CIRCUIT DIAGRAM & HARNESS

Return to INDEX

EX80U HYDRAULIC CIRCUIT DIAGRAM

EX80U ELECTRICAL CIRCUIT DIAGRAM

EX80U CONNECTORS

EX80U ENGINE HARNESS

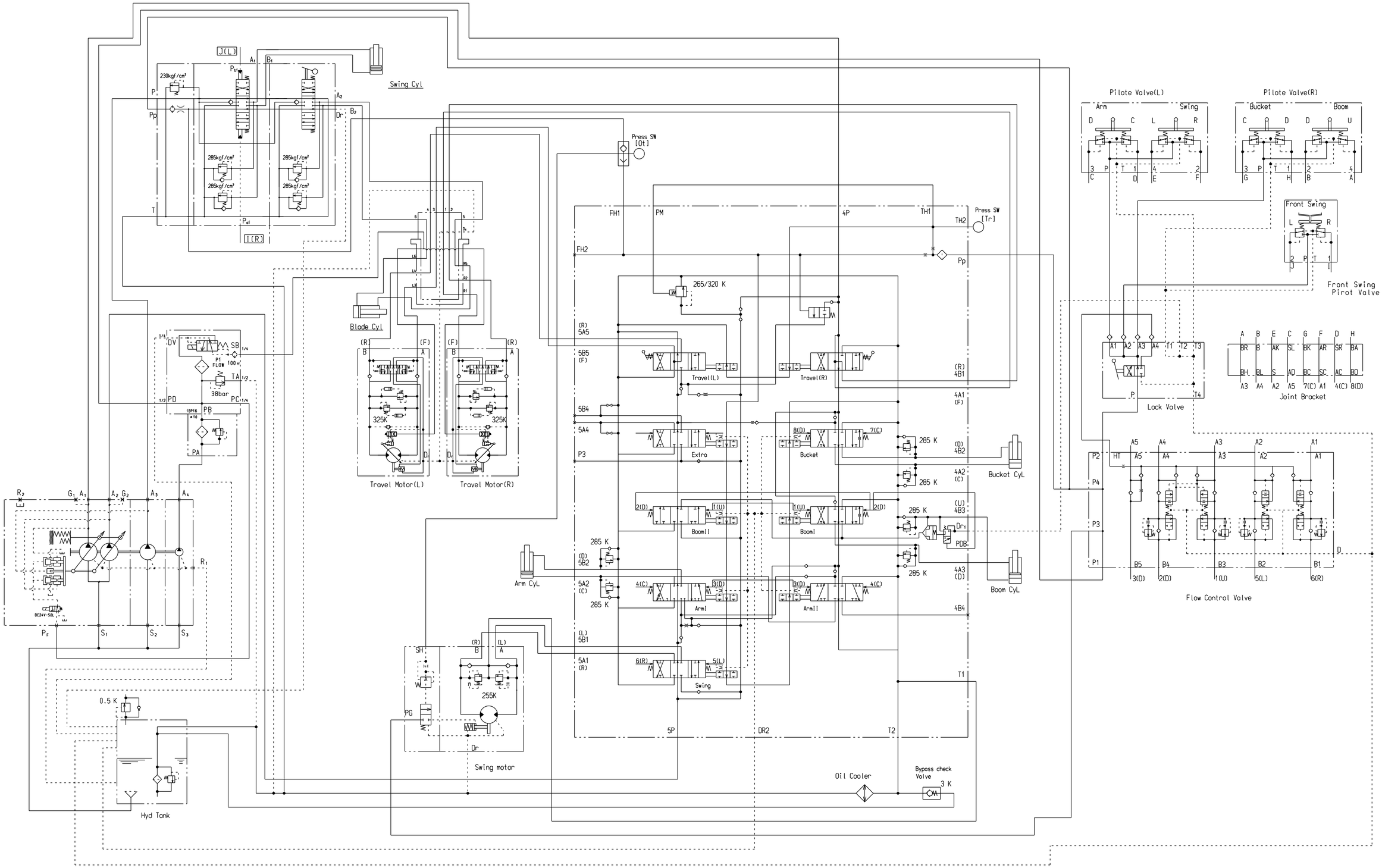
EX80U CAB HARNESS

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EX80U HYDRAULIC CIRCUIT DIAGRAM

NOTE : Refer to the PEFORMANCE STANDARD in the technical manual for the relief valve pressure setting value.



TIGHTENING TORQUE SPECIFICATIONS

Descriptions	Bolt Dia mm	Q'ty	Wrench Size mm	Torque		
				N·m	(kgf·m)	(lbf·ft)
Engine cushion rubber mounting nut	14	4	22	137	(14)	(101)
Engine cushion rubber mounting bolt, nut	16	2	24	235	(24)	(175)
Engine bracket mounting bolt	10	8	17	49	(5)	(36)
Hydraulic oil tank mounting bolt	16	4	24	206	(21)	(152)
Fuel tank mounting bolt	16	4	24	206	(21)	(152)
UNION fittings for hydraulic hoses and piping			19	29	(3)	(21.5)
			22	39	(4)	(29)
			27	93	(9.5)	(69)
			32	137	(14)	(101)
			36	175	(18)	(130)
			41	205	(21)	(152)
Pump mounting bolt	12	4	19	88	(9)	(65)
Control valve mounting bolt	14	3	22	137	(14)	(101)
Control valve bracket mounting bolt	12	4	19	88	(9)	(65)
Swing device mounting bolt	16	10	24	205	(21)	(52)
Battery mounting nut	10	4	17	20	(2)	(14.5)
Cab mounting nut	16	4	24	205	(21)	(152)
Swing bearing mounting bolt to upperstructure	16	4	24	265	(27)	(195)
Swing bearing mounting bolt to undercarriage	16	24	24	265	(27)	(195)
Center joint mounting bolt	10	3	17	49	(5)	(36)
Center joint stopper mounting bolt	12	2	19	88	(9)	(65)
Travel device mounting bolt	16	20	24	300	(31)	(225)
Travel motor cover mounting bolts	14	8	22	137	(14)	(101)
Sprocket mounting bolt	16	24	24	265	(27)	(195)
Upper roller mounting bolt	14	2	22	137	(14)	(101)
Lower roller mounting bolt	14	40	22	245	(25)	(180)
Track shoe mounting bolt	14	320	22	245	(25)	(180)
Access cover mounting bolt	6		10	9.8	(1)	(7.2)
	10		17	49	(5)	(36)
	12		19	88	(9)	(65)
Low pressure piping flex waster coupling	8	–	13	10.3to12.4	(1.05to1.26)	(7.95to9.11)
	5	–	8	2.9	(0.3)	(2.1)
	6	–	10	4.0	(0.45)	(3.3)
Counterweight mounting bolt	27	3	41	1370	(140)	(1010)

NOTE: (1) Apply lubricant (e.g. white zinc B dissolved into spindle oil) to bolts and nuts to reduce friction coefficient of them.

(2) Make sure bolt and nut threads are clean before installing.

(3) Apply Loctite to threads before installing and tightening swing bearing mounting bolts and lower roller mounting bolts.

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MAIN CONTROLLER FAULT CODE LIST

Fault Code	Trouble	Cause of Trouble
01	Abnormal EC sensor	• Faulty MC • Faulty Harness • Faulty EC Sensor
07	Abnormal engine control lever angle sensor	• Faulty MC • Faulty Harness • Faulty Engine Control Lever Angle Sensor

MAIN CONTROLLER MONITORING ITEM LIST

Dr.EX has a function to monitor the command signals from the MC and the input signals (to MC) from various switches and sensors.

Monitor Item	Descriptions	Unit
Target engine speed	Command signal value to EC motor	rpm
EC angle	Input from EC sensor	V
Dial angle	Input from engine control lever angle sensor	V
Auto-idle switch	ON/OFF signal from auto-idle switch	*AI
Travel Mode Switch	ON/OFF signal from travel mode switch	*Lo, Hi
Pressure switch	ON/OFF signal from all pressure switches	* Fr, Tr
Key switch	ON/OFF signal from key switch	*Ky
Engine learning control		* Successful, EC failed, Ky failed
Pump control solenoid valve input	ON/OFF signal from pump control solenoid valve	ON, OFF
EC motor position		step

*NOTE: * White letters (or figures) are shown on the black screen when the switches are ON (connected).*

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Disassemble Pump Device

- Be sure to thoroughly read all precautions for disassembly/ assembly work on page (W1-1-1) before starting any repair work.

1. Remove socket bolts (43) from cover (5) to remove pilot pump (42).

   : 6 mm

2. Remove socket bolts (45) from cover (5) to remove body (44) assembly and O-ring (59) and (60).

   : 8 mm

IMPORTANT: When remove cover (5) assembly, take care to prevent pins (68) from dropping. Also when valve plate (1) is attached to cover (5), take care to prevent the valve plate from dropping.

3. Remove socket bolts (6) and (12) from housing (25) to remove cover (5) assembly and packing (2).

   : 12 mm

4. Remove spring seat (37) and shim (35) from cover (5). Remove spring (34), spring (33) and spring seat (32) from housing (25).

5. Remove valve plate (1) and cylinder block (20) assembly from shaft (24).

6. Remove plungers (16), retainer (17), spherical bushing (18) and pins (19) from cylinder block (20) assembly.

IMPORTANT: If it is not necessary, do not remove retaining ring (23), washers (21) and spring (22) from cylinder block (20).

7. Remove retaining ring (79) from housing (25) to remove cover (78),oil seal (77) and O-ring (76).

8. Use a plastic hammer to drive out shaft (24) from housing (25).

9. Remove retaining rings (74) from shaft (24). Use a press to remove bearing (75) from shaft (24).

10. Remove socket bolts (73) from housing (25) to remove cover (72), O-ring (71), distant piece (70) and the outer race of bearing (69).

    : 6 mm

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ENGINE SYSTEM TROUBLESHOOTING

E-1 Starter does not rotate.

Related Fault Code: None

- Measure each voltage by referring to the table below.
- Electronic system such as MC has nothing to do with the trouble obstructing the rotation of starter.
- Check for loose harness connections beforehand.

Check if battery voltage and electrolyte density are normal.

- Voltage: 24 volts or more
  Density: 1.25 to 1.28

YES

With key switch positioned as shown in table below, check if each terminal voltage on starter and starter relay is normal.

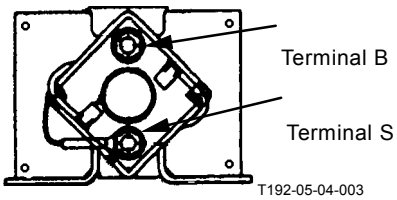
Starter — Unit (V)

Terminal \ Key Switch	ON	START
B	24	24
S	0	24

Starter Relay — Unit (V)

Terminal \ Key Switch	ON	START
B	24	24
C	0	24
S	0	24

Starter Relay Terminal Position



T192-05-04-003

NO

(When key switch is turned to the START position, if voltage at terminal B is lower than 18 volts, battery may be faulty.)

YES

Regardless of key switch position ON or START, voltage at terminal B on starter and starter relay is 0 volts.

- Key switch: ON⇔START

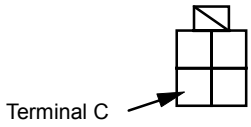
NO

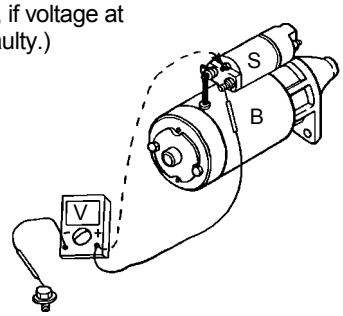
With key switch positioned at START, voltage at terminal C on starter and starter relay does not increase to 24 volts.

- Key switch: START

With key switch positioned at START, voltage at terminal S on starter and starter relay does not increase to 24 volts.

Starter Relay Connector





Starter Terminal Position

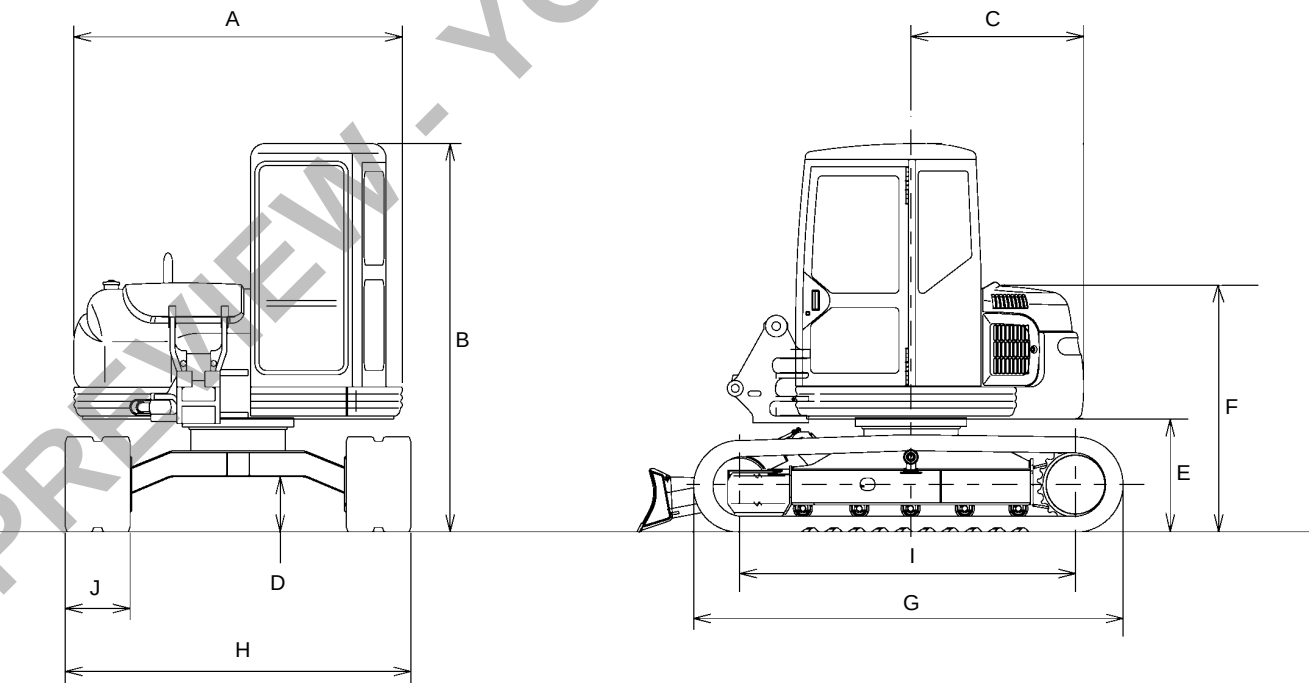
T554-07-02-001

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SPECIFICATIONS

Type of Front-End Attachment	Boom Swing Type
Standard Bucket Capacity (Heaped)	PCSA 0.28 m^3 (0.37 yd^3), CECE 0.25 m^3
Operating Weight	8100 kg (17900 lb)
Base Machine Weight	6850 kg (15100 lb)
Engine	Nissan A-BD30 40.5 kW/2000 min^{-1}(55 PS/2000 rpm)
A: Overall Width	2300 mm (7'7")
B: Cab Height	2700 mm (8'10")
C: Rear End Swing Radius	1200 mm (3'11")
D: Minimum Ground Clearance	390 mm (1'3")
E: Counterweight Clearance	790 mm (2'7")
F: Engine Cover Height	1740 mm (5'9")
G: Undercarriage Length	2980 mm (9'9")
H: Undercarriage Width	2400 mm (7'10")
I: Sprocket Center to Idler Center	2330 mm (7'8")
J: Track Shoe Width	450 mm (1'6")
Ground Pressure	34.8 kPa (0.35 kgf/cm^2, 4.98 psi)
Swing Speed	14.3 min^{-1} (rpm)
Travel Speed (Fast / Slow)	4.5/3.3 km/h (2.8/2.1 mph)
Gradeability	35 Deg. (70 %)



T196-01-01-001

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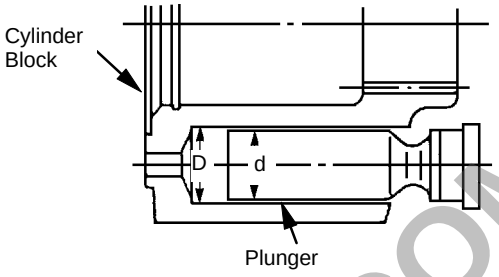
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MAINTENANCE STANDARD

Main Pump

1. Clearance between plunger outer diameter and cylinder block inner diameter

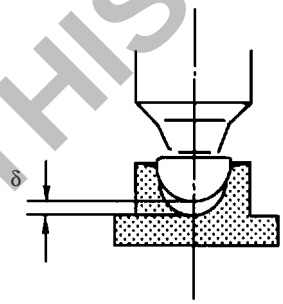
   (D-d): 0.060 mm (0.0024 in) or less.



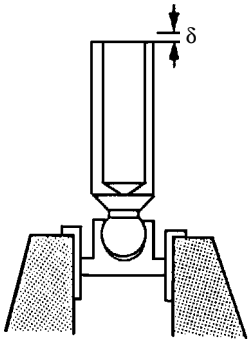
W507-02-04-009

2. End play between plunger and shoe

   δ: 0.2 mm (0.0079 in) or less



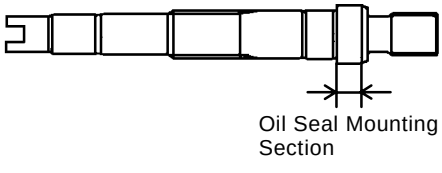
W107-02-06-140



W107-02-06-141

3. Be sure that there is no wear and score on the oil seal mounting surface of the shaft.

   Worn amount: 0.025 mm (0.00098 in)



W507-02-04-010

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INTRODUCTION

TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
  - Be sure to thoroughly read this manual for correct product information and service procedures.
- If you have any questions or comments, at if you found any errors regarding the contents of this manual, please contact using “Service Manual Revision Request Form. at the end of this manual.
  (Note: Do not tear off the form. Copy it for usage.):
  Publications Marketing & Product Support
  Hitachi Construction Machinery Co. Ltd.
  TEL: 81-298-32-7173
  FAX: 81-298-31-1162

ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.
  - The Operator’s Manual
  - The Parts Catalog
  - Operation Manual of the Engine
  - Parts Catalog of the Engine
  - Hitachi Training Material

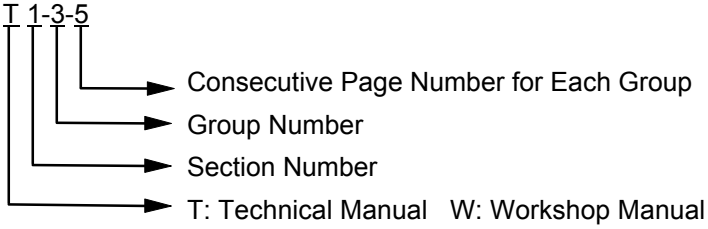
MANUAL COMPOSITION

- This manual consists of three portions: the Technical Manual (Operational Principle), the Technical Manual (Troubleshooting) and the Workshop Manual.
  - Information included in the Technical Manual (Operational Principle):
    technical information needed for redeliver and delivery, operation and activation of all devices and systems.
  - Information included in the Technical Manual (Troubleshooting):
    technical information needed for operational performance tests, and troubleshooting procedures.
  - Information included in the Workshop Manual:
    technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:

Example : T 1-3-5



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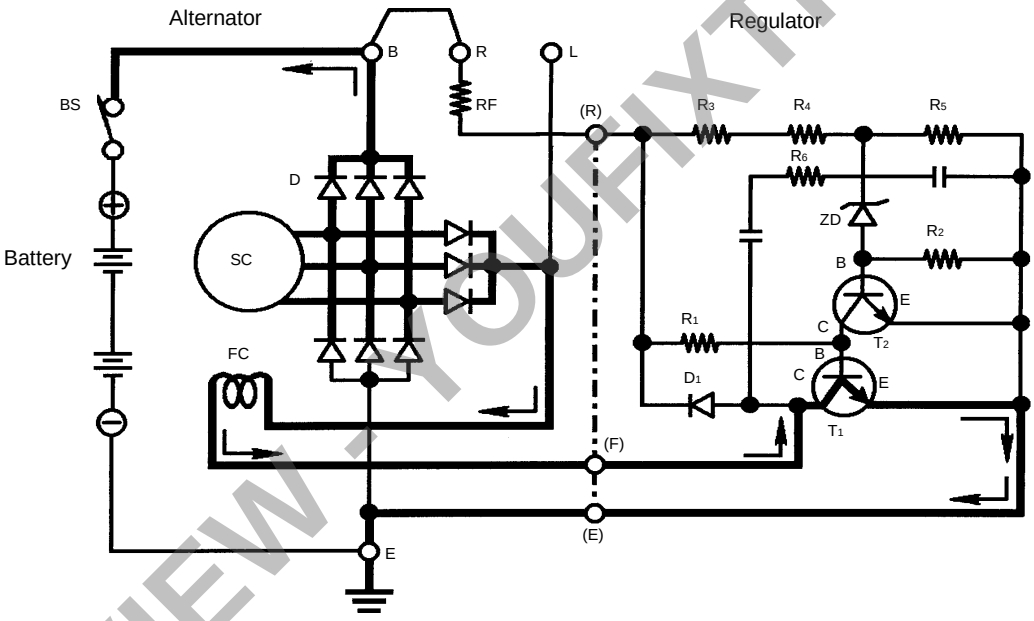
Power Generation

The alternator consists of field coil FC, stator coil SC, and diode D. The regulator consists of transistors T_1 and T_2, zener diode ZD, and resistances R_1 and R_2.

Alternator terminal B connects as follows:

B→R→RF
- (R)→ R_1 → Base B of Transistor T_1
- FC→ (F)→ Collector C of Transistor T1

When battery relay BS is ON, the battery voltage is routed to base B of regulator transistor T_1, connecting collector C and emitter E. Therefore, the ground side of field coil FC is grounded via transistor T_1. Before field coil FC is grounded, no current flows through field coil FC. However, when the rotor starts rotating, alternating voltage is generated in stator coil SC by the remanent excitation field in the rotor. Then, when electrical current flows through field coil FC, the rotor is further magnetized, causing generating voltage to increase and letting more electrical current to flow through field coil FC. Thereby, generating voltage increases further, starting to charge the batteries.



T157-04-02-008

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Boom Swing Control Pilot Valve

Spool (6) is supported with return spring (5) via spring guide (3). However, bushing (7) is held in position so that the flange of pusher (2) or the top face of spring guide (3) can't move upward, obstructing return spring (5) to move upward further.

- In Neutral (Corresponding to A to B Point on the Output Diagram)

  When the boom swing control pedal is in neutral, spool (6) completely blocks pressure oil port P. The output port is open to port T so that the output port pressure is equal to the hydraulic oil tank pressure.

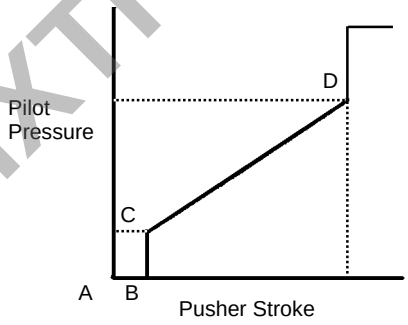
  When cam (1) is tilted slightly, pusher (2) and spring guide (3) move downward as a unit while compressing return spring (5) and balance spring (4). As the pressure at the top and bottom of spool (6) is equal to the hydraulic oil tank pressure, spool (6) is moved downward with the head bottom face of the spool kept in contact with spring guide (3). This state is maintained until clearance A becomes zero.

- Outputting Pressure in proportion to Control Lever Stroke (Corresponding to the C to D point on the Output Diagram)

  When the boom swing control pedal is tilted further to lower pusher (3), the spool notch (B) is connected to the passage in spool (6) allowing the pressure oil to flow from port P to the output port. When the oil pressure at the output port increases, spool (6) moves upward, closing notch B so that the oil pressure at the output port is maintained constant. As pusher (2) is lowered, balance spring (4) is compressed further, increasing the spring force. Then, the oil pressure at the output port is increased in proportion to balance spring (4) force.

- Outputting Pressure at Control pedal Stroke End (Corresponding to the stroke end on the Output Diagram)

  When the control pedal is tilted to lower pusher (2) further, spool (6) moves downward together with pusher (2). Then, notch B is widened so that the output port pressure is maintained equal to the pressure in port P. Pusher (2) can be moved downward until spring guide (3) comes in contact with the casing counter bore. This position corresponds to the pedal stroke end. Stroke dimension C of pusher (2) determines the total pedal stroke.



Output Diagram T522-02-05-001

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SAFETY TRANSPORTING

- The danger of tipping is present when loading/unloading the machine onto/from a truck or trailer bed.

  - Be sure to observe local regulations when transporting the machine on public roads.
  - Provide an appropriate truck or trailer for transporting the machine.

  Take the following precautions when loading / unloading the machine:

  1. Select firm level ground.
  2. Be sure to use a loading dock or ramp.
  3. Be sure to have a signal person when loading/unloading the machine.
  4. Always turn the auto-idle switch OFF when loading or unloading the machine, to avoid unexpected speed increase due to unintentional operation of a control lever.
  5. Be sure to load/unload the machine at slow speed.
  6. Avoid steering while driving up or down the ramp as it is extremely dangerous. If steering is unavoidable, first move back to the ground or flatbed, modify traveling direction, and begin to drive again.
  7. Do not operate any levers besides the travel levers when driving up or down the ramp.
  8. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
  9. Prevent possible injury from machine tipping while the upperstructure is rotating.
  10. Keep the arm tucked under and rotate the upperstructure slowly for best stability.
  11. Securely fasten chain or cables to the machine frame. Refer to "transporting" chapter in the operator's manual for details.



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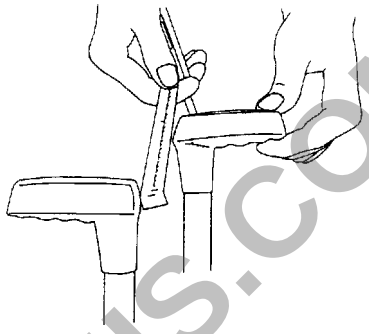
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CONTROL LEVER STROKE

Summary:

1. To measure each control lever stroke as well as the lever stroke end play and operation smoothness.
2. Measure the stroke at the lever grip center.
3. When the lever play is provided in the neutral position, divide the play equally to measure the stroke.



T107-06-03-005

Preparation:

1. Maintain hydraulic oil temperature at 50±5 °C (122±9 °F).

Measurement:

1. Stop the engine.
2. Measure the operation strokes of the boom, arm, bucket, swing, and travel levers at the lever grip top from neutral to the stroke end using a ruler.
3. Measure the chord length from neutral to the stroke end.
4. Repeat step 2. three times and calculate the average values.

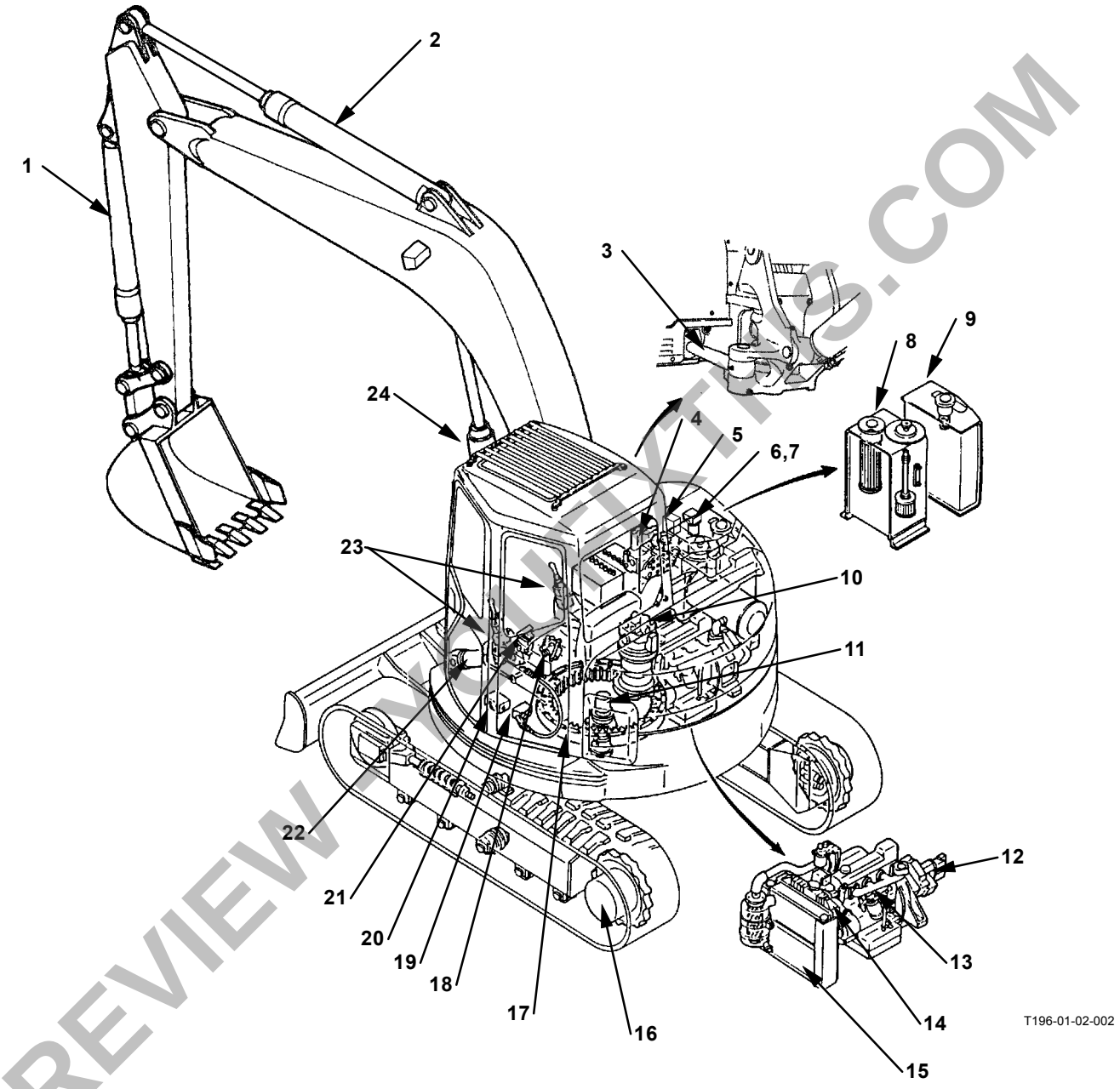
Evalution:

Refer to Performance Standard Table in Group T4-2.

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MAIN COMPONENTS

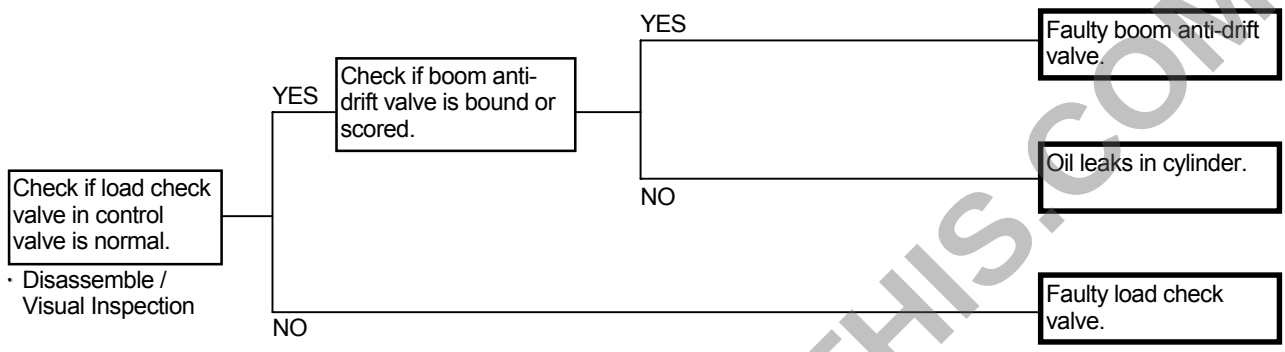


1 - Bucket Cylinder	7 - Travel Mode Solenoid Valve	13 - Engine	19 - Pilot Shut-Off Valve
2 - Arm Cylinder	8 - Hydraulic Oil Tank	14 - Radiator	20 - Shockless Valve
3 - Boom-Swing Cylinder	9 - Fuel Tank	15 - Oil Cooler	21 - Boom-Swing Pilot Valve
4 - Control Valve 1	10 - Swing Device	16 - Travel Device	22 - Blade Cylinder
5 - Shuttle Valve	11 - Center Joint	17 - Swing Bearing	23 - Front Attachment/Swing Pilot Valve
6 - Pilot Filter	12 - Pump device	18 - Control Valve 2	24 - Boom Cylinder

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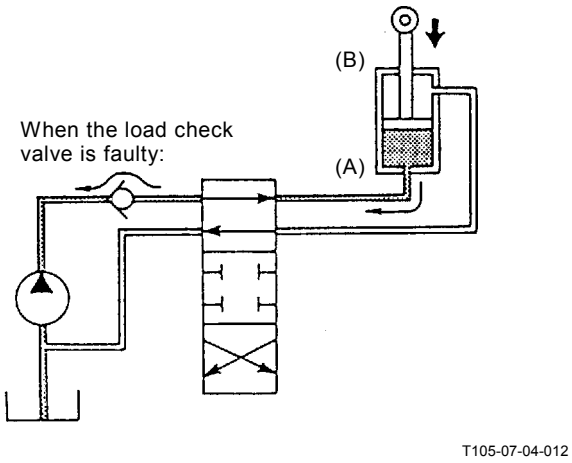
F-4 When boom raise is operated, boom start to move after moving slightly downward.

Related Fault Code: None



NOTE: 1. During the initial stage of operation, oil pressure and flow rate from the pump is low. Therefore, if the load check valve is malfunctioning, the oil in the bottom side of the boom cylinder flows back into the circuit through the load check valve, causing the boom cylinder to temporarily retract.

2. Since oil pressure and flow rate from the pump is low, if oil leaks from bottom side (A) to rod side (B) due to faulty boom cylinder piston or cylinder barrel, the boom cylinder is temporarily retracted during the initial stage of operation. In addition, cylinder force is reduced, increasing the cylinder drift in this case.



T105-07-04-012

F-5 Boom starting speed is slow during boom lower operation. Boom lower operation is jerky.

Related Fault Code: None



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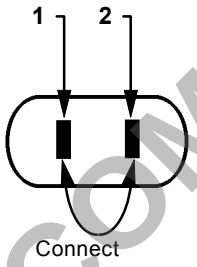
CHECK BY FALSE SIGNAL

With the key switch OFF, disconnect the sensor or switch connector. Short-circuit terminal No.1 (power source) on the machine harness end connector to terminal No. 2 (signal) with a wire and supply the power source voltage as a false signal to the connector. Check this condition using Dr. EX monitor function.
When checking sensor, if the maximum value is displayed, the system up to the MC and the machine harness end connector is normal.
When checking pressure switch, if the status ON is displayed, the system up to the MC and the machine harness end connector is normal.

IMPORTANT: On three-polarity connectors, do not short-circuit terminal No.1 or No.2 to terminal No.3 or to the vehicle .

Two Polarity

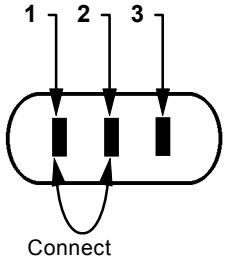
(Pressure Sensor)



T107-07-05-010

Three Polarity

(EC Sensor)



T107-07-05-011

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(Blank)

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12. Install guides (11), steel balls (10), seats (9), O-rings (8) and plugs (7) into cover (5) (at two places).

: 6 mm
: 31 to 41 N·m
(3.15 to 4.2 kgf·m, 23 to 30.5 lbf·ft)

13. Apply LOCTITE #270 to socket bolts (67). Install O-ring (65) and cylinder (66) to cover (5) with the socket bolts. After coating pins (68) with grease, install the pins into the cylinder (66).

: 8 mm
: 55 to 69 N·m
(5.6 to 7.0 kgf·m, 40 to 51 lbf·ft)

14. Install pistons (64), disc springs (63), shims (62) and piston (61) into cover (5) (at two places).

IMPORTANT: In case knock pins (3) and needle bearing (4) were removed, install them into cover (5) before starting step 15.
When installing valve plate (1), align oil ports with those on cover (5).

15. Coat valve plate (1) with grease, install the valve plate to cover (5).

IMPORTANT: When installing cover (5), take care not to drop valve plate (1) and pins (68).

16. Secure cover (5) to housing (25) with socket bolts (6) and (12).

: 12 mm
: 150 to 180 N·m
(15 to 18 kgf·m, 108.5 to 130.2 lbf·ft)

17. Apply LOCTITE #241 to orifice (52). Install the orifice, O-ring (53) and plug (54) into body (44).

: 3 mm [for orifice (52)]
: 5.1 to 6.4 N·m
(0.52 to 0.65 kgf·m, 3.8 to 4.7 lbf·ft)
: 4 mm [for plug (54)]
: 13.2 to 17.6 N·m
(1.35 to 1.8 kgf·m, 9.8 to 13 lbf·ft)

18. Install spring (55), spool (56), O-ring (57) and plug (58) into body (44).

: 6 mm
: 31 to 41 N·m
(3.15 to 4.2 kgf·m, 23 to 30.5 lbf·ft)

19. Install sleeve (49), spring (51) and spool(50) into body (44) in this order. Secure solenoid (47) to body (44) with socket bolts (45).

: 3 mm
: 3.4 to 4.4 N·m
(0.35 to 0.45 kgf·m, 2.5 to 3.3 lbf·ft)

20. Install O-rings (59) and (60) to body (44). Secure body (44) to cover (5) with socket bolts (45).

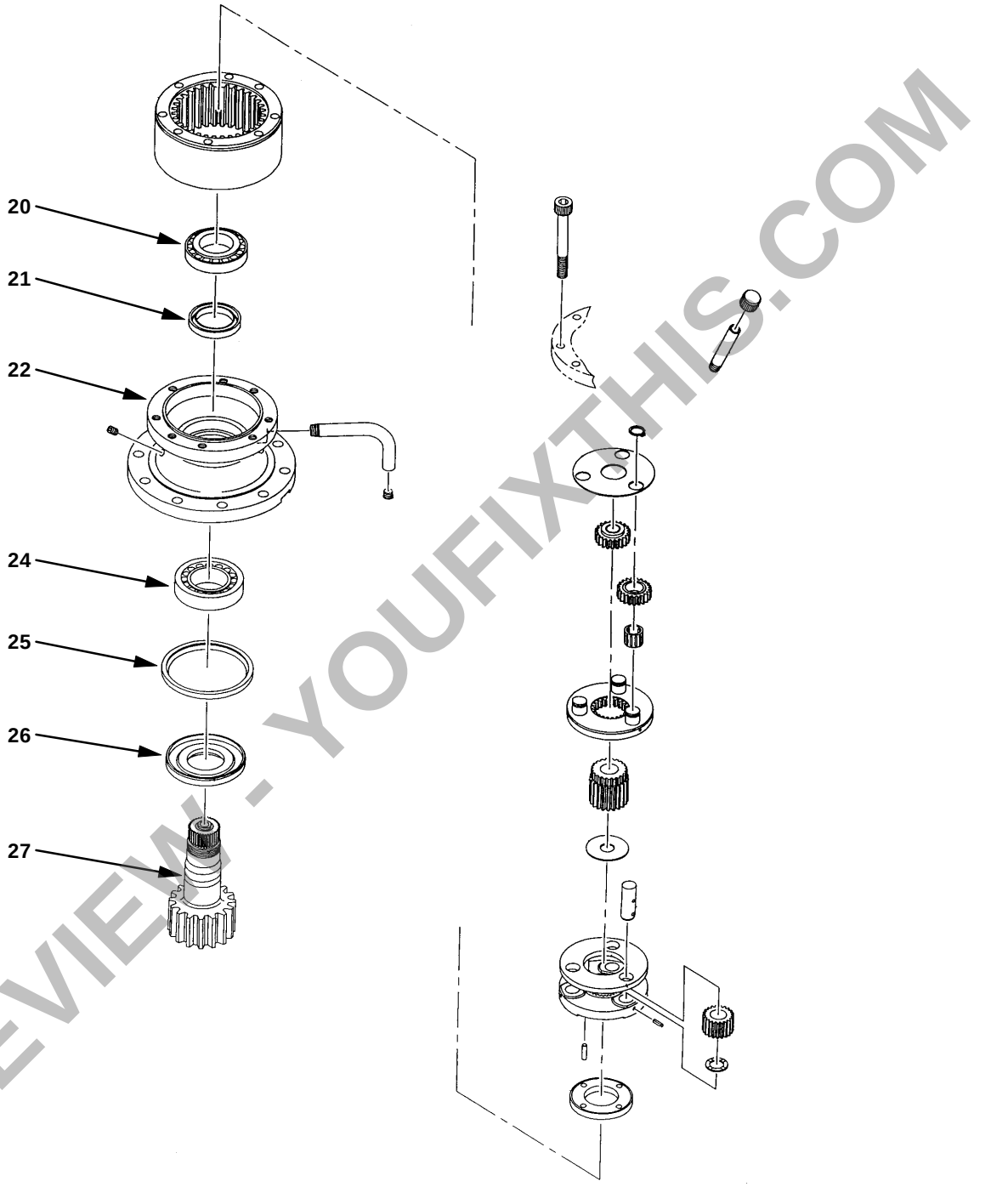
: 8 mm
: 55 to 69 N·m
(5.6 to 7.0 kgf·m, 40 to 51 lbf·ft)

21. Secure pilot pump (42) to cover (5) with socket bolts (43). (Secure the blade pump with pilot pump (42) if the blade pump is equipped.)

: 6 mm
: 28 to 35 N·m
(2.9 to 3.6 kgf·m, 21 to 26 lbf·ft)

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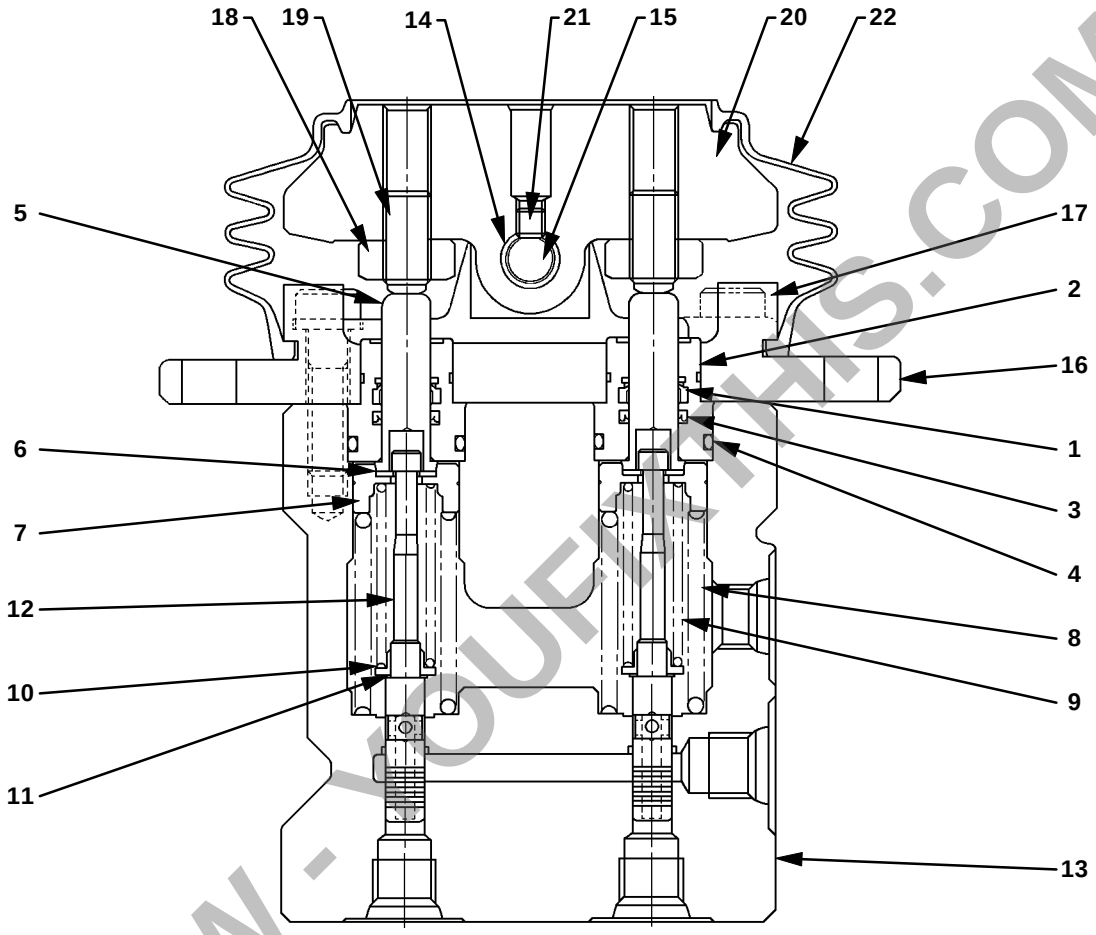


W152-02-06-001

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ASSEMBLE PILOT VALVE FOR BOOM SWING

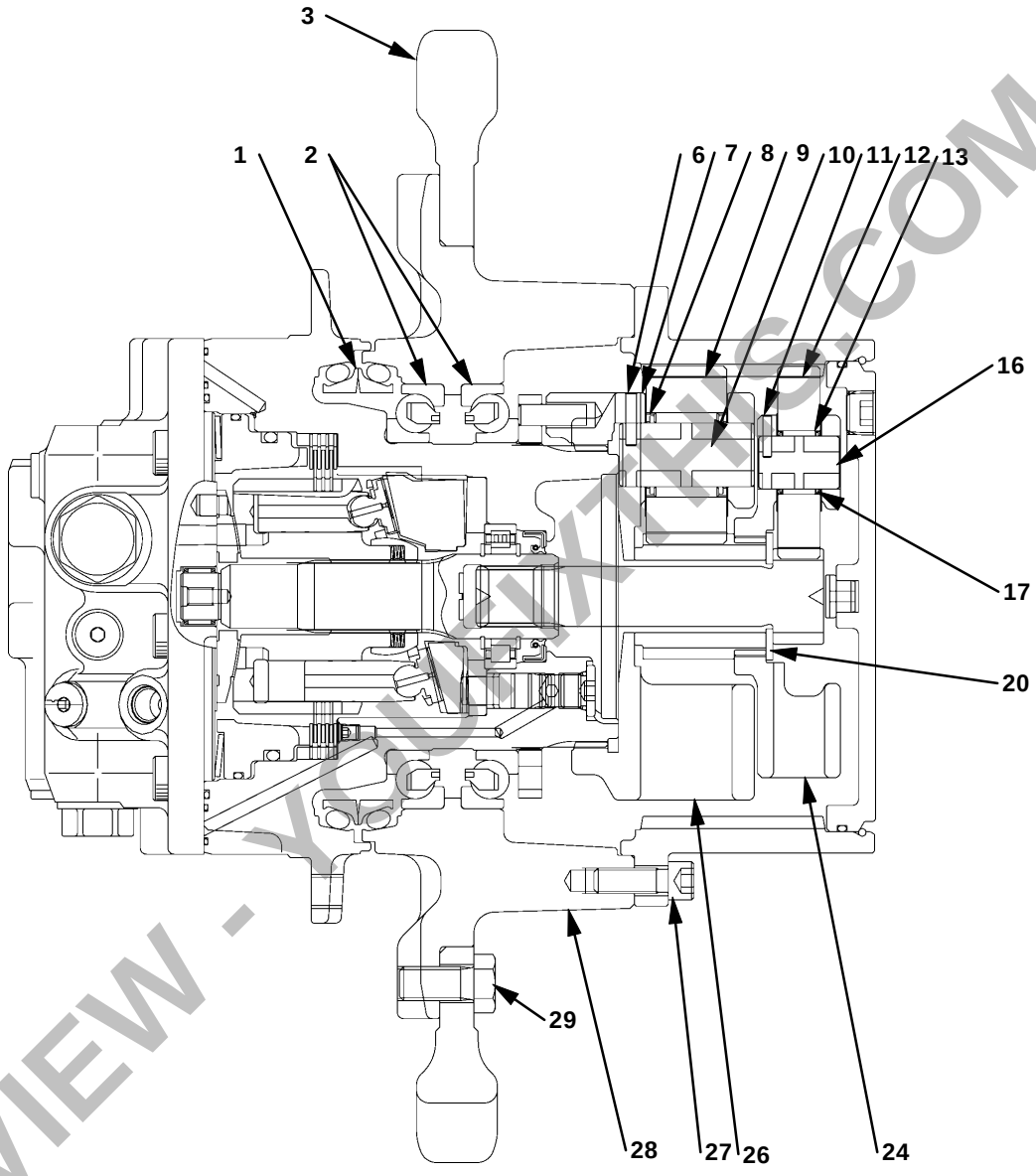


T554-02-07-010

1 - Dust Seal (2 Used)
2 - Bushing (2 Used)
3 - Oil Seal (2 Used)
4 - O-Ring (2 Used)
5 - Pusher (2 Used)
6 - Washer (4 Used)
7 - Spring Guide (2 Used)
8 - Return Spring (2 Used)
9 - Balance Spring (2 Used)
10 - Spacer (2 Used)
11 - Shim (2 Used)
12 - Spool (2 Used)
13 - Casing
14 - Bushing (2 Used)
15 - Pin
16 - Plate
17 - Socket Bolt (2 Used)
18 - Lock Nut (2 Used)
19 - Set Screw (2 Used)
20 - Cam
21 - Set Screw
22 - Boots

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W197-03-02-001

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Assemble Front Idler

- Be sure to thoroughly read all precautions for disassembly / assembly work on page W1-1-1 before starting any repair work.

1. Install bushings (6) (2 used) into idler (5) using a press.

IMPORTANT: When installing bearing (1) onto axle (4), take care not to damage O-ring (7).

2. Install O-ring (7) to axle (4). Aligning the pin holes, install bearing (1) onto axle (4). Then, drive pin (2) into bearing (1).

IMPORTANT: For handling of floating seal (3), refer to the section "Precautions for floating seal handling" on page W1-1-3.

3. Install one pair of floating seal (3) into idler (5) and bearing (1). Press axle (4) into idler (5) from the side installed with floating seal.

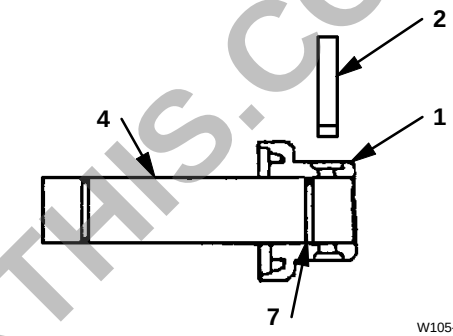
4. Install the other pair of floating seal (3) into idler (5) and bearing (1). Install O-ring (7) to axle (4). Aligning the pin holes, install bearing (1) onto axle (4). Then drive pin (2) into bearing (1).

5. Add engine oil (SAE #30, API Class CD)140 cm^3 via bearing (1) plug hole. Install plug (8) to bearing (1).

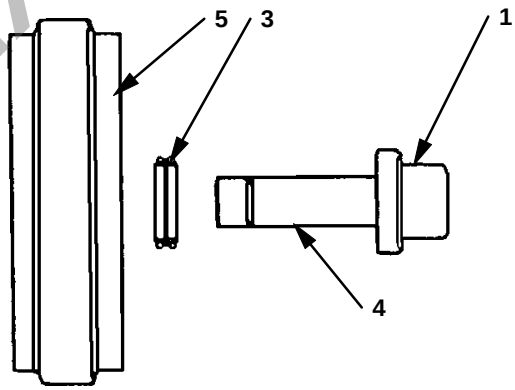
: 6 mm
: 20 N·m (2 kgf·m, 14.5 lbf·ft)

7. Secure yoke (10) to bearings (1) with socket bolts (9) (4 used).

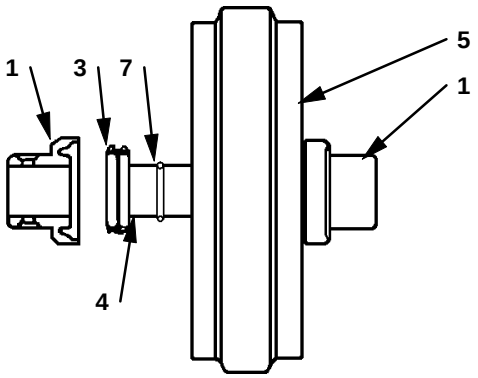
: 12 mm
: 175 N·m (18 kgf·m, 130 lbf·ft)



W105-03-05-014



W157-03-05-006



W157-03-05-005

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Remove Boom Swing Cylinder

CAUTION: Prevent personal injury. Metal debris may fly off when a hammer is used to remove pins. Be sure to wear necessary protections, such as goggles, hard-hat, etc.

1. Loosen the nut (3) on stopper bolt (4) of pin (1), to remove stopper bolt (4). Pull pin (1) out, remove boom swing cylinder (5) from swing post to remove thrust plate (2).

   : 22 mm

2. Loosen and remove mounting bolts (7) (4 used) located on front side cover (6). Remove cover (6).

   : 13 mm

3. Loosen and remove mounting socket bolts (9) (5 used) on right side cover (8) and mounting bolt (10). Remove the cap on fuel tank to remove cover (8).

   : 8 mm
   : 17 mm

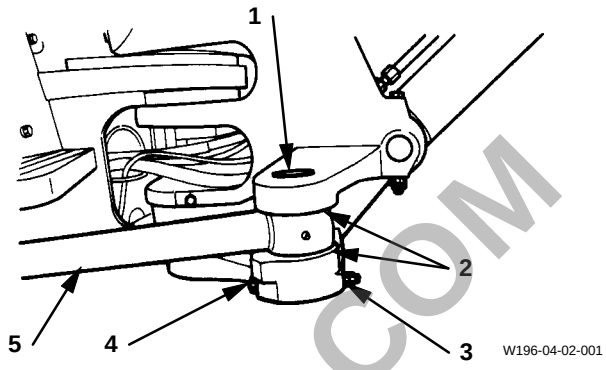
4. Drain fuel out to a container of 100 L (26.4 US gal) by loosing plug (11) to open the drain cock (12) on the fuel tank.

   : 6 mm

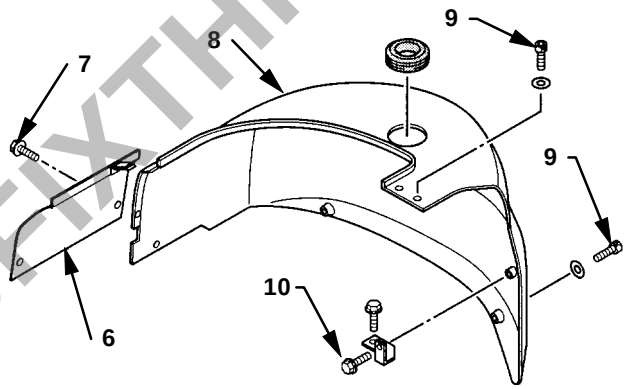
CAUTION: Fuel tank (13) weight: 36 kg (79 lb)

5. Remove fuel hose pipe and mounting bolt (14) from fuel tank (13). Then, hoist and remove fuel tank (13). Cap each fuel hose ends.

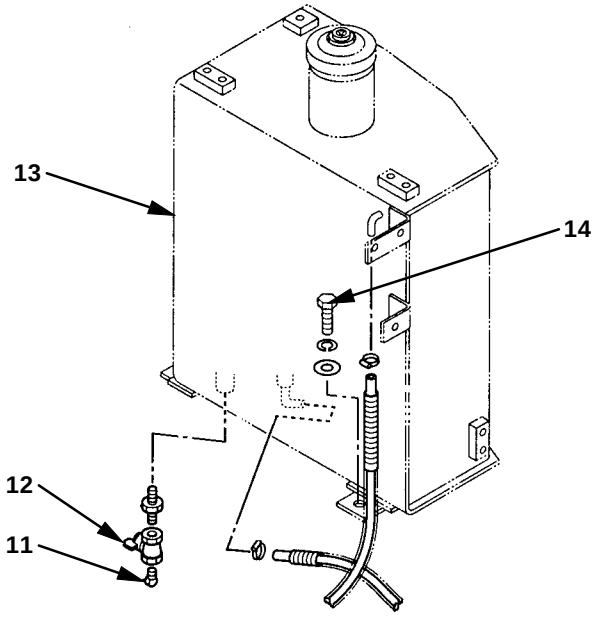
   : 24 mm



W196-04-02-001



W196-02-02-002

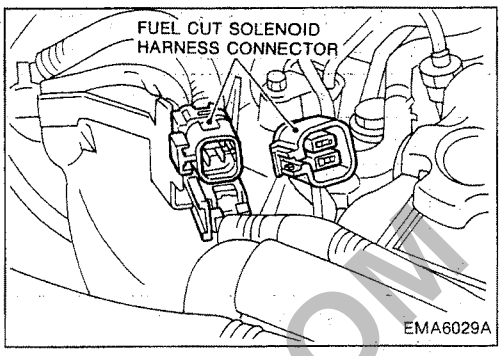


W196-04-02-002

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Disconnect the fuel cut solenoid connector to prevent fuel from being injected when the engine is cranked. (Automotive use)



5) Crank the engine and check the compression pressure (after the compression gauge needle has stabilized.)

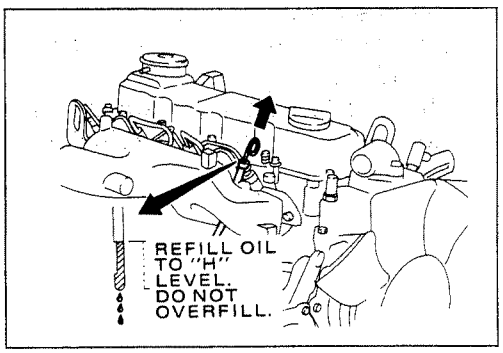
(After warming up)

Standard value	kg/cm^2 (psi)/rpm	30.0 (427)/200
Service limit	kg/cm^2 (psi)/rpm	25.0 (356)/200
Limit of difference between cylinders	kg/cm^2 (psi)/rpm	3.0 (43)/200

LUBRICATING SYSTEM

CHECKING ENGINE OIL

1) Check oil level before starting engine.
   If the engine has been started, stop the engine and wait at least 10 minutes before checking oil level.
2) The oil level must be between the H and L marks on the level gauge.
3) Engine oil must be free from white cloudiness and heavy contamination.



API classification	Ambient temperature °C (°F)	Viscosity
Class CD	–18 to 10 (0 to 50)	SAE 10W
	–7 to 25 (19 to 77)	SAE 20W/20
	5 to 40 (41 to 104)	SAE 30
	Higher than 30 (86)	SAE 40
	Higher than –18 (0)	SAE 15W/40

Oil quantity

Unit: ℓ (Imp qt)

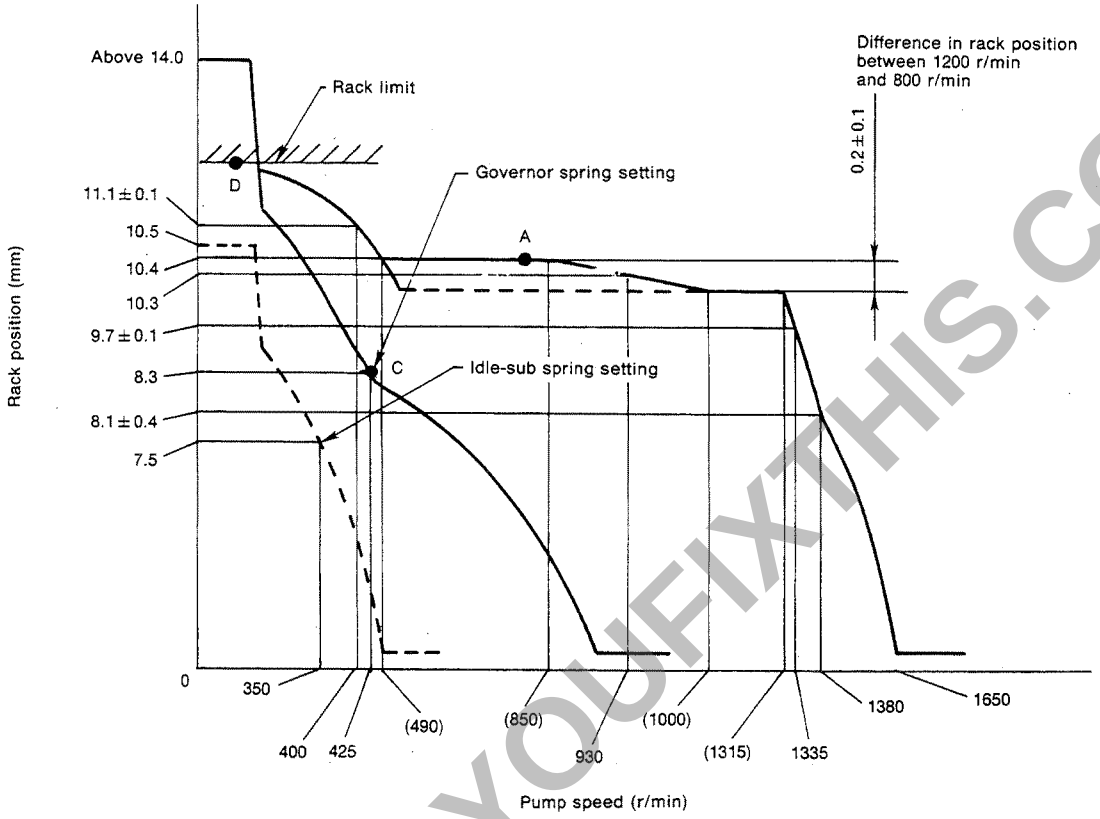
	Automotive use	Industrial use
Oil pan	H: 7.5 (6-5/8), L: 6 (5-1/4)	H: 10 (8-3/4), L: 8 (7)
Oil filter	0.7 (5/8)	

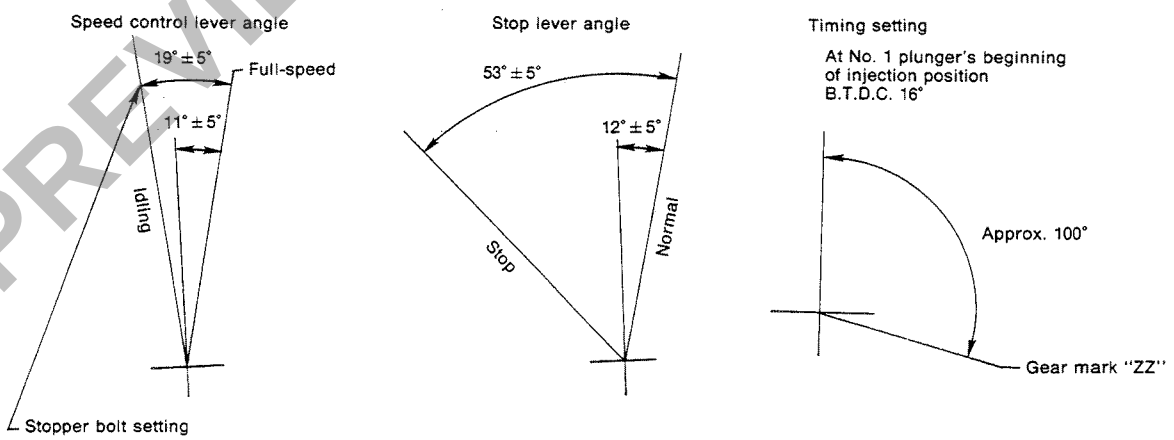
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3. Governor Adjustment

Recommended speed droop adjustment screw position: 13
(notches from fully tightened position)





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