Attach to Vol. No. : TT173E-01

CONECTORS

EX300-5,300LC-5,330LC-5,350H-5,350LCH-5,370-5,370HD-5(Machines produced from beginning Aug. '98)

CONNECTORS TERMINAL (These Connectors are the harness end connectors, unless otherwise specified.)

SOL/V 1 2 JFC02P-GY PB185-02326-B	SOL/V 1 2 JFC02P-B PB185-02026	WWES 1 2 C02_FW	SERVO MOTOR AIR-CON. 4 1 / 5 3 2 AMP 172026-1	BLOWER RESISTER AIR-CON. 1 3 / 2 4 AMP 172134-1	BLOWER RELAY AIR-CON. 1 4 / 2 3	THERMISTER BLOWER MOTOR PRESSURE SW. AIR-CON. 1 / 2 CN02F 7323-2228		LERNING SW. 2 1 / OPEN OPEN OPEN OPEN C06_FW	STARTER RELAY E / S R PH065-03010 C 7322-3010 B 7323-3010
DIODE A K A K PH065-02010	SPEAKER PH065-02010	PILOT PRESS.SEMSOR 1-5V 3-GND 2-SENS PACKARD 12052895	Dr.EX WIPER 1 2 / 3 4 7323-2044 SJD PH025-04010 N-SLC-4F(N)	GLOW RELAY 4 / 3 1 / 2 7323-2228 7323-3010	PRESS. SW. (FRONT) (GATE LOCK) 1 2 PACKARD 12020599	HEATER, AIR-CON. AIRCON_CONN HEATER_CONN 1 2 / 4 3 – + N_SLC_4F(N) C02FB	OPTION POWER 1 2 3 / 4 5 6 M06_FW	RADIO CAB/H SPL+ SPR+ ACC (ALM) / SPL- SPR- GND B.UP ILL C10FW
PRESSURE SENSOR 1 2 3 AMP EJ(II) 3 Pole	PRESS.SW. (TRAV) 1 2 7323-9327 090-2-WP	WIPER E L / S B MWP04F_B	WASHER LB / L 7323-2228	HYD. OIL LEVEL SW. FUEL SENSOR 2 1 GND. Z02F-GY	ALTERNATOR L OPEN R 7322-7434-40	ACCEL 1 2 3 OPEN C04FW ACCEL_SUB OPEN OPEN 2 1 C04MW		
RELAY 1 3 2 / 5 / 4 6098-1493	ENG. OIL LEVEL COOLANT TEMP. SW. 7323-7414-40	COOLANT LEVEL OPEN 1 2 PH065-03010	N SENSOR 1 2 Z02F-GY	A SENSOR,EC SENSOR 1 2 3 Z03F-GY	EC MOTOR 1 2 / 3 4 Z04F-GY	KEY SW. 4 2 6 / 5 3 1 SJD DSD06F-W PH776-06015	RADIO AM-SANYO NC SP+ ACC ALM / NC SP- GND B.UP ILL 7119-3090 (PA-9P)	
CONTROLLER-A 1 2 6 7 8 12 13 / 14 15 19 20 21 25 26 AMP-174516-6	CONTROLLER-B 1 4 5 8 / 9 12 13 16 AMP-174514-6	ATTACHMENT SYSTEM 1 2 3 / 10 C10FW	RADIO AM-FM FUJITU-TEN SPR+ SPL+ ACC B.UP / SPR- SPL- GND- NC NC ILL 0902-10P AUDIO 7283-1100					
CONTROLLER-D 1 2 5 6 7 10 11 / 12 13 16 17 18 21 22 AMP-174515-6	MONITOR 13 17 20 / 21 25 28 AMP 174046-2	ENG. CONTROL UNIT 4 3 2 1 / 5 6 7 8 9 C10FW	QOS CONTROLLER 3 2 1 / 6 5 4 7319-3460-30					
MONITOR 29 34 38 / 39 44 48 AMP 174047-2	MONITOR 1 6 / 7 12 AMP 174045-2	A/C CONTROLLER 1 6 / 7 12 AMP 172245-2	A/C CONTROLLER 1 8 / 9 16 AMP 172021-2					

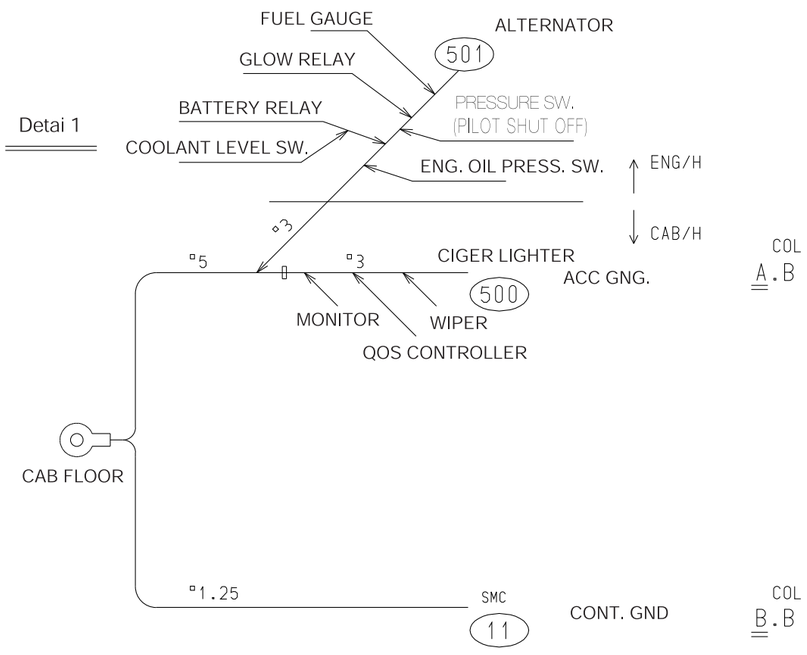
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HARNESS CIRCUIT NO.

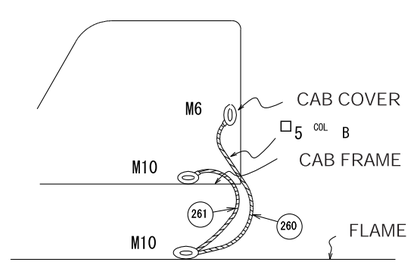
PARTS	TERMINAL NO.	HARNESS CIR NO.
CONTROLLER-A	1-26	1-26
CONTROLLER-B	1-16	32-46
CONTROLLER-D	1-22	51-72
OTHERS		100-200
MONITOR CONTROLLER	1~48	201-244
		500-652
QOS		654-659

GROUND WITH HARNESS
INTERNAL GROUND
CONNECTOR
SCREW TERMINAL
WATERPROOF PLUG CONNECTOR
FLAT TERMINAL

Detai 1



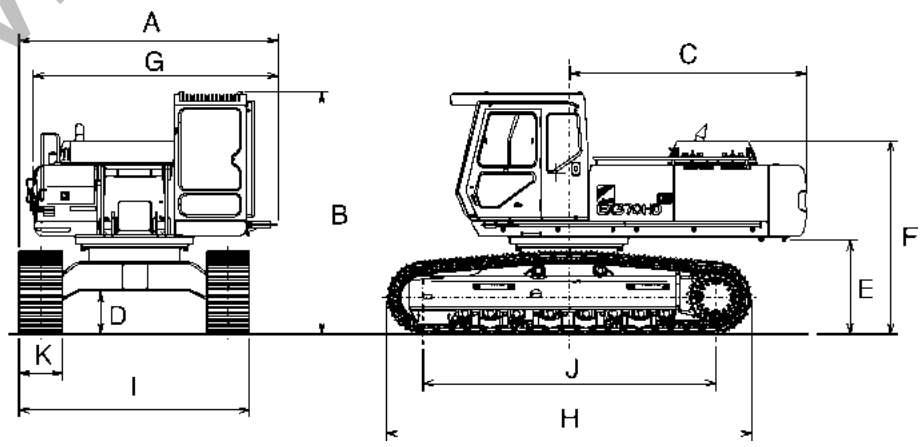
Detai 2



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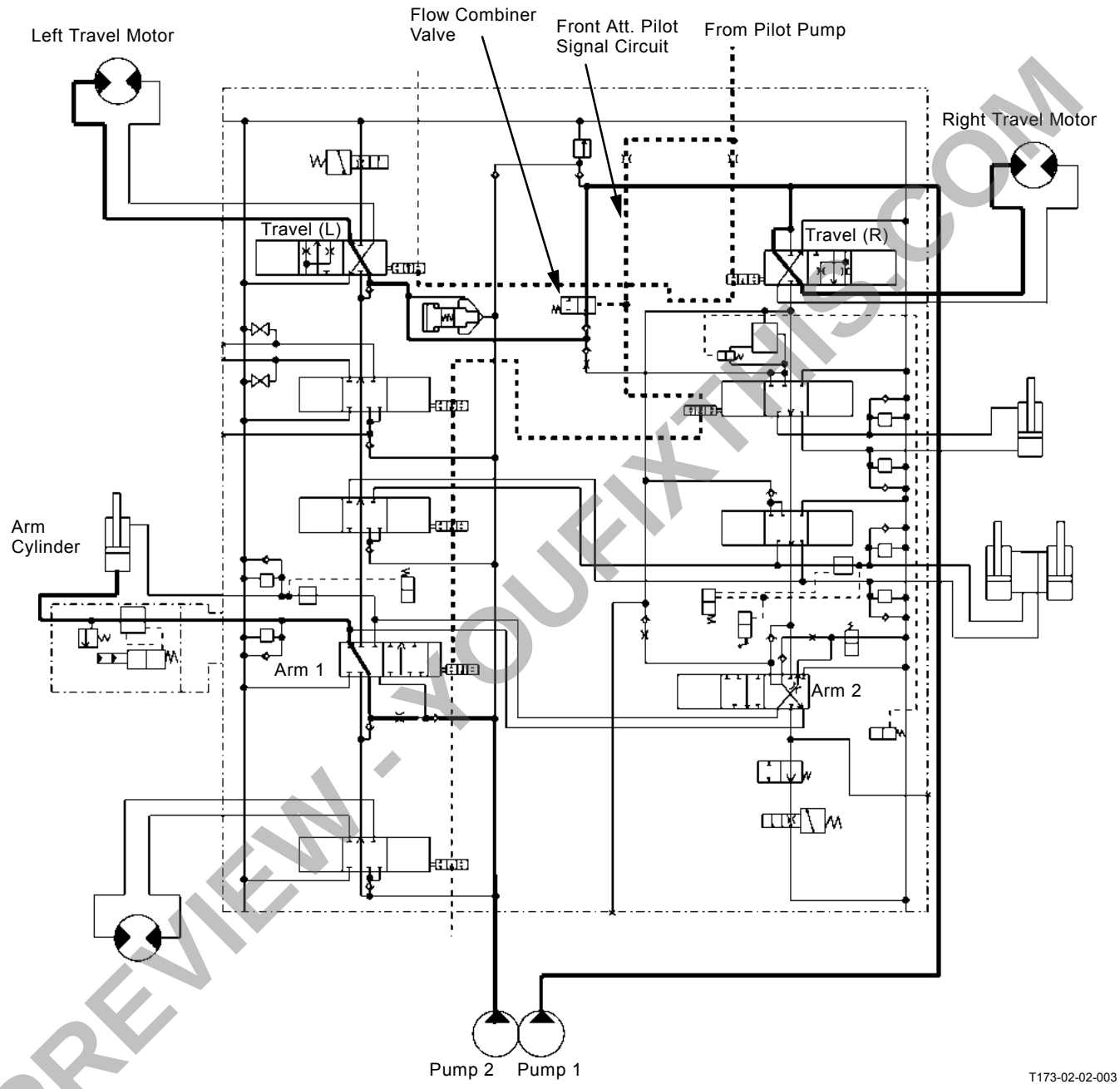
Model	EX370-5, EX370HD-5
Type of Front-End Attachment	3.2 m (10 ft 6 in) Standard Arm
Bucket Capacity (Heaped)	PCSA 1.50 m3 (1.96 yd3), CECE 1.30 m3
Operating Weight	36000 kg (79370 lb)
Basic Machine Weight	28100 kg (61950 lb)
Engine	ISUZU B-6SDIT 169 kW/1900 min-1 (230 PS/1900 rpm) * 177 kW/2000 min-1 (240 PS/2000 rpm)
A: Overall Width (Excluding Rear-View Mirrors)	3580 mm (11 ft 9 in)
B: Cab Height	3340 mm (12 ft)
C: Rear End Swing Radius	3300 mm (10 ft 10 in)
D: Minimum Ground Clearance	** 560 mm (1 ft 10 in)
E: Counterweight Clearance	** 1250 mm (4 ft 1 in)
F: Engine Cover Height	** 2620 mm (8 ft 7 in)
G: Overall Width of Upperstructure	3370 mm (11 ft 1 in)
H: Undercarriage Length	5060 mm (16 ft 7 in)
I: Undercarriage Width	3190 mm (10 ft 6 in)
J: Sprocket Center to Idler Center	4050 mm (13 ft 3 in)
K: Track Shoe Width	600 mm (24 in) (Grouser shoe)
Ground Pressure	67 kPa (0.68 kgf/cm2, 9.7 psi)
Swing Speed	11.3 min-1 (rpm)
Travel Speed (fast/slow)	4.9/3.0 km/h (3.0/1.9 mph)
Gradeability	35° (tan θ=0.70)

*NOTE: H/P mode values are indicated with * mark. The dimensions indicated with ** mark do not include the height of the shoe lug.*



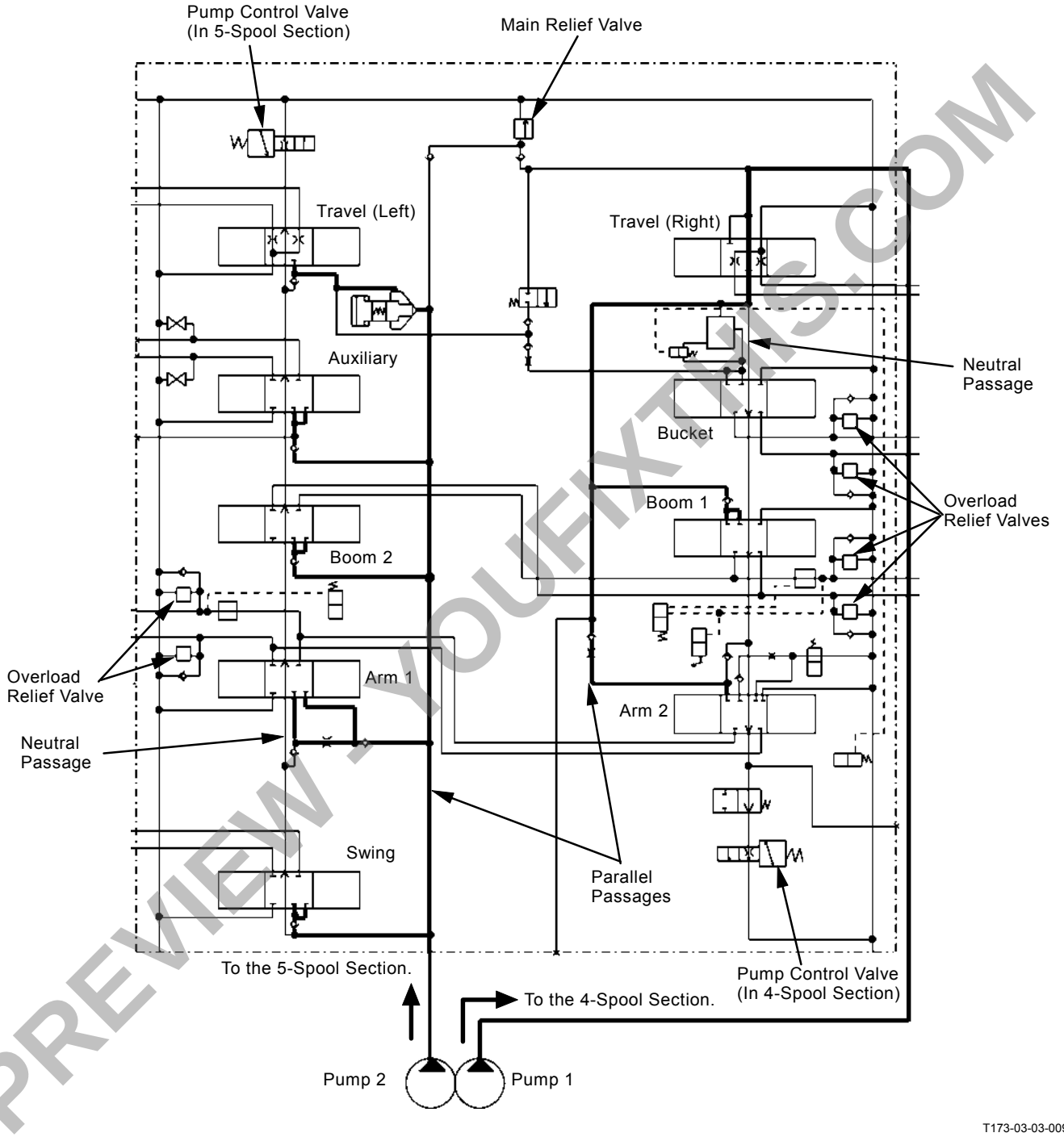
M173-11-002

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T173-03-03-009

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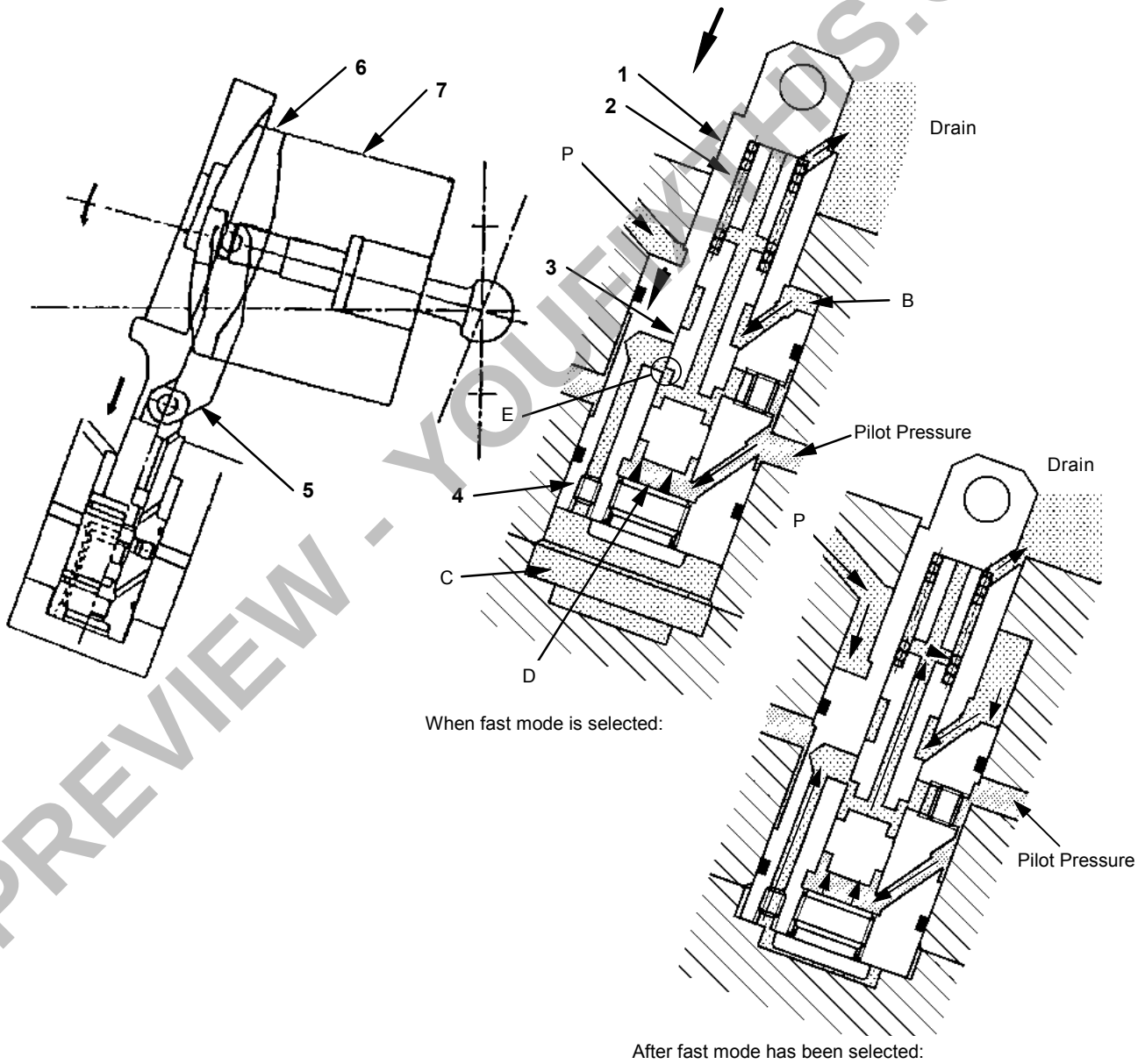
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- Fast Speed

When the travel mode switch is turned to the fast position, the MC sends signals to solenoid valve unit (SI) in response to travel loads. Then, pilot pressure is routed into chamber D, moving spool (3) upward.

Thus, section E is opened so that the oil in chamber C is drained via the passages in spool (3). As pressure oil from the motor port is routed, servo piston (1) is lowered, reducing the swash plate angle of rotor (7).

Consequently, the plunger stroke in the travel motor is reduced, increasing the travel motor rotation speed.



When fast mode is selected:

After fast mode has been selected:

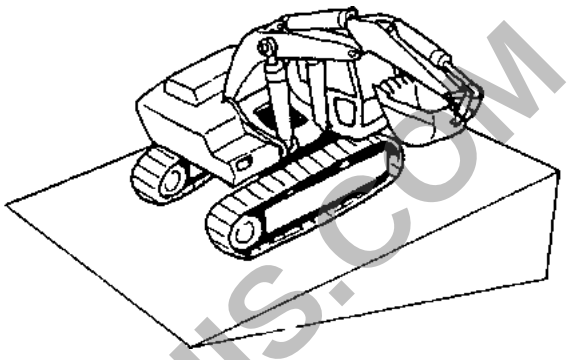
T157-03-02-002

1 - Servo Piston
2 - Spring
3 - Spool
4 - Orifice
5 - Link
6 - Valve Plate
7 - Rotor

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MAXIMUM SWINGABLE SLANT ANGLE

Summary:
With the upperstructure swung 90° to the slope, check the maximum slant angle on which the upperstructure can swing to the uphill side.



T105-06-03-011

Preparation:
1. Check that the swing gear and bearing are well lubricated.
2. Load bucket fully. In lieu of loading the bucket, weight (W) of the following specification can be used.
   W=1800 kg (3970 lb)
3. With the arm cylinder fully retracted and the bucket cylinder fully extended, hold the arm top pin to the position flush with the boom foot pin height.
4. Climb a slope and swing the upperstructure 90° to the slope.
5. Maintain the hydraulic oil temperature at 50±5 °C (122±9 °F).

Measurement:
1. Select the following switch positions:

Engine Control Dial	E Mode Switch	HP Mode Switch	Work Mode Switch	Auto-Idle Switch
Fast Idle	OFF	OFF	General Purpose Mode	OFF

2. Operate the swing lever to full stroke to swing the upperstructure to the uphill side.
3. If the machine can swing, measure the cab floor slant angle.
4. Increase the slope angle and repeat steps 2. and 3. until the machine can not swing. Obtain the maximum. Check both clockwise and counterclockwise.
5. Perform the measurement three times.

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

Remedy:
Refer to the Troubleshooting B in Group T5-4.

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4. Operate the machine yourself

Try to identify the trouble by operating the machine yourself.
If the trouble cannot be confirmed, stop the engine and obtain further details of the malfunction from the operator.
Also, check for any incomplete connections of the wire harnesses.



T107-07-01-004

5. Perform troubleshooting

CAUTION: Never attempt to disconnect harnesses or hydraulic lines while the engine is running. The machine may malfunction or pressurized oil may spout, possibly resulting in personal injury. Be sure to stop the engine before disconnecting harnesses or hydraulic lines.

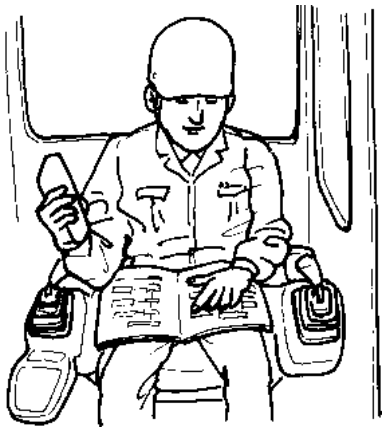
Connect the diagnostic analyzer, Dr.EX, to the MC (Main Controller) to obtain malfunction records.



T107-07-01-005

If any fault codes are displayed on the monitor, check sensing signal circuits, referring to Troubleshooting A.

If no fault code is indicated on the monitor, go to the troubleshooting B group.
Note that Dr.EX will be necessary in the troubleshooting B procedures for monitoring real time component performance.

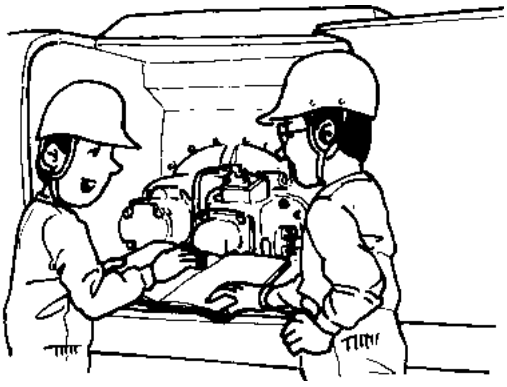


T107-07-01-006

* Note that the fault codes displayed do not necessarily indicate machine trouble. The controller stores even temporary electrical malfunctions, such as a drop in battery output voltage or disconnections of the switches, sensors, etc., for inspections.
For this reason, the “RETRIAL” is required to erase the accumulated fault codes from the controller memory and to confirm if any fault codes are indicated after the “RETRIAL”.

6. Trace possible causes

Before reaching a conclusion, check the most likely causes again. Try to identify the actual cause of the trouble.



T107-07-01-007

Based on your conclusion, make a plan for appropriate repairs to avoid consequent malfunctions.

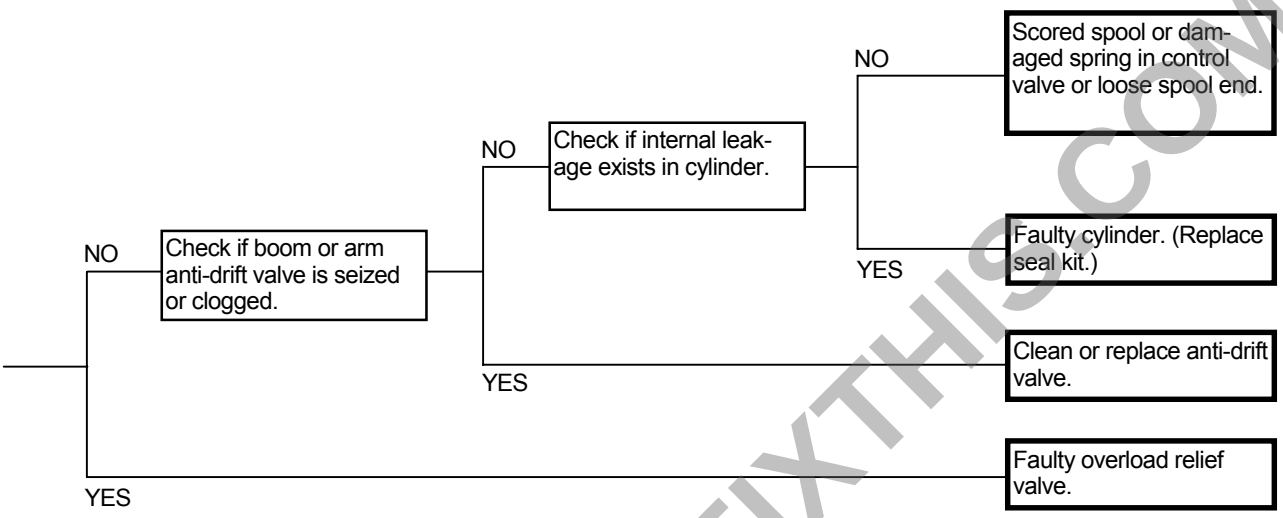
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Arm Regenerative Control Valve	Boom Regenerative Control Valve	Travel Flow Control Valve	Bucket Flow Control Valve
• To increase arm speed by allowing the return oil from the arm cylinder rod side to flow into the arm cylinder bottom side when the valve is switched by pilot pressure oil led from solenoids valve unit (SC).	• To increase boom lower speed, to improve controllability, and to prevent cavitation by allowing the return oil from the boom cylinder bottom side to flow into the boom cylinder rod side.	• To ensure pressure oil to raise boom when travel and boom raise functions are operated at the same time.	• To restrict the bucket circuit to assist boom to raise when a combined operation of bucket, arm roll-in, and boom raise is made.
• Arm regenerative function does not operate.	• The same as described below.	• Oil flow is not restricted properly.	• The same as described below.
• Arm speed is very slow when leveling.	• If kept closed, boom lower speed decreases. • If kept opened, jacking up the machine using the front attachment is difficult.	• If fully closed, shock increases when travel combined operation is made. • If fully opened, boom is not raised when the combined operation of travel down a slope and boom raise with bucket loaded is made. (Boom raise single operation can be achieved.)	• Bucket speed decreases if poppet valve is seized or switch valve is seized so that the poppet valve is closed. • Boom does not rise when the combined operation of bucket, arm roll-in, and boom raise is made with poppet valve fully opened, or if switch valve is seized so that poppet valve is fully opened.
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
T3-3	T3-3	T3-3	T3-3

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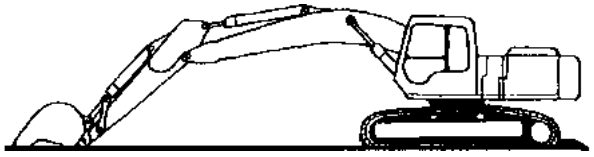
- Boom Cylinder Internal Leakage Check

1. With the bucket cylinder fully retracted and the arm cylinder slightly extended from the fully retracted position, lower the bucket tooth tips onto the ground.

2. Disconnect hoses to the boom cylinder rod side. Then, drain oil from hoses and cylinders. (Plug the disconnected hose ports.)

3. Retract the arm cylinder to lift the bucket above the ground.

   At this time, if oil flows out of the pipes from which the hoses were disconnected and the boom cylinder is retracted, internal leakage in the boom cylinder exists.
   If no oil flows out of the pipes from which the hoses were disconnected but the boom cylinder is retracted, internal leakage in the control valve exists.



T105-07-04-009

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PRECAUTIONS FOR INSPECTION AND MAINTENANCE

1. Disconnect the power source.
   Be sure to remove the negative terminals from the batteries first when taking wire harnesses and connectors off for repair or replacement work.
   Failure to do so can result in damage to the wire harnesses, fuses, and fusible links and, in some cases, cause fire due to short circuiting.
2. Color coding of wire harnesses.
   The color codes of the wire harnesses in the electrical system are shown below.
   In cases on the design sheet where two colors are indicated for one wire, the left initial stands for the base color, while the right initial stands for the marking color.

Code	Color	Code	Color
R	Red	W	White
L	Blue	G	Green
Or	Orange	Lg	Light green
Y	Yellow	B	Black
Br	Brown	P	Pink
Gr	Gray	V	Violet

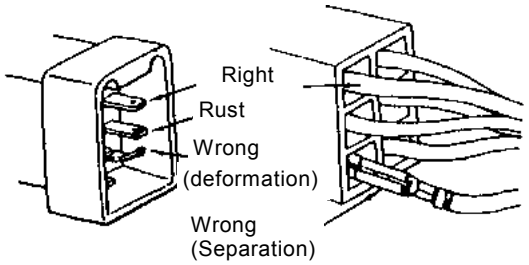
NOTE: 1) Code BW indicates a black base wire with white fine-line marking.
2) Initials "O" and "Or" both stand for the color orange.
3) Longitudinal stripes printed on wires indicates kinds of wires (AVS).



T107-07-06-001

3. Precautions for connecting and disconnecting terminal connectors.

1) When disconnecting harnesses, grasp them by their connectors. Do not pull on the wire itself. Be sure to release the lock first before attempting to separate connectors, if a lock is provided. (Refer to the Instructions for Disconnecting Connector on page T5-6-3.)
2) Water-resistant connectors keep water out so that if water enters them, water will not easily drain from them. When checking water-resistant connectors, take extra care not to allow water to enter the connectors. In case water should enter the connectors, reconnect only after the connectors are thoroughly dried.
3) Before connecting terminal connectors, check that no terminals are bent or coming off. In addition, as most connectors are made of brass, check that no terminals are rusting.
4) When connecting terminal connectors provided with a lock, be sure to insert them together until the lock "clicks."



T107-07-06-002

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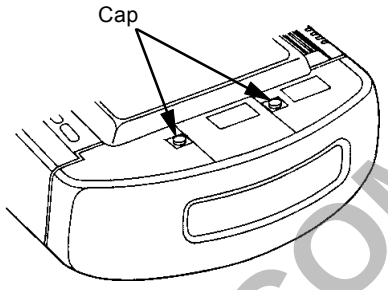
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REMOVE AND INSTALL COUNTERWEIGHT

Removal

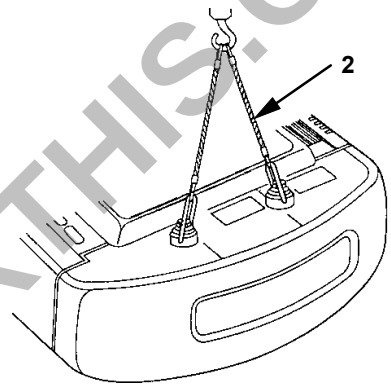
CAUTION: Approx. weight of counterweight:
6800 kg (14990 lb) (EX300-5)
7550 kg (16640 lb) (EX350H-5, EX370HD-5)

1. Remove caps from counterweight.
   Install eye-bolts to the counterweight.
   Eye-bolts: M42, Pitch 4.5



W155-02-02-006

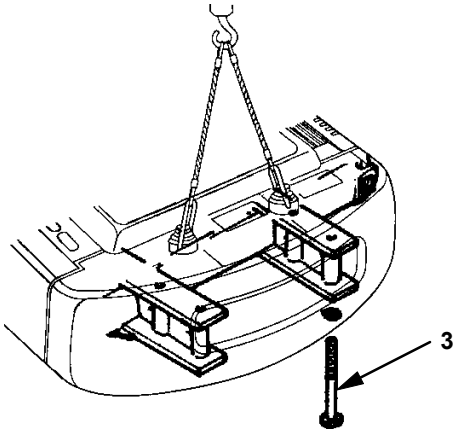
2. Attach wire rope (2) to eye-bolts using shackles.
   Take out slack of wire rope by applying tension slowly with a crane or hoist.



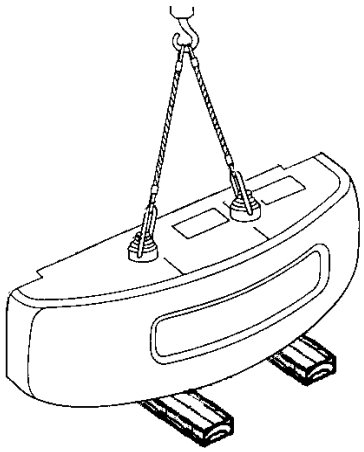
W155-02-02-001

3. Remove bolts (3).
   Lift counterweight using a crane or hoist.

   : 50 mm (EX300-5)
   : 55 mm (EX350H-5, EX370HD-5)



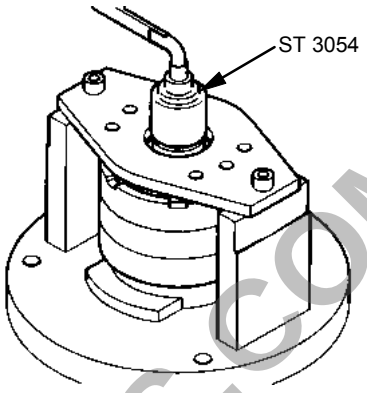
W155-02-02-003


W155-02-02-004

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9. Tighten bearing nut (6) by turning drive disc (2) clockwise using tool (ST 3054).

NOTE: When tightening bearing nut (6), tighten counterclockwise.



W173-02-04-023

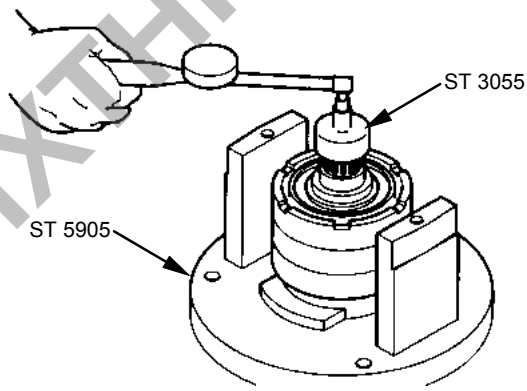
10. Install a torquemeter and adapter (ST 3055) on the spline of drive disc (2) to measure bearing preload. Make a record of the starting torque. Be sure to rotate drive disc (2) two or three times before recording, for smoother movement of drive disc (2).

    Starting Torque Specification:
    3±0.5 N·m (0.30±0.05 kgf·m, 2.17±0.36 lbf·ft)

CAUTION:

(1) Take care to avoid being burned when heating the bearings in an oil bath.

(2) Casing weight: 20 kg (44 lb)



W173-02-04-024

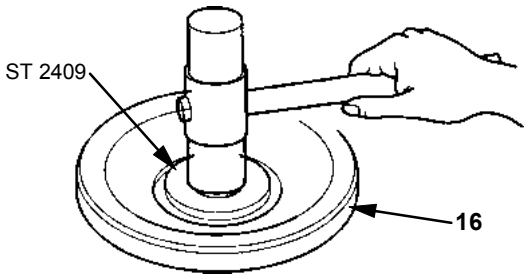
11. Heat casing (1) 50 to 80 °C (122 to 176 °F). Apply grease to the inside of casing (1).

12. Install drive disc (2) into casing (1).

NOTE: Confirm that drive disc (2) is securely installed in casing (1) after the casing has cooled down to room temperature.

13. Install O-ring (17) into the groove on casing (1) bore. Apply grease to O-ring (17).

14. Install oil seal (15) into seal cover (16), using special tool (ST 2409). Apply grease to oil seal (15) lip.



W173-02-04-019

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Disassemble Control Valve (5)

- Read carefully “Precautions for Disassembly and Assembly” (W1-1-1) before starting repair work.

Flow Combiner Valve

1. Loosen five socket bolts (22) and remove flow combiner valve assembly (1).

   : 14 mm

2. Insert block (2) into vice and fix to it.

3. Loosen main relief valve (21) from base, and remove from block (2).

   : 32 mm

4. Loosen plug (9) and take out spool (16), stopper (14), spring (12) and (13) from block (2).

   : 32 mm

5. Loosen plug (19), and take out poppet (17) and spring (18) from block (2).(common to 3 places)

   : 12 mm

IMPORTANT: Attach identification mark to each port and part.

6. Loosen and remove plug (3).

   : 5 mm

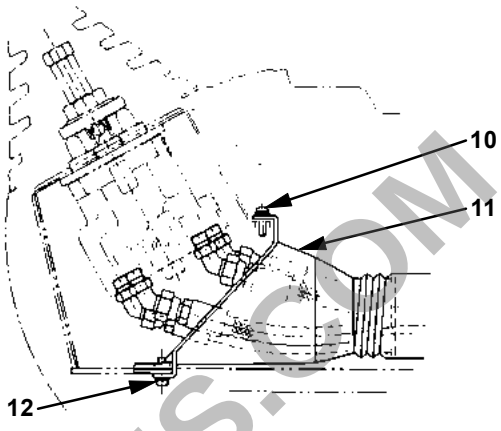
7. Take out two orifices (15) from block (2).

   : 4 mm

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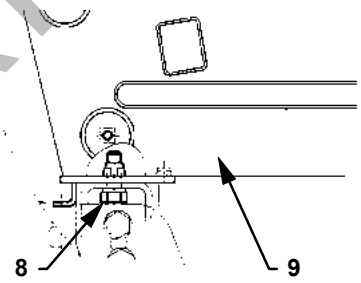
4. Install cover (11) using screws (10) and (12).



W157-02-07-009

5. Secure stand (9) using bolts (8) (2 used).

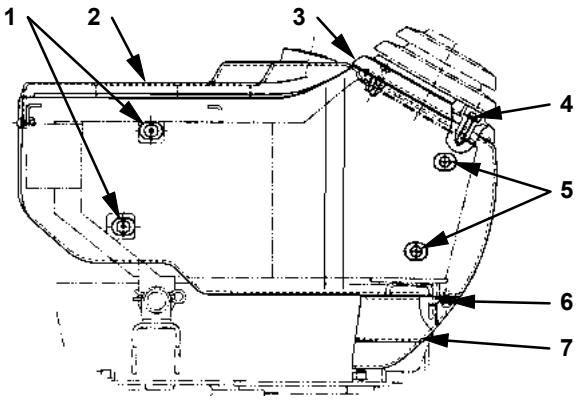
: 17 mm
: 49 N·m (5.0 kgf·m, 36 lbf·ft)



W157-02-07-008

6. Install frame (2) using screws (1) (2 used) and screws (5) (2 used).
Install cover (7) using screws (6) (2 used).
Set the boot in position, and secure it using screws (4) (4 used).

IMPORTANT: After completing installation: Check hydraulic oil level. Add oil if necessary. Run the engine. Check the components for any oil leakage.



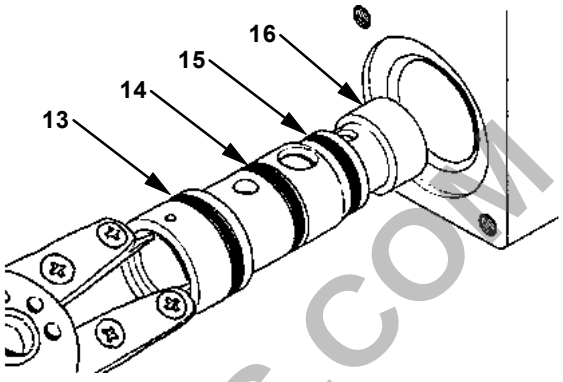
W157-02-07-007

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Assemble Proportional Solenoid Valve

IMPORTANT: When inserting sleeve (16), be sure to align the ports of the sleeve with the ports of the housing.

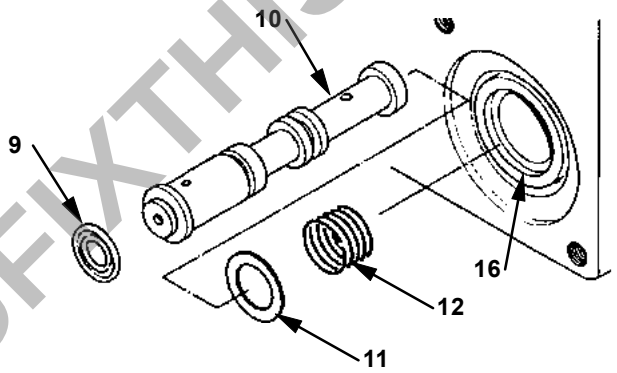
1. Install washer (18) and plate (17) into the housing. Apply a film of grease to O-rings (13), (14) and (15).
   Apply a film of hydraulic oil to sleeve (16).
   Install O-rings (13), (14) and (15) onto sleeve (16) and insert into the housing.
   Install sleeve (16) together with plate (17) and washer (18).



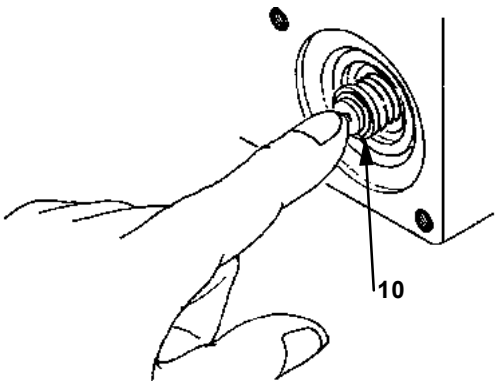
W157-02-11-005

IMPORTANT: Take care not to damage the bore edges of sleeve (16) when inserting the spool assembly.
After inserting spool (10) to check that spool (10) slides in and out smoothly without any restriction about 3 to 5 mm (0.12 to 0.020 in).

2. Install diaphragm (9), washer (11) and spring (12) to spool (10). Apply a film of hydraulic oil to the spool assembly and insert it into sleeve (16).



W157-02-11-009



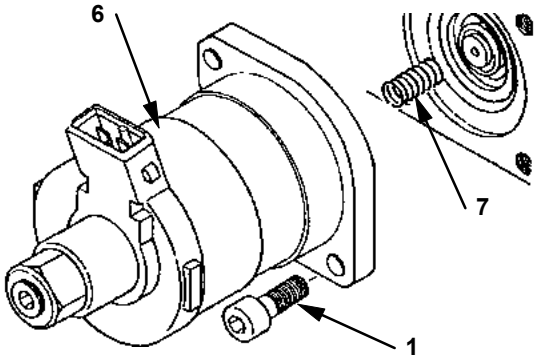
W157-02-11-010

3. Install solenoid (6) and tighten socket bolts (1).

IMPORTANT: Lock nut (2) and adjusting screw (4) should not be removed during disassembly, so they are not required to be reassembled.

IMPORTANT: Be careful not to allow spring (7) to fall out when installing solenoid (6).

: 3 mm
: 2.9 N·m (0.3 kgf·m)



W157-02-11-011

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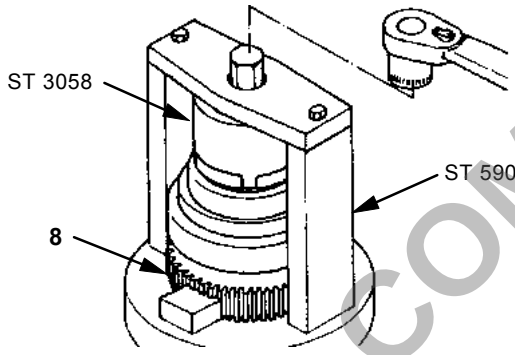
15. Attach drive disc (8) assembly to special tool (ST 3058 and 5904). Remove bearing nut (16).

16. Place support wooden blocks under the outer race, as illustrated. Press drive disc (8) using a press to pull out bearing (11) and spacer (10).

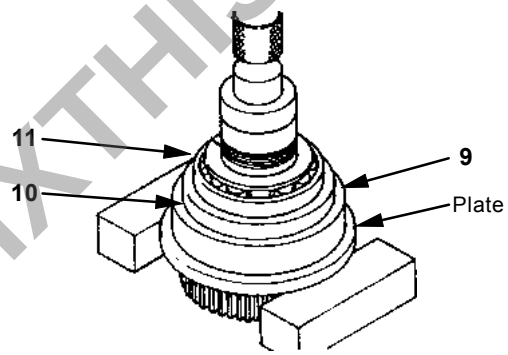
17. Remove the outer race of bearing (11) from spacer (10).

18. Place wooden blocks under the inner race of bearing (9). Push drive disc (8) out using a press.

IMPORTANT: If the inner race of bearing (9) is removed, do not reuse it.



W107-03-02-119



W107-03-02-121

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Disassemble Travel Motor (EX370HD-5)

- Read carefully "Precautions for Disassembly and Assembly" (W1-1-1) before starting repair work.

1. Remove socket bolts (6) (6 used) to remove body (5) from cover (18).
   : 6 mm
2. Remove socket bolts (21) (8 used). Remove cover (18) from casing (32) using a crane.
   : 14 mm
3. Lay cover (18) with casing (32) mounting face upward. Remove spring (23) (12 used), valve plate (40), O-ring (7), O-rings (16 and 17) (2 used each) and O-rings (22) (7 used).

NOTE: Occasionally, springs (23) and/or valve plate (40) may remain in casing (32).

4. Remove collar (8) and needle bearing (9) from cover (18).
5. Remove O-ring (45) (3 used) from casing (32).

CAUTION: When using compressed air to remove brake piston (26), hold brake piston (26) using a protector such as a cloth so that the piston does not fly out.

6. Install bolts (M 8, pitch 1.25) (2 used) to brake piston (26). Remove brake piston (26) from casing (32). Or, remove brake piston (26) by applying compressed air of 98 to 196 kPa (1 to 2 kgf/cm^2, 14 to 28 psi) into the parking brake release hydraulic circuit in casing (32).

NOTE: A bicycle pump can be used to supply compressed air. Do not use a screw driver. Using a screw driver may score parts.

7. Remove O-rings (25 and 27) and backup rings (24 and 28) from brake piston (26).
8. Lay casing (32) and remove rotor (39) assembly from shaft (53).
9. Remove plungers (36) (9 used) and retainer plate (37) from rotor (39).
10. Remove holder (38) and springs (41) (9 used) from rotor (39).
11. Remove friction plates (29) (3 used) and disc plates (30) (3 used) from casing (32).
12. Install bolts (M8, pitch 1.25) to swash plate (35) and remove swash plate (35) from casing (32).
13. Remove balls (42) (2 used), pistons (34) (4 used) and springs (33) (4 used) from casing (32).

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Disassemble Track Adjuster (EX370HD-5)

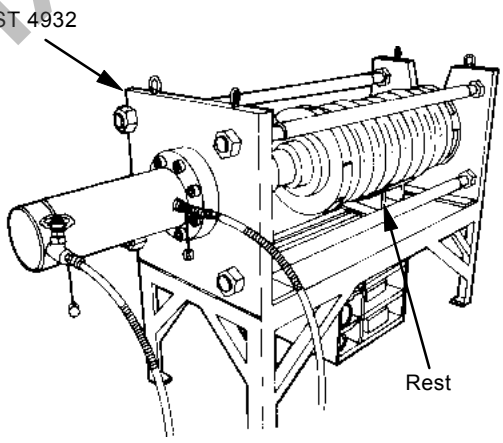
- Read carefully “Precautions for Disassembly and Assembly” (W1-1-1) before starting repair work.
  Use a pump unit which has the maximum pressure of 69 MPa (700 kgf/cm^2, 9 950 psi) and the flow rate of 8 to 10 liters (2.1 to 2.6 US gal.). Be sure to set the main relief pressure less than 49 MPa (500 kgf/cm^2, 7110 psi) (Press capacity must be less than 80 tons).

  Be sure to use special tool (ST 4932) for assembly/disassembly of the track adjuster.

CAUTION: Prevent personal injury. The spring force of the track adjuster is extremely large. Thoroughly inspect the special tool for any damage. Carefully perform assembly work referring to the procedure below.

CAUTION: Track adjuster assembly weight: 250 kg (550 lb)

1. Position the track adjuster on the rest of special tool (ST 4932) using a crane.

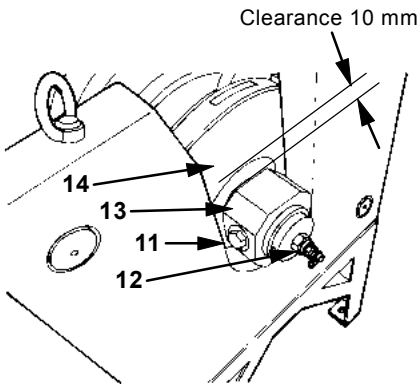


W142-03-04-019

IMPORTANT: Compress spring (15) until the clearance between bracket (14) and nut (13) is approximately 10 mm (0.4 in).

2. Loosen valve (12). Compress track adjuster spring (15) using special tool (ST 4932).

3. Remove valve (12) and bolt (11) to remove nut (13).
   : 19 mm, 115 mm



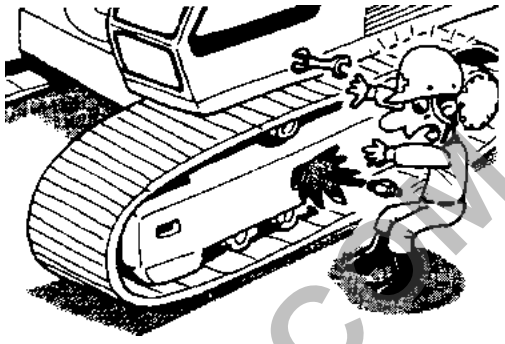
W142-03-04-020

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REMOVE AND INSTALL TRACK

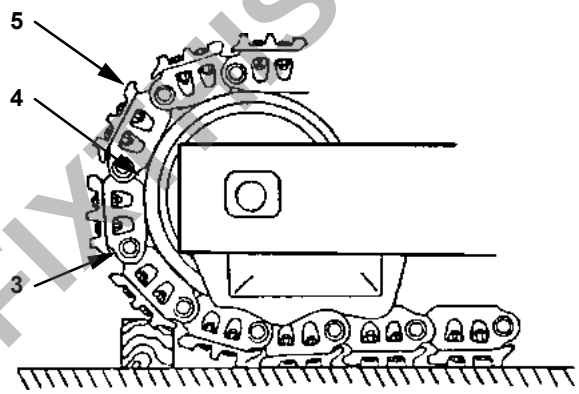
Removal

CAUTION: Do not loosen valve (1) quickly or loosen too much since high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve (1). Never loosen grease fitting (2).



W105-03-07-001

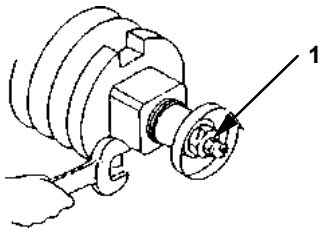
1. Move the tracks so that master pin (3) is positioned over front idler (4).
   Put a wooden block under track shoes (5).



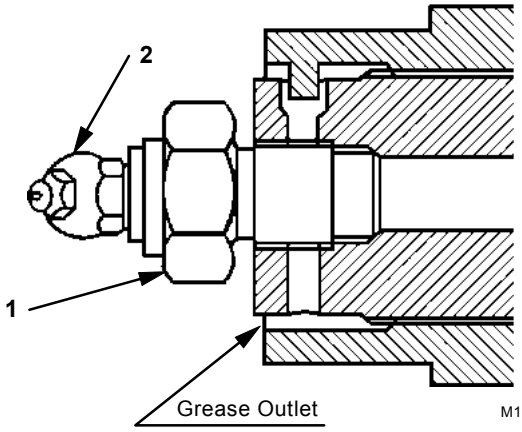
W105-03-07-006

2. To loosen the track tension, slowly turn valve (1) counterclockwise one turn; grease will escape from grease outlet.

: 24 mm



W105-03-07-002



M104-07-119

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Assemble Cylinder

1. Install bushing (6) to cylinder head (9) using a press.
   Special tools for bushing installation:
   (Boom) : 105 mm (ST 2393)
   (Arm) : 115 mm (ST 2671)
   (Bucket) : 95 mm (ST 2360)

IMPORTANT: Be sure that the rings are installed correctly.

2. Install ring (5), seal (4), and retaining ring (7) to cylinder head (9).

3. Install dust seal (3) to cylinder head (9) using a plastic hammer.
   Special tools for dust seal installation:
   (Boom) : (ST 2392)
   (Arm) : (ST 2672)
   (Bucket) : (ST 2357)

4. Install O-ring (10) and retaining ring (2) to cylinder head (9).

5. Install wear rings (13) (2 used), seal ring (15), teflon rings (12) (2 used) to piston (14).

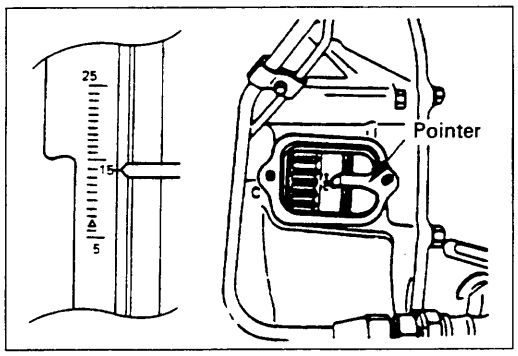
6. Install cylinder head (9) assembly to cylinder rod (1).

IMPORTANT: Be sure to install cushion ring (11) so that "R" part faces cylinder rod nut (17) side.

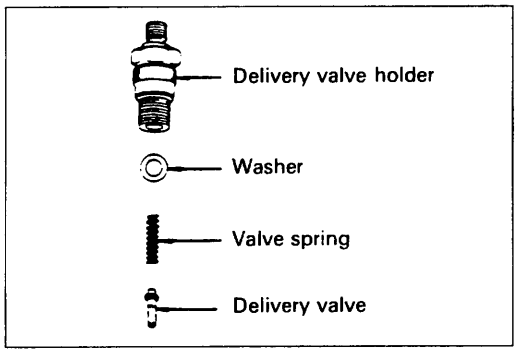
7. Install cushion ring (11) to cylinder rod (1). Install piston (14) assembly to cylinder rod (1).

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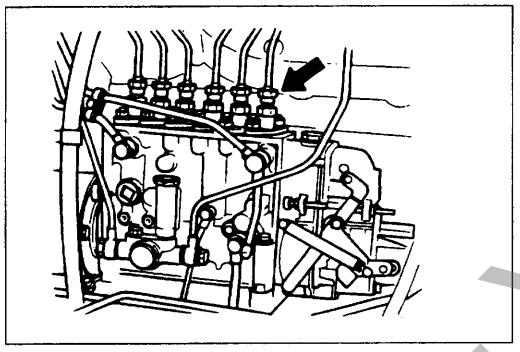
10. While operating the feed pump, slowly rotate the crankshaft clockwise, and at the point the fuel flow stops from the No. 1 delivery valve holder, confirm that the pointer on the flywheel housing is aligned with the 14° mark engraved on the flywheel.



11. Remove the No. 1 plunger delivery valve holder, and insert the valve spring and delivery valve.
Install the washer and delivery valve holder, and tighten to the designated torque.

Delivery valve holder tightening torque N·m (kgf·m/lb·ft)

108 – 118 (11.0 – 12.0 / 80 – 87)



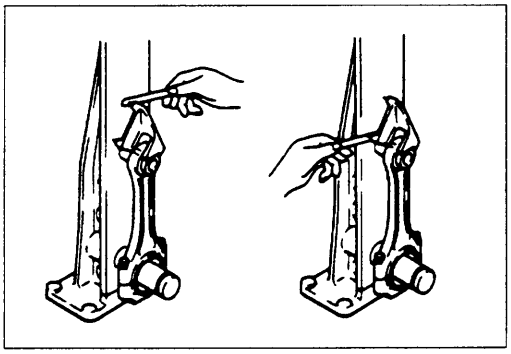
12. Install the No. 1 injection valve, and screw on the feed pump cap.

Note:
The feed pump may be damaged if the engine is started when the feed pump cap is not screwed on.

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CONNECTING ROD



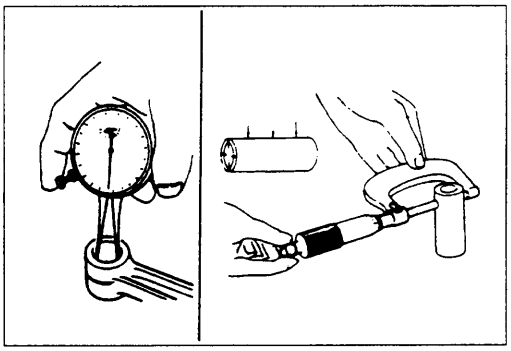
Connecting rod twist and parallelism

Use a connecting rod aligner to measure the connecting rod's twist distortion and parralelism between the rod's large and small ends.

If the measured value exceeds the limit, replace the connecting rod.

Connecting rod parallelism (per 100 mm length) mm (in)

	Standard	Limit
Twist, parallelism	0.03 (0.0012) or less	0.10 (0.0039)



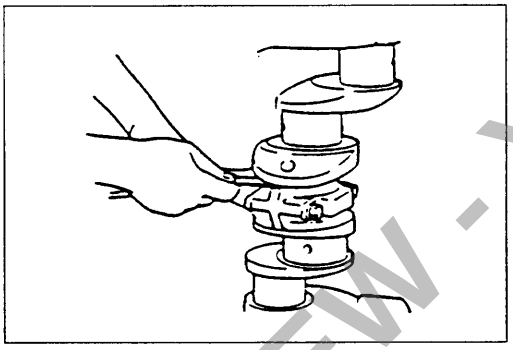
Connecting rod small end bushing clearance

Use an inside dial gauge and micrometer to measure the inside diameter of the connecting rod's small hole bushing and the outside diameter of the piston pin.

If the measured clearance exceeds the limit value, the piston pin, or the connecting rod's small hole bushing must be replaced.

Connecting rod small end bushing clearance mm (in)

Standard	Limit
0.012 – 0.027 (0.00047 – 0.0011)	0.10 (0.0039)



Connecting rod side face clearance

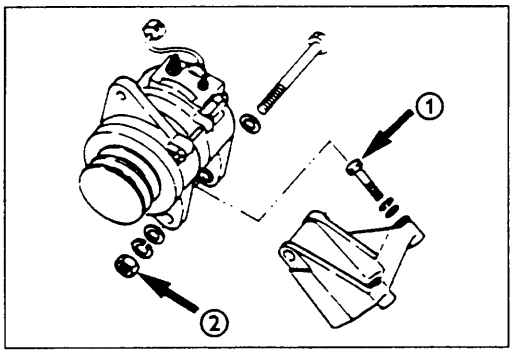
1. Install the connecting rod to the crankpin.
2. Use a feeler gauge to measure the clearance between the side face of the connecting rod's big end and the side face of the crankpin's arm.
   If the measured value exceeds the limit, the connecting rod must be replaced.

Connecting rod large end side face clearance mm (in)

Standard	Limit
0.17 – 0.28 (0.0067 – 0.0110)	0.35 (0.014)

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24. Alternator

Install the alternator bracket and alternator, and tighten to the designated torque.

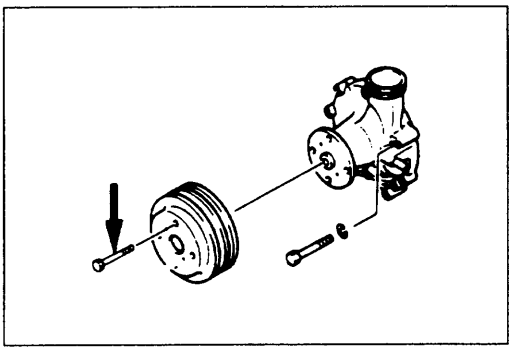
Alternator bracket tightening torque ① N·m (kgf·m/lb·ft)

31 – 45 (3.2 – 4.6 / 23 – 33)

Alternator bolt tightening torque ② N·m (kgf·m/lb·ft)

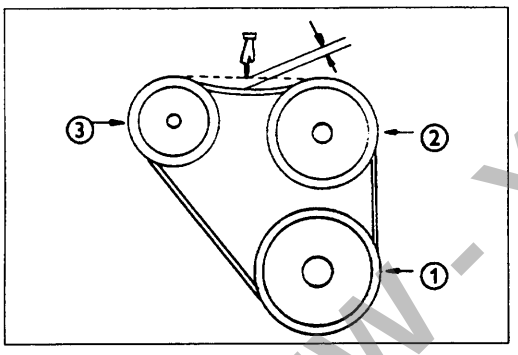
83 – 125 (8.5 – 12.7 / 61 – 92)

Tighten the alternator bolts first by hand; then adjust the fan belt tension and finally tighten the bolts to the designated torque.



25. Water pump pulley

Attach the pulley to the water pump and tighten to the designated torque.



26. Fan belt

Adjust the belt tension by moving the generator and adjusting plate.

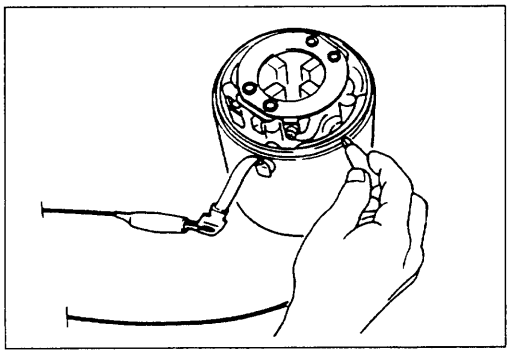
(1) Crank pulley
(2) Water pump pulley
(3) Alternator pulley

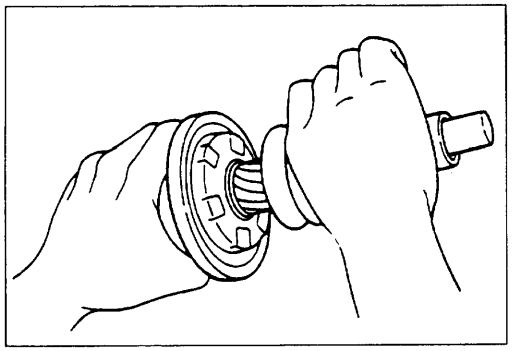
See chapter 2, Maintenance, "Cooling system." (P. 33)

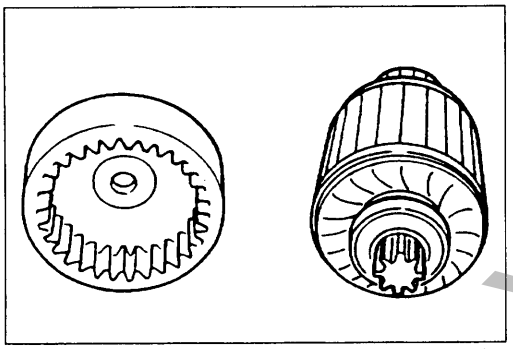
Note:
When replacing a belt, replace both belts as a single set.

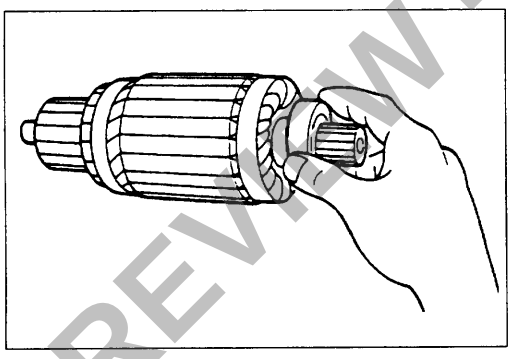
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3. Field coil Inspection

(1) Use a tester to check for any broken winding. A broken wire is indicated if no continuity is found between the field coil's M terminal and the brush lead wire (shunt coil resistance about 4.3 Ω).

(2) Check for continuity between the field coil and the yoke; repair or replace if continuity is found. (Perform this measurement with the shunt coil's ⊖ terminal disconnected from the yoke.)

4. Overrunning clutch

Rotate the pinion by hand and confirm that it turns in one direction only.

Inspect the pinion's teeth and replace those demonstrating excessive wear or damage.

Note:

When cleaning the overrunning clutch, do not immerse the entire clutch in the cleaning solution, since the grease inside the clutch will be dissolved, leading to seizure.

5. Reduction gear

Inspect the reduction gear for excessive wear.

6. Bearings

Rotate the armature bearings' outer race by hand, and confirm that it turns smoothly.

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Major Category	Name of Part	Inspection Item	Nominal Dimension	Assembly Standard Value	Limit	Repair Procedure	Comments
Main Operating Parts	Crankshaft	Uneven wear on journal and pins	Dia. 90 (3.5433) Dia. 80 (3.1496)	0.001 (0.00004)	0.05 (0.002)	Replace	Do not attempt to grind: always replace with new parts
		Journal wear	Dia. 90 (3.5433)		Dia. 89.909 (3.5397)	Replace	
		Pin wear	Dia. 80 (3.1496)		Dia. 79.894 (3.1454)	Replace	
		Journal and pin finish precision (taper and ellipse)		Ellipse and taper 0.007 (0.0003)			
		Journal and bearing arc spread			96 (3.779)	Use those with projection and proper arc; take care with back side fit	Load 9807N (1000kgf/2205lb) Projection 0.03–0.07mm(0.0011–0.0028in)
		Clearance between journal and bearing		0.045 – 0.110 (0.0018 – 0.0043)	0.16 (0.0063)	Replace bearing	
		Journal bearing undersize				Undersize bearings cannot be used	
		Crankshaft end play		0.10 – 0.285 (0.0039 – 0.0112)	0.4 (0.016)	Replace thrust bearings	Measure at crankshaft's No. 4 bearing thrust surface
		Crankshaft runout		0.08 or less (0.003)	0.15 (0.0059)	Replace	
		Ring gear				Perform lapping on gears with burrs; in cases of severe damage, replace.	
		Crankshaft balance (g-cm)		36 or less		Check dynamic balance	(Ref. value) At ends of journal
		Lower crankcase bolts tightening torque (angular tightening method) N·m (kgf-m/lb-ft)		M14 bolts 98 (10/72) ↓ 142 – 152 (14.5 – 15.5/105 – 112) ↓ 30 – 60° M10 bolts 31 – 45 (3.2 – 4.6/23 – 33)		Apply molybdenum disulfide grease to threads and seating areas of bolts before tightening	Do not catch foreign matter in bolts
		Crankshaft rear oil seal wear				In case of oil leak, replace oil seal	Check for oil seal collapse (liberally apply oil when installing)

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