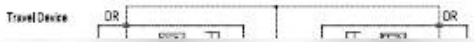
ZAXIS27U-2 HYDRAULIC CIRCUIT DIAGRAM

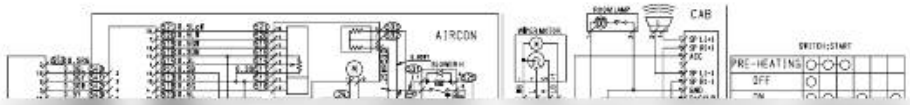


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ZAXIS27U-2 ELECTRICAL CIRCUIT DIAGRAM



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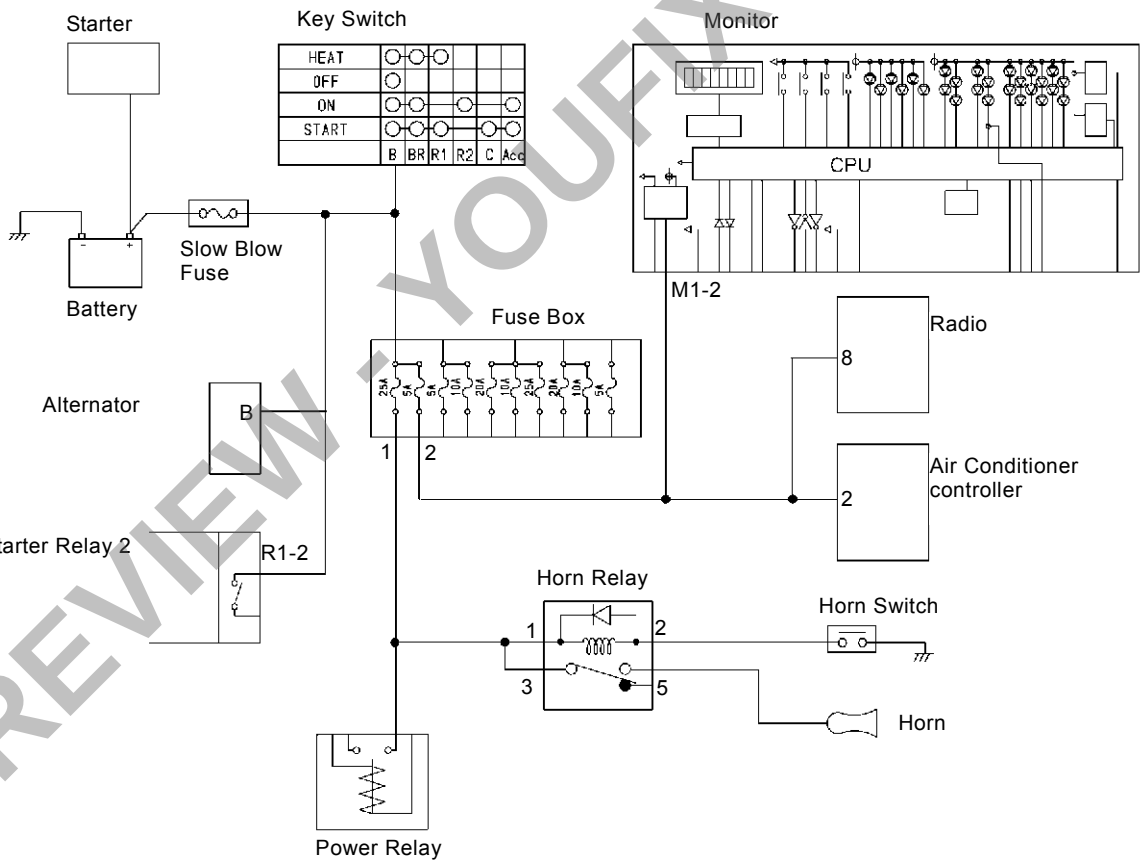
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POWER CIRCUIT (KEY SWITCH: OFF)

The battery negative terminal is grounded to the vehicle frame. When key switch is in OFF position, power is supplied only to the monitor (hour meter) and memory backup circuit.

NOTE: The horn can be honked when key switch is in OFF position.

Battery
- → Slow Blow Fuse
  - → Fuse Box Terminal #1, 2
    - → Monitor Terminal #M1-2
    - → Radio Terminal #8 (only cab-mounted machine)
    - → Air Conditioner Controller Terminal #2 (only cab-mounted machine)
    - → Horn Relay Terminal #1, #3
    - → Power Relay Terminal #2
  - → Key Switch Terminal B
  - → Alternator Terminal B
  - → Starter Relay Terminal R1-2 (only ZAXIS30U-2, 35U-2)
- → Starter Terminal B



T1MJ-02-03-007

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STARTING CIRCUIT (KEY SWITCH: START)

1. When the key switch is turned to the START position, terminal B is connected to terminals BR, R1, C and ACC in the key switch.
2. Current from key switch terminal ACC is supplied to starter relay 2 terminal #4, alternator terminal IG, engine stop solenoid holding side, 1-second timer terminal #3, *engine controller and fuel pump via the fuse box as a power source respectively.
3. When current from key switch terminal ACC is supplied to 1-second timer terminal #3, current from 1-second timer terminal #2 is supplied to 1-second timer terminal #1 via power relay terminals #4-#3 and activates the power relay for 1 second.
4. Consequently, current from fuse #1 is sent to the absorbing side of engine stop solenoid via power relay terminals #2 and #1.
5. Thus, the solenoid moves to the absorbing side and the control rack is activated (the engine is ready to start.)
6. Alternator terminal L is grounded when the alternator is not or slowly rotating. Thus, terminals M1-13 on the monitor are grounded via alternator terminal L and the alternator indicator lights.

NOTE: Current through the absorbing side is blocked one second later. The engine is kept rotating due to current through the solenoid holding side from fuse #9.

7. Current from switch terminal R1 is supplied to the air heater, terminal #M1-12 on the monitor and starter relay 2 terminal R1-2 (only ZAXIS27U-).
8. Current from switch terminal BR is supplied to the pilot shut-off switch via the fuse box.
   The pilot shut-off switch is turned ON by pressing the pilot shut-off lever down, and turned OFF by pulling the pilot shut-off lever up. The pilot shut-off switch must be turned OFF when the engine starts.
9. When the pilot shut-off switch is turned OFF, starter relay 2 is turned ON.
10. When starter relay 2 is turned OFF, the contact between terminals #3 and #4 becomes ON. Current from key switch terminal C is supplied to starter relay 2 terminals #3-#4 through starter relay 2 terminals #3 and #4. Thus, starter relay 2 magnetizes the inside coil, and makes the contact between terminals R1-1 and R1-2 ON.
11. Current from the battery (ZAXIS27U-2: current from key switch terminal R!) is supplied to starter terminal S via starter relay 2 terminals R1-2-R1-1.
12. Current from the battery is supplied to the starter motor via starter terminal B and the contact. Thus, the starter rotates.
13. When the engine is running, the alternator generates electricity. Voltage of alternator terminals P and B increases.
14. Voltage of alternating current in proportion to rotating speed of the alternator is supplied from alternator terminal P to starter relay 2 terminal R2-6. When rotating speed of the alternator reaches 1350 ± 210 min^{-1}, starter relay 2 stops to magnetize the inside coil.
15. Thus, the contact between starter relay 2 terminals R1-1 and R1-2 is turned off. Then, the current to the starter is stopped and the starter stops.

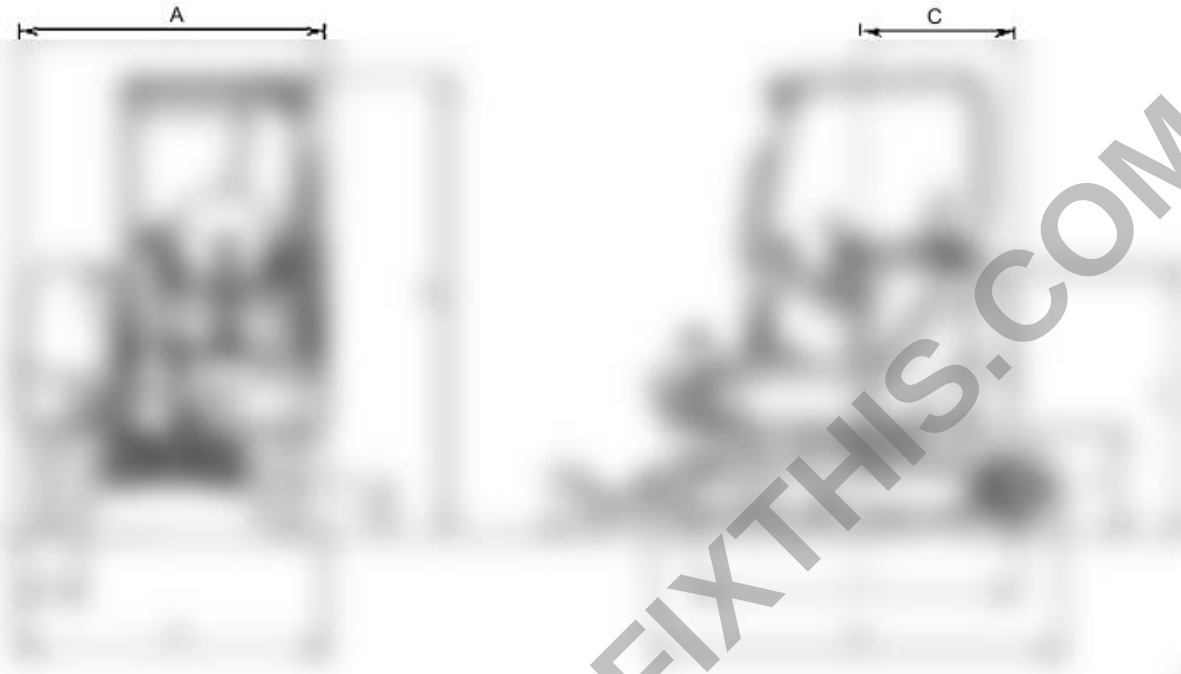
*NOTE: *: Only ZAXIS30U-2, 35U-2*

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SPECIFICATIONS

ZAXIS27U-2



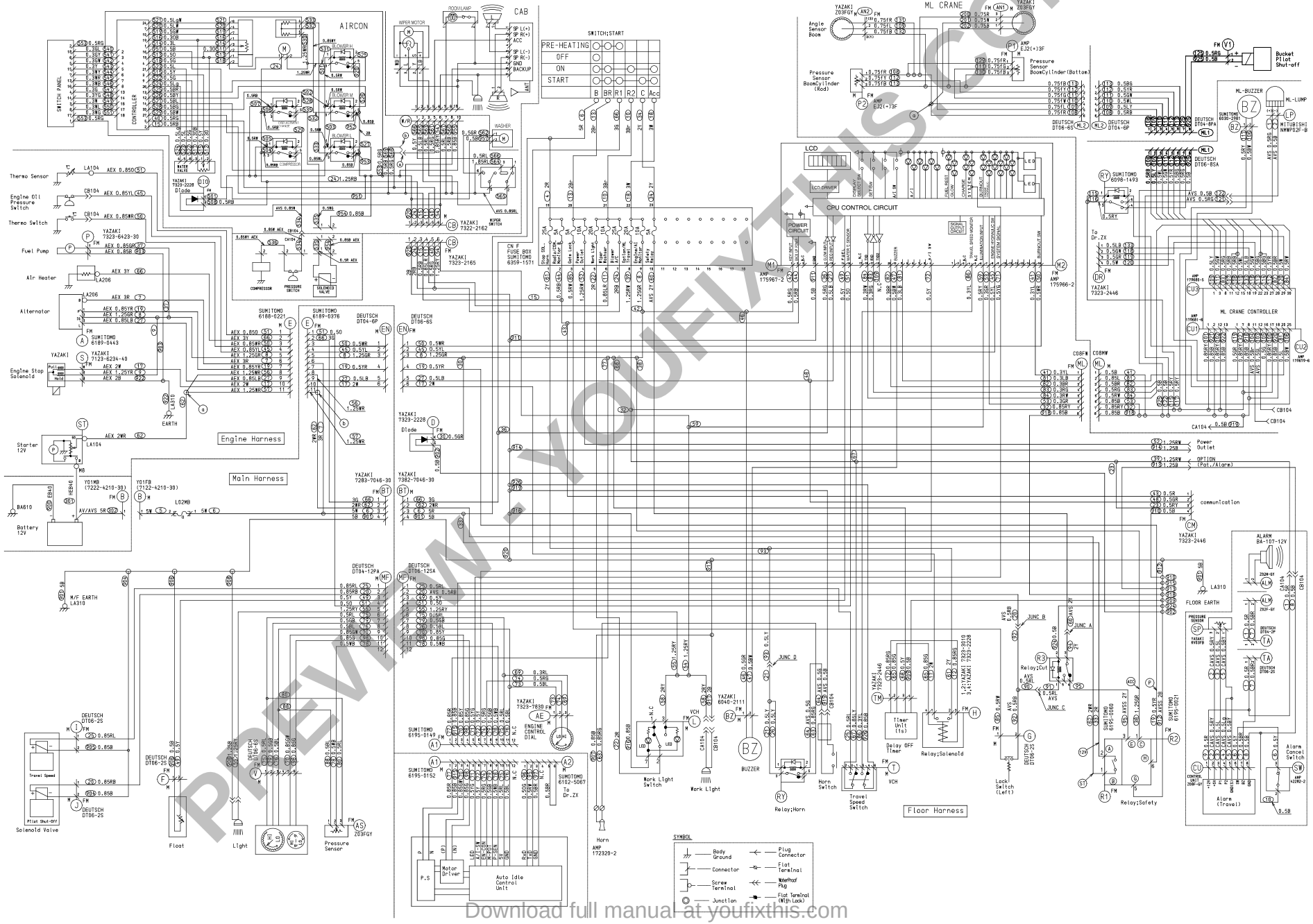
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ML specification is only available Japanese domestic market.

ZAXIS30U-2/35U-2/40U-2/50U-2 ELECTRICAL CIRCUIT DIAGRAM



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PREVENT BURNS

Hot spraying fluids:

- After operation, engine coolant is hot and under pressure. Hot water or steam is contained in the engine, radiator and heater lines.
  Skin contact with escaping hot water or steam can cause severe burns.

  - To prevent possible injury from hot spraying water, stop the engine. Begine to work after the engine and radiator are sufficiently cooled
  - DO NOT remove the radiator cap until the engine is cool. When opening, turn the cap slowly to the stop. Allow all pressure to be release before removing the cap.
  - The hydraulic oil tank is pressurized. Again, be sure to release all pressure by slowly removing the cap.



SA-039

Hot fluids and surfaces:

- Engine oil, gear oil and hydraulic oil also becomes hot during operation.
  The engine, hoses, lines and other parts become hot as well.

  - Wait for the oil and components to cool before starting any maintenance or inspection work.



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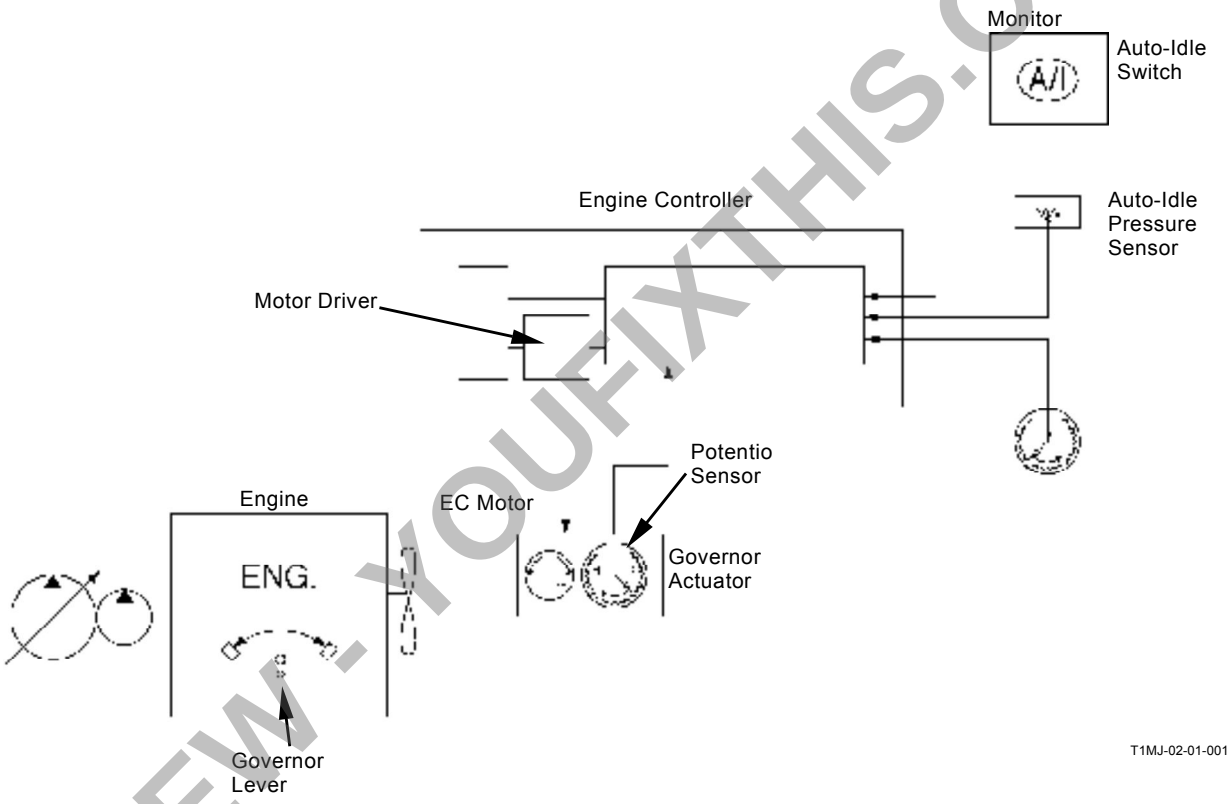
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Engine Control (only ZAXIS 30U-2, 35U-2)

The engine control consists of the following functions.

- Engine Control Dial Control
- Auto-Idle Control

NOTE: The control by using a controller is not equipped for ZAXIS 27U-2.



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- Travel Pilot Valve

Control Lever-In Neutral (Pusher Stroke: A to B)

When the control lever is in neutral, spool (6) blocks pressure oil in port P completely. As the output port is connected to port T through hole (7), pressure in the output port becomes equal to the hydraulic oil tank pressure.

When the control lever is moved slightly, pusher (2) and spring guide (3) move downward together while compressing return spring (5). At this time, as pressure under spool (6) (output port) is equal to the hydraulic oil tank pressure, spool (6) moves downwards by balance spring (4), while the bottom surface of spool (6) head is kept in contact with spring guide (3). This state is maintained until clearance (A) of spool (6) becomes zero.

At Beginning of Decompressing (Pusher Stroke: B to C)

When the control lever is further tilted and hole (7) on spool (6) is opened to port P. Pressure oil in port P flows to the output port through the passage in spool (6) and pressure in the output port increases.

During Metering or Decompressing (Pusher Stroke: C to D)

Oil pressure in the output port acts on the bottom surface of spool (6) so that spool (6) is pushed upward.

Until force acting on spool (6) overcomes balance spring (4) force, balance spring (4) is not compressed. Then, spool (6) is not raised and oil pressure in the output port increases.

If oil pressure in the output port increases further, force to push spool (6) upward increases. When this force overcomes balance spring (4) force, balance spring (4) is compressed so that spool (6) is moved upward.

As spool (6) is moved upward, hole (7) is closed so that pressure oil from port P stops flowing to the output port and pressure oil in the output port stops increasing.

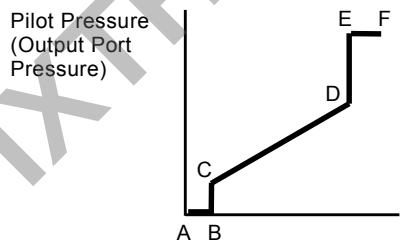
As spool (6) is moved downward, balance spring (4) is compressed and spring force increases. Therefore, oil pressure in the output port becomes equal to the oil pressure acting on spool (6) being balanced in position with the spring force.

Control Lever-Full Stroke (Pusher Stroke: E to F)

When the control lever is moved to full stroke, pusher (2) compresses return spring (5) more and spool (6) is moved downward.

At this time, spool (6) is pushed directly by the bottom of pusher (2). As a result, hole (7) on spool (6) does not close even if pressure in the output port increases.

As a result, pressure in the output port becomes equal to pressure in port P.



Output Diagram

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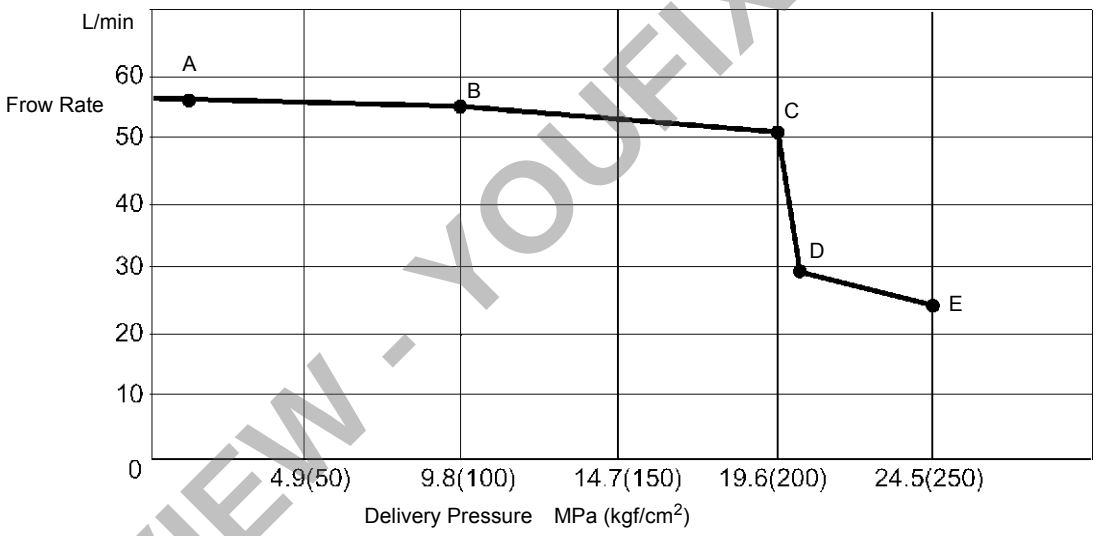
- Auxiliary Section P-Q Control (Torque Control)

  - Rated Pump Speed: 2200 min^{-1} (rpm)
  - Pilot Pump Pressure: 4.1 MPa (42 kgf/cm^2, 593 psi)
  - Hydraulic Oil Temperature 50±5°C (122±41°F)

  - Main Pump P-Q Diagram

  - Air Conditioner: OFF

	Q L/min (US gal/min)	P MPa (kgf/cm^2, psi)
A	56.0 (14.8)	2.0 (20, 291)
B	55.5 (14.6)	9.8 (100, 1425)
C	50.4 (13.3)	19.6 (200, 2850)
D	29.8 (7.9)	20.6 (210, 2995)
E	25.0 (6.6)	24.5 (250, 3562)



T1MF-04-02-002

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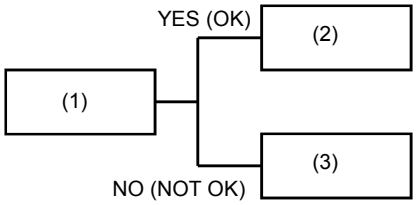
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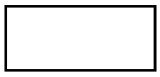
TROUBLESHOOTING C PROCEDURE (DIAGNOSIS OF MONITOR)

This procedure is used when there are malfunction on components regarding monitor, such as gauge or indicators.

- How to Read the Troubleshooting Flow Charts



After checking or measuring item (1), select either Yes (OK) or No (NOT OK) and proceed to item (2) or (3) next.



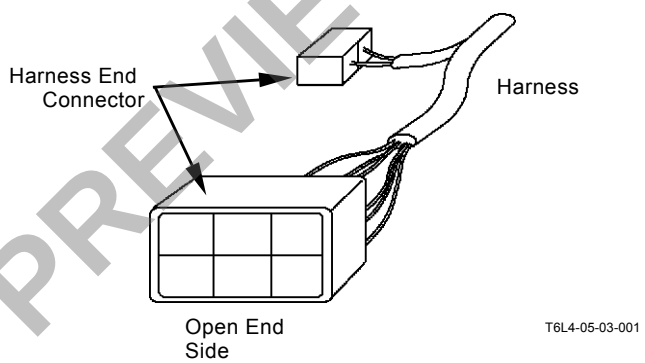
· Key switch: ON

As shown to the left, measuring methods or items to be referred to are indicated in the spaces under the box. Take care to measure or check correctly. Incorrect measuring or checking methods may result in making troubleshooting impossible, and may damage components.



The thick-line box indicates the causes. Scanning through thick-line boxes, possible causes can be focused.

NOTE: The connector drawings show the harness end connectors, seen from the open end side.



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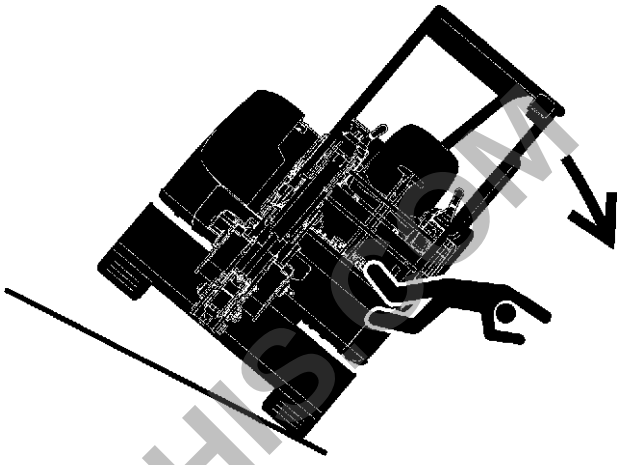
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AVOID TIPPING

- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

To avoid tipping:

- Be extra careful before operating on a grade.
  - Prepare machine operating area flat.
  - Keep the bucket low to the ground and close to the machine.
  - Reduce operating speeds to avoid tipping or slipping.
  - Avoid changing direction when traveling on grades.
  - NEVER attempt to travel across a grade steeper than 15 degrees if crossing the grade is unavoidable.
  - Reduce swing speed as necessary when swinging loads.



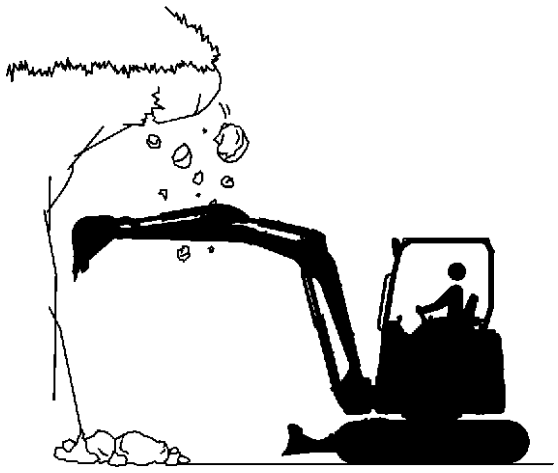
SA-1301

- Be careful when working on frozen ground.
  - Temperature increases will cause the ground to become soft and make ground travel unstable.

025-E01A-0540-4

NEVER UNDERCUT A HIGH BANK

- The edges could collapse or a land slide could occur causing serious injury or death.



SA-1302

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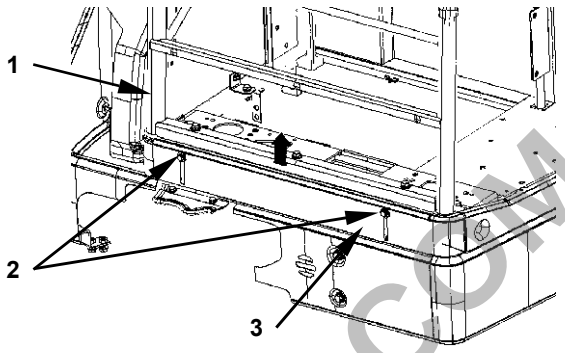
PROCEDURE FOR FLOOR TILTING UP

CAUTION: If tilting up operation is made with the door open, it interferes with the cover (3).

1. Remove two bolts (2), and remove (3) from the canopy or cab (1).
   : 13 mm

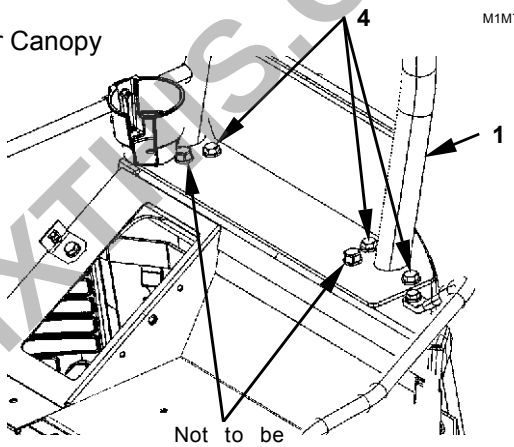
IMPORTANT: Near bolts (4), two bolts for fixing the canopy or cab (1) are fitted. Never remove these two bolts in tilting up operation.
A bolt never to be removed can be identified by the attached cap or red paint.

2. Remove three bolts (4) from the canopy or cab (1).
   : 19 mm



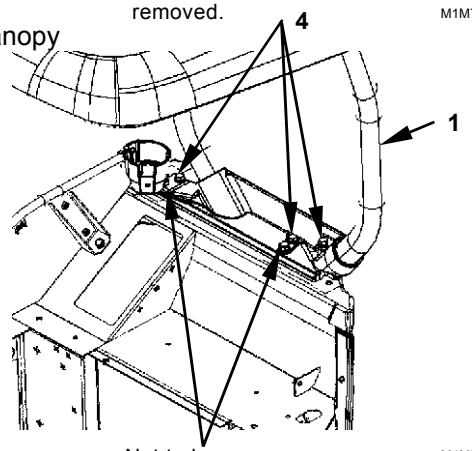
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4-Pillar Canopy



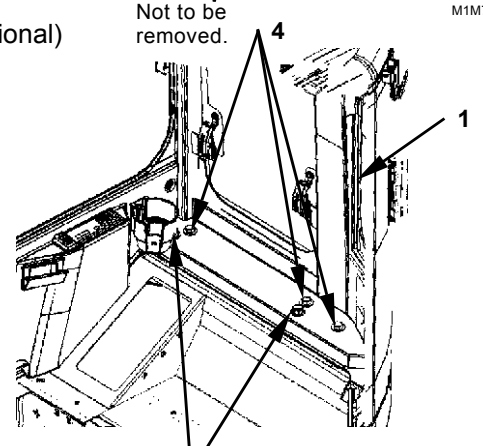
M1M7-07-063

2-Pillar Canopy



M1M7-07-062

Cab (Optional)

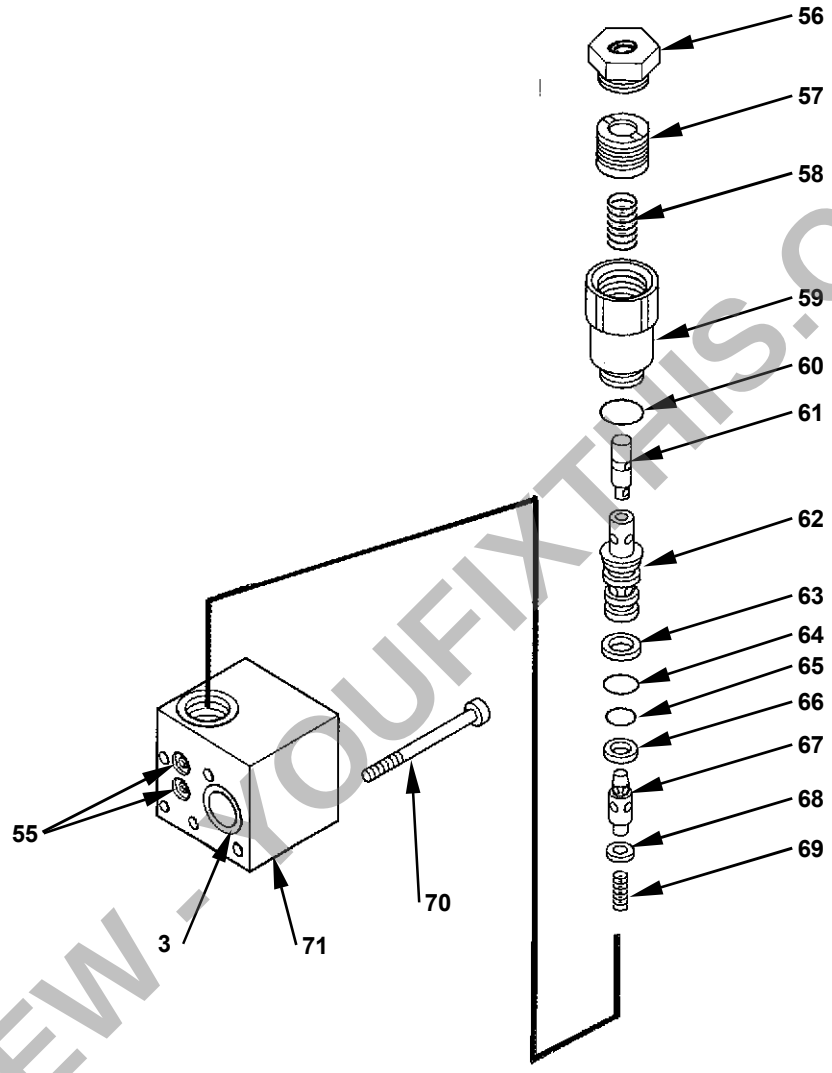


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DISASSEMBLE BOOM ANTI-DRIFT VALVE



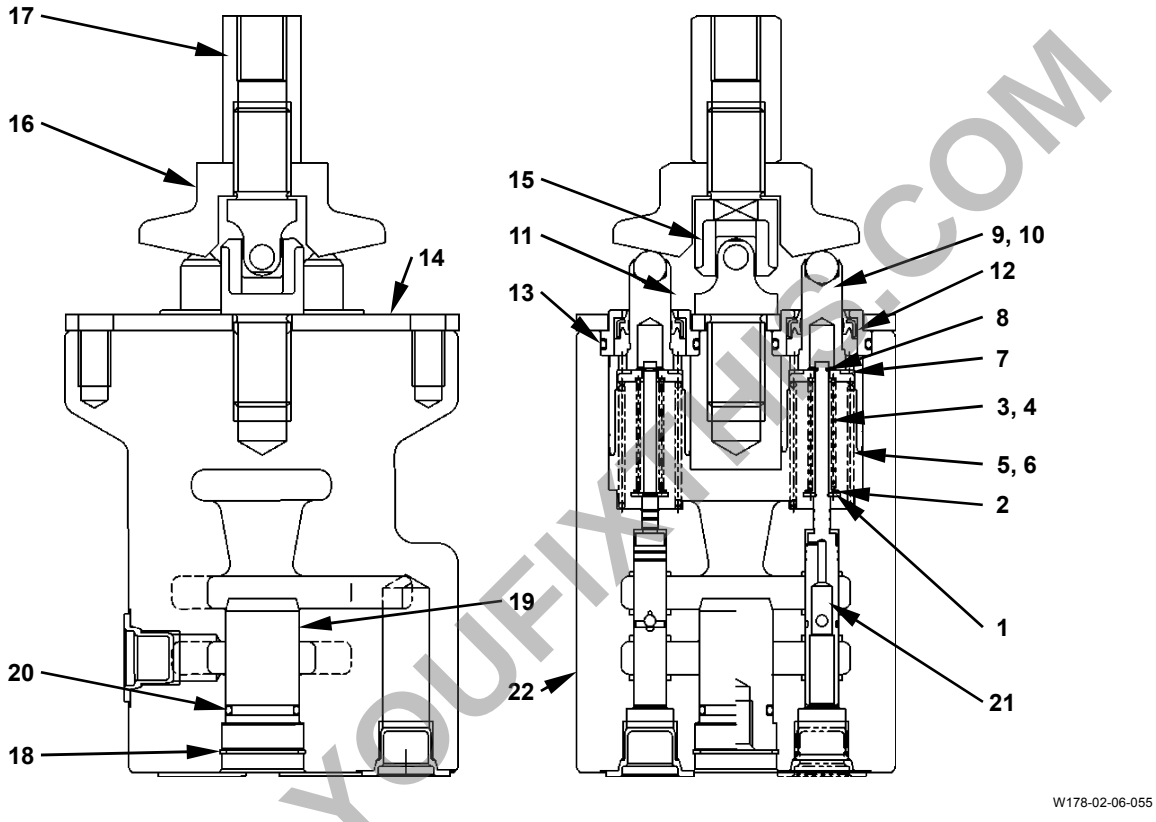
W1LA-02-04-007

3 - O-Ring
55 - O-Ring (2 Used)
56 - Plug
57 - Piston
58 - Spring
59 - Plug
60 - O-Ring
61 - Spool
62 - Sleeve
63 - Backup Ring
64 - O-Ring
65 - O-Ring
66 - Backup Ring
67 - Check Valve
68 - Spring Seat
69 - Spring
70 - Socket Bolt (5 Used)
71 - Body

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ASSEMBLE RIGHT AND LEFT PILOT VALVES

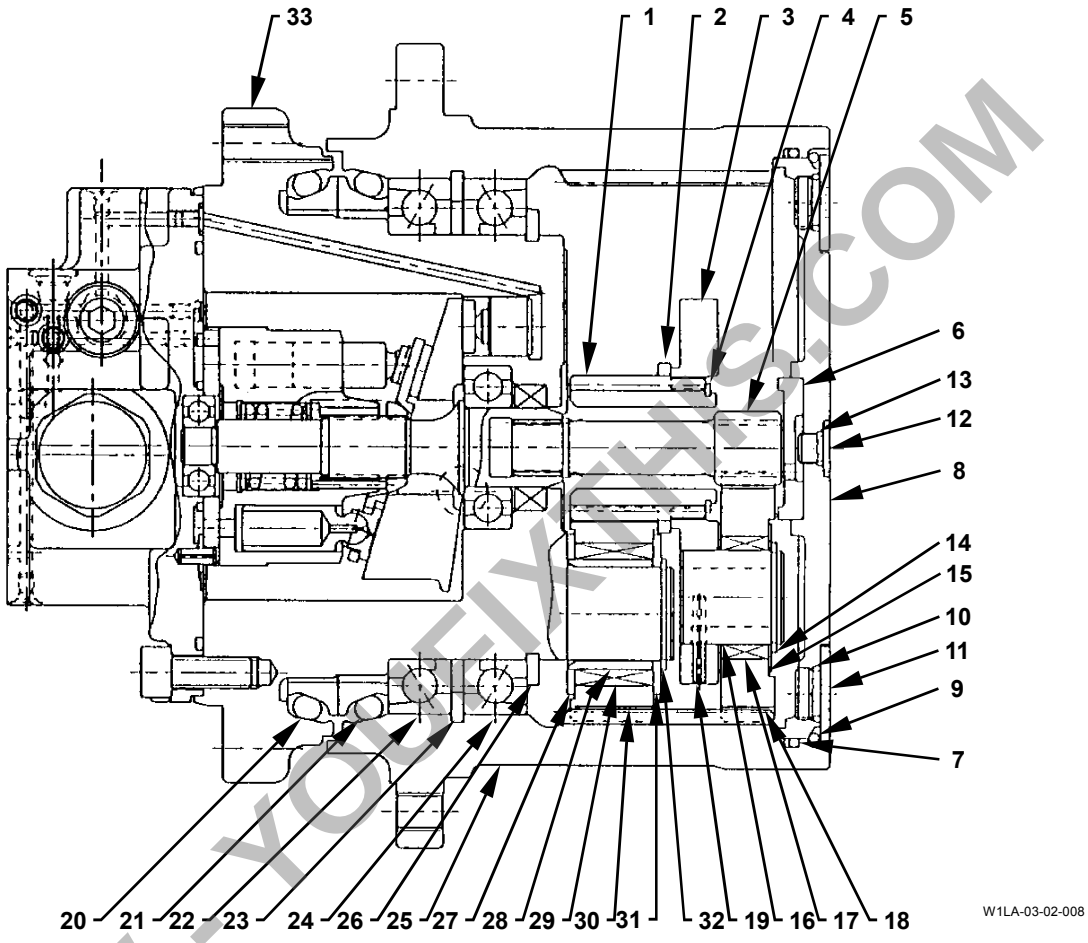


1 - Spacer (4 Used)
2 - Shim (Several)
3 - Balance Spring A (2 Used)
4 - Balance Spring B (2 Used)
5 - Return Spring A (2 Used)
6 - Return Spring B (2 Used)
7 - Spring Guide (4 Used)
8 - Retaining Ring (4 Used)
9 - Pusher A (2 Used)
10 - Pusher B (2 Used)
11 - Oil Seal (4 Used)
12 - Sleeve (4 Used)
13 - O-Ring (4 Used)
14 - Plate
15 - Universal Joint
16 - Cam
17 - Screw Joint
18 - Retaining Ring
19 - Plug
20 - O-Ring
21 - Spool (4 Used)
22 - Casing

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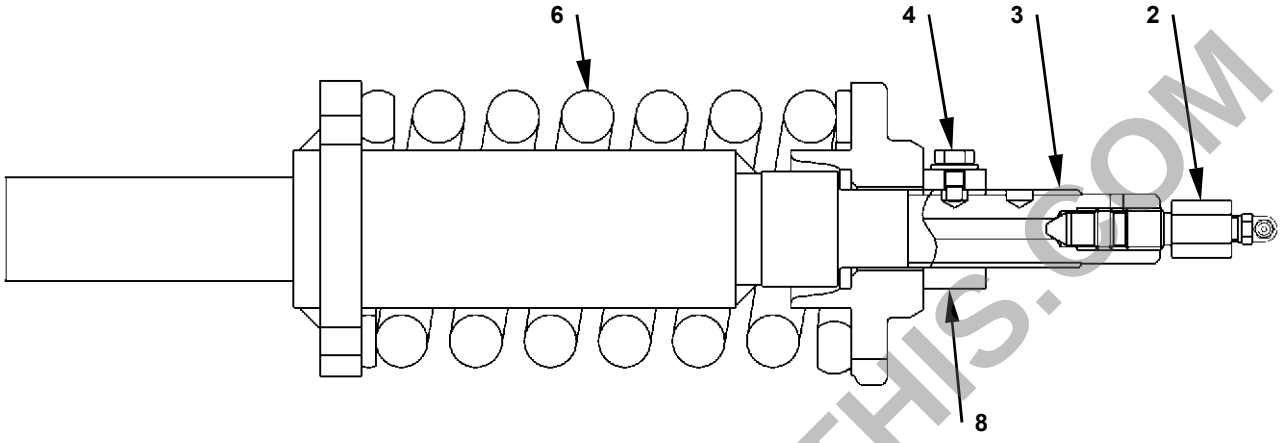
ASSEMBLE TRAVEL DEVICE



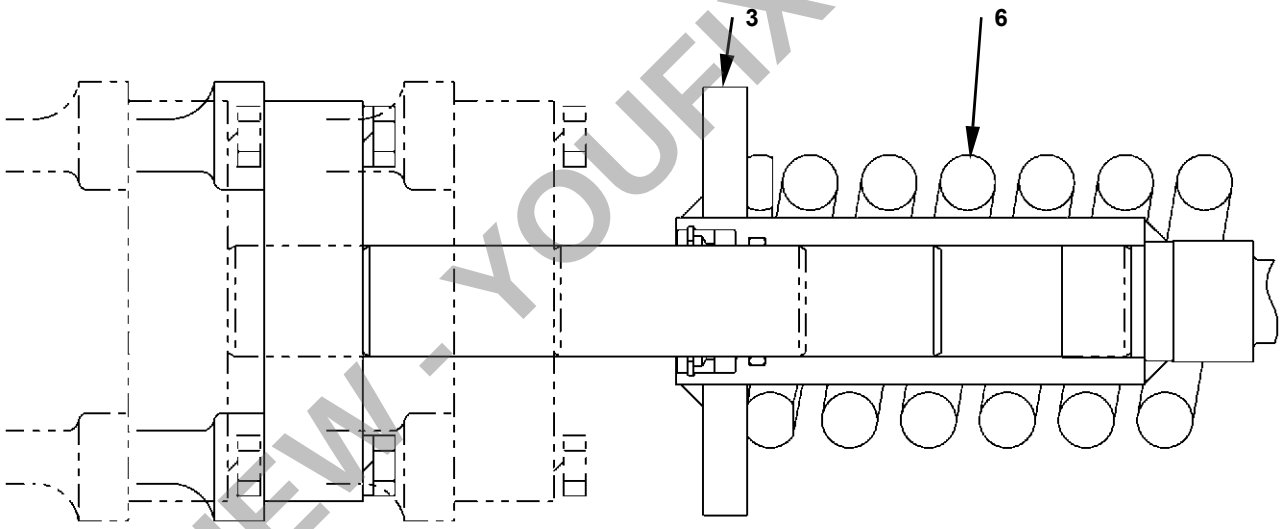
1 - Sun Gear
2 - Thrust Washer
3 - Carrier
4 - Retaining Ring
5 - Drive Gear
6 - Slide Ring
7 - O-Ring
8 - Cover
9 - Stopper Ring
10 - O-Ring (2 Used)
11 - Plug (2 Used)
12 - Plug
13 - O-Ring
14 - Retaining Ring (3 Used)
15 - Thrust Washer (6 Used)
16 - Pin (3 Used)
17 - Needle Bearing (3 Used)
18 - First Stage Planetary Gear (3 Used)
19 - Spring Pin (3 Used)
20 - Floating Seal
21 - Floating Seal
22 - Bearing
23 - Retaining Ring
24 - Bearing
25 - Ring Gear
26 - Retaining Ring
27 - Thrust Washer (4 Used)
28 - Inner Race (4 Used)
29 - Needle Bearing (4 Used)
30 - Second Stage Planetary Gear (4 Used)
31 - Thrust Washer (4 Used)
32 - Retaining Ring (4 Used)
33 - Body

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W1LD-03-04-004



W1LD-03-04-003

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Remove Boom Cylinder

CAUTION: Boom cylinder (3) weight:
ZAXIS27U-2, 30U-2: 32 kg (71 lb)
ZAXIS35U-2: 35 kg (77 lb)

1. Remove bolt (5). Remove cover (4) from boom cylinder (3).
   : 17 mm

2. Attach a nylon sling onto boom cylinder (3). Hold boom cylinder (3). Remove bolt (1). Remove pin (2) by using a bar and hammer.
   : 19 mm, 22 mm

3. Remove the shims from both sides of piston rod boss. Start the engine. Retract the piston rod to the stroke end. Pass a wire through the piston rod boss and secure in order not to extend the piston rod.

4. Remove hoses (9) (2 used) from boom cylinder (3). Attach an identification tag onto the removed hoses for assembling. Cap the open ends.
   : 22 mm

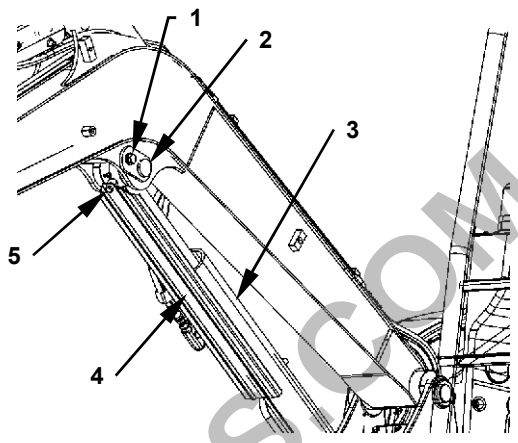
5. Place boom cylinder (3) on a stand.

6. Remove nuts (8) (2 used) and bolt (6) from pin (7).
   : 17 mm

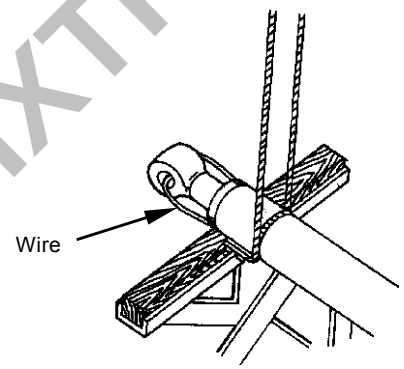
7. Remove pin (7) by using a bar and hammer. Remove the shims from both sides cylinder tube boss.

NOTE: Put the matching marks on swing post (10) and pin (7) for assembling.

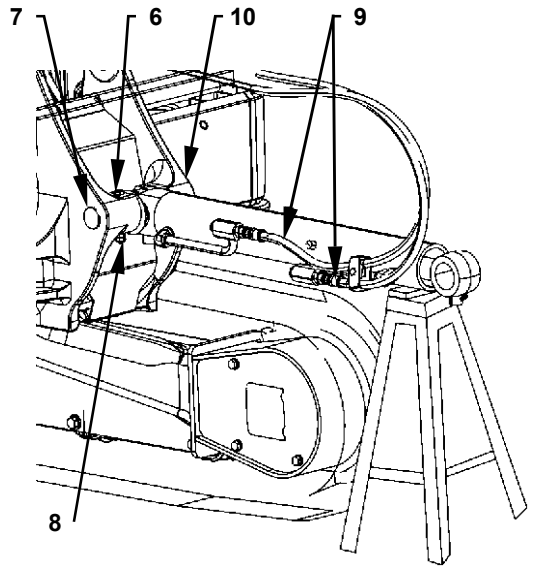
8. Remove boom cylinder (3).



W1MJ-04-02-007



W554-02-03-007



W1MJ-04-02-008

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IMPORTANT:

If the coolant water runs short quickly or when the radiator runs short of water with the Coolant recovery tank level unchanged, water may be leaking or the air tightness may be lost. Increase in the Coolant recovery tank water level during operation is not abnormal.

The increased water in the Coolant recovery tank returns to the radiator when the engine is cooled down.

If the water level is normal in the Coolant recovery tank but low in the radiator, check loosened clamping of the rubber hose between the radiator and Coolant recovery tank or tear in the hose.

Standard

Engine: The radiator shall be filled up.

(Unit: liter)

Model	Coolant water volume In an engine
3TNV82A	1.8
3TNV84 (T) 3TNV88	2.0
4TNV84 (T) 4TNV88	2.7
4TNV94L 4TNV98 (T)	4.2
4TNV106 (T)	6.0

Engine coolant water capacity may differ from the above volume depending on an engine installed on a machine unit.

(5) Fuel pipe and coolant water pipe inspection and maintenance

Check the rubber hoses for fuel and coolant water pipes cracked. If the cracked hose is found, replace it with new one. Check the loosened clamp. If found, tighten it.

(6) Inspection and adjustment of governor lever and accelerator

Make sure the accelerator of the machine unit can be operated smoothly before starting the engine. If it feels heavy to manipulate, lubricate the accelerator cable joints and pivots. Adjust the accelerator cable if there is a dislocation or excessive play between the accelerator and the governor lever. Refer to 3.2.3.

(7) Warning lamp & instruments function check

Before and after starting the engine, check to see that the alarm function normally. Failure of alarm cannot warn the lack of the engine oil or the coolant water. Make it a rule to check the alarm operation before and after starting engine every day. Refer to each manual for machine units in details.

2.2.2 inspection after initial 50 hours operation

Be sure to check the following points after initial 50 hours operation, thereafter every 250 hours or 3 months operation.

No.	Inspection Item
(1)	Lube oil and filter replacement
(2)	V-belt tension check

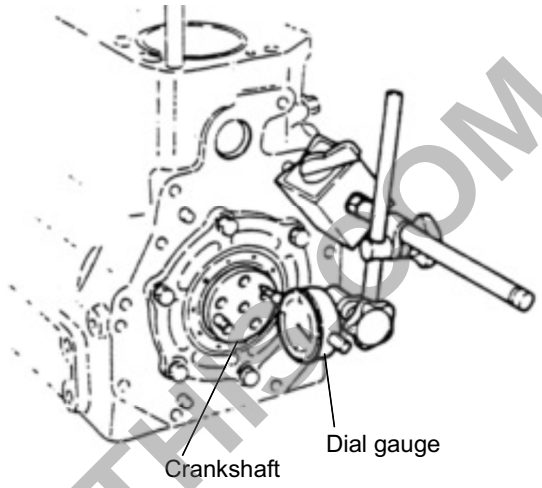
(1) Lube oil and filter replacement (1st time)

⚠ CAUTION

When an engine is still hot, be careful with a splash of engine oil which may cause burns. Replace engine oil after the engine oil becomes warm. It is most effective to drain the engine oil while the engine is still warm.



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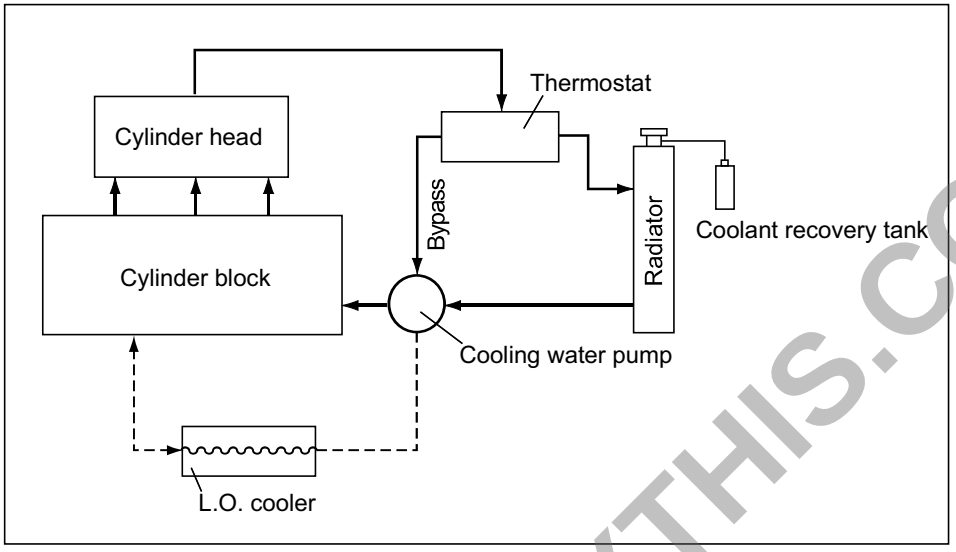
Step	Removal Parts	Remarks
23	1)Remove main bearing cap bolt. While shaking main bearing cap, remove main bearing cap together with lower main bearing metal. 2)Extract crankshaft, taking care not to damage it. 3)Remove upper main bearing metal.	1)Before extracting crankshaft, measure the side gap around it.  Apply a dial gauge to the end of crankshaft. Force the crankshaft on both sides in the axial direction to measure the thrust gap. Alternatively, insert a thickness gauge directly between the base thrust metal and the thrust surface of the crankshaft to measure the gap. If the limit size is exceeded, replace the thrust metal with a new one. Thrust gap (All models) 2)Notice on the removal of thrust metal. a)When removing thrust metal, ascertain the position and direction where thrust metal is installed in relation to the cap. b)Make sure that the thrust metal groove is outward in relation to the cap.
24	1)Remove piston and connecting rod assembly.	1)To selectively remove a desired piston and connecting rod assembly without extracting crankshaft, take the steps itemized below: a)Remove carbon deposits from the upper wall of the cylinder using fine sandpaper, taking care not to damage the inner surface of the cylinder. b)While turning the crankshaft, with the connecting rod cap removed, raise the piston up to the top dead center (TDC). c)Extract the piston/connecting rod assembly while tapping the connecting rod at the large end with the handle of a plastic hammer or the like.
25	2)Remove tappet.	

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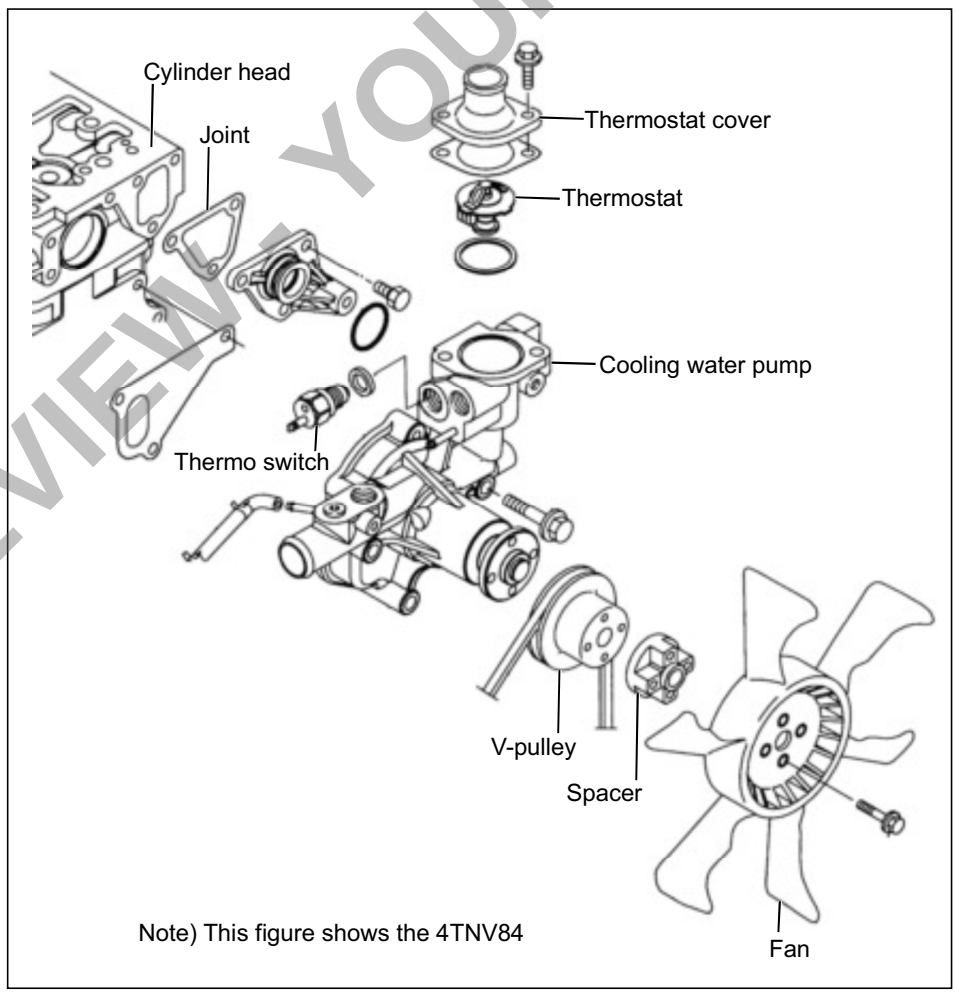
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6. Cooling system

6.1 Cooling water system



6.2 Cooling water pump components



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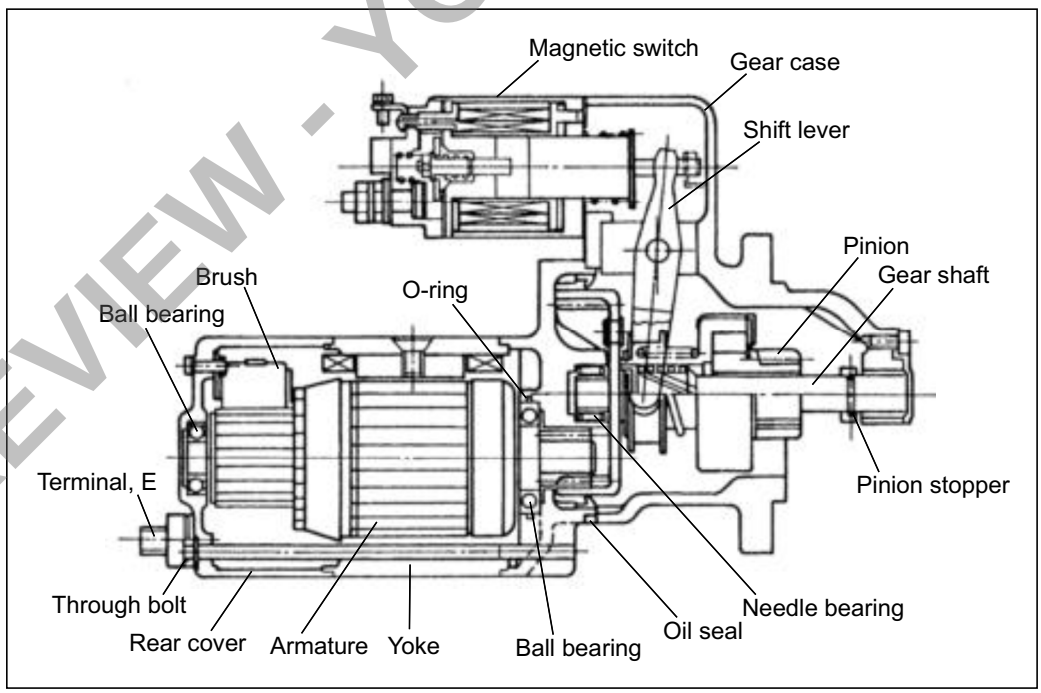
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9.2 For 4TNV106 (T)

9.2.1 Specifications

Manufacturer's model (Hitachi)		-	S13-138
Yanmar code		-	129953-77010
Nominal voltage		V	12
Nominal output		kW	3.0
Rating		Sec	30
Revolution direction (as viewed from pinion)		-	Clockwise
Clutch system		-	Roller clutch
Engagement system		-	Magnetic shift
Pinion: Module/number of teeth		-	M3/9
Weight		kg	7.3
Pinion projection voltage (at 100)		V	8 or less
No-load	Terminal voltage/current	V/A	12/180 or less
	Revolution	rpm	3000 or more
Loaded	Terminal voltage/current	V/A	9/500
	Torque	N•m (kgf•m)	16.7 (1.7) or more
	Revolution	min-1	1270 or more

9.2.2 Congiguration drawing



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