

SHOP MANUAL

KOMATSU

**PC60-5
PC60L-5
PC60U-5**

MACHINE MODEL	SERIAL No.
PC60-5	20501 and up
PC60L-5	7501 and up
PC60U-5	4501 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.
- PC60, 60L and 60U mount the 4D95L-1 engine.
For details of the engine, see the 95 series engine Shop Manual.

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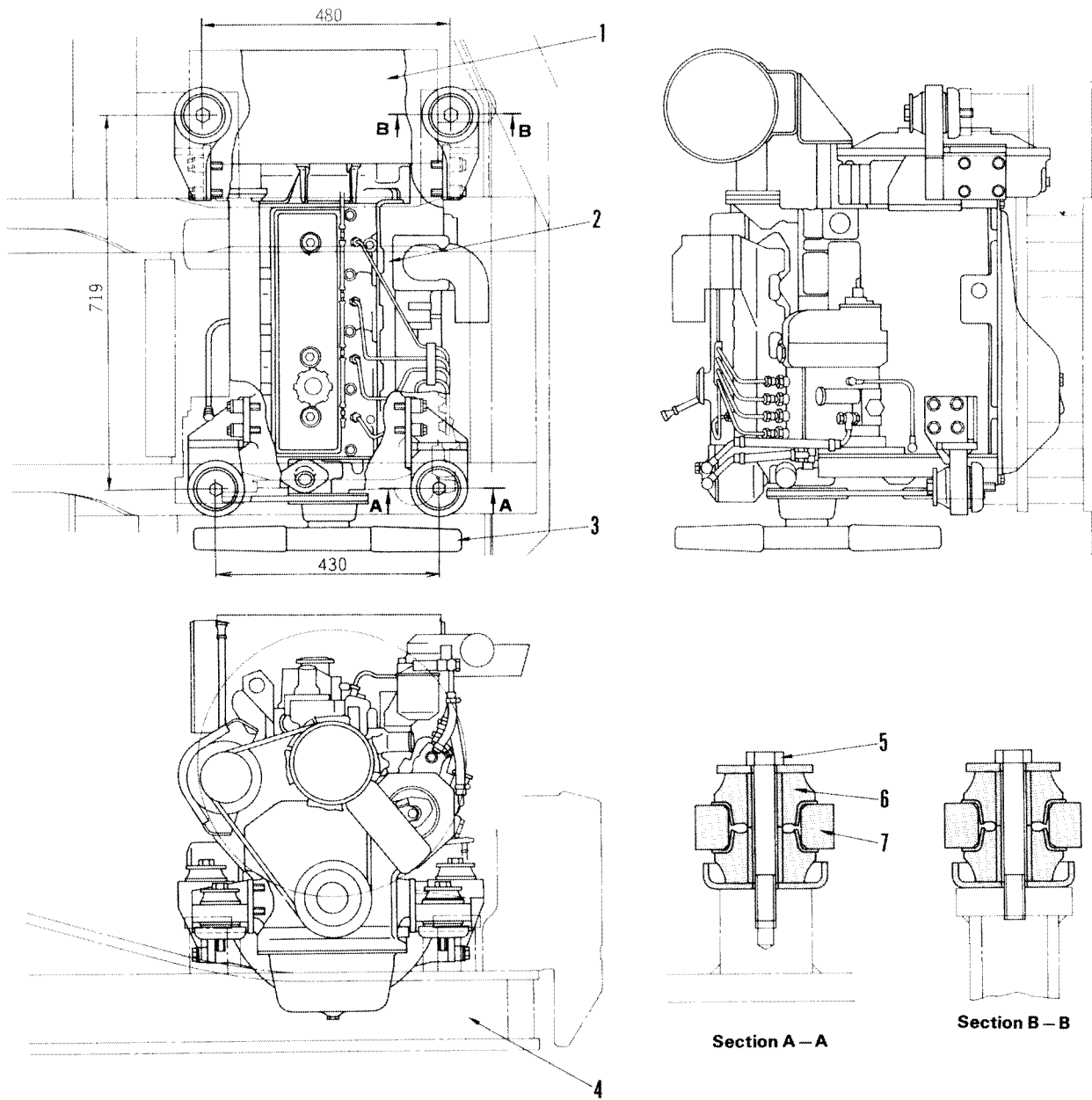
ENGINE

11 STRUCTURE AND FUNCTION



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ENGINE MOUNT

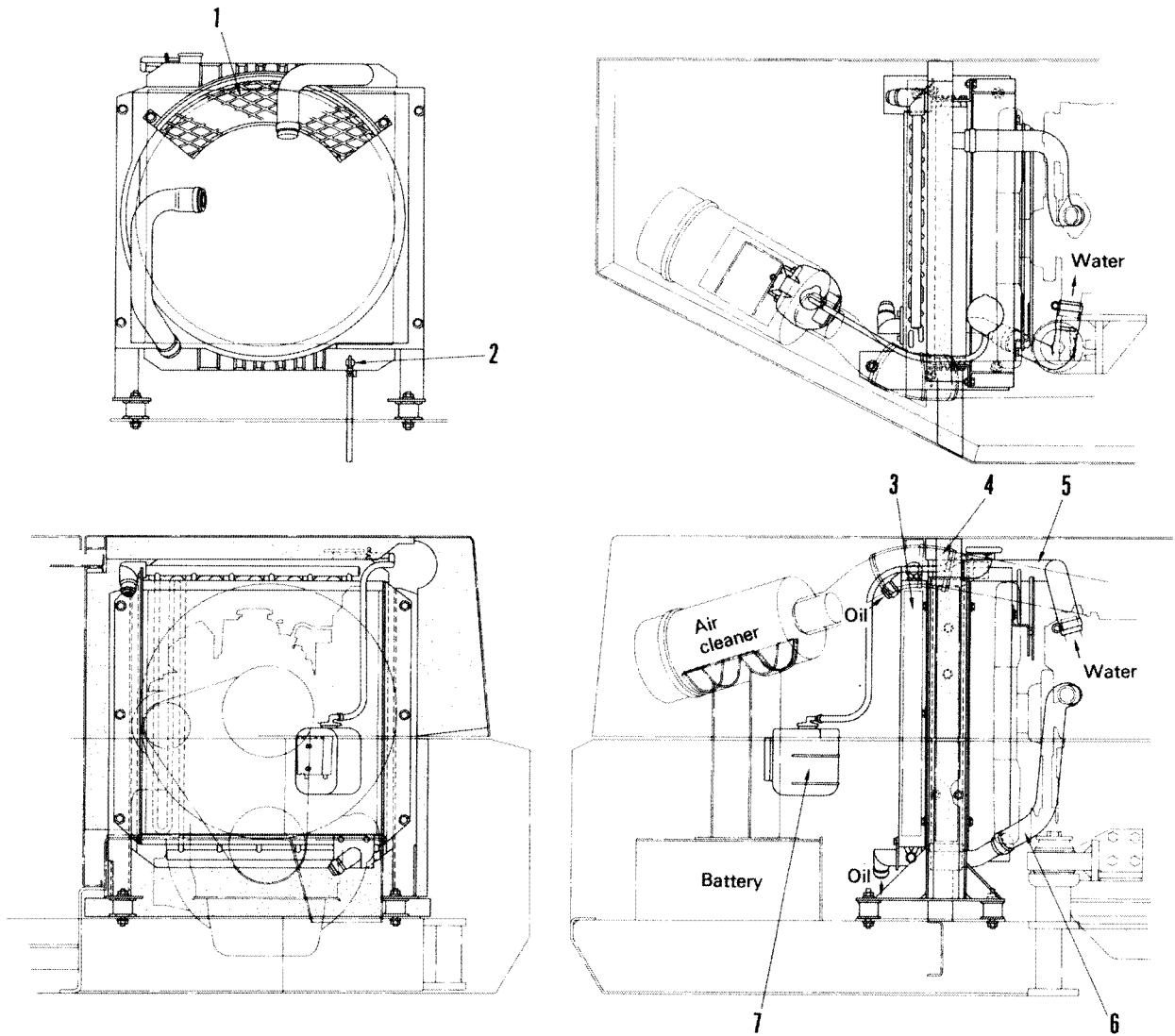


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• The engine is mounted crosswise at the rear of the upper structure. The front and rear mounts are supported by rubber pads which absorb shock.

- | | |
|--------------------|-------------------|
| 1. Muffler | 5. Mounting bolt |
| 2. Engine | 6. Rubber pads |
| 3. Radiator fan | 7. Engine support |
| 4. Revolving frame | |

RADIATOR

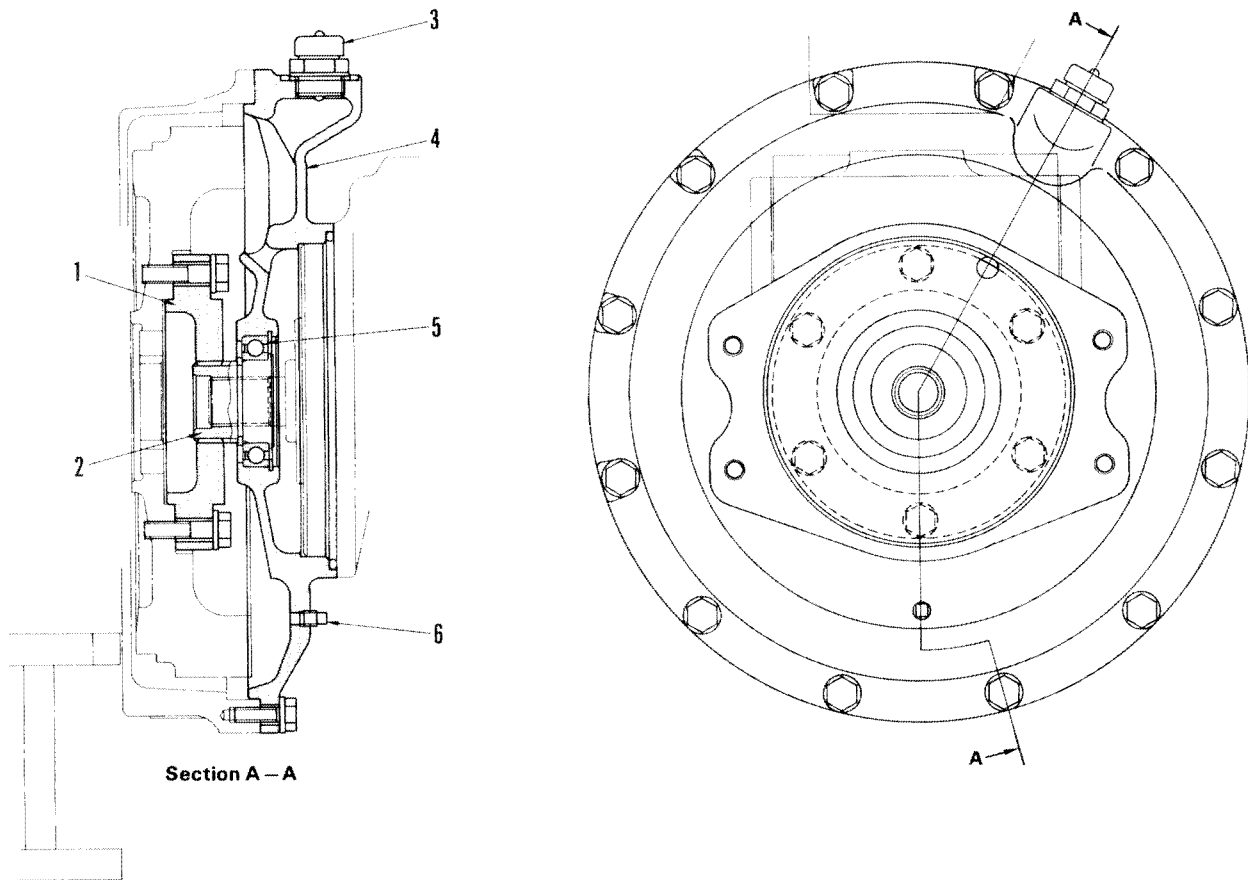


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- A model CD-3 corrugated fin type radiator core and the suction type of fan are used.
- The water level in the radiator can be visually checked through the sub-tank which is in front of the radiator.

- | | |
|------------------|----------------|
| 1. Fan guard | 5. Inlet hose |
| 2. Drain valve | 6. Outlet hose |
| 3. Oil cooler | 7. Sub-tank |
| 4. Radiator core | |

PTO



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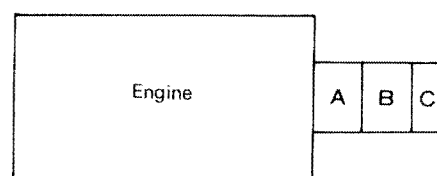
- The pumps are installed to the PTO case through the coupling at the rear of the flywheel housing of the engine.

- The pumps shown in the figure at right have the following functions.

Pump A (Front main pump): Used for L.H. travel, arm low speed, swinging, boom high speed and service spool.

Pump B (Rear main pump): Used for R.H. travel, bucket, boom low speed and arm high speed.

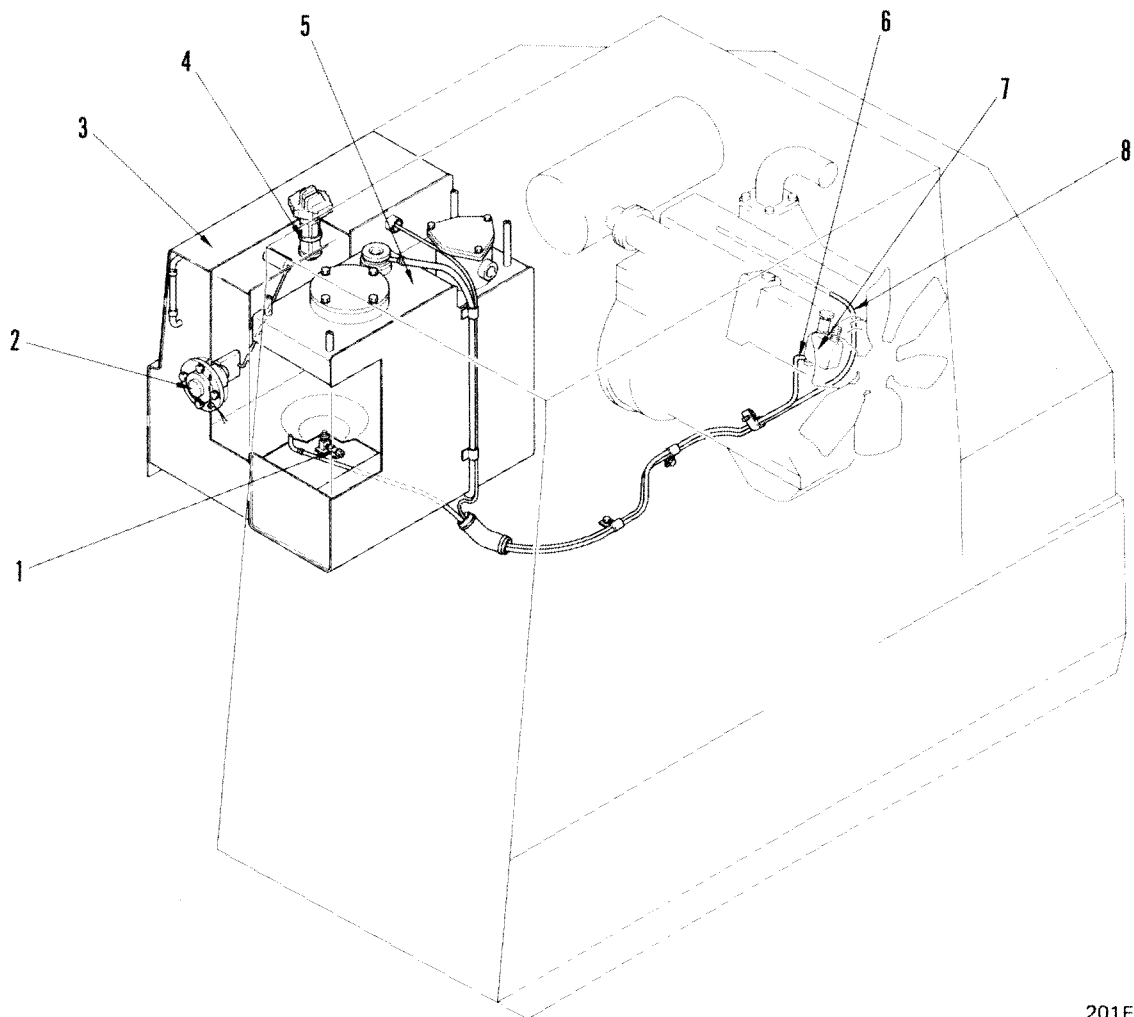
Pump C (Charging pump): Used for driving the auto-deceleration cylinder (if equipped), assisting the hydraulic pressure of the control valves and controlling the main pumps.



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1. Coupling
2. Shaft
3. Breather
4. Case
5. Bearing
6. Oil level plug

FUEL TANK AND PIPING

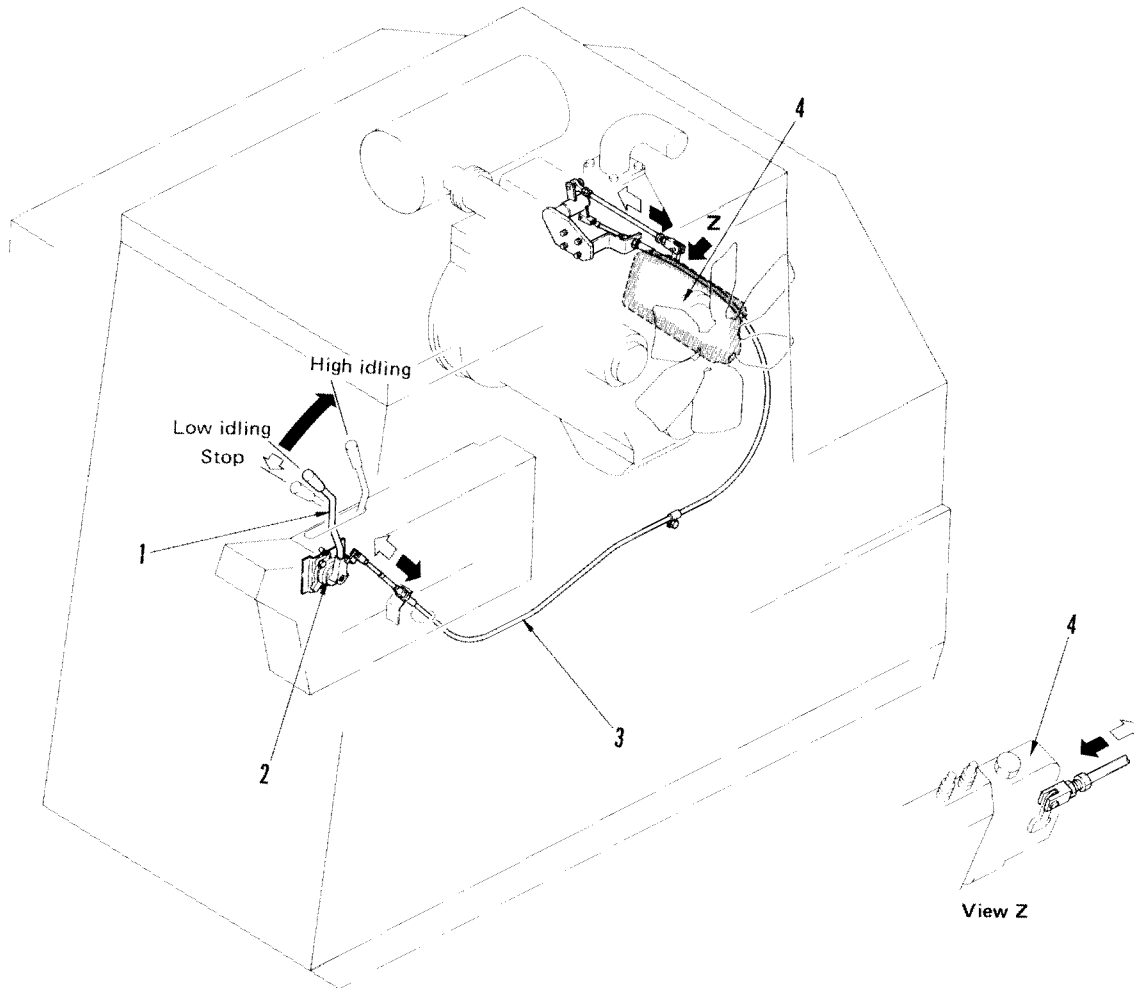


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- The fuel tank is installed together with the hydraulic tank as a unit.

- | | |
|----------------------|------------------------|
| 1. Drain valve | 5. Hydraulic tank |
| 2. Fuel level sensor | 6. Fuel supply hose |
| 3. Fuel tank | 7. Fuel injection pump |
| 4. Strainer | 8. Fuel return hose |

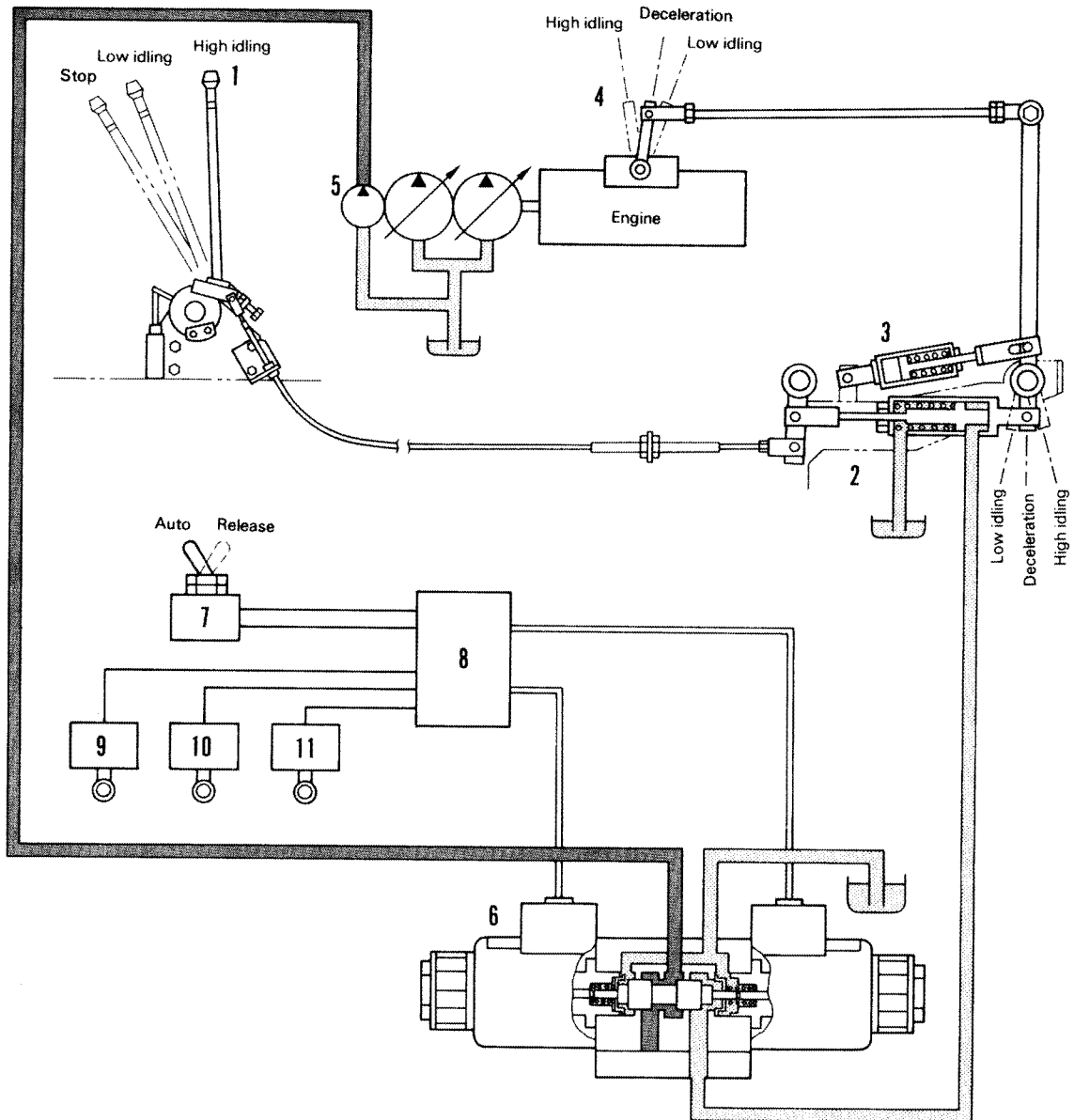
ENGINE CONTROL



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1. Engine control lever
2. Stopper
3. Cable
4. Fuel injection pump

AUTO-DECELERATION SYSTEM (If equipped)



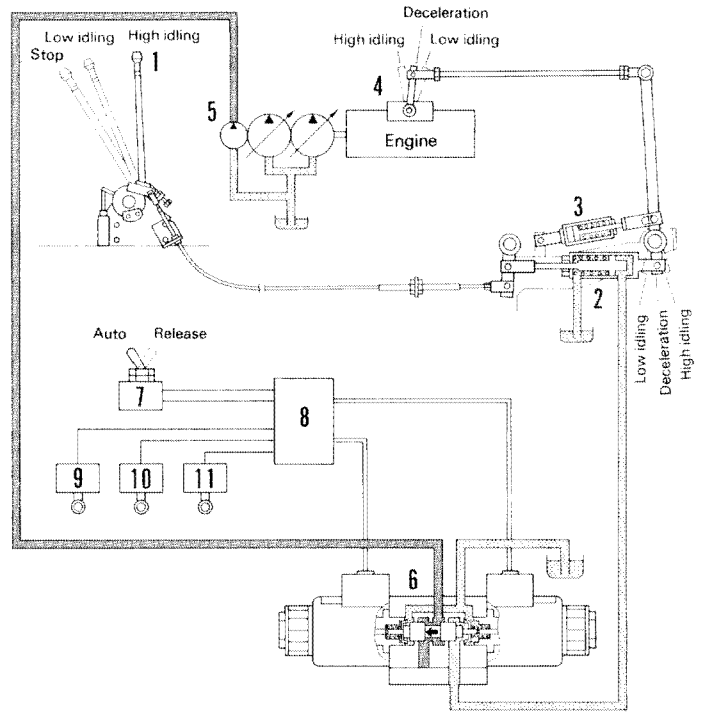
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- | | |
|----------------------------------|----------------------------------|
| 1. Fuel control lever | 7. Auto-deceleration switch |
| 2. Deceleration cylinder | 8. Controller |
| 3. Loose spring | 9. Limit switch (work equipment) |
| 4. Engine governor control lever | 10. Limit switch (swing) |
| 5. Charging pump | 11. Limit switch (travel) |
| 6. Solenoid valve | |

OPERATION (Auto-deceleration selector switch at AUTO)

1. Engine running, control levers at NEUTRAL

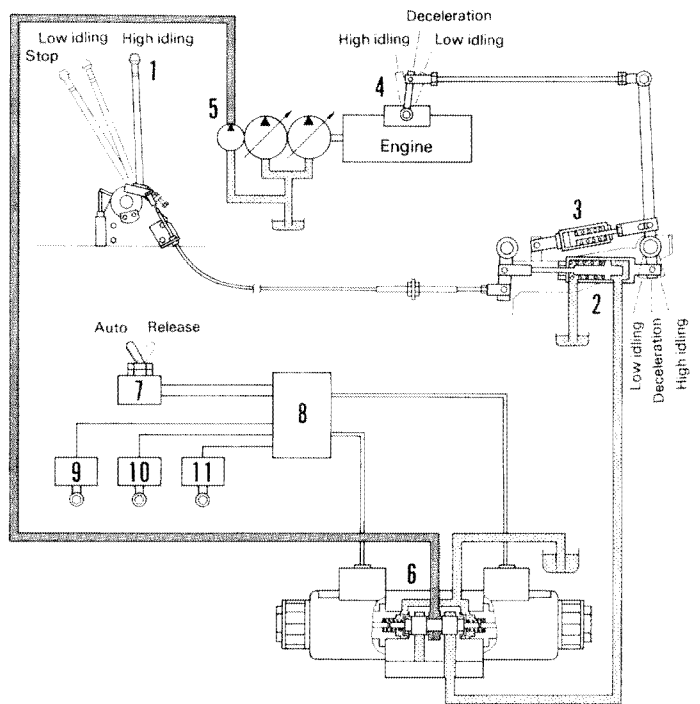
1) If fuel control lever (1) is set to the high idling position and the control levers are set at NEUTRAL, limit switches (9), (10) and (11), set on the linkage between the control levers and control valves, are switched OFF. Because of this, an electric signal flows to controller (8), and controller (8) sends out a signal to switch deceleration solenoid valve (6). When deceleration solenoid valve (6) is switched, the flow of pressure oil from charging pump (5) to the rod end of deceleration cylinder (2) is shut off. At the same time, the oil at the rod end of deceleration cylinder (2) is drained from deceleration solenoid valve (6) back to the tank. The force of the loose spring and the spring inside deceleration cylinder (2) retracts the deceleration cylinder, and engine governor lever (4) which is connected by a linkage is pulled back. (See Fig. 1) When this happens, loose spring (3) is compressed, so fuel control lever (1) is not returned.



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Fig. 1

2) About 0.2 seconds after the lever is placed in neutral, the electric signal from controller (8) is cut, and deceleration solenoid valve (6) is switched. When deceleration solenoid valve (6) is switched, the flow of oil draining to the tank from the rod end of deceleration cylinder (2) is shut off by deceleration solenoid valve (6). When this happens, deceleration cylinder (2) which was starting to retract in step 1), stops after about 0.2 seconds. At the same time, engine governor lever (4) also stops. (No.1 deceleration position)
The engine speed at this point is 1900 – 2100 rpm (No.1 deceleration speed). It is held at this position (No.1 deceleration position) for about 4.0 seconds. (See Fig. 2)



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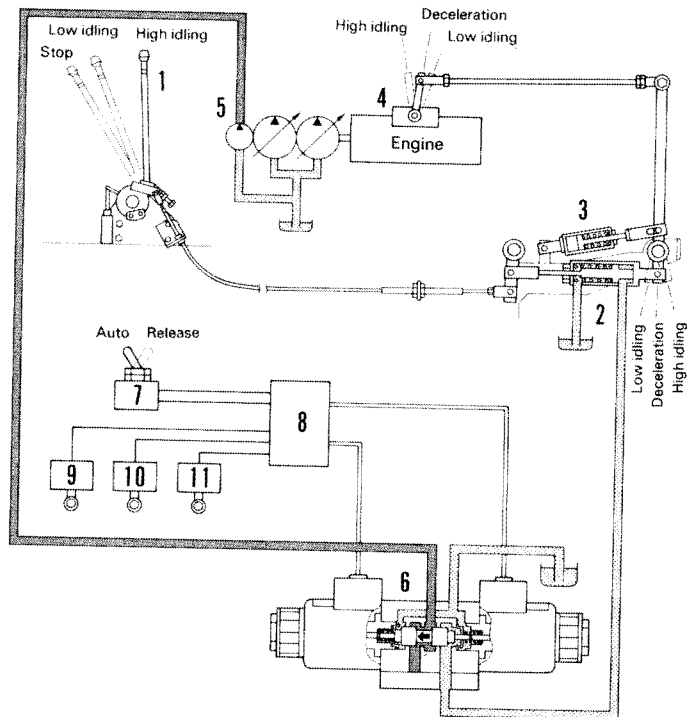
Fig. 2

3) About 4.5 seconds after the lever is moved to neutral, controller (8) again sends out an electric signal and switches deceleration solenoid valve (6).

When deceleration solenoid valve (6) is switched, the oil at the rod end of deceleration cylinder (2) is again drained. Deceleration cylinder (2) is retracted and engine governor lever (4) is pulled back to the half open (deceleration) position. (See Fig. 3)

When this happens, loose spring (3) is compressed and fuel control lever (1) is not returned. The engine speed at this point is 1500 – 1700 rpm (deceleration speed).

- ★ When the engine is running at full throttle, and the control levers are set to neutral, steps 1) – 3) are carried out over a period of about 4.5 seconds, and the engine speed drops from full throttle to the deceleration speed.



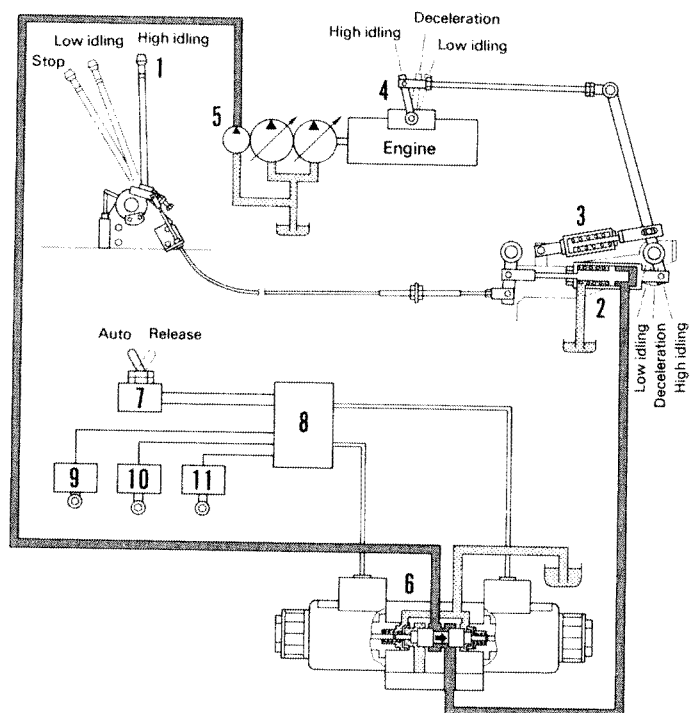
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Fig. 3

2. Engine running, control levers operated

If the control lever are operated with fuel control lever (1) at the high idling position, limit switches (9), (10) and (11) are turned ON. When this happens, an electric signal flows to controller (8), and controller (8) sends out a signal to switch deceleration solenoid valve (6). When deceleration solenoid valve (6) is switched, pressurized oil from charging pump (5) enters the rod end of deceleration cylinder (2). Deceleration cylinder (2) extends and pushes back engine governor lever (4) to the high idling position.

When this happens, the engine speed rises from the deceleration speed to full throttle. (See Fig. 4)

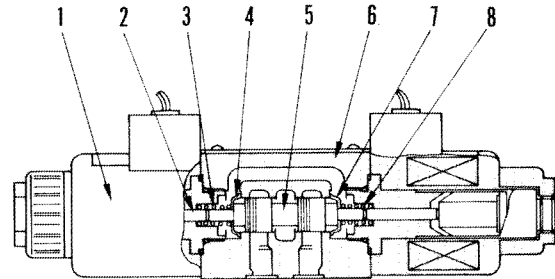
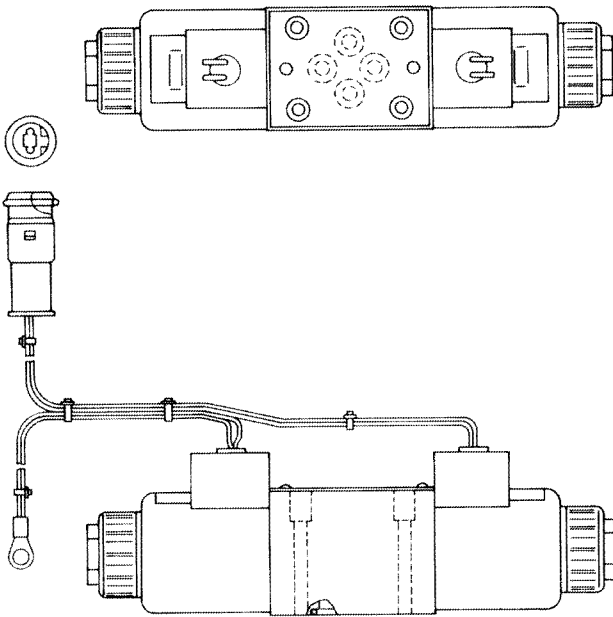


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Fig. 4

★ FOR MACHINES EQUIPPED WITH AUTO-DECELERATION SYSTEM

1. SOLENOID VALVE



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FUNCTION

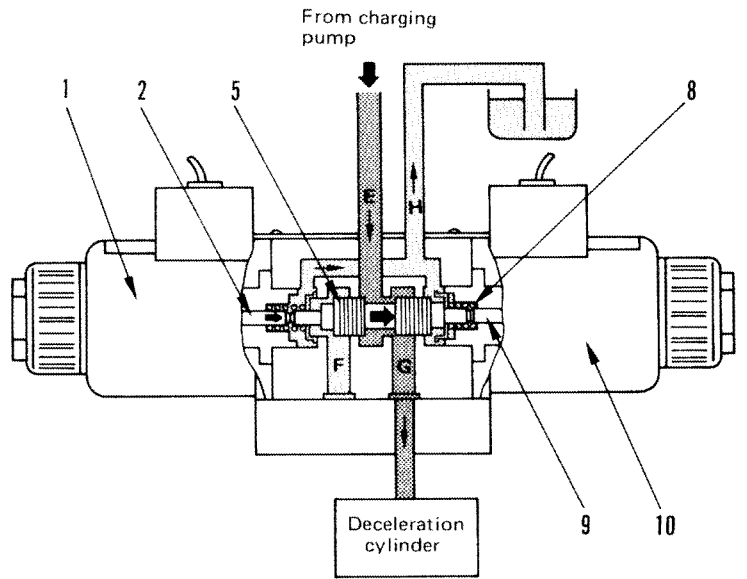
- The solenoid valve is operated by an electric signal sent from the limit switch (which is interlocked with the travel control lever) and release the oil flow from the charging pump.

1. Solenoid assembly
2. Push-pin
3. Spring
4. Spring retainer
5. Spool
6. Valve body
7. Spring retainer
8. Spring

OPERATION

1. Work equipment, travel, and swing control levers in OPERATION

If the control levers are set to OPERATION the limit switch which interlocks with them will be operated to excite solenoid (1), then pushpin (2) will push spool (5) in the direction of the arrow (➡) to close ports E and F and open ports F and H, E and G. As a result, the oil from the charging pump flows from port E to G to operate the deceleration cylinder.

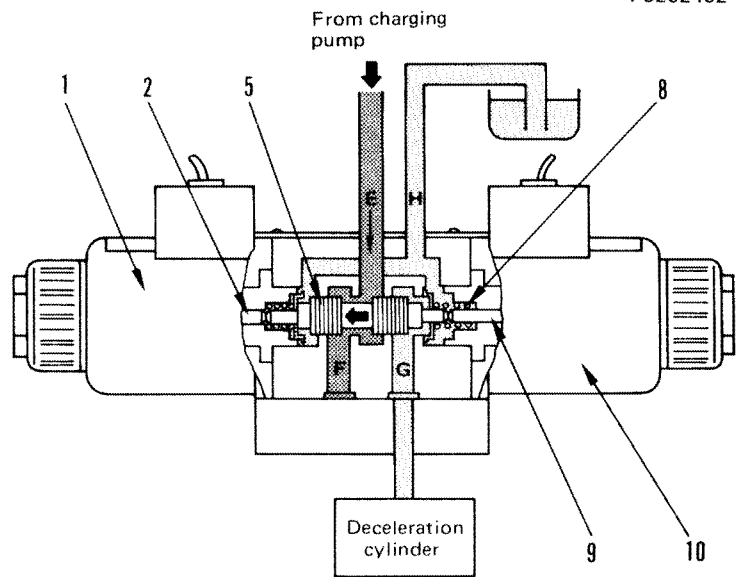


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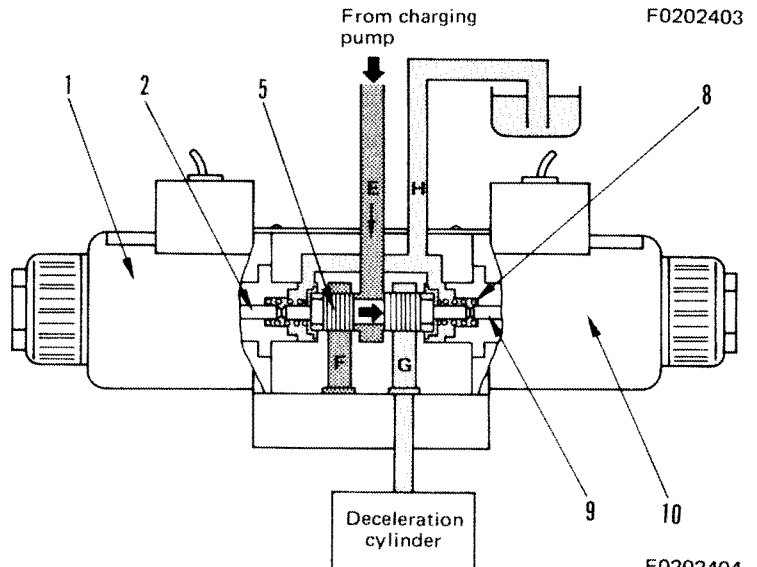
2. Work equipment, travel, and swing control levers at NEUTRAL

If the control lever is set to the neutral position, the limit switch will turn off to turn off solenoid valve (1) and energize solenoid valve (10). As a result, spool (5) is pushed by push pin (9) in the direction of the arrow (←) and ports H and G are opened to drain some of the oil in the deceleration cylinder. (At this time, the engine speed is lowered to the first deceleration speed.)

At the same time, ports E and F are opened, and the oil from the charging pump flows into port F through port E and stops at the block. After 0.2 seconds, the controller operates solenoid valves (1) and (10) to push back spool (5) in the direction of the arrow (➡), and each port is closed. The deceleration cylinder is stopped at a midway position. After four seconds, the controller operates solenoid valves (1) and (10) again to push spool (5) in the direction of the arrow (←) to open ports H and G. As a result, the oil in the deceleration cylinder is drained and the engine speed goes down to the second deceleration speed.



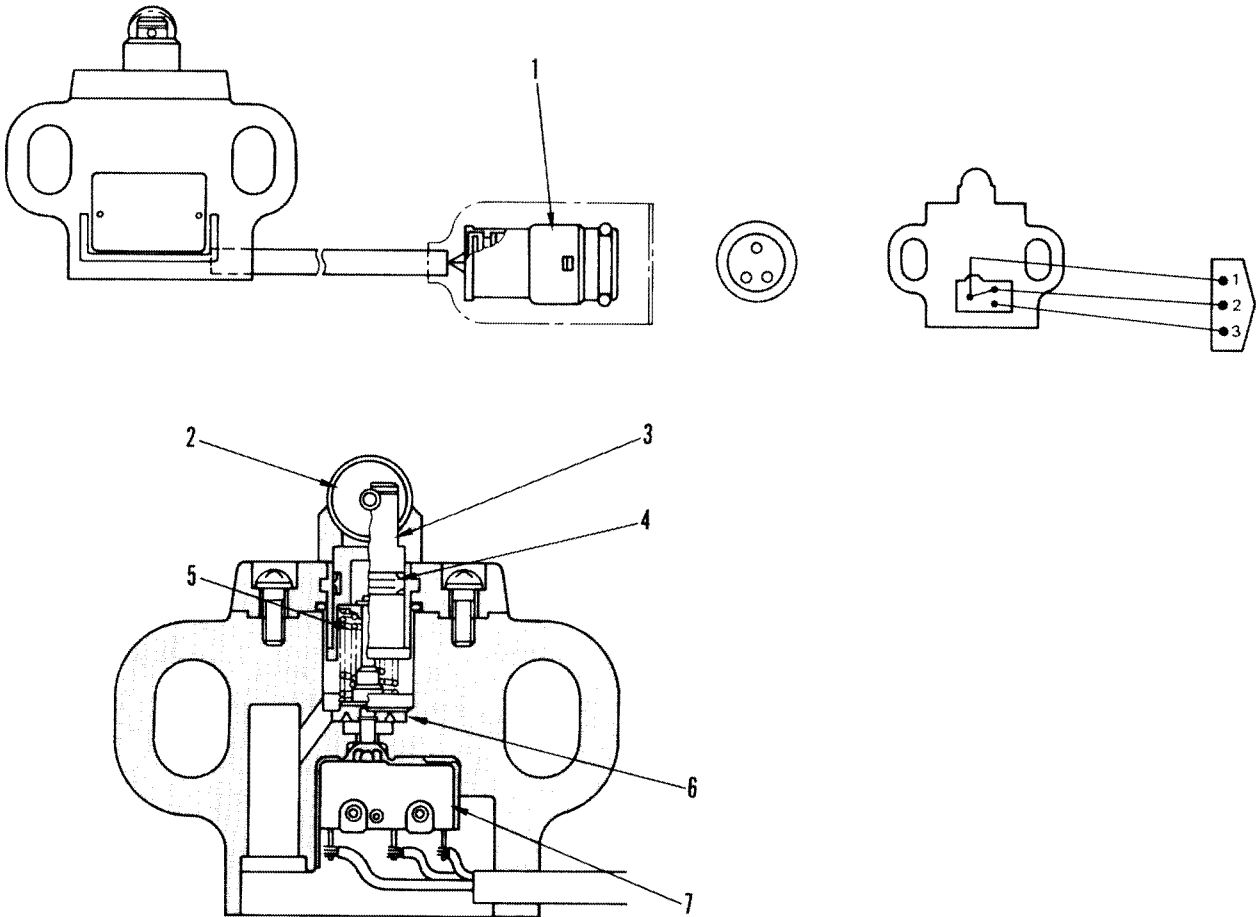
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★ FOR MACHINES EQUIPPED WITH AUTO-DECELERATION SYSTEM

2. LIMIT SWITCH

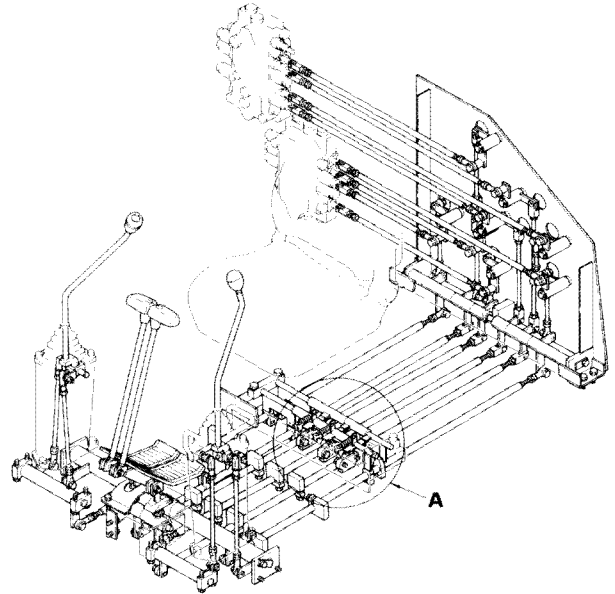


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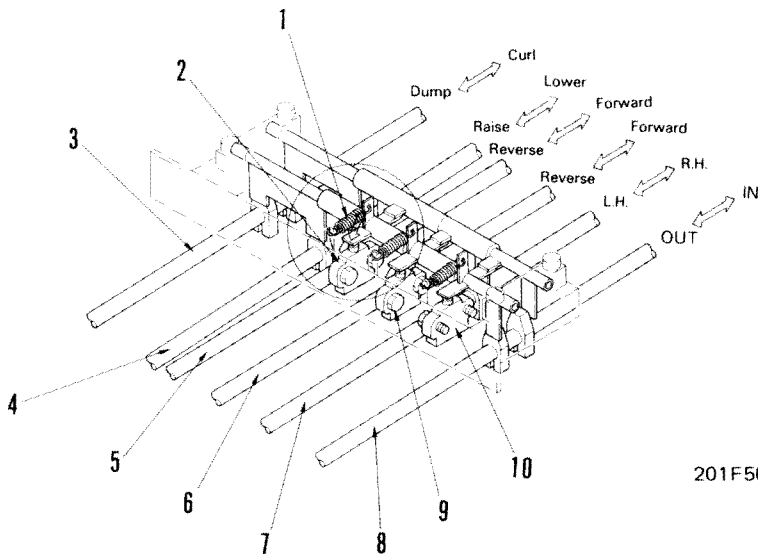
- | | |
|--------------|-----------------|
| 1. Connector | 5. Spring |
| 2. Roller | 6. Seal |
| 3. Shaft | 7. Limit switch |
| 4. Dust seal | |

★ FOR MACHINES EQUIPPED WITH AUTO-DECELERATION SYSTEM

- A limit switches which energizes the solenoid for straight travel, swing mechanical brake and swing priority control are set in the control lever linkage.
- When the control lever is operated, the motion of the linkage rod will cause lever (11) to turn when pushed by bosses (12) and (13). This will, in turn, actuate limit switch (2), (9) and (10) to make contact (ON). When the control lever is moved back to the neutral position, rod will move back to its original position. Lever (11) will be moved back by spring (1), causing limit switch (2), (9), and (10) to break contact (OFF).
- Thus, the limit switch energizes the solenoid valve when the contact is made (ON), thereby controlling the pilot circuit.

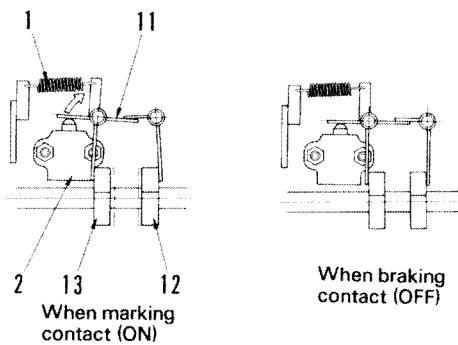


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Detail A

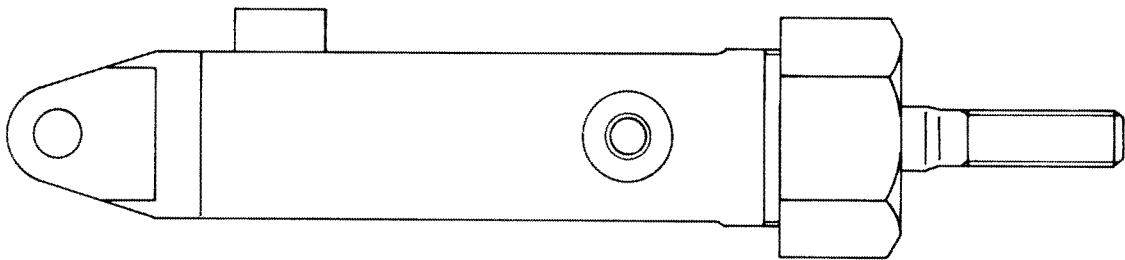
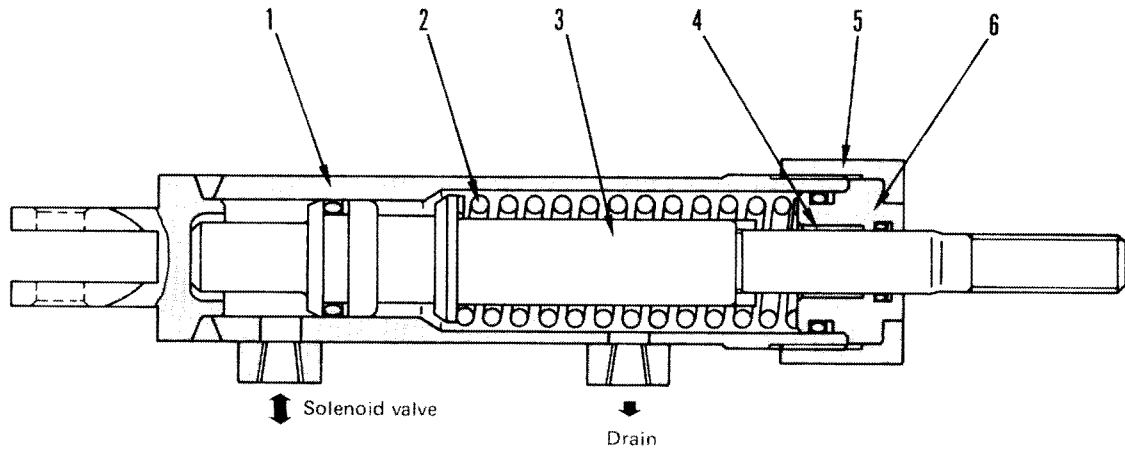


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1. Spring
2. Limit switch (work equipment)
3. Bucket control rod
4. Boom control rod
5. R.H. control rod
6. L.H. control rod
7. Swing control rod
8. Arm control rod
9. Limit switch (travel)
10. Limit switch (swing)
11. Lever
12. Boss
13. Boss

★ FOR MACHINES EQUIPPED WITH AUTO-DECELERATION SYSTEM

3. DECELERATOR CYLINDER



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- | | |
|------------------|------------|
| 1. Cylinder | 4. Bushing |
| 2. Return spring | 5. Nut |
| 3. Piston | 6. Stopper |

ENGINE

12 TESTING AND ADJUSTING



Testing and adjusting data	12- 2
Tool list for testing and adjusting	12- 3
Adjusting valve clearance	12- 4
Measuring exhaust gas color	12- 5
Measuring compression pressure	12- 6
Measuring blow-by pressure	12- 7
Adjusting fuel injection timing	12- 8
Testing and adjusting fan belt tension	12- 9
Adjusting fuel control lever	12-10
Adjusting auto-deceleration system (If equipped)	12-11



When carrying out testing, adjusting or troubleshooting, stop the machine on level ground, apply the lock levers and block the tracks.



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.

TESTING AND ADJUSTING DATA

Applicable machine model			PC60, 60L, 60U-5		
Engine model			4D95L-1		
Item	Condition	Unit	Standard value	Permissible value	
Engine speed	High idling speed	rpm	2250 – 2350		
	Low idling speed		850 – 900		
	Rated speed		2100		
Exhaust gas color	Quick acceleration	Bosch scale	4.5	5.5	
	At high idling		–	–	
Valve clearance (at cold)	Intake valve	mm	0.35		
	Exhaust valve		0.50		
Compression pressure (SAE30 oil)	Oil temperature: 40 – 60°C	kg/cm ²	30	21	
	(Engine speed)	(rpm)	(320 – 360)	(320 – 360)	
Blow-by pressure (SAE30 oil)	Water temperature: Inside operating range At high idling	mmH ₂ O	50	100	
Oil pressure (Water temperature: Inside operating range)	At high idling	kg/cm ²	3.0 – 6.0	2.1	
	At low idling (SAE30)		1.0	0.7	
	At low idling (SAE10W)		0.8	0.7	
Oil temperature	All speed (oil in oil pan)	°C	80 – 110	120	
Fuel injection timing	B.T.D.C.	degree	16	16	
Fan belt tension (Alternator side)	Deflection when pushed with a force of 6 kg	mm	8	6 – 8	