SEBM04250107

SHOP MANUAL

KOMATSU

WA500-1

MACHINE MODEL SERIAL No.

WA500-1 **10001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- WA500-1 mount the S6D140-1 engine;
  For details of the engine, see the 6D140-1 Series Engine Shop Manual.

05-91(02)03261

FOREWORD

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into chapters for each main group of components; these chapters are further divided into the following sections.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

Troubleshooting charts correlating "Problems" to "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your KOMATSU distributor for the latest information.

MEASURING INSTRUCTIONS

PREPARATIONS BEFORE CHECKING

1. **Cleaning of parts**
   Wash parts to be checked. Special care should be paid to thoroughly remove dust and dirt from the surfaces on which measurements are to be made so that possible errors can be eliminated.

2. **Minor repair of part surfaces**
   Remove scratches, dents and rust from parts to be checked. If the surface are rough, the measurements will be inaccurate. When smoothing any surface, be careful not to use an oilstone or sand paper coarser than the finished surface.

3. **Preparation of measuring tools**
   Clean the tools and thoroughly remove dust and dirt from the surfaces which contact parts. Check the tools for proper function and zero-point adjustment. Remedy any abnormality.

4. **Maintenance of measuring tools**
   Handle all tools with sufficient care and do not subject them to unreasonable force or shocks which can affect their delicate construction. Periodically check the tools for accuracy and, if necessary, calibrate them. Put the tools back into their cases and return them to their fixed storage locations whenever not in use. It is recommended to assign a person to be responsible for the proper storage of measuring tools.

MEASURING TOOLS

- Repeat each measurement two or three times to eliminate possible errors. Further repetition will be necessary, if there is a large variation in the readings.
- When measuring the inside or outside diameter of a cylindrical object, take two readings with the measuring device put in two directions at right angles to each other. Repeat this at several points along the overall length of the object.
- Along eye-measurement below the unit of a scale may be used for making a comparison between two approximately equal measurements, the accuracy of such eye-measurements should not be considered as reliable.
- At the start of each measurement, select a measuring device having an accuracy appropriate for judging whether the measurement reaches its allowable limit.

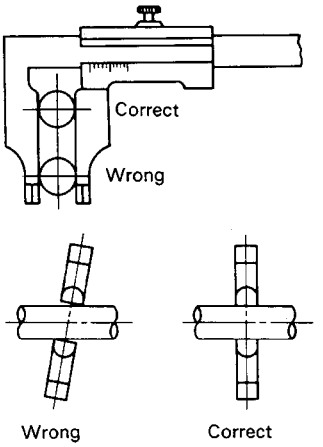
BLOCK GAUGES

- To bring two blocks into contact, wash each block with benzene to remove rust-preventing oil and wipe with a clean cotton cloth. Put one block on the other, causing a sliding or twisting movement between the two.
- If the contact between two blocks feels rough, apply a fine-grade oilstone to the blocks along their edges. (Do not try to rub the contact surface of the blocks.)
- Do not leave the blocks in contact for a long time. Long-time contact will make the blocks difficult to separate or cause black rust to appear on the contact surfaces.
- When separating two blocks, slide or twist them. Do not try to pull them apart, by force or strike them with a mallet.
- When storing a block gauge, wipe off moisture, dirt and fingerprints, coat with a rust-preventing lubricant such as vaseline, and put the gauge back in its case.

VERNIER CALIPERS

- At the start of measurement, close the jaws and check that there is no clearance (due to wear) between the jaws and that the "zero" point of the graduation is in exact alignment with the "zero" point of the vernier scale.

- **Measuring an outer diameter**



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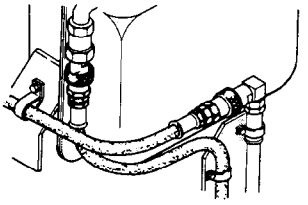
4. Handling hoses with self-seal couplings

1) Do not attempt to connect or disconnect or coupling without first relieving the internal hydraulic pressure.
   ★ The gushing hydraulic fluid will not only soil the surroundings, but the high flow rate may also damage the O-ring of the coupling.
2) Never use a hammer to tighten or loosen a coupling.
   ★ Such sharp blows can deform the coupling, leading to oil leakage or cracking of the coupling.
3) Protect the disconnected piping from the intrusion of dust and dirt! If it is to remain disconnected for some time, seal by connecting to another coupling or by fitting a dust cap or a blind plug to each end.



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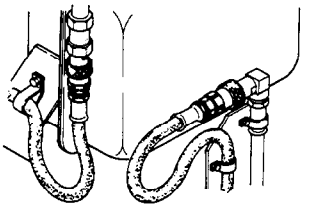
During storage



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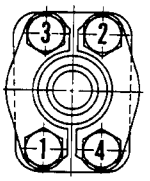
5. Handling split flanges

1) Follow the bolt tightening sequence given in the figure.



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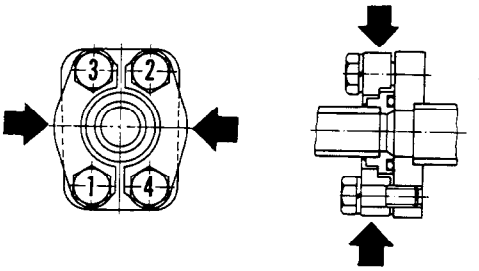
2) Press the two halves completely together and tighten them uniformly. If they are not held tightly together, they will separate by a distance equivalent to the clearance between the fastening bolts and their holes, forming a pathway for oil leakage.



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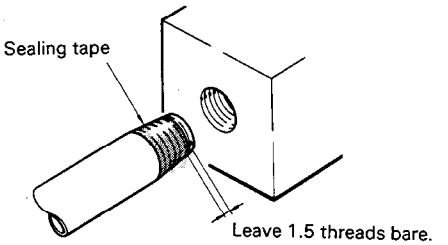
6. Using sealing tape

1) To prevent oil leakage, wind sealing tape around the tapered thread before inserting the plug into the plug hole.
2) Wrap all but the first 1.5 threads at the tip and then force the tape into the threads with a fingernail. Wind the tape in the same direction as the threads.



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10 ENGINE

TOOL LIST FOR TESTING AND ADJUSTING

No.	Testing and measuring item	Tool Name	Part No.	Remarks
1	Engine speed	Tachometer	799-203-8000	Digital display 60-19999 rpm
2	Battery specific gravity	Battery coolant tester	795-500-1000	1.1 – 1.3
3	Coolant freezing temperature			–5 – –50°C
4	Water temperature, oil temperature, intake temperature	Thermistor temperature gauge	790-500-1300 or 799-101-6000	0 – 200°C
5	Exhaust temperature			0 – 1000°C
6	Lubricating oil pressure	Engine pressure measuring kit	799-203-2002	0 – 10 kg/cm²
7	Fuel pressure			0 – 20 kg/cm²
8	Intake pressure, exhaust pressure			0 – 1500 mmHg
9	Blow-by pressure			0 – 1000 mmH_2O
10	Intake resistance			–1000 – 0 mmH_2O
11	Compression pressure	Compression gauge	795-502-1204	0 – 70 kg/cm²
12	Blow-by pressure	Blow-by checker	799-201-1503	0 – 500 mmH_2O
13	Valve clearance	Feeler gauge	795-125-1210	0.43, 0.80 mm
14	Exhaust gas color	Handy smoker checker	799-210-9000	Discoloration 0 to 70% standard color (Discoloration % x 1/10 = Bosch index)
15	Fuel on water mixed in oil	Engine oil checker	799-201-6000	Water content 0.1%, 0.2% in standard sample
16	Coolant quality	Water quality tester	799-202-7001	PH, nitrous acid ion concentration
17	Leakage from cooling system	Cap tester	799-202-9001	0 – 2 kg/cm²
18	Fuel injection pressure Nozzle injection condition	Nozzle tester	Commercially available	0 – 300 kg/cm²
19	Electrical circuit	Tester	Commercially available	Current, voltage, resistance
20	Accelerator pedal force	Push-pull scale	79A-262-0020	Commercially available 0 – 25 kg

⚠ When carrying out testing, adjusting or troubleshooting, stop the machine on level ground, insert the safety pins and block the tires.

⚠ When working in groups, use agreed signals and do not allow unauthorized persons near the machine.

⚠ When checking the water level in the radiator wait for the water to cool. Do not remove the radiator cap while the water is hot. Boiling water may spurt out.

⚠ Be careful not to get caught in rotating parts.

MEASURING ACCELERATOR PEDAL OPERATING FORCE AND OPERATING ANGLE

★ Measurement condition

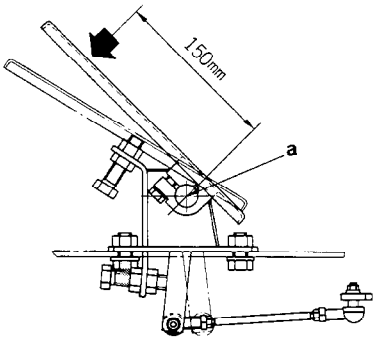
• Coolant temperature: Inside operating range.

Unit: kg

Item	Standard value	Permissible value
Operation force of accelerator pedal	8 – 9	13.5

Special tool

	Part No.	Part Name	Q'ty
A	79A-262-0020	Push-pull scale	1



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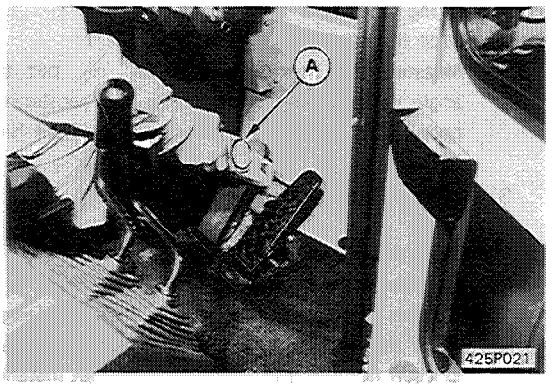
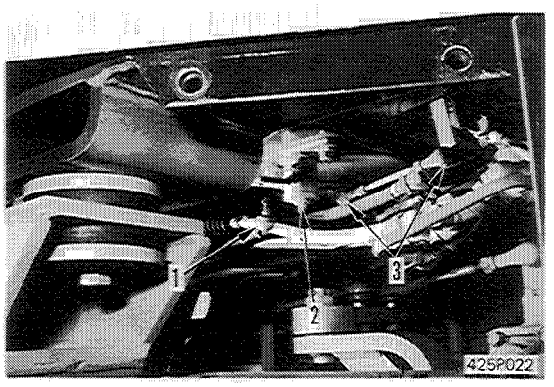
OPERATING FORCE

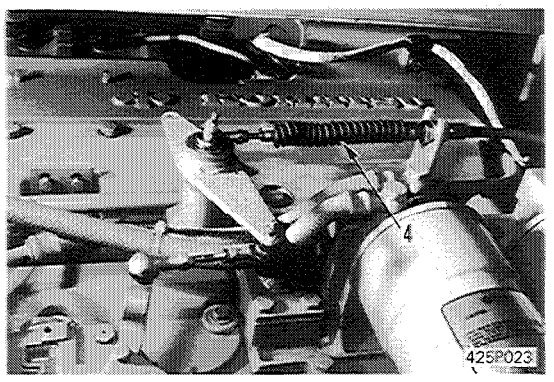
1. **Measuring procedure**
   1) Put push-pull scale **A** in contact with the accelerator pedal at point 150 mm from pedal fulcrum "**a**".
   ★ The center of push-pull scale **A** must be in contact with a point 150 mm from the pedal fulcrum.
   2) Start the engine, push the pedal in the direction of operation and measure the maximum value when pushing from idling to the end of the pedal travel (high idling).

Testing and adjusting

1) Stop the engine.
2) Disconnect the cable (1) at the bottom of the accelerator pedal, and check that the linkage (2) and ball joint (3) at the bottom of the pedal move smoothly.
3) Connect the cable at the bottom of the pedal, then disconnect at the connection for the injection pump, and check that the cable (4) moves smoothly.
   ★ When carrying out this inspection, adjust or replace parts as necessary. Measure the operating force again and check that it is within the standard value.

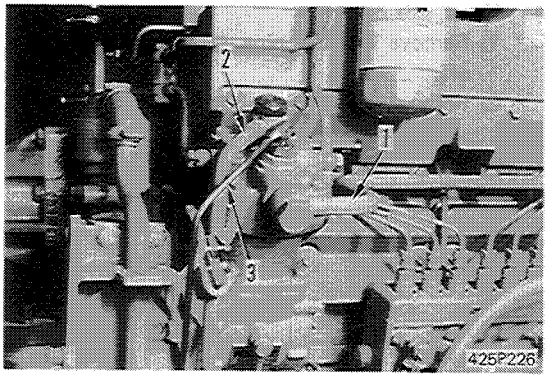






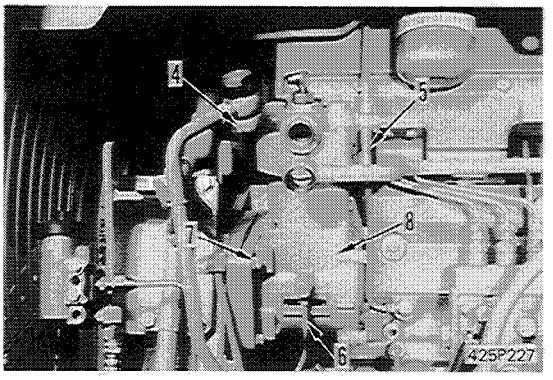
REMOVAL OF AIR COMPRESSOR ASSEMBLY

1. Remove catch of engine right side cover, then open cover.
2. Disconnect air tubes (1), (2) and (3).
3. Disconnect water tube (4).
4. Remove lubrication tubes (5) and (6).
5. Remove mounting bolts (7), then remove air compressor assembly (8).

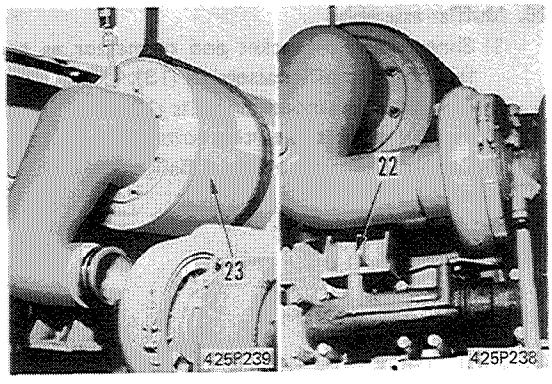


INSTALLATION OF AIR COMPRESSOR ASSEMBLY

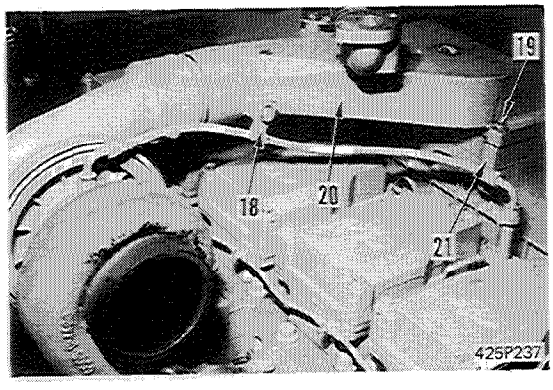
1. Fit O-ring and install air compressor assembly (8), then tighten mounting bolts (7).
2. Fit gasket and install lubrication tubes (6) and (5).
3. Fit gaskets and install water tubes (4).
4. Fit gaskets and install air tubes (3), (2) and (1).
5. Close cover of engine right side cover, then lock with catch.



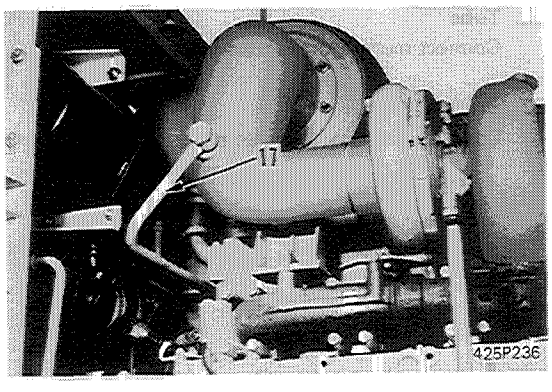
16. **Air cleaner assembly**
    1) Sling air cleaner and intake connector as one unit, then install air cleaner assembly (23).
    2) Tighten intake connector bracket mounting bolts (22).
    3) Secure air cleaner mounting band.



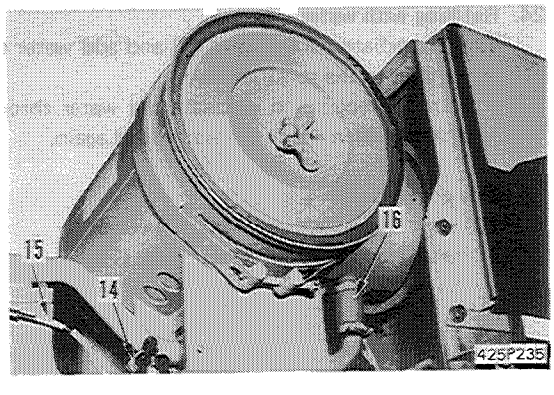
17. **Connector assembly**
    1) Fit gaskets and install electrical air intake heater (21).
    2) Fit gaskets and O-ring then install intake connector (20) and tighten mounting bolts (19).
    3) Install clamp (18).



18. **Compressor tube**
    Fit gaskets and install between air cleaner and compressor tube (17).
    ★ Install clmaps at 2 points.

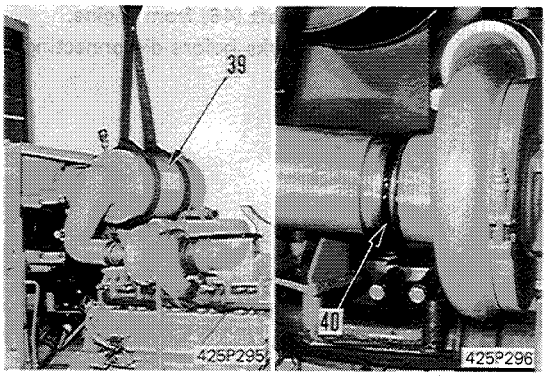


19. **Hose, switch**
    1) Connect komaclone intermediate hose (16).
    2) Connect wire (15), then install electrical air intake heater switch assembly (14).



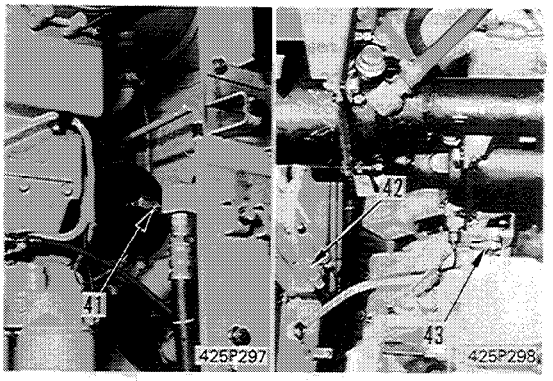
2) Sling air cleaner (39), remove it.
★ An O-ring is inserted at the connecting portion of the air cleaner and turbocharger so be careful when removing.

kg Air cleaner: 32 kg

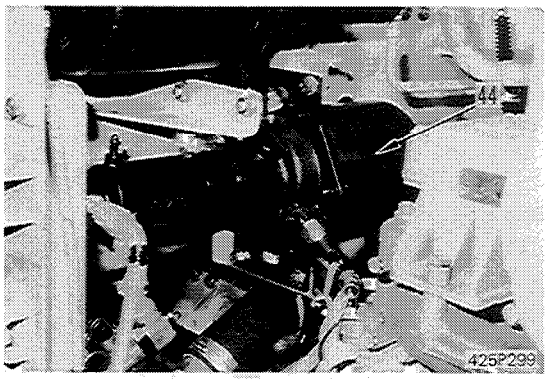


15. Brake chamber

1) Disconnect air piping (41), oil piping (42) and electrical wiring (43) from chamber.

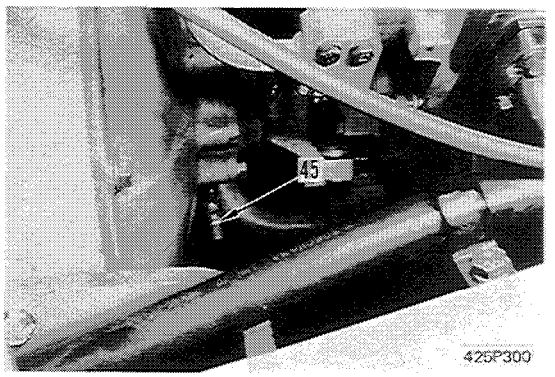


2) Remove brake chamber (44).



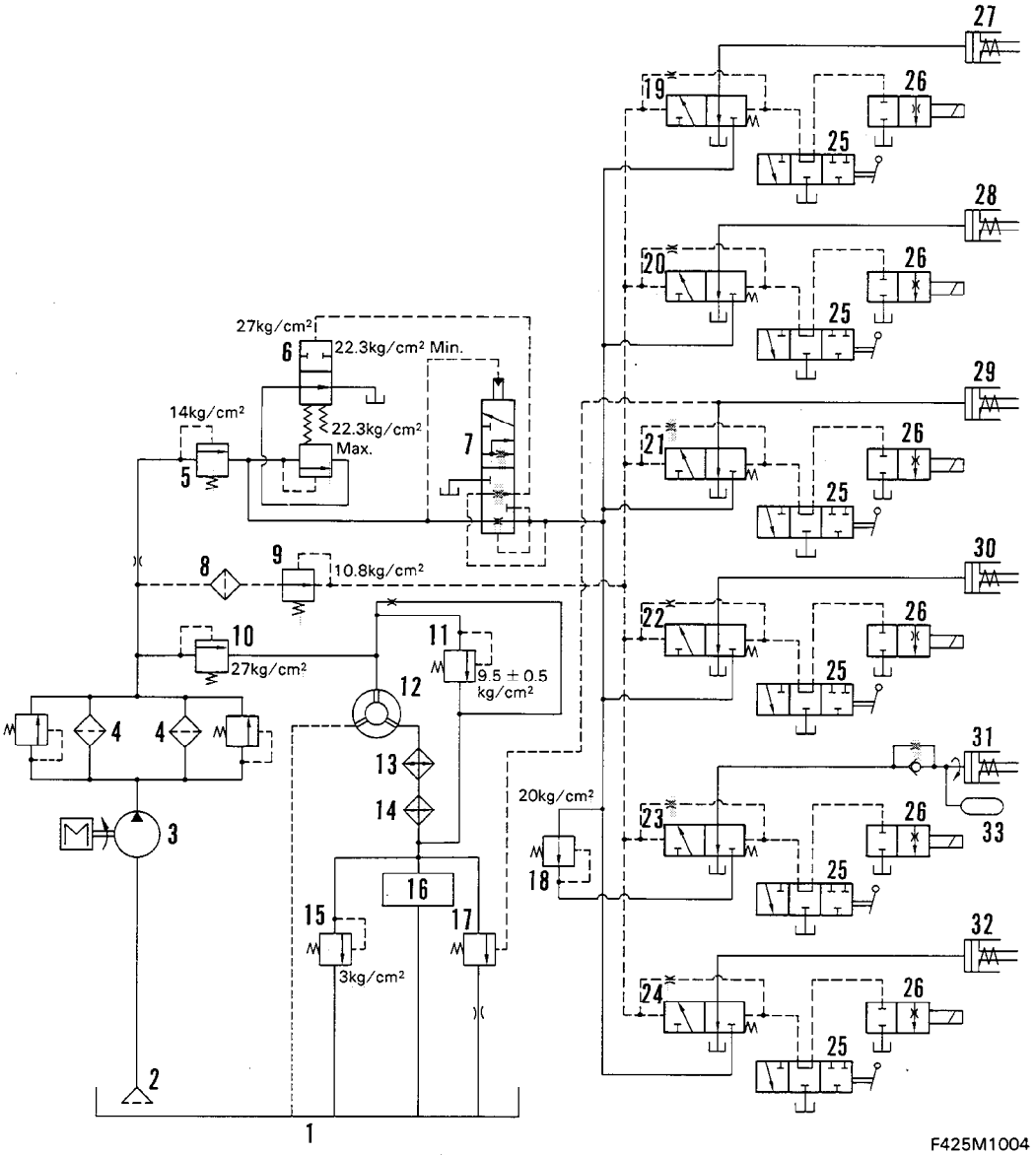
16. Engine

1) Disconnect greasing hose (45) for damper at damper end.



ENGINE
14 MAINTENANCE STANDARD

- Serial No. 10187 and up (Except D spec.)

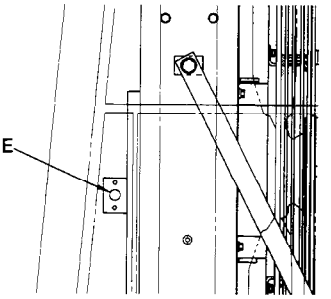


1. Transmission case
2. Strainer
3. Torque converter charging pump
4. Oil filter
5. Priority valve
6. Modulating valve
7. Quick return valve
8. Pilot oil filter
9. Pilot reducing valve
10. Main relief valve
11. Torque converter relief valve
12. Torque converter
13. Oil cooler (water cooled type)
14. Oil cooler (air cooled type)
15. Transmission lubrication relief valve
16. Transmission lubrication
17. Lubrication bypass valve
18. Reducing valve
19. REVERSE spool
20. FORWARD spool
21. 4th spool
22. 3rd spool
23. 2nd spool
24. 1st spool
25. Emergency manual spool
26. Solenoid valve
27. REVERSE clutch
28. FORWARD clutch
29. 4th clutch
30. 3rd clutch
31. 2nd clutch
32. 1st clutch
33. Accumulator valve

- Serial No. 10187 and up (Except D spec.)

OUTLINE

- The oil leaving the torque converter is at high temperature. This oil enters port **D** of the water-cooled oil cooler and is cooled by the engine cooling water. It is then discharged from port **C**, and enters port **E** of the air-cooled oil cooler. From port **F**, it lubricates the transmission and returns to the transmission case.



View Z

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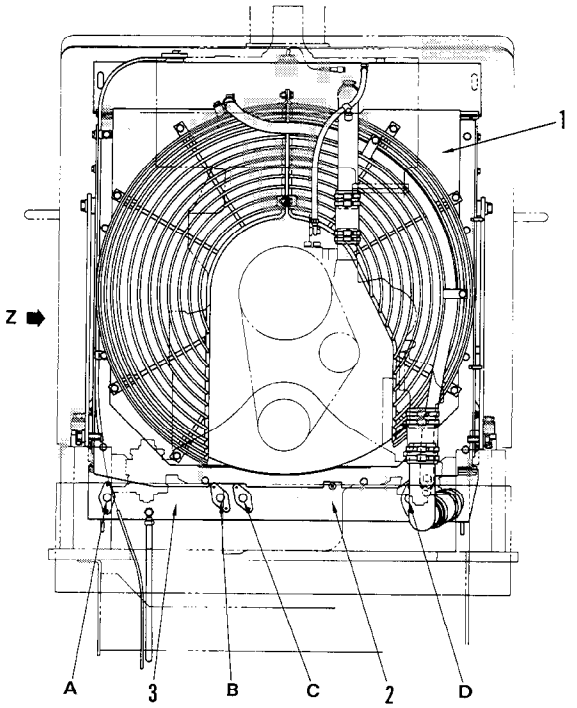

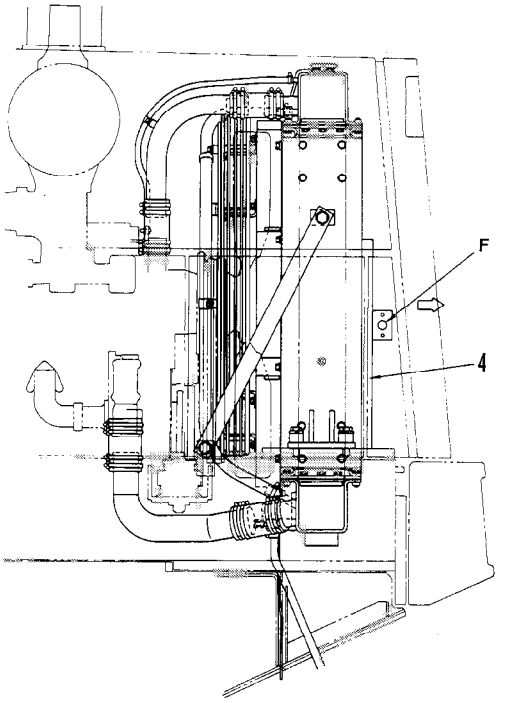

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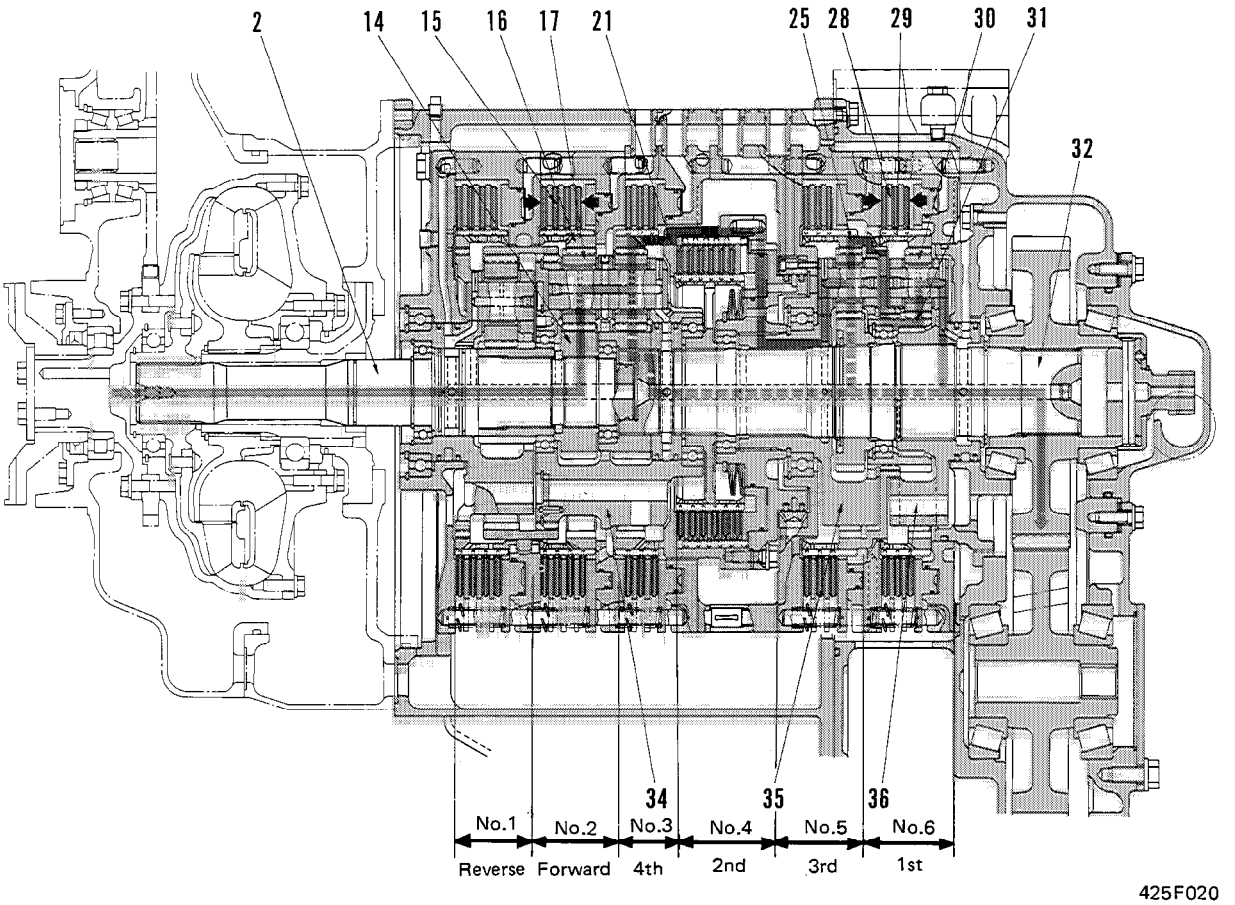
1. Radiator
2. Torque converter oil cooler (Water-cooled type)
3. Hydraulic oil cooler (Water-cooled type)
4. Torque converter oil cooler (Air-cooled type)

A. Hydraulic oil outlet port
B. Hydraulic oil inlet port
C. Torque converter oil outlet port
D. Torque converter oil inlet port
E. Torque converter oil inlet port
F. Torque converter oil outlet port

FORWARD 1ST



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- In 1st FORWARD, No. 2 clutch (15) and No. 6 clutch (28) are engaged. The motive force transmitted from the torque converter by input shaft (2) is transmitted to output shaft (32).
- No. 2 clutch (15) is actuated by the hydraulic pressure applied to the clutch piston, and it locks ring gear (16) in position. No. 6 clutch (28) is actuated by the hydraulic pressure applied to the clutch piston and holds gear (29) in position.
- The motive force from the torque converter is transmitted to the input shaft (2). The rotation of the input shaft (2) is transmitted to planetary gear (17) through sun gear (14).
- Ring gear (16) is held in position by No. 2 clutch so the rotation of planetary gear (17) rotates carries (34), which is on the inside of ring gear (16). This carrier is connected to No. 5 carrier (33) through No. 4 ring gear (24), so when No. 6 clutch is actuated, the rotation of carrier (33) is transmitted to gear (30) and rotate output shaft (32).

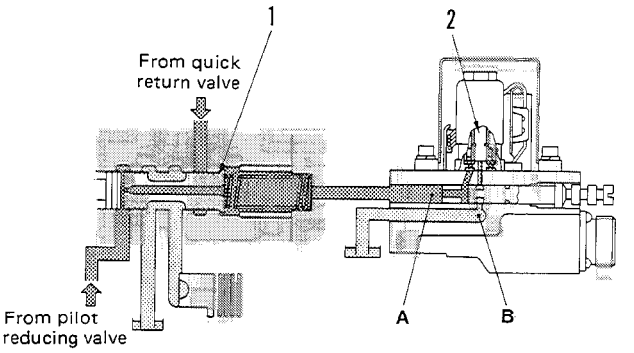
EMERGENCY MANUAL SPOOL

Function

- If there is any failure in the electrical circuit of the transmission control system, and the solenoid valve does not work, the emergency manual spool is used. This spool is attached to each directional and speed spool and is used to operate the transmission valve mechanically. (It is used to drive the machine to a place where it can be repaired.)
  - ★ Particular attention must be paid for when using this spool.

Operation

1. **When solenoid valve is normal:**
   (Emergency manual spool is at normal position)
   When the solenoid valve is working normally, the spool is maintained in this position.
   Oil from directional and speed spool (1) enters port **A**, but it is shut off by solenoid valve (2).



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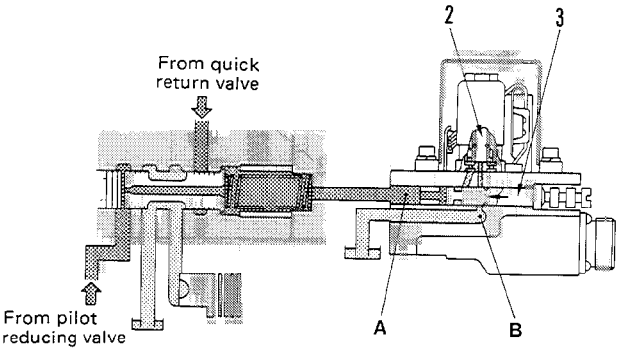
2. **When solenoid valve is abnormal:**
   a. **Clutch in disengaged position**
   (Emergency manual spool is pushed to the left)
   Emergency manual spool (3) is pushed to the left, and the oil at port **A** is shut off regardless of the action of solenoid valve (2). The oil cannot flow to port **B**, so the clutch is not actuated.



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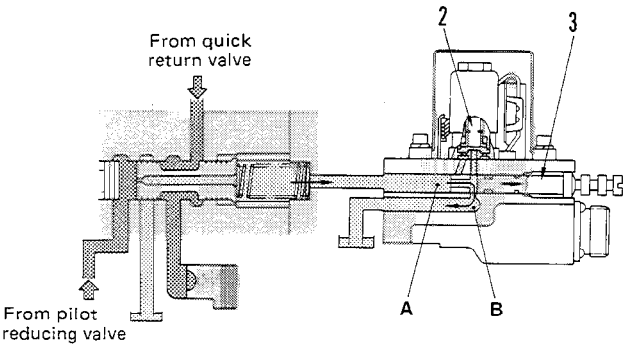
   b. **Clutch in engaged position**
   (Emergency manual spool is pulled to the right)
   When emergency manual spool (3) is pulled to the right, the oil at port **A** is drained to port **B** regardless of the operation of solenoid valve (2). As a result, the clutch is actuated.



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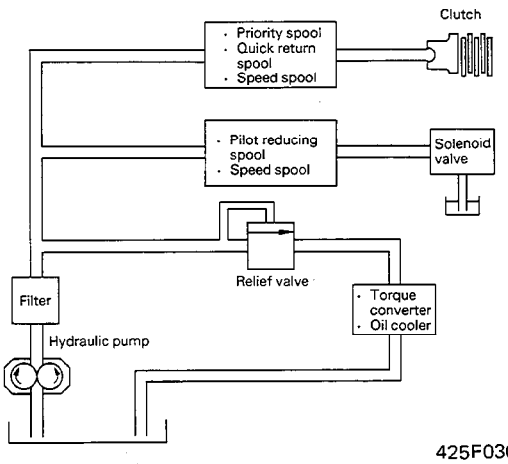
MAIN RELIEF VALVE

Function

- The main relief valve acts to supply the necessary oil to the clutch when shifting gear. When the gears are not being shifted, it sends all of the oil directly to the torque converter.



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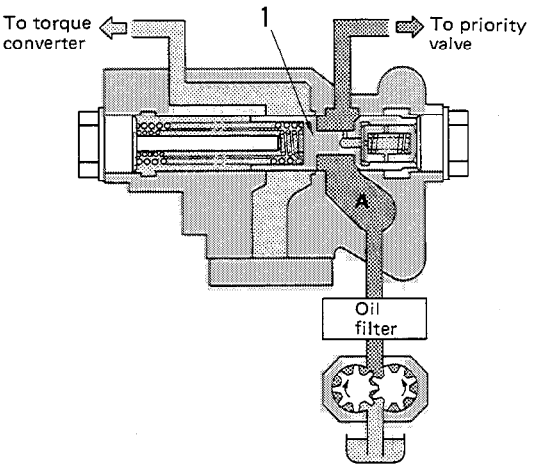
Operation

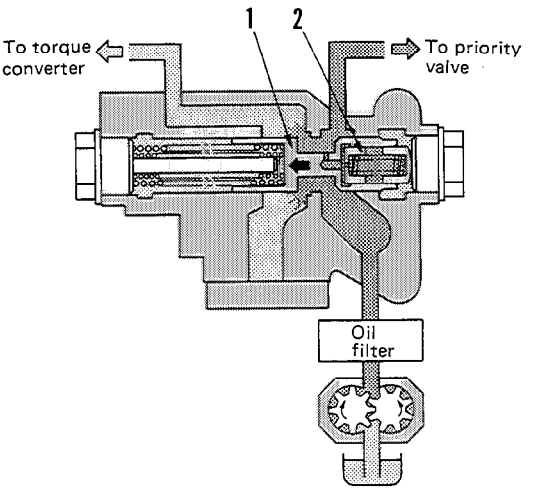
- The oil from the pump passes through the oil filter and enters port **A** of main relief valve (1).
- Until the specified pressure is reached, the oil flows to the priority valve.



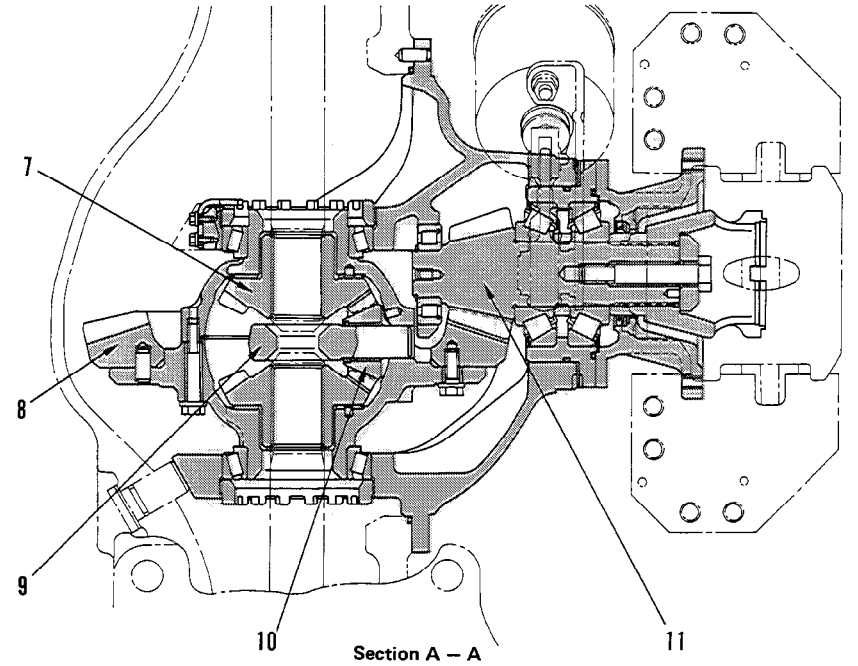
425F031

- When the pressure goes above the specified level, oil passes through the orifice in relief valve (1), pushes poppet (2), and moves relief valve (1) to the left. The oil is relieved to the torque converter, so the specified pressure is maintained.

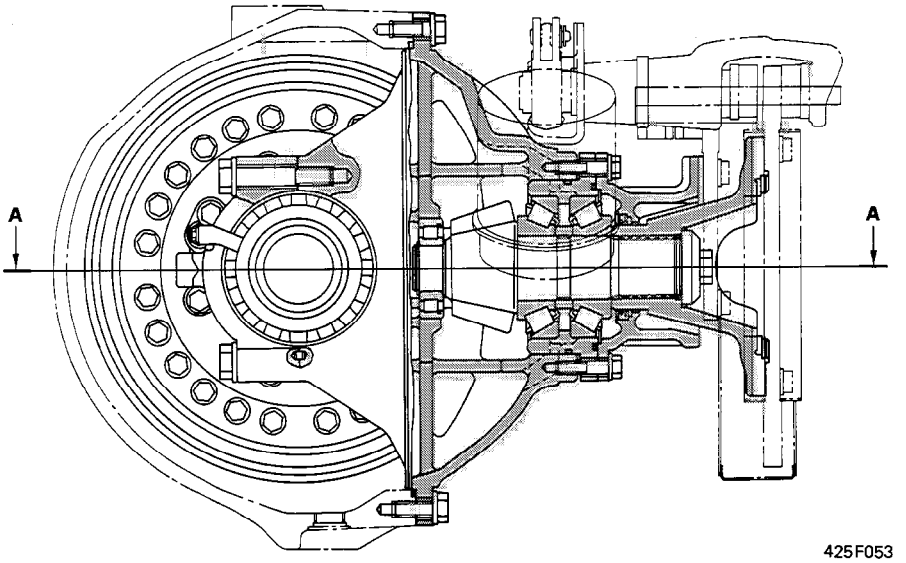
  ★ Specified pressure: 27 kg/cm^2



425F032



Section A – A

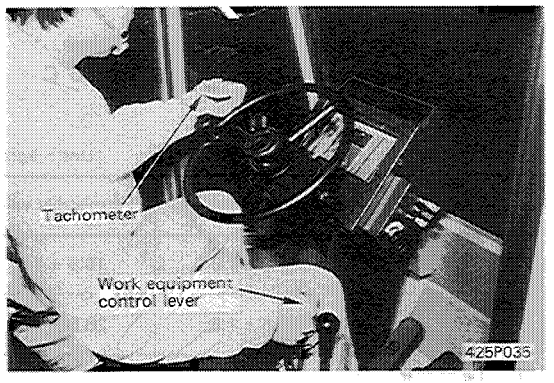


425F053

7. Side gear (Differential) (Teeth 18)
8. Bevel gear (Teeth 37)
9. Shaft
10. Pinion (Differential) (Teeth 10)
11. Bevel pinion (Teeth 9)

2. Measuring hydraulic stall

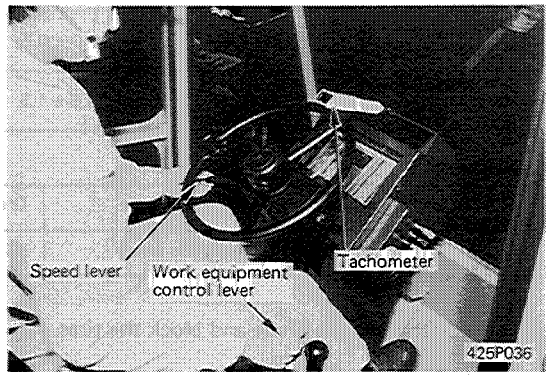
1) Start engine and run at high idling.
2) Operate the dump or lift control lever to move the cylinder to the end of its stroke and actuate the relief valve of the main control valve.
3) Measure the engine speed at this point.
   ★ Do not run the engine at stall speed for more than 20 seconds, and operate the control lever quickly.



3. Measuring full stall

Measure the engine speed when torque converter stall and hydraulic stall are reached at the same time.

★ Measure full stall when both the torque converter and hydraulic stall speeds are normal. If either stall speed is abnormal, remove the abnormality and measure the stall speed again.



Example 3:

Problem 1 → Abnormal
Problem 2 → Normal
Problem 3 → Normal

} From the table of example 3, the cause is one of "a", "c" and "e".

Continue problems

Problem 4 → Normal
Problem 5 → Normal

} From the table of example 3-1, the cause is "c".

Example 3

Problems \ Remedy	X	C	Δ X	A	X
	a	b	c	d	e
1	●	●	●	●	
2			●		●
3		Ⓥ		Ⓥ	
4	○			○	
5		○			○

Example 3-1

Problems \ Remedy	X	C	Δ X	A	X
	a	b	c	d	e
1	●	●	●	●	
2			●		●
3		Ⓥ		Ⓥ	
4	Ⓥ			Ⓥ	
5		Ⓥ			Ⓥ

Example 4:

Problem 1 → Abnormal
Problem 2 → Noraml

} From the table of example 4, the cause is one of "a", "b" or "d".

Continue problems

Problem 3 → Abnormal
Problem 4 → Abnormal
Problem 5 → Normal

} From the table of example 4-1, the cause is "a" or "d".

Example 4

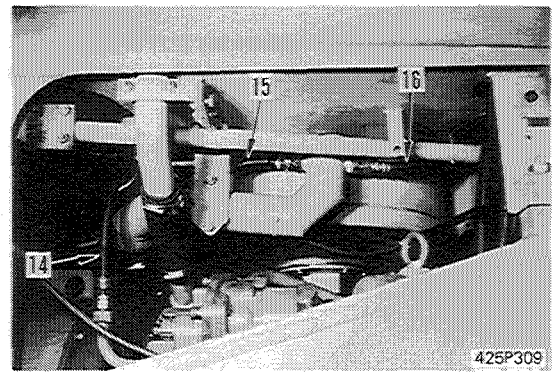
Problems \ Remedy	X	C	Δ X	A	X
	a	b	c	d	e
1	●	●	●	●	
2			Ⓥ		Ⓥ
3		○		○	
4	○			○	
5		○			○

Example 4-1

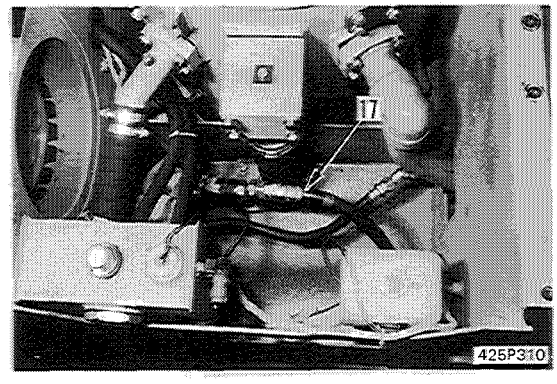
Problems \ Remedy	X	C	Δ X	A	X
	a	b	c	d	e
1	●	●	●	●	
2			Ⓥ		Ⓥ
3		●		●	
4	●			●	
5		Ⓥ			Ⓥ

As can be seen from the above examples, it is not necessary to perform all of the problems.
Also, looking at a particular cause, no matter how many ● marks there are in the column corresponding to that cause, it will cease to be an actual cause if there is even one ○ mark is the same column.

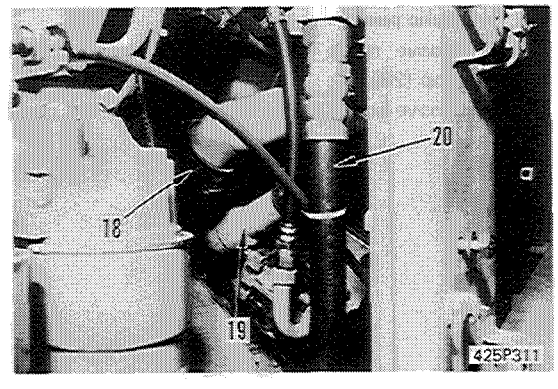
2. **POC piping**
   - Disconnect hose (14) between POC pump and strainer at tube of strainer side.
   - Disconnect hose (15) between main control valve and manifold at manifold end.
     ★ Remove clamp.
   - Disconnect hose (16) between POC valve and manifold at manifold end.
     ★ Remove clamp.



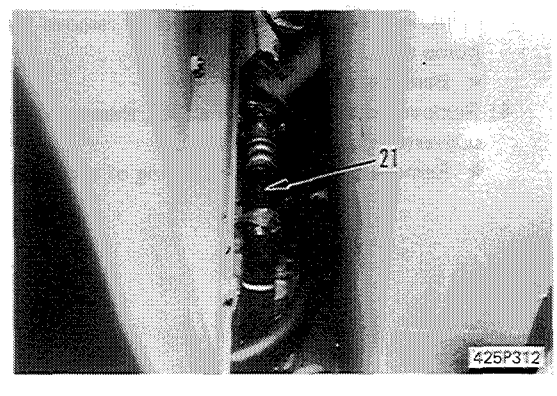
   - Disconnect hose (17) between POC relief valve and POC valve at POC relief valve end.
     ★ After disconnecting, pull out of bulkhead.



3. **Hydraulic piping**
   - Loosen clamp of hose (18) between hydraulic tank and switch and hydraulic pump.
   - Loosen clamp of hose (19) between hydraulic tank and steering pump.
   - Disconnect hose (20) between hydraulic tank and oil cooler at tube end.

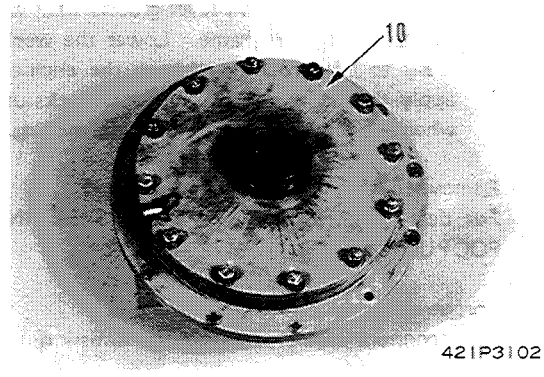


   - Disconnect hose (21) between main control valve and hydraulic tank at connection at left side of transmission.



4) Install flange (10), and tighten mounting bolts.

Contact surface of flange and outer body:
Gasket sealant (LG-4)



421P3102

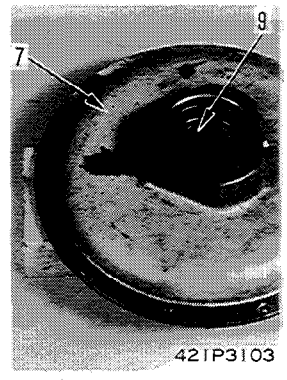
2. **Cover**

1) Fit the snap ring (6A), then fit the snap ring (6) after press fit oil seal (9) in cover (7).
   ★ Press fit the oil seal with the lip face on the bearing side.
2) Assemble snap ring (6), bearing (8) and snap ring (4) in shaft (5), then assemble shaft in cover (7).

Shaft splines in contact with inner body:
Molybdenum disulphide dry lubricant (coat, then leave for 2 – 3 minutes).

Contact surface of shaft and inner body oil seal:
Lithium type, molybdenum disulphide high pressure grease.

Bearing:
Lithium type, molybdenum disulphide high pressure grease.



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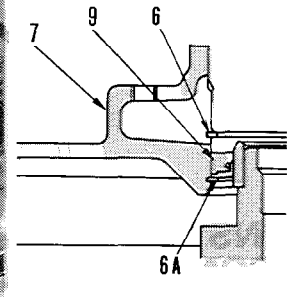
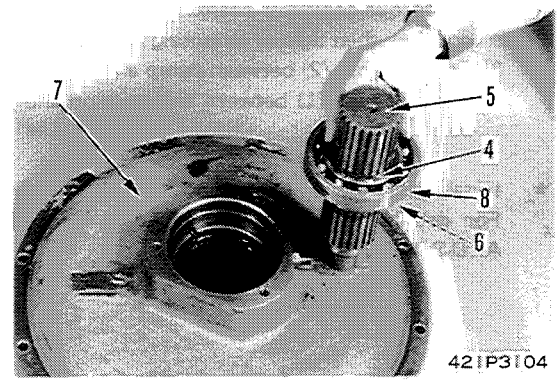


421F3007A

3) Press fit oil seal (2) in cover (1), and assemble O-ring.
   ★ Press fit the oil seal with the lip face on the coupling side.
4) Install cover (1), and tighten mounting bolts.



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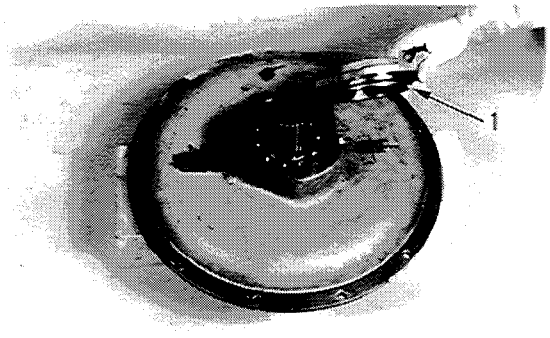

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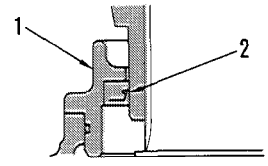
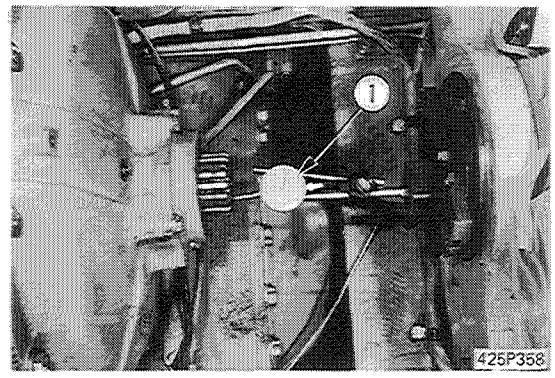


421F3008

2) Install dial gauge (1) to input coupling of torque converter, and put probe in contact with damper output shaft. Rotate input coupling of torque converter and adjust position.
   ★ Runout: Within 2 mm
   ★ Measure both radial and face runout.
3) After adjusting position, tighten front and rear mounting bolts fully.

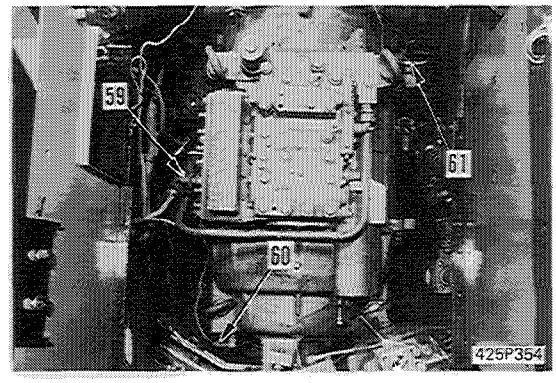
   kgm Mounting bolt: 28.5 ± 3 kgm

   kgm Mounting bolt: 18 ± 2 kgm



3. Electrical wiring

Connect electrical wiring to connector as follows:
- Wiring (61) of torque converter hydraulic level sensor.
- Wiring (60) of pickup sensor.
- Wiring (59) of transmission valve.



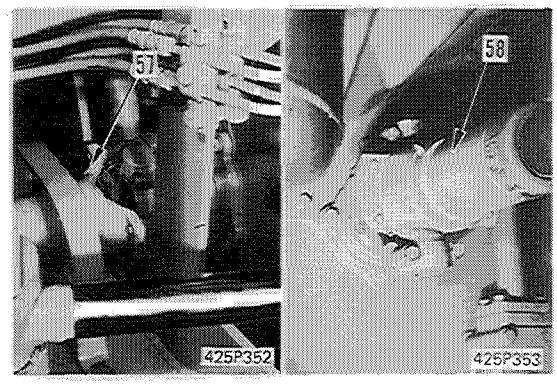
4. Center and rear drive shafts

1) Connect center drive shaft (57) to transmission.

   kgm Mounting bolt: 11.5 ± 1 kgm

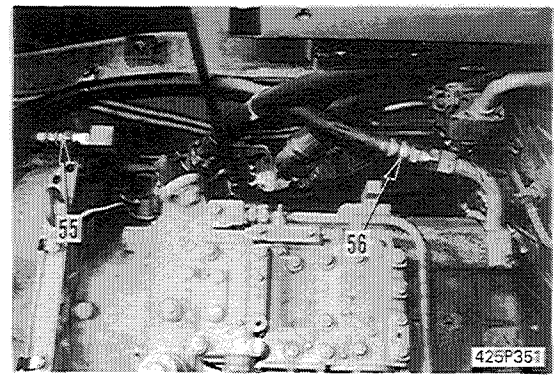
2) Connect rear drive shaft (58) to transmission.

   kgm Mounting bolt: 11.5 ± 1 kgm



5. Torque converter piping

1) Connect hoses (55) and (56) between transmission and cooler to transmission.



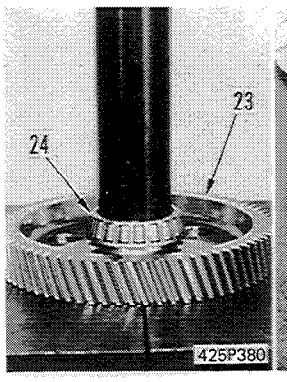
ASSEMBLY OF TORQUE CONVERTER ASSEMBLY

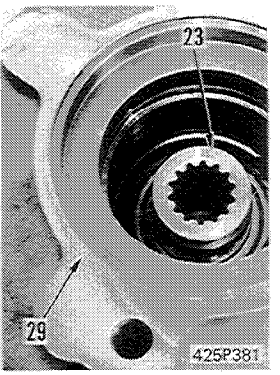
Special tools

	Part No.	Part name	Q'ty
A	790-501-5000	Unit repair stand	1
A_1	790-901-2110	Bracket	1
A_2	793-310-2160	Plate	1

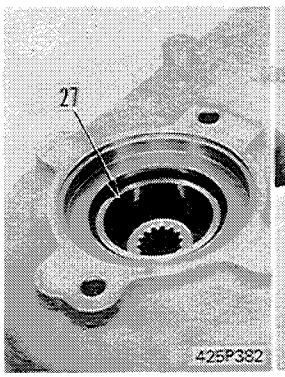
ASSEMBLY OF PTO ASSEMBLY

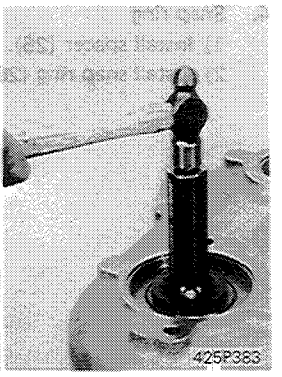
1. **Gear**
   1) Install bearing (24) (inside diameter: 50 mm) on gear (23).
   2) Set gear (23) in PTO case (29).



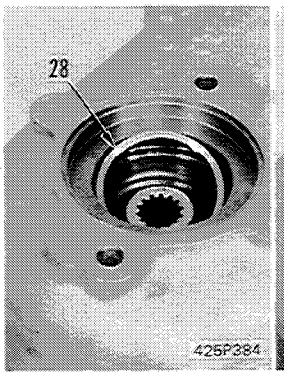


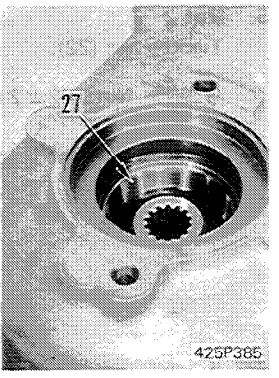
2. **Outer race, spacer**
   1) Install outer race (27) (outside diameter: 90 mm).
      ★ Be careful to install facing in the correct direction.



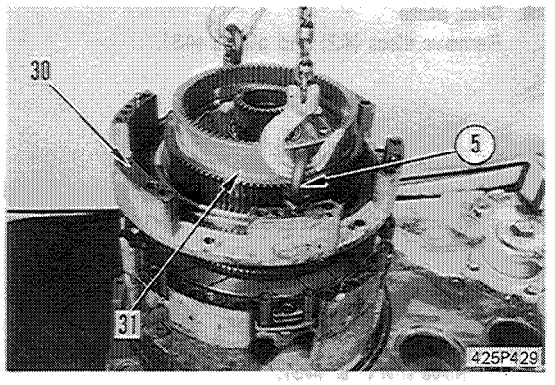


   2) Install spacer (28).
   3) Install outer race (27) (outside diameter: 90 mm).
      ★ Be careful to install facing in the correct direction.



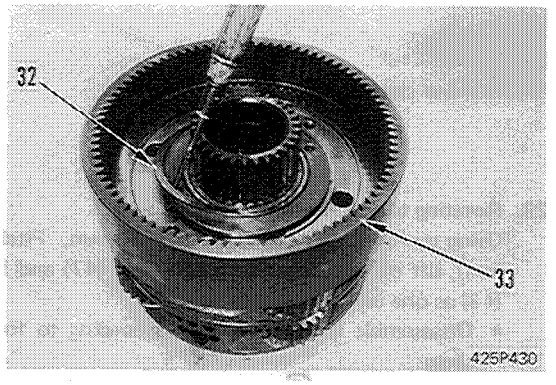


15. **No. 2 piston, housing**
Lift out piston and housing (30).



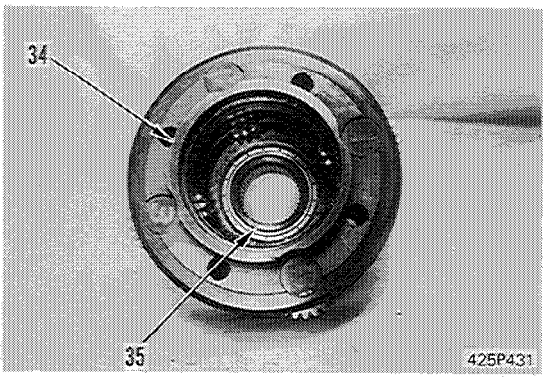
16. **Drum carrier assembly**
Using eye-bolts ⑤ (Thread dia. = 16 mm, Pitch = 2.0 mm), lift out No. 2 piston and housing (30) and drum carrier assembly (31) as one unit.

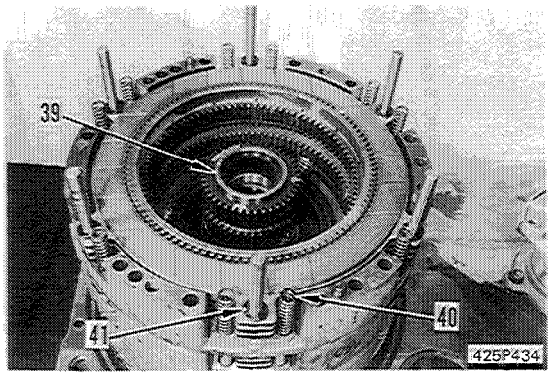
★ Disassemble drum and carrier assembly according to following steps:
1) Remove snap ring (32), then remove drum (33).
2) Remove bearing (35) from carrier case (34).
3) Remove pins, then remove planetary gears (36), bearing (37) and thrust washer (38) from carrier case.

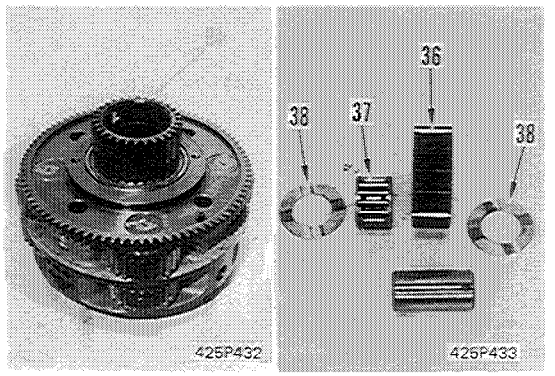


17. **Sun gear**
Remove sun gear (39).

18. **Spring**
Remove springs (40) and (41).
★ Springs (41) are inserted between each plate.

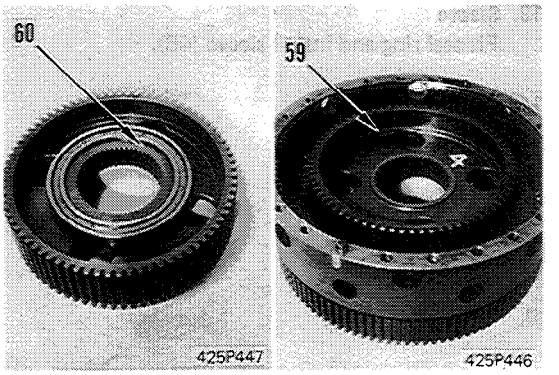




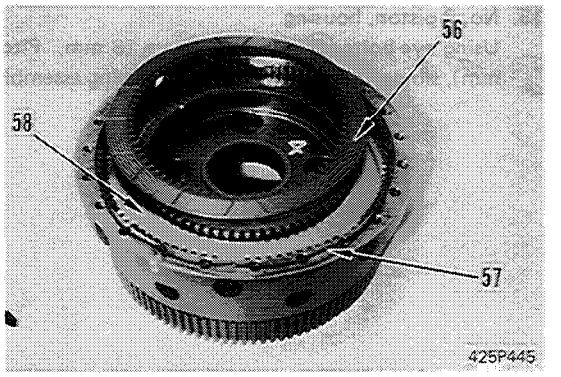


3) Install bearing (60) to inner gear and secure with snap ring.

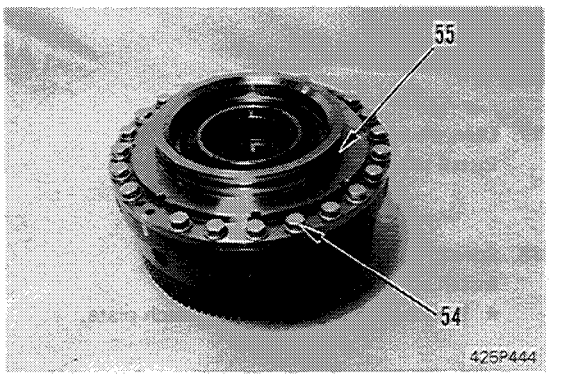
4) Install inner gear (59) to drum.



5) Install plates (58), springs (57) and discs (56).

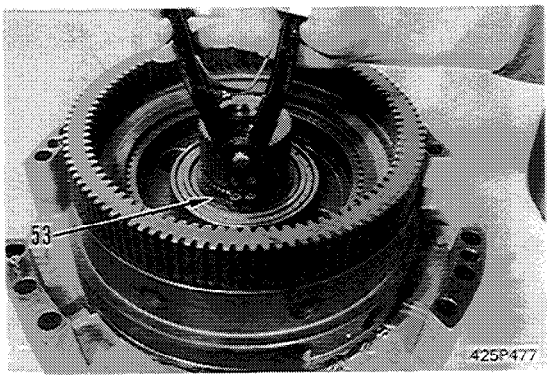


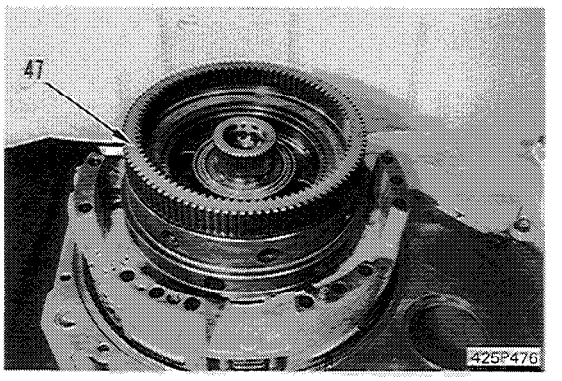
6) Install case (55) and tighten bolts (54).



7) Fit seal rings and install clutch assembly (47).

8) Install snap ring (53).

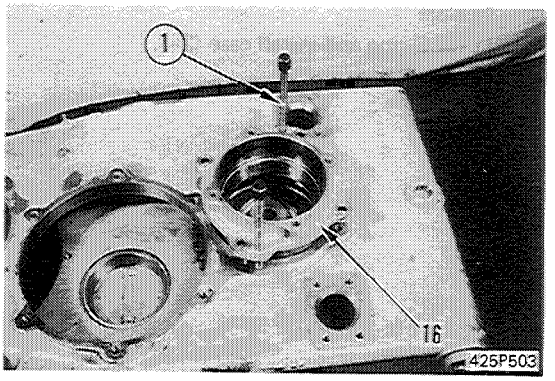




10. Cage

Using forcing screw ① , remove cage (16).

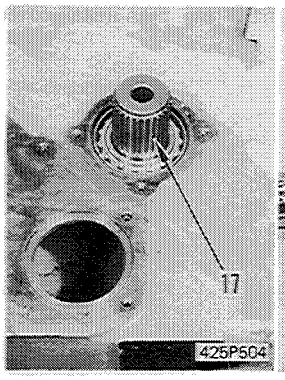
★ Check the number and thickness of the shims and keep in a safe place.

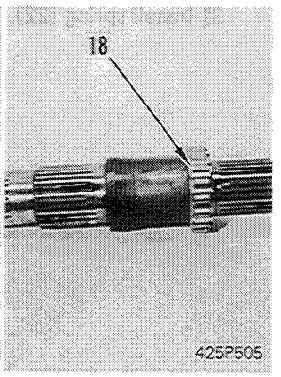


11. Shaft

1) Remove shaft (17).

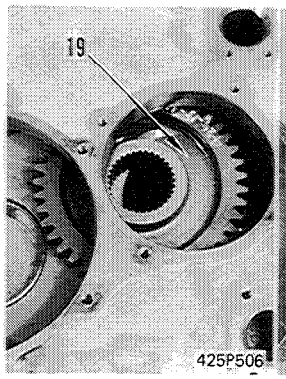
2) Remove bearing (18) from shaft.

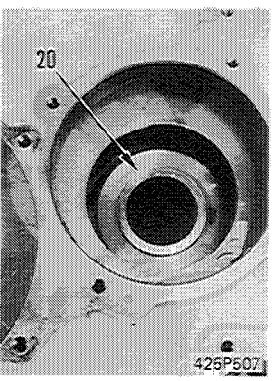




12. Gear

Remove gear (19) and collar (20).

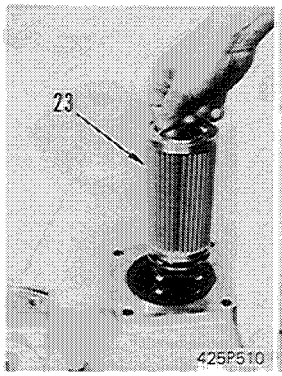


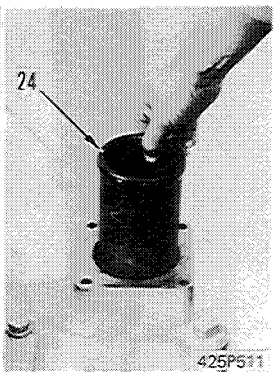


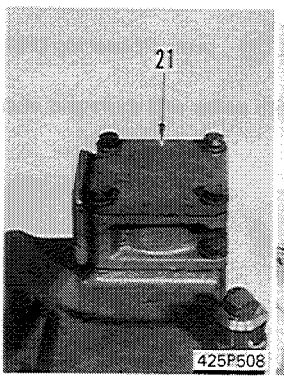
13. Strainer

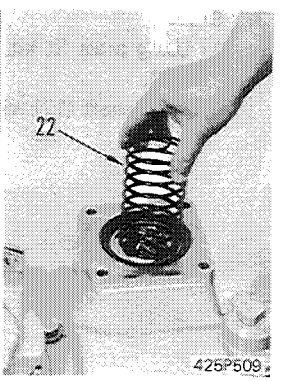
1) Remove cover (21), then remove spring (22).

2) Take out strainer (23) and remove case (24).

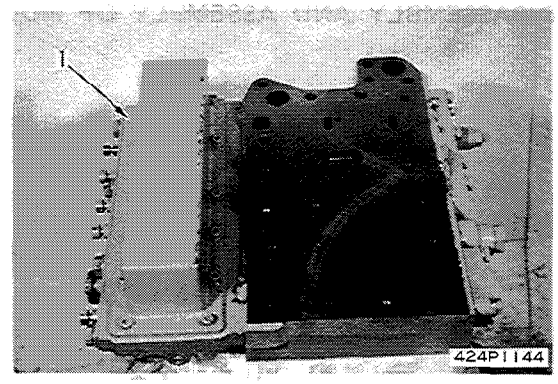








DISASSEMBLY OF SPEED VALVE ASSEMBLY

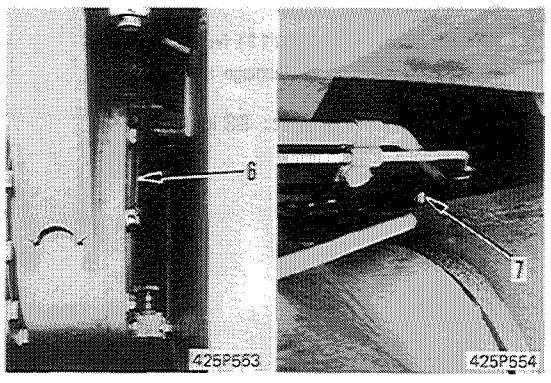


1. Remove solenoid valve assembly (1).
2. Remove stopper (2), spring (3) and valve (4).
3. Remove valves (5) and (6), and shim (7).
4. Remove spring (8), then remove shim (9), valves (11), (12) and (13), and spring (14) as a set.
5. Remove covers (15) and (16).
6. Remove spacer (17).
7. Remove spring (18) and valve (19).
8. Remove plug (20), then remove collar (21) and spring (22).

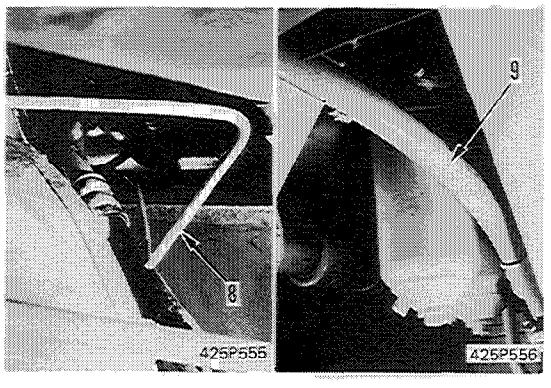
ASSEMBLY OF SPEED VALVE ASSEMBLY

1. Assemble spring (22) in collar (21), install in body (23), then fit O-ring and install plug (20).
2. Assemble spring (18) in valve (19) and install.
3. Install spacer (17).
4. Fit gasket and install covers (16) and (15).
5. Assemble valve (12), spring (14), valve (13), shim (9) and spring (8) in valve (11) and install in body.
6. Assemble shim (7) in valve (6), and install in body.
7. Install valve (5).
8. Install valve (4), spring (3) and stopper (2).
9. Fit gasket and install solenoid valve assembly (1).

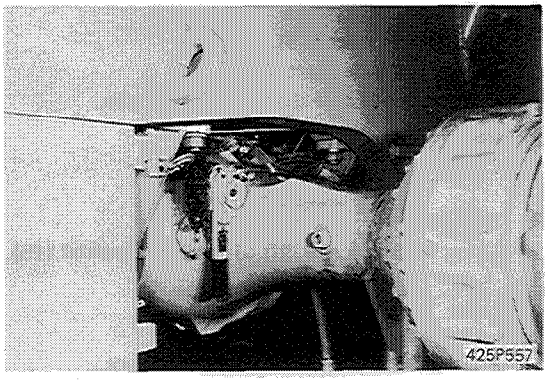
4. **Grease tube**
   1) Disconnect grease tubes (6) and (7) from rear axle support.



   2) Disconnect grease tube (8) from front axle support.
      ★ Remove clamp of electric wiring from support.
      ★ Disconnect hose (9) between torque converter pump and filter from filter end.



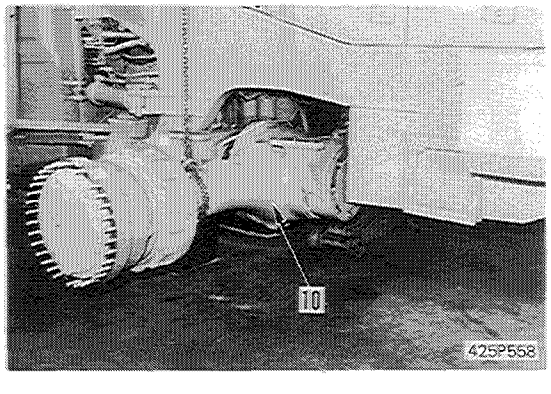
5. **Rear axle, support**
   1) Fix axle support and rear axle with a chain.



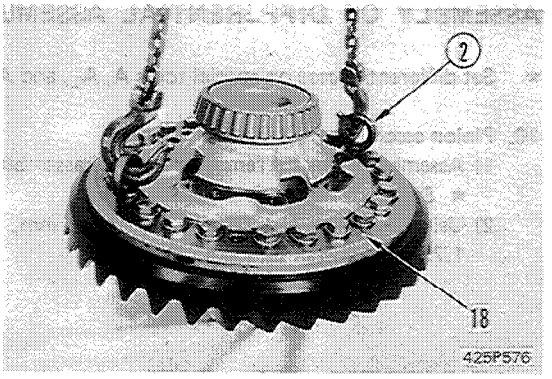
   2) Remove mounting bolts, then using hoist and jack to maintain balance, lower rear axle and support.

      kg Rear axle, support: 2,050 kg

   3) Pull out rear axle and support from under machine.
      ★ Support both ends of the axle with jacks.



5. **Bevel gear (large)**
   Using eye-bolts (2) (Thread dia. = 16 mm, Pitch = 2.0 mm), lift and install bevel gear (18).
   ★ Align pin hole of thrust and dowel pin on case side and install.

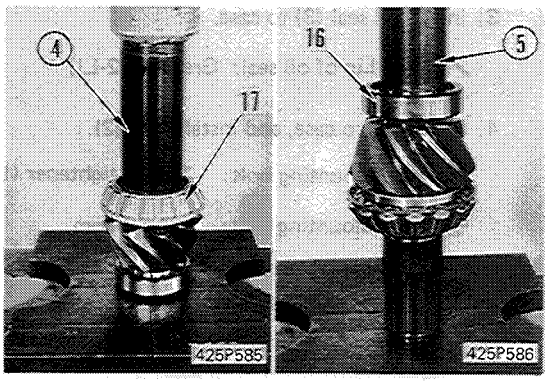


FINE ASSEMBLY OF PINION ASSEMBLY

6. **Bearing**
   1) Using press fit kit (4) (26 mm inner diameter), install pinion bearing (17).
   2) Using press fit kit (5) (55 mm inner diameter), install bearing (16).

      Rotating surface of bearing: Engine oil (EO30-CD)

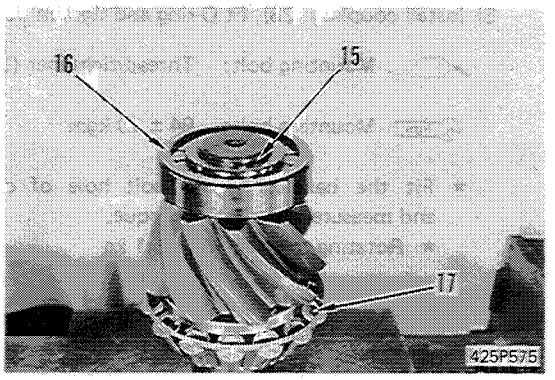
   3) Install snap ring (15).

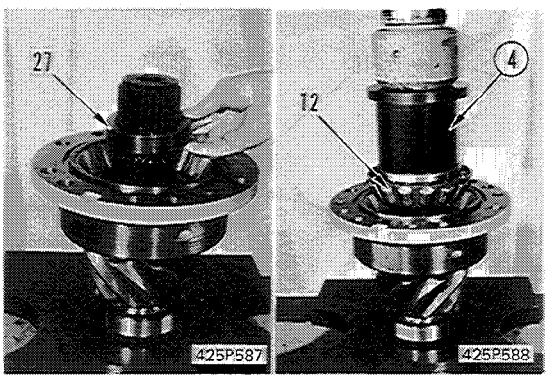


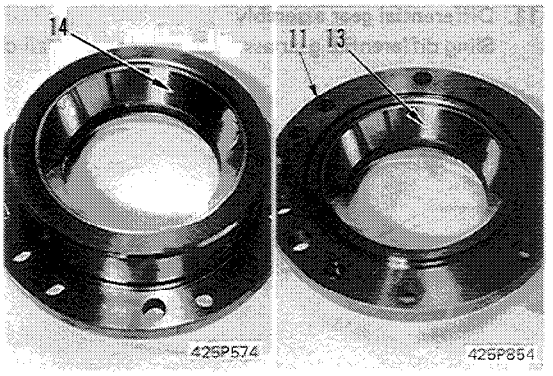
7. **Cage**
   1) Install outer races (14) and (13).
   2) Install cage (11) to pinion assembly.

8. **Collar**
   Instal collar (27).

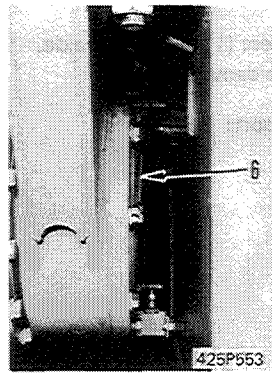
9. **Bearing**
   Using press fit kit (4) (76 mm inner diameter), install bearing (12).

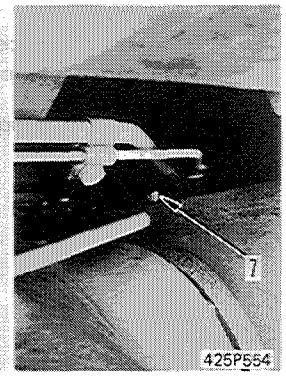




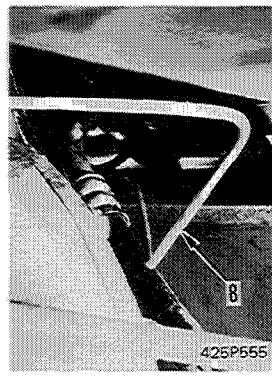


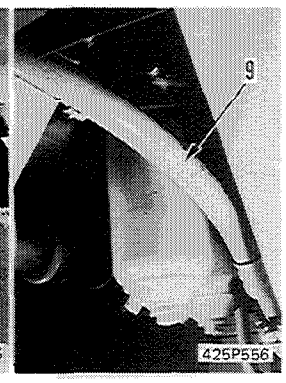
4. **Grease tubes**
   1) Disconnect grease tubes (6) and (7) from rear axle support.



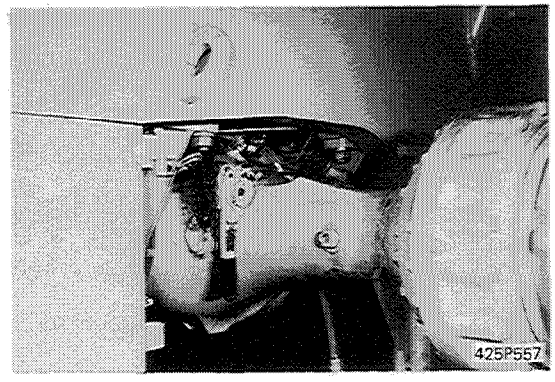


   2) Disconnect grease tube (8) from front axle support.
      ★ Remove clamp of electric wiring from support.
      ★ Disconnect hose (9) between torque converter pump and filter from filter end.





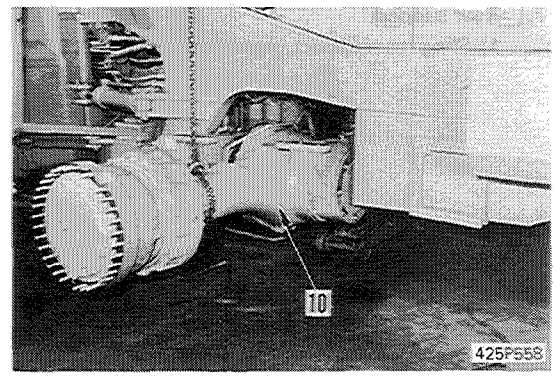
5. **Rear axle, support assembly**
   1) Secure alxe support and rear axle with chains.



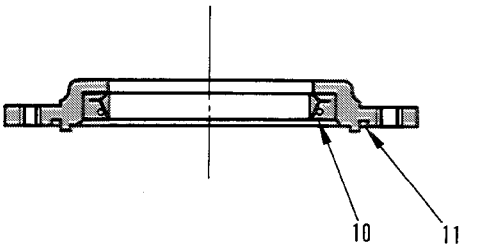
   2) Remove mounting bolt, then using thoist and garage jack to maintain balance, lower rear axle and support.

      kg Rear axle, support: 2,050 kg

   3) Pull out rear axle and support (10) from under the machine.
      ★ Support both ends of the axle with jacks.



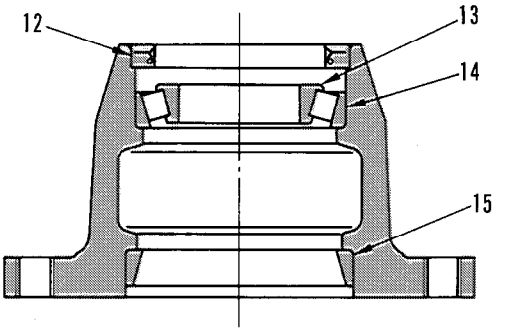
4. **Oil seal**
   1) Remove oil seal (10) and O-ring (11) from retainer.



425F274

   2) Remove oil seal (12) from case.

5. **Case**
   Remove bearing cone (13) and bearing outer race (14) and (15).



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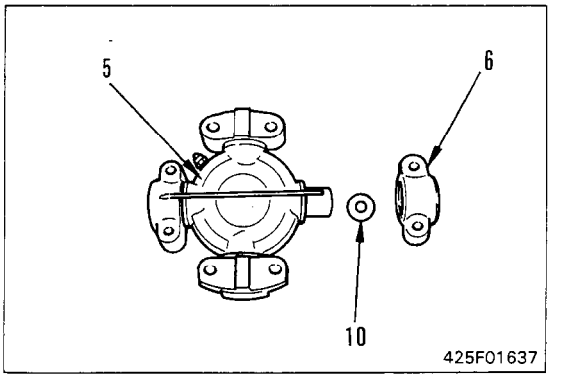
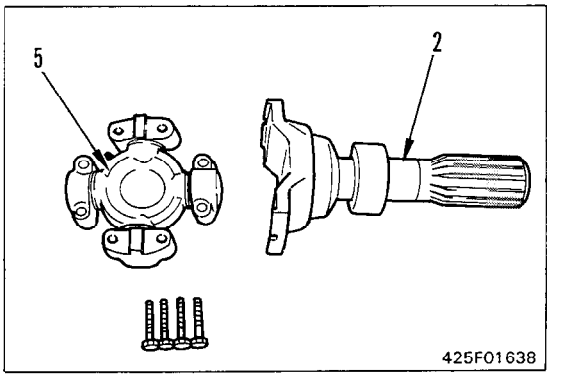
2) Assemble Derling washer (10) and bearing cap (6) to spider assembly (5).
★ Be careful not to damage bearing with heat when welding strap.

Bearing cap: Grease (G2-LI)



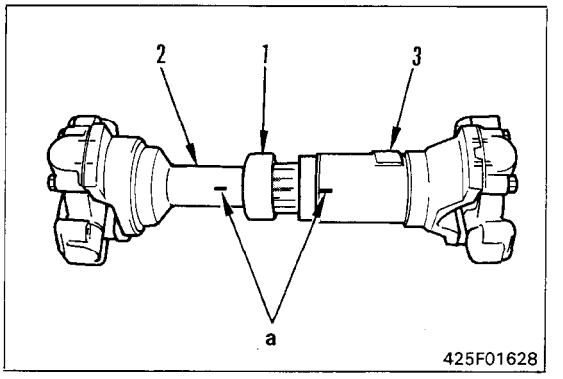
3) Assemble spider assembly (5) to shaft (2).
★ Carefully align match marks.
★ Clean the mounting face of the bearing cap by wiping with a clean cloth.

Mounting bolt: 14.5 ± 1 kgm

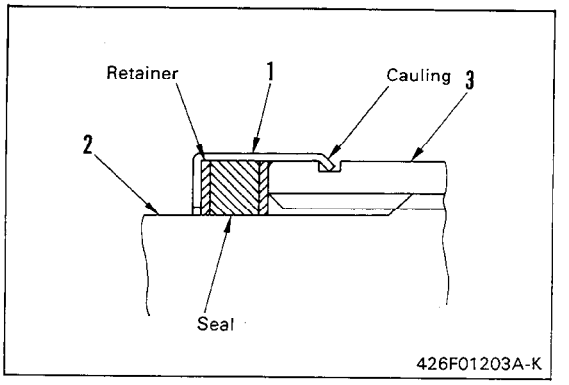


4) Align match marks "a", then install shaft (2) to yoke (3).
★ Check that the direction of the spider assembly is the same.
★ If the spline is worn, replace the whole drive shaft assembly.

Spline: Grease (G2-LI)

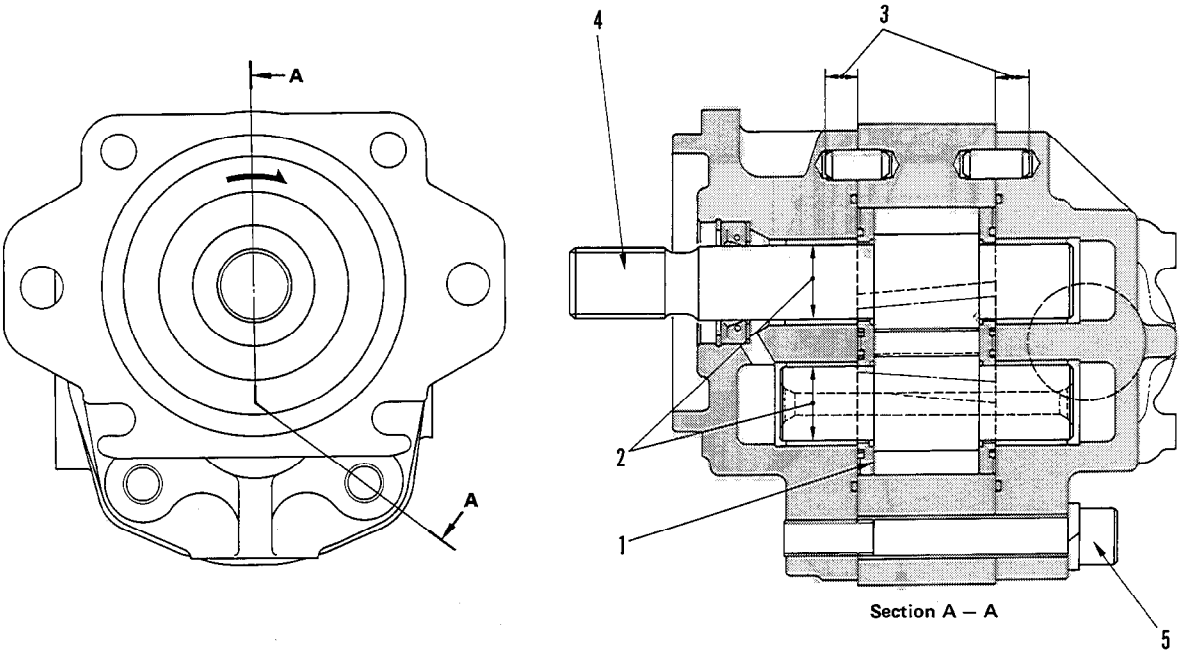


5) If cover (1) has been removed, do as follows.
i) Insert seal and retainer to cover (1) and shaft (2), assemble cover (1), then caulk with a punch on diagonally opposite sides.



TORQUE CONVERTER CHARGING PUMP

- **Model SAR (3)-080**



425F134

Unit: mm

No.	Check item	Criteria				Remedy
1	Clearance between gear case and side plate, gear	Standard clearance		Clearance limit		Replace
		0.10 – 0.15		0.19		
2	Clearance between inside diameter of plain bearing and outside diameter of gear shaft	0.06 – 0.149		0.20		
3	Insertion depth of pin	$14^{0}_{-0.5}$				
4	Rotating torque of spline shaft	0.7 – 1.2 kgm				–
5	Tightening torque of bolt	25.2 ± 1.7 kgm				Retighten
	Discharge Oil: EO10-CD Temperature: 45 – 55°C	Revolution (rpm)	Pressure (kg/cm²)	Standard discharge (ℓ/min.)	Repair limit discharge (ℓ/min.)	–
		2,500	210	184	170	

Unit: mm

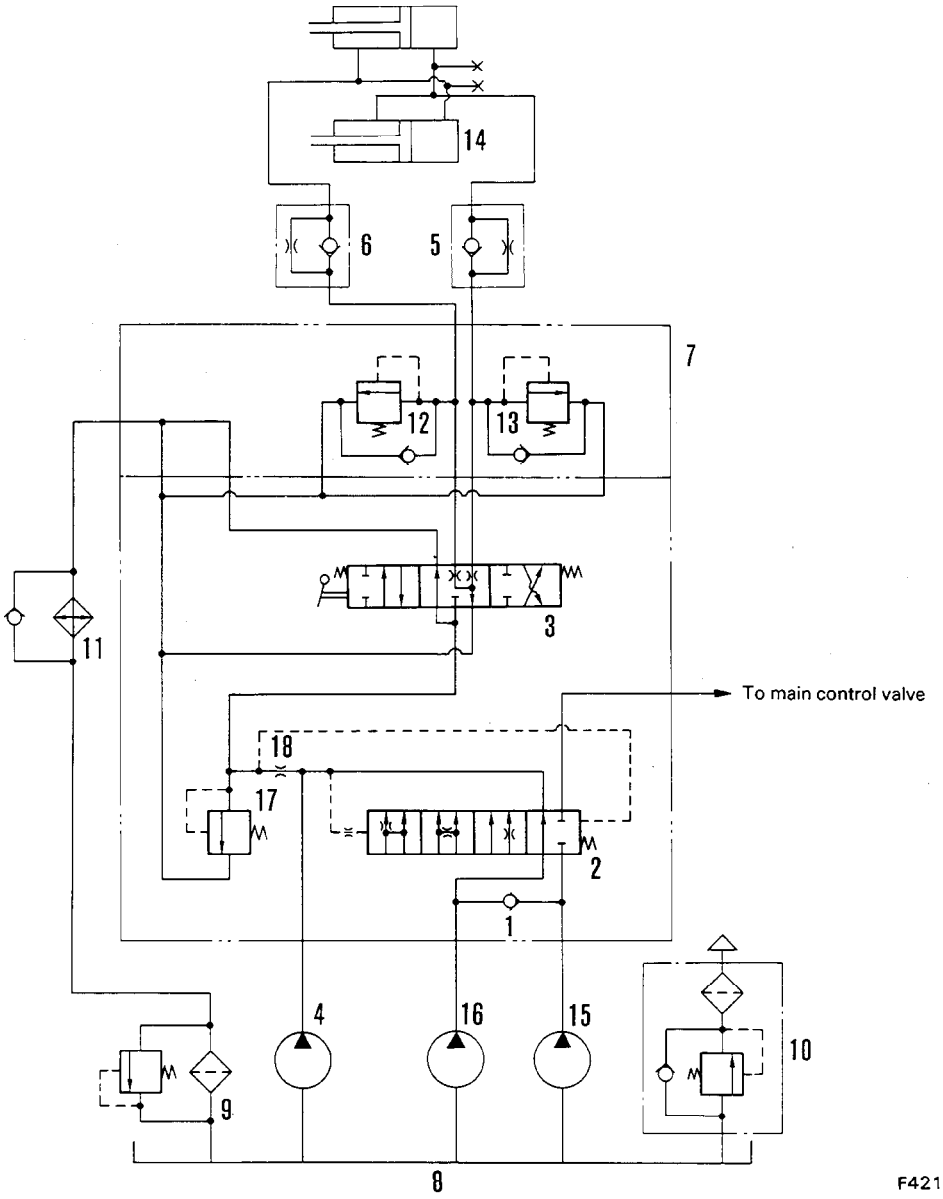
No.	Check item	Criteria					Remedy
1	Clearance between reducing valve and body	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		25	−0.035 −0.045	+0.012 0	0.035 – 0.058	0.08	
2	Clearance between torque converter relief valve spool and body	25	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.08	
3	Clearance between priority valve spool and body	25	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.08	
4	Clearance between quick return valve spool and body	12	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.08	
5	Clearance between modulating valve spool and body	25	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.08	
6	Clearance between main relief valve spool and body	28	−0.035 −0.045	+0.013 0	0.035 – 0.058	0.08	
7	Priority valve spring	Standard size			Repair limit		
		Free length	Installation length	Installation load	Free length	Installation load	
		62	37.7	22.1 kg	59.6	19.9 kg	
8	Torque converter relief valve spring	62	48	12.8 kg	60.6	11.5 kg	
9	Modulating valve spring (Inner)	118	110	5.55 kg	117	5.3 kg	
10	Modulating valve spring (Outer)	145.7	144	1.69 kg	141	1.60 kg	
11	Main relief valve spring (Inner)	108	83.5	30.8 kg	105	29.3 kg	
12	Main relief valve spring (Outer)	122	83.5	37.9 kg	118	36.0 kg	
13	Thickness of shim for reducing valve	3 mm (pressure per 1 piece: 0.65 kg/cm²)					Adjust
14	Thickness of shim for modulation valve	3 mm (pressure per 1 piece: 0.20 kg/cm²)					
15	Thickness of shim for priority valve	2 mm (pressure per 2 piece: 0.26 kg/cm²)					
16	Thickness of shim for torque converter relief valve	4 mm (pressure per 1 piece: 0.26 kg/cm²)					
17	Thickness of shim main relief valve	1.5 mm (pressure per 1 piece: 0.39 kg/cm²)					
18	Tightening torque of modulation lock nut	4.25 ± 0.75 kgm					Retighten

Unit: mm

No.	Check item	Criteria			Remedy
1	Thickness of side gear washer	Standard size	Tolerance	Repair limit	Replace
		4	0 −0.03	3.5	
2	Thickness of pinion gear washer	10.5	–	10.0	
3	Wear of oil seal surface	100	0 −0.087	–	
4	Tightening torque of mounting bolt	28.5 ± 3.0 kgm			Retighten
5	Tightening torque of mounting bolt	56.0 ± 6.0 kgm			
6	Tightening torque of mounting bolt	28.5 ± 3.0 kgm			
7	Tightening torque of mounting bolt	2.5 ± 1.0 kgm			
8	Tightening torque of mounting bolt	94.5 ± 10.5 kgm			
9	Tightening torque of mounting bolt (for F)	28.5 ± 3.0 kgm			
10	Tightening torque of mounting bolt (for F)	28.5 ± 3.0 kgm			
11	Tightening torque of mounting bolt	28.5 ± 3.0 kgm			
12	Tightening torque of mounting bolt	94.5 ± 10.5 kgm			
13	Tightening torque of mounting bolt	1st step: 0.4 ± 0.1 kgm (when measuring clearance (no shim)) 2nd step: 11.5 ± 1.0 kgm (shim installed)			

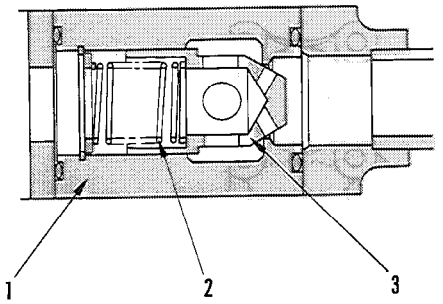
HYDRAULIC CIRCUIT DIAGRAM FOR STEERING

Neutral



1. Check valve
2. Demand spool
3. Steering spool
4. Steering pump
5. Two-way restrictor valve
6. Two-way restrictor valve
7. Steering valve
8. Hydraulic tank
9. Oil filter
10. Breather
11. Oil cooler
12. Safety valve (with suction)
13. Safety valve (with suction)
14. Steering cylinder
15. Hydraulic pump
16. Switch pump
17. Relief valve
18. Orifice

TWO-WAY RESTRICTOR VALVE



425F070

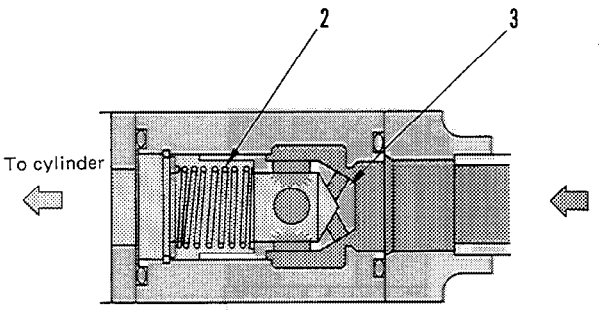
1. Body
2. Spring
3. Poppet

Function

- To reduce the shock caused by the inertia of the machine when the steering is operated, an orifice is installed in the oil line of the return circuit from the cylinder. This applies pressure to the returning oil, and regulates the movement of the cylinder piston.

Operation

- When the oil is flowing to arrow ⬅ , it pushes spring (2) and flows through the orifice, and between poppet (3) and the poppet seat.



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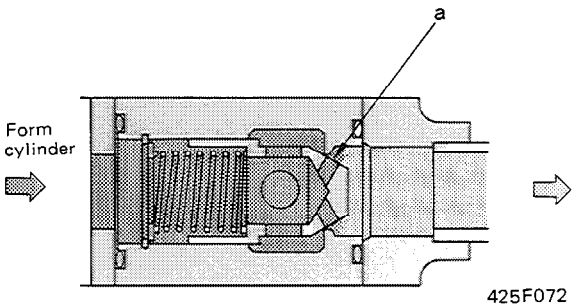
- When the oil is flowing to arrow ➡ , the oil flows only from orifice **a** inside the poppet (3), so the flow is controlled.



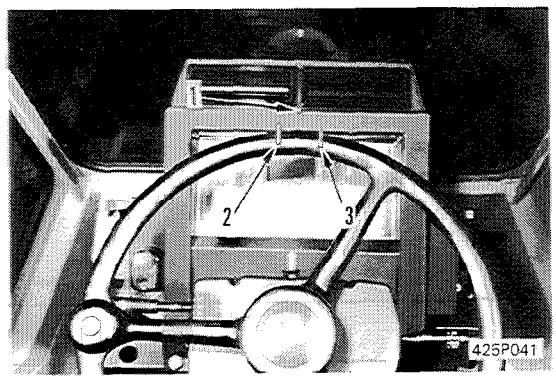
425F072

MEASURING STEERING WHEEL PLAY

★ Measurement condition
- Engine speed: Stop
- Machine posture: Facing straight

Unit: mm

Item	Standard value	Permissible value
Steering wheel play	20 – 70	20 – 100

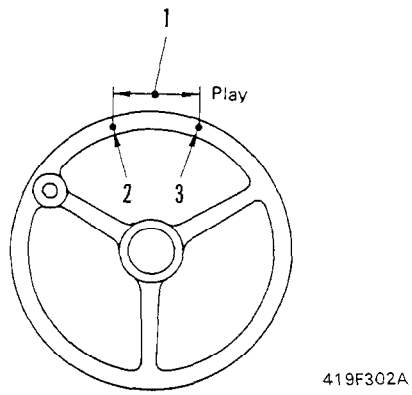


HOW TO MEASURE

1. Turn the steering wheel lightly clockwise and counterclockwise two or three times and confirm the neutral position of the steering mechanism. Put mark (1) on the outer frame of the vehicle monitor.

2. Turn the steering wheel clockwise, and when the steering wheel starts to become heavy (when the steering valve lever starts to move), make mark (2) on the steering wheel in line with mark (1).

3. Turn the steering wheel counterclockwise, and when the steering wheel starts to become heavy (when the steering valve lever starts to move), make mark (3) on the steering wheel in line with mark (1). Then measure the distance in a straight line between mark (2) and mark (3).



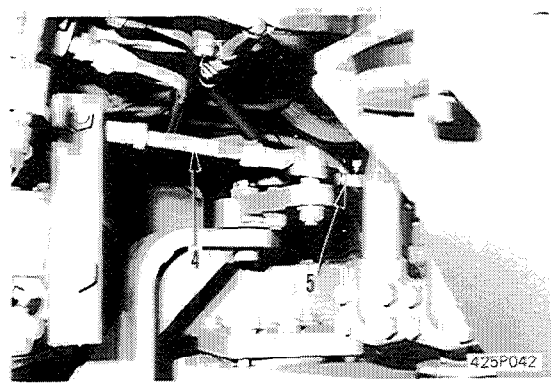
TESTING AND ADJUSTING

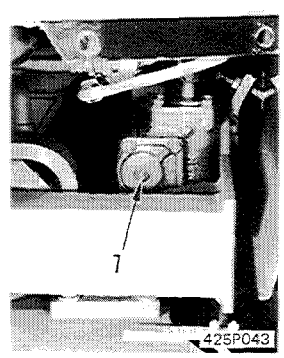
★ Inspect the steering linakge (4) and (5) for looseness and free play. If any, adjust the linakge.

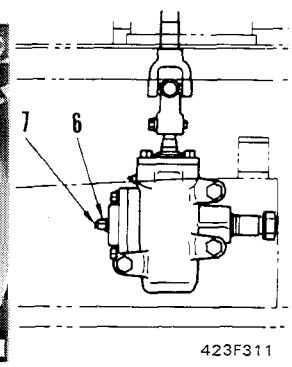
1. Loosen lock nuts (6) on the steering gear box.

2. Then, adjust by turning adjustment sdrew (7) in or out.

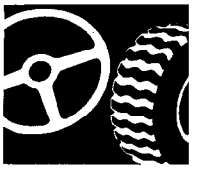
★ To decrease the free play, turn the adjustment screw (7) in. to increase the free play, turn the screw out.







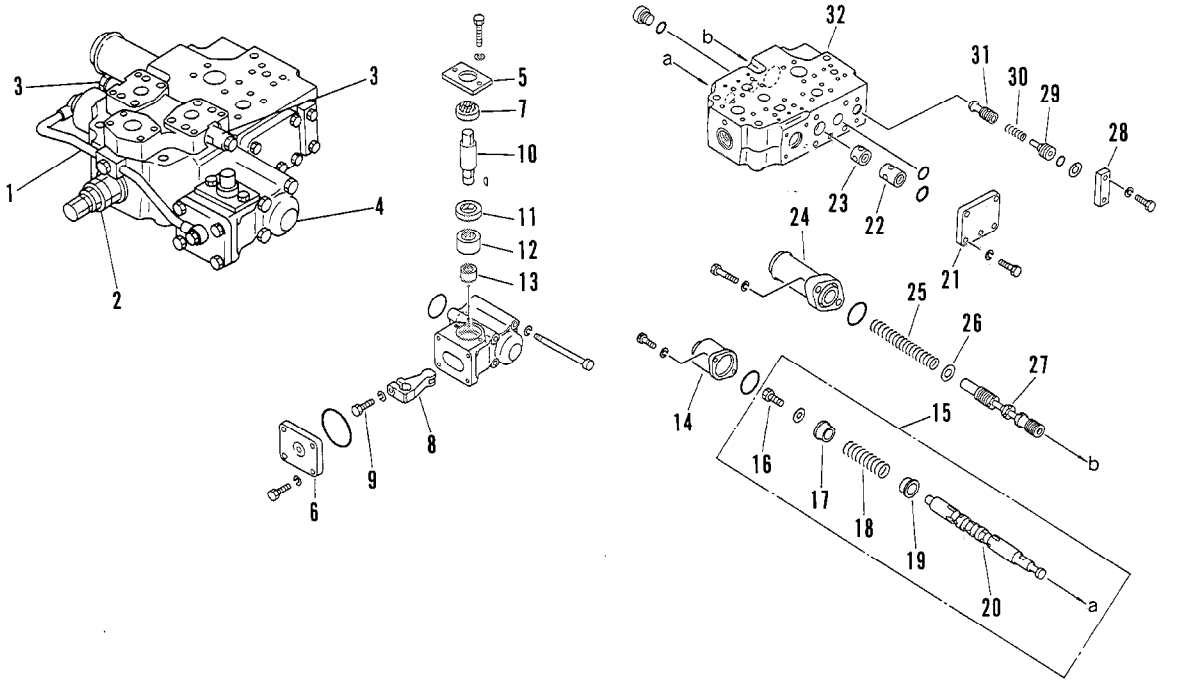
STEERING SYSTEM
43 DISASSEMBLY AND ASSEMBLY



★ Take the following method for air bleeding when you start to operate hydraulic cylinders after reassembling cylinder, pumps and pipings.

1. Start engine, keep idling.
2. Operate hydraulic cylinder 4 — 5 cycles, but do not exceed beyond 100 mm of stroke end.
3. Continue to operate cylinder 3 — 4 cycles until stroke end.
4. After finishing above steps, keep normal engine speed.
   NOTE: After long storage, same procedure is required.

DISASSEMBLY AND ASSEMBLY OF STEERING VALVE



DISASSEMBLY OF STEERING VALVE

1. Remove tube (1).

2. Remove main relief valve assembly (2).

3. Remove safety valve (with suction valve) assembly (3).

4. Remove case assembly (4).
   ★ Disassembly and assembly of case assembly.
   1) Remove covers (5) and (6).
   2) Remove dust seal (7).
   3) Loosen bolt (9) of lever (8), then remove shaft (10).
   4) Remove oil seal (11) and bearing (12) and (13).

5. Remove case (14), then remove spool assembly (15).
   ★ Disassembly and assembly of spool assembly.
   1) Remove bolt (16), then remove retainer (17), spring (18) and retainer (19) from spool (20).
      ★ Loosen bolt (16) with the spool assembled in the body.

6. Remove plate (21), then remove orifices (22) and (23).

7. Remove cover (24), then remove spring (25), washer (26) and spool (27).

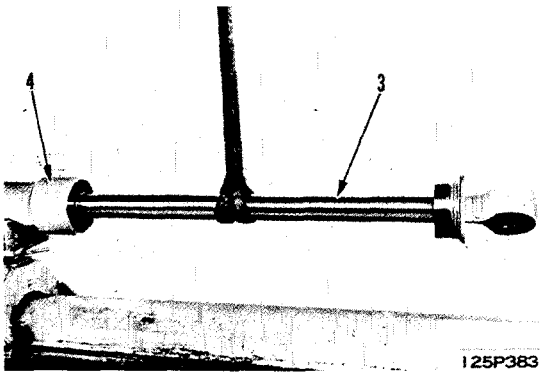
8. Remove plate (28), then remove seat (29), spring (30) and poppet (31).

   kg Steering demand valve assembly: 55 kg

6. Remove piston rod and head assembly from tool **A**.

7. Set cylinder (4) in tool **A**.

8. Raise piston rod and head assembly (3), and assemble in cylinder (4).

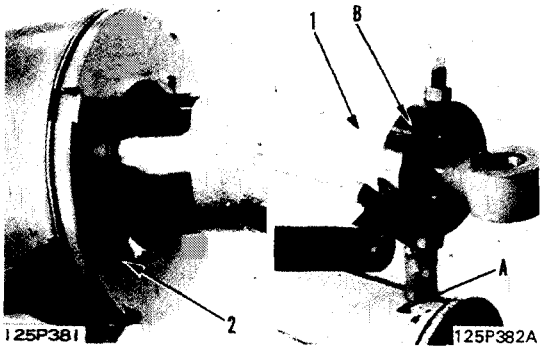


9. Using tool **B**, tighten cylinder head nut (2).

   kgm Cylinder head nut: 95 ± 9.5 kgm

10. Bend lock into notch on cylinder side.

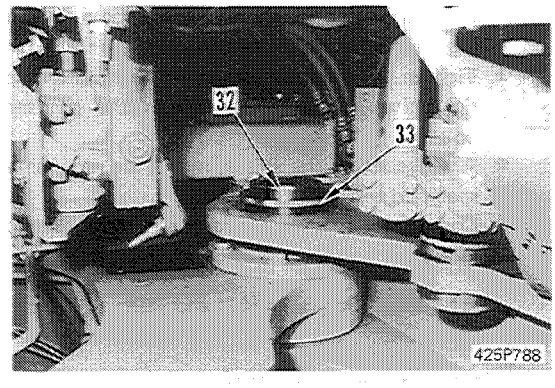
11. Remove cylinder assembly from tool **A**.



3. **Connecting frame**
Move front frame towards rear frame and align pin holes.

⚠ Use a bar to align the pin holes. Never use your fingers.

★ Align the pin holes correctly.



4. **Upper hinge pin**
1) Assemble spacer (33), insert upper hinge pin (32), tap lightly 3 times with a copper hammer until it settles in.
★ Tap lightly with copper hammer, do not tap hard.
★ Absolutely, do not coat spacer (33) with grease.

Outer circumference of hinge pin: Grease (G2-LI)

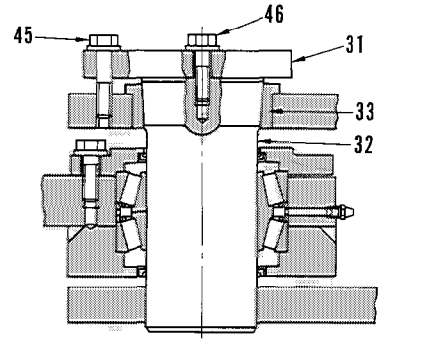
2) Assemble retainer (31).

Mounting bolt (45): Thread tightener (LT-2)

Mounting bolt (45): 18 ± 2 kgm

Mounting bolt (46): 18 ± 2 kgm

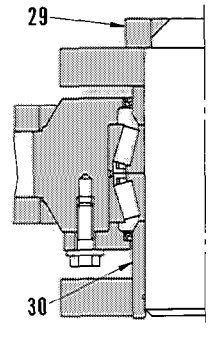
★ If the torque of the mounting bolts (45) and (46) do not reach the specified there may be grease on spacer (33), so remove it and tighten the mounting bolts again.

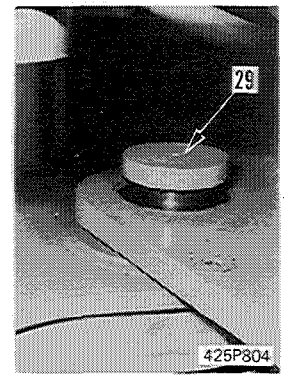


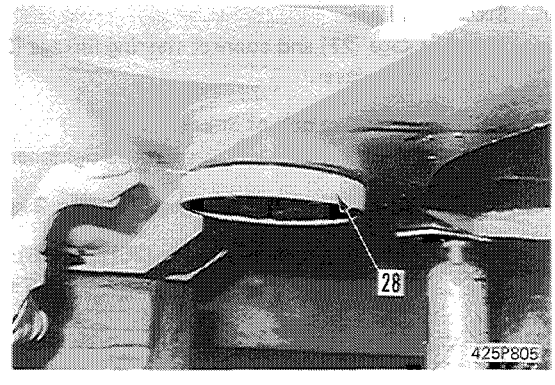
5. **Lower hinge pin**
1) Insert lower hinge pin (29) and assemble spacer (30).

Outer circumference of hinge pin: Grease (G2-LI)

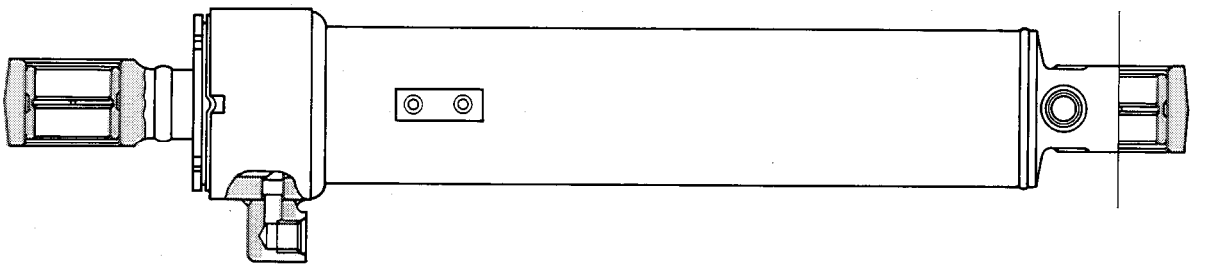
2) Install retainer (28) to lower hinge pin, and after it settles in fully, measure clearance "c" between retainer and frame at 4 locations on circumference, and select shims so the measured value is less than 0.08 – 0.18 mm.

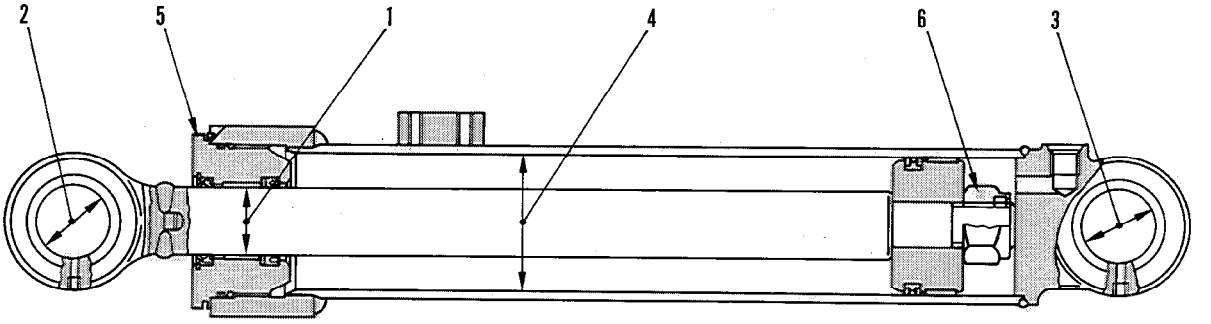






STEERING CYLINDER





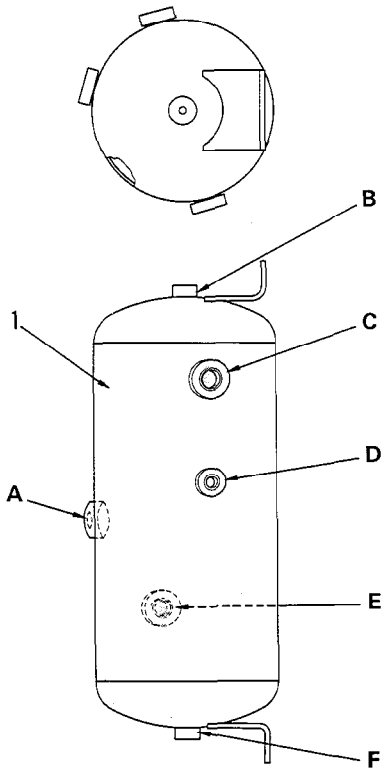
425F155

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between rod and bushing	55	−0.100 −0.174	+0.163 +0.006	0.106 – 0.337	0.637	Replace bushing
2	Clearance between piston rod mounting pin and diameter of hole	60	0 −0.074	+0.174 +0.100	0.100 – 0.220	1.0	
3	Clearance between cylinder bottom mounting pin and bushing	60	0 −0.074	+0.174 +0.100	0.100 – 0.220	1.0	
4	Cylinder bore	110	–	+0.3 0	–	–	
5	Tightening torque of cylinder head	95 ± 9.5 kgm					Retighten
6	Tightening torque of piston nut	145.0 ± 14.5 kgm (Width across the flats 55 mm)					

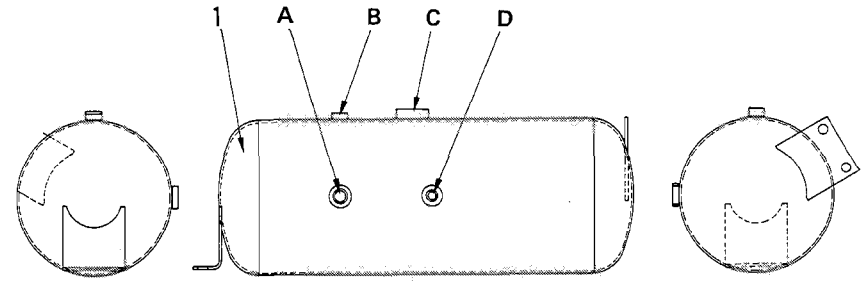
AIR TANK

WET TANK



421F059

DRY TANK



425F084

A. To air governor (PT 1/2)
B. Air pressure sensor pick-up (PT 1/8)
C. To air tank (dry) (PT 1/2)
D. Plug mount (PT 1/4)
E. From air compressor (PT 1/2)
F. To drain valve (PT 1/4)
G. Drain valve (PT 1/8)
H. From air tank (wet) (PT 1/2)
I. Plug hole (PT 1/8)
J. To brake valve (PT 3/8)

Name	Capacity (ℓ)	Maximum pressure
Wet tank	9.4	9.5 kg/cm^2
Dry tank (L)	26.6	9.5 kg/cm^2
Dry tank (R)	26.6	9.5 kg/cm^2

- The air tank consists of one wet tank and two dry tanks. The air from the compressor first enters the wet tank and the moisture is removed. It is then divided and sent to the left and right dry tanks.
- A safety valve and air pressure sensor are installed in the wet tank.

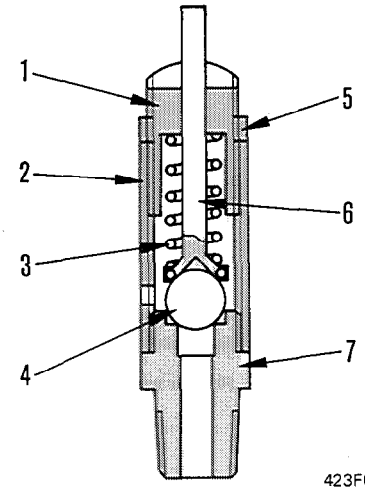
SAFETY VALVE

Function

- The safety valve is installed in the wet tank, and acts as a safety device for the air circuit.

Operation

- If the air governor does not work properly and the pressure inside the air tank rises above the set pressure, ball (4) is pushed up and the air escapes to the atmosphere.



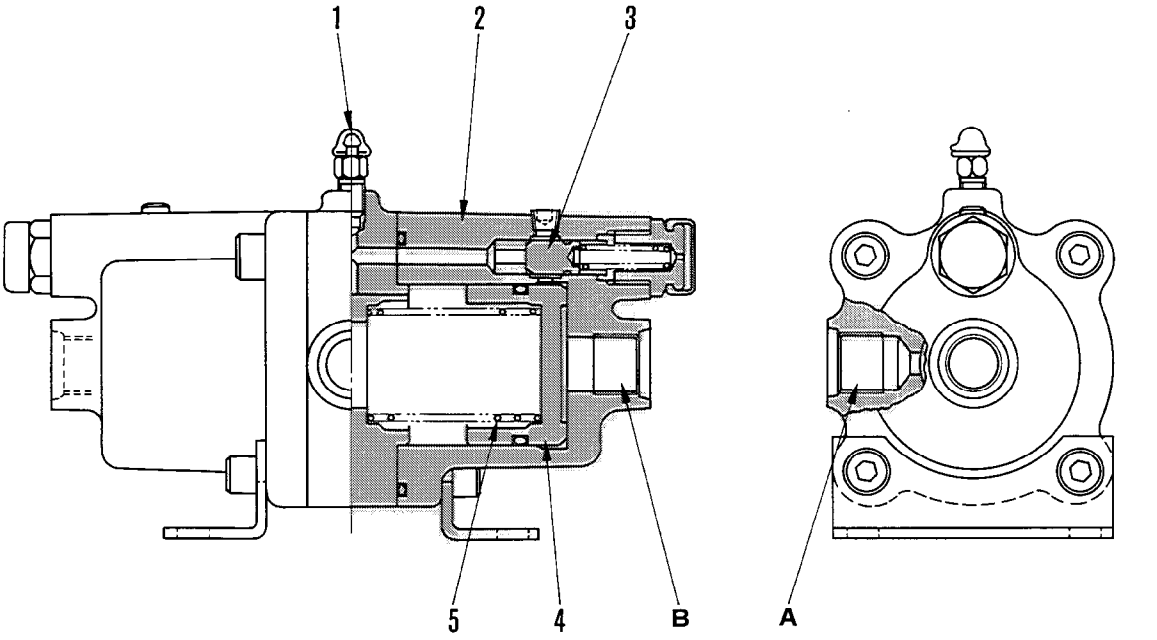
423F096

1. Adjustment nut
2. Spring cage
3. Spring
4. Ball
5. Lock nut
6. Relief valve
7. Body

SLACK ADJUSTER

Function

- The slack adjuster is installed in the brake oil line from the brake chamber to the brake piston. It acts to keep the clearance between the brake piston and discs constant even when the brake discs are worn. In this way it acts to keep a constant time lag when the brake is operated.

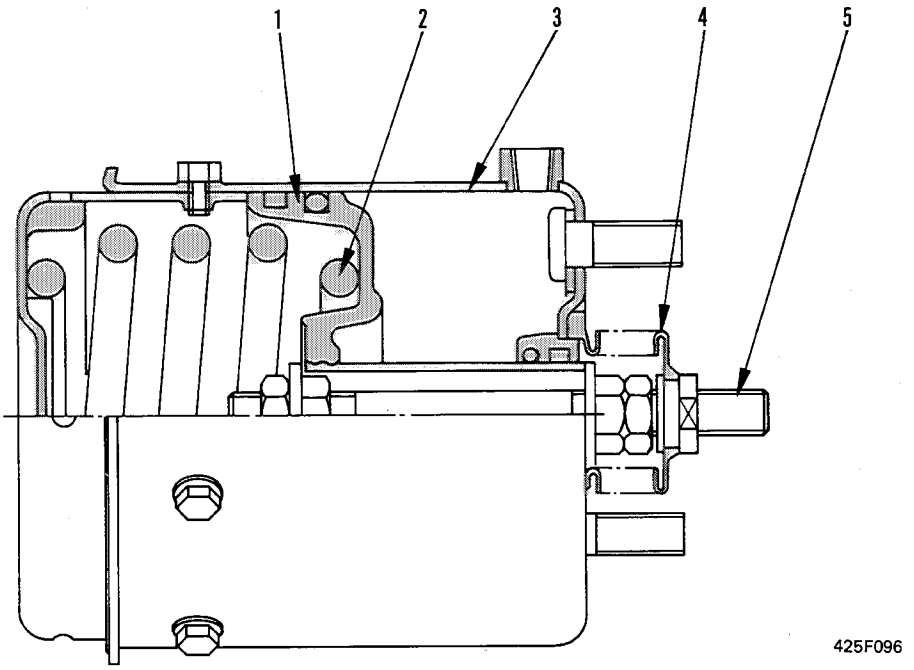


423F109

1. Bleeder
2. Cylinder
3. Check valve
4. Piston
5. Spring

A. Inlet port
B. Outlet port

SPRING CYLINDER



1. Piston
2. Spring
3. Cylinder
4. Boot
5. Rod

Outline

- The air pressure from the parking brake solenoid valve pushes the spring and compresses it to release the parking brake.
  Usually the parking brake is kept applied by spring (2), so the machine is prevented from moving.

CHECKING BRAKE PISTON LEAKAGE

★ Measurement condition
- Coolant temperature: Inside operating range
- Test pressure: 53 kg/cm^2
- Air pressure: Inside operating range

Unit: kg/cm^2

Item	Standard value	Permissible value
Drop in pressure	Max. 5.0	Max. 5.0

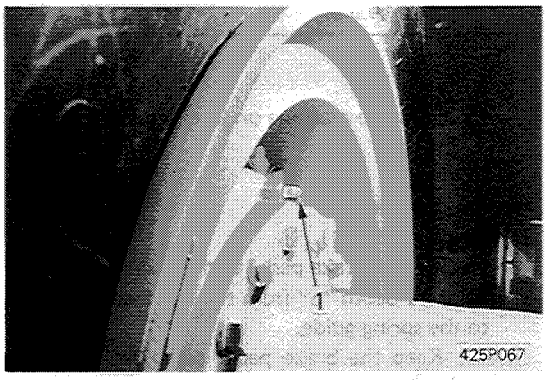
Special tool

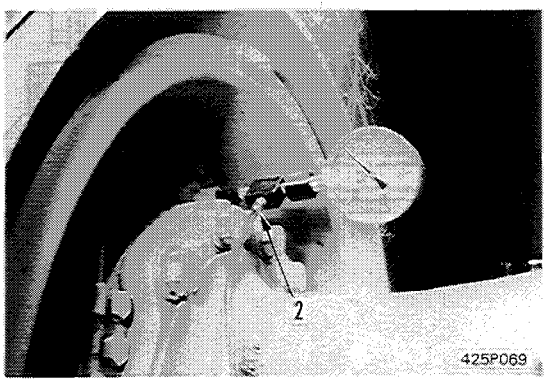
	Part No.	Part Name	Q'ty
A	793-520-1801	Brake test kit	1

⚠ Block the tires securely.

Measuring procedure

1. Remove bleeder screw (1), then install tool **A** in bleeder screw mount.
2. Start the engine and bleed the air.
   ★ Bleed air from plug (2).
   ★ Turn the transmission cut off switch ON.
3. Depress the left brake. When the gauge reading is 53 kg/cm^2, leave for 5 minutes and check how much the pressure drops.
4. After measuring, stop the engine, and loosen the bleeder screw.
   Lower the pressure, then remove tool **A**.
   ★ After completing operation, bleed the air from the brake circuit again.





4. Brake does not release, or drags.

Checks before troubleshooting

- Does brake pedal return completely?
- Does parking brake completely disengage?

Fault check

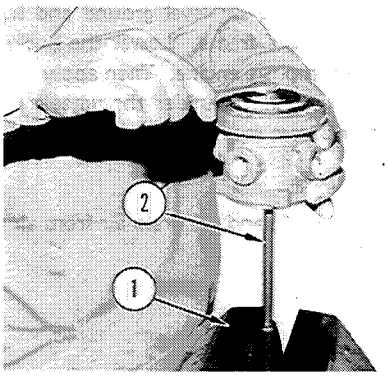
- Abnormal heat generation in brake.
- Inertial travel on flat ground.

No.	Problems / Remedy	Causes: Internal fault in brake valve (sticking piston) (a)	Internal fault in brake chamber (faulty return action of air cylinder, blockage in oil port of master cylinder) of defective power cluster relay valve (b)	Faulty brake lining (c)	Faulty operating brake piston (d)	Internal fault in slack adjuster (e)
		△ X	△ X	△ X	△ X	△ X
1	Air comes out and brake disengaged if brake chamber air input is disconnected when brake pedal is released.	○				
2	Circuit pressure fails off and brake disengages if oil is bled from air bleeder when brake pedal is released.	○	○		○	
3	A particular wheel rotates sluggishly when the machine is raised with a 4-wheel jack, the wheel axles placed on a stand, the engine shut down and the tires rotated by hand with the parking brake released.			○	○	

The following symbols are used to indicate the action to be taken when a cause of failure is located.

X: Replace △: Repair
A: Adjust C: Clean

3) Hold slot-head screwdriver (2) in vice (1), assemble relay piston spring (11), relay piston (12) and stem assembly (13) in bottom of upper body, then set with screwdriver.
★ Do not forget to fit an O-ring on the relay piston.

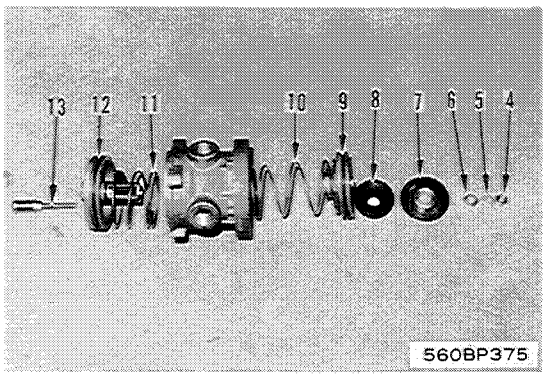


560BP374

4) Assemble return spring (10), upper piston (9), rubber spring (8), spring seat (7), and washers (5) and (6) from top of upper body, then tighten with nut (4).
★ Do not forget to fit an O-ring on the upper piston.

The piston may fly out under the force of the return spring, so hold the piston by hand when assembling.

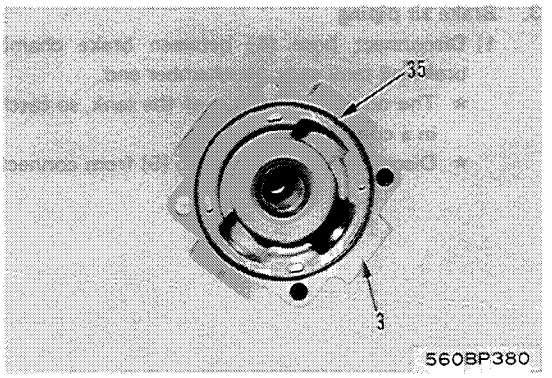
kgm Nut: 0.55 ± 0.15 kgm



560BP375

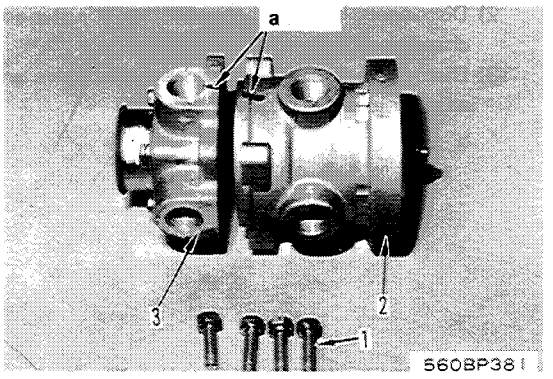
3. Body assembly

1) Install O-ring (35) on lower body (3).



560BP380

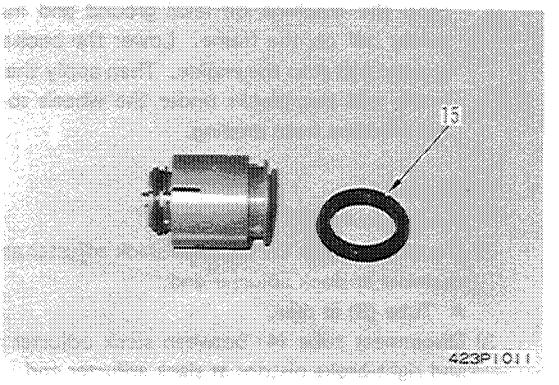
2) Align match marks "a" on upper body (2) and lower body (3), assemble and tighten mounting bolts (1).



560BP381

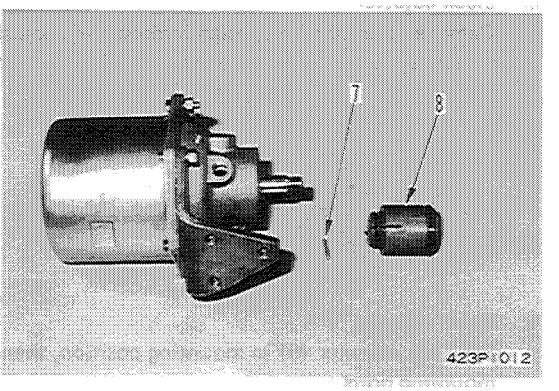
2) Assemble packing (15) on piston.
★ Install the packing with the lip facing the outside.

Packing: Grease (G2-LI)



6. Piston assembly

Blow air into air cylinder and blow out rod. Set piston assembly (8) in mounting position, then connect with pin (7).
★ The pin hole is hidden by the retainer, so move the retainer to the right and insert the pin.
★ After inserting the pin, check that the retainer has moved back to its original place and the pin is hidden.

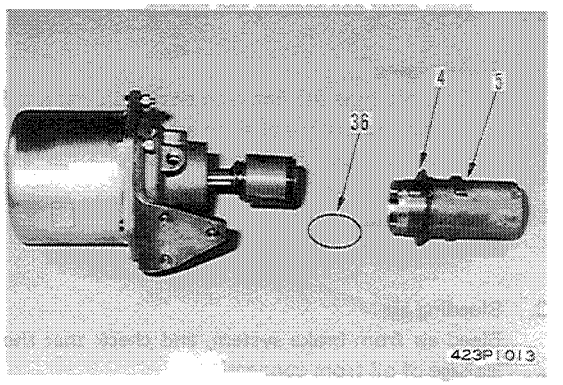


7. Cylinder

Install nut (4) and O-ring (36) on cylinder (5), screw into mount, then secure with nut.
★ Screw the cylinder in fully, then turn back until the breather and bleeder are in a straight line.

Inside surface of cylinder: Brake oil

kgm Nut: 14 ± 3 kgm



8. Sensor

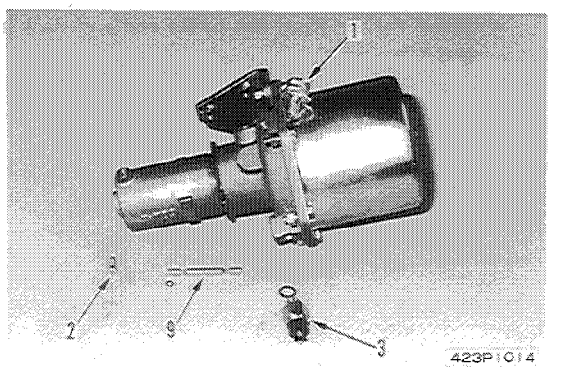
Fit O-rings on rod (9) and sensor (3), then install in mounting position.
★ Insert the rod until it is level with the body.

kgm Sensor: 5.6 ± 0.6 kgm

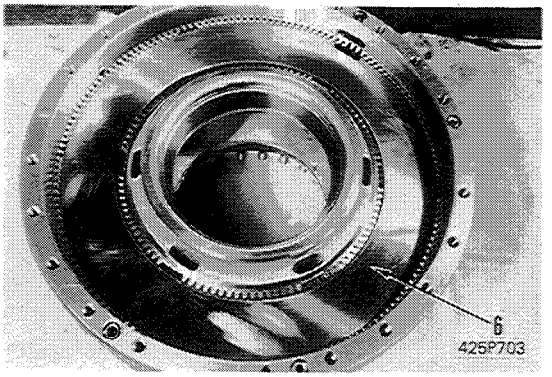
9. Accessories

Install breather (1) and bleeder (2).

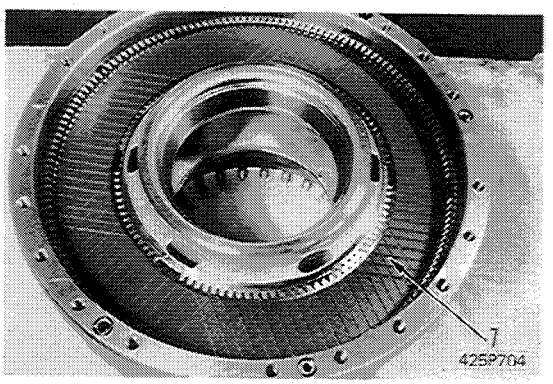
kgm Bleeder: 0.95 ± 0.25 kgm



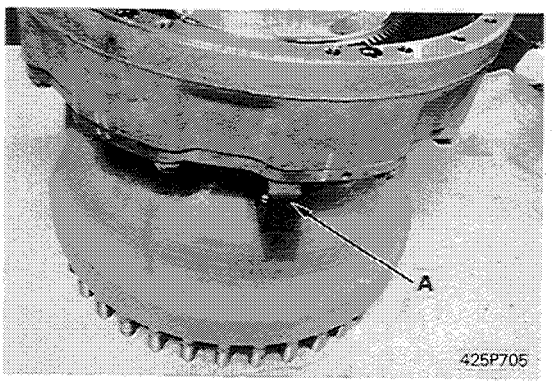
2. **Plate, disc**
   1) Remove plate (6).



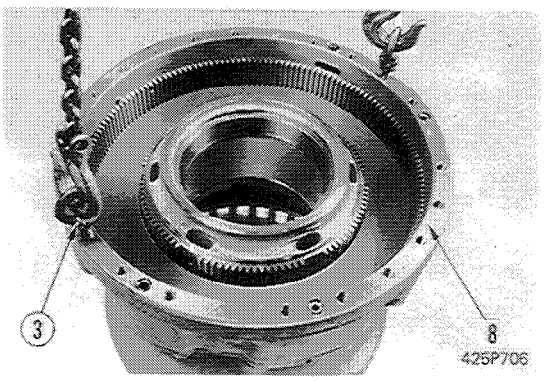
   2) Remove disc (7).
      ★ When removing the disc and plates, put match marks on the inner gear and disc, and outer gear and plate before removing.
      ★ The discs are made of soft material, so be careful not to damage them when removing.
      ★ Remove discs and plates alternately.



3. **Outer drum**
   ★ Remove tool **A**.



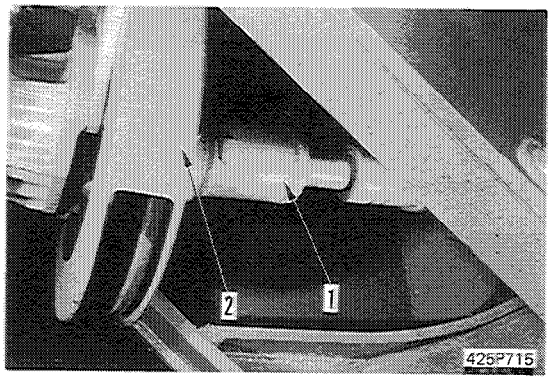
   1) Using eye-bolts (3) (Thread dia. = 12 mm, Pitch = 1.75 mm), lift out outer drum (8).



REMOVAL OF PARKING BRAKE

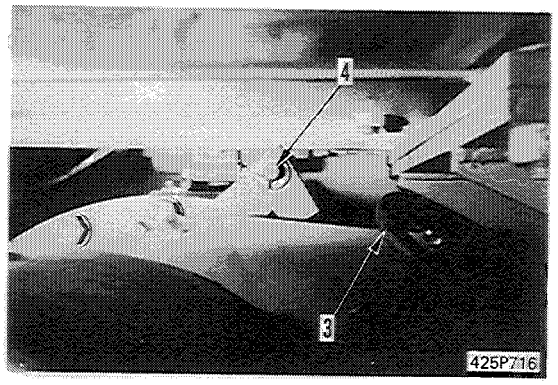
⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.

1. **Drive shaft**
   Disconnect front drive shaft (1) from differential, and remove disc cover (2).
   kg Drive shaft: 44 kg

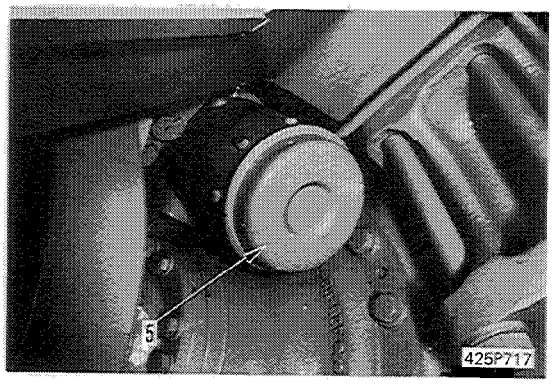


2. **Air hose**
   Disconnect air hose (3) from spring cylinder.

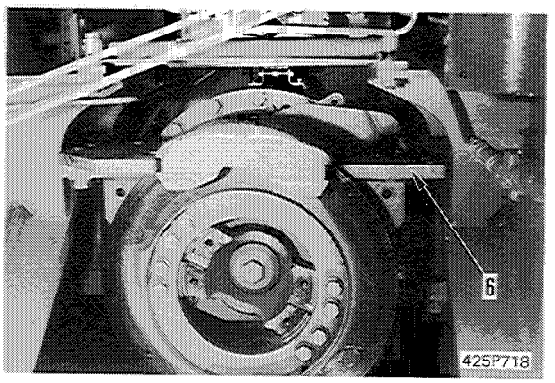
3. **Linkage**
   Remove pin (4) and disconnect linkage.
   ★ For details on adjusting screw, see TESTING AND ADJUSTING section.



4. **Spring cylinder**
   Remove nut, then remove spring cylinder (5).



5. **Caliper**
   1) Remove plate (6).
      ★ Remove pad.

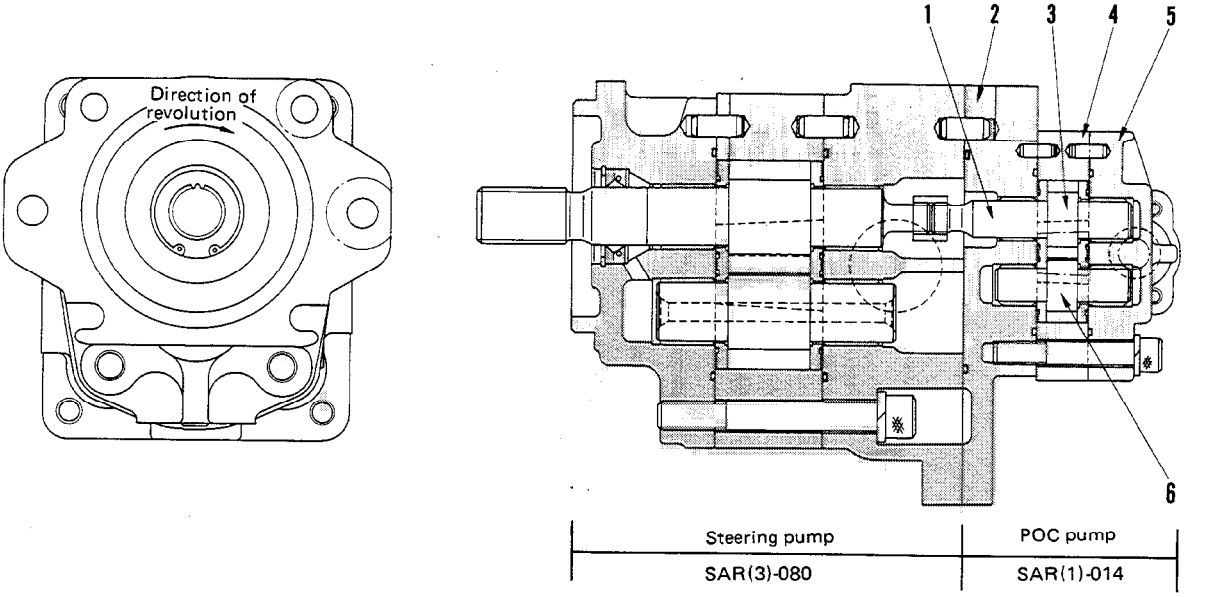


Unit: mm

No.	Check item	Criteria					Remedy
1	Clearance between pedal mounting pin and mount plate	Standard size	Tolerance		Standard clearance	Repair limit	
			Shaft	Hole			
		10	−0.015 −0.050	+0.036 0	0.086 – 0.015	Pin: 9.85 Hole: 10.1	
2	Crearance between roller and pin	10	−0.015 −0.050	+0.058 0	0.015 – 0.108	Pin: 9.85 Hole: 10.1	
3	Clearance between mount plate and plunger	26.5	−0.020 −0.160	+0.033 0	0.020 – 0.193	Plunger:26.16 Hole: 26.65	
4	Clearance between primary piston and upper body	60	+0.150 +0.050	+0.401 +0.325	0.175 – 0.351	–	
5	Clearance between relay piston and lower body	66.5	0 −0.10	+0.76 +0.10	0.10 – 0.86	–	
6	Outside diameter of roller	Standard size		Tolerance		Repair limit	
		26.2		+0.1 −0.1		26.0	Replace
7	Free height of rubber spring	14.4		+0.2 −0.2		12.0	
8	Piston return spring	Standard size			Repair limit		
		Free length	Installation length	Installatioin load	Free length	Installation load	
		65.3	14.6	10.5 kg	54	–	
9	Primary valve spring	41.3	14.3	4.5 kg	34	–	
10	Inner stem spring	35.6	16.0	2.8 kg	30	–	
11	Outer stem spring	41.0	16.0	4.0 kg	34	–	
12	Relay piston spring	39.5	12.1	4.7 kg	33	–	
13	Secondary valve spring	16.5	10.2	3.0 kg	14	–	
14	Tightening torque of nut	0.55 ± 0.15 kgm					Retighten

WORK EQUIPMENT SYSTEM
61 STRUCTURE AND FUNCTION

POC PUMP

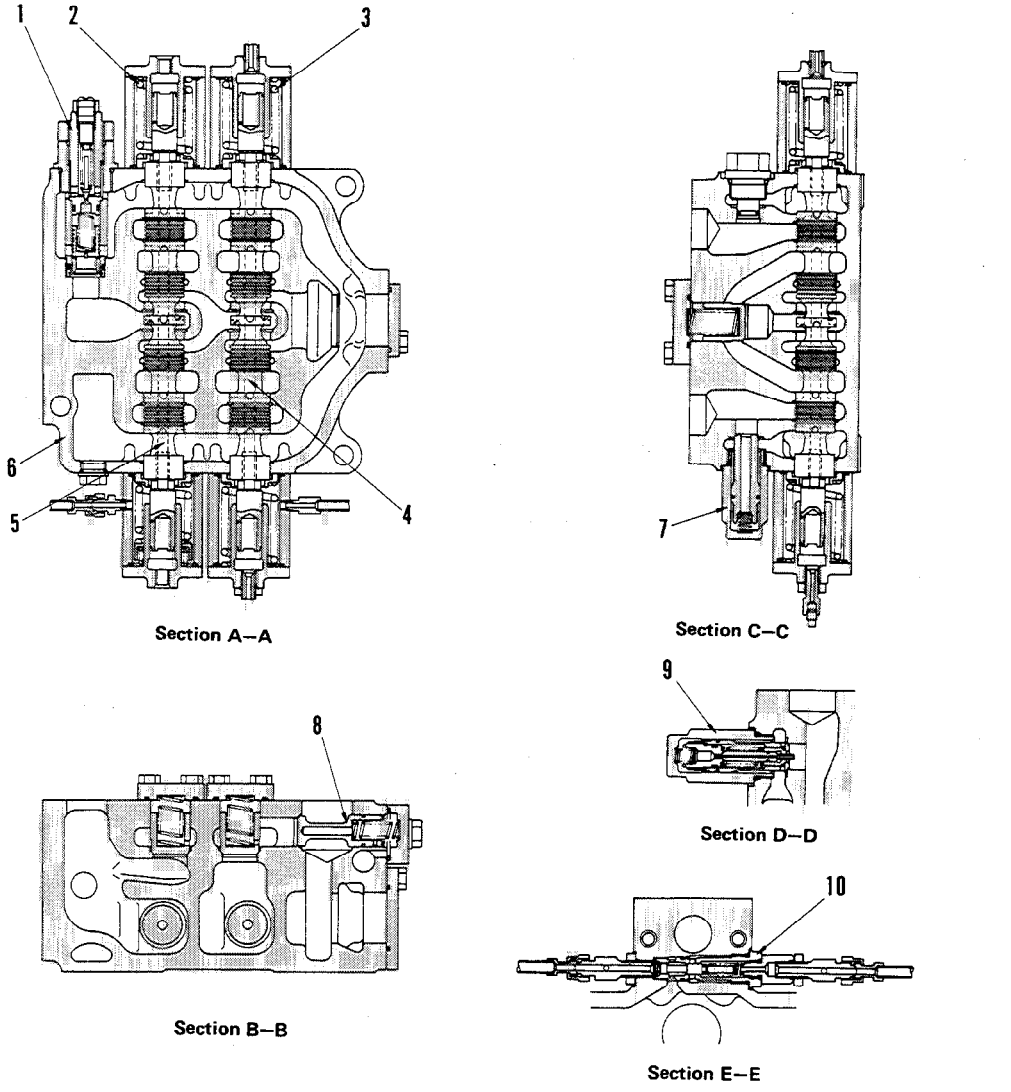


425F103

1. Drive gear (Teeth 12)
2. Front cover
3. Drive gear (Teeth 12)
4. Gear case
5. Rear cover
6. Driven gear (Teeth 12)

Specifications

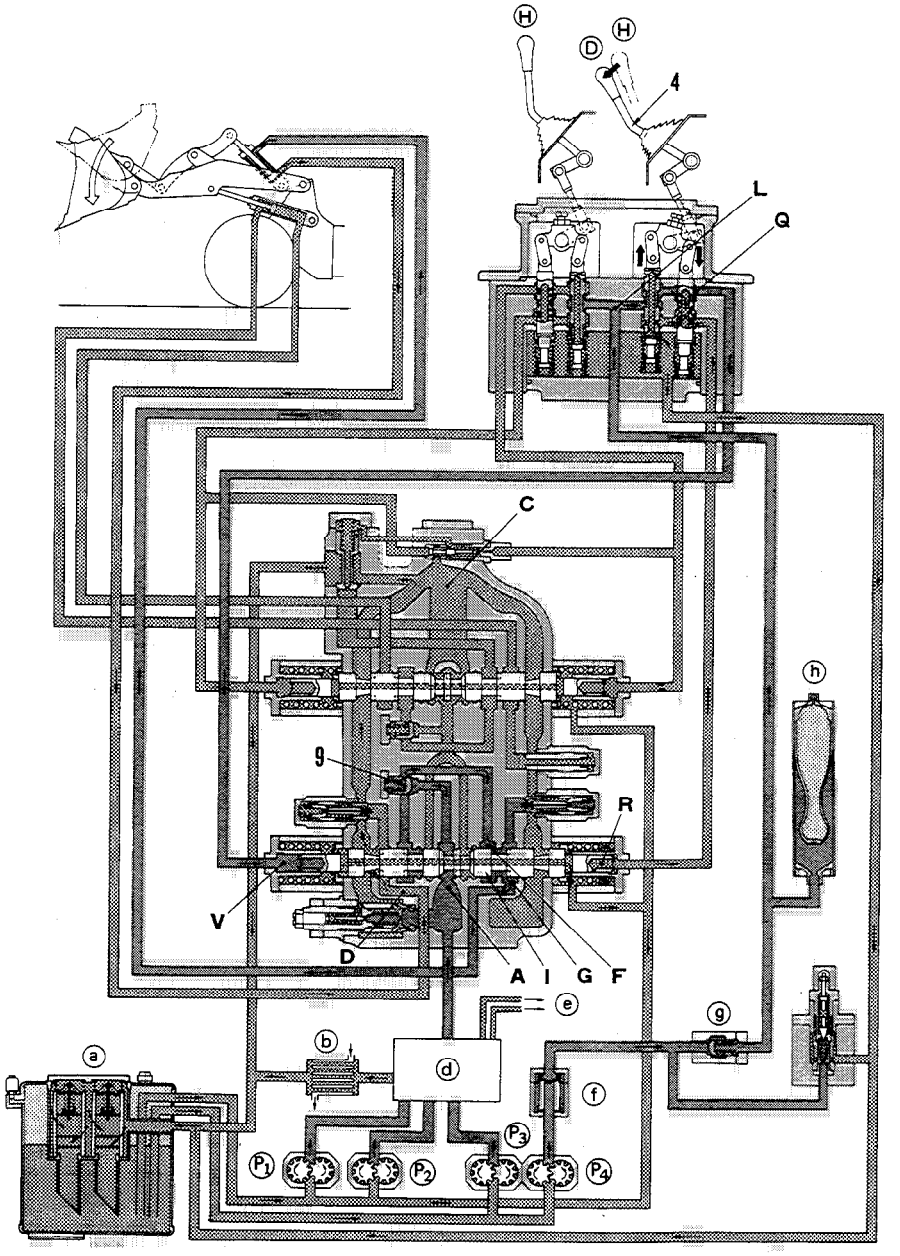
POC pump	
Model	SAR(1)-014
Theoretical discharge	14.5 cc/rev
Max. pressure	210 kg/cm^2
Max. pump speed	3500 rpm



Outline

- The main control valve controls the actuation of the attachments and the bucket in the hydraulic system. It has a tandem circuit which gives priority to the bucket circuit.
- The oil from the pump enters port P. The maximum pressure is set by the main relief valve (1). The oil passes through the bypass circuit of dump spool (5) and lift spool (4). It then flows from port T to the drain circuit, passes through the filter and returns to the tank. If the dump and lift spools are actuated, the oil flows to the dump and lift cylinders.
  However, the circuit gives priority to the bucket, so when the dump spool is being operated, even if the lift spool is operated, the lift arm will not move.
- There are two safety valves (with suction valves) (9) to protect the circuit if abnormal pressure is generated in the bucket circuit. If one of the two safety valves is acting as a relief valve, the other valve acts as a suction valve to make up any lack of oil.

DUMP SPOOL AT "DUMP"



(D) Dump
(F) Float
(H) Hold
(L) Lower
(R) Raise
(T) Tilt
(a) Hydraulic tank
(b) Oil cooler
(d) Steering valve
(e) To steering cylinder
(f) Filter
(g) Check valve
(h) Accumulator
(P1) Switch pump
(P2) Hydraulic pump
(P3) Steering pump
(P4) POC pump

425F110

Operation

- When the dump lever (4) is pushed, pressure oil from port **L** of the POC valve flows to port **V** via port **Q**. The oil in chamber **R** is connected to the drain circuit. The pressure oil in port **U** pushes the push piston against the force of the spring and moves dump spool (1) to the DUMP position.
- The bypass circuit is closed by the spool (1), so the oil from port **A** pushes up check valve (9). The oil from check valve (9) then flows from port **F** and enters port **G**, and goes to the rod end of the cylinder.
- At the same time, the oil at the bottom end of the cylinder flows from port **D** to drain port **C**, and returns to the tank. Therefore, the bucket is dumped.

WORK EQUIPMENT SYSTEM
62 TESTING AND ADJUSTING

★ The following precautions are necessary when using the Standard Value Tables to make judgements during troubleshooting or during testing and adjusting.

1. The values in these tables are based on the values for new machines leaving the plant, so they should be used as target values when repairing or when estimating wear after a period of use.
2. The standard values in these tables for judgement when troubleshooting are estimated values based on the standard values for the machine when shipped from the plant, and on the results of various tests. Therefore, they should be used as reference in combination with repair and operating records when making judgements.
3. These standard value tables must not be used for standard values when judging claims. In addition, do not use these values alone to make simple judgements.

MEASURING WORK EQUIPMENT

★ Measurement condition
- Coolant temperature: Inside operating range
- Steering position: Neutral
- Hydraulic temperature: 45 – 55°C
- Engine speed: High idling

Unit: sec.

Item	Standard value	Permissible value
Lift arm lifting time	6.8 – 7.4	Max. 8.9
Lift arm lowering time	3.0 – 4.0	Max. 4.8
Bucket dumping time	1.4 – 2.0	Max. 2.4
Bucket tilt back time (Full stroke)	1.9 – 2.5	Max. 3.0
Bucket tilt back time (From horizontal position of bucket)	1.3 – 1.9	Max. 2.3

Special tool

	Part No.	Part Name	Q'ty
A		Stop watch	1

Measuring procedure

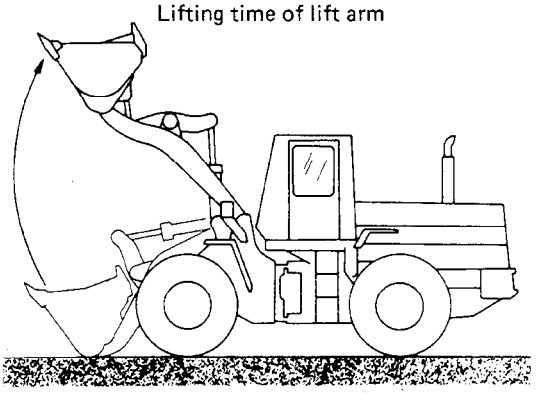
1. **Lifting time of lift arm**
   Set the bucket near the maximum tilt back position and at the lowest position on the ground. Raise the bucket and measure the time taken for bucket to reach the maximum height of the lift arm.

2. **Lowering time of lift arm**
   Set the bucket horizontal with the lift arm at the maximum height, lower the bucket and measure the time taken for the bucket to reach the lowest position on the ground.

3. **Dumping time of bucket**
   Raise the lift arm to the maximum height and measure the time taken for the bucket to move from the maximum tilt back position to the maximum dump position.

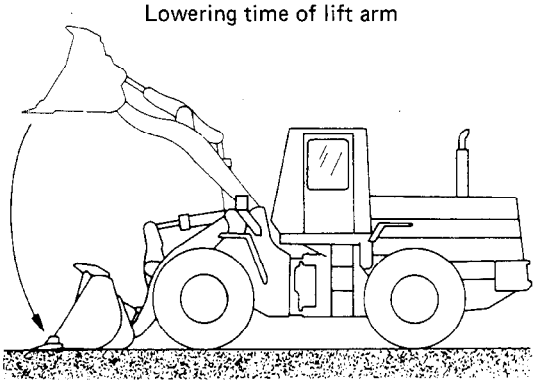
4. **Tilt back time of bucket**
   1) Raise the lift arm to the maximum height and measure the time taken for the bucket to reach the maximum tilt back position.
   2) Set the bucket horizontal and measure the time taken for the bucket to move from the horizontal position to the maximum tilt back position.

Lifting time of lift arm



423F327

Lowering time of lift arm



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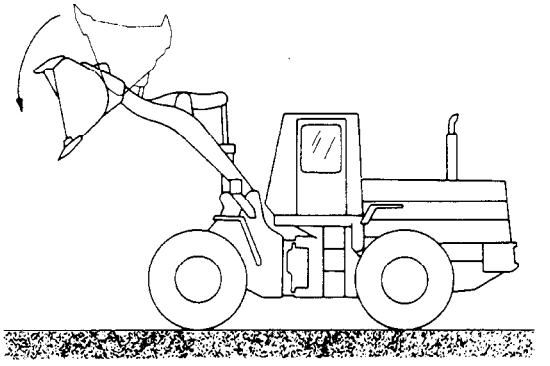
Dumping time of bucket



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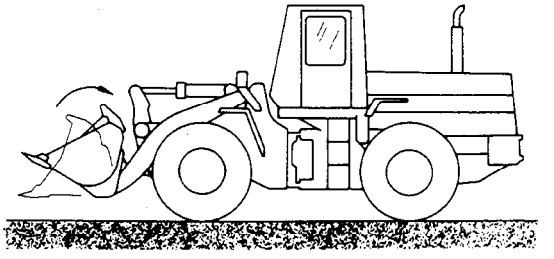
Tilt back time of bucket

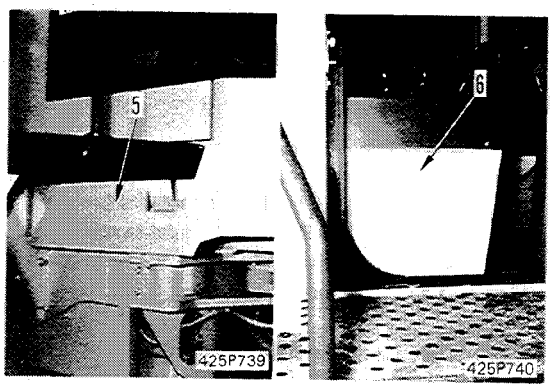


423F330

WORK EQUIPMENT SYSTEM
63 DISASSEMBLY AND ASSEMBLY

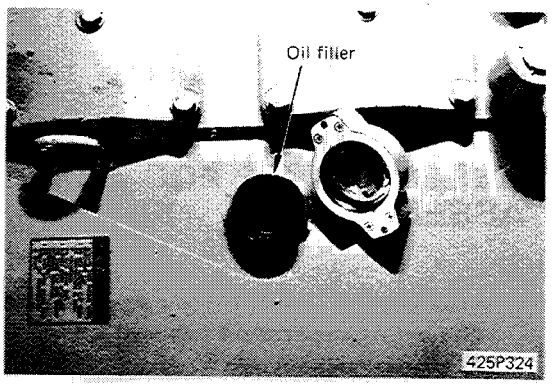
★ Take the following method for air bleeding when you start to operate hydraulic cylinders after reassembling cylinders, pumps and pipings.
1. Start engine, keep idling.
2. Operate hydraulic cylinder 4 — 5 cycles, but do not exceed beyond 100 mm of stroke end.
3. Continue to operate cylinder 3 — 4 cycles until stroke end.
4. After finishing above steps, keep normal engine speed.
   NOTE: After long storage, same procedure is required.

4. **Cover**
   Install cover (5) under cab and cover (6) of console box on right side of operator's seat.

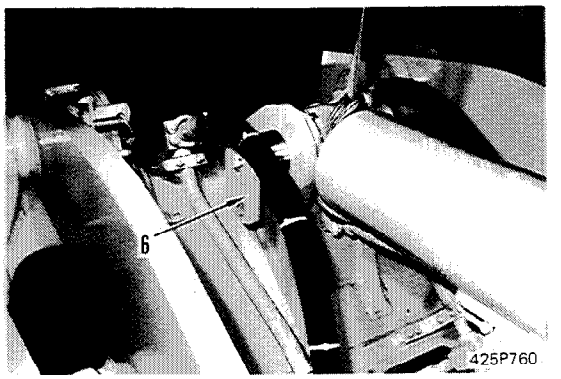


5. **Refilling with oil**
   Tighten plugs at top of hydraulic tank filter, and plugs of pump piping, then add hydraulic oil through oil filler to the specified level.

   kgm Plug at top for filter: 1.2 ± 0.1 kgm

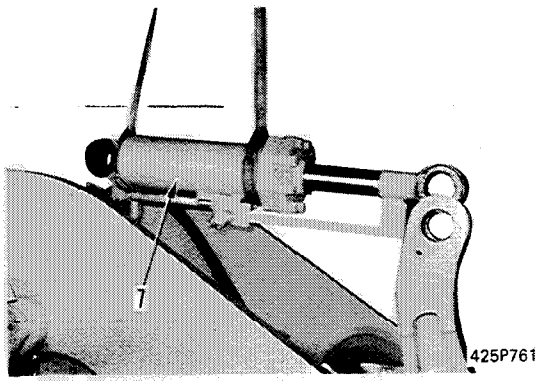


5. **Dump cylinder**
   1) Remove lock bolt, then remove pin (6) at bottom end.
      ★ There are shims installed, so check the number and thickness of the shims, and keep in a safe place.



   2) Remove dump cylinder (7).
      ★ Be careful not to damage the cylinder rod.

      kg Dump cylinder: 283 kg

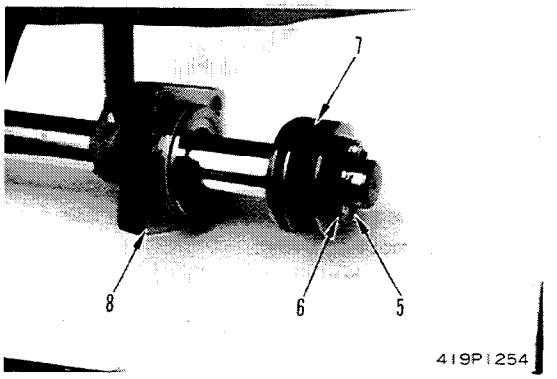


4. Assemble cylinder head assembly (8) and piston assembly (7) on piston rod.
   ★ Coat backup ring (11) with grease so that it does not stick out, and assemble carefully.

5. Assemble spacer (6), then tighten piston bolts (5).

   kgm Piston bolt: 18.0 ± 2.0 kgm
   (Width across flats: 22 mm)

   Mounting bolt: Adhesives (LT-2)



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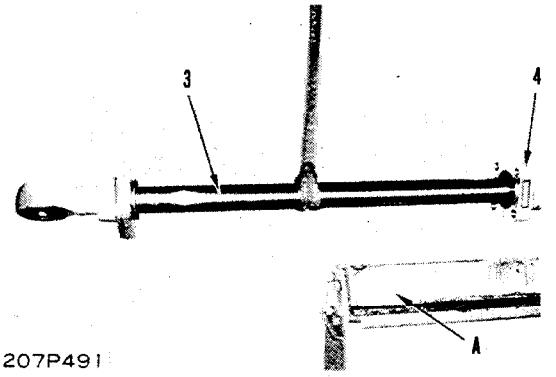
6. Set cylinder (4) in tool **A**, then raise piston rod and head assembly (3), and assemble in cylinder (4).

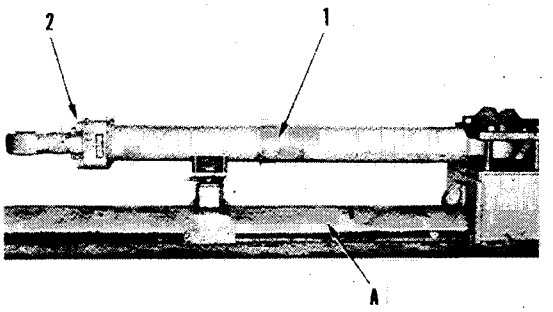


207P491

- Tighten cylinder head mounting bolts (2).

  kgm Cylinder head mounting bolt:
  47.5 ± 14.5 kgm (Lift cylinder)
  117.5 ± 12.5 kgm (Dump cylinder)

- Remove cylinder assembly (1) from tool **A**.

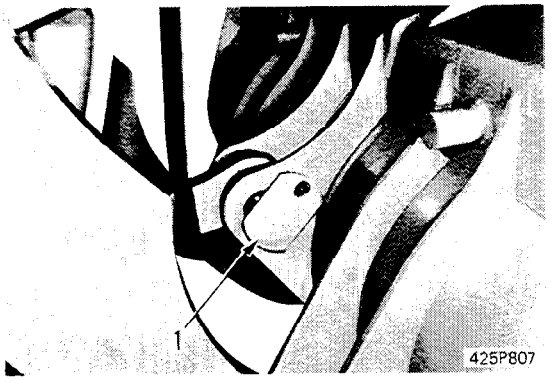


207P490

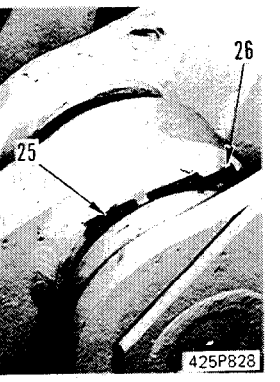
6) Greasing (Serial No. 11464 and up)
Add grease from the central grease fitting of the bucket pin until grease comes out from the dust seal.

Bucket pivot portion: Grease (G2-LI)

8. **Bucket link**
1) Sling bucket link, align hole of mounting pin (1) and assemble, then lock bolt.
★ Be careful not to get the cord ring caught.



2) When exchanging only cord ring:
i) Insert cord ring (25) in groove.
★ Stretch cord ring slightly while inserting in groove.
ii) Insert bolt (26) in cord ring and secure.
★ Tighten the bolt enough so that it does not change shape of cord ring.

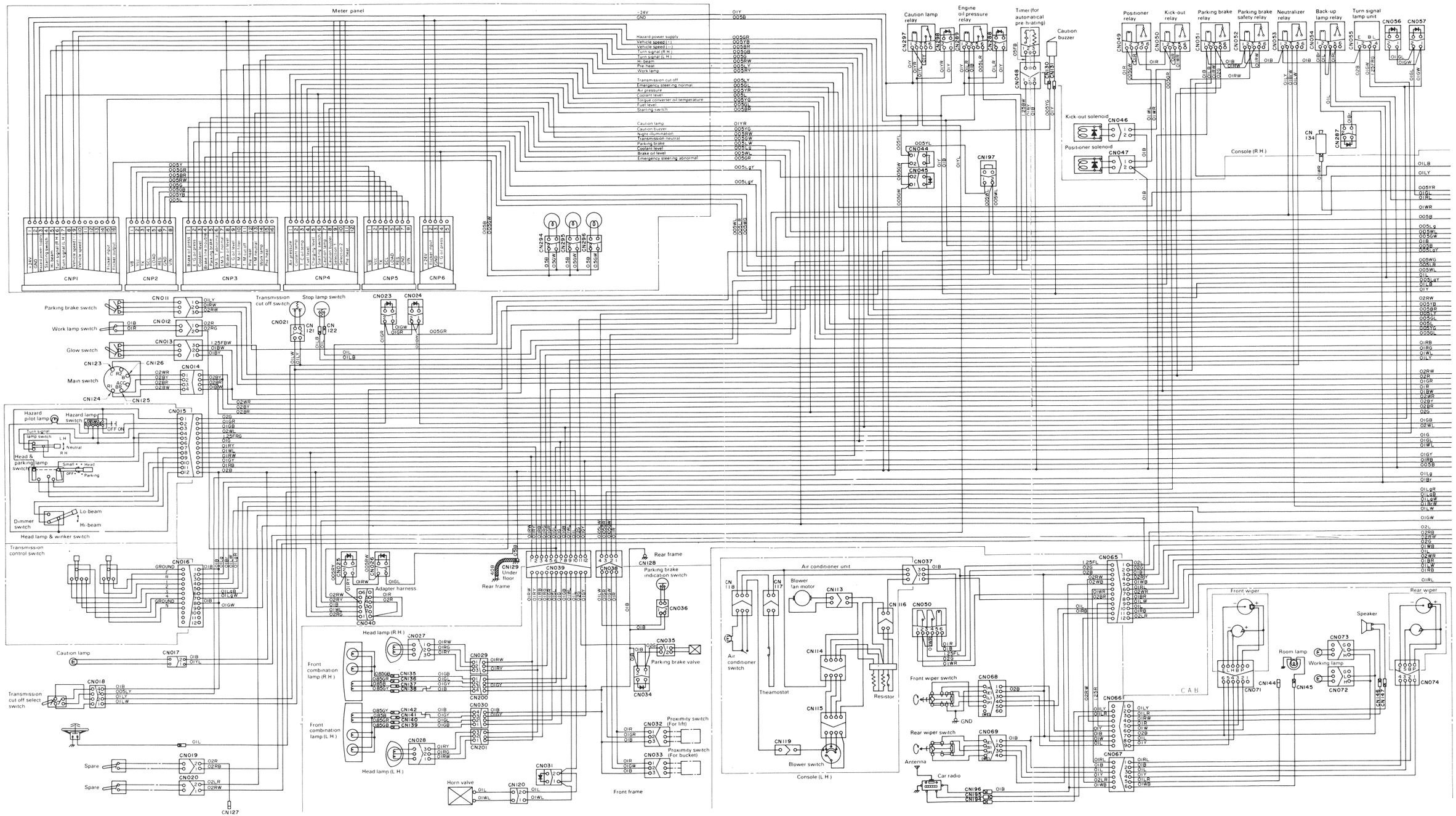


9. **Refilling with oil**
Refill each pin with oil or grease.

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between pin and bushing at boss ends of bucket link	110	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	Replace also if other parts are biting into pin
2	Clearance between pin and bushing at joint of lift arm and bucket	110	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
3	Clearance between pin and bushing at joint of lift arm and frame	120	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
4	Clearance between pin and bushing at joint of dump cylinder bottom and frame	120	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
5	Clearance between pin and bushing at joint of dump cylinder rod and lever	120	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
6	Clearance between pin and bushing at joint of tilt lever and lift arm	140	−0.043 −0.106	+0.395 +0.295	0.338 – 0.501	1.0	
7	Clearance between pin and bushing at joint of lift cylinder bottom and frame	120	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
8	Clearance between pin and bushing at joint of lift cylinder rod and lift arm	120	−0.036 −0.090	+0.307 +0.220	0.256 – 0.397	1.0	
		Width between bosses	Width of hinge		Standard clearance (Clearance a+b)		
9	Joint of dump cylinder and frame	143	140		3.0		Insert shims on both sides to make clearance on both left and right sides less than 1.5 mm
10	Joint of lift arm and frame	153	150		3.0		
11	Joint of lift arm and bucket	180	176.8		3.2		
12	Joint of bucket link and bucket	145	142		3.0		
13	Joint of tilt lever and bucket link	144	142		2.0		
14	Joint of tilt lever and lift arm	240	237		3.0		
15	Joint of bucket lever and dump cylinder	143	140		3.0		
16	Joint of lift cylinder and lift arm	125	122		3.0		
17	Joint of lift cylinder and frame	123	120		3.0		

Serial No. 10663 and up



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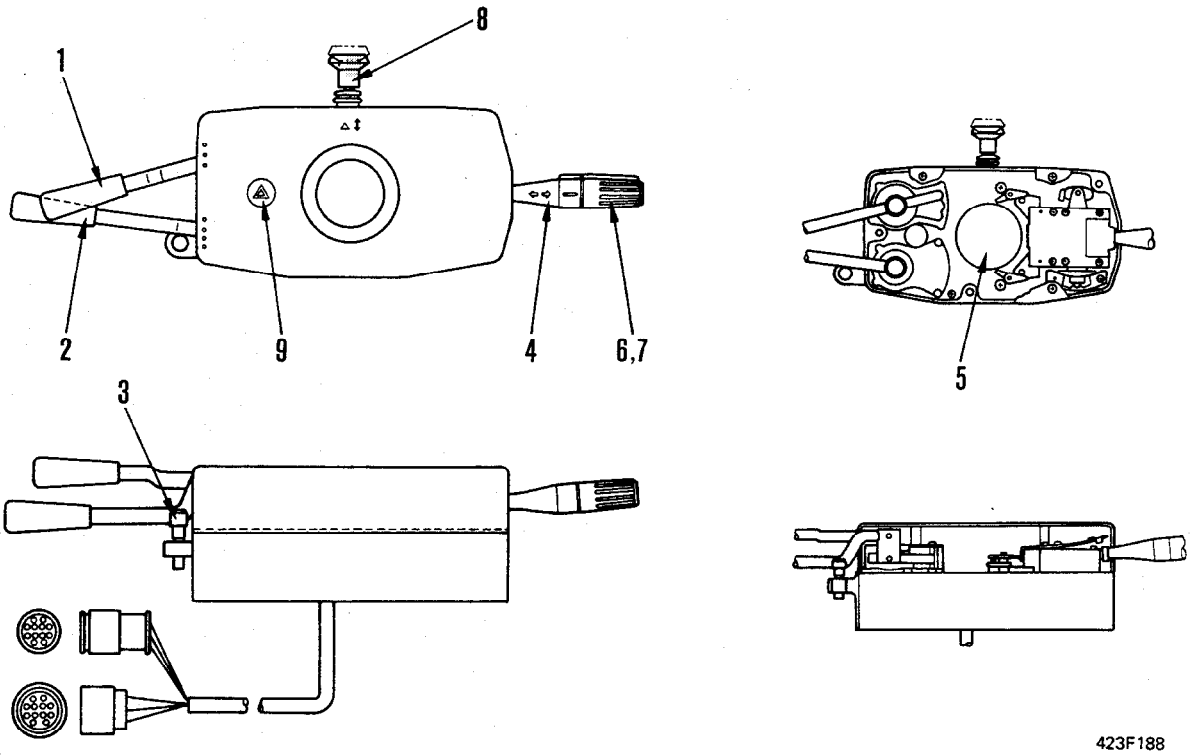
COMBINATION SWITCH



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Outline

- The FORWARD-REVERSE lever has three contacts; the speed control lever switch has four contacts. The switch alone has no detent mechanism. The detent mechanism is in the combination switch itself. Each switch is held at two places by pins. In addiiton, each switch is secured to the base by three screws.

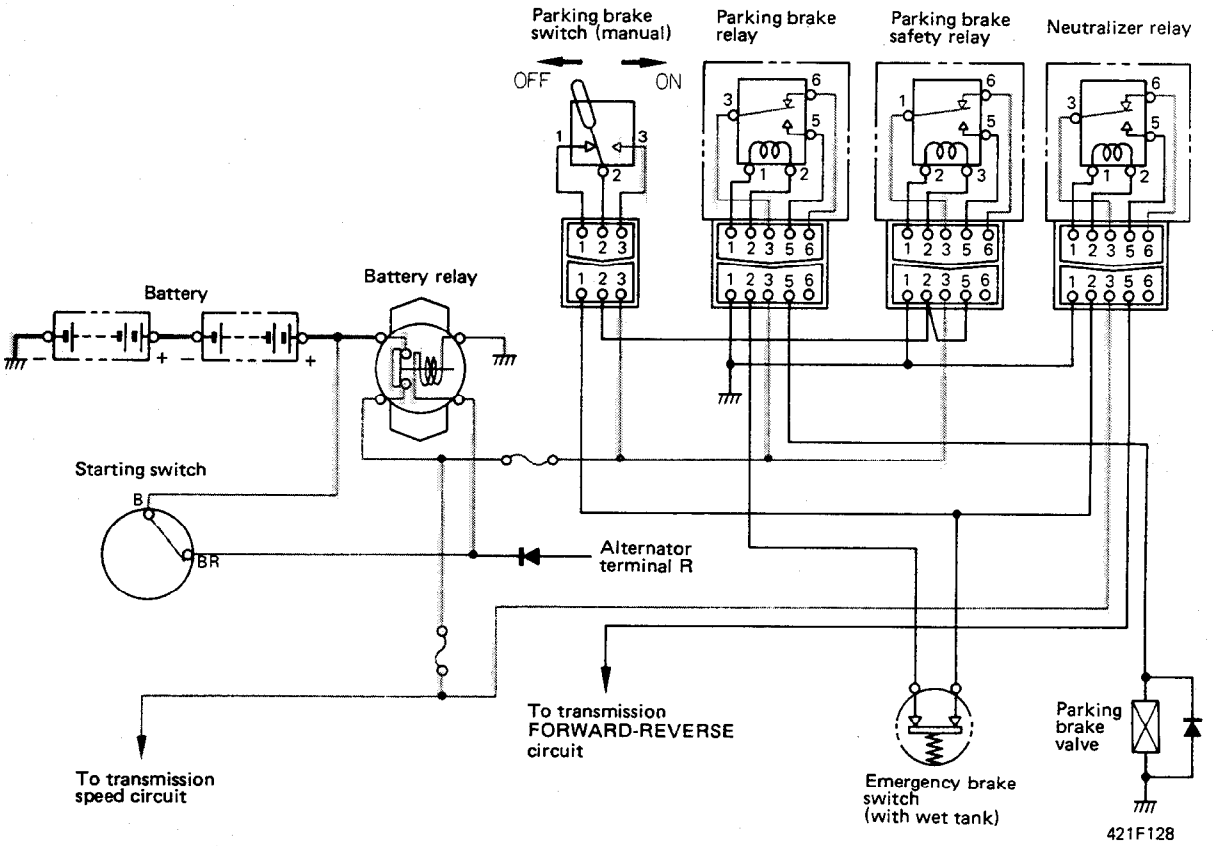
When the lever is moved to the desired position, the switch, which is connected by a shaft, moves and electric current flows in only that circuit to move the machine.

Function

1	FORWARD-REVERSE lever switch	Selecting FORWARD, REVERSE or NEUTRAL
2	Speed control lever switch	Selecting machine speed range
3	Speed control lever stopper	Prevents speed control lever from going into 3rd or 4th speed during operations
4	Direction indicator lamp	Indicates direction when turning left or right
5	Self cancel	Returns direction indicator lamp lever to neutral automatically after turning left or right
6	Lamp switch	Selects clearance lamps, headlamps, parking lamps
7	Dimmer switch	Selects travel beam, low beam
8	Emergency flasher switch	Makes left and right winkers flash at the same time
9	Emergency flasher pilot lamp	Lights up when emergency flasher lamp is ON.

2-2. Parking brake switch turned OFF (released) before starting switch is turned ON.

- Electric current flows as follows.
  (1) Battery (+) → starting switch → battery relay coil → ground connection, so the battery relay is CLOSED.
  However, in this case, the parking brake switch is OFF (released), so the parking safety relay is not actuated. For this reason, no electricity flows to the parking brake valve. Therefore, after the automatic parking brake is actuated, even if the starting switch is turned to ON, the parking brake is not automatically released.
- In addition, no electric current flows to the FORWARD-REVERSE circuit of the transmission, so the machine does not move.

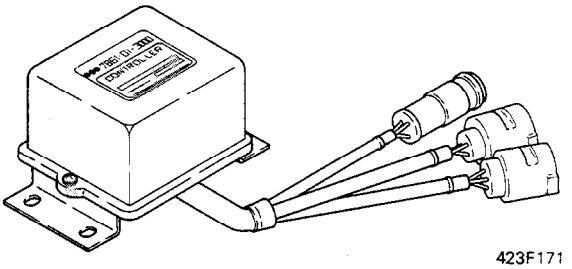


CONTROLLER

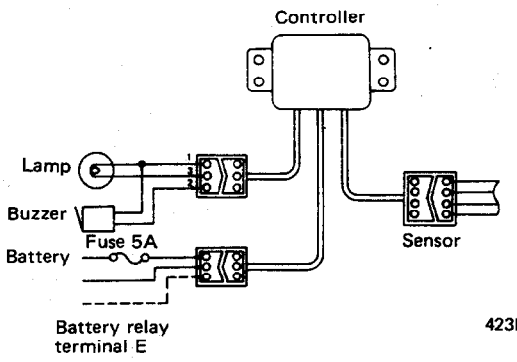
Serial No. 10001 – 10662

Function

- The auxiliary controller acts as the power source box and provides electric power to the panel.
  The power source (battery, alternator) for the machine has a large difference in voltage, so the auxiliary controller converts this to a stable voltage and supplies it to the panel.
  Even if excessive voltage is generated by failure in the alternator or regulator, it is cut by the auxiliary controller.

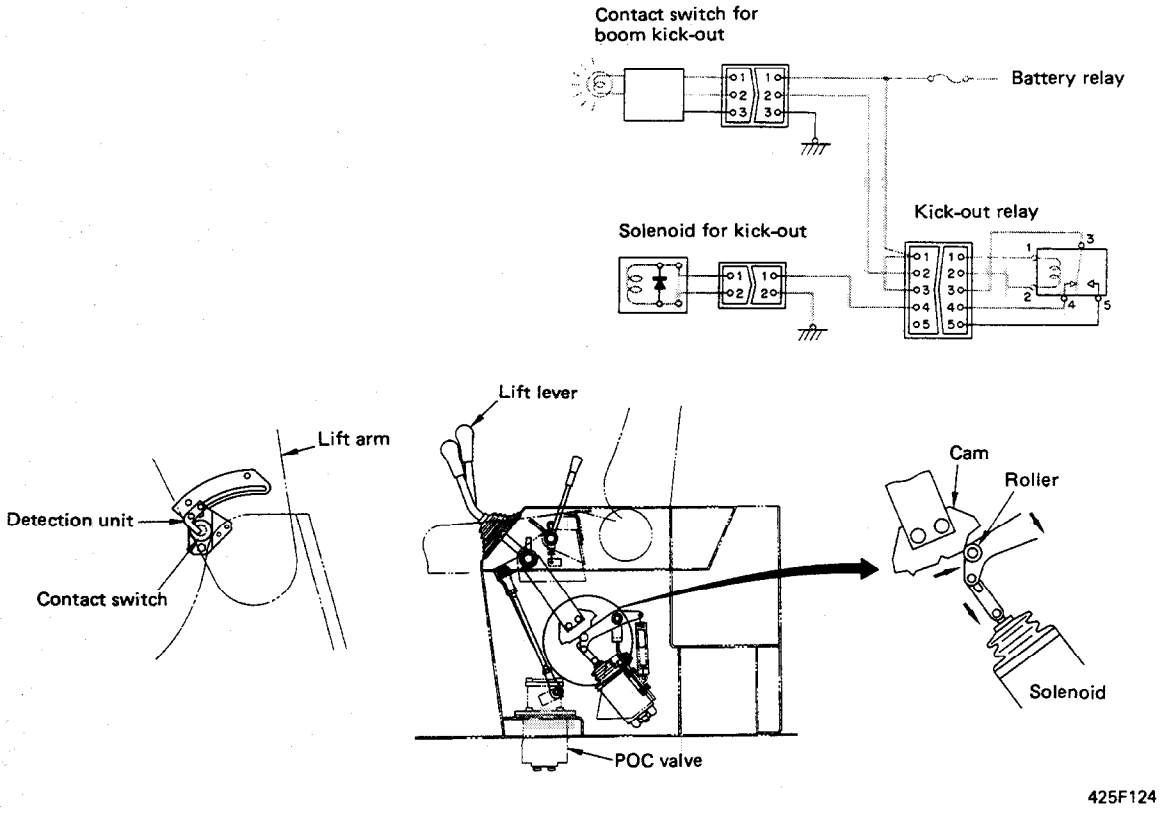


423F171



423F172A

- When the lift arm goes up and reaches the set position for the kick-out (that is, the detection unit (steel plate) is in contact to the sensing surface of the contact switch), the contact switch and relay circuit act to send electric current to the solenoid. This actuates the magnet, the cam is pulled out of the cam detent, and the lift spool is returned to the neutral position by the return spring.

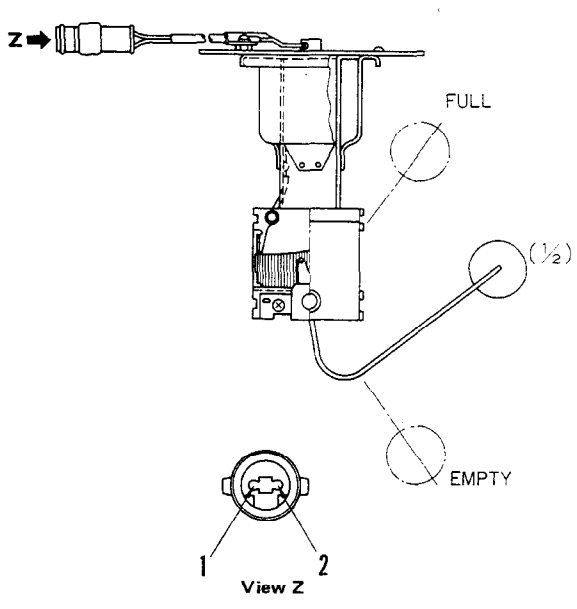


Movement of contact switch

Position	Sensing surface of contact switch is in contact with detection unit.	Sensing surface of contact switch separated from detection unit.
Contact switch display	ON	OFF
Contact switch load circuit (relay switch circuit)	Current flows	Current shut off
Relay switch load circuit (solenoid circuit)	Current flows	Current shut off

CHECKING FOR ABNORMALITY IN FUEL LEVEL SENSOR

If there is any marked difference between the level displayed and the amount of fuel remaining inside the fuel tank (for example, the fuel tank is full but the fuel gauge does not indicate FULL), measure the resistance at the five positions of the float shown in the diagram on the right with the fuel level sensor as an individual part.



425F01009

Method of measuring

- Connect one pole to terminal (1), and touch the other pole against terminal (2) to measure the resistance.

Resistance value of fuel level sensor at each point

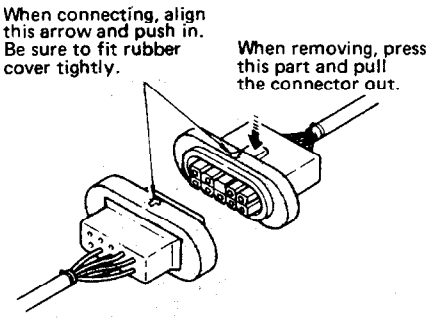
Unit: Ω

Full	1/2	EMPTY
10 ± 2	36 ± 5	95 ± 10

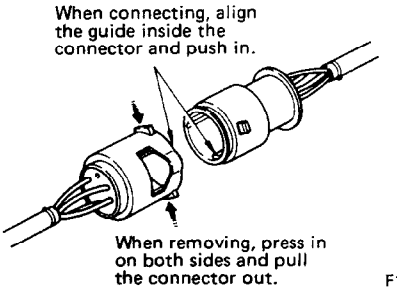
★ The standard values are only a guide.

PRECAUTION WHEN HANDLING CONNECTOR

1. If the connector has a lock, always release the lock before disconnecting the connector.

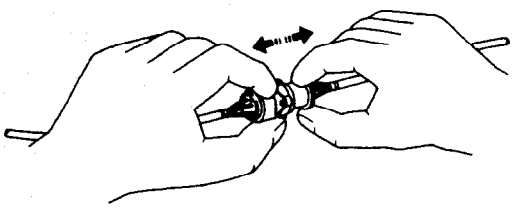


F142A092

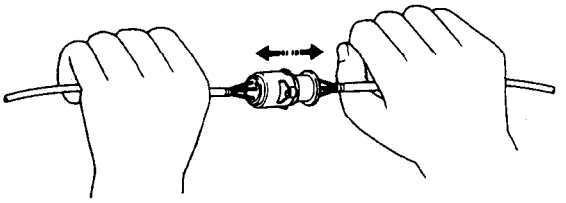


F142A093

2. Never pull the cord to disconnect the connector.

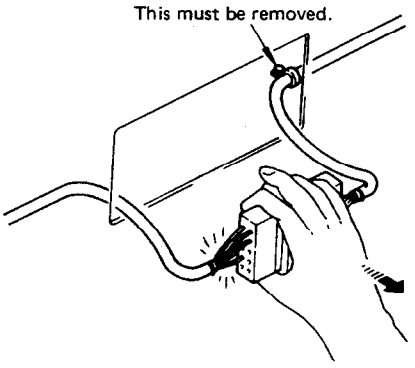


F142A094



F142A095

3. If the connector is difficult to disconnect, do not try to pull it out.
   (If it is difficult to reach by hand, remove the clamp and move the wiring harness.)



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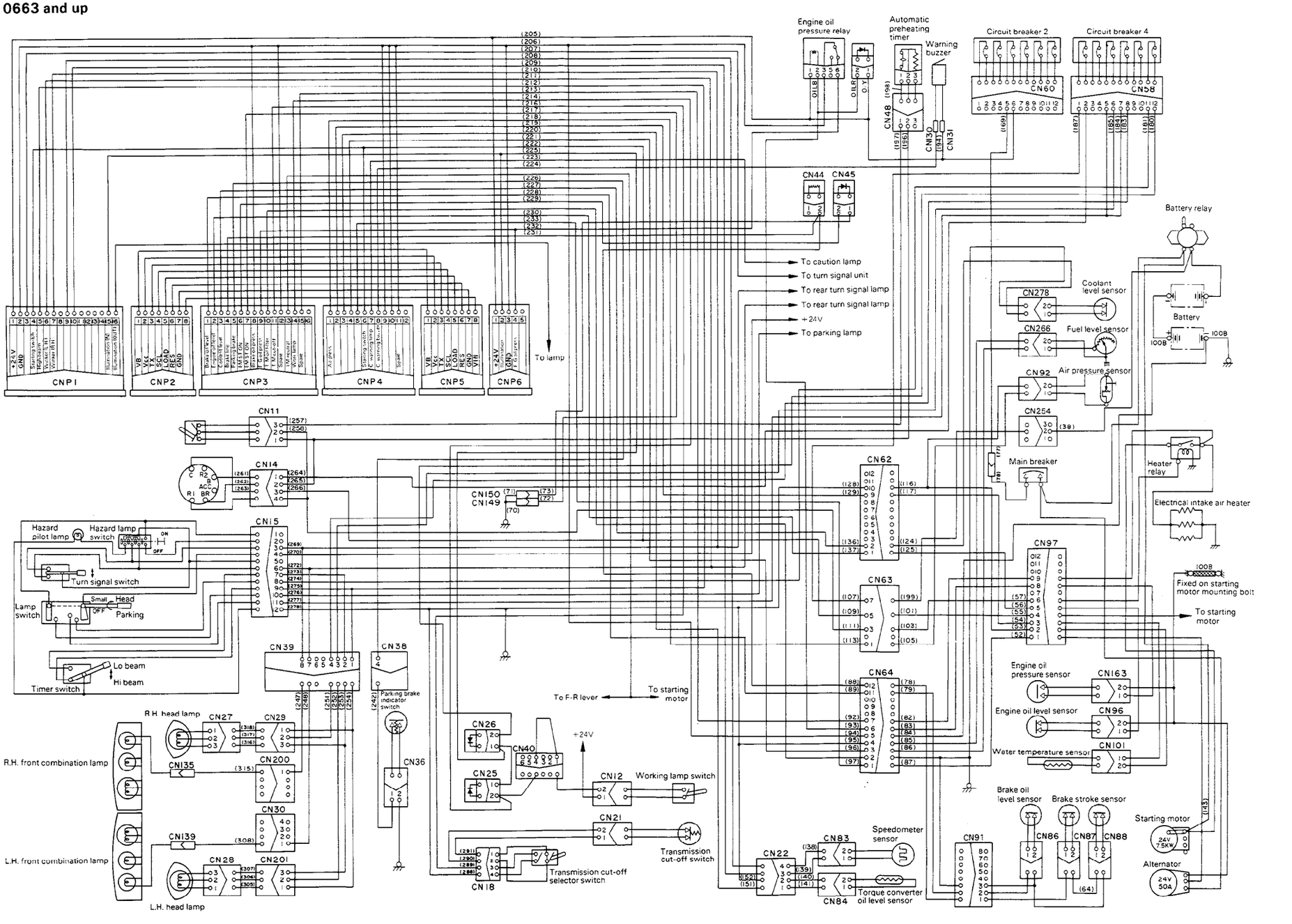
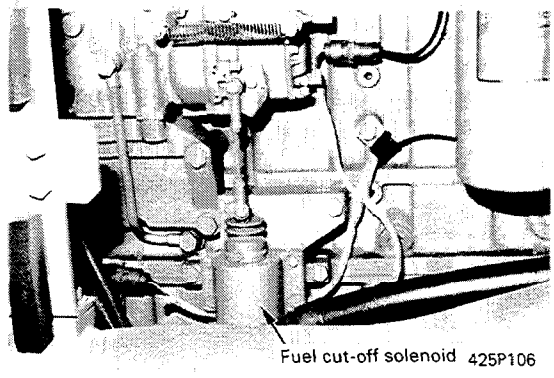
Serial No. 10663 and up



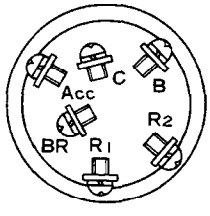
421F01127A-1K

Fuel cut-off solenoid
Serial No. 10001—10388

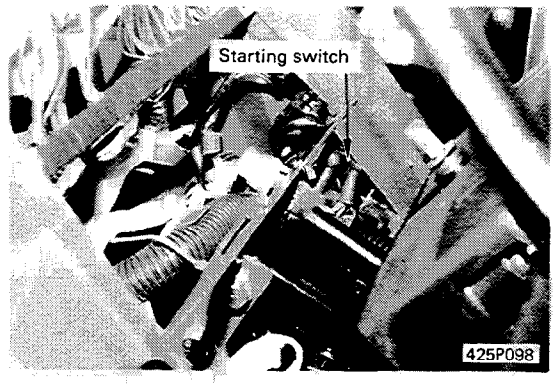
Serial No. 10001—10388



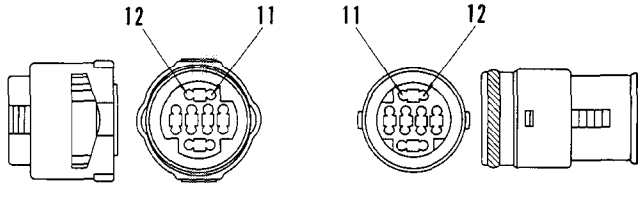
STARTING SWITCH

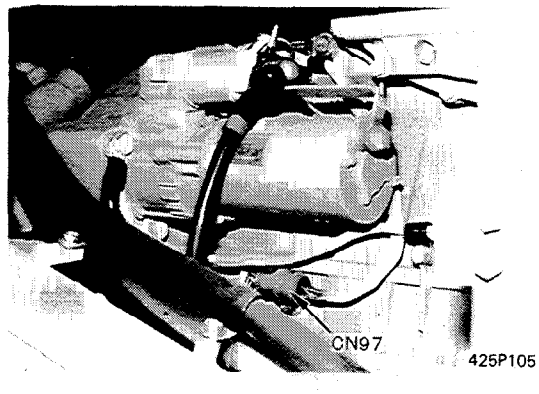


425F217



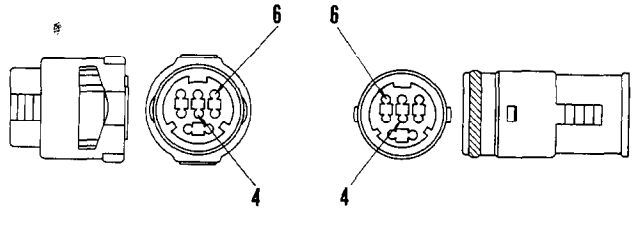
CN97 (Intermediate connector)
ECONOSEAL connector 12 pins

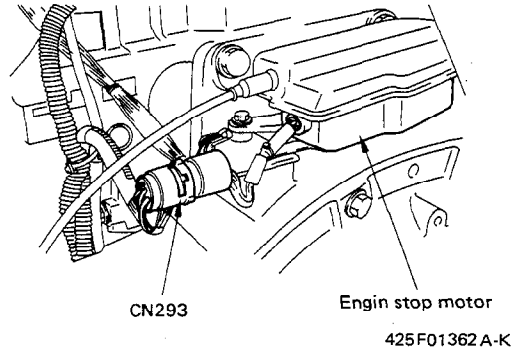




Serial No. 10389 and up

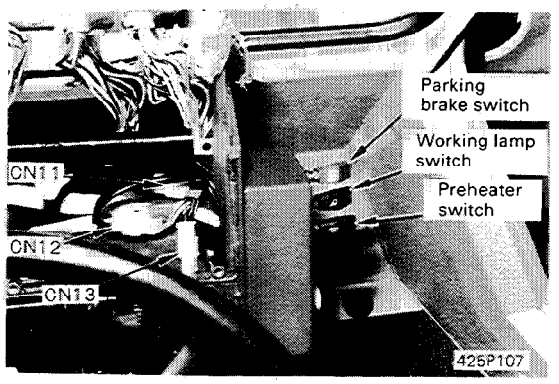
CN293 (For engine stop motor)
Serial No. 10389 and up
ECONOSEAL connector 8 pins



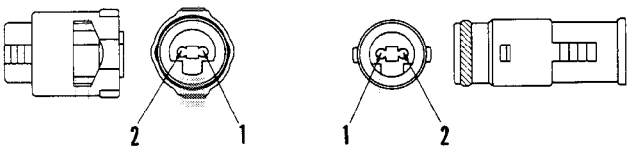


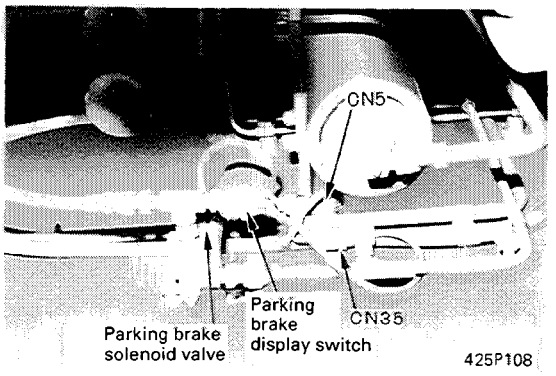
425F01362 A-K

CN11 (Parking brake switch)
N-SLC connector 3 pins

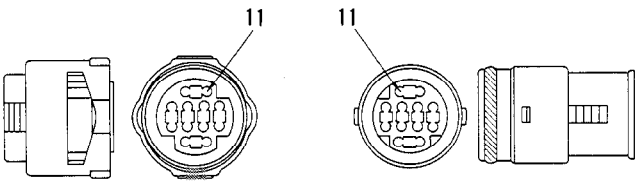


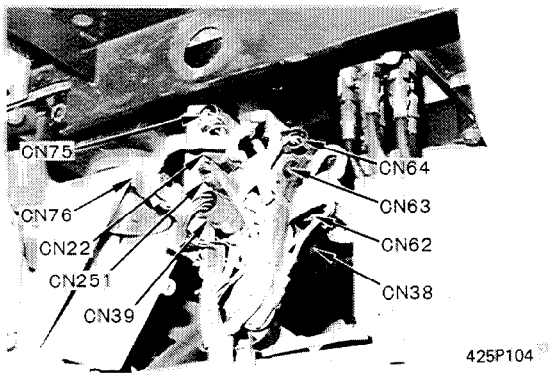
CN35 (Parking brake solenoid valve)
ECONOSEAL connector 2 pins



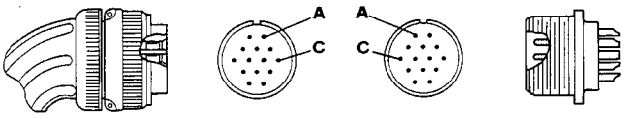


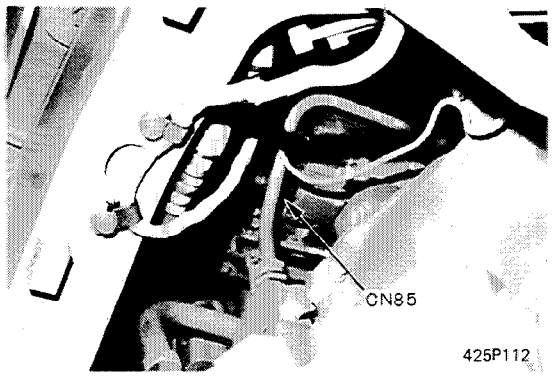
CN39 (Intermediate connector)
ECONOSEAL connector 12 pins



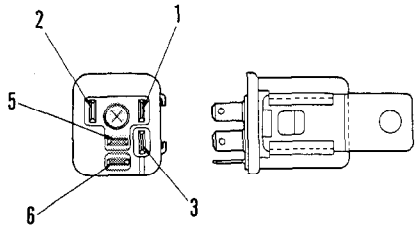


CN85 (For transmission control valve)
BENDIX connector 14 pins

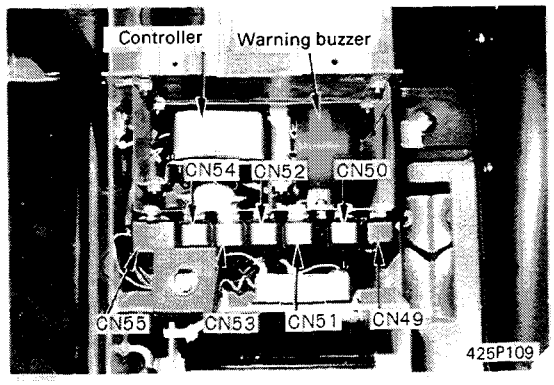




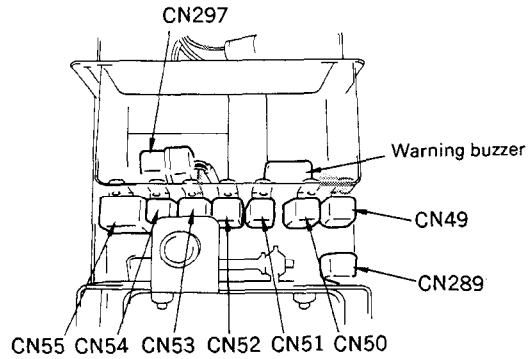
CN53 (Neutraliter relay)
CN54 (Back-up relay)
RELAY connector 5 pins



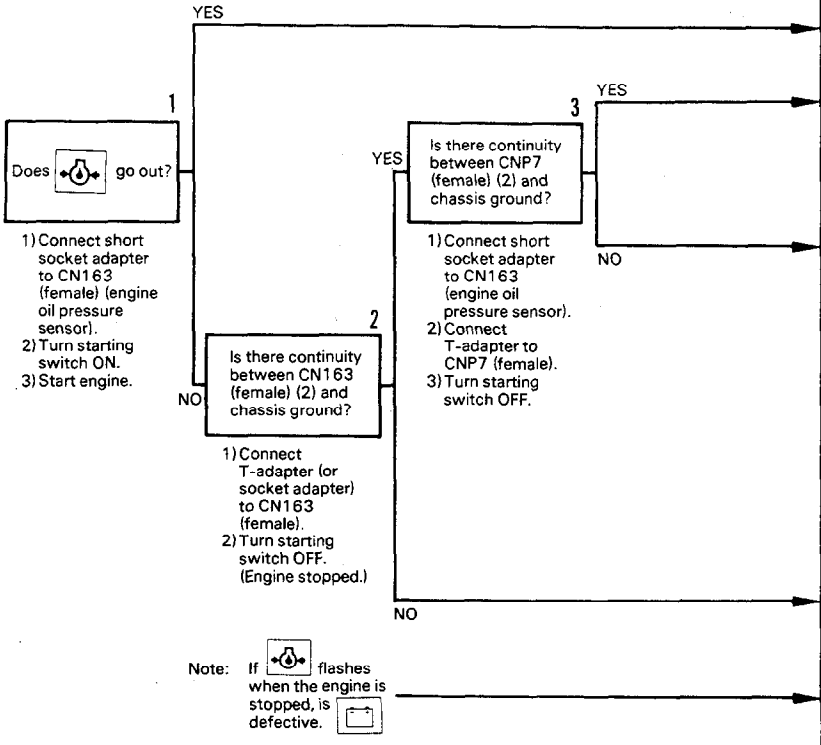
Serial No. 10001 — 10662



Serial No. 10663 and up



b) (ENGINE OIL PRESSURE) FLASHES.

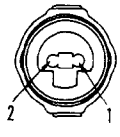


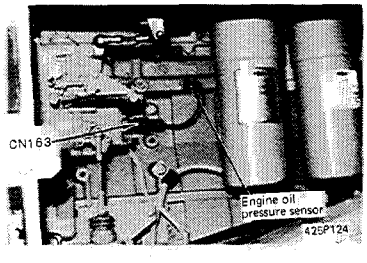
Cause	Remedy
Defective engine oil pressure sensor	Replace
Defective CAUTION module 2	Replace
Disconnection in wiring harness, or defective contact between CN163 (female) (1) – CN97 (8) – CN64 (6) – CNP7 (female) (2)	After inspection, repair (clean) or replace
Disconnection in wiring harness, or defective contact between CN163 (female) (2) – CN97 (12) – chassis ground	After inspection, repair (clean) or replace
See M-7-b) "Even when engine is stopped, engine oil pressure lamp or battery charge lamp flashes".	After inspection, repair (clean) or replace

Troubleshooting tools	Tester	Short socket adapter
	T-adapter (for DLI)	T-adapter or socket adapter (for Econoseal)

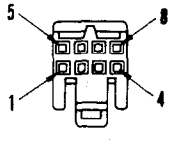
POISTION OF CONNECTOR

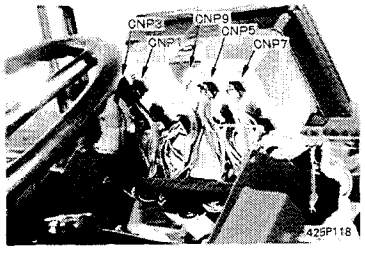
- Procedure No. 1
  CN163 (female)





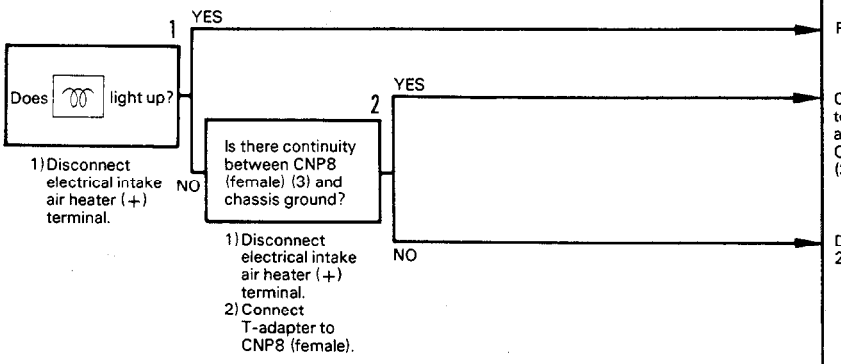
- Procedure No. 3
  CNP7 (female)





f) DOES NOT LIGHT UP.

Note: If the engine oil pressure and battery charge are abnormal, the preheating will not work.

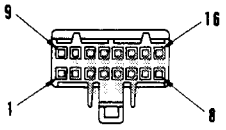


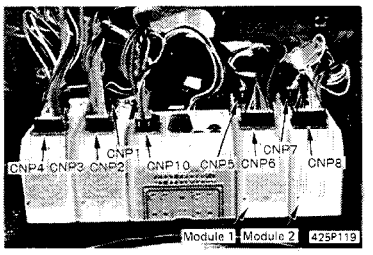
Cause	Remedy
Refer to E-15	
Contact between +24V terminal and electrical intake air heater (+) — CN97 (9) — CN64 (7) — CN98 (female) (3)	After inspection, repair (clean) or replace.
Defective CAUTION module 2	Replace

Troubleshooting tools	Tester	Short socket adapter
	T-adapter (for DLI)	T-adapter or socket adapter (for Econoseal)

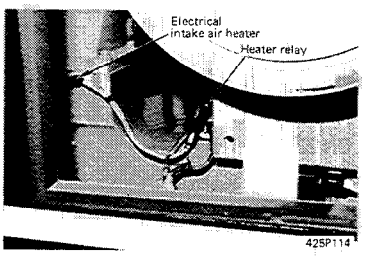
POSITION OF CONNECTOR

- Procedure No. 1
  CNP8 (female)





- Electrical intake air heater



e) HIGH BEAM PILOT LAMP DOES NOT LIGHT UP.

Do both left and right head lamps light up?

1) Turn starting switch ON.
2) Turn combination switch to head lamp position.
3) Turn dimmer switch to LOW BEAM.

YES → Is voltage between CNP10 (female) (4) and chassis ground 20 – 30V?

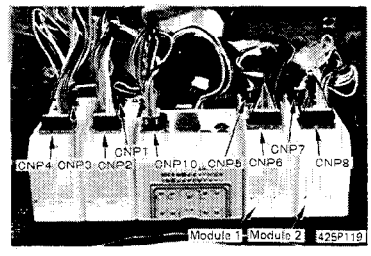
1) Connect T-adapter to CNP10 (female).
2) Turn starting switch ON.
3) Turn combination switch to head lamp position.
4) Turn dimmer switch to HIGH BEAM.

	Cause	Remedy
YES	Defective speedometer module	Replace
NO	Defective contact, or disconnection in wiring harness between CNP10 (female) (4) and CN39 (female) (1).	After inspection, repair (clean) or replace
NO	Bulbs broken in both head lamps (low beam lamps) (If the low beam bulb is broken, the pilot lamp will not light up even if the switch is turned to HIGH BEAM.)	Replace

Troubleshooting tools	Tester	
	T-adapter (for DLI)	T-adapter or socket adapter (for Econoseal)

POSITION OF CONNECTOR

- Procedure No. 2
  CNP10 (female)



h) MONITOR DISPLAYS NO ABNORMALITY, BUT CENTRAL WARNING BUZZER SOUNDS INTERMITTENTLY.

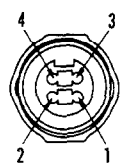
	Cause	Remedy
1 Does central warning buzzer stop? (1) Disconnection in CN43. (2) Start engine. — YES	Defective CAUTION 2 module	Replace
1 Does central warning buzzer stop? (1) Disconnection in CN43. (2) Start engine. — NO	Defective auxiliary controller	Replace

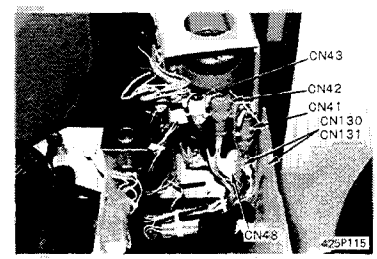
Troubleshooting tools	Tester	
		T-adapter or socket adapter (for Econoseal)

POSITION OF CONNECTOR

- Procedure No. 1

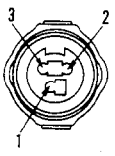
  CN43

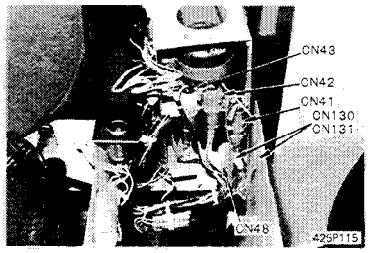




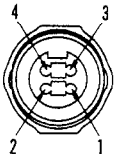
POSITION OF CONNECTOR

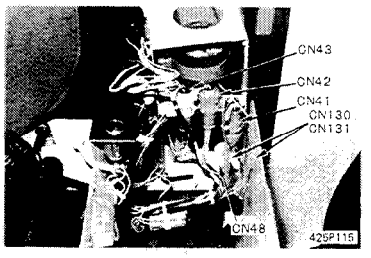
- Procedure No. 1
  CN42 (female)



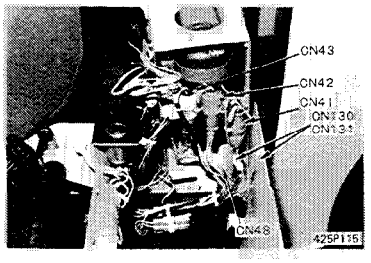


- Procedure No. 3
  CN43 (female)

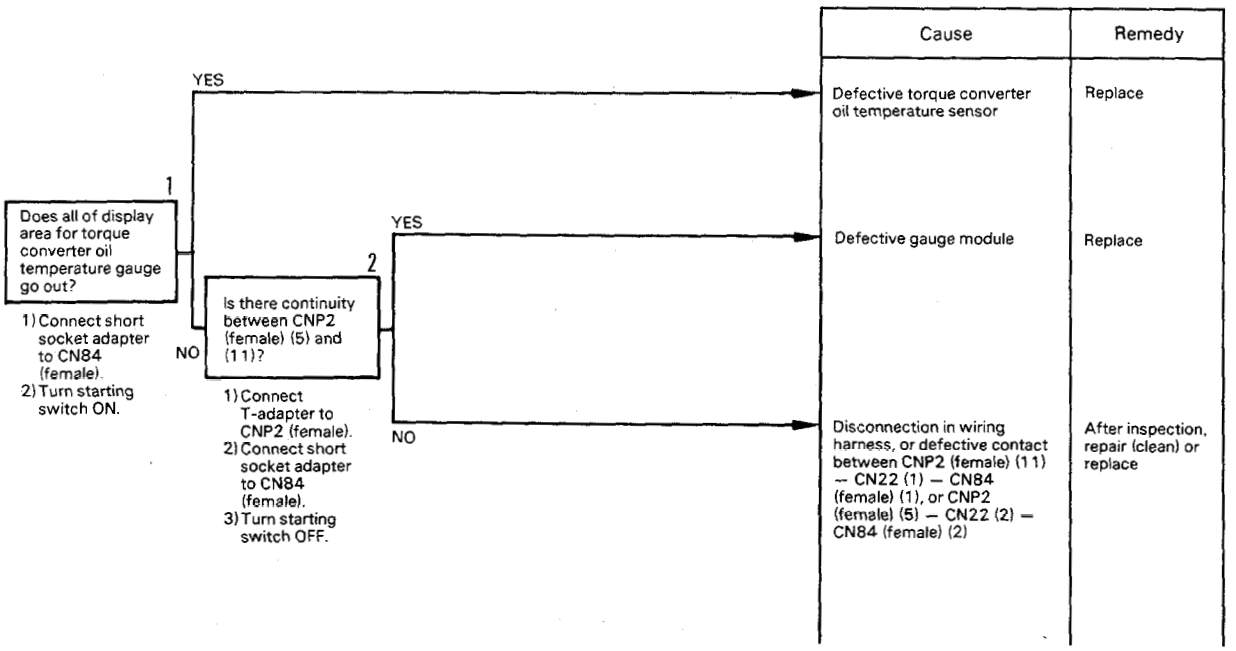




- Procedure No. 2
  CN130, 131



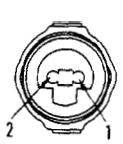
ii) Stays at bottom position and does not move.

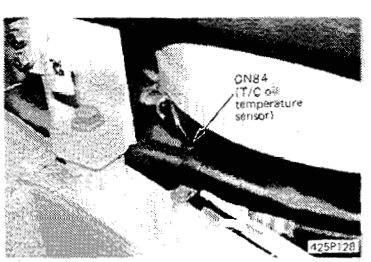


Troubleshooting tools	Tester	Short socket adapter
	T-adapter (for DLI)	

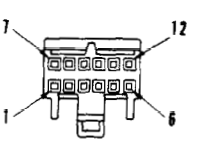
POSITION OF CONNECTOR

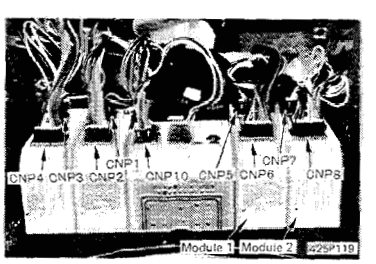
- Procedure No. 1
  CN84 (female)



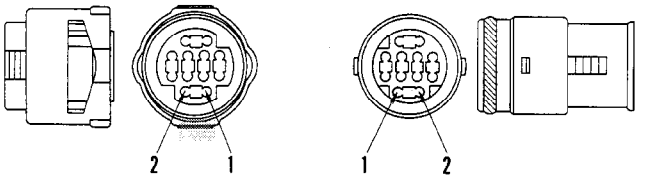


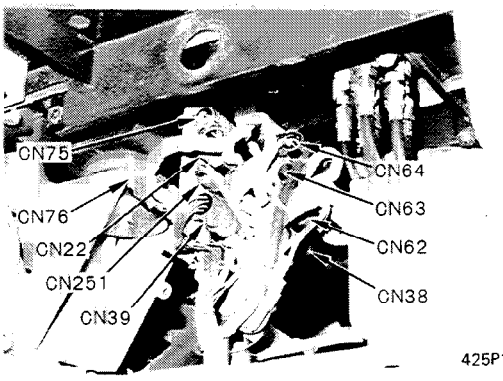
- Procedure No. 2
  CNP2 (female)



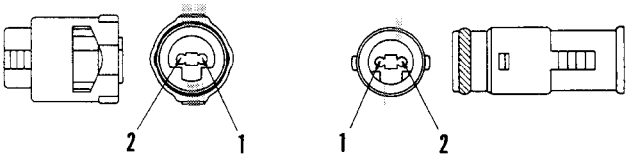


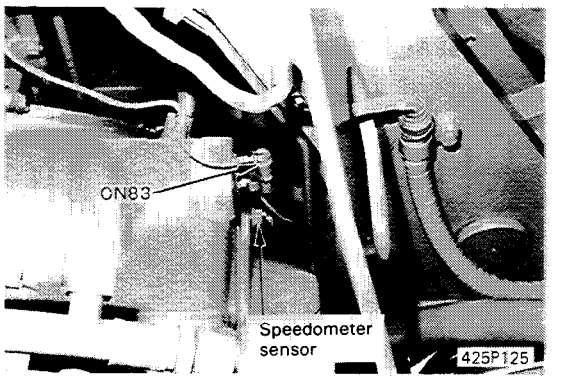
CN64 (Intermediate connector)
ECONOSEAL connector 12 pins



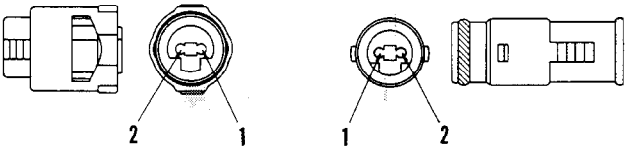


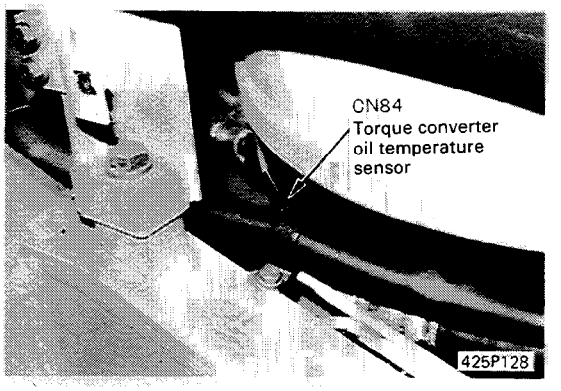
CN83 (Speedometer sensor)
ECONOSEAL connector 2 pins



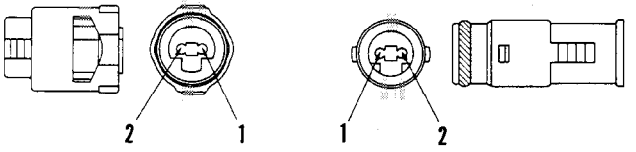


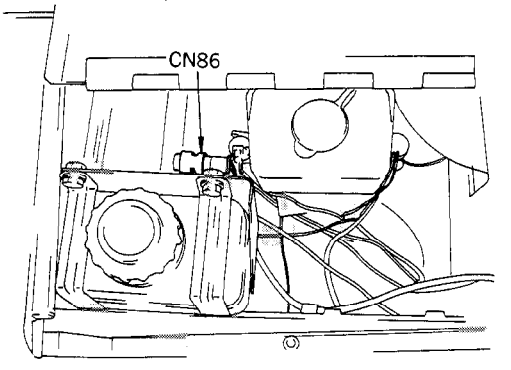
CN84 (Torque converter oil temperature sensor)
ECONOSEAL connector 2 pins





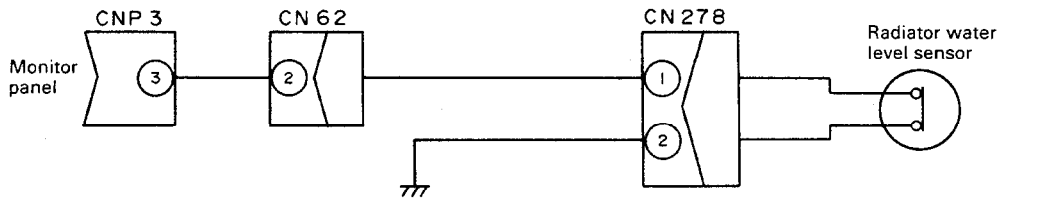
CN86 (Brake oil level sensor)
ECONOSEAL connector 2 pins





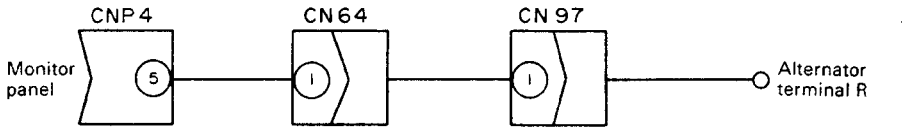
425F555

M-3 Related electrical circuit drawing



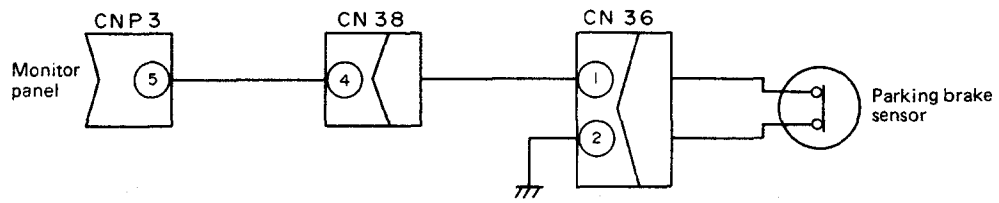
425F513

M-4 Related electrical circuit drawing



425F514

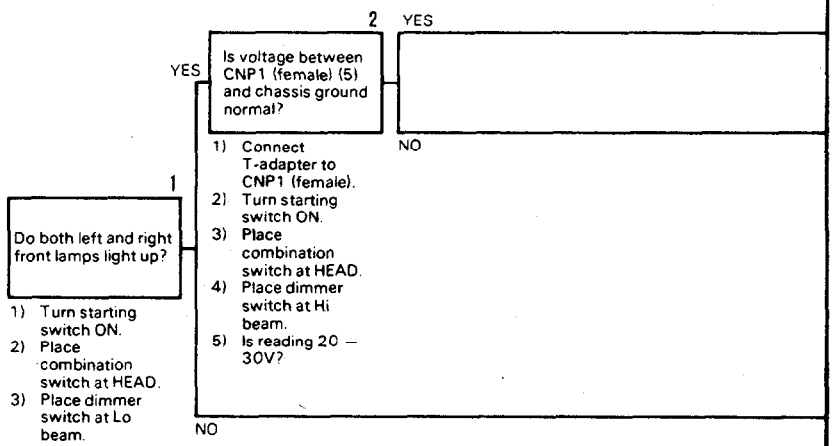
M-13 Related electrical circuit drawing



425F523

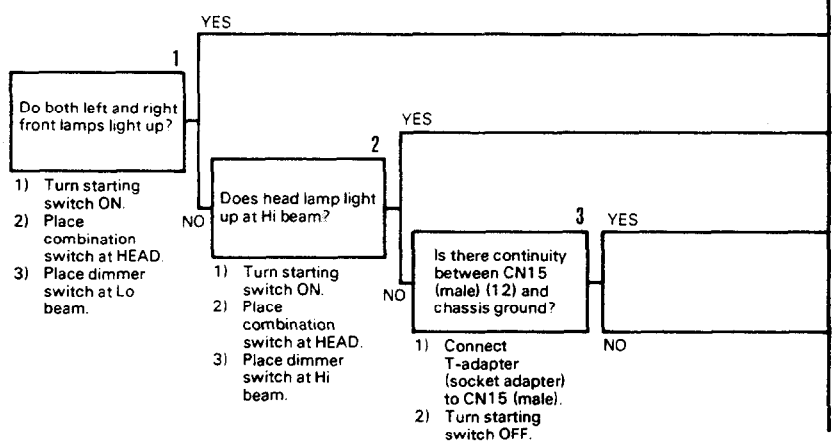
e) Hi beam pilot does not light up

If the head lamp does not switch to Hi beam, check the head lamp system.



Cause	Remedy
Defective monitor panel	Replace
Defective contact, or disconnection in wiring harness between CNP1 (female) (5) and CN39 (male) (1).	After inspection, repair (clean) or replace
Both head lamp bulbs (Lo beam lamps) broken? (If the Lo beam bulb is broken, the Hi beam pilot will not light up even if the lamp is switched to Hi beam.)	Replace

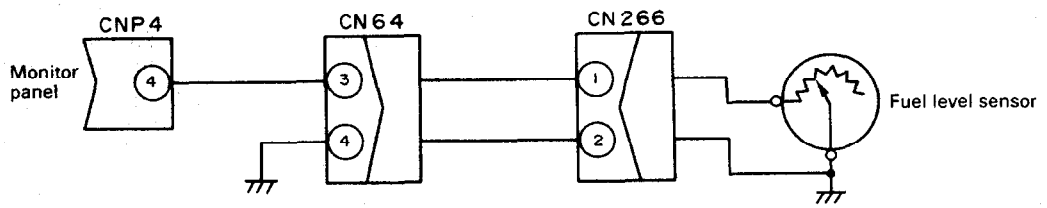
f) Hi beam pilot stays lighted up



Cause	Remedy
Defective monitor panel	Replace
Defective contact, or disconnection in wiring harness between CN15 (female) (9) and combination switch	After inspection, repair (clean) or replace
Defective contact, or disconnection in wiring harness between CN15 (female) (12) and combination switch	After inspection, repair (clean) or replace
Defective contact, or disconnection in wiring harness between CN15 (male) (12) and chassis ground	After inspection, repair (clean) or replace

Trouble-shooting tools	T-adapter (for DLI)	
	T-adapter or socket adapter (for Econoseal)	

M-29 Related electrical circuit drawing



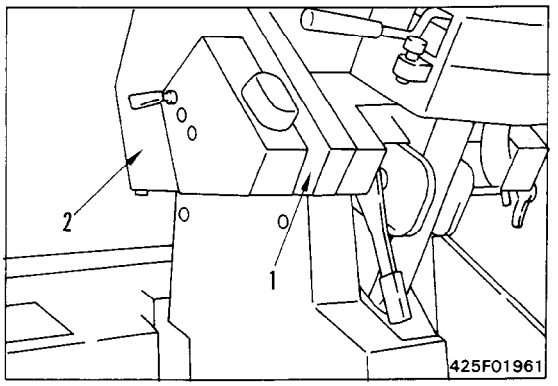
425F516

REMOVAL OF MACHINE MONITOR

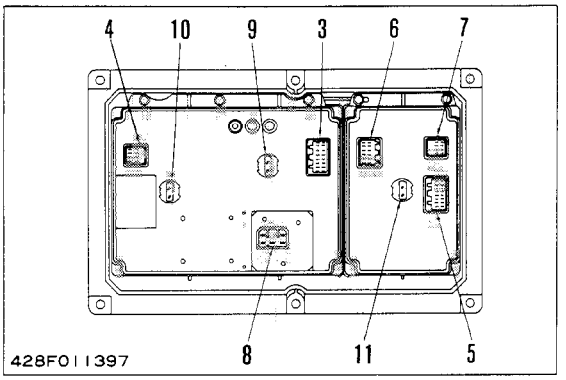
Serial No. 10663 and up

⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the work equipment to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.

- Disconnect the cable from the negative (-) terminal of the battery.

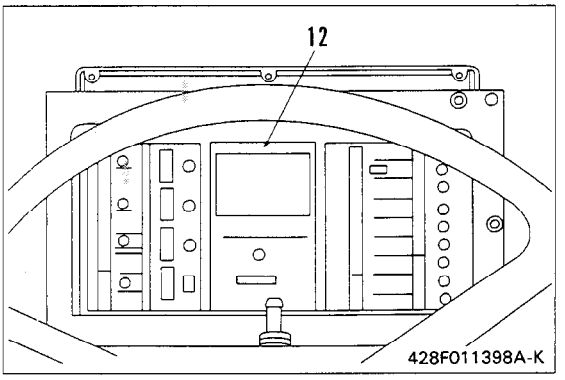


1. **Covers**
   Remove covers (1) and (2) of machine monitor.



2. **Wiring**
   Disconnect the following wirings from connector.
   - Connector (3) for CNP1
   - Connector (4) for CNP2
   - Connector (5) for CNP3
   - Connector (6) for CNP4
   - Connector (7) for CNP 5
   - Connector (8) for CNP6
   - Connector (9) for CNP7 (Night lighting lamp)
   - Connector (10) for CNP8 (Night lighting lamp)
   - Connector (11) for CNP9 (Night lighting lamp)

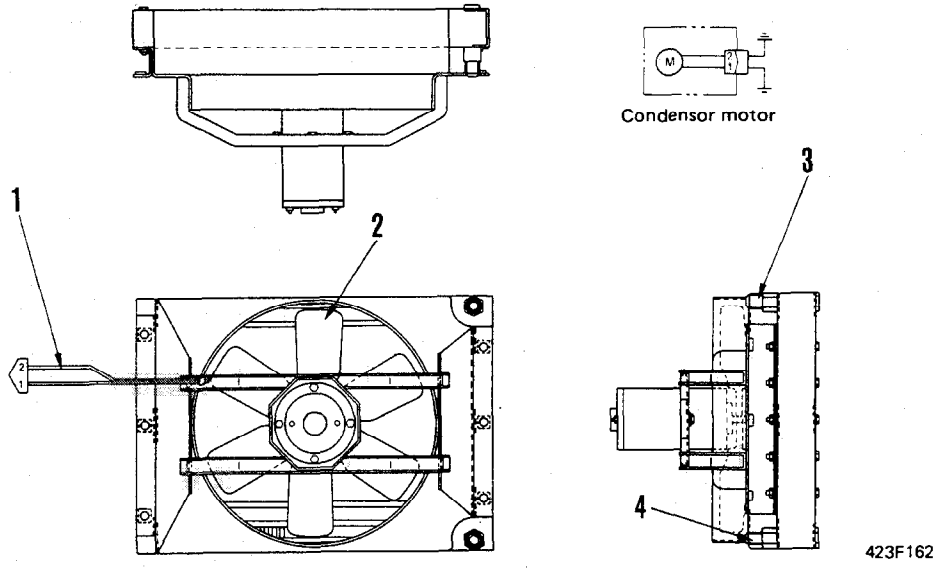
   ★ After disconnecting the connectors, mark with a tag to distinguish when installing.



3. **Machine monitor**
   Remove mounting bolts, then remove machine monitor (12).
   ★ When removing the machine monitor, be careful not to give it any sudden shock.

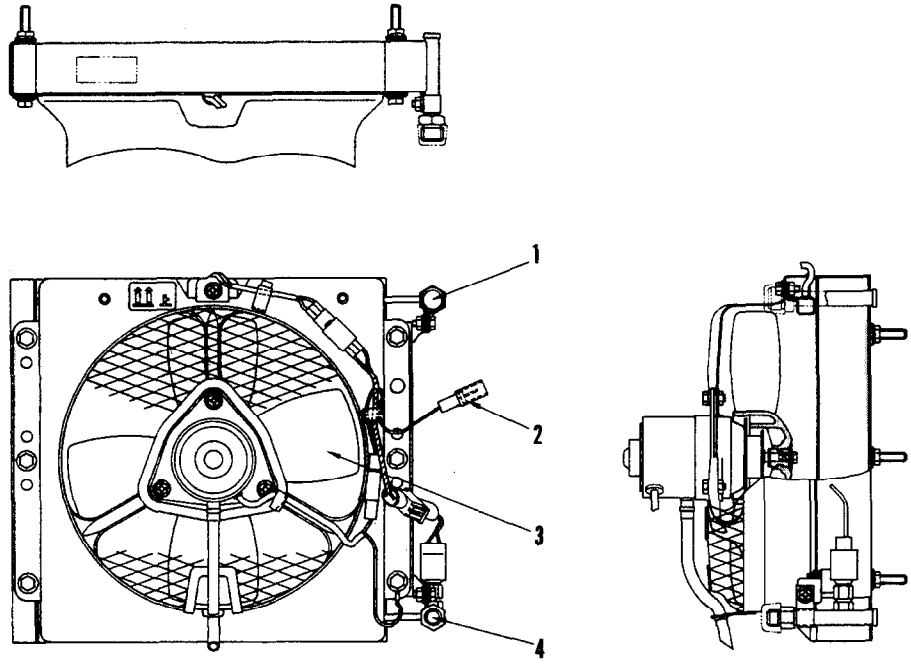
CONDENSER

For DAIKIN air conditioner



1. Electrical wiring
2. Fan
3. Refrigerant gas inlet port
4. Refrigerant gas outlet port

For DENSO air conditioner

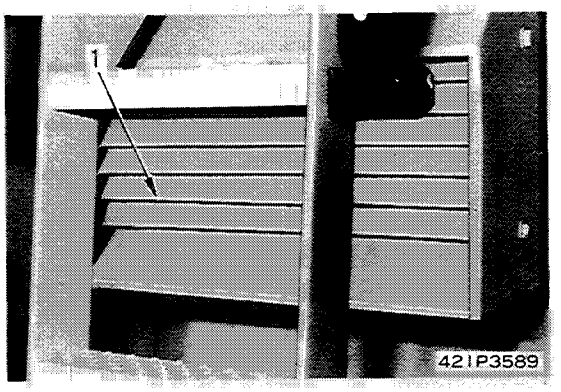


1. Refrigerant gas inlet poat
2. Electrical wiring
3. Fan
4. Refrigerant gas outlet port

REMOVAL OF DRY RESERVOIR

⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.

1. Remove cover (1).
2. Remove bolt (2), and move air conditioner condenser to front.
3. Disconnect electric wiring (3) from connector.
4. Loosen air conditioner hoses (4) and (5), and drain air conditioner gas.
   - ★ Do not disconnect the hose completely. Loosen it slightly to drain the gas.
   - ★ After draining the air conditioner gas, disconnect hoses (4) and (5).
   - ★ After disconnecting the hoses, fit covers to the connectors and hoses to prevent water or dirt and dust from entering.
5. Remove clamp, then remove dry reservoir (6).



INSTALLATION OF DRY RESERVOIR

1. Set dry reservoir (6) in mounting position, and tighten clamp.
2. Connect hoses (4) and (5).
   - ★ To prevent water or dirt and dust from entering, do not remove the covers from the hoses until just before installing them.
   - ★ Hold the hoses securely with a wrench to prevent them from twisting when they are tightened.

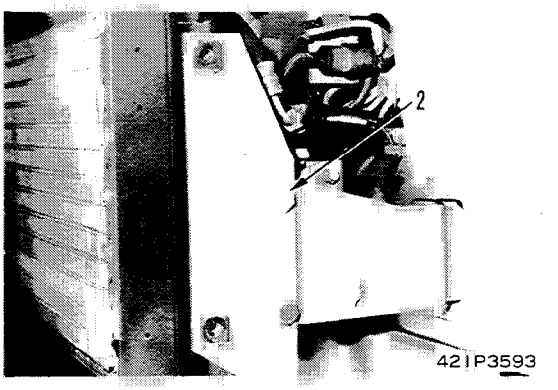
   Hose connector, flared part: Compressor oil

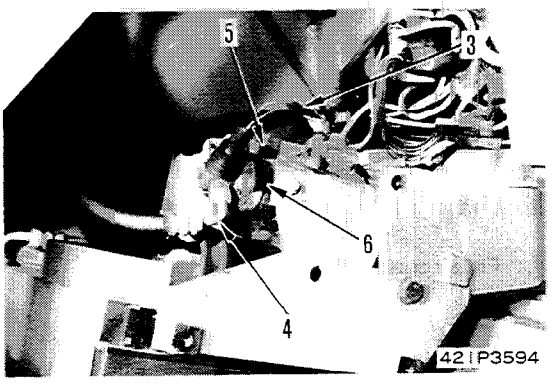
   Hose (4) nut: 3.7 ± 0.4 kgm (DAIKIN air conditioner)

   Hose (5) nut: 3.7 ± 0.4 kgm (DAIKIN air conditioner)

   Hose (4) nut: 1.35 ± 0.15 kgm (DENSO air conditioner)

   Hose (5) nut: 1.35 ± 0.15 kgm (DENSO air conditioner)
3. Connect electric wiring (3) to connector.
4. Set air conditioner condenser in mounting position, then secure with bolts (2).
5. Install cover (1).
6. Fill with air conditioner gas.





Note 1.) If it is impossible to raise the pump speed to the value shown in the table because of limitations of the test bench, calculate the allowance for the delivery from the following formula:

$$Q = Q_0 - \frac{(N_0 - N)\, Qth}{1000}$$

however, $N \geqq 1000$ rpm

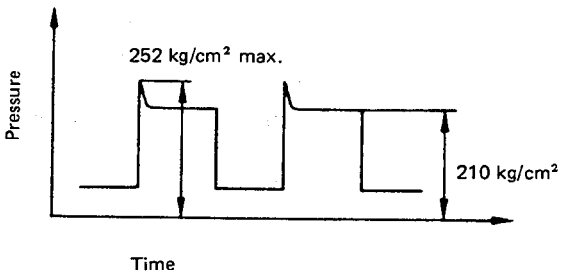
where, N: RPM of test bench
Q: Repair limit for delivery at N rpm (liters/min)
N_0: RPM in the table
Q_0: Repair limit for delivery in the table (liters/min)
Qth: Capacity code

Note 2.) If the test bench allows the pump to raise its delivery pressure above 140 kg/cm^2 but not above 210 kg/cm^2, use the repair limit for delivery given in Table, No. 1.

Note 3.) For pumps whose service pressure exceeds 50 kg/cm^2 in operation, use Table, No. 1. (Do not use Table, No. 2)

Note 4). The volumetric efficiency of a pump decreases after the pump is reassembled. After reassembly, therefore, perform the following tests with a test bench or flow-meter kit (790-303-1001).

(1) Shock test
20 times



(2) Performance test (measure the delivery)