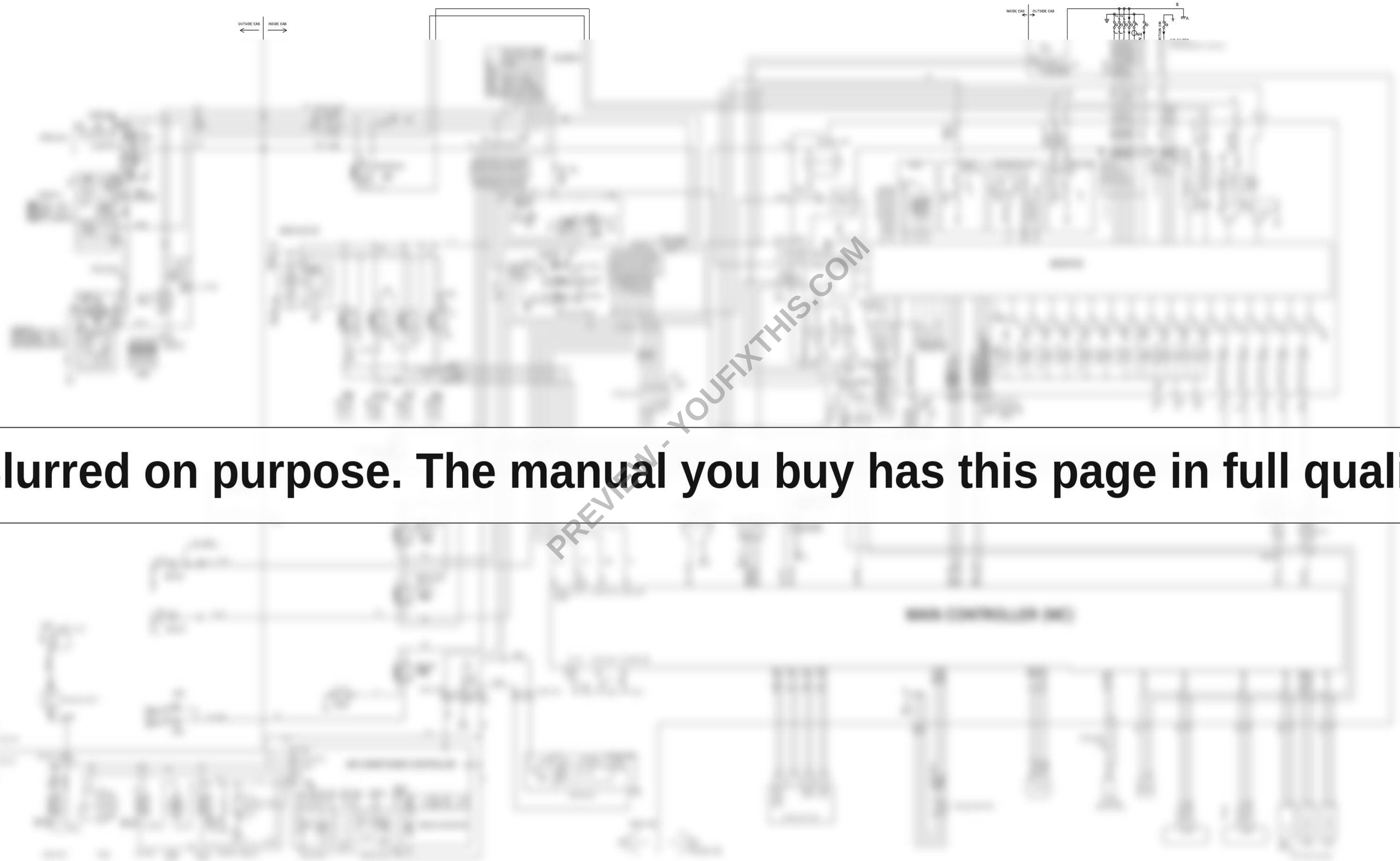
EX150LC-5 ELECTRICAL CIRCUIT DIAGRAM



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EX150LC-5 HYDRAULIC CIRCUIT DIAGRAM

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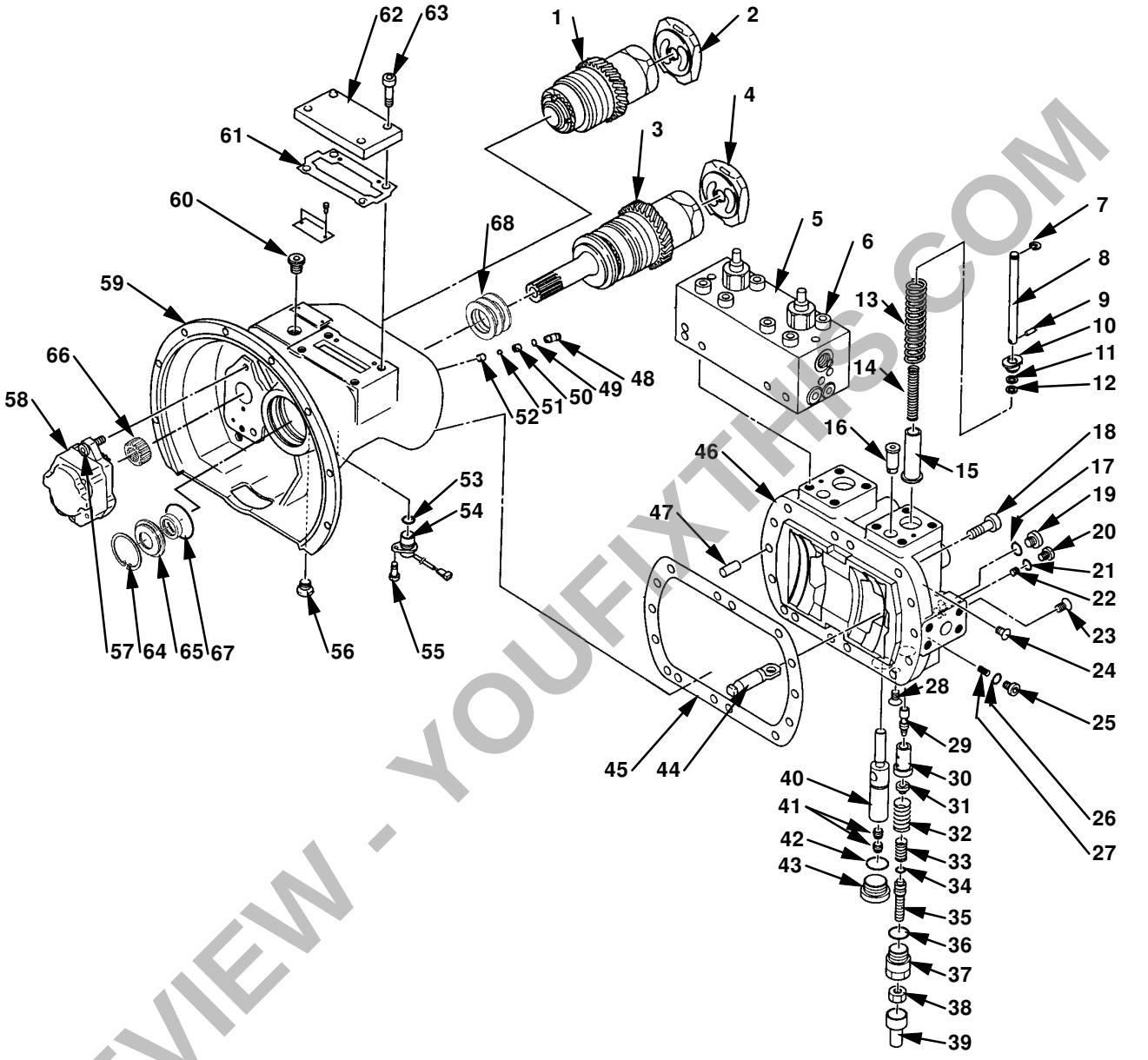


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DISASSEMBLE PUMP DEVICE



W165-02-04-001

1 - Rotary Group (Idle Side)
2 - Valve Plate
3 - Rotary Group (Drive Side)
4 - Valve Plate
5 - Regulator Cover
6 - Socket Bolt (8 Used)
7 - Spacer (2 Used)
8 - Rod (2 Used)
9 - Spring Pin (2 Used)
10 - Spring Seat (2 Used)
11 - 0.5 mm Shim (2 Used)
12 - 1.0 mm Shim (4 Used)
13 - Spring (2 Used)
14 - Spring (2 Used)
15 - Spring Seat (2 Used)
16 - Retainer (2 Used)
17 - O-Ring (2 Used)
18 - Socket Bolt (12 Used)
19 - Plug (2 Used)
20 - Plug (2 Used)
21 - O-Ring (2 Used)
22 - Orifice (2 Used)
23 - Plug
24 - Plug
25 - Plug (2 Used)
26 - O-Ring (2 Used)
27 - Orifice (2 Used)
28 - Plug
29 - Spool
30 - Bushing
31 - Spring Seat
32 - Spring
33 - Spring
34 - O-Ring
35 - Adjusting Screw
36 - O-Ring
37 - Guide
38 - Lock Nut
39 - Cap
40 - Piston (2 Used)
41 - Set Screw (4 Used)
42 - O-Ring (2 Used)
43 - Plug (2 Used)
44 - Rod (2 Used)
45 - Packing
46 - Valve Casing
47 - Knock Pin (2 Used)
48 - Sleeve
49 - O-Ring (2 Used)
50 - Guide
51 - Steel Ball
52 - Bushing
53 - O-Ring
54 - N Sensor
55 - Socket Bolt
56 - Plug
57 - Socket Bolt (2 Used)
58 - Pilot Pump
59 - Housing
60 - Plug
61 - Packing
62 - Plate
63 - Socket Bolt (4 Used)
64 - Retaining Ring
65 - Seal Case
66 - Coupling
67 - O-Ring
68 - Shim

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TIGHTENING TORQUE SPECIFICATIONS

No.	Descriptions	Bolt Dia mm	Q'ty	Wrench Size mm	Torque		
					N·m	kgf·m	lbf·ft

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Dr.EX FAULT CODE

FAULT CODE	TROUBLE	CORRECTIVE ACTION
01	EC sensor failure	1) Perform “Retrial B.” 2) Check harness. 3) Replace EC sensor.
02 03	Pump 1 delivery pressure sensor failure Pump 2 delivery pressure sensor failure	1) Perform “Retrial B.” 2) Check harness. 3) Replace the pump delivery pressure sensor.
04 05	Pump 1 control pressure sensor failure Pump 2 control pressure sensor failure	1) Perform “Retrial B.” 2) Check harness. 3) Replace the pump control pressure sensor.
06	Arm roll-in pilot pressure sensor failure	1) Perform “Retrial B.” 2) Check harness. 3) Replace the arm roll-in pilot pressure sensor.
07	Engine control dial failure	1) Perform “Retrial B.” 2) Check harness. 3) Replace the engine control dial.

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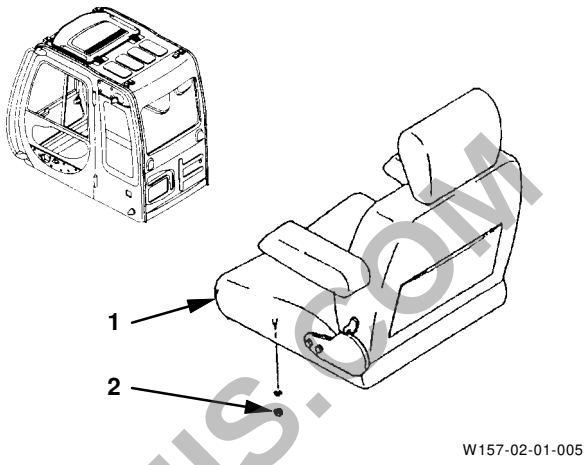
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REMOVE AND INSTALL CAB

Removal

1. Remove nuts (2) and seat (1).

   : 13 mm



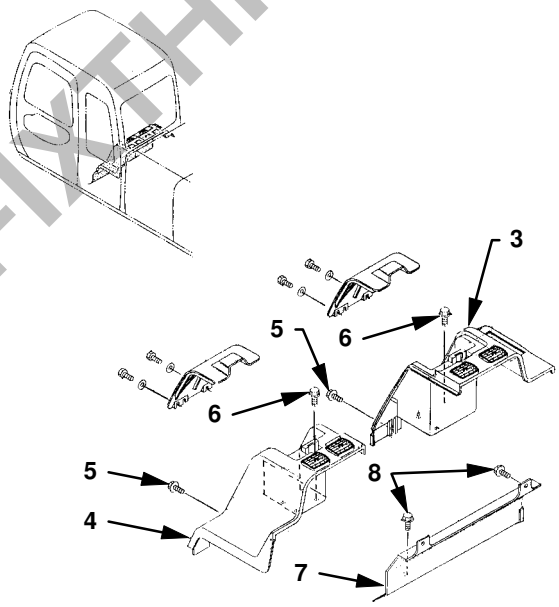
W157-02-01-005

2. Loosen bolts (5) behind the cab and bolts (6) in rear boxes (3 and 4).
   Remove rear boxes (3 and 4).

   : 13 mm

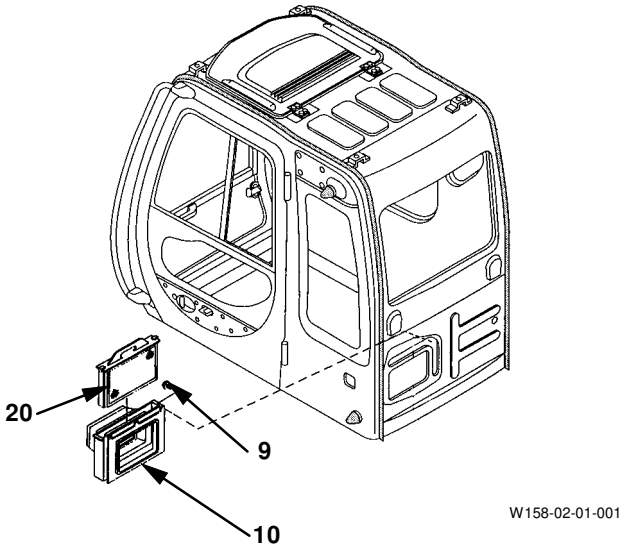
3. Loosen bolts (8) to remove rear box under cover (7).

   : 13 mm



W157-02-01-017

4. Remove filter (20). Loosen screw (9) to remove duct (10) from the cab.



W158-02-01-001

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RELATIONSHIP BETWEEN MACHINE TROUBLE SYMPTOMS AND PARTS IN TROUBLE

This table indicates the probable machine trouble symptoms by part item when each part is failed and procedures to determine if the part has failed.

		EC Motor	EC Sensor	Engine Control Dial
Part function		• To operate governor lever.	• To detect the slow-idle speed governor lever position (2.5 V).	• To instruct the engine target speed governor lever position.
Control System Trouble		• Governor lever does not move.	• Whenever key switch is ON, governor lever position is learned as in the slow idle speed position differing from the correct position. Accordingly, engine speed is controlled afterward with the discrepancy which occurred at this time.	• Even if engine control dial is operated, engine speed is unchanged. • If harness to engine control dial is broken, target speed 1600 min-1 is used as the backup value.
Machine Symptom		• Even if engine control dial is operated, engine speed does not increase from slow speed range. • Starter rotates but engine fails to start occasionally. • While engine is running at a faster than specific speed, if harness to EC motor is broken, engine stalls. • While engine is running at a slower than specific speed, if harness to EC motor is broken, engine becomes uncontrollable. Engine does not stop even if key switch is turned OFF.	• If the discrepancy occurred to the slower side, engine speed is changed by engine control dial. However, engine speed control range stays slower than normal. (Note: If the discrepancy occurred to the faster side, when engine control dial is turned to the fastest position, EC motor continues moving. However, EC motor is a worm gear type so that governor lever is kept holding at the full stroke position. If engine control dial is turned to the slowest position, governor lever returns to the slow idle position.) • When engine is started, engine speed fluctuates. • Engine start may become difficult.	• Engine speed is constantly held at 1 600 min-1. (Auto-idle function operates, and engine can be stopped by turning key switch.)
Trouble Shooting Procedures	By Dr.EX Self-Diagnosing Function	-	Fault code 01 is displayed.	Fault code 07 is displayed.
	By Dr.EX Monitor Function	-	Monitor Item: EC angle	Monitor item: Target engine speed
	By Lamp Harness Check	• Install lamp harness (ST7125). Then, check output signal from EC and check if harness is normal.	-	-
	By Other Check/ Measurements	-	-	-
Note		• Engine is stopped by EC motor. No engine stop motor is provided. However, a fuel cutoff cable is installed.	• If EC sensor is failed, engine learning operation becomes impossible.	-
Descriptions in (Operational Principle)Technical Manual		T2-1	T2-1	T2-1

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SPECIFICATIONS

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RECOGNIZE SAFETY INFORMATION

- This is the **SAFETY ALERT SYMBOL**.
  - When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.
  - Follow recommended precautions and safe operating practices.



001-E01A-0688

SA-688

UNDERSTAND SIGNAL WORDS

- On machine safety signs, signal words designating the degree or level of hazard - DANGER, WARNING, or CAUTION - are used with the safety alert symbol.
  - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
  - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
  - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
  - **DANGER or WARNING safety signs** are located near specific hazards. General precautions are listed on **CAUTION safety signs**.
  - Some safety signs don't use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.
- **CAUTION** also calls attention to safety messages in this manual.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
- ***NOTE*** indicates an additional explanation for an element of information.



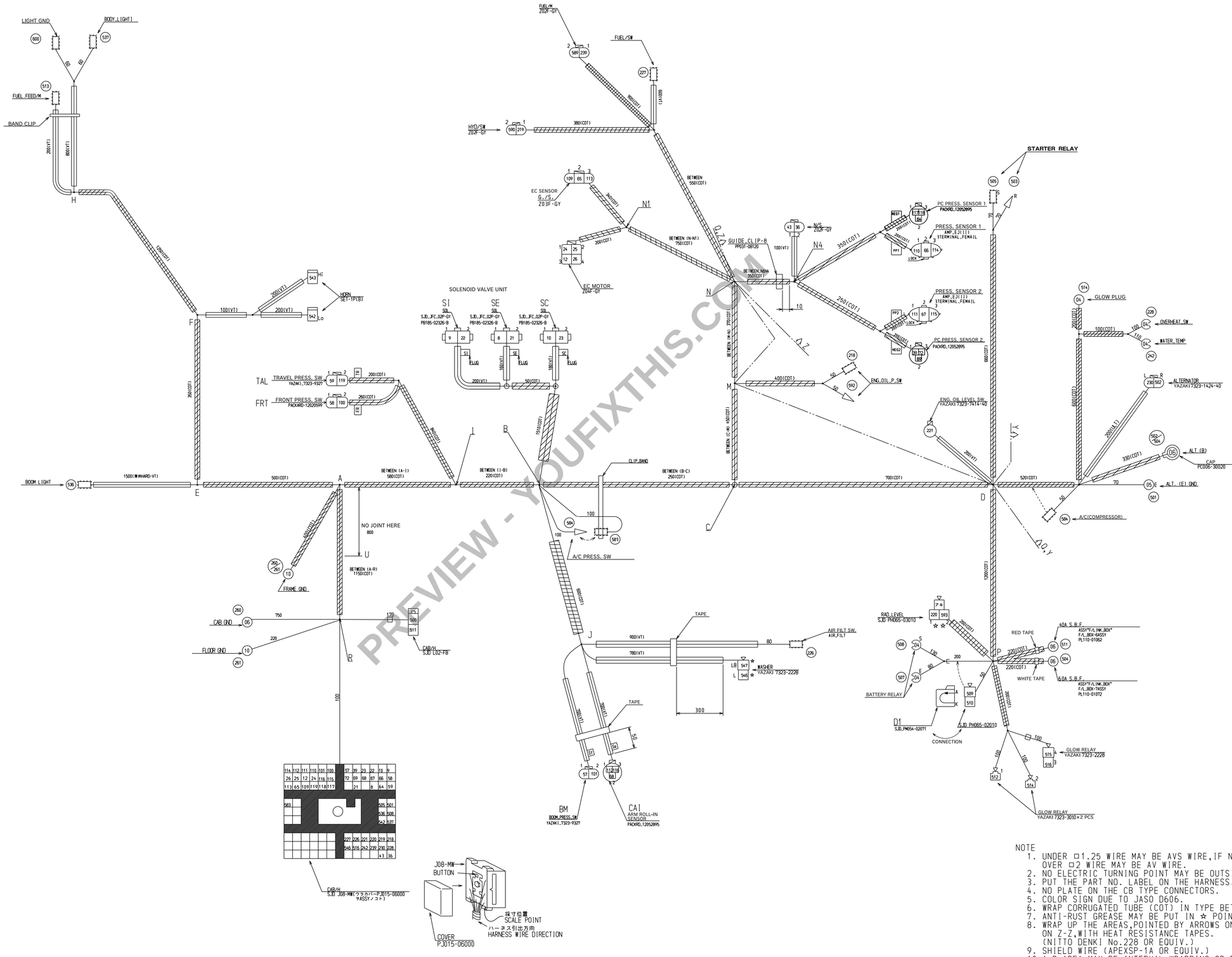
SA-1223

002-E01C-1223

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EX150LC-5 ENGINE HARNESS

NO.	SIZE	COLOR	CIRCUIT FROM	CIRCUIT TO	COMMENT
8	0.5	R/W	CAB/H	SE-1	
9	0.5	Lg/B	CAB/H	S1-1	
10	0.5	LO/R	CAB/H	SC-1	
12	0.5	O/R	CAB/H	EC/M-3	
21	0.5	R/Y	CAB/H	SE-2	
22	0.5	Lg/R	CAB/H	S1-2	
23	0.5	L/W	CAB/H	SC-2	
24	0.5	B/R	CAB/H	EC/M-1	
25	0.5	R	CAB/H	EC/M-2	
26	0.5	Y	CAB/H	EC/M-4	
36	0.5	B	CAB/H	N/S-2	OUTER_OF_SHIELD
39	0.5	W/R	CAB/H	NEG 2-1	CHAVX
43	0.5	W	CAB/H	N/S-1	INNER_OF_SHIELD
57	0.5	B/R	CAB/H	BM-1	
58	0.5	B/W	CAB/H	FRT-1	
59	0.5	W/B	CAB/H	TAL-1	
64	0.5	L	CAB/H	NEG 1-2	CHAVX
65	0.5	Y/B	CAB/H	EC-ANG/S-2	
66	0.5	R/G	CAB/H	P/S_P1-2	CHAVX
67	0.5	G/B	CAB/H	P/S_P2-2	CHAVX
68	0.5	R/B	CAB/H	CAI-2	
69	0.5	G/W	CAB/H	NEG 2-2	CHAVX
72	0.5	L/G	CAB/H	NEG 2-3	CHAVX
100	0.5	O/R	CAB/H	FRT-2	
101	0.5	O/L	CAB/H	BM-2	
109	0.5	Y/L	CAB/H	EC-ANG/S-1	
110	0.5	W	CAB/H	P/S_P1-1	CHAVX
111	0.5	Y/G	CAB/H	P/S_P2-1	CHAVX
112	0.5	Y/R	CAB/H	CAI-1	
113	0.5	B/L	CAB/H	EC_ANG/S-3	
114	0.5	R/Y	CAB/H	P/S_P1-3	CHAVX
115	0.5	Y/B	CAB/H	P/S_P2-3	CHAVX
116	0.5	B/W	CAB/H	CAI-3	
117	0.5	L/B	CAB/H	NEG 1-1	CHAVX
118	0.5	G/Y	CAB/H	NEG 1-3	CHAVX
119	0.5	O/R	CAB/H	TAL-2	
218	0.5	W/L	CAB/H	ENG.OIL_P.SW-F	
219	0.5	G	CAB/H	HYD/SW-1	
220	0.5	L	CAB/H	RAD_LEV-1	
221	0.85	W/B	CAB/H	ENG.OIL_LEV	
226	0.5	G/L	CAB/H	AIR_FILT-F	
227	0.5	W/Y	CAB/H	FUEL_SW	
228	0.5	R/L	CAB/H	OVERHEAT	AEX
230	0.5	L/L	CAB/H	ALT-L	AEX
239	0.5	Br	CAB/H	FUEL_M-1	
242	0.5	W/B	CAB/H	WATER_TEMP	AEX
260	5	B	FRAME_GND	CAB_GND	
261	5	B	FRAME_GND	FLOOR_GND	
501	3	B	CAB/H	ALT-E	
502	0.5	W	ALT-R	ALT-B	
503	0.85	W/G	(238) ⊕	START-R	
504	8	W	60A_F/L	ALT-B	
505	1.25	B/W	CAB/H	START-S	
506	5	W	(504) ⊕	CAB/H	
507	2	B	(501)	BATT/R-E	
508	2	R/W	CAB/H	BATT/R-S	
509	2	B	(501)	DT-A	
510	2	R/W	(508) ⊕	DT-K	
511	3	R	40A_F/L	CAB/H	
512	3	R	(511) ⊕	G/R-1	
513	2	R/B	(511) ⊕	FUEL_FEED/M	
514	3	B/Y	G/R-2	GROM	
515	0.5	B	(501)	G/R-4	
516	0.5	G/Y	CAB/H	G/R-3	
536	2	R/L	CAB/H	BOOM_LIGHT	
537	2	R	CAB/H	BODY_LIGHT	
542	0.85	R/G	CAB/H	HORN-LO	AV
543	0.85	R/G	(542) ⊕	HORN-HI	AV
546	0.5	Pu	CAB/H	WASHER-L	
547	0.5	B	(501)	WASHER-LB	
583	0.85	W/B	CAB/H	A/C_SW-F	
584	0.85	W/R	A/C	A/C_SW-M	
589	0.5	B	(501)	FUEL/M-2	
590	0.5	B	(501)	HYD/SW-2	
591					
592	0.5	B	(501)	ENG.OIL_P.SW-M	
593	0.5	B	(501)	RAD_LEVEL-2	
600	2	B	(501)	LIGHT_GND	



NOTE
1. UNDER □1.25 WIRE MAY BE AVS WIRE,IF NO COMMENT.
   OVER □2 WIRE MAY BE AV WIRE.
2. NO ELECTRIC TURNING POINT MAY BE OUTSIDE OF Q-Q POINT.
3. PUT THE PART NO. LABEL ON THE HARNESS.
4. NO PLATE ON THE CB TYPE CONNECTORS.
5. COLOR SIGN DUE TO JASO D606.
6. WRAP CORRUGATED TUBE (COT) IN TYPE BETWEEN H-F-E-A,A-B
7. ANTI-RUST GREASE MAY BE PUT IN ☆ POINTS
8. WRAP UP THE AREAS,POINTED BY ARROWS ON Y-Y AND
   ON Z-Z,WITH HEAT RESISTANCE TAPES.
   (NITTO DENKI No.228 OR EQUIV.)
9. SHIELD WIRE (APEXSP-1A OR EQUIV.)
10. A-R AREA MAY BE INTERVAL WRAPPING OR PITCH WRAPPING.
11. ⊕MARKED JOINT MAY BE WRAPPED BY SELF-FUSION TAPE
    OR MAY BE PUT ON R DIRECTION FROM U POINT,OR MAY
    BE DOUBLE JOINT ON THE HOLE TYPE CONNECTOR.

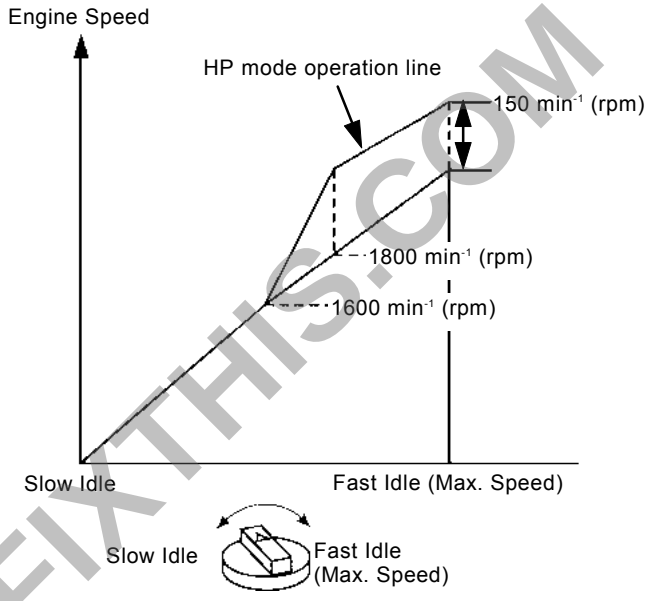
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HP Mode Control

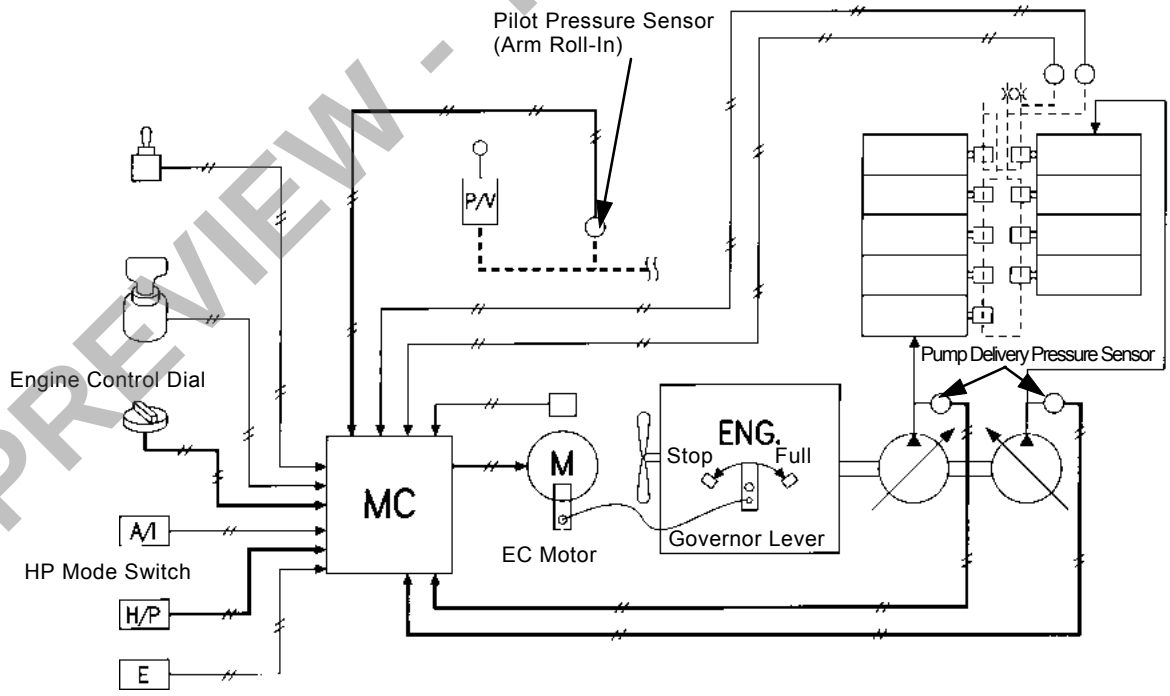
Purpose: To instantaneously increase the engine speed only when a little more hydraulic power is required for arm roll-in operation. For example, to increase the arm roll-in power while conducting a deep ditching work.

Operation: Only when the following conditions are satisfied, the MC drives the EC motor to operate the engine faster than normal operation.

- Engine Control Dial Setting: 1600 min-1 or faster
- HP Mode Switch: ON
- Operation: Arm Roll-In
- Average Delivery Pressures of Pump 1 and 2: Higher Range



T157-04-03-002



T157-04-04-029

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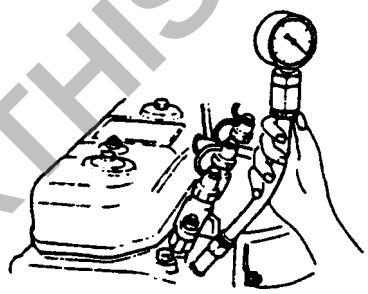
ENGINE COMPRESSION PRESSURE

Summary:

1. Measure compression pressure in the cylinders to check for a decline in engine power.
2. Check exhaust gas color and the amount of blow-by gas from the crankcase. Keep track of engine oil consumption.
3. Check for abnormalities in the intake system, including the air filter.

Preparation:

1. Confirm that valve clearances are correct.
2. Confirm that the batteries are charged properly.
3. Run the engine until the coolant temperature gauge reaches the operating range.
4. Stop the engine. Remove glow plugs from each cylinder.
5. Install an adaptor and compression gauge in place of the glow plug in one cylinder. (Be sure to sufficiently tighten the adaptor and compression gauge to prevent air leakage.)



T157-05-02-001

Measurement:

1. Turn the starter to crank the engine. Record the compression pressure of each cylinder.
2. Repeat measurement three times for each cylinder and calculate the mean values.

Evaluation:

Refer to the Performance Standard Table in Group T4-5.

Remedy:

Refer to engine shop manual.

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E-6 Engine Does Not Stop Even If Key Switch is Turned OFF.
(When the engine does not stop, be sure to stop the engine by pulling the fuel cut handle located under the seat stand before checking.)

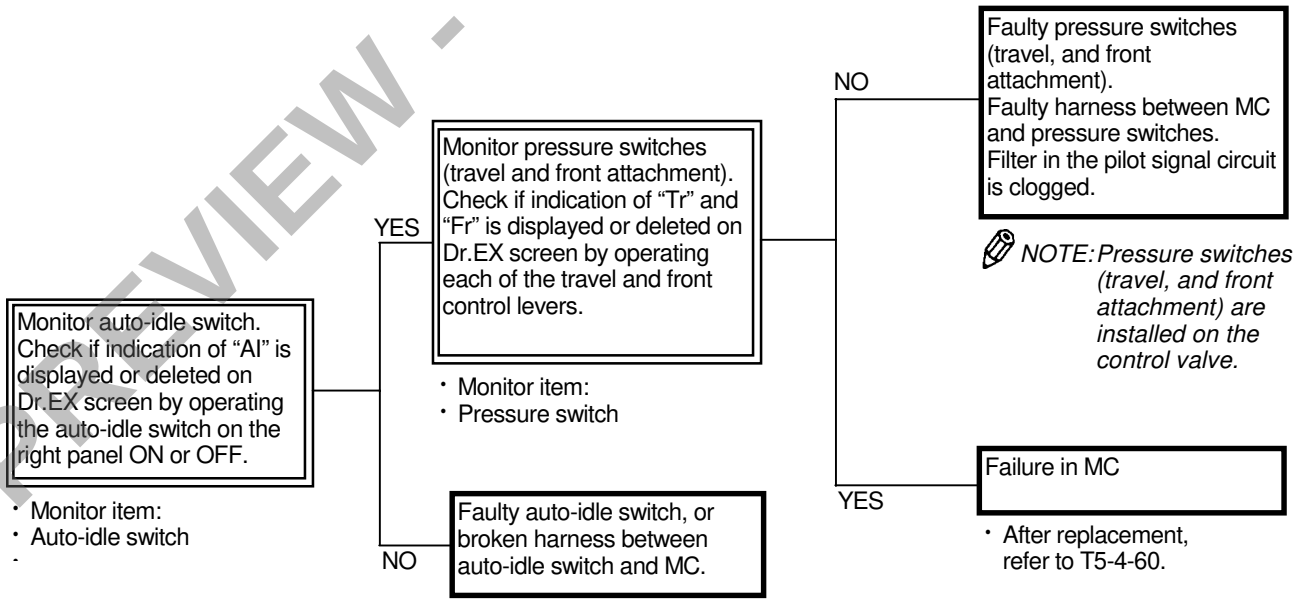
Related Fault Codes: 01 and 07

Checking Instruction
- Trouble symptoms such as “Engine runs slower than normal at all operation speed.” or “Even if engine control dial is turned, engine speed is unchanged” are sure to exist at the same time. Perform the troubleshooting of all symptoms.

E-7 Auto-Idle Function Does Not Function.

Related Fault Code: None

Checking Instruction
- When trouble corresponding to E-1 to E-6 exist, perform the troubleshooting of them beforehand.
- Refer to the Control System group titled “Auto-Idle Control” in the SYSTEM Section in the Operational Principle book (Technical Manual).

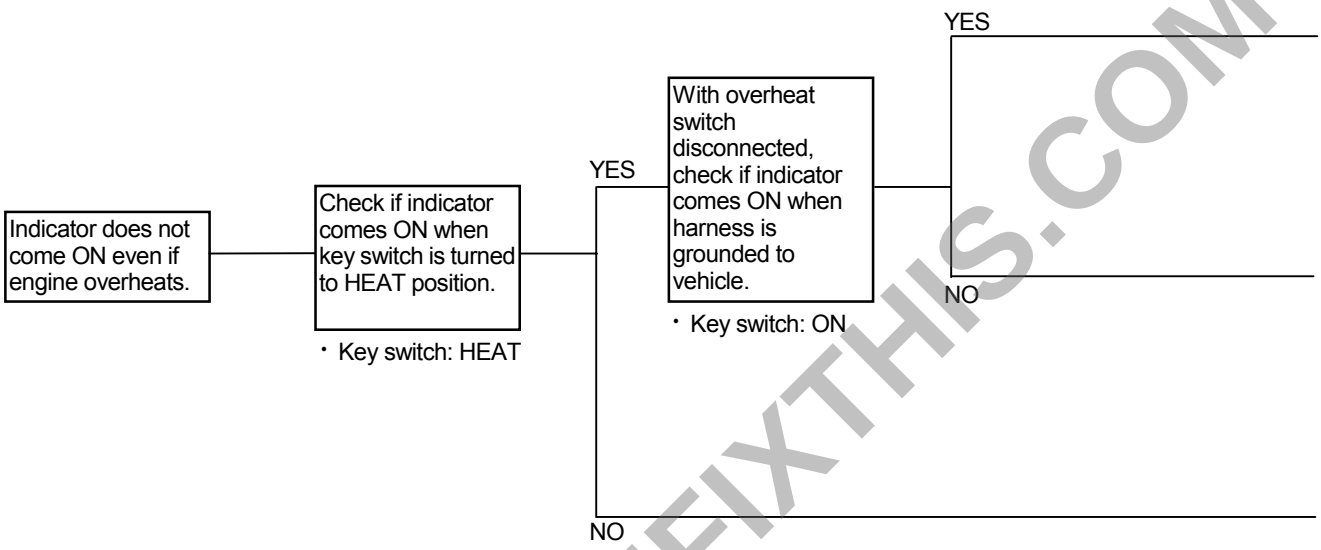


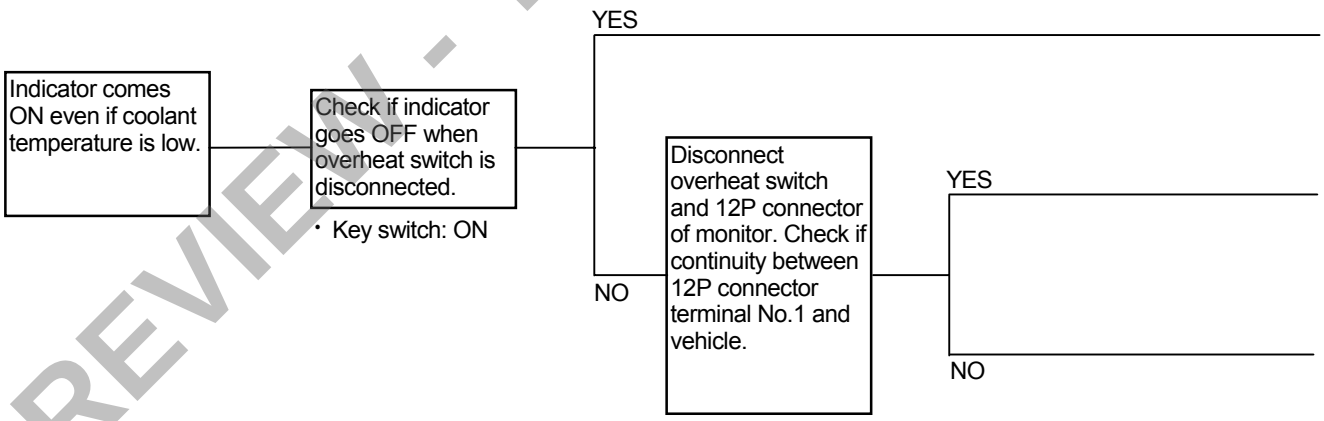
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MALFUNCTION OF OVERHEAT INDICATOR

Providing that:

- Be sure to inspect wiring connections prior to troubleshooting.





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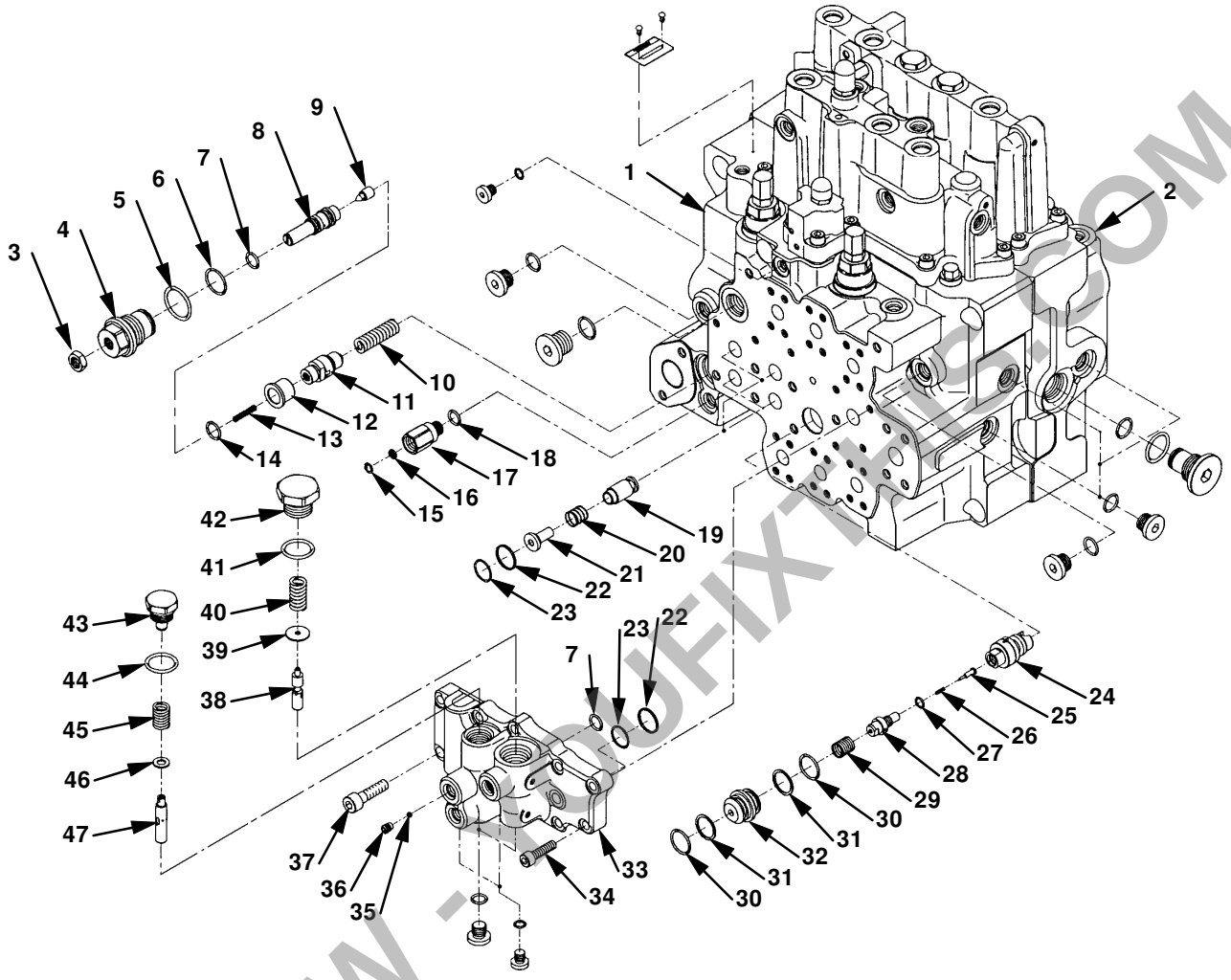
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DISASSEMBLE CONTROL VALVE 1



W155-02-05-021

1 - Housing (4-spool side)
2 - Housing (5-spool side)
3 - Lock Nut
4 - Body
5 - O-Ring
6 - O-Ring
7 - O-Ring (2 Used)
8 - Adjusting Screw
9 - Valve
10 - Spring
11 - Piston
12 - Bushing
13 - Spring
14 - O-Ring
15 - Snap Ring
16 - Filter
17 - Adapter
18 - O-Ring
19 - Check Valve (4 Used)
20 - Spring (4 Used)
21 - Seat (4 Used)
22 - Backup Ring (5 Used)
23 - O-Ring (5 Used)
24 - Valve Seat
25 - Check Valve
26 - Spring
27 - O-Ring
28 - Plug
29 - Spring
30 - O-Ring (2 Used)
31 - Backup Ring (2 Used)
32 - Bushing
33 - Pilot Plate
34 - Socket Bolt (7 Used)
35 - Filter
36 - Screw
37 - Socket Bolt (6 Used)
38 - Spool
39 - Washer
40 - Spring
41 - O-Ring
42 - Plug
43 - Plug
44 - O-Ring
45 - Spring
46 - Washer
47 - Spool

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MAINTENANCE STANDARD

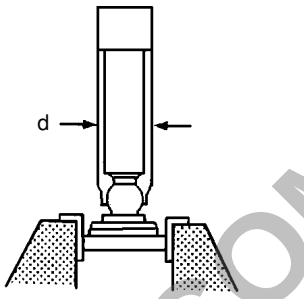
Swing motor

1. Plunger and rotor bore clearance

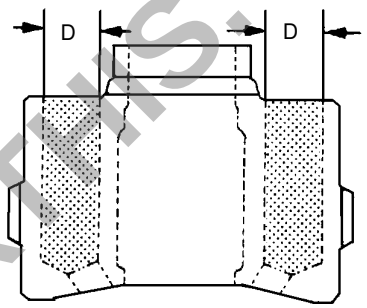
Standard Clearance	Allowable Limit
0.027 mm (0.0011 in)	0.052 mm (0.0020 in)

D-d : Less than 0.05 mm
(D-d : Less than 0.0020 mm)

NOTE: 1 mm=0.03937 in



W107-02-06-138

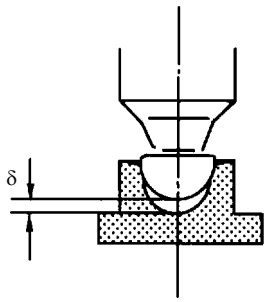


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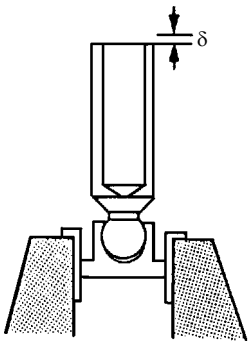
2. Plunger and shoe clearance

Standard Clearance	Allowable Limit
0	0.3 mm (0.012 in)

NOTE: 1 mm=0.03937 in



W107-02-06-140



W107-02-06-141

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Assemble Pilot Relief Valve

1. Install poppet (4) and spring (5) into body (3).

IMPORTANT: Be sure to check if poppet (4) moves smoothly.

2. Install shim (6) and O-ring (2) to plug (8) and tighten plug (8) to body (3).

   : 36 mm
   : 49 N·m (5 kgf·m, 36 lbf·ft)

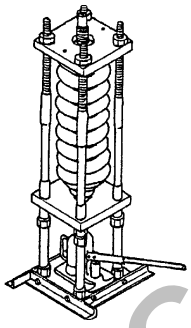
3. Install O-ring (2) to plug (1) and tighten plug (1) to body (3).

   : 8 mm
   : 49 N·m (5 kgf·m, 36 lbf·ft)

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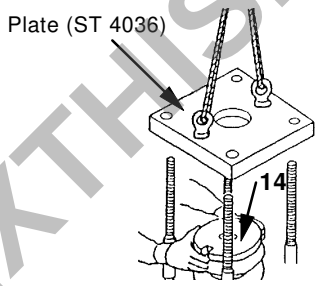
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8. Lower jack to release the spring force.



W105-03-04-015

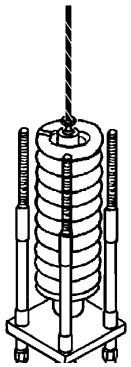
9. Loosen the nuts to remove the plate (ST 4036).
   Remove washer (14).



W105-03-04-016

CAUTION: Spring assembly weight: 80 kg (176 lb)

10. Remove the track adjuster, using an eyebolt (M16, Pitch 1.5) and hoist.
    Remove the hoist and eyebolt.



W105-03-04-017

CAUTION: Spring weight: 47 kg (104 lb)

11. Remove spring (16) from rod (8).

12. Remove spacer (15) from rod (8).

13. Remove socket bolts (1) and flange (2).
    Remove O-ring (3) from flange (2).

    : 8 mm

14. Pull out piston rod (4) from cylinder (10).

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Remove Arm Cylinder

1. Insert a wooden block between arm cylinder (1) and boom (12).

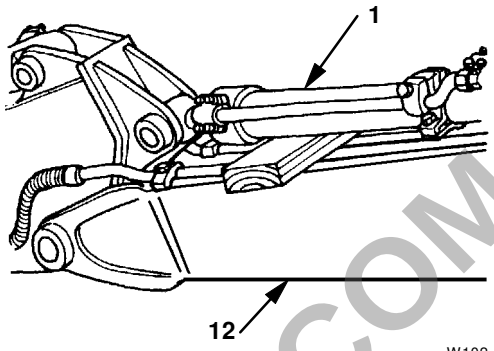
2. Stop the engine. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure. Then, remove the cap.
   Completely release the residual pressure from the hydraulic circuit by performing the “Hydraulic Circuit Pressure Release Procedure.” Refer to page W4-2-10.

3. Remove ring (10) and stopper pin (11).

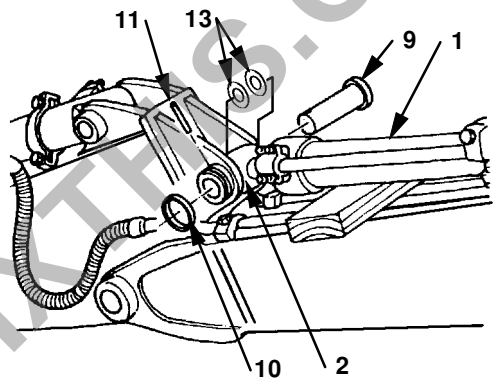


4. Remove pin (9) and thrust plate (13).

5. Use wire to secure cylinder rod (2) as illustrated.



W102-04-02-009



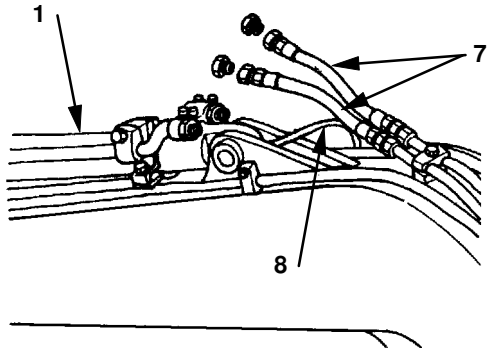
W158-04-02-009

6. Disconnect arm cylinder hoses (7) (2 used).
   Put plugs on the pipe on arm cylinder (1) and hoses.

   : 36 mm

7. Disconnect lubricant supply pipe (8).

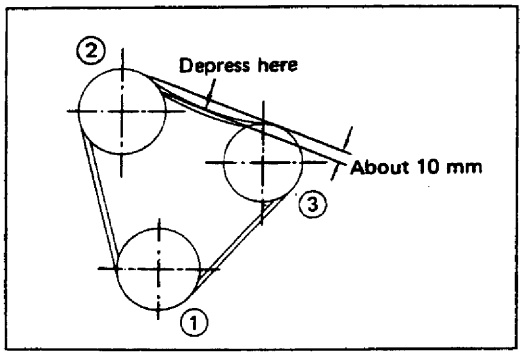
   : 19 mm



W102-04-02-014

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COOLING SYSTEM

Cooling Fan Drive Belt

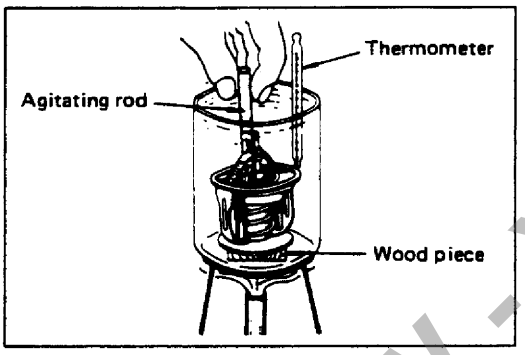
Adjustment

1. Check the cooling fan drive belt for cracking and other damage.
2. Check the drive belt tension by exerting a force of 10 kg (22lb) midway between the water pump pulley ② and the alternator pulley ③.
3. Adjust the belt tension by loosening the alternator mounting bolt and the alternator adjusting bolt and pivoting the alternator.

   Be sure to retighten the bolts after adjusting the belt tension.

mm (in)

Cooling Fan Drive Belt Deflection	8.0–12.0 (0.3–0.5)



Thermostat

Inspection

Visually inspect the thermostat.

Replace the thermostat if excessive wear or damage is discovered during inspection.

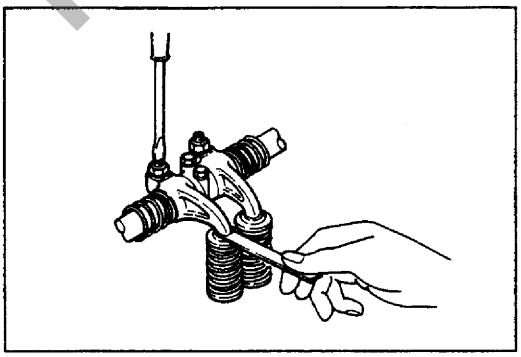
Measure the valve lift.

mm (in)

Amount of Valve Lift at 90°C (203°F)	10.0 (0.39)

°C(°F)

Valve Opening Temperature	80–84 (176–183)



VALVE CLEARANCE AND ADJUSTMENT

Note:

The cylinder head bolts were previously tightened with the "Angular Tightening Method". Therefore, it is not necessary to retighten the cylinder head bolts before adjusting the valve clearance.

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SECTION 5

ENGINE ASSEMBLY III (REASSEMBLY)

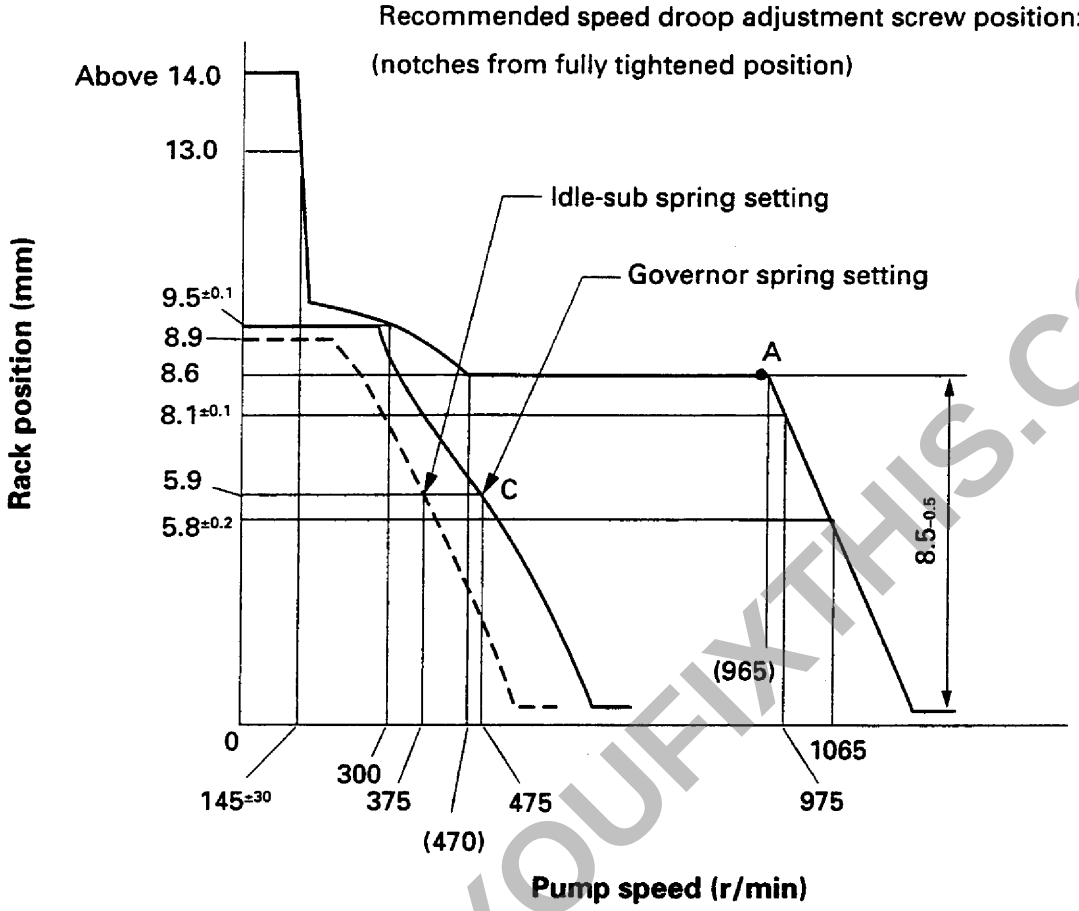
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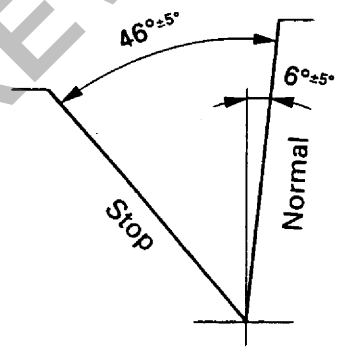
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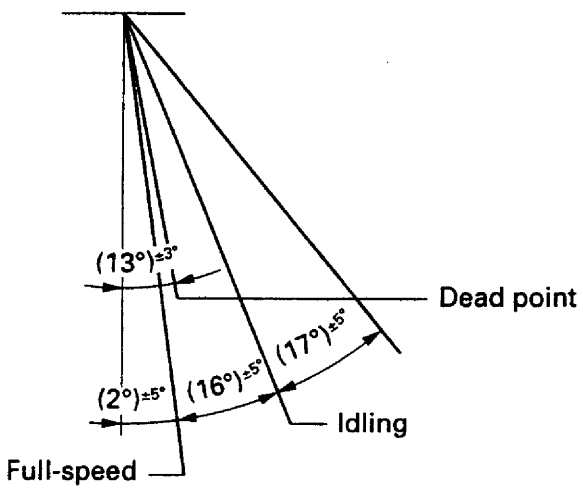
3. Governor adjustment



Stop lever angle



Speed control lever angle



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