.
  - ◆ Crushed wire rope
  - ◆ Rotted
  - ◆ Painting or other subjects on the wire rope
  - ◆ Worn or broken end of the wire rope
  - ◆ All the wire ropes are installed on the pulley
  - ◆ All the wire ropes are tightened properly
  - ◆ Pulley has no damage
  - ◆ No loose fastener
- 3、 Replace wire rope if any damage is found.
- 4、 Install the cover plate on the end of the boom.
- 5、 Start engine from platform.
- 6、 Extend boom for about 0.6m.
- 7、 Stow boom and observe the movements of the second and third section of the boom.

Result: the stowed distance of the second section should not exceed the 1/2 of that of the third section.

## Procedures D

### D-1. Check the boom slide block

The maintenance of boom slide block is very essential for the safety operation of the machine. Each slide block located on the boom surface and forms friction pairs. Inappropriate boom slide block or continued operation with old slide block may lead to parts damage and unsafe operation.

- 1、 Start the engine from the ground controller.

- 2、 Raise the boom to the appropriate working height and shut down the engine.
- 3、 Remove the dust covers of each rear boom.
- 4、 Measure the thickness of each slide block.
- 5、 Replace the slide block if its thickness is less than the required specification.
- 6、 Take off the bolts from the rear boom, and remove the rear cover.
- 7、 Take off all the bolts from the side inspective cover, and remove the slide inspective cover.
- 8、 Measure the thickness of each slide block.
- 9、 Replace the slide block timely if its thickness is less than the required specification.
- 10、 Extend and stow the boom in the whole motion range, and check key parts which may lead to boom stuck.

## D-2. Lubricating the turntable pivoting support and swiveling gear



Annual lubrication for the turntable pivoting support and swiveling gear is very essential for the normal operation of the machine and extension of the working life. Continued operation without proper lubrication for the turntable pivoting support and swiveling gear may lead to parts damage.

- 1、 Take off the bolts from the swiveling gear cover, and remove the cover from the machine.
- 2、 Open the side turntable cover of the ground controller.
- 3、 Find the lubricated joints behind the ground controller box.
- 4、 Spray lubricants to the inside of pivoting support, and rotate the support 10 to 13cm until the whole pivoting support is fully lubricated.
- 5、 Spray lubricants to each wheel of the swiveling gear.
- 6、 Install pivoting support cover.

## D-3. Replace oil in the driving torque hub



Inappropriate oil level in the reducer will lower the work performance of the machine. Continued operation under this situation will lead to damaged parts.

Drive torque hub.

- 1、 Drive the torque hub, and rotary the torque hub to let one lid on the top, while the other located with the top one with a horizontal angle of 90°.
- 2、 Unscrewing the horizontal lid, and check the oil level.

Result: the oil level reaches the end of the plug.

- 3、 Unscrewing the top lid and add oil to make the oil level hold the same horizontal line with the 90°lid bottom.
- 4、 Screw the oil lid.
- 5、 Repeat this program for other drive torque hub.

### **Turntable swiveling torque hub**

#### **NOTICE**

It is located behind the side cover of the turntable ground controller. Implement this program after the cover is removed.

- 1、 Open the side cover of the ground controller.
- 2、 Unscrew lid at the top of the brake device and check oil level.

Result: the oil level reaches the end of the plug.

- 3、 Unscrewing the top lid and add oil to make the oil level hold the same horizontal line with the 90°lid bottom.
- 4、 Screw the lid.

### **D-4. Check the engine belt**



The maintenance for engine is very essential for the normal engine work and working life. The machine cannot work normally with loose or defective engine belt. Continued operation under this situation will lead to parts damage.

#### **▲WARNING**

Do not implement this program when the engine is running. This may cause personal injury.

#### **▲CAUTION**

Pay attention to the heat parts of engine. Severe burns may be caused by touching these parts.

- 1、 Take off the fixed bolts on the engine mounting plate, and rotary the engine mounting plate to depart the engine from the machine.
- 2、 Check the engine belt from

- ◆ crack
  - ◆ wear and tear
  - ◆ brush
  - ◆ breakage
- 3、 Replace the belt immediately if any damage was found.
  - 4、 Check the generator belt from
    - ◆ crack
    - ◆ wear and tear
    - ◆ brush
    - ◆ breakage
  - 5、 Replace the belt immediately if any damage was found.
  - 6、 Rotate the engine mounting plate and turn back the engine.
  - 7、 Screw fixed bolts and lock the engine.

**▲WARNING**

Death or serious injury may be caused if not screw fixed bolts and lock the engine.



## Procedures E

### E-1. Check and replace the hydraulic oil



Checking and replacing hydraulic oil is very essential for normal operation of the machine and working lift. Dirty hydraulic oil and filter may cause malfunctioning. Continued operation under such situation will lead to damaged parts. Frequent replacement of hydraulic oil will be required under very dirty workplace.

#### NOTICE

Implement this program when the boom is stowed and the axle is retracted. The O-ring on the hose and pipe connector must be replaced when the hose and connector is removed.

- 1、 Open the side turntable cover of the ground controller.
- 2、 Close the hydraulic cut-off valve on the oil tank.
- 3、 Take off the oil plug, row the oil to proper container, and check the content manual.
- 4、 Disconnected the wires of horn, take off the fixed bolts, and remove the horn.
- 5、 Disconnect and plug two oil pipes.
- 6、 Disconnect and plug oil pipes of auxiliary power units.
- 7、 Disconnect and plug oil pipes of scavenge oil filter.
- 8、 Unscrew the fixed bolts of hydraulic oil tank.
- 9、 Take off the oil tank.
- 10、 Take off the scavenge oil filter from the hydraulic oil tank.
- 11、 Take off the oil drain filter.
- 12、 Take off the oil absorbing filter and clean it with proper liquid.
- 13、 Clean the inner surface of the oil tank with proper liquid.
- 14、 Install the oil tank on the machine.
- 15、 Screw the fixed bolts on the oil tank.
- 16、 Install the horn and connect wires.
- 17、 Install the pipeline to the scavenge oil filter.

## E-2. Replace or repair the engine cooler



Replacing or repairing the engine cooler is very essential for the normal machine work and working life. Old or dirty cooler may cause malfunctioning. Continued operation under such situation may lead to engine damage. Frequent replacement for coolers are required if it is very dirty.

### **CAUTION**

Pay attention to heat engine parts and coolant. Severe burns may be caused by touching heat engine parts and/ or coolant.

### **NOTICE**

Implement this program when the engine is shut down and cool.

- 1、 Unscrew the fixed bolts on the engine mounting plate, and rotate the mounting plate to move the engine out of the machine.
- 2、 Wear protective overalls and glasses.
- 3、 Disconnect the return hose of the cooler, drain the water in the hose to a proper container. Please refer to the capacity declaration.
- 4、 Remove the water tank cover from the water tank slowly.
- 5、 Open the drain valve and drain the coolant of the water tank to proper container.
- 6、 Close the drain valve after all the coolant drain out.
- 7、 Replace the coolant tubes and tube folders.
- 8、 Add appropriate coolant to the water tank.
- 9、 Add coolant to make the oil tank recover to the required temperature.
- 10、 Clean the overflow of coolant during the implementation of this program.
- 11、 Start the engine from the ground controller and let it run until the engine reaches its operating temperature. Continue to run the engine until the coolant cycle normally in the cooling system.
- 12、 Shut down the engine.
- 13、 Cool the engine.
- 14、 Rotate the engine mounting plat and move it back to the machine.
- 15、 Check the coolant liquid level and add coolant as required.

### E-3. Replace the fuel hose



Maintenance for the fuel hose is very essential for the normal machine work and safety operation. Unsafe operation may be caused if old, broken or leaking fuel hose were not found.

#### **⚠ DANGER**

Engine fuel is flammable and this program must be implementing in an outdoor, ventilated place which is far from the fire source. And a standard fire extinguisher must be ensured to be prepared at your fingertips.

#### **NOTICE**

Clean the overflow of fuel during the implementation of this program.

#### **NOTICE**

Implement this program when the engine is shut down.

- 1、 Open the side turntable cover of the ground controller.
- 2、 Unscrew the fixed bolts of the engine mounting plate and rotate the mounting plate to move the engine out of machine.
- 3、 Disconnect the connector of pipeline and fuel tank at the fuel filter/ water separator and plug the pipe
- 4、 Remove and replace the following fuel hoses and hose folders.

#### **Lovol engine**

- ◆ Pipeline between oil tank and fuel filter/water separator
- ◆ Pipeline between fuel filter/water separator and fuel pump
- ◆ Pipeline between fuel pump and fuel filter

#### **Cummins engine**

- ◆ Pipeline between fuel tank and fuel filter/water separator
- ◆ Pipeline between fuel filter/water separator and fuel pump
- ◆ Pipeline between fuel injector and fuel tank

- 5、 Clean the overflow of fuel during the implementation of this program
- 6、 Install the hose between fuel tank and fuel filter/water separator, and tighten the hose folder.
- 7、 Empty the fuel system and replace fuel filter/water separator filter element.

#### E-4. Move and check wire ropes for boom extended/stowed

### NOTICE

This program is required to implement every 5 years or 5000 hours in SINOBOOM operators' manual. After the first implement of this program the wire ropes are required to be replaced every two years.

The wire ropes of boom extended/stowed is use to extend and stow the 3<sup>rd</sup> boom. It is essential to the normal and safe operation for the machine to periodically move and inspect the wire ropes for boom extended/stowed. It should be operated smoothly, no shaking or loud, abnormal noise.

- 1、 Take down the boom cylinder from the machine.
- 2、 Take down the extended wire ropes from the boom extended cylinder and keep flat on the ground.
- 3、 Observe the boom wire ropes and its parts as follows:
  - ◆ Wear and damage of the wire line
  - ◆ Corrosion
  - ◆ Painting and raw material of the wire ropes
  - ◆ Wire ropes at the end of the regulator
- 4、 Replace the wire ropes if any damage was found.

### NOTICE

The extended wire ropes must be replaced in pairs.

### NOTICE

The chain wheels should be replaced too if the wire rope was replaced.

- 5、 Take down the stowed wire ropes from the boom extended cylinder and keep flat on the ground.
- 6、 Observe the inside wire ropes of the boom and its parts by electric torch as follows:
  - ◆ Wear and damage of the wire line
  - ◆ Corrosion
  - ◆ Painting and raw material of the wire ropes
  - ◆ Wire ropes at the end of the regulator
- 7、 Replace the wire ropes if any damage was found.
- 8、 Install the wire ropes
- 9、 Install the telescopic cylinder with boom.
- 10、 Adjust boom extended/stowed wire ropes.

## Maintenance procedures



### Observe and obey:

- ◆ Maintenance program will be implement by qualified personnel with professional training of machine maintenance.
- ◆ Damaged or malfunctioning machine should be labeled and removed timely.
- ◆ Repair all the damage or malfunction of the machine before operation.

### Before start maintenance:

- ◆ Read, understand and obey the safety rules and operating instructions in the operation manual of GTBZ28.
- ◆ Prepare all the necessary tools and parts.
- ◆ Read each program and annexes. Any behavior of shout-cuts may cause dangerous situation.
- ◆ Please implement the maintenance program of this machine according to the following instructions unless special declaration is provided.

Park the machine on a flat, horizontal surface.

The boom is stowed.

Rotate the turntable with the boom at the end range of the wheel

Lock the turntable with turntable lock pins.

The key switch is on the “OFF” position and takes the key off.

Lock the wheels.

## About this section:

The majority of these programs should be implementing in the specialized maintenance centers. Choose the appropriate maintenance program after the detection of the failure.

### Label illustrations



**Security warning signs**---to indicate the potential personal injury. Comply all the safety tips after this sign to avoid possible personal injury or death.

**⚠ DANGER**

**Red**---to indicate the existence of emergency hazardous situation. It will cause persona death or serious injury if not avoided.

**⚠ WARNING**

**Orange**---to indicate the existence of potential dangerous situation. It will cause personal death or serious injury if not avoided.

**⚠ CAUTION**

**Yellow and with safety warning sign**---to indicate the existence of potential dangerous situation. It will cause minor or moderate personal injury if not avoided.

**CAUTION**

**Yellow and without safety warning sign**---to indicate the existence of potential dangerous situation. It will cause property damage if not avoided.

**NOTICE**

**Green**---to indicate operating or maintenance information.

## 1. Foot switch components

### 1-1 Foot switch

#### How to test footswitch

#### **NOTICE**

Implement this program when the key switch is on the position of "OFF".

- 1、 Disconnect the cable connector of footswitch at the bottom of the platform.
- 2、 Unscrew the mounting bolts of the footswitch shield from the platform.
- 3、 Unscrew the mounting bolts that connected with footswitch and footswitch shield.
- 4、 Remove the cover near the end of footswitch cable from the bottom of footswitch.
- 5、 Detect circuit continuity by Ohmmeter without pressing footswitch.
- 6、 Detect circuit continuity by Ohmmeter with pressing footswitch

## 2. Platform components

### 2-1. Platform

#### How to unload platform

- 1、 Remove footswitch.
- 2、 Support the platform with appropriate support equipment.
- 3、 Find the cables connected with the bottom of controller box. Count the quantity of the cables and remember their locations.
- 4、 Disconnect the cables from the bottom of controller box.
- 5、 Unscrew the fixed bolts of platform controller box. Remove platform controller box and put aside.
- 6、 Unscrew the fixed bolts of platform bracket.
- 7、 Remove the cable for welding. (If equipped.)

#### **⚠WARNING**

Death or serious injury may be caused by touching live circuit. Take off all the rings, watches and jewelry.

- 8、 Unscrew the platform mounting bolts and remove the platform from the machine.

### 2-2. Platform leveling cylinder

Platform leveling cylinder ensures the boom keep horizontal status in the scope of entire movement. The platform keeps the horizontal status relative to the turntable status.

### How to remove the platform leveling cylinder

#### NOTICE

The O-rings of the hose or pipe connector must be removed when unload the hose and pipe connector.

- 1、 Extend the boom until the connecting pin on the end of the platform leveling cylinder can be touched.
- 2、 Raise the boom slightly and put support equipment under the platform.
- 3、 Low the boom until the platform place on the support equipment.

#### NOTICE

Please do not load all the weight of the boom on the support equipment.

- 4、 Label and disconnect the hydraulic hose located on the boom cylinder and plug hose connector.
- 5、 Unscrew the fixed bolts of connecting pin at the tailpiece of the piston rod of platform leveling cylinder. Don't remove the pin.
- 6、 Remove the closing ring but do not remove the pin.
- 7、 Support platform leveling cylinder with appropriate support equipment. Protect piston rod against damage.
- 8、 Remove the connecting pin at the tailpiece of the piston rod with brass hammer.
- 9、 Remove the connecting pin at the end of cylinder with brass hammer.
- 10、 Pull out the platform leveling cylinder from the boom carefully.

### 2-3. Platform revolving solid

Platform revolving solid is used for rotate the platform, the helical gear of hydraulic drive in the range of 160°.

### How to remove the platform revolving solid

#### NOTICE

The O-rings of the hose or pipe connector must be removed when unload the hose and pipe connector.

- 1、 Unload platform. Please refer to 2-1 to check how to unload the platform.
- 2、 Disconnect the socket from the platform angle sensor.
- 3、 Label, disconnect and plug "V1" and "V2" fracture hoses of the platform rotating valve. Plug the pipe connector on the valve table.
- 4、 Unscrew the mounting bolts of the platform valve table. Put the valve table aside.
- 5、 Remove the cover of the platform battery from the wiring box. Do not disconnect



the wires.

- 6、 Remove the wiring box from the platform and put it aside.
- 7、 Remove the welding cable. ( If equipped.)
- 8、 Support the platform and install welded parts but do not apply any support pressure.
- 9、 Unscrew 8 bolts from the welded parts of the platform.
- 10、 Unscrew the center bolts and remove the platform mounting welded parts from the platform revolving solid.
- 11、 Support platform revolving solid and do not apply any support pressure.
- 12、 Support the tailpiece of the piston rod of the platform leveling cylinder. Protect the cylinder piston rod against damage.
- 13、 Unscrew the fixed bolts of the pins from the connecting pin of the tailpiece of the piston rod of platform leveling cylinder and platform revolving solid.
- 14、 Unscrew the two pins with brass hammer and remove platform revolving solid from the machine.

#### **How to drain liquid from the platform revolving solid**

##### **NOTICE**

Do not start the engine. Using auxiliary power during the implementation of this program.

- 1、 Press auxiliary power button and platform right rotation button on the ground controller at the same time until the platform rotate to the rightmost side.
- 2、 Connect a clean hose to the top drain valve. Put the other side of the hose in a container to collect discharging liquid. Fix the container on the boom.
- 3、 Open the drain valve on the top of revolving solid slowly. Do not remove the drain valve from the revolving solid.
- 4、 Press the platform left rotating button until the platform rotate to the leftmost side. Continued to press the button until the air discharged from the drain valve. Then close the drain valve.
- 5、 Connect clean hose to the bottom of drain valve and open the drain valve slowly. Do not remove the drain valve.
- 6、 Press the platform right rotating button until the platform rotate to the rightmost side. Continue to press the button until the air discharge from the drain valve. Then close the drain valve.
- 7、 Remove the hose from the drain valve and clean the overflow of hydraulic oil.
- 8、 Rotate the platform from the left to the right and check the leakage of the drain valve.

- 9、 Clean the oil overflow during the implementation of this program.

### 3. Boom and its components

#### 3-1. Towline

The towline and boom guide rail is for the protection of cable and hose in the movement. The towline can be repaired without unload the cables and hoses. It is necessary to unload the towline for overhaul implementation.

##### How to remove the towline

The O-rings of the hose or pipe connector must be removed when unload the hose and pipe connector.

##### **NOTICE**

Implement this program when the boom is stowed.

- 1、 Unscrew the fixed bolts of towline guide rail and remove the guide rail from the machine..
- 2、 Unload the protective shaft from the hose wiring harness of the boom towline guide rail at the end of the platform.
- 3、 Label, disconnect and plug all the hydraulic hose from the boom towline guide rail to the platform valve table.
- 4、 Label and disconnect the black socket at the bottom of the controller box.
- 5、 Unscrew the fixed bolts of the boom towline guide rail at the side of engine located in the end of platform.
- 6、 Place backstop between towline and guide rail.
- 7、 Bind guide rail, wooden backstop and towline.
- 8、 Unscrew the fixed bolts of the limit switch cover on the top of second jib of the end of platform. Remove limit switch cover.
- 9、 Label and disconnect wire connectors from the proximity and limit switches on the top of second jib of the end of platform.
- 10、 Unscrew the mounting bolts of towline guide rail from the side of ground control at the end of platform.
- 11、 Unload the inner guide rail from the towline guide rail bracket at the side of machine engine.
- 12、 Label, disconnect and plug the hydraulic hose supported on the towline.
- 13、 Unscrew the relax joints

- 14、 Label and disconnect wire connector.
- 15、 Label, disconnect and plug the hose of telescopic cylinder. Plug the hose connector.
- 16、 Remove the mounting bolts of towline from the towline bracket.
- 17、 Remove the side board from the bottom of the towline.
- 18、 Remove the hose and cable cover. Remove the cover.
- 19、 Remove the hose and wire clip.
- 20、 Label and disconnect cable.
- 21、 Pull out the hydraulic hose from the towline guide rail.
- 22、 Place backstop under the towline and towline guide rail bracket
- 23、 Binding guide rail, wooden support and towline.
- 24、 Bind two parts of the towline.
- 25、 Lock the two ends of towline with traveling crane. Lift the towline carefully and place it on the backstop with adequate capacity.

### **3-2. Boom**

#### **How to adjust the clearance between booms**

- 1、 Measure the slide blocks from the upside, side and bottom of the booms.
- 2、 Unscrew the fastening bolts from the dustproof cover at the end of the boom. Remove the dustproof cover.
- 3、 Extend the boom until the slide block can be touched.
- 4、 Loose the fastening bolts of the slide block.
- 5、 Install the mat for the slide blocks at the top and the bottom of the boom until they are very close to the boom.
- 6、 Install the mat for the slide blocks at the two sides of boom until they are very close to the boom.
- 7、 Fastening the mounting bolts.
- 8、 Extend and stow the boom in the whole range. Inspect the key positions which may cause stick.

#### **How to unload the boom**

- 1、 Unload the platform. Please refer to 2-1.
- 2、 Unload the platform revolving solid. Please refer to 2-3.
- 3、 Unload the towline. Please refer to 3-1.

- 4、 Lift the boom up to about 1.2 meters.
- 5、 Tie down the terminal of the cylinder rod of the luffing cylinder with the gallus of the travelling crane.
- 6、 Tie down the platform parts for the support of the end boom with travelling crane of more than 10 tons of capacity.
- 7、 Place wooden support block under the luffing cylinder.
- 8、 Unscrew the fixed pin bolts connected with the luffing cylinder and boom.
- 9、 Lift the boom with travelling crane until the pin roll connected with the luffing cylinder and boom can be unloaded.
- 10、 Low the luffing cylinder carefully and place it on the supported wooden blocks.
- 11、 Low the boom to the horizontal place.
- 12、 Unscrew the bolts of the cover at the end of the boom. Remove the cover.
- 13、 Disconnect the wires and hydraulic hoses used for the telescopic function of the boom.
- 14、 Fasten the end of the boom with a travelling crane of 10 ton capacity as a support, but do not lift it.
- 15、 Unscrew the fixed bolts of pin rolls connected with the turntable and the boom.
- 16、 Unscrew the pin rolls connected with the turntable and boom by soft material.
- 17、 Remove the boom from the machine carefully and place it on the support frame with adequate capacity.

## 4. Engine

### 4-1. Flexible shaft coupling

Flexible shaft coupling connect with engine and pump. It connected with the flywheel of the engine by bolts and there are spline slots in the center of it for the connection of pump.

#### **How to remove the flexible shaft coupling**

- 1、 Disconnect the electric proportional control wire pin plug located on the drive pump.
- 2、 Unload the hose clip of the air filter hose from the air filter.
- 3、 Unscrew the mounting bolts of the air filter. Remove the air filter from the machine.
- 4、 Remove the fuel filter/water separator from the pump mounting plate. Do not disconnect the fuel hose.

- 5、 Remove the pump of fuel filter/water separator and place it on the side.
- 6、 Support the drive pump with adequate support equipment. Remove all the bolts of the pump mounting plate.
- 7、 Withdraw the pump from the engine carefully.
- 8、 Remove the mounting bolts for the flexible shaft coupling, and remove the flexible shaft coupling from the flywheel.

#### **How to install the flexible shaft coupling**

- 1、 Install the flexible shaft coupling connected with spline slots.
- 2、 Spread pine glue on the mounting bolts. Fasten the mounting bolts with 41Nm torque moment.
- 3、 Install the pump and spread pine glue on the mounting bolts. Fasten the mounting bolts with 41Nm torque moment.

#### **4-2. Transfer element for the hydraulic pressure and coolant temperature**

Coolant temperature transfer element is an electrical device. If the temperature of the coolant reach 99℃, then ECM will close the engine to avoid damage and will not start the engine until the temperature of the coolant is lower than 99℃.

Hydraulic pressure transfer element is an electrical device. If the hydraulic pressure is under 0.8bar, then ECM will close the engine to avoid damage.

## **5. Limit Switch**

### **5-1 How to test limit switch**

#### **Mechanically operate the limit switch**

1. Manually activate the limit switch

Result: The limit switch boom can move freely and reset. You can feel and hear obvious ticktack.

2. Use ohmmeter to test the resistance between switch connections, to ensure its continuity.

3. Activate limit switch. Use ohmmeter to test the resistance between switch connections, to ensure its continuity.

#### **Mechanical safe limit switch**

1. Use ohmmeter to test the resistance between switch connections, to ensure its

continuity.

2. Activate the limit switch. Use ohmmeter to test the resistance between switch connections, to ensure its continuity.

### **Approach the limit switch**

1. Use ohmmeter to test the resistance between switch connections, to ensure its continuity.

2. Find the magnetic area which is close to the switch.

3. Place a magnetic metal block 12.7mm in front of the magnetic area which is near to the switch.

4. Use ohmmeter to test the resistance between the switches, to ensure its continuity.

5. Move the magnetic metal 12.7mm away from the magnetic area which is near to the switch.

6. Use ohmmeter to test the resistance between the switches, to ensure its continuity.

## **6. Hydraulic pump**

### **6-1 Functional Pump**

There are three pumps connected with the engine. Among them one variable pump is used for the drive function and the other two rational pump attached on the drive pump for the other functions of the machine.

#### **How to remove the functional pumps**

#### **NOTICE**

O-rings at the end of hose or hose connector must be discharged when remove the hose and hose connector.

- 1、 Close the cut-off valves at the two ends of the hydraulic oil tank.
- 2、 Label, disconnect and plug the hose from the functional pump. Plug the hose connectors of the pump.
- 3、 Support the functional pump with the lift jack.
- 4、 Unscrew the mounting bolts of the pump. Remove the pump carefully.

### **6-2 Drive pump**

The drive pump is a two-way variable pump. The output of the pump was controlled by the electrical displacement controller located on the pump.

#### **How to remove the drive pump**

- 1、 Remove the functional pump. Please refer to “how to remove the functional pump”.
- 2、 Disconnect the connection of electrical displacement controller located on the drive pump.
- 3、 Close the two cut-off valves on the hydraulic oil tank.
- 4、 Label, disconnect, and plug the hydraulic hose from the drive pump. Plug the hydraulic hoses.
- 5、 Support the drive pump with adequate support equipment and remove the mounting bolts of the two drive pumps.
- 6、 Pull out the drive pump carefully until the spline slot of the pump axle off the flexible shaft coupling.
- 7、 Remove the drive pumps from the machine.

## **7. Fuel and hydraulic oil tank**

### **7-1 Fuel tank**

#### **How to remove the fuel tank**

- 1、 Remove the side turntable cover of the engine. Please refer to 5-1, How to remove the fixed turntable cover.
- 2、 Label, disconnect and plug the hoses for the fuel supply and fuel return. Plug the hose connector on the fuel tank.
- 3、 Remove the supply oil cover from the oil tank.
- 4、 Discharge the fuel to the adequate container with manual pump. Check the capacity declaration.
- 5、 Unscrew the fastening bolts of the fixing strap on the fuel tank. Remove the fixing strap from the fuel tank.
- 6、 Support with adequate lift equipment to fixed the fuel tank.
- 7、 Remove the fuel tank from the machine.

### **7-2 Hydraulic oil tank**

#### **How to remove the hydraulic oil tank**

- 1、 Remove the side turntable cover of the engine.
- 2、 Close the two cut-off valves on the hydraulic oil tank.
- 3、 Remove the oil drain plug and discharge all the fuel to the adequate container. Check

the capacity declaration.

- 4、 Unscrew the fastening bolts of the ground control bracket. Remove the ground controller from the machine.
- 5、 Label and disconnect the wires from the horn.
- 6、 Unscrew the fixed bolts of the horn. Remove the horn from the machine.
- 7、 Label, disconnect and plug the oil suction hose attached to the cut-off valves of the hydraulic oil tank.
- 8、 Label, disconnect and plug the oil supply hoses for the auxiliary power unit. Plug the hose connectors on the oil tank.
- 9、 Disconnect and plug the T-type tube union connected with two hoses on the scavenge oil filter. Plug the tube union of the hydraulic oil tank.
- 10、 Remove the fixed bolts of the hydraulic oil tank.
- 11、 Tie two ends of the hydraulic oil tank tightly with the lifting gallus of travelling crane.
- 12、 Remove the hydraulic oil tank from the machine.

## **8. Rotary parts of turntable**

### **8-1 Rotary hydraulic motor and rotary reducer of the turntable**

#### **How to remove the rotary hydraulic motor of the turntable**

- 1、 Lock the turntable with the turntable fixed pin.
- 2、 Remove the fixed turntable cover on the side of the ground controller.
- 3、 Label, disconnect and plug the hydraulic hoses of the turntable.
- 4、 Remove the mounting bolts of the motor/ brake system. Remove the motor from the brake system.

#### **How to remove the turntable rotary reducer**

- 1、 Lock the turntable with turntable fixed pin.
- 2、 Remove the turntable rotary motor. Please refer to “How to remove the turntable rotary hydraulic motor”.
- 3、 Remove the brake system from the rotary reducer and place it on the side.
- 4、 Tie down the rotary reducer with lifting belts of the traveling crane.
- 5、 Unscrew the mounting bolts of the reducer and remove the reducer from the machine.
- 6、 Remove the oil drain plug of the reducer and discharge the oil from the reducer.



### Install rotary reducer

- 7、 Install rotary reducer. Fasten the mounting bolts of reducer with 285Nm torque moment.
- 8、 Install the brake system on the reducer and fasten the mounting bolts with 27Nm torque moment.
- 9、 Install the motor on the brake system and fasten the mounting bolts with 75Nm torque moment.

## 9. Steering components

### 9-1 Steering sensor

Steering sensor is for steering angle measure and transmits information to the ground controller. They are located in the upper portion of each steering connection disk.

**NOTICE** Two people needed for this procedure.

**NOTICE** This procedure must be implemented when the axle stowed.

#### How to test the tyre parallel

1. Start the engine from the platform controller.
2. Press the foot switch and the idle speed button of the engine until high idle speed.

#### Test the tyre

3. Press the steering mode button.
4. Measure the distance from the inner side of the tyre to the outer side of the chassis sideboard. (Both side of the axle should be measured).

**Result:** If this two distance are equal, then the tyre is parallel to the chassis.

**Notice:** If this two distance are not equal or the tyre is not parallel to the chassis, then please adjust the steering sensor. Please refer to “how to adjust steering sensor”.

#### How to test steering sensor

1. Find the sensor on the steering connecting plate.
2. Unscrew the fixed bolt on the steering sensor’s shell, but don’t move it.
3. Turn the shell of the steering sensor clockwise or anticlockwise. Measure the distance from the inner side of the tyre to the outer side of the chassis sideboard. (Both side of the axle should be measured).
4. Repeat the 3<sup>rd</sup> step until the tyre is parallel to the chassis.
5. Screw the fixed bolt of the steering sensor shell.
6. Repeat the 3<sup>rd</sup> step, 4<sup>th</sup> step and 5<sup>th</sup> step to the other steering sensor.

## 9-2 Steering knuckle and torque hub

### How to unload steering knuckle and torque hub

The lubricate axletree fixed on the steering knuckle must be replaced duly. And there is another steering sensor in the upper side of the Steering knuckle.

**NOTICE** The O-ring at the end of hose or hose connector must be unloaded when remove the hose or hose connector.

1. Unload the bolt of the hose bracket; Remove the hose bracket which is installed on the top of the steering knuckle.
2. Label, disconnect and plug the hose on the drive motor and brake device. Plug the hose connector on the drive motor and brake device.
3. Label the place where the steering sensor of the steering knuckle installed.
4. Unload the fixing bolt of the sensor shell, remove the sensor shell carefully.
5. Put the hose and the sensor cable aside together.
6. Loosen the wheel felloe nut but don't move it.
7. Use a capable jack under the active bracket to support, don't lift the machine.
8. Place steel bars under the side wheel felloe which is opposite to the machine.
9. Lift the machine up to 15cm and place steel bars to support the bracket.
10. Move the nut, wheel felloe and tyre.
11. Unload the fixing bolt of the drive motor.
12. Slip the drive motor axle out of the torque hub and move the driving motor from the machine.
13. Unload the orientation pin of the steering fuel tank joint pin axes.
14. Unload the joint pin axes.

## 9-3 Driving motor

### How to unload driving motor

**NOTICE** The O-rings at the end of hose or hose connector must be unloaded when remove the hose and hose connector.

- 1、 Label, disconnect and plug the hydraulic hoses of driving motor. Plug the hose connectors of driving motor.
- 2、 Unload the bolts of the driving motor.
- 3、 Slip the driving motor out of the brake device and torque hub.

## 9-4 Torque hub

### How to unload the torque hub

**NOTICE** The O-ring at the end of hose or hose connector must be unloaded

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when remove the hose or hose connector.

- 1、 Unload the driving motor. Please refer to 9-3 to see how to remove the driving motor.
- 2、 Label, disconnect and plug the hydraulic hoses of the brake device.
- 3、 Loose the bolts of the tires. Do not move them.
- 4、 Place a lift jack with adequate capacity under the telescopic shaft of the driving torque hub. Do not lift the machine from the ground.
- 5、 Place steel bars at the end of the machine with reverse direction.
- 6、 Lift the machine up to 15cm and place steel bars to support the bracket.
- 7、 Unload the bolts of wheels and remove the tire and wheel felloe.
- 8、 Place the second lift jack to support the driving torque hub.
- 9、 Unload the mounting bolts of the drive torque hub and steering knuckle. Remove the drive torque hub from the machine.