WSM

WORKSHOP MANUAL
TRACTOR,FRONT LOADER, BACKHOE

B21,TL421,BT751

Kubota

KiSC issued 04, 2006 A

G GENERAL

[6] TIGHTENING TORQUES

(1) General Use Screws, Bolts and Nuts

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⬡ ④ No-grade or 4T						⑦ 7T						⑨ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit / Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M6 (6 mm, 0.24 in.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5				77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5				124 to 147	12.6 to 15.0	91.2 to 108				167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141				197 to 225	20.0 to 23.0	145 to 166				260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209				275 to 318	28.0 to 32.5	203 to 235				344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289				368 to 431	37.5 to 44.0	272 to 318				491 to 568	50.0 to 58.0	362 to 419

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American standard cap screws with UNC or UNF threads.

Grade	SAE grade 5 or 8		
Unit / Size	N·m	kgf·m	ft-lbs
1/4	9.8 to 11.7	1.0 to 1.2	7.2 to 8.6
5/16	19.0 to 23.1	1.9 to 2.4	14 to 17
3/8	33.9 to 40.7	3.5 to 4.2	25 to 30
1/2	88.1 to 105.8	9.0 to 10.8	65 to 78
9/16	122.0 to 146.4	12.4 to 14.9	90 to 108
5/8	176.3 to 211.5	18.0 to 21.6	130 to 156

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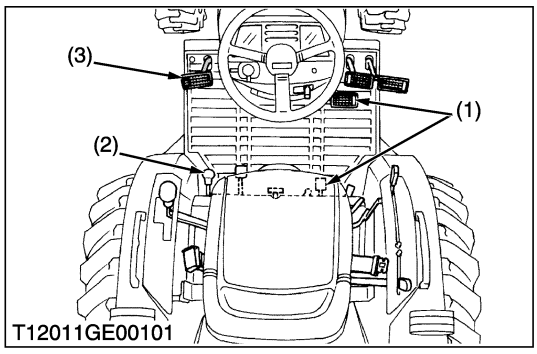

Checking Engine Start System (Tractor serial No.60971 and above)

CAUTION

- **Do not allow anyone near the tractor while testing.**
- **If the tractor does not pass the test do not operate the tractor.**

■ Preparation before testing

1. Place all control levers in the “NEUTRAL” position.
2. Set the parking brake and stop the engine.

■ Test 1: Switch for the speed control pedal.

1. Sit on operator’s seat.
2. Depress the speed control pedal to the desired direction.
3. Depress the clutch pedal fully.
4. Disengage the PTO gear shift lever.
5. Turn the key to “START” position.
6. The engine must not crank.

■ Test 2: Switch for the PTO gear shift lever.

1. Sit on operator’s seat.
2. Depress the clutch pedal fully.
3. Engage the PTO gear shift lever.
4. Place the speed control pedal in neutral position.
5. Turn the key to “START” position.
6. The engine must not crank.

■ Test 3: Switch for the clutch pedal.

1. Sit on operator’s seat.
2. Disengage the PTO gear shift lever.
3. Place the speed control pedal in neutral position.
4. Release the clutch pedal.
5. Turn the key to “START” position.
6. The engine must not crank.

■ Test 4: Switch for the operator’s seat.

1. Sit on operator’s seat.
2. Start the engine.
3. Depress the clutch pedal fully.
4. Engage the PTO gear shift lever.
5. Stand up.(Do not get off the machine.)
6. The engine must shut off.

(1) Speed control pedal
(2) PTO gear shift lever
(3) Clutch pedal

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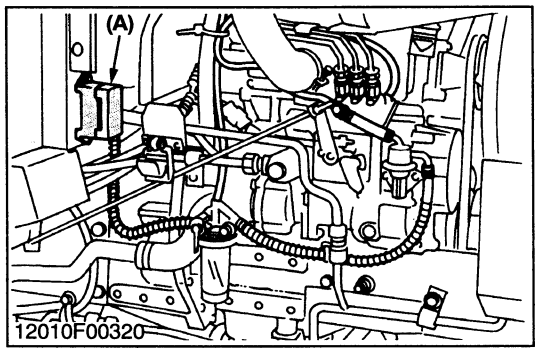

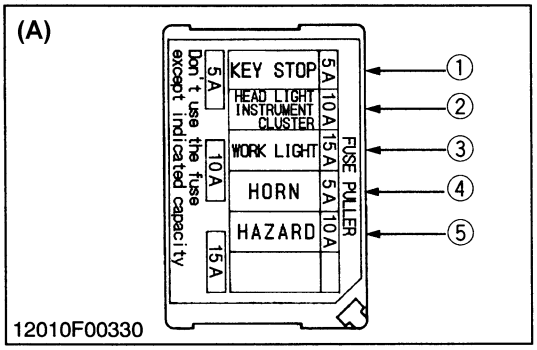

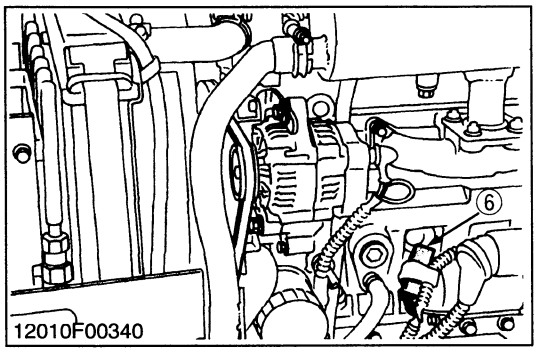

Replacing Fuse (Without OPC)

1. The tractor electrical system is protected from potential damage by fuses.
   A blown fuse indicates that there is an overload or short somewhere in the electrical system.
2. If any of the fuses should blow, replace with a new one of the same capacity.

■ IMPORTANT

- **Before replacing a blown fuse, determine why the fuse blew and make any necessary repairs. Failure to follow this procedure may result in serious damage to the tractor electrical system. Refer to troubleshooting section of this manual or your local KUBOTA dealer for specific information dealing with electrical problems.**
- **If any of them should blow, replace with a new one of the same capacity.**

■ Protected Circuit

Fuse No.	Capacity (A)	Protected circuit
①	5	Key stop
②	10	Head lights
③	15	Work light
④	5	Horn
⑤	10	Hazard lights
⑥	Slow blow fuse	Check circuit against wrong battery connection

(A) Fuse Box

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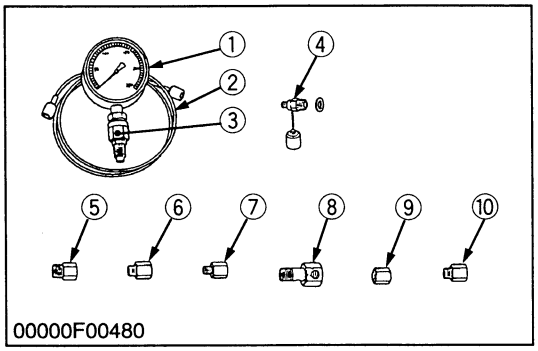

Relief Valve Pressure Tester

Code No : 07916-50045

Application : This allows easy measurement of relief set pressure.

(1) Gauge (07916-50322)
(2) Cable (07916-50331)
(3) Threaded Joint (07916-50401)
(4) Threaded Joint (07916-50341)
(5) Adaptor **B** (M18 × P1.5) (07916-50361)
(6) Adaptor **C** (PS3/8) (07916-50371)
(7) Adaptor **D** (PT1/8) (07916-50381)
(8) Adaptor **E** (PS3/8) (07916-50392)
(9) Adaptor **F** (PF1/2) (07916-62601)
(10) Adaptor **58** (PT1/4) (07916-52391)

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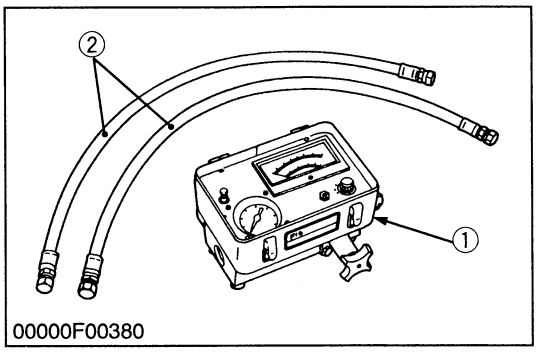

Flow Meter

Code No : 07916-52791 (Flow Meter)
07916-52651 (Hydraulic Test Hose)

Application : This allows easy testing of hydraulic system.

(1) Flow Meter
(2) Hydraulic Test Hose

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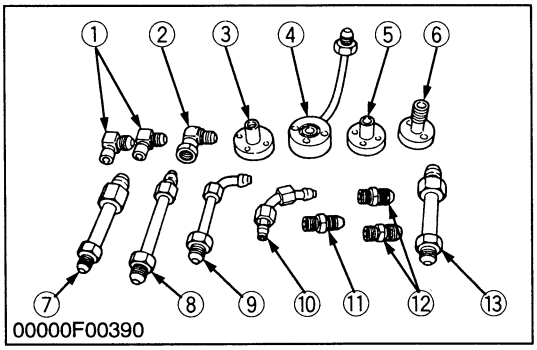

Adaptor Set for Flow Meter

Code No : 07916-54031

Application : Use for testing the hydraulic system.

(1) Adaptor **52**
(2) Adaptor **53**
(3) Adaptor **54**
(4) Adaptor **61**
(5) Adaptor **62**
(6) Adaptor **63**
(7) Adaptor **64**
(8) Adaptor **65**
(9) Adaptor **66**
(10) Adaptor **67**
(11) Adaptor **68**
(12) Adaptor **69**
(13) Hydraulic Adaptor **1**

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■ NOTE

- **The following special tools are not provided, so make them referring to the figure.**

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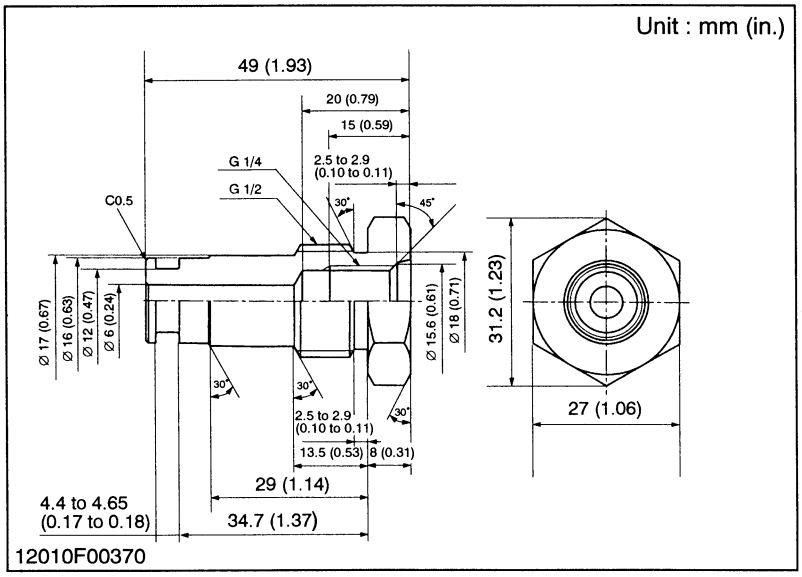

HST Adaptor (A)

Application : Use for checking the change relief valve setting pressure and high pressure relief valve setting pressure.

■ NOTE

- **When using, attach with following parts.**
  O-ring : 04811-06170
  Backup ring : 66363-39631

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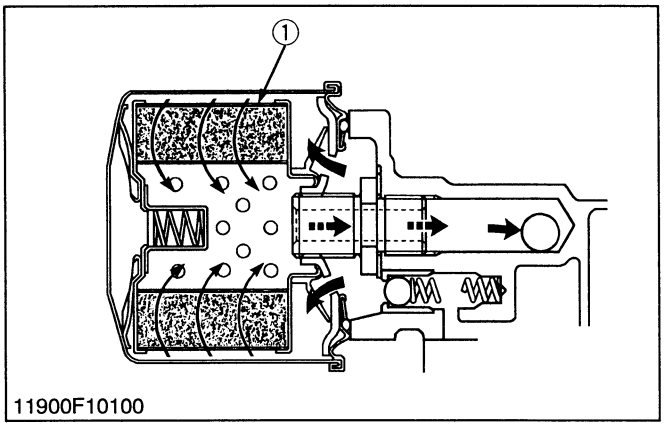
1 ENGINE

(3) Oil Filter Cartridge



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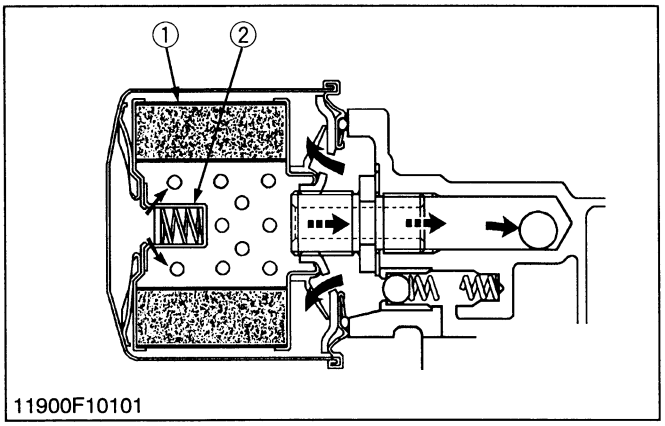

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Impurities in engine oil can cause to wear and seize components as well as impairing the physical and chemical properties of the oil itself. Impurities contained in force-fed engine oil are absorbed on the filter paper for removal as they pass through the filter element (1).

When the filter element is clogged and the oil pressure in inlet line builds up by 98 kPa (1.0 kgf/cm^2, 14 psi) more than the outlet line, the bypass valve (2) opens and the oil flows from inlet to outlet bypassing the filter element.

(1) Filter Element
(2) Bypass Valve

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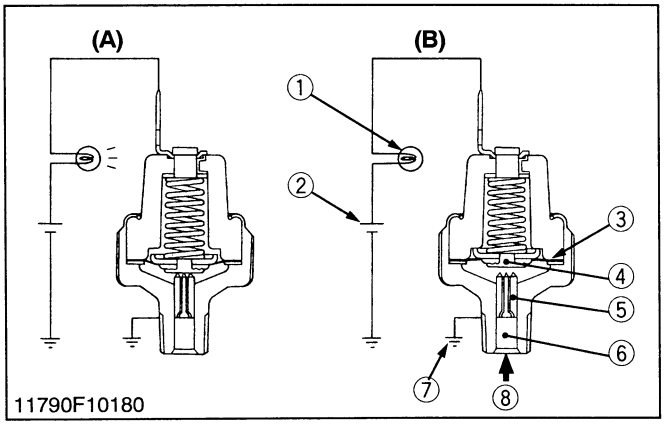
(4) Oil Pressure Switch



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The oil pressure switch is mounted on the cylinder block, to warn the operator that the lubricating oil pressure is poor.

If the oil pressure falls below the specified value, the oil warning lamp will light up, warning the operator. In this case, stop the engine immediately and check the cause of prssure drop.

(1) Warning Lamp
(2) Battery
(3) Rubber Gasket
(4) Contact Rivet
(5) Contact
(6) Oil Passage
(7) Cylinder Block
(8) Oil

(A) At Lower Oil Pressure (49 kPa, 0.5 kgf/cm^2, 7 psi or less)
(B) At Proper Oil Pressure

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SERVICING

CONTENTS

TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item		N·m	kgf·m	ft-lbs
Canopy mounting bolt and nut		33.9 to 40.7	3.5 to 4.2	25.0 to 30.0
Upper frame mounting bolt and nut, Front		38.2 to 41.2	3.9 to 4.2	28.1 to 30.4
Upper frame mounting bolt and nut, Rear		62.8 to 72.6	6.4 to 7.4	46.3 to 53.5
Front frame mounting bolt and nut		122 to 146	12.4 to 14.9	90.0 to 108
Connecting bar mounting bolt and nut		122 to 146	12.4 to 14.9	90.0 to 108
Brace mounting bolt and nut		150 to 160	15.3 to 16.3	110 to 118
Loader side frame mounting screw, bolt and nut		150 to 160	15.3 to 16.3	110 to 118
Frame mounting bolt and nut		176 to 212	18.0 to 21.6	130 to 156
Rear wheel mounting screw and nut		196 to 226	20.0 to 23.1	145 to 167
Main frame connecting rod mounting screw		61 to 73	6.2 to 7.4	45 to 54
Main frame connecting plate mounting bolt and nut		108 to 118	11.0 to 12.0	79.7 to 87.0
Main frame support mounting screw, bolt and nut		108 to 118	11.0 to 12.0	79.7 to 87.0
Main frame mounting screw		150 to 160	15.3 to 16.3	110 to 118
Steering wheel mounting nut		29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Drag link slotted nut		48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Front axle frame mounting screw and nut		60.8 to 70.5	6.2 to 7.2	44.9 to 52.1
Front axle frame reamer stud bolt		24.5 to 31.4	2.5 to 3.2	18.1 to 23.1
Delivery pipe nut		34.3 to 44.1	3.5 to 4.5	25.3 to 32.5
Clutch housing and engine mounting	M8	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2
screw, bolt and nut	M10	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Flow priority valve mounting screw		17.7 to 20.6	1.8 to 2.1	13.0 to 15.2
Clutch cover mounting screw		23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Fan cover mounting screw		3.9 to 5.9	0.4 to 0.6	2.9 to 4.3

Item	Size × Pitch	N·m	kgf·m	ft-lbs
Cylinder head cover cap nut	M7 × 1.0	6.9 to 8.8	0.7 to 0.9	5.1 to 6.5
Injection pipe retaining nut	M12 × 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Nozzle holder assembly	M20 × 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Nozzle holder	–	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Overflow pipe assembly retaining nut	M12 × 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Glow plug	M8 × 1.0	7.8 to 14.7	0.8 to 1.5	5.8 to 10.8
* Rocker arm bracket nut	M7 × 1.0	21.6 to 26.5	2.2 to 2.7	15.9 to 19.5
* Cylinder head screw	M10 × 1.25	63.7 to 68.6	6.5 to 7.0	47.0 to 50.6
* Crankshaft screw	M14 × 1.5	235.4 to 245.2	24.0 to 25.0	173.6 to 180.8
* Connecting rod screw	M8 × 1.0	41.2 to 46.1	4.2 to 4.7	30.3 to 33.9
* Flywheel screw	M10 × 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
* Main bearing case screw 1	M8 × 1.25	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
* Main bearing case screw 2	M9 × 1.25	49.0 to 53.9	5.0 to 5.5	36.2 to 39.8
Bearing case cover screw	M6 × 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
* Idle gear shaft 1 mounting screw	M6 × 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
* Oil pressure switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
Idle adjust screw cap nut	M6 × 1.0	7.8 to 9.8	0.8 to 1.0	5.8 to 7.2
Fuel limit cap nut	M6 × 1.0	7.8 to 9.8	0.8 to 1.0	5.8 to 7.2

■ NOTE

- **For * marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in size × Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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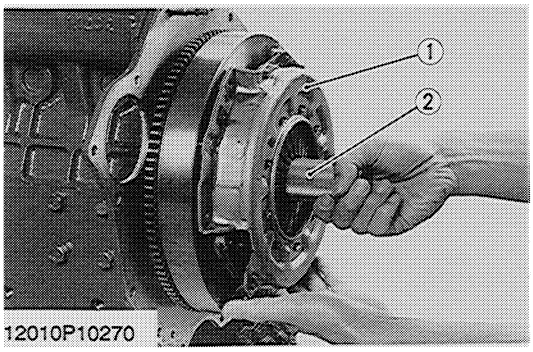

Clutch Assembly

1. Remove the clutch assembly (1).

(When reassembling)

- Direct the shorter end of the clutch disc boss toward the flywheel.
- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Insert the plessure plate noting the position of straight pins.

■ IMPORTANT

- **Be sure to align the center of disc and flywheel by inserting the clutch center tool (2).**

■ NOTE

- **Do not allow grease and oil on the clutch disc facing.**

Tightening torque	Clutch cover mounting screw	23.5 to 27.5 N·m 2.4 to 2.8 kgf·m 17.4 to 20.3 ft-lbs

(1) Clutch Assembly (2) Clutch Center Tool

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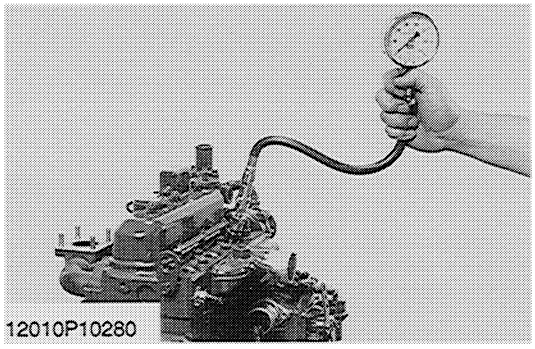
[2] ENGINE BODY CHECKING AND ADJUSTING



Compression Pressure

1. Run the engine until it is warmed up.
2. Stop the engine and disconnect the **2P** connector from the fuel pump.
3. Remove the air cleaner, the muffler and all injection nozzles.
4. Set a compression tester (Code No. 07909-30208) with the adaptor to the nozzle hole.
5. Keep the engine stop lever at **"Stop Position"**.
6. While cranking the engine with the starter, measure the compression pressure.
7. Repeat steps 4 through 6 for each cylinder.
8. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.
9. If the compression pressure is still less than the allowable limit, check the top clearance, valve and cylinder head.
10. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ NOTE

- **Check the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for performing this test.**
- **Variances in cylinder compression values should be under 10 %.**

Compression pressure	Factory spec.	2.84 to 3.24 MPa 29 to 33 kgf/cm^2 412 to 469 psi
	Allowable limit	2.26 MPa 23 kgf/cm^2 327 psi

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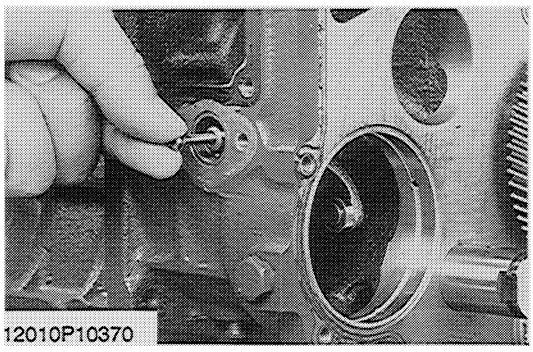
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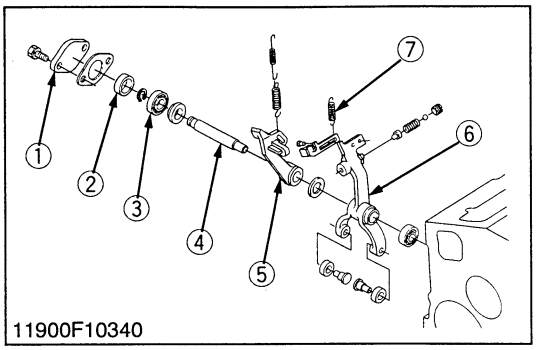

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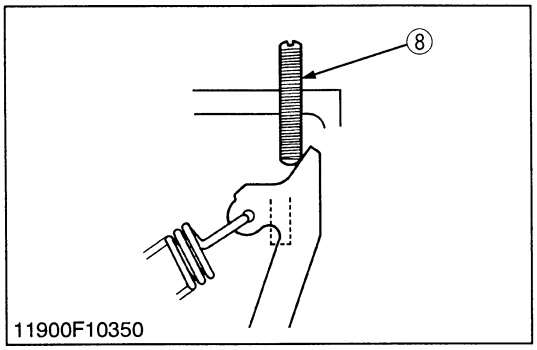

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Fork Lever

1. Remove the start spring (7).
2. Remove the fork lever shaft cover (1).
3. Pull out the fork lever shaft (4), and remove the spacer (2), bearing (3), fork levers 1 (6) and 2 (5).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to the both sides of the fork lever shaft cover, and fit the fork lever shaft cover with the **"UP"** mark facing upwards.
- Securely fit the start spring.

■ IMPORTANT

- **Install the fork lever 2 (5) to position it on the right side of the maximum output limit bolt (8) as shown in the figure.**

(1) Fork Lever Shaft Cover
(2) Spacer
(3) Bearing
(4) Fork Lever Shaft
(5) Fork Lever 2
(6) Fork Lever 1
(7) Start Spring
(8) Maximum Output Limit Bolt

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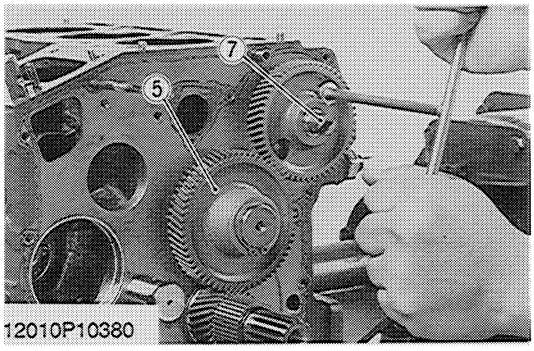

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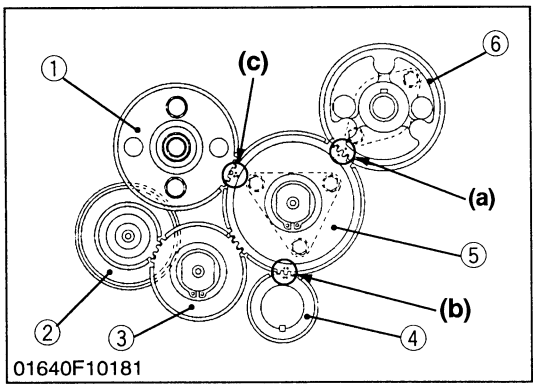

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Camshaft and Idle Gear 1

1. Remove the external snap ring, and then remove the idle gear 1 (5).
2. Remove the camshaft stopper mounting screw, and pull out the camshaft (7).

(When reassembling)

- When installing the idle gear 1, be sure to align the alignment marks **(a)**, **(b)**, **(c)** on the gears.
- Securely fit the external snap ring and stopper.

(1) Injection Pump Gear
(2) Governor Gear
(3) Idle Gear 2
(4) Crank Gear
(5) Idle Gear 1
(6) Cam Gear
(7) Camshaft
(a) Alignment Mark (Idle Gear 1 and Cam Gear)
(b) Alignment Mark (Idle Gear 1 and Crank Gear)
(c) Alignment Mark (Idle Gear 1 and Injection Pump Gear)

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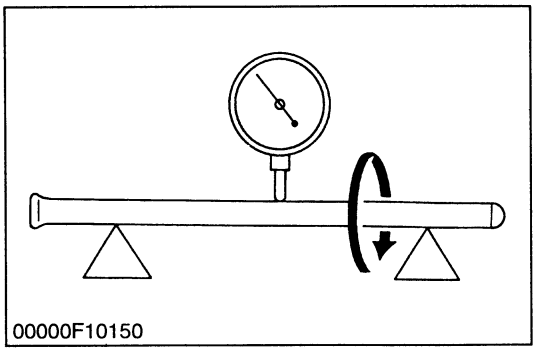
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Push Rod Runout

1. Place the push rod on V blocks.
2. Measure the push rod runout.
3. If the measurement exceeds the allowable limit, replace the push rod.

Push rod runout	Allowable limit	0.50 mm 0.0196 in.

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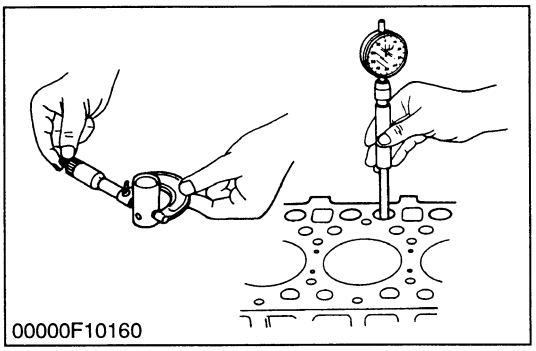
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Oil Clearance between Tappet and Tappet Guide Bore

1. Measure the tappet O.D. with an outside micrometer.
2. Measure the I.D. of the tappet guide bore with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit or the tappet is damaged, replace the tappet.

Oil Clearance between tappet and tappet guide bore	Factory spec.	0.020 to 0.062 mm 0.00079 to 0.00244 in.
	Allowable limit	0.07 mm 0.0028 in.
Tappet O.D.	Factory spec.	19.959 to 19.980 mm 0.78579 to 0.78661 in.
Tappet guide bore I.D.	Factory spec.	20.000 to 20.021 mm 0.78740 to 0.78823 in.

00000S10121

Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2 and 3 (Continue)

(Reference)

- Undersize crankshaft bearing 2 and 3

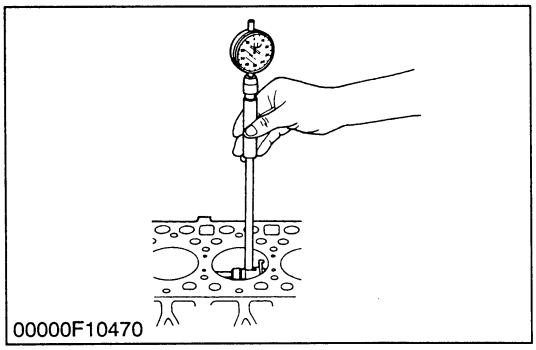
Undersize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Crankshaft bearing 2 02	16241-23931	020 US
	Crankshaft bearing 3 02	16241-23861	020 US
0.4 mm 0.016 in.	Crankshaft bearing 2 04	16241-23941	040 US
	Crankshaft bearing 3 04	16241-23871	040 US

- Undersize dimensions of crankshaft journal

Undersize / Dimension	0.2 mm 0.008 in.	0.4 mm 0.016 in.
A	2.3 to 2.7 mm radius 0.0906 to 0.1063 in. radius	2.3 to 2.7 mm radius 0.0906 to 0.1063 in.radius
B	1.0 to 1.5 mm radius 0.0394 to 0.0591 in. radius	1.0 to 1.5 mm radius 0.0394 to 0.0591 in. radius
C	47.734 to 47.750 mm 1.87929 to 1.87992 in.	47.534 to 47.550 mm 1.87141 to 1.87204 in.
D	51.721 to 51.740 mm 2.03626 to 2.03700 in.	51.521 to 51.540 mm 2.02838 to 2.02913 in.
• The crankpin journal must be fine-finished to higher than ∇∇∇∇ (0.8 S).		

00000S10352

(5) Cylinder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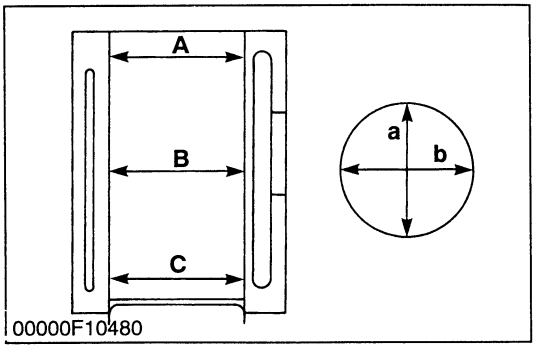

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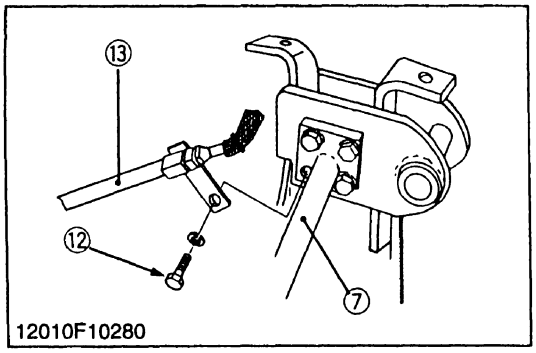
Cylinder Wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer to **"Correcting Cylinder"**)
4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (Refer to **"Correcting Cylinder"**)

Cylinder I.D.	Factory spec.	76.000 to 76.019 mm 2.99212 to 2.99287 in.
	Allowable limit	76.169 mm 2.99878 in.

(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to Piston Pin
(b) Piston Pin Direction

00000S10363



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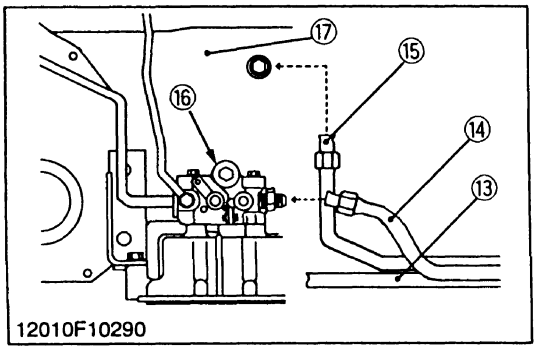

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Main Frame (Continued)

7. Attach the main frame connecting rod (7).

■ **NOTE**

- **When attaching the main frame connecting rod (7), be careful that one right side mounting screw (12) is longer size than others. And this screw (12) tightens with pipe stay. (See figure left.)**

8. Tighten the all screws, bolts and nuts with specified torque, following the below order.
   i) Screw (11) for main frame connecting rod.
   ii) Screw (1) for main frame.
   iii) Bolt (3) and nut for main frame connecting plate.
   iv) Lock nut (4) for main frame connecting plate. (Only for double nut type.)
   v) Bolt (9) and nut for main frame connecing plate.

■ **NOTE**

- **When tighten the lock nuts, fix inside nuts securely.**
- **Bolt tightening tool is introduced to the reference in 1-S62 to achieve a more certain tightening torque of lock nut. It can use for fixing the mounting bolts and nut of main frame connecting plate.**

9. Connect the brake rods.
10. Attach the main frame supports (6) and tighten the bolts and nuts with specified torque.
11. Place and connect three hydraulic pipes (13), (14), (15).

Tightening torque	Main frame connecting rod mounting screw	61 to 73 N·m 6.2 to 7.4 kgf·m 45 to 54 ft-lbs
	Main frame connecting plate mounting bolt, nut and lock nut	108 to 118 N·m 11.0 to 12.0 kgf·m 79.7 to 87.0 ft-lbs
	Main frame mounting screw	150 to 160 N·m 15.3 to 16.3 kgf·m 110 to 118ft-lbs
	Main frame support mounting bolt and nut	108 to 118 N·m 11.0 to 12.0 kgf·m 79.7 to 87.0 ft-lbs

(13) Carry-over Pipe
(14) Delivery Pipe (for Front Loader)
(15) Return Pipe (for Front Loader)
(16) Hydraulic Block
(17) Transmission Case

12010S10510

SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Clutch Pedal	Free travel	20 to 30 mm 0.8 to 1.2 in.	–
Clutch Pedal Stopper Bolt	Clearance "A" between Stopper Bolt and Clutch Housing	8.5 mm 0.33 in.	–
Safety Switch Setting Position	Distance "A" of Safety Switch when Clutch Pedal Fully Depressed	17 to 21 mm 0.67 to 0.83 in.	–
Clutch Disc	Disc Surface to Rivet Top (Depth)	–	0.3 mm 0.012 in.
Clutch Disc Boss to Gear Shaft	Backlash (Displacement Around Disc Edge)	–	2.0 mm 0.079 in.
Pressure Plate	Flatness	–	0.2 mm 0.008 in.
Diaphragm Spring	Mutual Difference	–	0.5 mm 0.020 in.

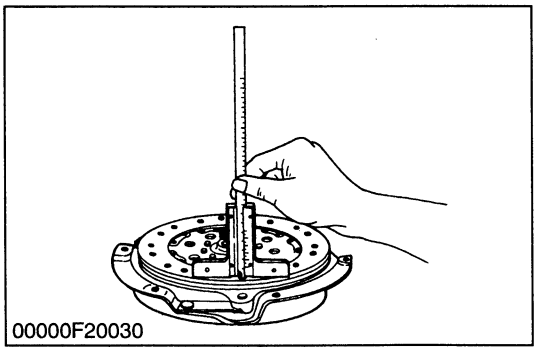
12010S20020

TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-9.)

Item	N·m	kgf·m	ft-lbs
Canopy mounting bolt and nut	33.9 to 40.7	3.5 to 4.2	25.0 to 30.0
Upper frame mounting bolt and nut, Front	38.2 to 41.2	3.9 to 4.2	28.1 to 30.4
Upper frame mounting bolt and nut, Rear	62.8 to 72.6	6.4 to 7.4	46.3 to 53.5
Front frame mounting bolt and nut	122 to 146	12.4 to 14.9	90.0 to 108
Connecting bar mountin gbolt and nut	122 to 146	12.4 to 14.9	90.0 to 108
Brace mounting bolt and nut	150 to 160	15.3 to 16.3	110 to 118
Loader side frame mounting screw, bolt and nut	150 to 160	15.3 to 16.3	110 to 118
Frame mounting bolt and nut	176 to 212	18.0 to 21.6	130 to 156
Rear wheel mounting screw and nut	196 to 226	20.0 to 23.1	145 to 167
Main frame connecting rod mounting screw	61 to 73	6.2 to 7.4	45 to 54
Main frame connecting plate mounting bolt and nut	108 to 118	11.0 to 12.0	79.7 to 87.0
Main frame support mounting screw, bolt and nut	108 to 118	11.0 to 12.0	79.7 to 87.0
Main frame mounting screw	150 to 160	15.3 to 16.3	110 to 118
Steering wheel mounting nut	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
Delivery pipe nut	34.3 to 44.1	3.5 to 4.5	25.3 to 32.5
Drag link slotted nut	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Clutch housing and engine mounting scerw, bolt and nut M8	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2
M10	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Clutch cover mounting screw	23.5 to 27.5	2.4 to 2.8	17.4 to 20.2

12010S20030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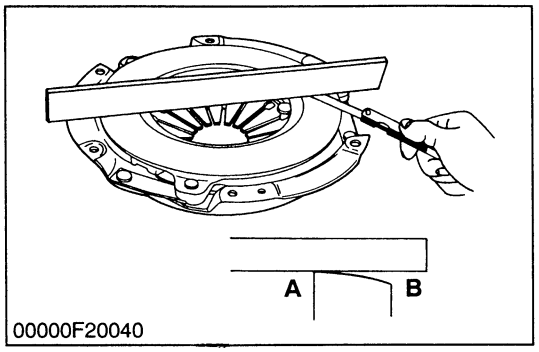
Clutch Disc Wear

1. Measure the depth from clutch disc surface to the top of rivet at least 10 points with a depth gauge.
2. If the depth is less than the allowable limit, replace the disc.
3. If oil is sticking to clutch disc, or disc surface is carbonized, replace the clutch disc.

Disc surface to rivet top (Depth)	Allowable limit	0.3 mm 0.012 in.

12010S20140



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Pressure Plate Flatness

1. Place a straightedge on the pressure plate and measure clearance with a feeler gauge at several points.
2. If the clearance exceeds the allowable limit, replace it.
3. When the pressure plate is worn around its outside and its inside surface only is in contact with the straightedge, replace even if the clearance is within the allowable limit.

Clearance between pressure plate and straightedge	Allowable limit	0.2 mm 0.008 in.

(A) Inside **(B) Outside**

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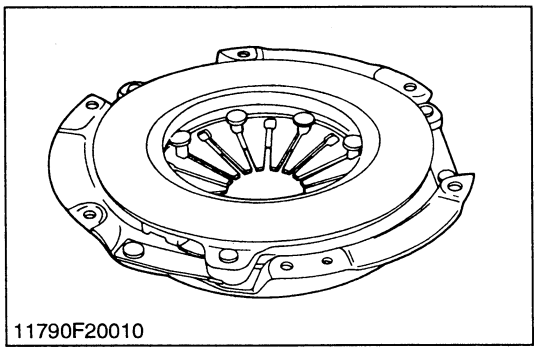
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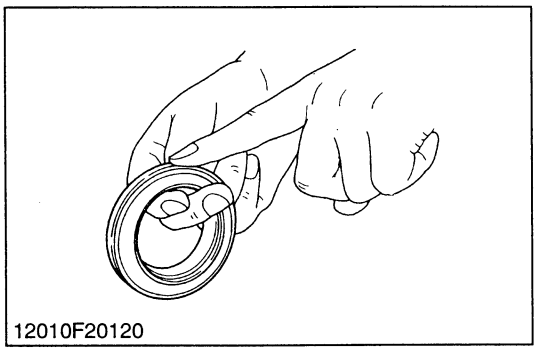
Checking Pressure Plate and Diaphragm

1. Check the pressure plate and if scratched on its surface, correct with sandpaper or replace it.
2. Check the diaphragm for cracke and scratches. If defects are found, replace it.

12010S20150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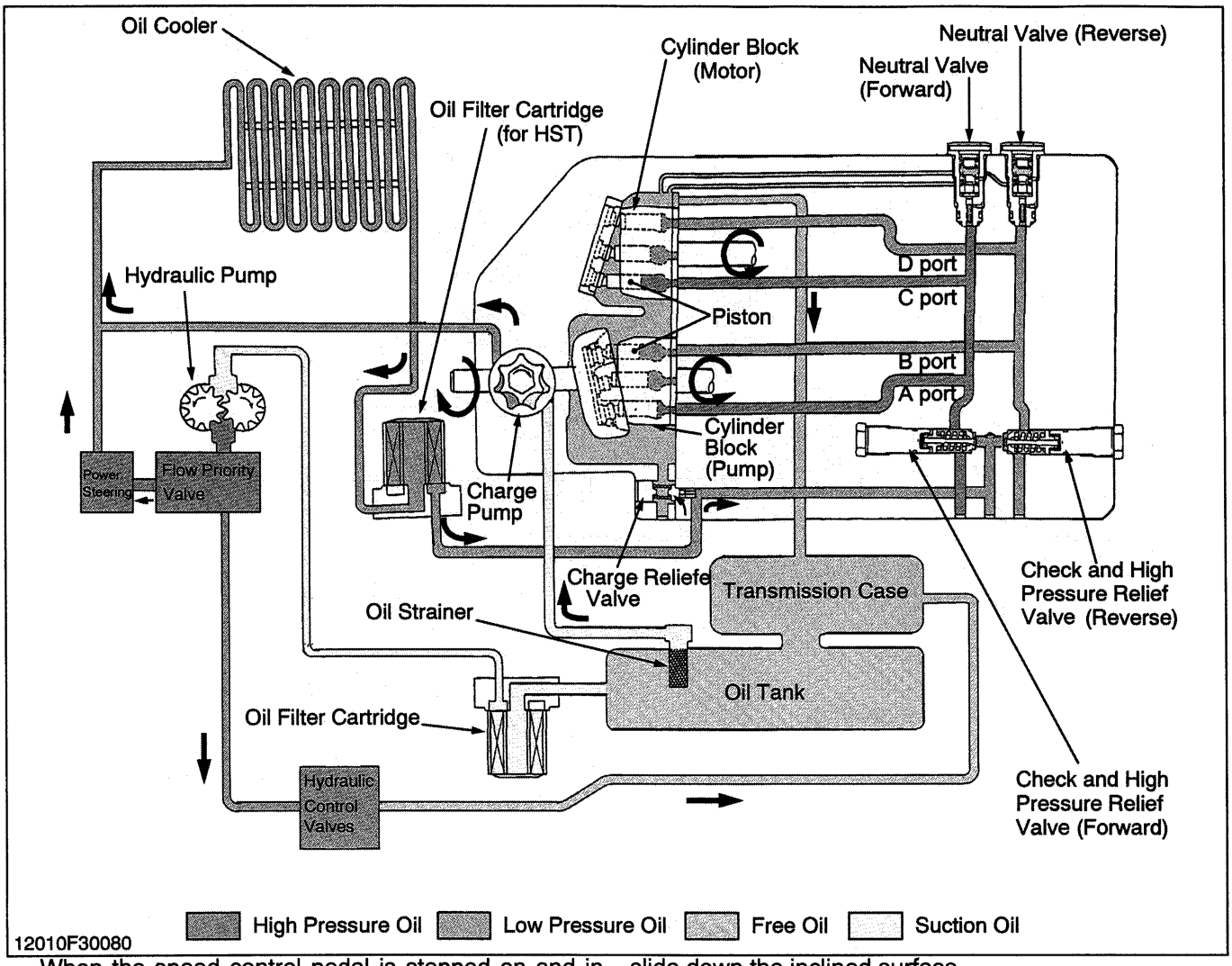
Checking Clutch Release Bearing

1. Check the clutch release bearing. If surface is worn excessively, or abnormal sounds occur, replace it.

12010S20160

■ Forward



When the speed control pedal is stepped on and in forward, the variable swashplate is tilted as shown in figure above.

As the pump cylinder block rotates with the input shaft, oil is forced out of pump port **A** at high pressure. As pressure oil enters motor port **C**, the pistons, which align with port **C**, are pushed against the swashplate and slide down the inclined surface.

Then the output shaft rotates with the motor cylinder block. This drives the machine forward and the angle of pump swashplate determines the output shaft speed.

As the motor cylinder block continues to rotate, oil is forced out of motor port **D** at low pressure and returns to the pump.

12010M30100

TROUBLESHOOTING (Continued)

CLUTCH HOUSING

Symptom	Probable Cause	Solution	Reference Page
Noise from Clutch Housing	• Transmission oil insufficient • Gear worn or broken • Bearing worn	Refill Replace Replace	3-S10 3-S18 3-S18

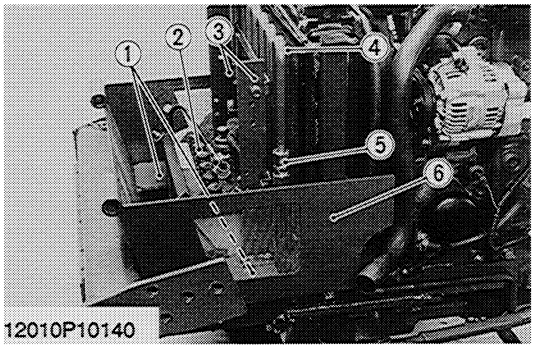
TRANSMISSION CASE SECTION

Noise from Transmission	• Transmission oil insufficient • Gear worn or broken • Improper backlash between spiral bevel pinion and bevel gear • Improper backlash between differential pinion and differential side gear • Bearings worn	Refill Replace Adjust Adjust Replace	3-S10 – 3-S35 3-S34 –
Gear Slip Out of Mesh	• Shift fork spring tension insufficient • Shift fork or shifter worn • Shift fork bent	Replace Replace Replace	– 3-S27, 28 3-S27, 28

DIFFERENTIAL CASE SECTION

Excessive or Unusual Noise at All Time	• Improper backlash between spiral bevel pinion and bevel gear • Improper backlash between differential pinion and differential side gear • Bearing worn • Insufficient or improper type of transmission fluid used	Adjust Adjust Replace Replenish or Replace	3-S35 3-S34 3-S29 G-8, 3-S10
Noise while Turning	• Differential pinions or differential side gears worn or damaged • Differential lock binding (does not disengage) • Bearings worn	Replace Replace Replace	3-S29 3-S29, 4-S6 3-S29
Differential Lock Can Not Be Set	• Differential lock shift fork damaged • Differential lock shifter mounting pin damaged • Differential lock clutch damaged	Replace Replace Replace	4-S6 4-S6 4-S6
Differential Lock Pedal Does Not Return	• Differential lock pedal return spring weaken or damaged • Differential lock fork shaft rusted	Replace Repair	4-S6 4-S6

12010S30030



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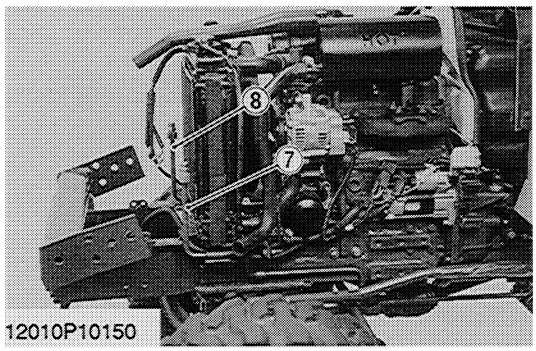


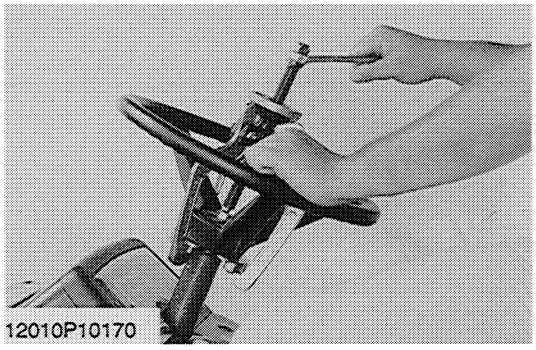
12010P10150

Battery, Oil Cooler, Front Grill and Hydraulic Pipes

1. Loosen the battery support nuts and take out the battery (2).
2. Disconnect the oil cooler pipe joints (5) and remove the oil cooler stay mounting screws, then remove the oil cooler (4) with stay (3).
3. Remove the front grill plate (1).
4. Remove the front grill (6).
5. Disconnect the return pipe to hydraulic filter and remove the return pipe (7).
6. Disconnect the pipe joint and remove the delivery pipe (8).

(1) Front Grill Plate
(2) Battery
(3) Oil Cooler Stay
(4) Oil Cooler
(5) Oil Cooler Pipe Joint
(6) Front Grill
(7) Return Pipe
(8) Delivery Pipe

12010S20070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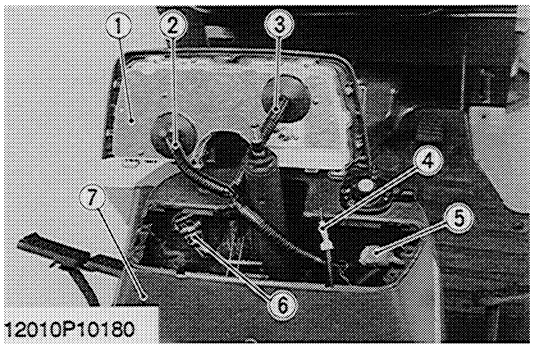
Steering Wheel

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut and remove the steering wheel with a steering wheel puller (Code No. 07916-51090).

(When reassembling)

Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 ft-lbs

12010S10230



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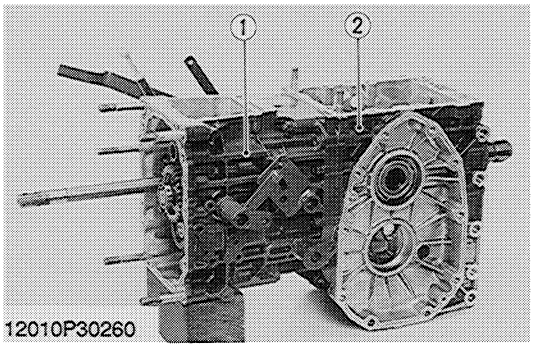
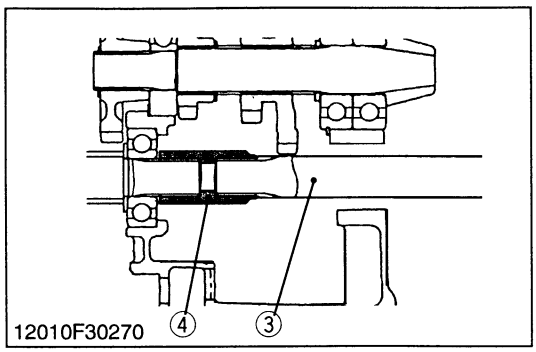
Meter Panel and Panel Under Cover

1. Open the meter panel (1) and disconnect the meter panel connector 1, 2 (2), (3) and hour-meter cable (4). Then remove the meter panel.
2. Disconnect the combination switch connector (5) and main switch connector (6).
3. Remove the panel under cover (7).

(1) Meter Panel
(2) Meter Panel Connector 1
(3) Meter Panel Connector 2
(4) Hour-meter Cable
(5) Combination Switch Connector
(6) Main Switch Connector
(7) Panel Under Cover

12010S10240





Differential Case and Transmission Case

1. Remove the case mounting screws and nuts and separate the transmission case (1) and differential case (2).

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the transmission case and differential case.

Tightening torque	Transmission case mounting screw and nut	39.2 to 44.1 N·m 4.0 to 4.5 kgf·m 28.9 to 32.5 ft-lbs

■ NOTE

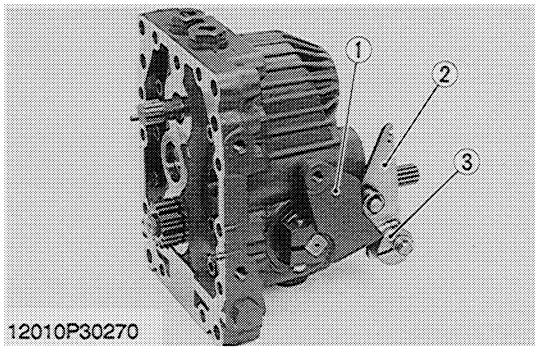
- **Be sure to reinstall the coupling (3), as shown figure.**

(1) Transmission Case
(2) Differential Case
(3) Coupling
(4) PTO Shaft

12010S30240

[4] DISASSEMBLING TRANSMISSION CASE

(1) Hydrostatic Transmission



Neutral Holder and Neutral Holder Arm

1. Place parting marks on the neutral adjuster (3) and the neutral holder arm (2).
2. Remove the neutral holder arm (2) with neutral adjuster (3).
3. Remove the screw and pull out the neutral holder (1).

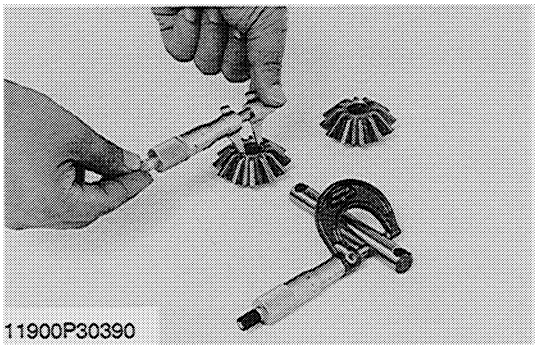
(When reassembling)

- Align the parting marks and install the neutral adjuster and the neutral holder arm.

Tightening torque	Neutral adjuster lock screw	17.7 to 20.5 N·m 1.8 to 2.1 kgf·m 13.0 to 15.2 ft-lbs
	Neutral holder mounting screw	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2ft-lbs

(1) Neutral Holder
(2) Neutral Holder Arm
(3) Neutral Adjuster

12010S30250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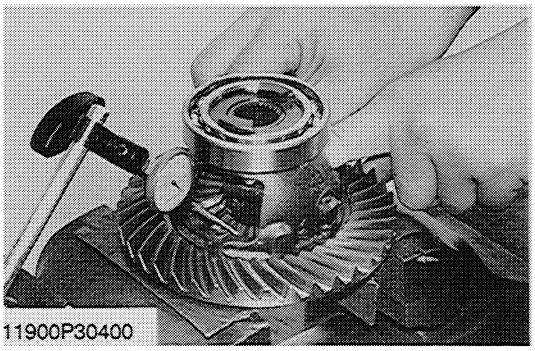
Clearance between Differential Pinion Shaft and Differential Pinion

1. Measure the differential pinion shaft O.D. with an outside micrometer.
2. Measure the differential pinion I.D. with an inside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace faulty parts.

Clearance between differential pinion shaft and differential pinion	Factory spec.	0.016 to 0.045 mm 0.0007 to 0.0018 in.
	Allowable limit	0.30 mm 0.0118 in.

Differential pinion I.D.	Factory spec.	16.000 to 16.018 mm 0.6300 to 0.6306 in.
Differential pinion shaft O.D.	Factory spec.	15.973 to 15.984 mm 0.6289 to 0.6292 in.

11900S30530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Backlash between Differential Pinion and Differential Side Gear

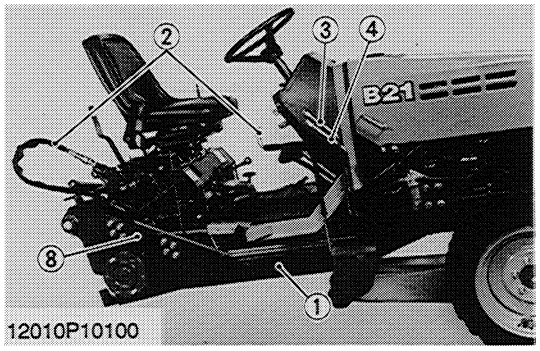
1. Secure the differential case with a vise.
2. Set the dial indicator (lever type) with its finger on the tooth of the differential side gear.
3. Press differential pinion and side gear against the differential case.
4. Hold the differential pinion and move the differential side gear to measure the backlash.
5. If the backlash exceeds the allowable limit, adjust with differential side gear shims.

Backlash between differential pinion and differential side gear	Factory spec.	0.1 to 0.3 mm 0.004 to 0.011 in.
	Allowable limit	0.4 mm 0.016 in.

■ NOTE

- **Thickness of shims :**
  0.8 mm (0.0315 in.), 1.0 mm (0.0394 in.), 1.2 mm (0.0472 in.)

11900S30540



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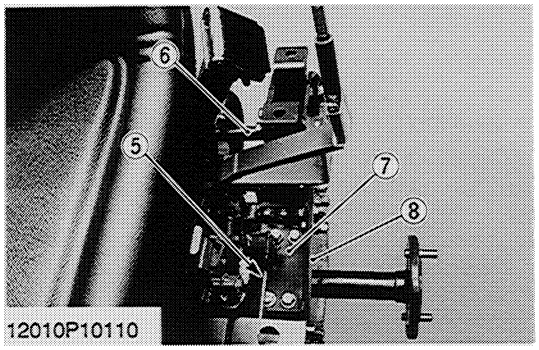

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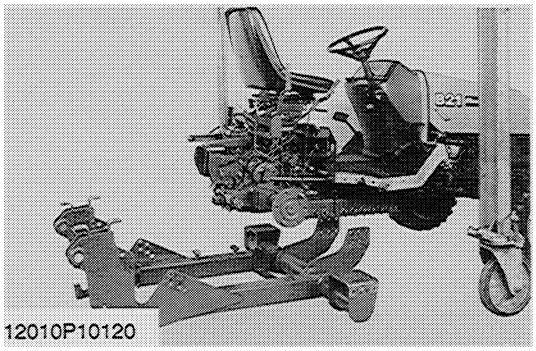
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Main Frame

1. Place hydraulic jack under the front side of main frame (1) and support it.
2. Remove the three pipes (2), (3) and (4).
3. Disconnect the both brake rods (5) at the brake case side.
4. Remove the main frame connecting rod (6).
5. Remove the main frame connecting plate (7) and support (8).
6. Remove the fuel filter mounting screw.
7. Remove the main frame mounting screws at the engine frame
8. Hoist the rear side of tractor body and separate the main frame.

■ NOTE

- **Place the protective caps on the remaining exposed pipe ends and pipe joints.**
- **After separating the main frame, place disassembling stand under the rear axles and support tractor.**

(When reassembling)

■ NOTE

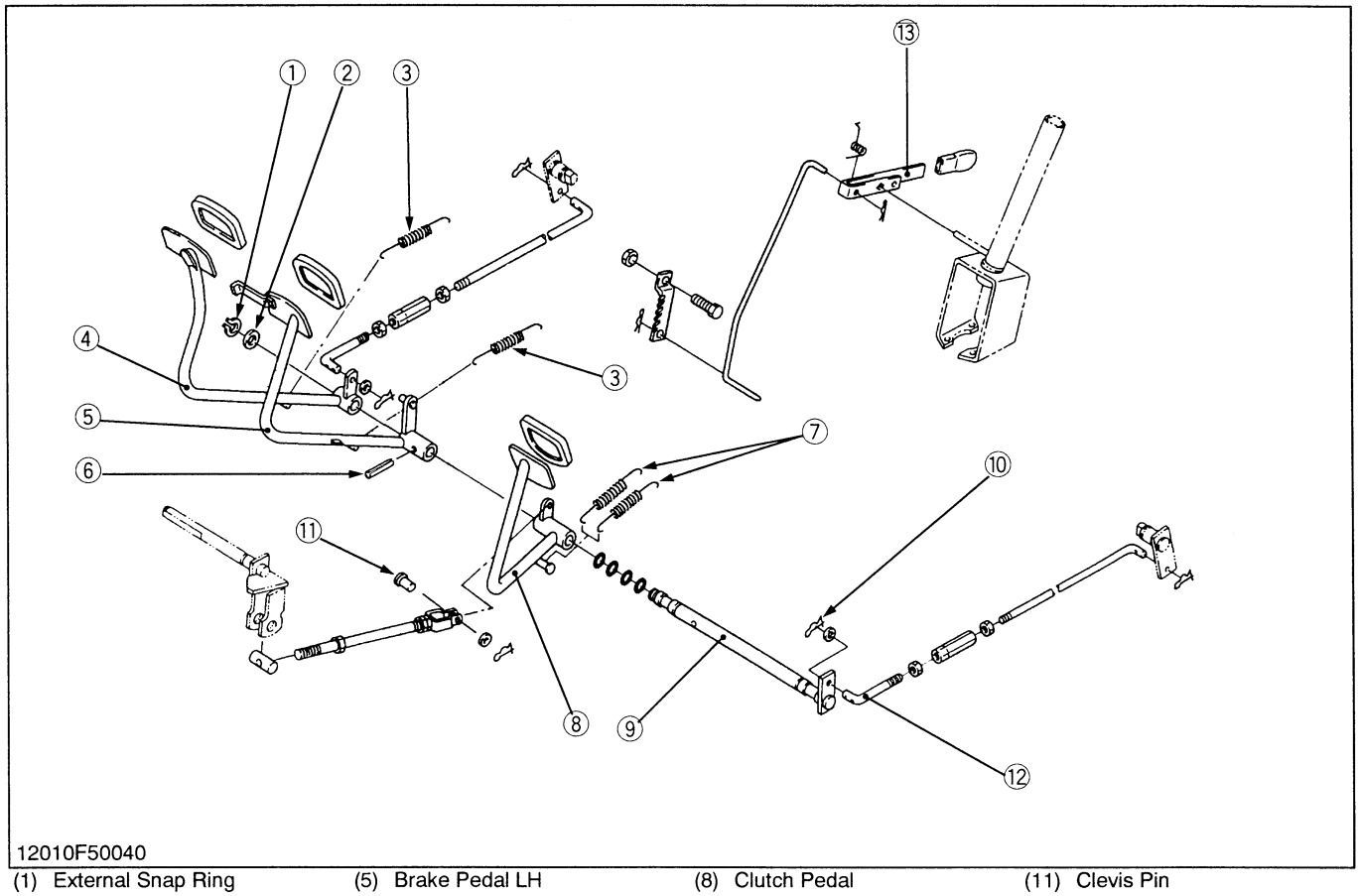
- **Assemble the main frame in the method of description to page 1-S59, when a double nut (lock nut) is used to install the main frame connecting plate (7).**

Tightening torque	Main frame connecting rod mounting screw	61 to 73 N·m 6.2 to 7.4 kgf·m 45 to 54 ft-lbs
	Main frame connecting plate mounting bolt and nut	108 to 118 N·m 11.0 to 12.0 kgf·m 79.7 to 87.0 ft-lbs
	Main frame support mounting screw, bolt and nut	108 to 118 N·m 11.0 to 12.0 kgf·m 79.7 to 87.0 ft-lbs
	Main frame mounting screw	150 to 160 N·m 15.3 to 16.3 kgf·m 110 to 118 ft-lbs

(1) Main Frame
(2) Carry-over Pipe
(3) Delivery Pipe (for Front Loader)
(4) Return Pipe (for Front Loader)
(5) Brake Rod
(6) Main Frame Connecting Rod
(7) Main Frame Connecting Plate
(8) Main Frame Support

12010S10190

Separating Brake Pedal



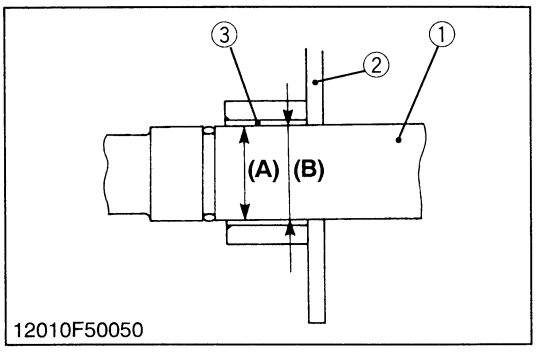
(1) External Snap Ring
(2) Collar
(3) Return Spring
(4) Brake Pedal RH
(5) Brake Pedal LH
(6) Spring Pin
(7) Return Spring
(8) Clutch Pedal
(9) Brake Pedal Shaft
(10) Spring Lock Pin
(11) Clevis Pin
(12) Brake Rod
(13) Parking Brake Lever

1. Remove the spring lock pin (10) of brake rod (12) and pull out the brake rod (12).
2. Remove the return spring (3), (7).
3. Remove the external snap ring (1) at the end of the brake pedal shaft (9).
4. Remove the spring pin (6) of the brake pedal LH (5).
5. Remove the clevis pin (11) of the clutch pedal (8).
6. Pull the right and left brake pedals from the brake pedal shaft (9).
7. Tap out the brake pedal shaft (9) to the left, and remove it with the clutch pedal (8).

(When reassembling)

- Apply grease to the brake pedal shaft.
- When inserting the spring pin, face its split in the direction at right angle to the brake pedal shaft.

12010S50040



Clearance between Brake Pedal Shaft and Center Frame Bush

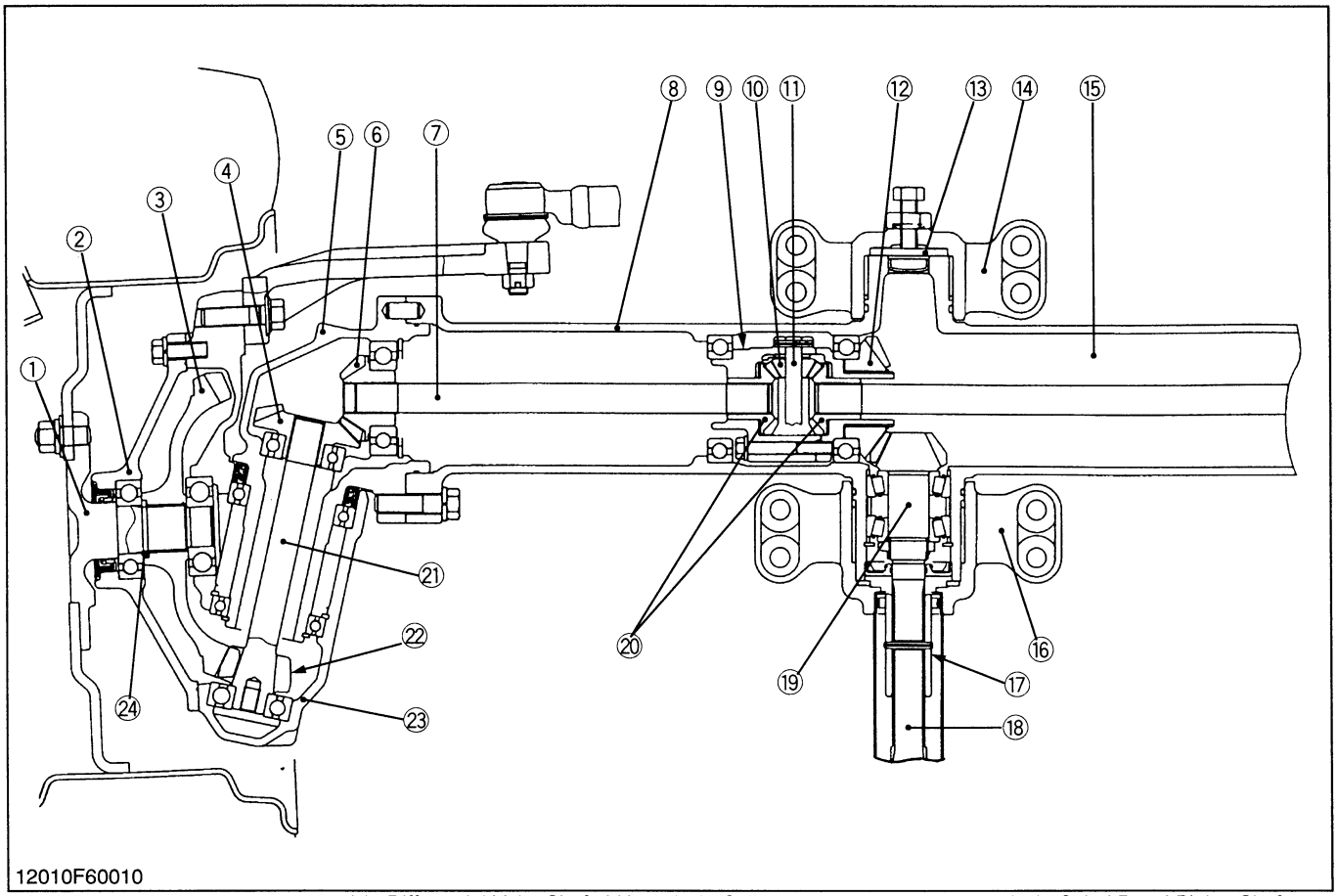
1. Measure the brake pedal shaft O.D. with an outside micrometer.
2. Measure the bush (3) I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace it.

Clearance between brake pedal shaft and center frame bush	Factory spec.	0 to 0.165 mm 0 to 0.00649 in.
	Allowable limit	1.0 mm 0.039 in.
Brake pedal shaft O.D.	Factory spec.	24.916 to 25.030 mm 0.98094 to 0.98543 in.
Center frame bush I.D.	Factory spec.	25.030 to 25.081 mm 0.98543 to 0.98744 in.

(1) Brake Pedal Shaft
(2) Center Frame
(3) Bush
(A) Bush I.D.
(B) Brake Pedal Shaft O.D.

12010S50050

[1] STRUCTURE



(1) Axle
(2) Axle Flange
(3) Bevel Gear
(4) Bevel Gear
(5) Bevel Gear Case
(6) Bevel Gear
(7) Differential Yoke Shaft, LH
(8) Front Axle Case
(9) Differential Gear Assembly
(10) Differential Pinion Gear
(11) Pinion Shaft
(12) Spiral Bevel Gear
(13) Collar
(14) Front Axle Bracket, Front
(15) Differential Yoke Shaft, RH
(16) Front Axle Bracket, Rear
(17) Coupling
(18) Propeller Shaft
(19) Spiral Bevel Pinion Shaft
(20) Differential Side Gear
(21) Bevel Gear Shaft
(22) Bevel Gear
(23) Front Gear Case
(24) Collar

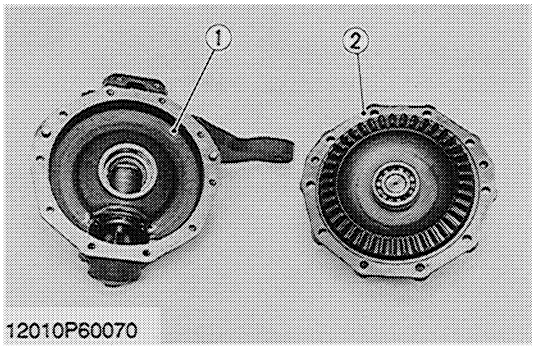
The front axle of the 4WD is constructed as shown above. Power is transmitted from the transmission through the propeller shaft (18) to the spiral bevel pinion shaft (19), then to the spiral bevel gear (12) and to the differential side gear (20).

The power through the differential side gear is transmitted to the differential yoke shaft (7), (15), and to the bevel gear shaft (21) through the bevel gears (4), (6) in the bevel gear case (5).

The revolution is greatly reduced by the bevel gears (22), (3), then the power is transmitted to the axle (1).

The differential system allows each wheel to rotate at a different speed to make turning easier.

12010M60010



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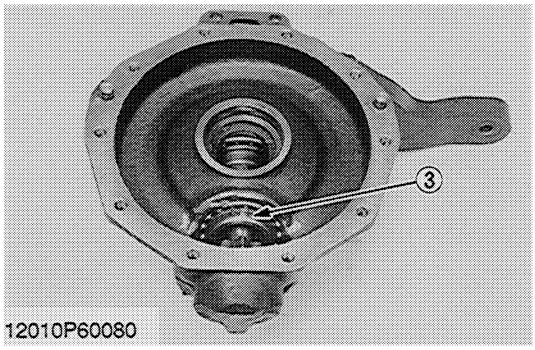
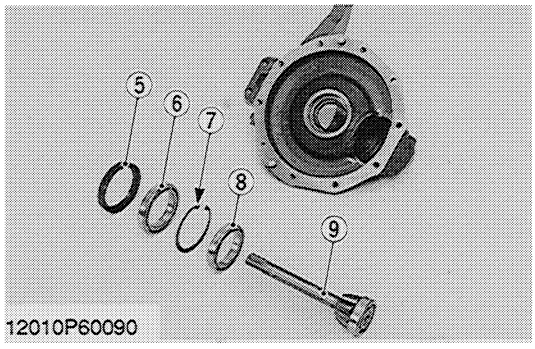


12010P60080



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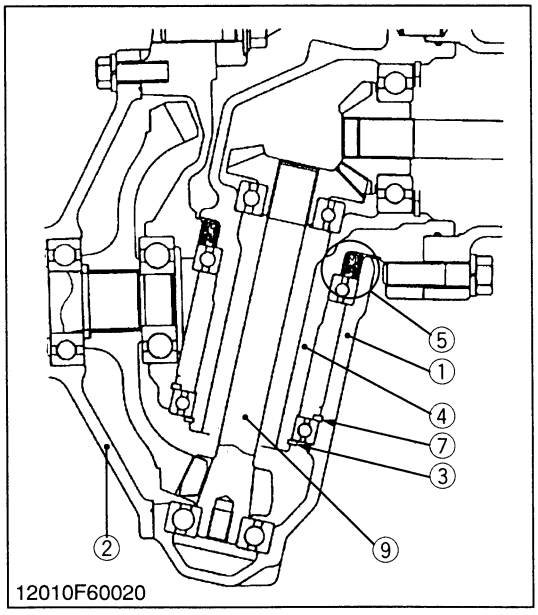


12010F60020

Front Gear Case

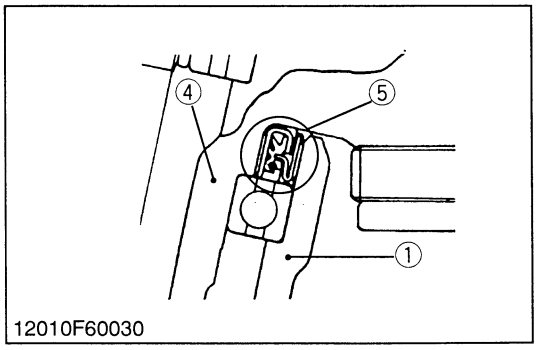
1. Remove the knuckle arm (Left side only).
2. Remove the axle flange (2).
3. Remove the external snap ring (3).
4. Remove the bevel gear case (4) from front gear case (1).
5. Remove the oil seal (5).
6. Remove the ball bearing 1 (6).
7. Remove the internal snap ring (7) and remove the ball bearing 2 (8).
8. Remove the bevel gear shaft (9) with ball bearing.

(When reassembling)

- Apply liquid gasket (Three Bond 1208D or equivalent) to joint face of the axle flange (2) and front gear case (1) after eliminate the water, oil and stuck liquid gasket.
- Tighten the axle flange mounting screws and nuts diagonally in several steps.
- Install the oil seal (5) of bevel gear case, noting its direction as shown in the figure.

Tightening torque	Knuckle arm mounting screw	103.0 to 117.7 N·m 10.5 to 12.0 kgf·m 76.0 to 86.8 ft-lbs
	Axle flange mounting screw	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 ft-lbs

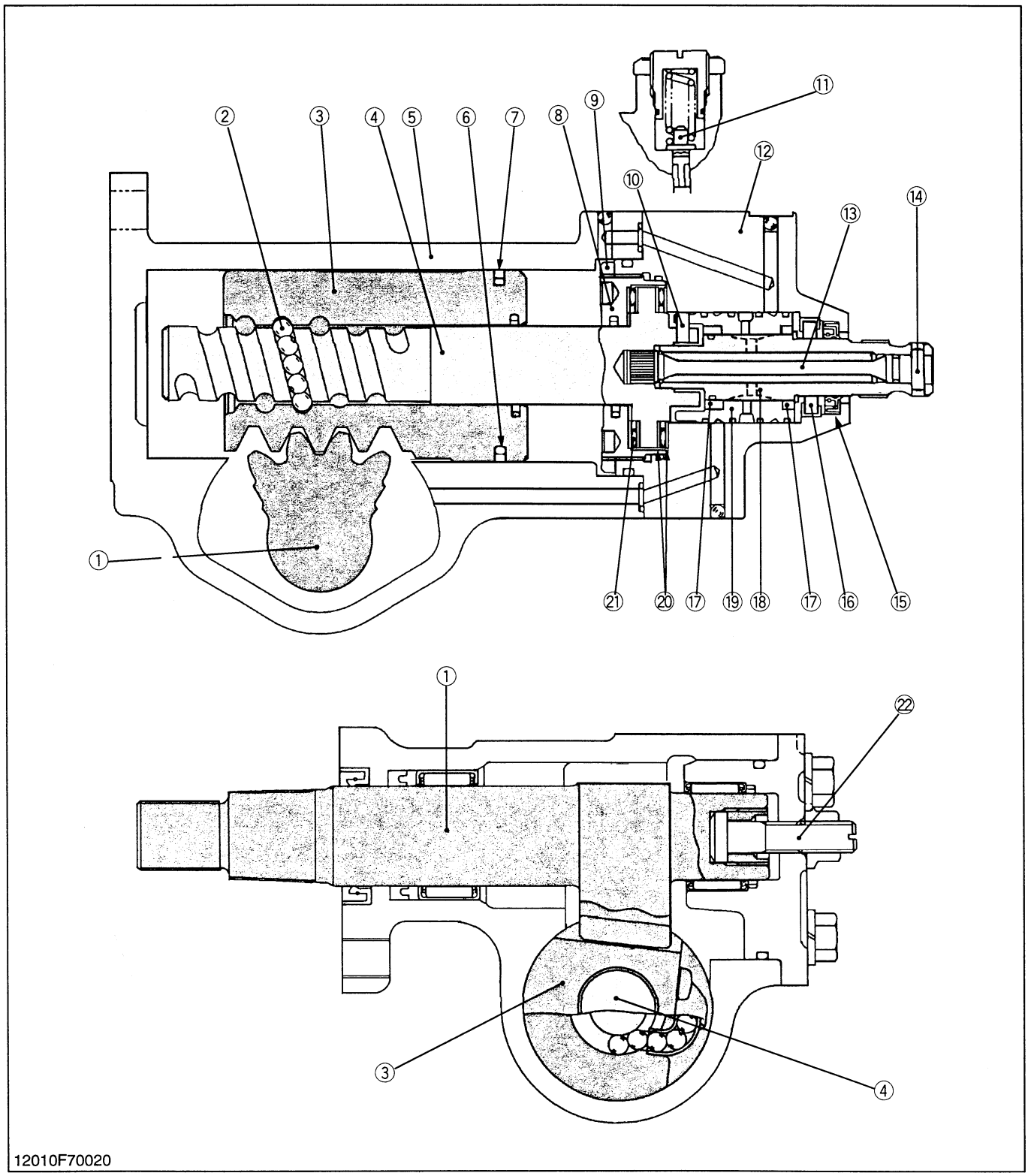
(1) Front Gear Case
(2) Axle Flange
(3) External Snap Ring
(4) Bevel Gear Case
(5) Oil Seal
(6) Ball Bearing 1
(7) Internal Snap Ring
(8) Ball Bearing 2
(9) Bevel Gear Shaft



12010F60030

12010S60140

[2] POWER STEERING BODY



(1) Sector Gear Shaft
(2) Balls
(3) Ball Nut
(4) Worm Shaft
(5) Gear Case
(6) O-ring
(7) Seal Ring
(8) Plug
(9) Lock Nut
(10) Pin
(11) Relief Valve
(12) Valve Housing
(13) Torsion Bar
(14) Pin
(15) Oil Seal
(16) Roller Bearing
(17) Press Fitted Ring
(18) Stub Shaft
(19) Sleeve
(20) Thrust Races
(21) Thrust Bearings
(22) Adjusting Screw for Play

12010M70020

DISASSEMBLING AND ASSEBLING

[1] SEPARATING POWER STEERING ASSEMBLY

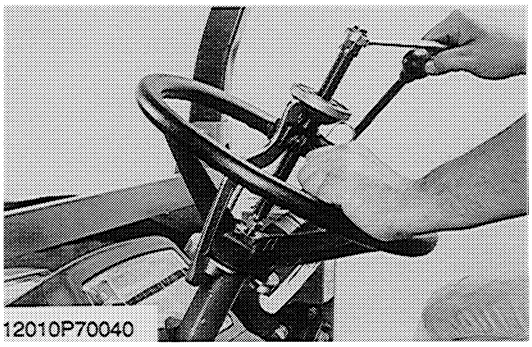
Battery Cord

1. Open the bonnet and disconnect the battery cord.

■ **NOTE**

- **When disconnecting the battery cords, disconnect the grounding cord first, when connecting, connect the positive cord first.**

12010S70080



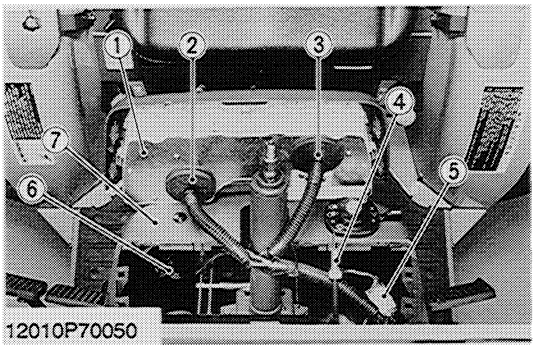
Steering Wheel

1. Remove the steering wheel cap.
2. Remove the steering wheel mounting nut and remove the steering wheel with a steering wheel puller. (Code No: 07916-51090)

(When reassembling)

Tightening torque	Steering wheel mounting nut	29.4 to 49.0 N·m 3.0 to 5.0 kgf·m 21.7 to 36.2 ft-lbs

12010S70090

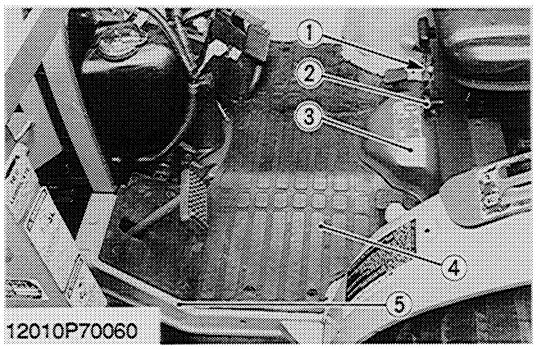


Meter Panel and Panel Under Cover

1. Open the meter panel (1) and disconnect the meter panel connectors (2), (3) and hour-meter cable (4). Then remove the meter panel.
2. Disconnect the combination switch connector (5) and main switch connector (6).
3. Remove the panel under cover (7).

(1) Meter Panel
(2) Meter Panel Connector 1
(3) Meter Panel Connector 2
(4) Hour-meter Cable
(5) Combination Switch Connector
(6) Main Switch Connector
(7) Panel Under Cover

12010S70100



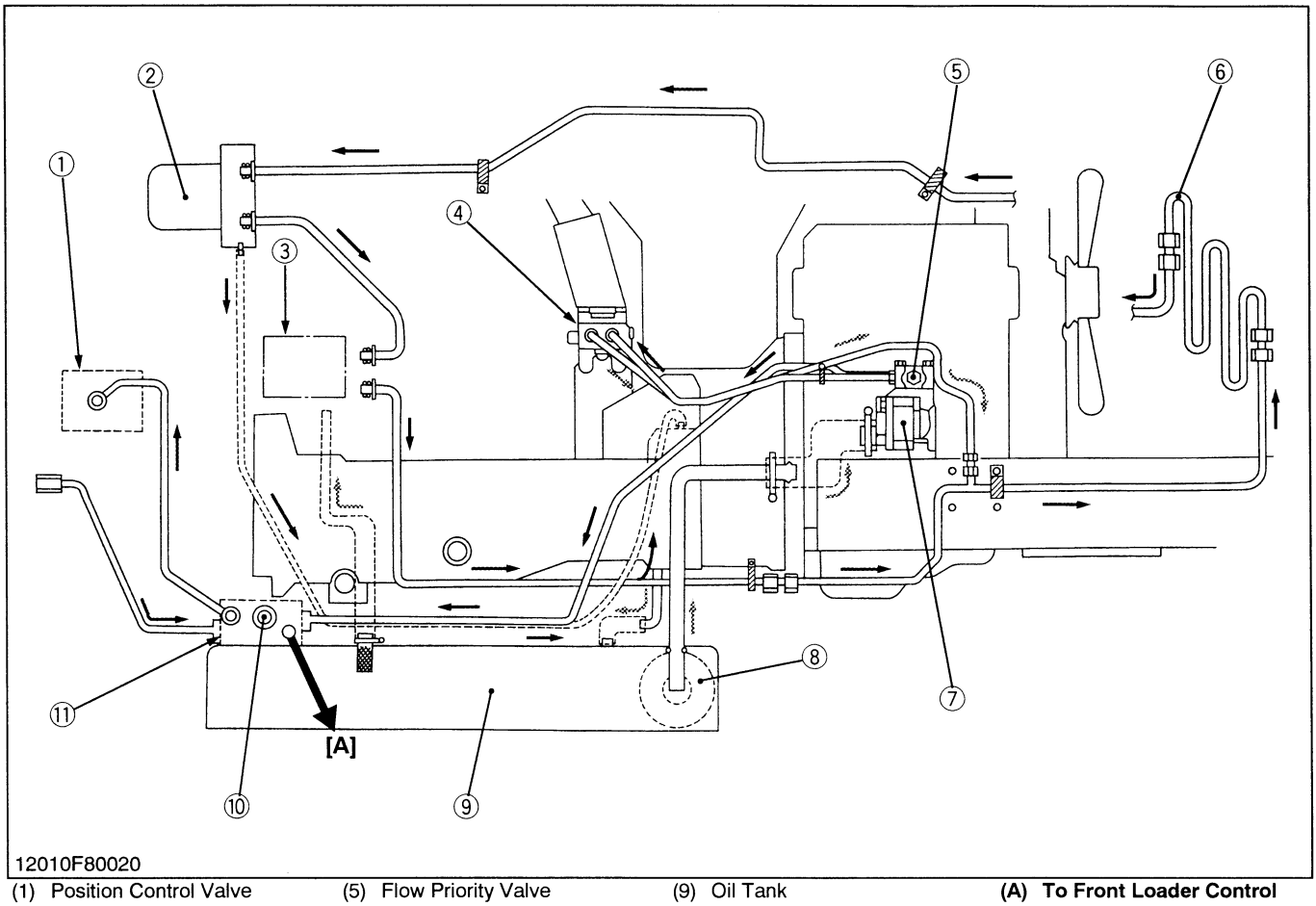
Step

1. Remove the dipstick (1) and lowering speed adjusting knob (2).
2. Remove the seat under cover (3).
3. Remove the rubber mat (4).
4. Remove the clutch spring and left hand step (5).

(1) Dipstick
(2) Lowering Speed Adjusting Knob
(3) Seat Under Cover
(4) Rubber Mat
(5) Step LH

12010S70110

[2] STRUCTURE



12010F80020

(1) Position Control Valve
(2) Oil Filter Cartridge (for HST)
(3) Hydrostatic Transmission
(4) Power Steering
(5) Flow Priority Valve
(6) Oil Cooler
(7) Hydraulic Pump
(8) Oil Filter Cartridge
(9) Oil Tank
(10) Relief Valve
(11) Hydraulic Block
(A) To Front Loader Control Valve

The hydraulic system of this tractor is composed of hydraulic pump, hydraulic block, position control valve, hydraulic cylinder, hydraulic oil filters, oil cooler and other components shown in the figures.

This system has the following functions.

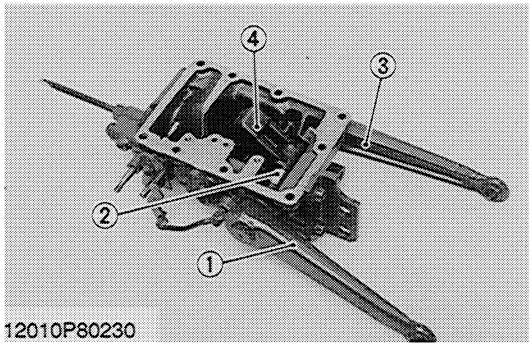
1. Oil is supplied by hydraulic pump connected to the engine. When engine is started, hydraulic pump starts running and suck oil from an oil tank.
2. A hydraulic pump forces out the oil to power steering control valve, position control valve for 3-point hitch hydraulic system, front loader control valve and backhoe control valve.

12010M80020

TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Implement Does Not Rise (No Noise)	• Control valve broken	Replace	8-S10
	• Control valve improperly adjusted	Adjust	8-S12
	• Control valve improperly assembled	Repair	8-S12
	• Relief valve spring damaged	Replace	8-S14
	• Spool sticks	Repair	8-S12
	• Piston O-ring or cylinder damaged	Replace	8-S11
(Noise)	• Oil filter cartridge clogged	Clean or Replace	–
	• Suction pipe loosen or broken	Repair or Replace	–
	• Suction pipe connecting hose loosen or broken	Repair or Replace	–
	• Suction pipe O-ring broken	Replace	–
	• Insufficient transmission oil	Refill	G-8
	• Relief valve setting pressure too low	Adjust or Replace	8-S8
	• Hydraulic pump broken	Replace	8-S6
Implement Does Not Reach Maximum Height	• Feedback rod improperly adjusted	Adjust	8-S9
Implement Does Not Lower	• Control valve malfunctioning	Repair or Replace	8-S12
Implement Drops by Its Weight	• Hydraulic cylinder worn or damaged	Replace	8-S11, S15
	• Piston O-ring worn or damaged	Replace	8-S11
	• Control valve malfunctioning	Replace	8-S12
Implement Hunts	• Control valve improperly adjusted	Adjust	8-S12

12010S80010



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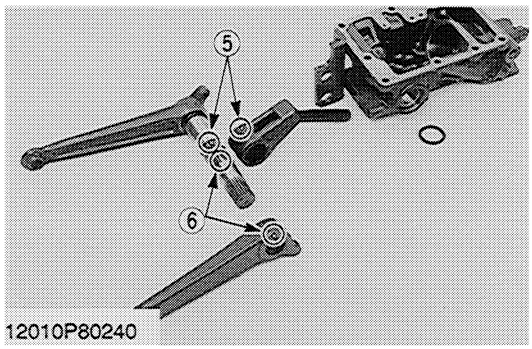


12010P80240

Lift Arm, Hydraulic Arm Shaft and Hydraulic Arm

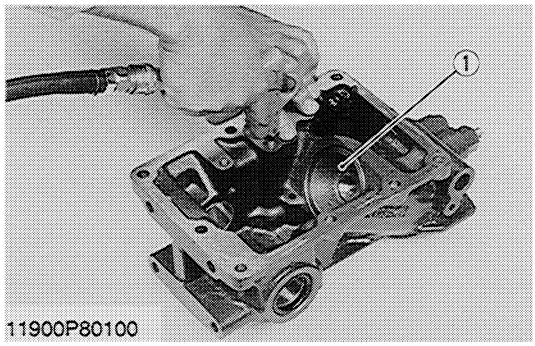
1. Remove the external snap ring, and remove the lift arm LH (3).
2. Draw out the hydraulic arm shaft (2) and lift arm RH (1) as a unit.

(When reassembling)

- Align the alignment marks (5) of the hydraulic arm and hydraulic arm shaft.
- Align the alignment marks (6) of the lift arm LH and hydraulic arm shaft.
- Apply grease to the right and left bushings and O-rings.
- Take care not to damage the O-rings.

(1) Lift Arm RH
(2) Hydraulic Arm Shaft
(3) Lift Arm LH
(4) Hydraulic Arm
(5) Alignment Marks
(6) Alignment Marks

12010S80180



11900P80100

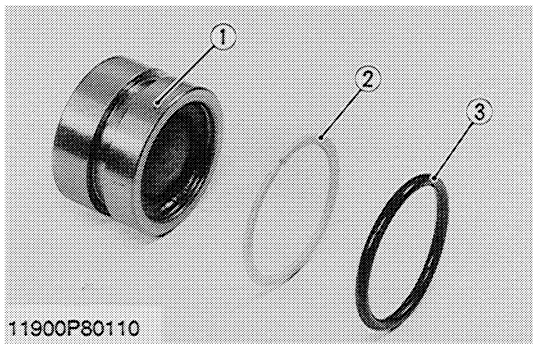
Hydraulic Piston

1. Inject the compressed air into the hydraulic cylinder, and take out the hydraulic piston (1).

(When reassembling)

- Take care not to damage the O-ring (3) and backup ring (2).
- Apply transmission fluid to the O-ring.
- Replace the O-ring if it is defective, worn or scratched, which may case oil leakage.

(1) Hydraulic Piston
(2) Backup Ring
(3) O-ring



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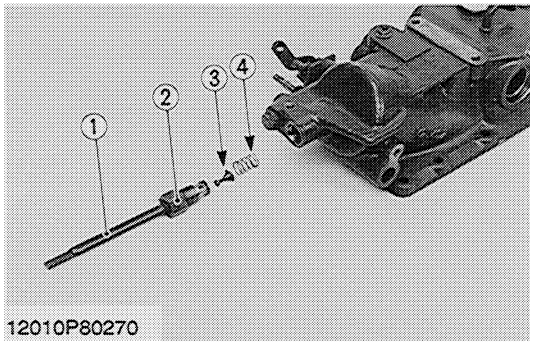


12010P80270

Lowering Speed Adjusting Valve

1. Remove the lowering speed adjusting valve body (2) with the lowering speed adjusting shaft (1).
2. Draw out the poppet (3) and spring (4).

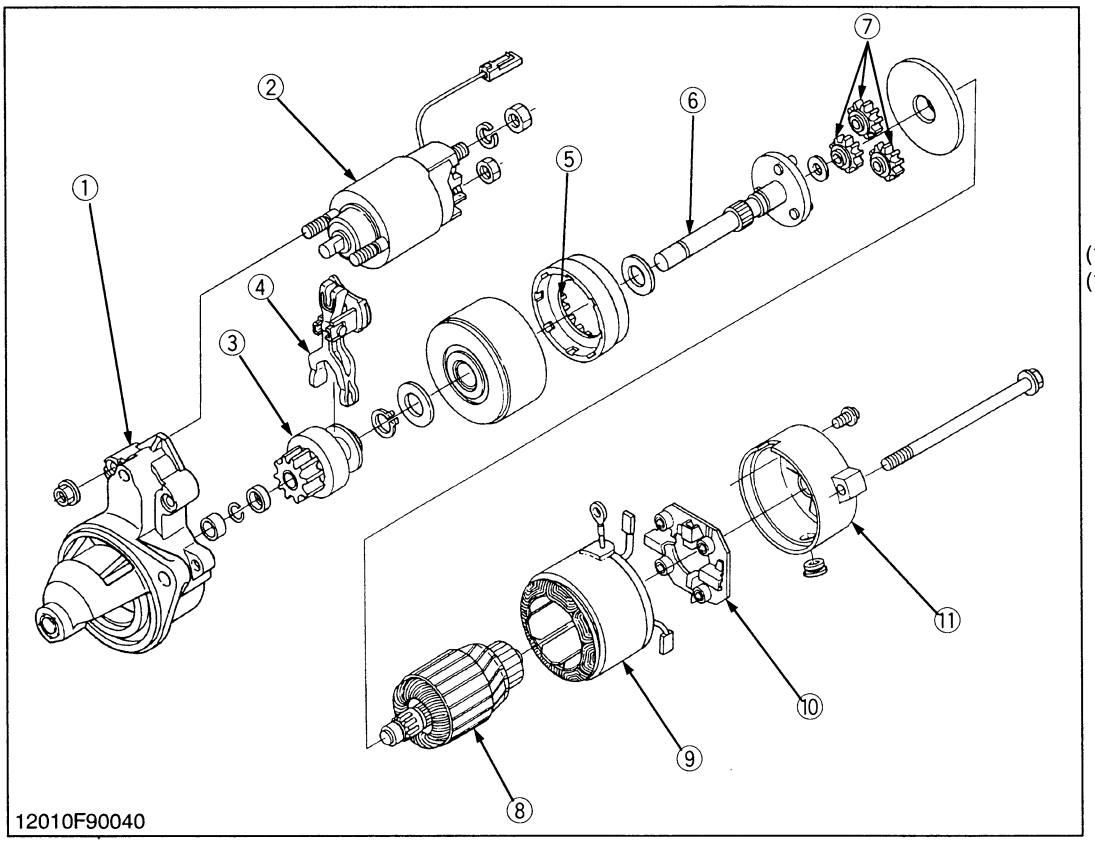
(When reassembling)

- Take care not to damage the O-rings.

(1) Lowering Speed Adjusting Shaft
(2) Lowering Speed Adjusting Valve Body
(3) Poppet
(4) Spring

12010S80200

(1) Starter

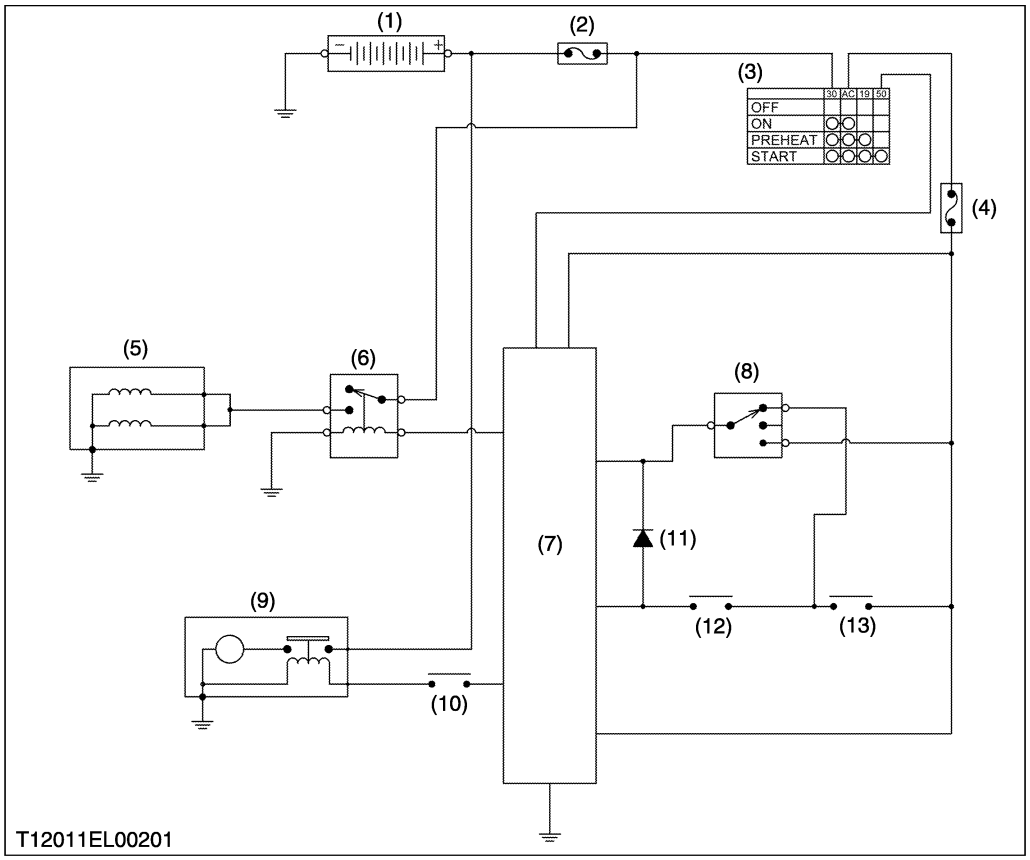


(1) Housing
(2) Magnetic Switch
(3) OVerrunning clutch
(4) Drive Lever
(5) Internal Gear
(6) Gear Shaft
(7) Planetary Gear
(8) Armature Shaft
(9) Yoke
(10) Brush Holder
(11) Rear End Frame

The starter is a reduction type.
The reduction system is used planetary gears, and the speed of gear shaft (6) is reduced to approximately one fifth of the armarture shaft (8).

12010M90020

(2) System Outline and Electrical Circuit

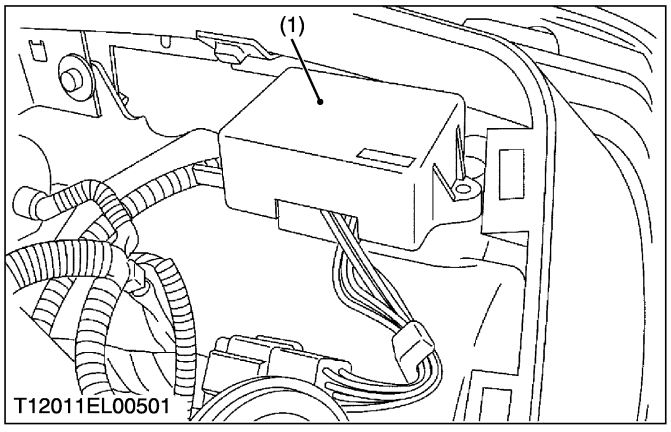


(1) Battery
(2) Slow Blow Fuse (50A)
(3) Main Switch
(4) Fuse (5A)
(5) Key Stop Solenoid
(6) Key Stop Solenoid Relay
(7) OPC Controller
(8) Seat Switch
(9) Starter
(10) Clutch Pedal Safety Switch
(11) Diode
(12) PTO Lever Safety Switch
(13) HST Pedal Safety Switch

The operator presence control (OPC) system which automatically stops the engine when operator stands from the seat. This system is controlled by the seat switch (8) , OPC controller (7), key stop solenoid relay (6), key stop solenoid (5), PTO lever safety switch (12), and HST pedal safety switch (13).

■ Electric Circuit

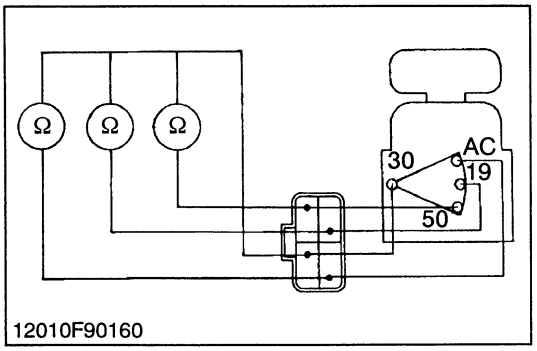
1. When sitting on the seat in the state of main switch "**ON**", the battery current passes the seat switch (8), OPC controller (7) and maintain the key stop solenoid relay (6).
2. When standing form the operators seat, the circuit from the seat switch (8) to the OPC controller (7) is cut. However, if the HST pedal (or PTO lever) are set at a neutral position, the circuit from the battery to the key stop solenoid relay (6) is formed with the HST pedal and PTO lever (or release the seat lock from forward position) switch (8), (12), (13).
3. When standing from the seat while shifting the PTO lever (12) or HST pedal (13), the circuit from the battery to the key stop solenoid relay (6) is cut, and the engine is stopped by function of key stop solenoid (5).



■ OPC Controller

After the current supply cuts, the OPC controller adapted for this system has maintained the state "**ON**" position for about one second.

(1) OPC Controller



12010F90160

4) Main Switch Key at START Position

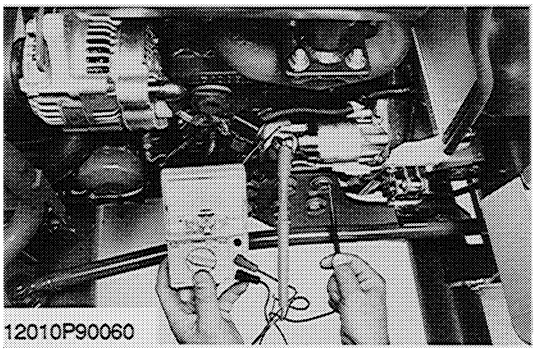
1. Set and hold the main switch key at the **START**position.
2. Measure the resistance with an ohmmeter across the **30** terminal and the **19** terminal, across the **30** terminal and the **50** terminal, and across the **30** terminal and the **AC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**30** terminal – **19** terminal	0 ohm
	30 terminal – **50** terminal	
	30 terminal – **AC** terminal	

Terminal / Key position	30	AC	19	50
OFF	●			
ON	●	●		
PREHEAT	●	●	●	
START	●	●	●	●

12010S90100

(2) Starter

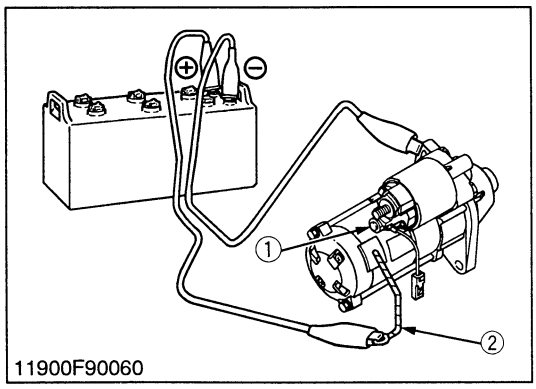

12010P90060

M Terminal Voltage

1. Measure the voltage with a voltmeter between the **M** terminal and the chassis.
2. If the voltage differs from the battery voltage, the battery's positive cable or the battery negative cable is faulty.

Voltage	Factory spec.	Approx. battery voltage

12010S90110



11900F90060

(1) **C** Terminal (2) Connecting Lead

Motor Test

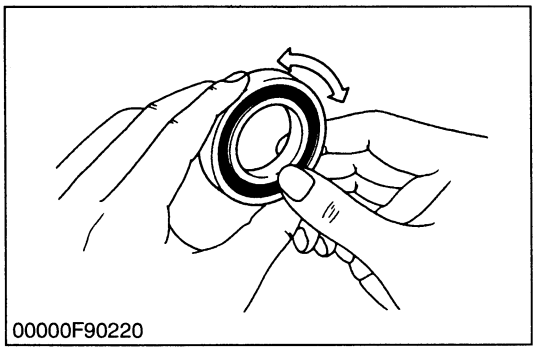
⚠ CAUTION

- **Secure the starter to prevent it from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter **M** terminal.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

11900S90080

SERVICING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Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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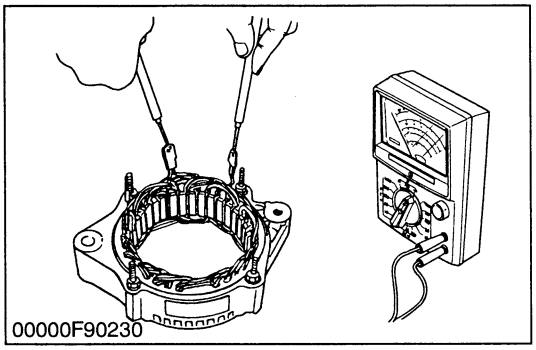
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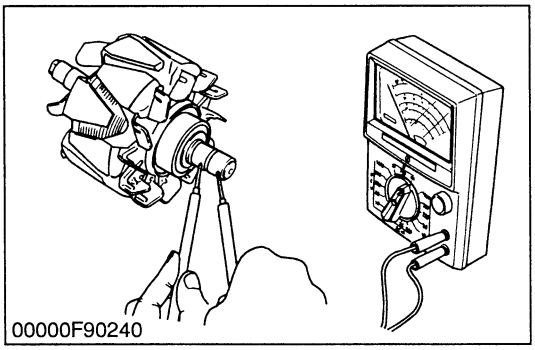
Stator

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	Less than 1.0 ohms

00000S90190

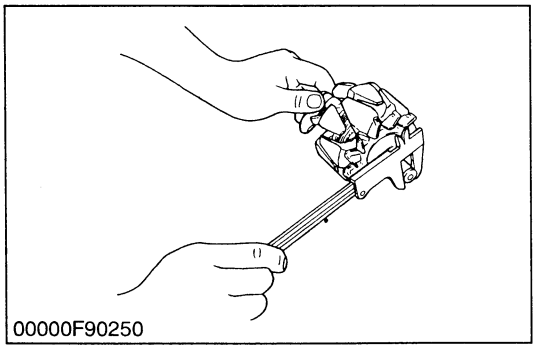

00000F90240

Rotor

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If infinity is not indicated, replace it.

Resistance	Factory spec.	2.9 ohms

00000S90200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Slip Ring

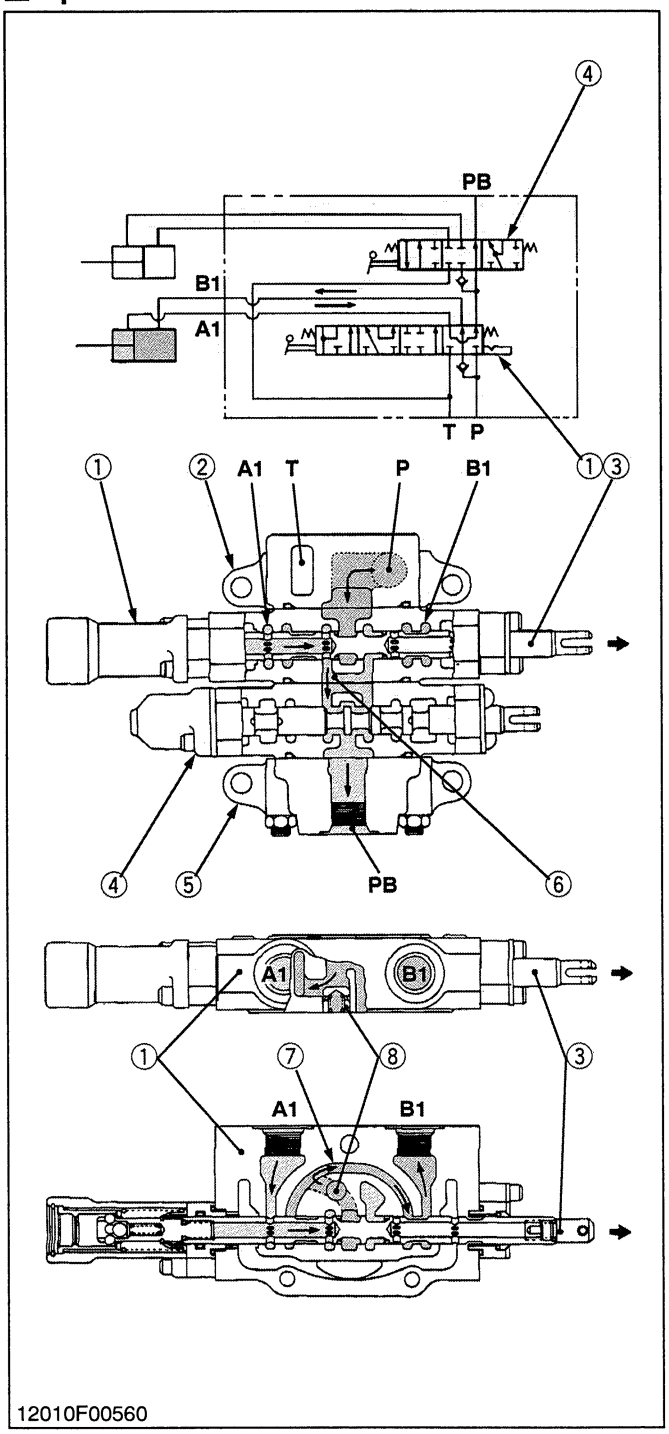
1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory spec.	14.4 mm 0.567 in.
	Allowable limit	12.8 mm 0.504 in.

00000S90210

F FRONT LOADER

■ Up



12010F00560

1. When the hydraulic control lever is set to the **"UP"** position, the spool (3) of the boom control valve (1) moves to the right, which forms oil passages between passage 1 (7) and **B1** port, and between **A1** port and **PB** passage 1 (6).
2. The pressure-fed oil from the **P** port opens the load check valve (8) and flows through the notched section of the spool (3) and **B1** port to extend the boom cylinder.
3. Return oil from the boom cylinder flows from the **A1** port through the passage in the spool (3) and **PB** passage 1 (6) to the bucket control valve (4).

(1) Boom Control Valve
(2) Inlet Section
(3) Spool
(4) Bucket Control Valve
(5) Outlet Section
(6) **PB** Passage 1
(7) Passage 1
(8) Load Check Valve

P : **P** Port
T : **T** Port
A1 : **A1** Port (From Boom Cylinder)
B1 : **B1** Port (To Boom Cylinder)
PB : **PB** Port

12010M01050

TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Boom Does Not Rise	• Control valve mulfunctioning	Repair or replace	F-S12, 13
	• Boom cylinder defective	Repair or replace	F-S14, 15, F-S17
	• Control lever linkage defective	Repair or replace	–
	• Hydraulic pump malfunctioning	Repair or replace	8-S6
	• Oil filter clogged	Clean or replace	G-14
	• Relief valve spring damaged	Replace	8-S15
	• Hydraulic hose damaged	Replace	–
Boom Does Not Lower	• Control valve malfunctioning	Repair or replace	F-S12, 13
Insufficient Boom Speed	• Boom cylinder tube worn or damaged	Replace	F-S14
	• Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	F-S15, 17
	• Oil leaks from pipe joints	Repair	–
	• Relief valve setting pressure too low	Adjust	F-S11
	• Insufficient transmission fluid	Refill	F-S2
	• Inlet pipe O-ring damaged	Replace	–
Bucket Does Not Move	• Control valve malfunctioning	Repair or replace	F-S12, 13
	• Bucket cylinder defective	Repair or replace	F-S14, 15, F-S17
	• Control lever linkage defective	Repair or replace	–
	• Hydraulic pump malfunctioning	Repair or replace	8-S6
	• Oil filter clogged	Clean or replace	G-14
	• Relief valve spring damaged	Replace	8-S5
	• Hydraulic hose damaged	Replace	–
	• Improper adjustment of self-leveling link	Adjust	F-S16
Insufficient Bucket Speed	• Bucket cylinder tube worn or damaged	Replace	F-S14
	• Bucket cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	F-S15, 17
	• Oil leaks from pipe joints	Repair	–
	• Relief valve setting pressure too low	Adjust	F-S11
	• Insufficient transmission fluid	Refill	F-S2
	• Inlet pipe O-ring damaged	Replace	–
Front End Loader Drops by Its Weight	• Boom cylinder tube worn or damaged	Replace	F-S14
	• Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	F-S15, 17
	• Oil leaks from pipe joints	Repair	–
	• Control valve malfunctioning	Repair or replace	F-S12, 13
Self-leveling Does Not Work	• Improper adjustment of self-leveling link	Adjust	F-S16
	• Feed-back linkage damaged	Repair or replace	F-S16

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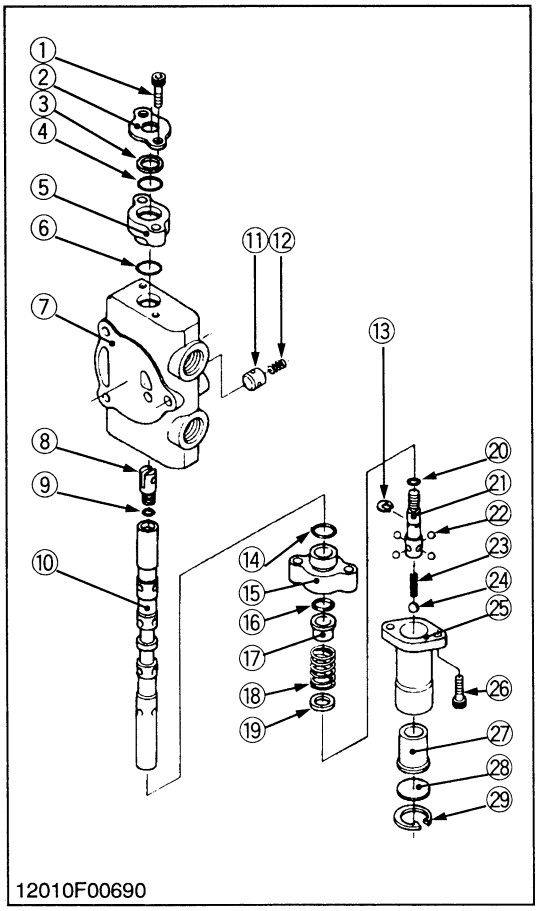

Disassembling Boom Control Valve

1. Remove the spring (12) and load check valve (11).
2. Remove the seal plate (2), wiper ring (3) and spacer (5) from the valve housing 1 (7).
3. Remove the cap (25) and spacer (15), and draw out the spool (10) from the valve housing 1 (7).

(When reassembling)

- Clean all parts with a suitable solvent, and dry with a lint-free cloth or air.
- Visually inspect all parts for signs of scoring or damage.
- Install the spool and spacer to the valve housing 1, using care not to damage the O-rings.

(1) Screw
(2) Seal Plate
(3) Wiper Ring
(4) O-ring
(5) Spacer
(6) O-ring
(7) Valve Housing 1
(8) Spool Head
(9) O-ring
(10) Spool
(11) Load Check Valve
(12) Spring
(13) Snap Ring
(14) O-ring
(15) Spacer
(16) O-ring
(17) Spring Seat
(18) Return Spring
(19) Spring Seat
(20) O-ring
(21) Detent Pin
(22) Detent Ball
(23) Detent Spring
(24) Detent Ball
(25) Cap
(26) Screw
(27) Detent Sleeve
(28) Spacer Washer
(29) Internal Snap Ring

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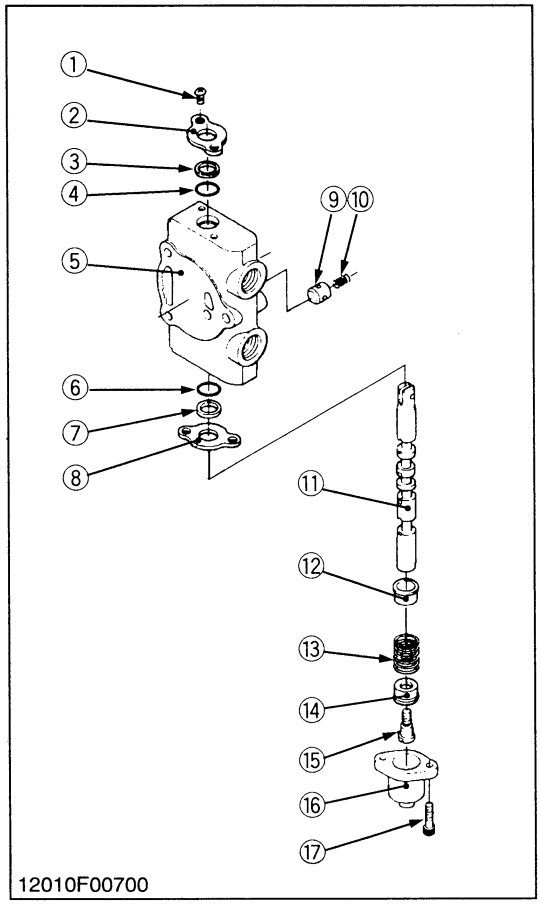

Disassembling Bucket Control Valve

1. Remove the spring (10) and load check valve (9).
2. Remove the seal plate (2) and wiper ring (3) from valve housing 2 (5).
3. Remove the cap (16), seal plate (8) and wiper ring (7), and draw out the spool (11) from the valve housing 2 (5).

(When reassembling)

- Clean all parts with a suitable solvent, and dry with a lint-free cloth or air.
- Visually inspect all parts for signs of scoring or damage.
- Install the spool and seal plate to the valve housing 2, using care not to damage the O-rings.

(1) Screw
(2) Seal Plate
(3) Wiper Ring
(4) O-ring
(5) Valve Housing 2
(6) O-ring
(7) Wiper Ring
(8) Seal Plate
(9) Load Check Valve
(10) Spring
(11) Spool
(12) Spring Seat
(13) Return Spring
(14) Spring Seat
(15) Cap Screw
(16) Cap
(17) Screw

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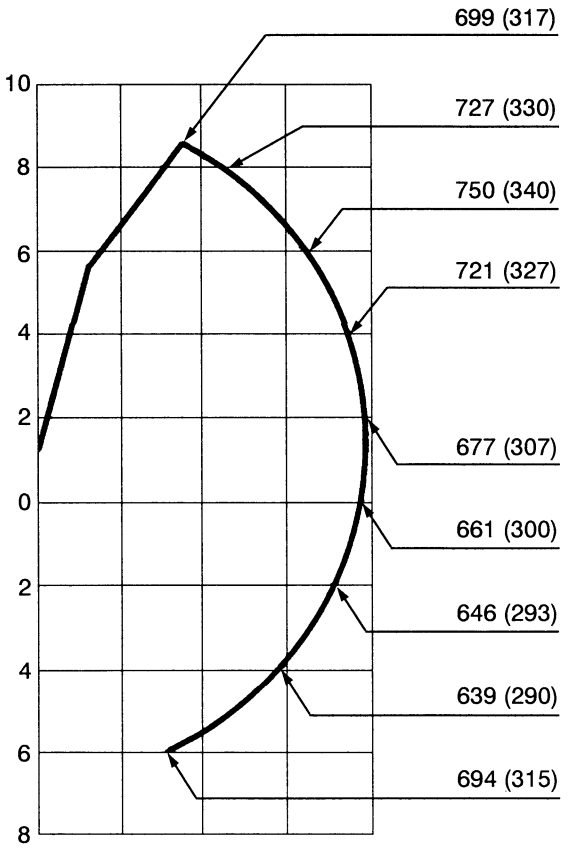
■ Lift Capacity (Per SAE J31)



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Lift capacities shown are 87 % of maximum lift force, according to SAE definition.

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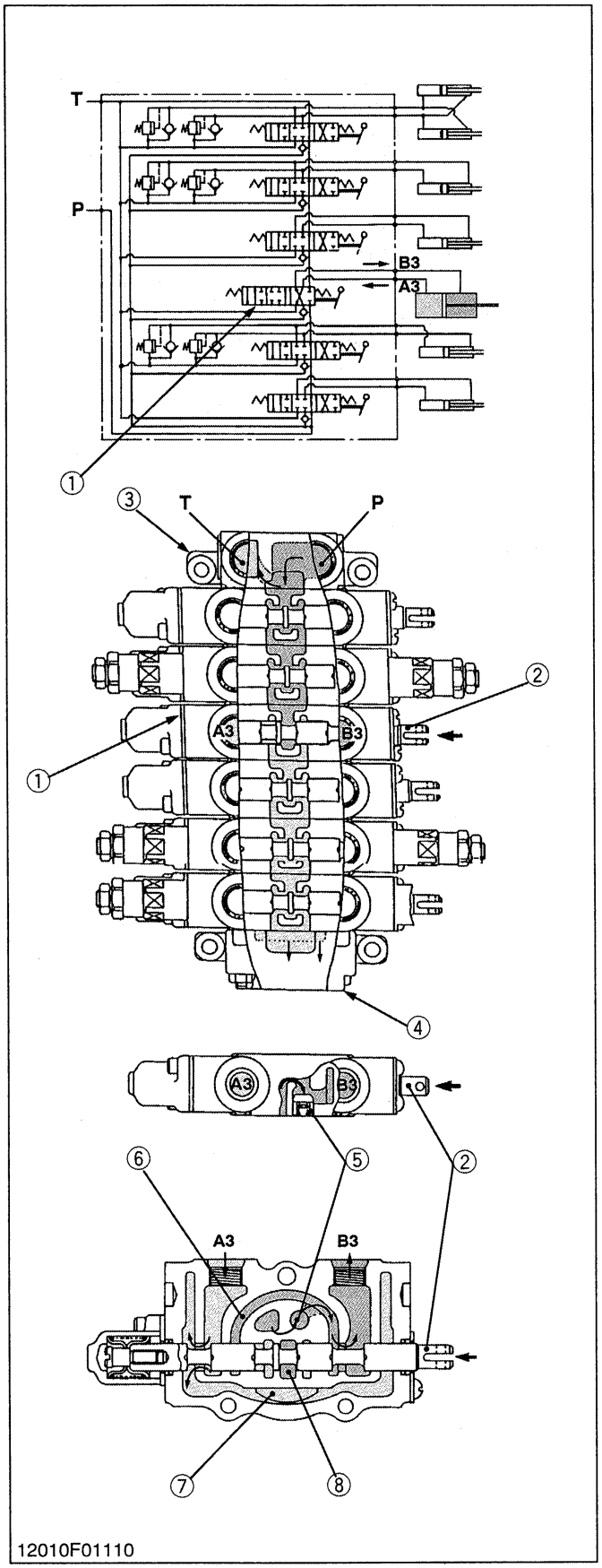
■ Stabilizer RH (Shrink)



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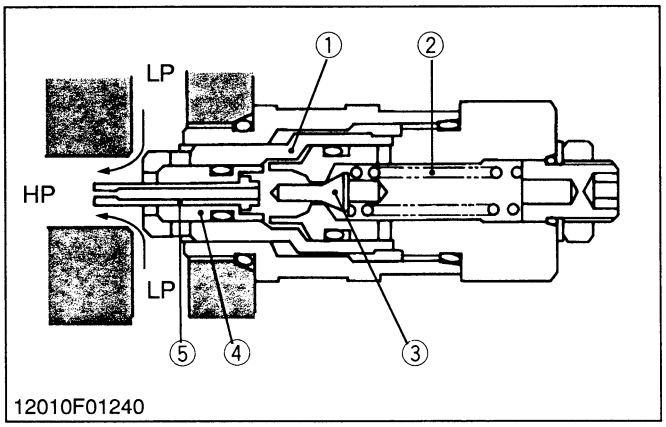
1. When the right stabilizer control lever is pushed to the forward to set to the **"SHRINK"** position, the spool (2) of the stabilizer RH control valve (1) moves to the left, which forms oil passage between bridge passage (6) and **B3** port, and between **A3** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5) and flows to **B3** port to retract the right stabilizer cylinder.
3. Return oil from the right stabilizer cylinder returns to the transmission case through the **A3** port, low pressure passage (7) and **T** port.

(1) Stabililzer RH Control Valve
(2) Spool
(3) Inlet Section
(4) Outlet Section
(5) Load Check Valve
(6) Bridge Passage
(7) Low Pressure Passage
(8) Neutral Passage

P : **P** Port
T : **T** Port
A3 : **A3** Port (From Stabilizer RH Cylinder)
B3 : **B3** Port (To Stabilizer RH Cylinder)

12010M00090

■ Anti-cavitation Operation



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This valve, in operation, prevents a condition - so called cavitation - that arises in the cylinder port where fluid is not entirely filling out.

That is, this relief valve is combined an anti-cavitation functions supplying oil.

The pressure oil at the tank port opens the check valve, allowing oil to flow through the tank port to prevent negative pressure from being generated in the cylinder.

(1) Check Valve
(2) Spring
(3) Pilot Poppet
(4) Main Poppet
(5) Poppet Valve

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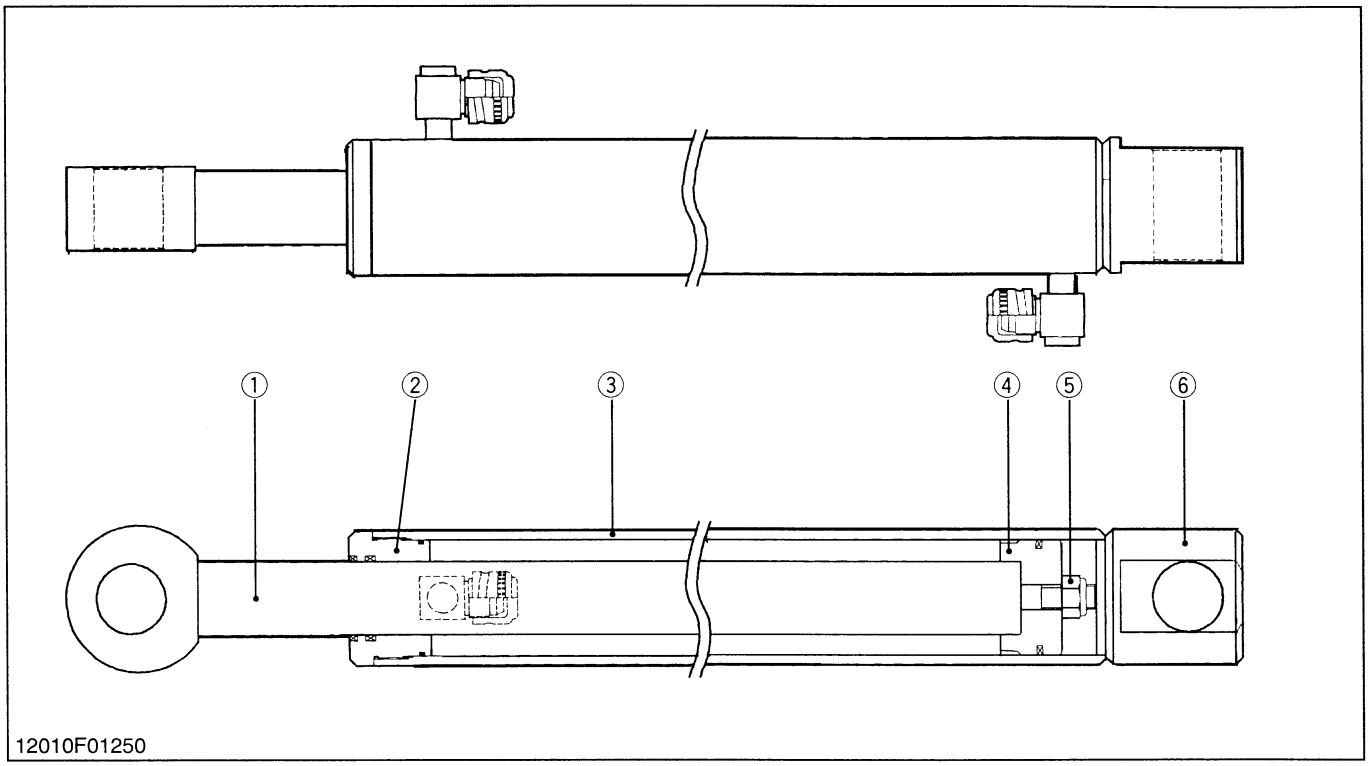
[3] HYDRAULIC CYLINDER



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(1) Rod
(2) Head
(3) Cylinder Tube
(4) Piston
(5) Nut
(6) Tube End

Bucket, dipperstick, boom, swing, and stabilizer cylinder consists of cylinder head (2), piston rod (1), cylinder tube (3), piston (4) and other parts as shown in the figure above.

They are single-rod double acting cylinders in which the reciprocating motion of the piston is controlled by hydraulic force applied to both of its ends.

Cylinder Specifications

	Bucket Cylinder mm (in.)	Dipperstick Cylinder mm (in.)	Boom Cylinder mm (in.)	Swing Cylinder mm (in.)	Stabilizer Cylinder mm (in.)
Cylinder I.D.	57.2 (2.25)	63.5 (2.50)	70.0 (2.75)	57.2 (2.25)	63.5 (2.50)
Rod O.D.	31.8 (1.25)	31.8 (1.25)	35.0 (1.38)	31.8 (1.25)	35.0 (1.38)
Stroke	451 (17.75)	490 (19.29)	455 (17.92)	236 (9.65)	311 (12.24)

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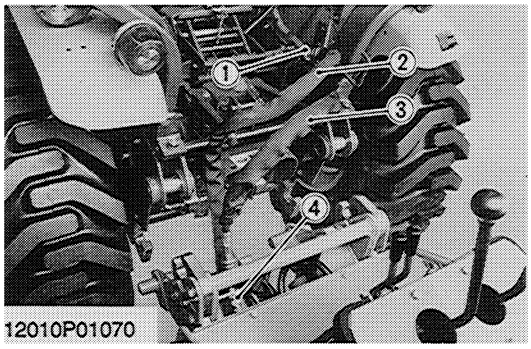

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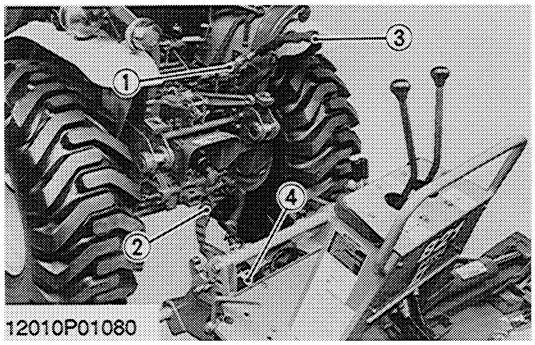

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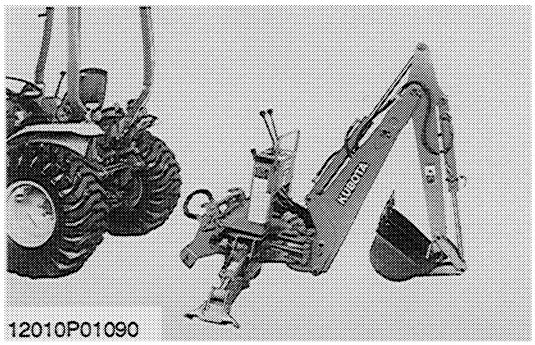
Hydraulic Hose

1. Disconnect the hydraulic hoses (2), (3).
2. Connect the tractor's outlet hose (3) to the return pipe (1).
3. Connect the backhoe's outlet hose (2) to the inlet hose (4).

(1) Return Pipe (Tractor)
(2) Outlet Hose
(3) Outlet Hose (Tractor)
(4) Inlet Hose

12010S00180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Separation

1. Slowly move the tractor forward and make sure of the removal of the backhoe.

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