Metric coarse thread standard tightening torque values. Be certain to tighten all capscrews and nuts to proper torque values

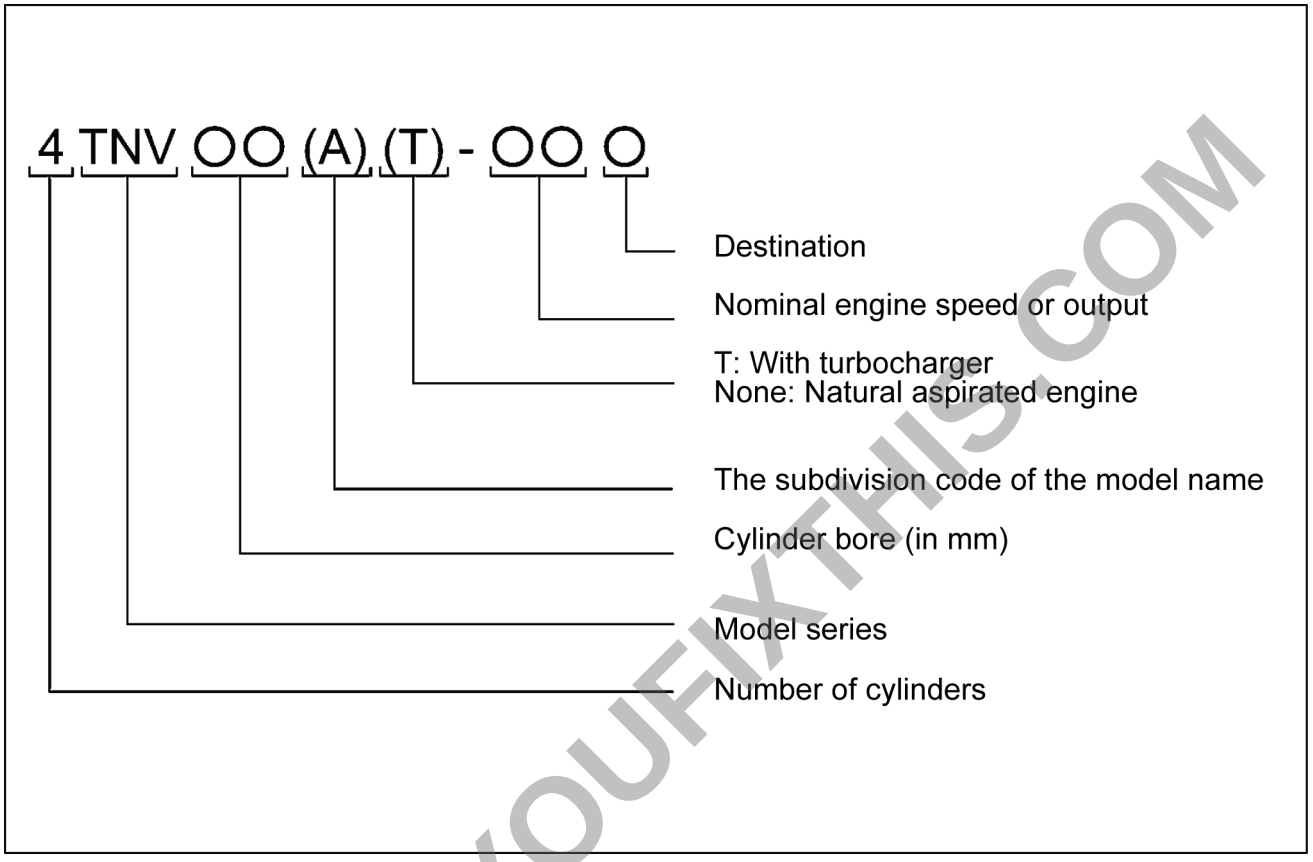
Classification	4.8T		7T		10.9T	
Nominal dimension	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6 x 1	3.9 - 4.9 N·m (2.88 - 3.61 lb ft)	3.3 - 4.1 N·m (2.43 - 3.02 lb ft)	8.6 - 10.6 N·m (6.34 - 7.82 lb ft)	7.3 - 8.9 N·m (5.38 - 6.56 lb ft)	15.6 - 19.2 N·m (11.51 - 14.16 lb ft)	13.2 - 16.2 N·m (9.74 - 11.95 lb ft)
M8 x 1.25	9.6 - 11.8 N·m (7.08 - 8.70 lb ft)	8.1 - 9.9 N·m (5.97 - 7.30 lb ft)	21.5 - 25.5 N·m (15.86 - 18.81 lb ft)	17.6 - 21.6 N·m (12.98 - 15.93 lb ft)	38.3 - 46.1 N·m (28.25 - 34.00 lb ft)	31.4 - 39.2 N·m (23.16 - 28.91 lb ft)
M10 x 1.5	19.6 - 23.6 N·m (14.46 - 17.41 lb ft)	16.1 - 19.7 N·m (11.87 - 14.53 lb ft)	41.2 - 51 N·m (30.39 - 37.62 lb ft)	35.3 - 43.1 N·m (26.04 - 31.79 lb ft)	74.6 - 92.2 N·m (55.02 - 68.00 lb ft)	63.7 - 77.5 N·m (46.98 - 57.16 lb ft)
M12 x 1.75	32.4 - 40.2 N·m (23.90 - 29.65 lb ft)	28.5 - 34.3 N·m (21.02 - 25.30 lb ft)	71.6 - 87.2 N·m (52.81 - 64.32 lb ft)	59.8 - 73.6 N·m (44.11 - 54.28 lb ft)	128 - 158 N·m (94.41 - 116.53 lb ft)	109 - 133 N·m (80.39 - 98.10 lb ft)
M14 x 2	52 - 63.8 N·m (38.35 - 47.06 lb ft)	44.1 - 53.9 N·m (32.53 - 39.75 lb ft)	113 - 139 N·m (83.34 - 102.52 lb ft)	96 - 116 N·m (70.81 - 85.56 lb ft)	206 - 246 N·m (151.94 - 181.44 lb ft)	172 - 210 N·m (126.86 - 154.89 lb ft)
M16 x 2	79.5 - 97.1 N·m (58.64 - 71.62 lb ft)	67.6 - 81.4 N·m (49.86 - 60.04 lb ft)	171 - 211 N·m (126.12 - 155.63 lb ft)	145 - 177 N·m (106.95 - 130.55 lb ft)	304 - 382 N·m (224.22 - 281.75 lb ft)	255 - 313 N·m (188.08 - 230.86 lb ft)
M18 x 2.5	110 - 134 N·m (81.13 - 98.83 lb ft)	93 - 113 N·m (68.59 - 83.34 lb ft)	236 - 294 N·m (174.06 - 216.84 lb ft)	206 - 246 N·m (151.94 - 181.44 lb ft)	432 - 530 N·m (318.63 - 390.91 lb ft)	363 - 441 N·m (267.74 - 325.26 lb ft)
M20 x 2.5	155 - 189 N·m (114.32 - 139.40 lb ft)	130 - 158 N·m (95.88 - 116.53 lb ft)	334 - 412 N·m (246.35 - 303.88 lb ft)	285 - 343 N·m (210.21 - 252.984 lb ft)	598 - 736 N·m (441.06 - 542.846 lb ft)	500 - 618 N·m (368.78 - 455.813 lb ft)
M22 x 2.5	206 - 246 N·m (151.94 - 181.44 lb ft)	172 - 212 N·m (126.86 - 156.36 lb ft)	451 - 549 N·m (332.64 - 404.92 lb ft)	383 - 461 N·m (282.49 - 340.02 lb ft)	814 - 990 N·m (600.38 - 730.19 lb ft)	677 - 833 N·m (499.33 - 614.39 lb ft)
M24 x 3	265 - 323 N·m (195.45 - 238.23 lb ft)	206 - 264 N·m (151.94 - 194.72 lb ft)	568 - 706 N·m (418.94 - 520.72 lb ft)	471 - 569 N·m (347.39 - 419.67 lb ft)	1042 - 1278 N·m (768.54 - 942.60 lb ft)	843 - 1039 N·m (621.76 - 766.33 lb ft)
M27 x 3	392 - 470 N·m (289.12 - 346.65 lb ft)	314 - 392 N·m (231.59 - 289.12 lb ft)	843 - 1039 N·m (621.76 - 766.33 lb ft)	687 - 843 N·m (506.71 - 621.76 lb ft)	1533 - 1867 N·m (1130.68 - 1377.03 lb ft)	1233 - 1507 N·m (909.41 - 1111.51 lb ft)
M30 x 3.5	529 - 647 N·m (390.17 - 477.2 lb ft)	441 - 539 N·m (325.26 - 397.55 lb ft)	1158 - 1412 N·m (854.10 - 1041.44 lb ft)	971 - 1187 N·m (716.17 - 875.49 lb ft)	2065 - 2535 N·m (1523.07 - 1869.72 lb ft)	1744 - 2136 N·m (1286.31 - 1575.43 lb ft)
M33 x 3.5	716 - 872 N·m (528.09 - 643.20 lb ft)	598 - 736 N·m (441.06 - 542.85 lb ft)	1549 - 1903 N·m (1142.48 - 1403.58 lb ft)	1304 - 1598 N·m (961.78 - 1178.62 lb ft)	2796 - 3424 N·m (2062.22 - 2525.41 lb ft)	2345 - 2875 N·m (1729.58 - 2120.49 lb ft)
M36 x 4	932 - 1128 N·m (687.41 - 831.97 lb ft)	775 - 951 N·m (571.61 - 701.42 lb ft)	2000 - 2452 N·m (1475.12 - 1808.5 lb ft)	1677 - 2049 N·m (1236.89 - 1511.26 lb ft)	3608 - 4412 N·m (2661.12 - 3254.12 lb ft)	3027 - 3693 N·m (2232.60 - 2723.82 lb ft)

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Engine - General specification

Engine nomenclature



TULI12EXN4778FA 1

Engine specification class

Classification	Load	Engine speed	Available engine speed
CL	Constant load	Constant speed	**1500 - 1800 RPM**
VL	Variable load	Variable speed	**2000 - 3000 RPM**

* The engine specification class (CL or VL) is described in the specifications table.

Engine specification

1. The information described in the engine specifications tables (the next page and after) is for standard engine. To obtain the information about the engine installed in each machine, refer to the manual provided by the Manufacturer.
2. Engine rating conditions are as follows (**SAE J1349**, **ISO 3046/1**)

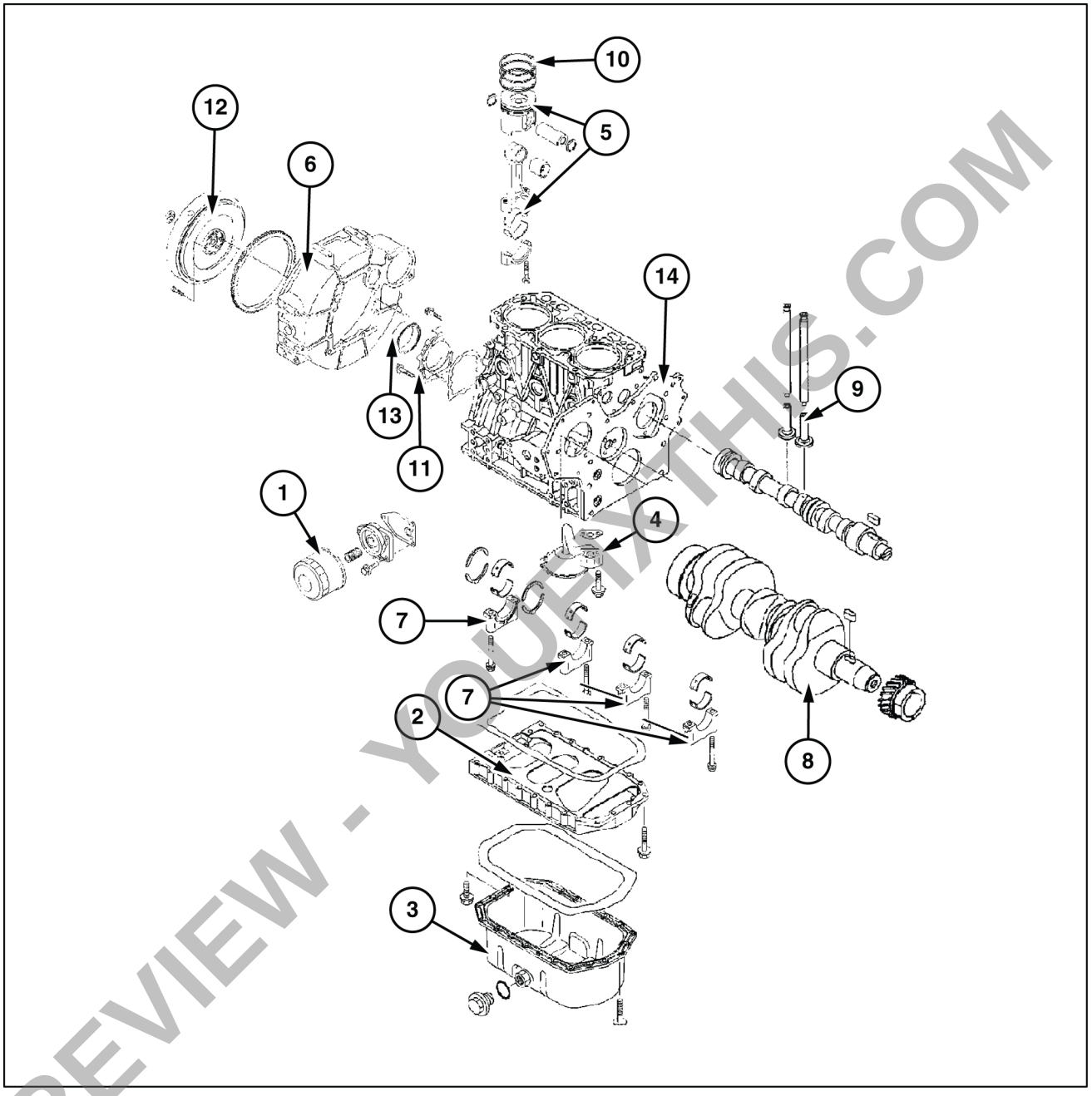
- Atmospheric condition: Ambient temperature **25 °C** (**77 °F**), atmospheric pressure **100 kPa** (**1 bar**), relative humidity 30%
- Fuel temperature: **25 °C** (**77 °F**) (fuel injection pump inlet)
- With cooling fan, air cleaner, exhaust silencer (**Yanmar** standard part)
- After running-in hours. Output allowable deviation: ± **3 %**

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Pan and covers - Component identification

NOTE: *This figure shows the* ***3TNV84****.*



TULI12EXN5012GB 1

1. Oil screen
2. Oil pan spacer
3. Oil pan
4. Oil suction pipe
5. Piston and connecting rod
6. Flywheel housing
7. Bearing cap
8. Crankshaft
9. Tappet
10. Piston ring
11. Oil seal case
12. Flywheel
13. Oil seal
14. Gear case flange

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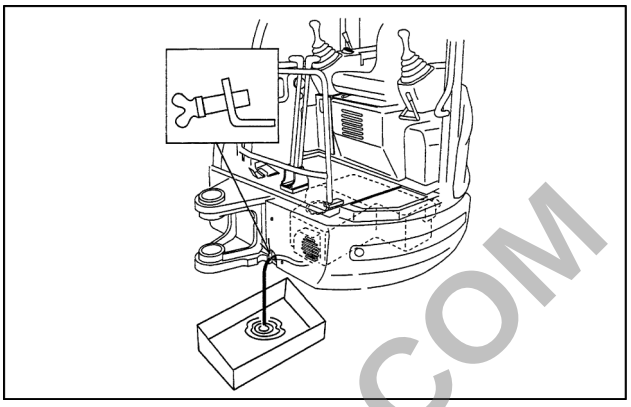
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Fuel tanks - Remove

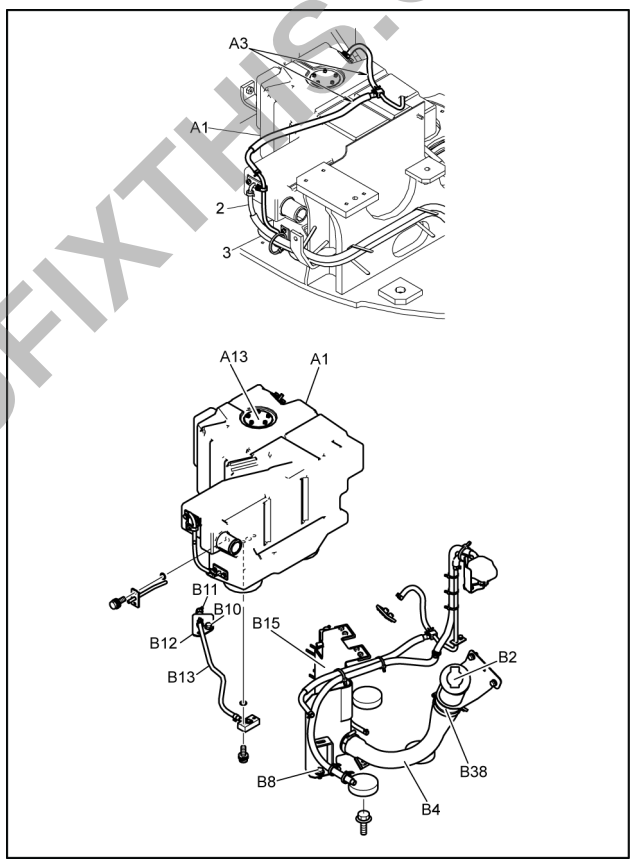
1. Open the fuel filler cap **(B2)** and loosen the drain cock **(B11)** to drain fuel.
   Tank capacity: **28 l** (**7.40 US gal**)
2. Disconnect the hoses **(2)** and **(3)** for the fuel inlet and outlet, the hose **(B4)** for the fuel supply port, and two air bleed hoses **(A3)**.
3. Loosen the **M10 x 20** sems-bolt **(B10)** to remove the flange **(B12)** together with the drain hose **(B13)**.

   : **17 mm**
4. Disconnect connector **(A13)** for the level sensor.
5. Remove two **M10 x 20** capscrews **(B8)**.

   : **17 mm**
6. Remove the fuel tank **(A1)** together with the bracket assembly **(B15)**.



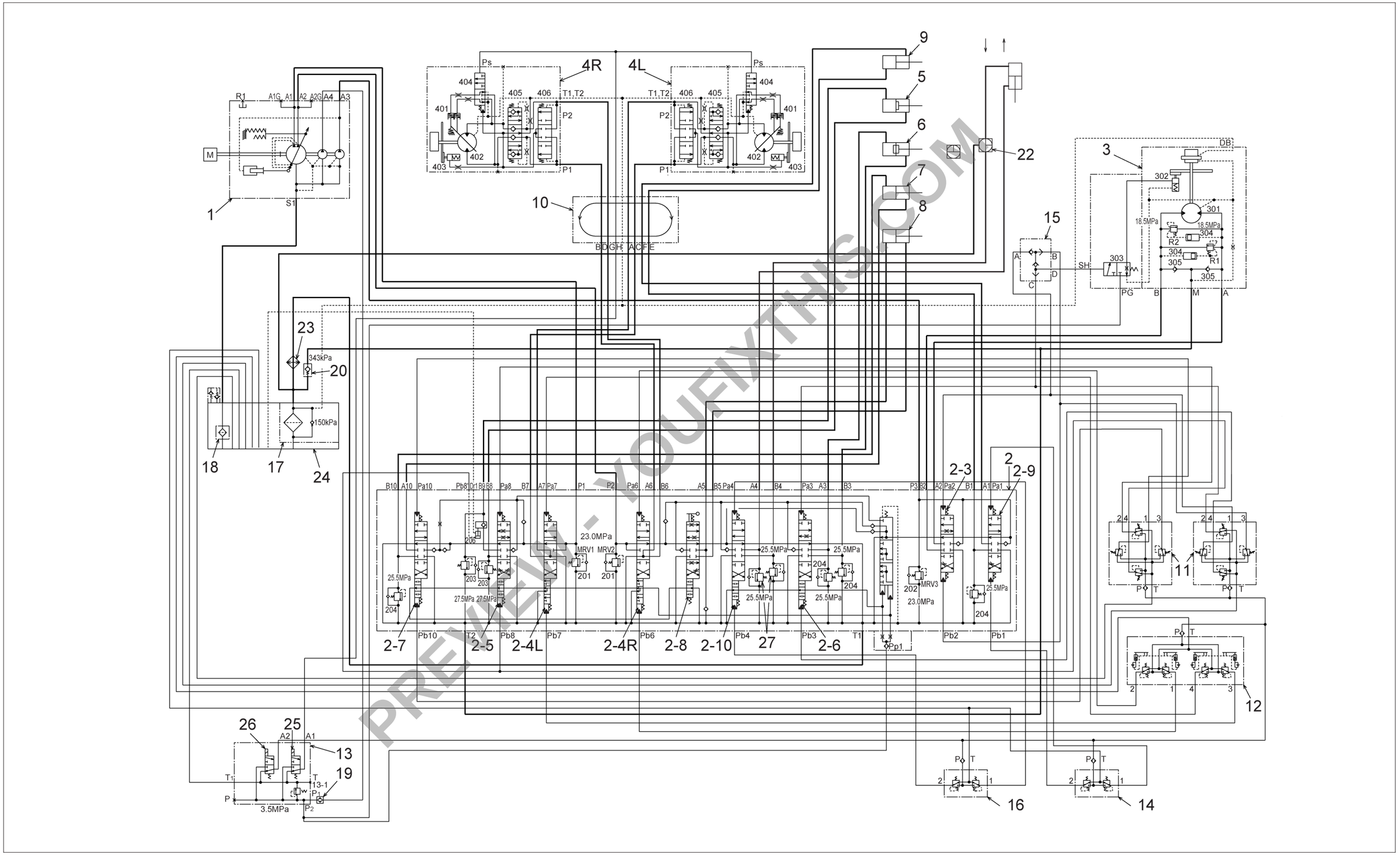
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TULI12EXN6307BA 2

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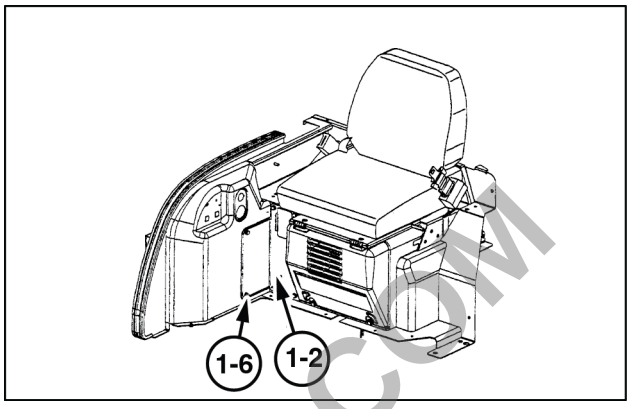
SMIL13MEX0277JB 1

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Oil reservoir - Prepare

1. Swing approximately 90° to the right to facilitate to remove the tank.
2. Unlock and open the right upper cover.
3. Remove the right lower cover.
4. Remove the floor cover.
5. Remove the inspection cover **(1-2)** of the control stand. Six **M8 x 20** sems-bolts **(1-6)**

   : **13 mm**



TULI12EXN4932AB 1

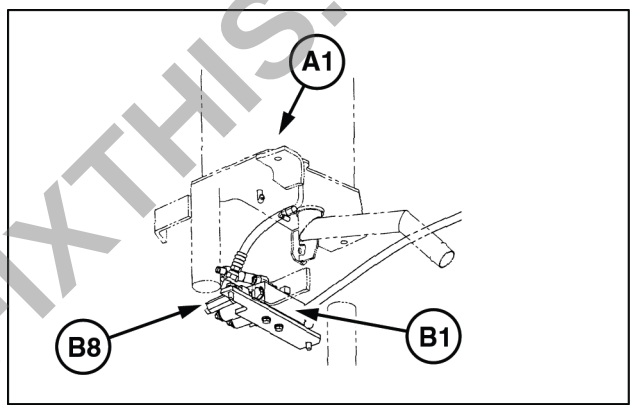
6. After releasing internal pressure of the hydraulic oil tank **(A1)**, remove the plug **(B8)** below the solenoid valve **(B1)** to drain hydraulic oil.

   : **22 mm**

   Tank capacity: **20 l** (**5.3 US gal**)

   - Spread a vinyl sheet under the solenoid valve to prevent contamination around the valve due to oil leakage.
   - Releasing tank pressure. Press the cap boot of breather assembly **(A15)** (see **Oil reservoir - Remove (35.300)**) with a finger to release the internal pressure.

NOTE: *Press and hold the boot until air-relieving sound stops.*



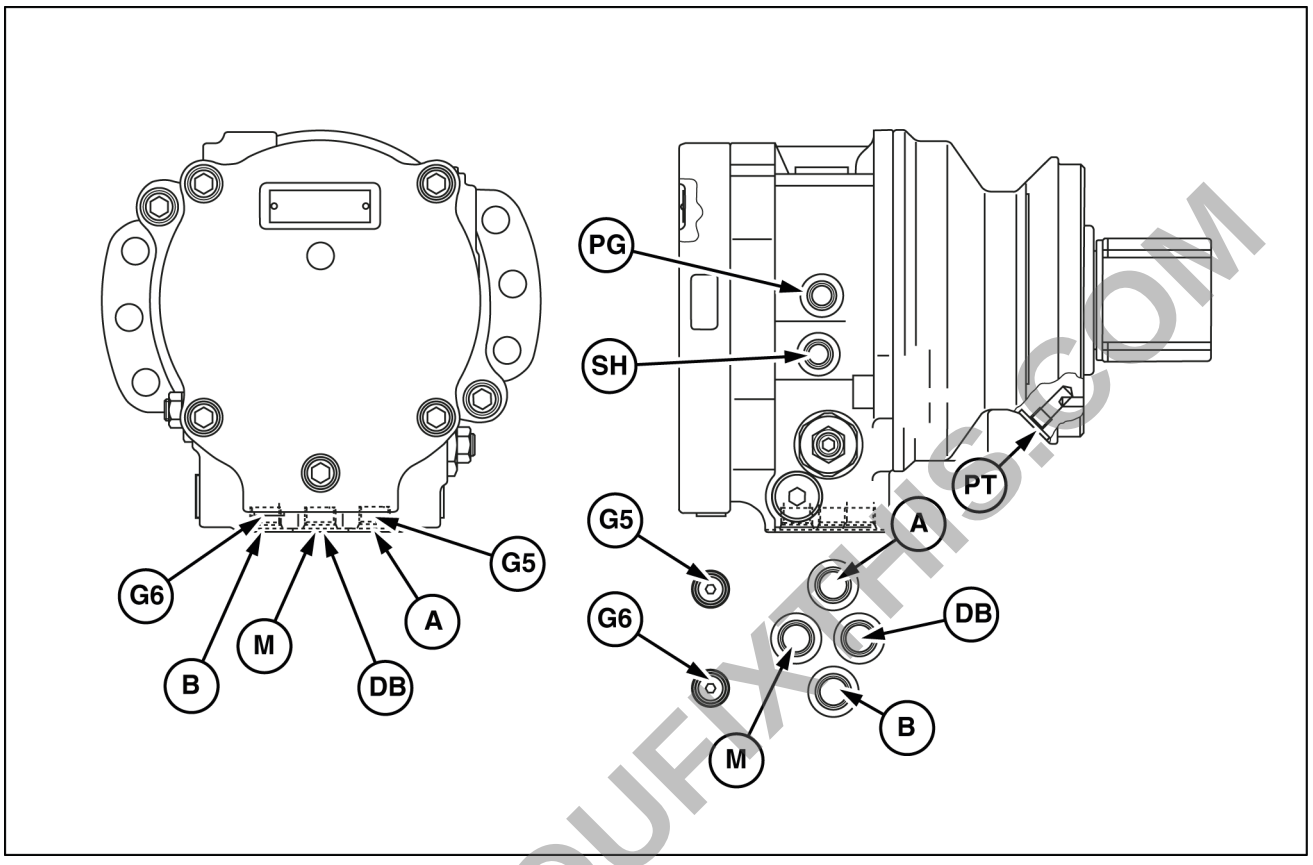
TULI12EXN4933AB 2

7. Remove the control valve.
8. Remove the solenoid valve.
9. In addition, remove the harness and hose clamped on the tank.
   - Remove the multi-control valve (option) if it is equipped.

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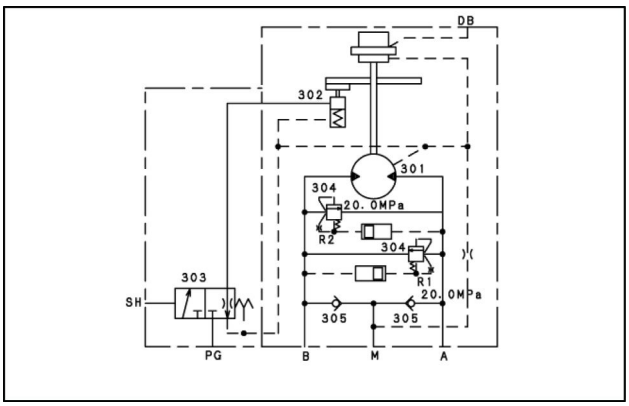
Hydraulic swing system - General specification



TULI12EXN6163FB 1

Hydraulic diagram

Port	Name	Dimensions
A	Main port	**PF 3/8**
B	Main port	
M	Make up port	
DB	Discharge port	
PG	Slewing parking brake release port	**PF 1/4**
SH	Slewing parking brake pilot port	
G5	Indicator port	**PF 1/8**
G6		
PT	Port for grease piping	**PT 1/8**



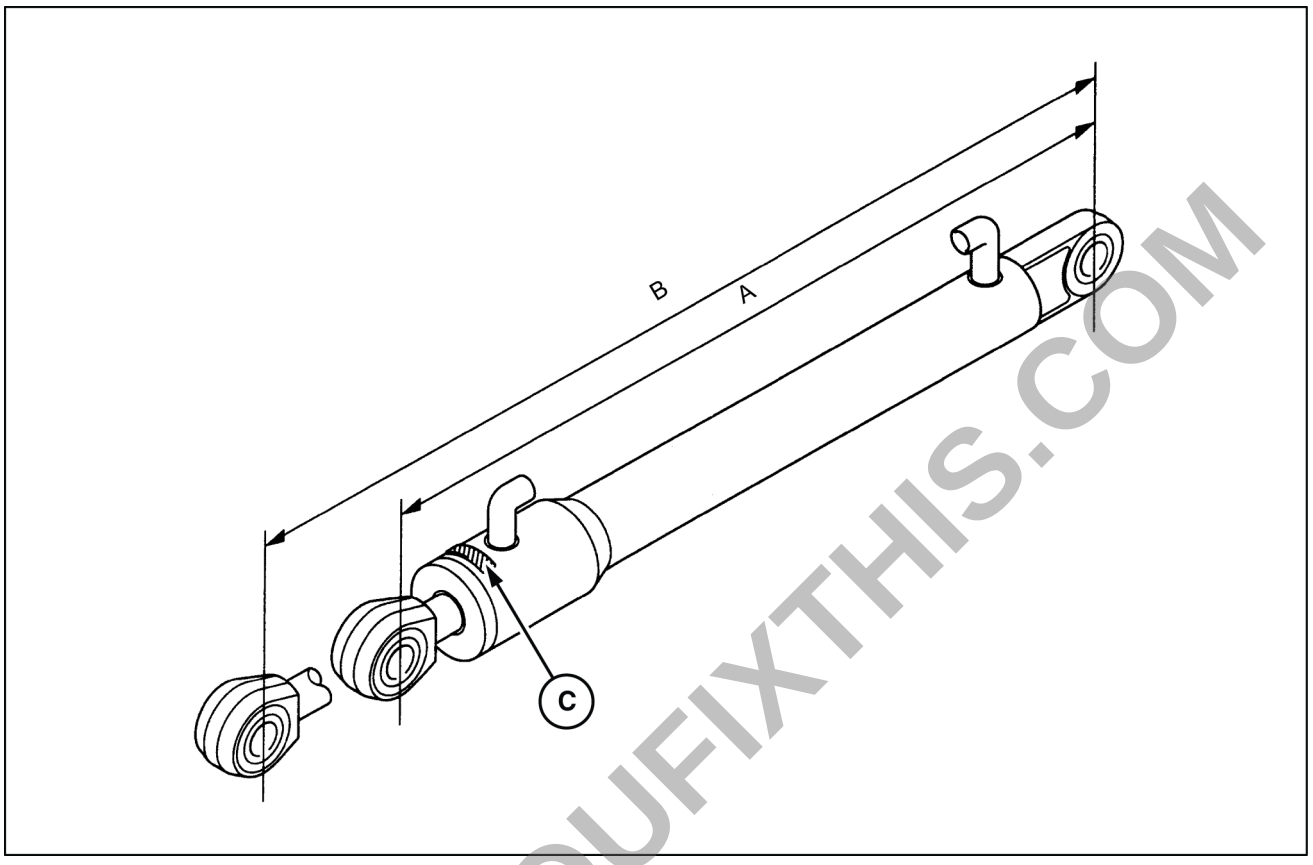
TULI12EXN6164AA 2

Rotational direction: Inlet **A** port: **CW**
Inlet **B** port: **CCW**
(View from shaft end)

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Boom cylinder - General specification



TULI12EXN4628FB 1

A. Fully retracted length
B. Fully extended length
C. Part no. and manufacturing no. stamp position

CX26B

Cylinder	Cylinder bore / Rod diameter	Stroke	Centre distance of mounting pins Full extend B / Full retract A	Cushion	Dry weight
Boom (canopy)	**ø 65 mm (2.56 in) / ø 40 mm (1.57 in)**	**480 mm (18.90 in)**	**1266 mm (49.84 in) / 786 mm (30.94 in)**	Rod side	**23 kg (51 lb)**
Boom (cab)	**ø 65 mm (2.56 in) / ø 40 mm (1.57 in)**	**457 mm (17.99 in)**	**1243 mm (48.94 in) / 786 mm (30.94 in)**		**23 kg (51 lb)**

CX30B

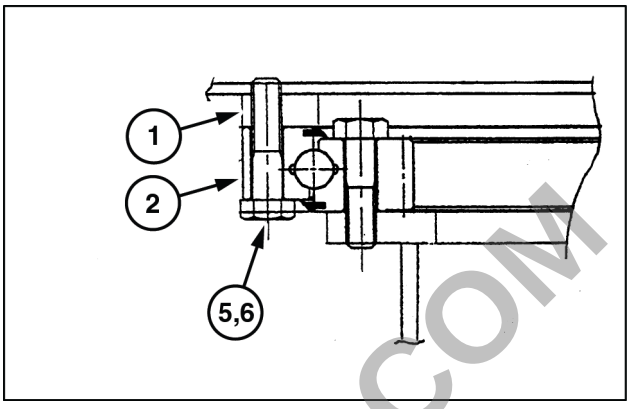
Cylinder	Cylinder bore / Rod diameter	Stroke	Centre distance of mounting pins Full extend B / Full retract A	Cushion	Dry weight
Boom (canopy)	**ø 70 mm (2.76 in) / ø 40 mm (1.57 in)**	**471 mm (18.54 in)**	**1257 mm (49.49 in) / 786 mm (30.94 in)**	Rod side	**24 kg (53 lb)**
Boom (cab)	**ø 70 mm (2.76 in) / ø 40 mm (1.57 in)**	**455 mm (17.91 in)**	**1241 mm (48.86 in) / 786 mm (30.94 in)**		**24 kg (53 lb)**

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Upper frame - Remove

1. Provide match-marks on the slewing bearing. Provide match marks between the upper frame **(1)** and the outer race of slewing bearing **(2)**.
2. Lifting upper frame temporarily.
   Temporarily lift the upper frame at three points applying wire ropes **(1)** on a position of the swing-bracket mounting hole for the front side and on two places of the rear end of the upper frame **(1)**.

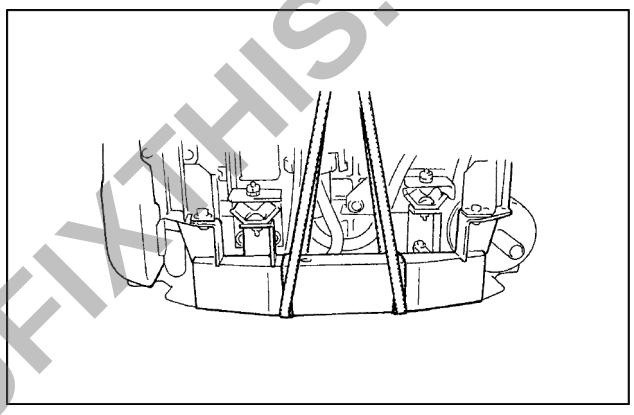


TULI12EXN4981AB 1

3. Removing bolt for mounting upper frame **(1)**. Loosen the screw **(6)** and fifteen capscrews **(5)** fixing the outer race of the slew bearing to the upper frame.


: **19 mm**

4. Removing upper frame **(1)**.
   Slightly lift the upper frame to ensure safety. Then remove it and place on a worktable capable of enduring the weight.
   Weight: Approximately **900 kg** (**1984 lb**) for **CX26B**
   Weight: Approximately **940 kg** (**2072 lb**) for **CX30B**



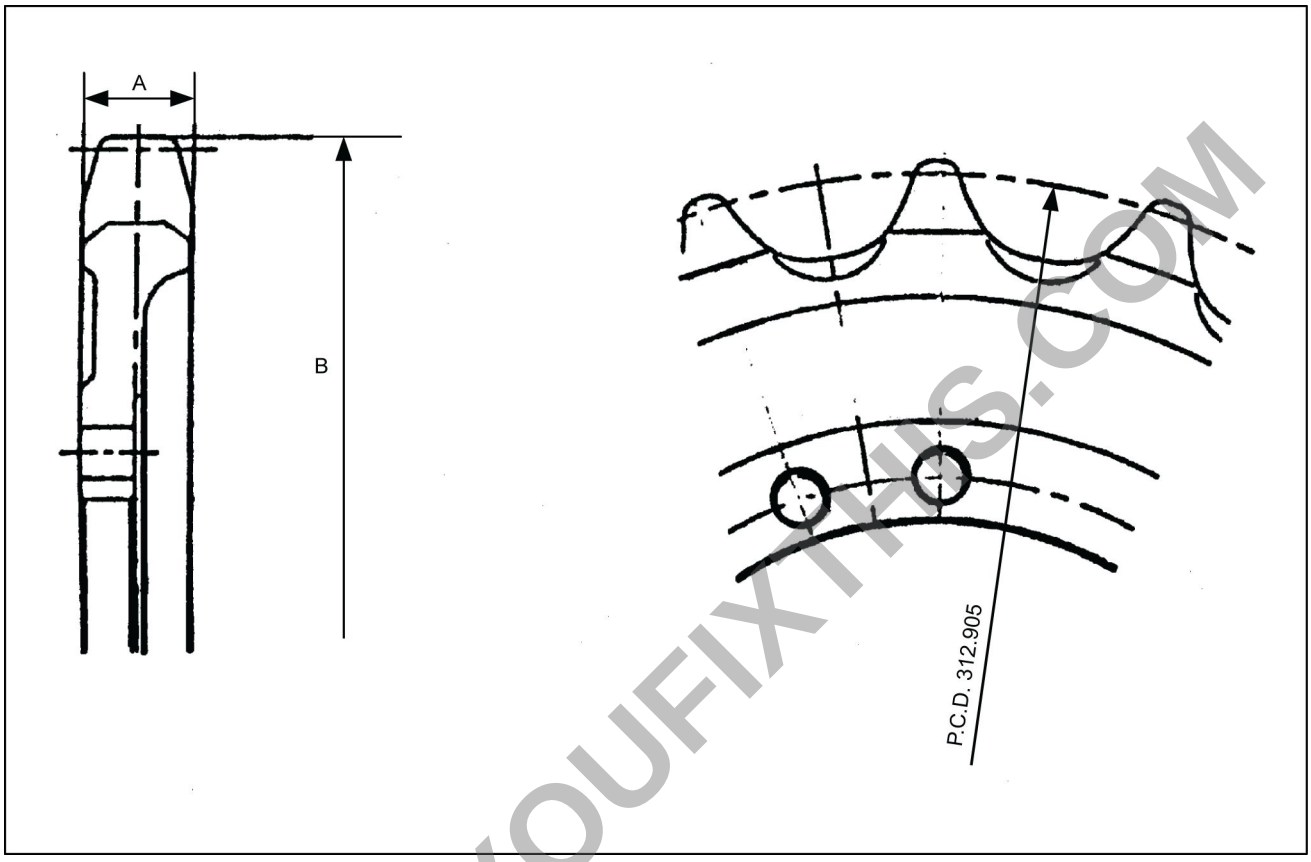
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Driving wheel - Service limits

Maintenance standard



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Code	Item	Standard value	Repairable level	Service limit	Remedy
A	Width of sprocket teeth	**24 mm** (**0.9 in**)	**21 mm** (**0.8 in**)	**20 mm** (**0.8 in**)	Replace
B	Sprocket outer diameter	**ø 318.5 mm** (**12.5 in**)	**ø 313 mm** (**12 in**)	**ø 311 mm** (**12 in**)	Welding repair or replacement

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Electrical equipment specifications

D-1, 2, 3, 4, 12, 14

Diode

Horn

Engine stop solenoid

Engine stop relay

Travel 1, 2 speed

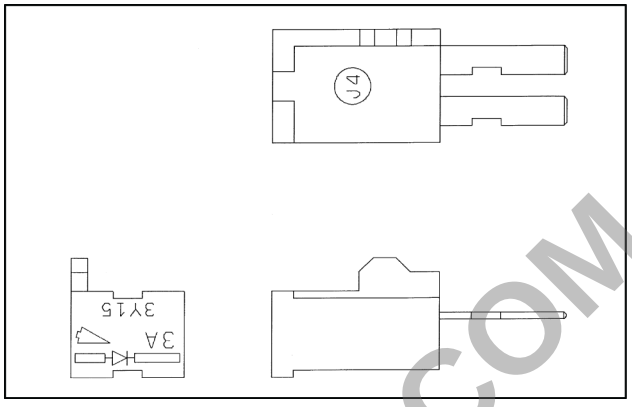
solenoid

Battery relay

Slewing / swing

Select relay

Engine stop solenoid

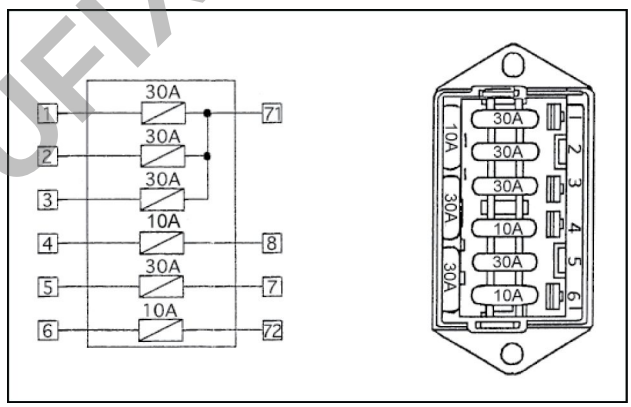


TULI12EXN4636AA 1

Max rated	Current	**3 A**
	Breakdown	**400 V**

E-1

Fuse box



TULI12EXN4637AA 2

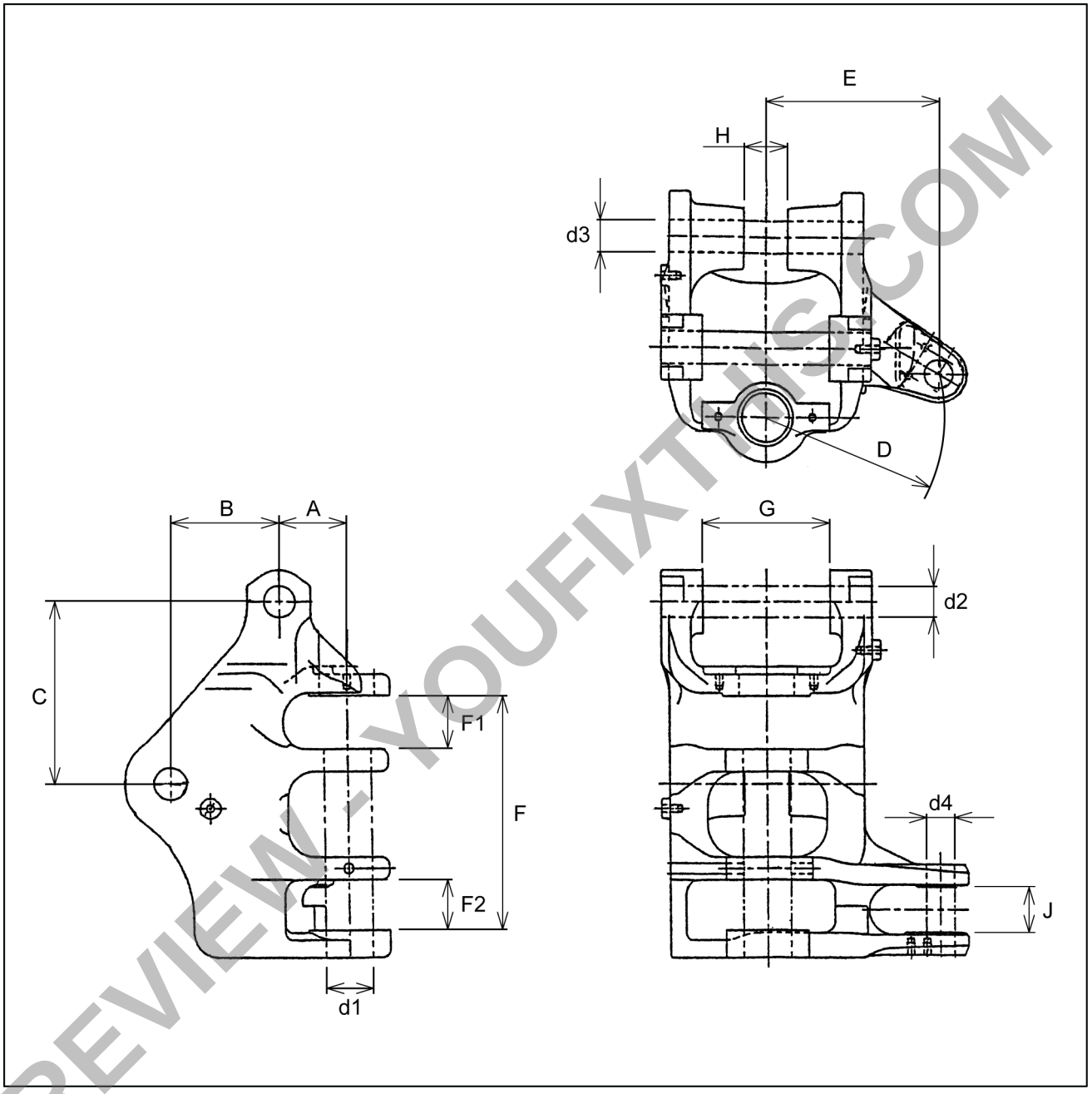
F1 **30 A**	Wiper Heater
F2 **10 A**	Relay Solenoid
F3 **30 A**	Working light
F4 **30 A**	Horn Cab light
F5 **30 A**	Engine stop Solenoid
F6 **10 A**	Battery relay Gauge cluster

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Boom pivoting support - Dimension

Swing bracket

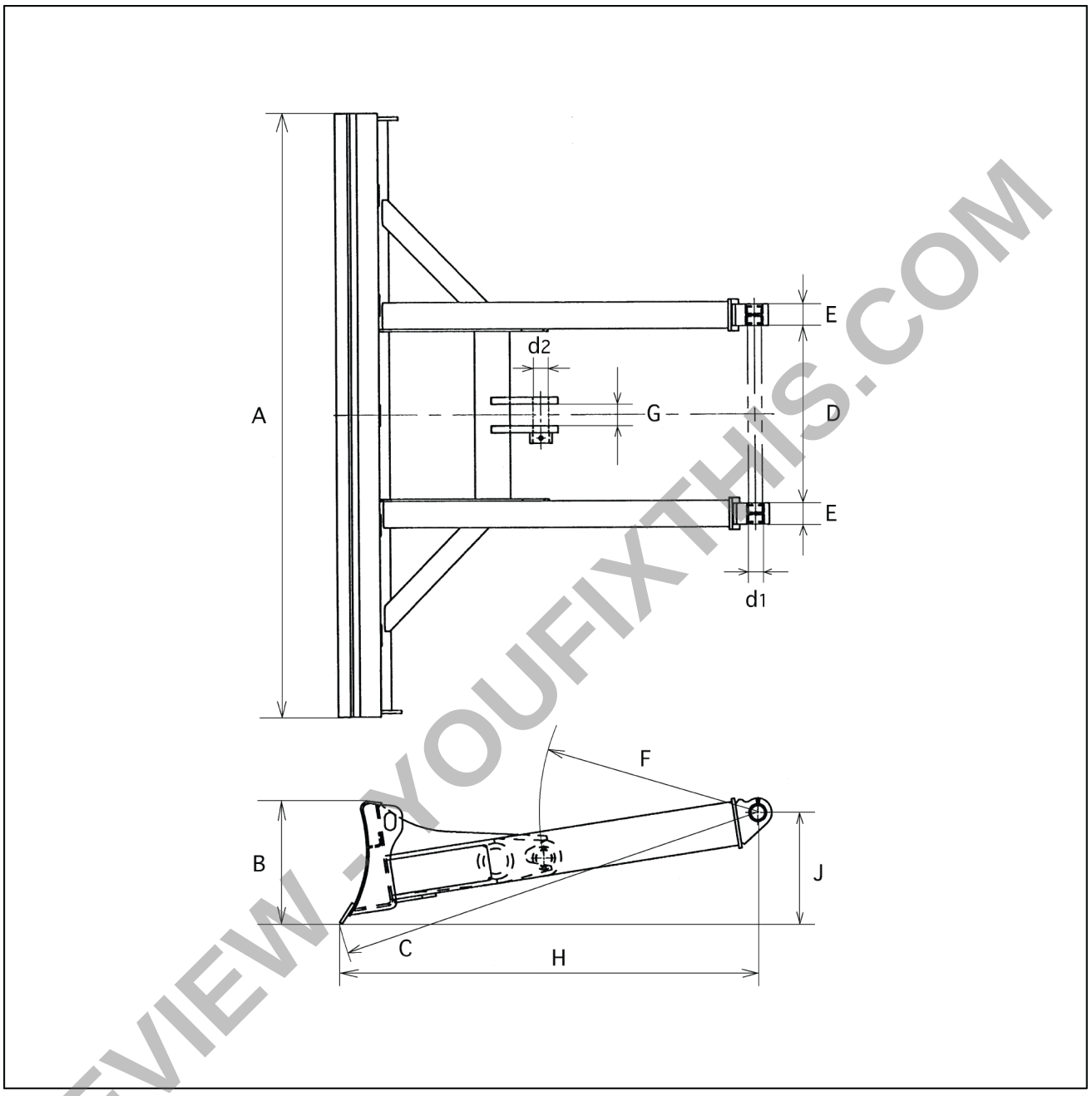


TULI12EXN4111GA 1

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Dozer blade - Dimension



TULI12EXN4109GA 1

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Cab and platform - Remove

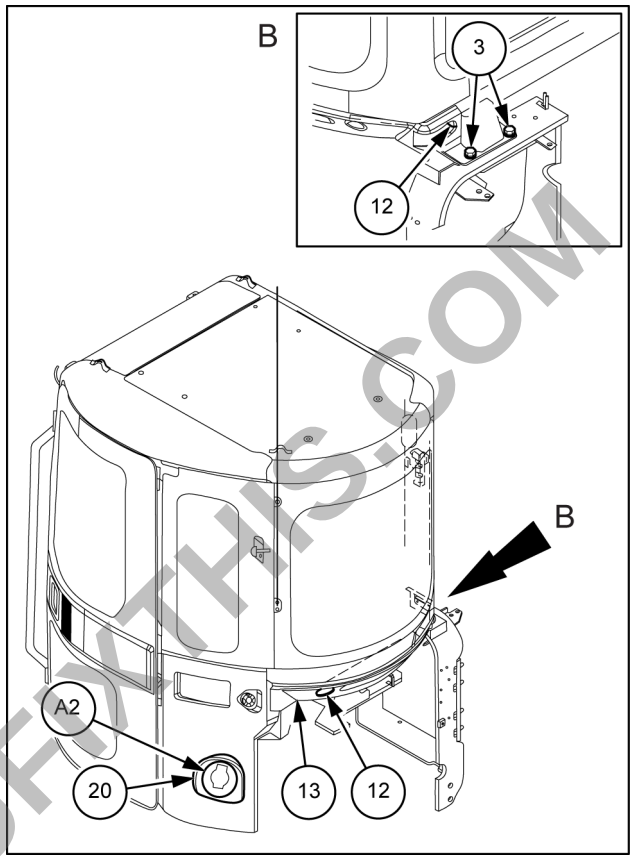
1. Remove the fuel filler cap **(A2)** and rubber cover **(20)**.
2. Removing cover installed on rear of cab. Loosen three sems-screws **M6 x 25 (12)** for installing the cover **(13)**.

   : plus screwdriver
3. Removing cab mounting screws. Loosen six cap-screws for mounting the cab.

Two capscrews **(1) M16 x 100**
One capscrew **(2) M16 x 50**
Three capscrews **(3) M16 x 55**

: **19 mm** and **24 mm**

An extension tool about **1 m** (**3.28 ft**) long is required for removing the capscrew item **(1)** (with mark *).



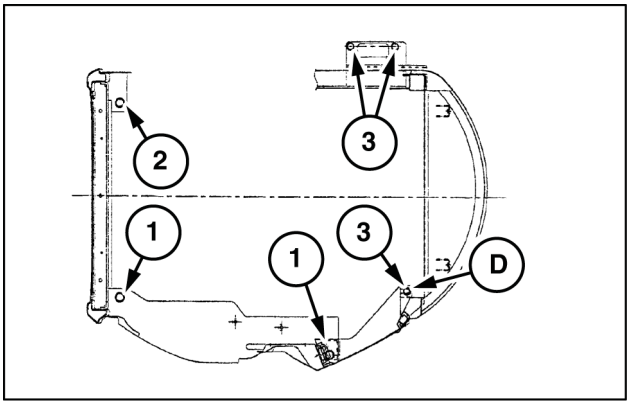
SMIL13MEX0276BB 1

Lifting cab

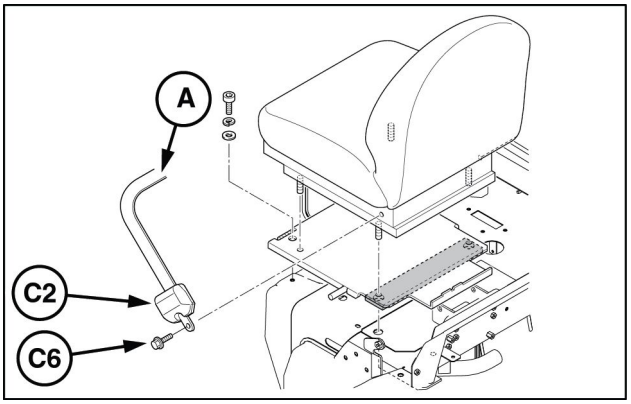
1. Loosen the sems-screws **M10 x 20 (C6)** to remove the seat belt assembly **(C2)** in advance to prevent it from interfering with the cab during lifting.

   : **17 mm**
2. Put slings through the lifting eyes on the cab top and lift up.
   Cab weight: **210 kg** (**463 lb**)

D. Adjust the clearance between guard and cab rear bracket with shims (t1.2, 2.0, 3.2).



TULI12EXN8289AB 2



TULI12EXN4205AB 3

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Step 19

Removal parts

1. Remove idle gear shaft, and then remove idle gear.
2. Remove the mounting screw of thrust bearing through the hole of the camshaft gear.
   Remove camshaft assembly.

Observations

1. Turn the cylinder block aside and carefully prevent tappet from jamming on the cam.
2. Preheat camshaft gear and camshaft assembly to 180°, 200° which are shrink fitted, before removing them.

Step 20

Removal parts

1. Remove gear case flange.

Step 21

Removal parts

1. Remove lubricating oil strainer.

Step 22

Removal parts

1. Remove crankpin side cap of the connecting rod.
   While turning crankshaft, place piston in the bottom dead center (BDC).

Observations

1. Before extracting piston, remove carbon deposits from the upper wall of the cylinder using fine sandpaper, while taking care not to damage the inner surface of the cylinder.
2. Make sure that the No. of the protection of the connecting rod matches the No. of the cylinder.
3. Take care not to let crankpin metal fall when removing connecting rod crankpin side cap.

Step 23

Removal parts

1. Remove the main bearing cover screw. 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.

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Hydraulic systems - Hydraulic schematic frame 02 - Hydraulic circuit operation

Color coding standard for hydraulic

Blue:	Feed, drain circuit	less than **0.34 MPa** (**49 psi**)
Green:	Return, make-up circuit	**0.34 - 0.59 MPa** (**49 - 86 psi**)
Violet:	Secondary pilot pressure	**0.59 - 3.5 MPa** (**86 - 508 psi**)
Red:	Primary pilot pressure	**3.5 - 3.9 MPa** (**508 - 566 psi**)
Orange:	Main pump drive pressure	**4.9 - 23 MPa** (**711 - 3336 psi**)
Blue:	At valve selection	
Red valve:	When proportional valve (reducing) is operating	
Red solenoid:	active and operating	
Displaying the flow circuit and stand-by circuit when operating Regarding the electrical symbols in this manual, refer to the electric circuit diagram		

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Pump - Assemble

Cautions for assembling

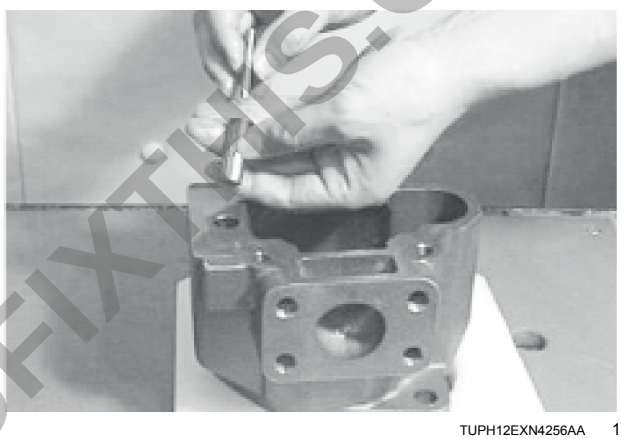
1. Wash each part thoroughly.
2. During disassembling, take utmost care not to damage the part or allow foreign materials to enter.
3. As a rule, the O-ring and oil seal should not be reused.
4. In out assembly work, the torque wrench is used to control the torque. Be sure to use the torque wrench.

Assemble the main pump in reverse order of disassembly.

Assembly of main pump

1. Assembling housing section

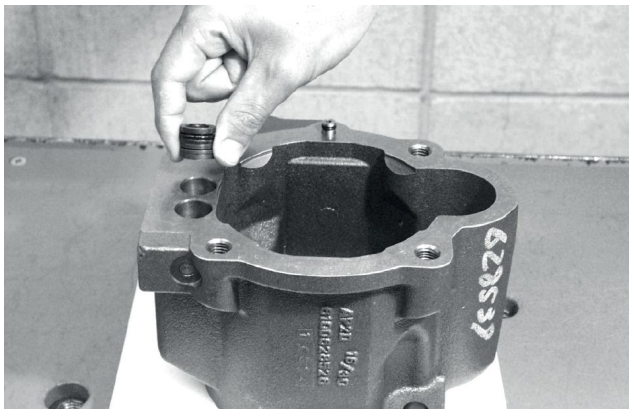
   A. Install the parallel pin and sleeve (Ø **5 mm** (**0.20 in**)) of the **P3** shift side into the housing.



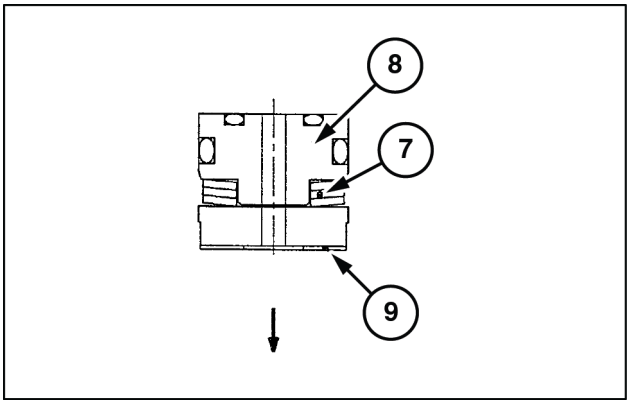
TUPH12EXN4256AA 1

   B. Install the piston **(8)**, coned disk spring **(7)**, distance piece and shim **(9)** into housing.

- Be careful to the orientation of the disk spring **(7)**.



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TULI12EXN4989AB 3

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Pedal control - Troubleshooting

Problem	Possible Cause	Correction
Secondary pressure does not rise	Insufficient primary pressure	Secure primary pressure
	Permanent set in fatigue of spring **(324)** for setting of secondary pressure	Replace it with new one
	The gap between spool and casing is too large	Replace it with complete remote control valve
	The control section is loosened	Replace parts of control section
Secondary pressure is unstable	Sliding part is not smooth	Repair unsmooth section
	Variation of pressure of tank line	Return oil to oil tank directly
	Air contamination in piping	Bleed air by operating several times
Secondary pressure is high	Pressure of tank line is high	Return oil to oil tank directly
	Sliding part is not smooth	Repair unsmooth section
Damping does not work	Air is accumulated in piston chamber	Bleed air by operating several times
	Sliding part is not smooth	Repair unsmooth section
	Permanent set in fatigue of damping spring **(336)**	Replace it with new one
	Gap between damping piston **(224)** and casing (damper) **(102)** is too large	Replace it with complete remote control valve
	Malfunction of check valve	Disassemble and check on check valve section
	Orifice of damping piston **(224)** is too large	Replace damping piston
Damping torque is heavy	Sliding part is not smooth	Repair unsmooth section
	Orifice of damping piston **(224)** is clogged	Repair or replace damping piston

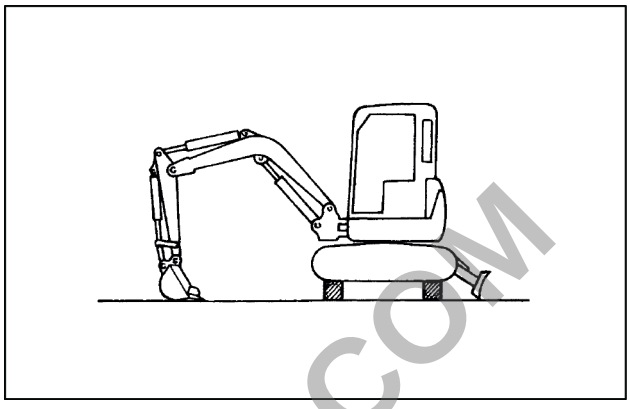
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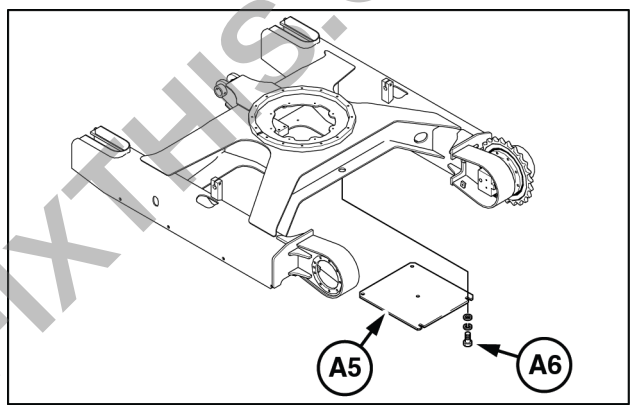
Hydraulic central joint - Prepare

1. Lift the machine by approximately **30 cm** (**11.81 in**) and insert support blocks under the crawlers, namely front, rear, right and left, to secure the working area under the machine.
2. Remove the cover of the floor plate.
3. Loosen four **M10 x 18** capscrews **(A6)** to remove the under cover **(A5)**.

   : **17 mm**
4. Release the residual pressure in the circuit and the hydraulic tank.
5. Disconnect the hose of the slewing motor.
   - Remove the canopy to facilitate to remove the swivel joints.



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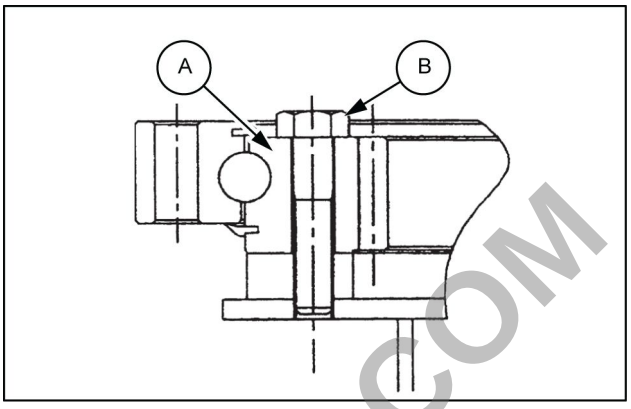
TULI12EXN4972AB 2

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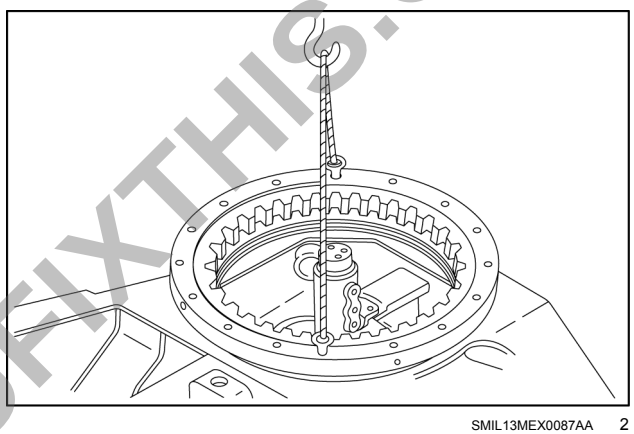
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Swing ring assembly - Remove

1. Remove the upper slewing structure.
2. Remove capscrews **(B)** that fix the inner race of slewing bearing **(A)**.
   19 mm
3. Remove the grease in the inner race of slewing bearing.
4. Screw lifting-bolts in the slewing bearing **(A)**, and lift it by crane.
   Weight of slewing bearing assebly: **30 kg** (**66.1 lb**)



SMIL13MEX0273AB 1



SMIL13MEX0087AA 2

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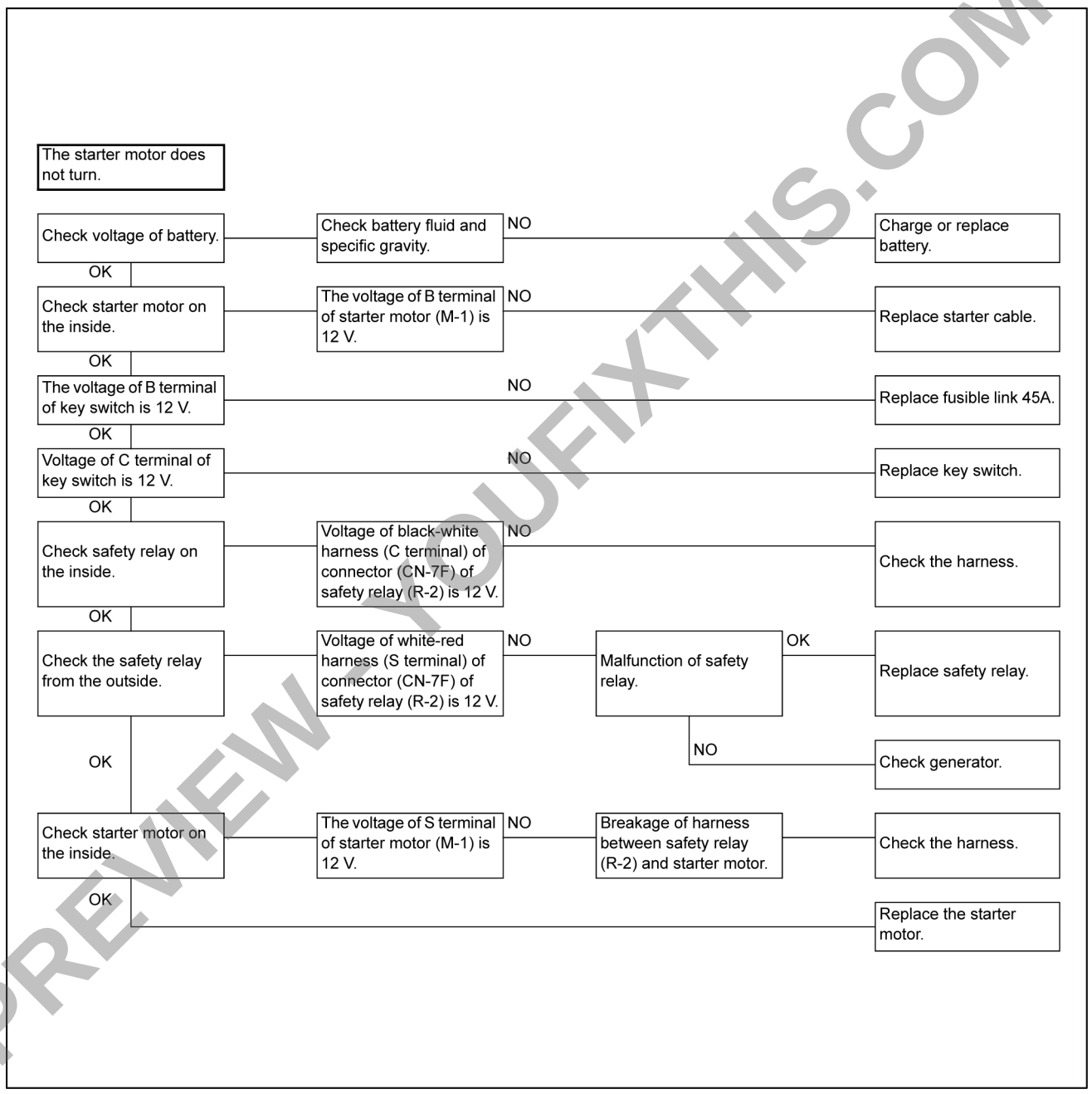
Abbreviations

Decel: Deceleration

SOL: Solenoid

General

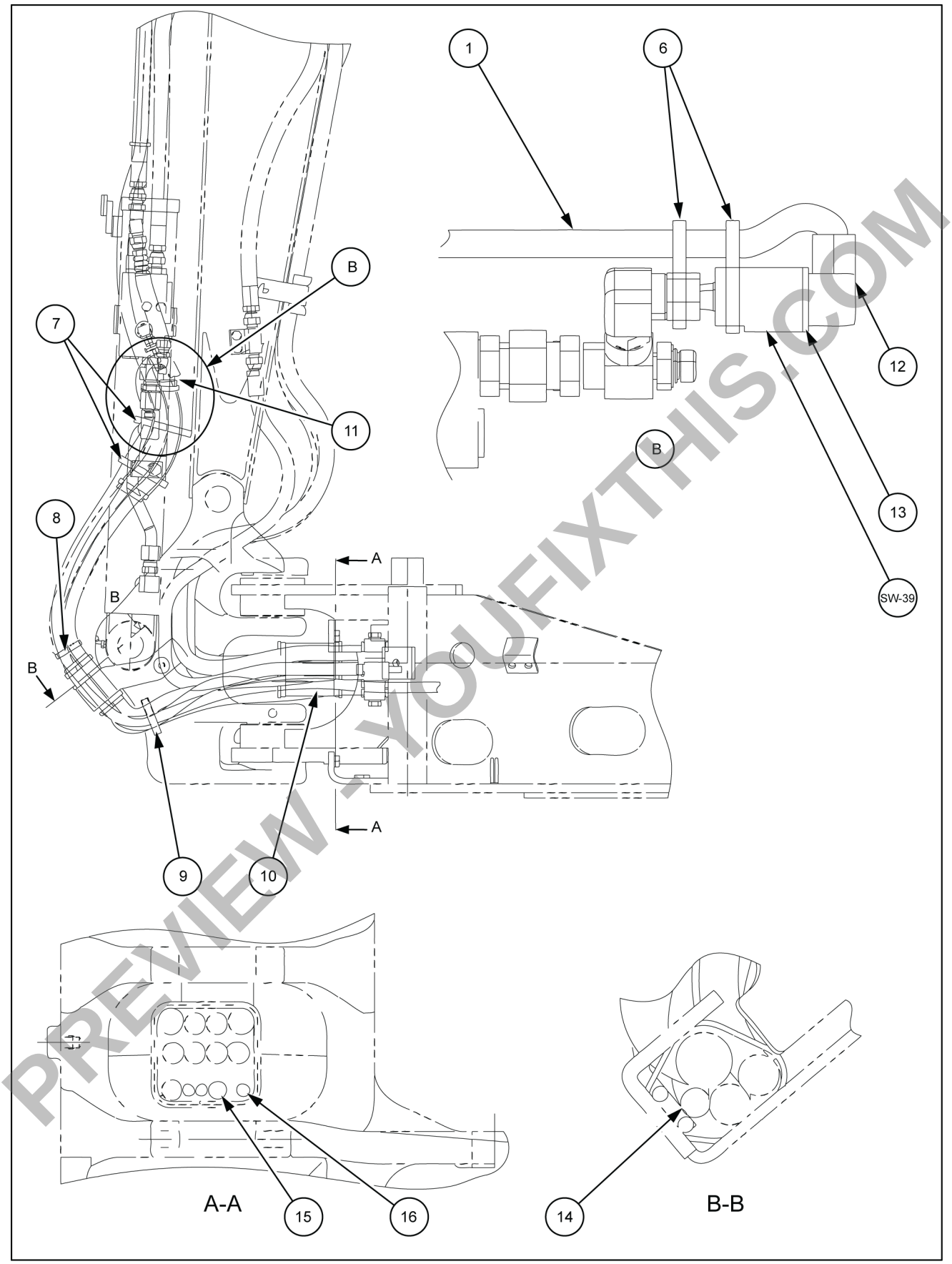
Engine does not start



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