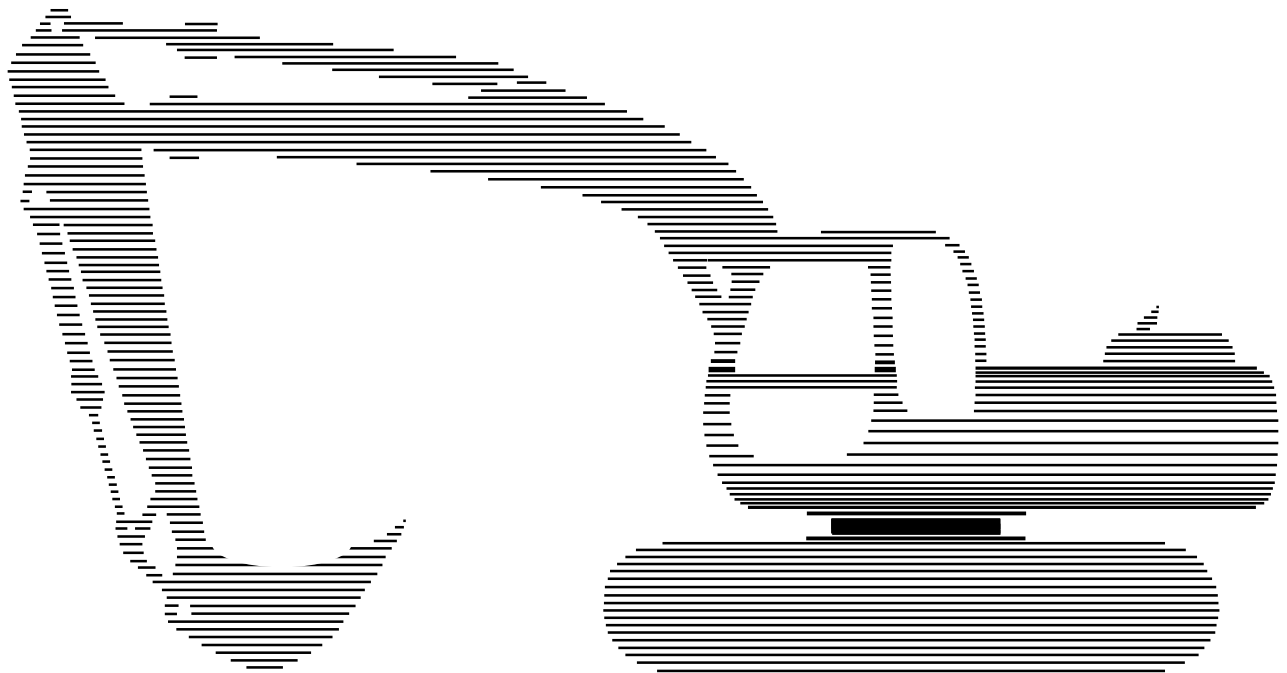


EX285 EXCAVATOR

TECHNICAL MANUAL OPERATIONAL PRINCIPLE



All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication.

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T1-1-6

SPECIFICATIONS

NOTES

CONTROL SYSTEM

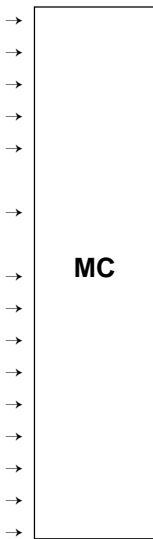
OUTLINE

Microcomputer built-in main controller (MC) is provided to control machine operation. Electronic sensing signals from the engine control dial, various sensors and switches are sent to the MC.

After processing the sensing signals in the logic circuits, the MC sends out the control signals to the EC motor and solenoid valve unit to control the engine, pump, and valve operations.

Sensing signals (Input signals)

- EC sensor
- Engine control dial
- Pump control pressure sensor
- Pump delivery pressure sensor
- N sensor
- Pressure switches (Travel - Front - Boom raise)
- Pilot pressure sensor (Arm roll-in)
- Auto-idle switch
- Learning switch
- HP mode switch
- E mode switch
- Travel mode switch
- Work mode switch
- Key switch
- Power boost switch



Control signals (Output signals)

→ EC motor:

- Engine control**
 - Normal control
 - HP mode control
 - E mode control
 - Auto-Idle control
 - Engine learning control

→ Solenoid valve (SD):

- Pump control**
 - Speed sensing control

→ Solenoid valve (SC, SG, SI):

- Valve control**
 - Power Boost control
 - Arm regenerative control
 - Travel motor swash angle control

→ Work mode control

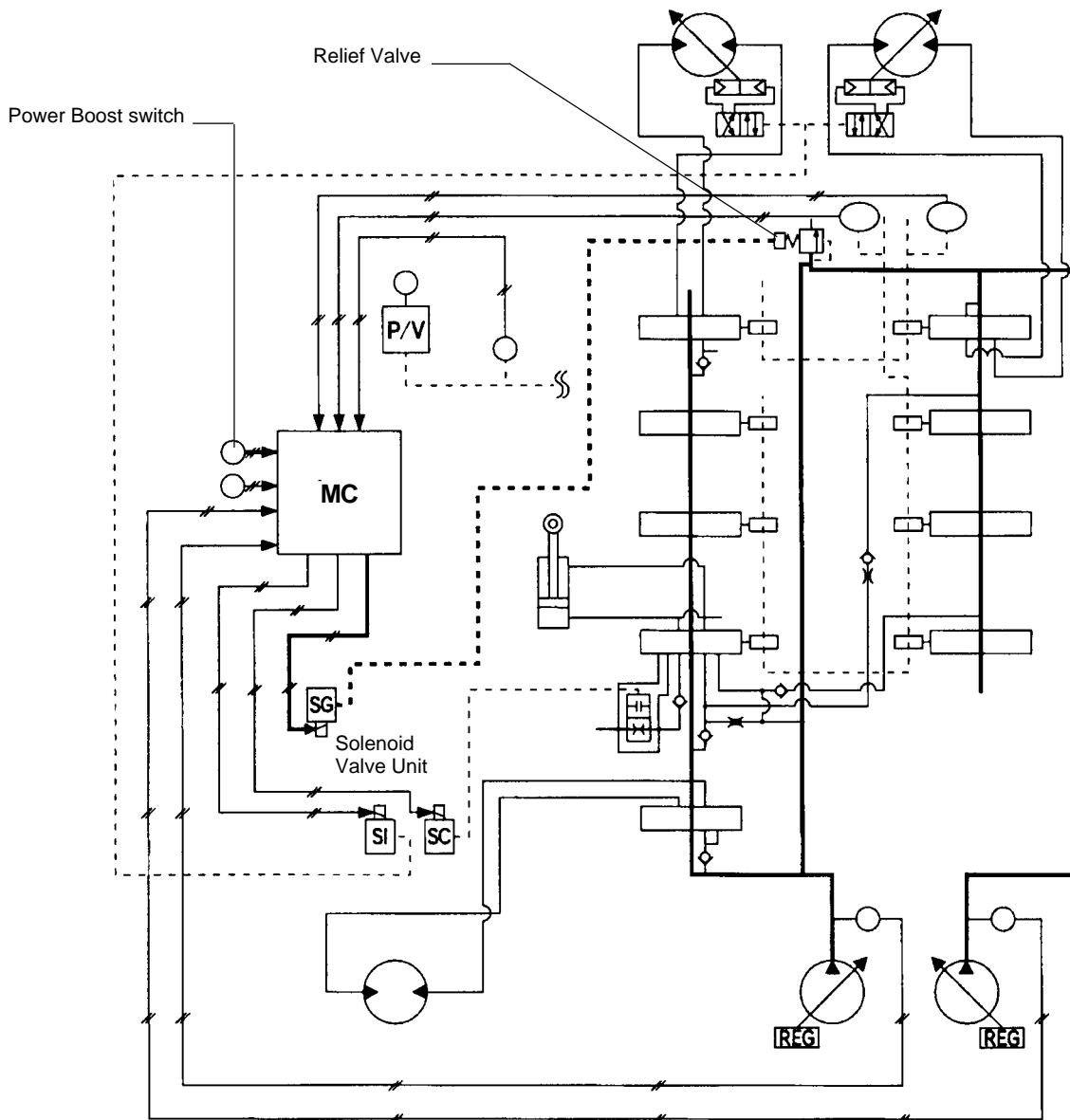
CONTROL SYSTEM

Power Boost Control

Purpose: To increase hydraulic power by temporarily increasing the main relief pressure.

Operation: When the power boost switch is turned

ON, the MC magnetizes solenoid valve unit (SG) for 8 seconds. When magnetized, solenoid valve unit (SG) supplies pilot oil pressure to the relief valve to increase the relief set pressure.



ELECTRICAL SYSTEM

OUTLINE

The electrical system is classified into the main circuit, control circuit, and monitor circuit.

- Main circuit operates the engine and accessories.
- Control circuit functions to control operations of the engine, hydraulic pump, and valves (including actuators such as solenoid valves, MC (Main Controller), switch box, sensors, and pressure switches).
- Monitor circuit operates the monitor devices consisting of the monitors, sensors, and switches.

- Engine Stop Circuit:
Stops the engine with the solenoid (Synchro-Start) when the key switch is placed in OFF position.
- Engine Emergency Stop Circuit:
Stops the engine in case of the oil pressure drop. (Monitor, solenoid (Synchro-Start), oil pressure switch).

In this group, the functions and construction of the main circuit are introduced.

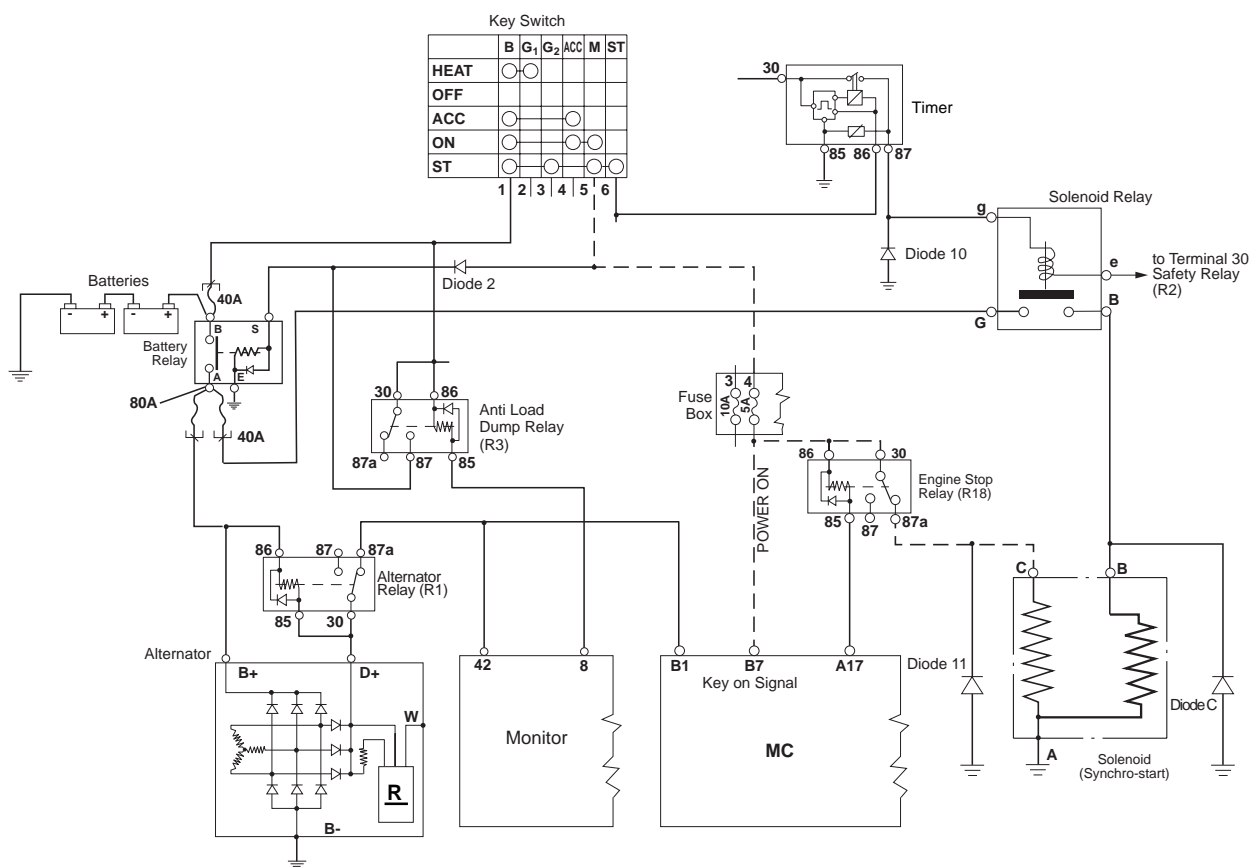
- Electric Power Circuit:
Supplies electric power to all electric system on this machine.
(Key Switch, Batteries, Fuses (Fuse Box and Fusible 40A), Battery Relay)
- Bulb Check Circuit:
Checks for blown indicator bulbs.
(Key Switch, Battery Relay, Fuses, Monitor)
- Preheat Circuit:
Helps start the engine in cold weather.
(Key Switch, Glow relay, Air intake heater)
- Starting Circuit:
Starts the engine.
(Key Switch, Starter, Starter Relay)
- Charging Circuit:
Recharges batteries and supplies consumption electricity. (Alternator), (Regulator)
- Surge Voltage Prevention Circuit:
Prevents surge voltage from occurring when the engine is stopped.
(Anti Load Dump Relay)
- Accessory Circuit:
Works with the key switch placed in the ACC position. (Key Switch, Battery, Fuses)

ELECTRICAL SYSTEM

**ENGINE STOP CIRCUIT
(Key Switch: OFF)**

When the key switch is turned from the ON position to the OFF position, the signal instructing the MC that the key switch is ON, is cut off. Then, the MC moves the EC motor to the slow idle position. At the same time, the Synchro-Start solenoid

(terminal C related to the holding coil) located on the injection pump is de-energized causing the engine to stop for lack of fuel supply.



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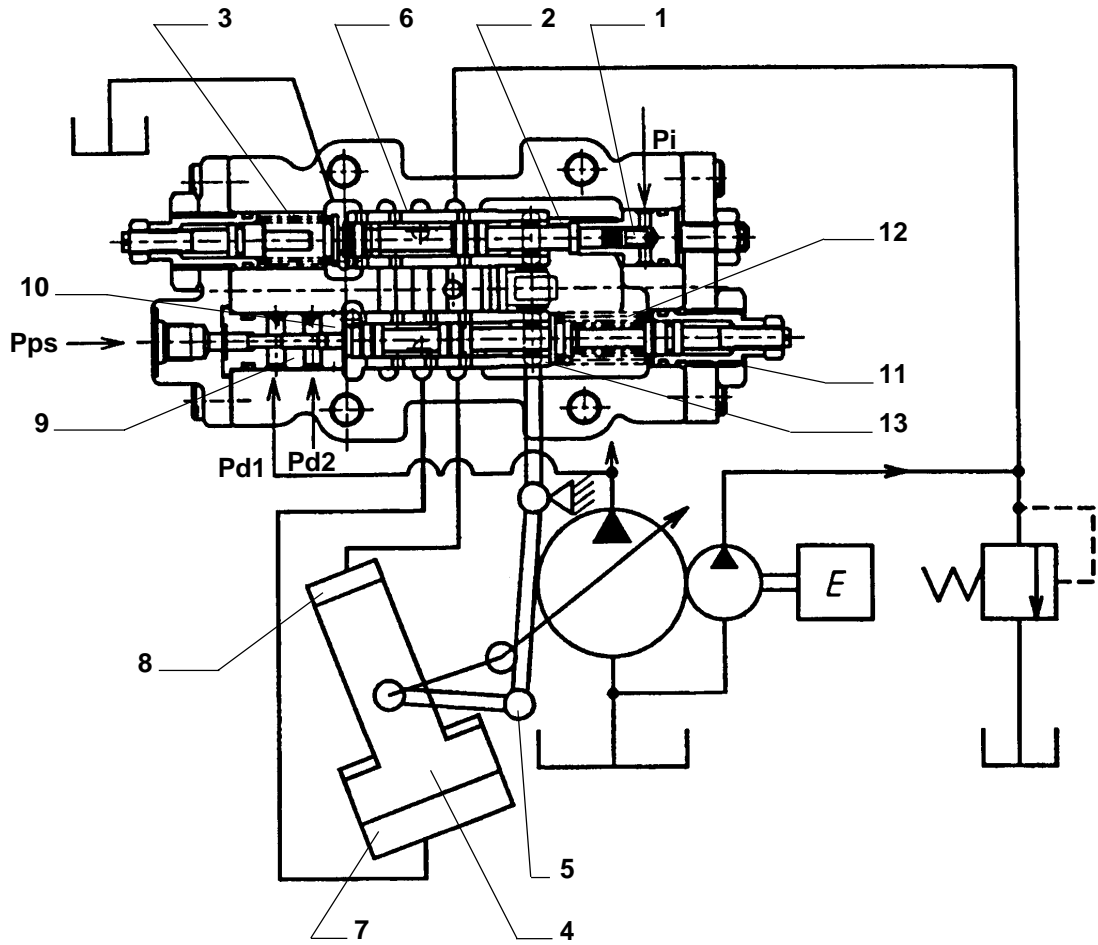


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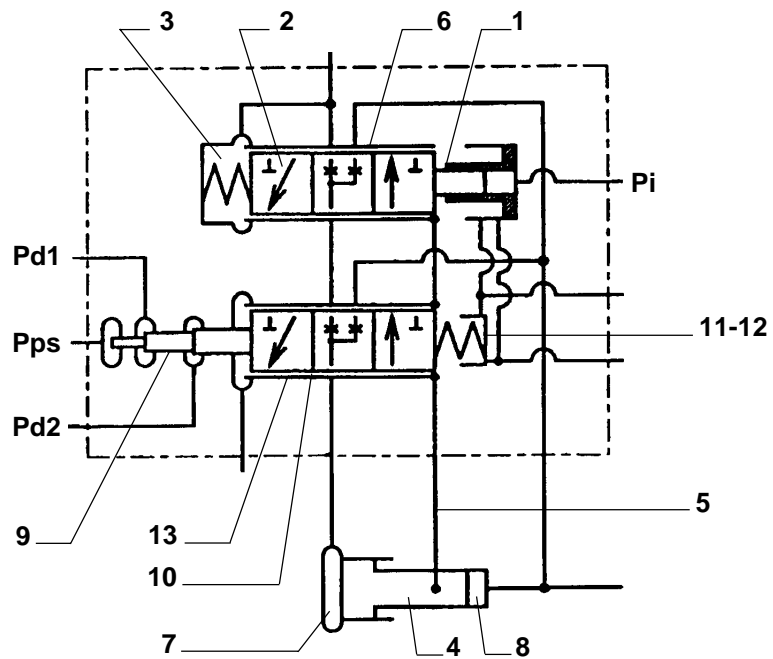
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PUMP DEVICE

Regulator operation



SM0012



SM0013

- 1 - Piston
- 2 - Spool B
- 3 - Spring
- 4 - Servo Piston
- 5 - Link
- 6 - Sleeve B
- 7 - Large Chamber

- 8 - Small Chamber
- 9 - Load Piston
- 10 - Spool A
- 11 - Inner Spring
- 12 - Outer Spring
- 13 - Sleeve A

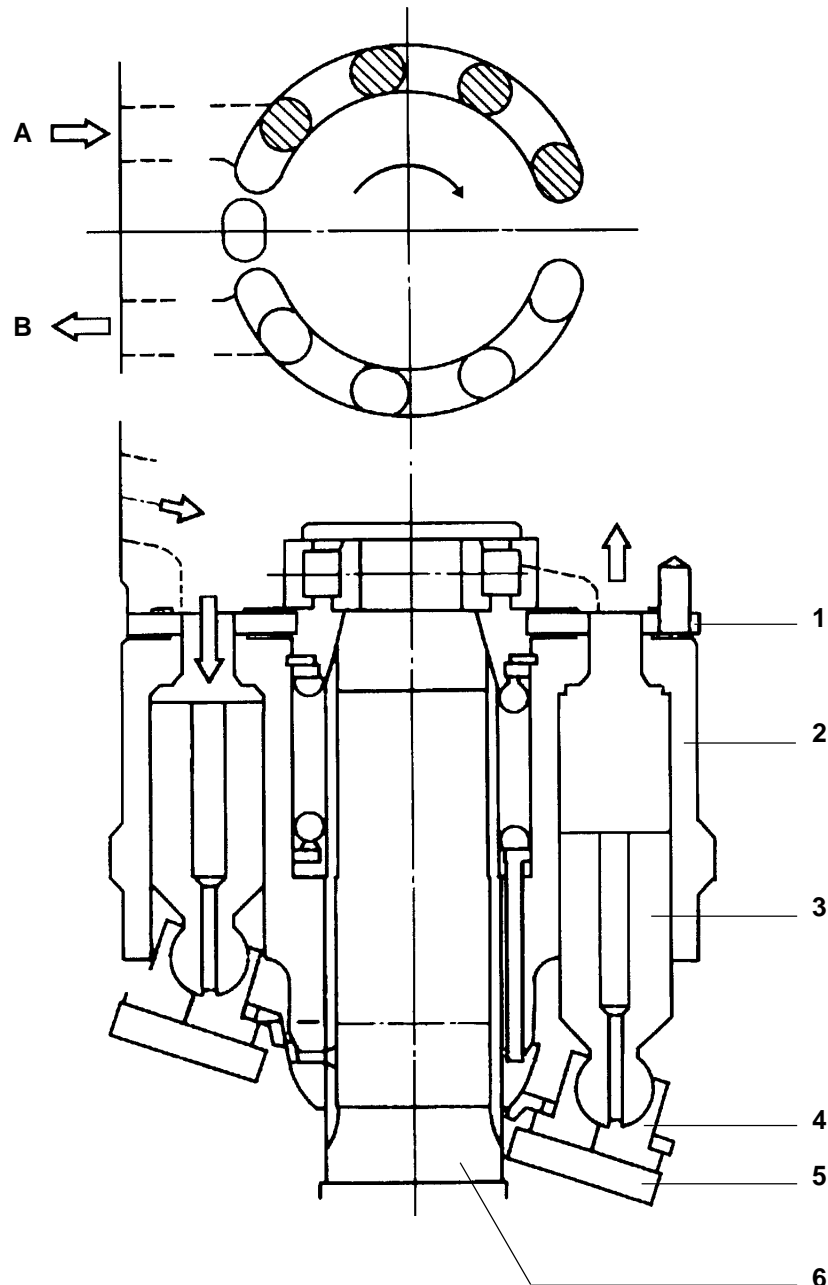
SWING DEVICE

Swing speed varies depending on the amount of oil delivered from the pump. From port A, high pressure oil is fed so that plunger (3) is pushed from the top to the bottom.

Shoe (4) then slides along swash plate (5), developing turning force.

Turning force is transmitted to the swing reduction gear unit via shaft (6). The return oil flows to outlet port B and returns to the hydraulic oil tank.

When pressure oil is fed to port B, the motor rotates in the opposite direction.

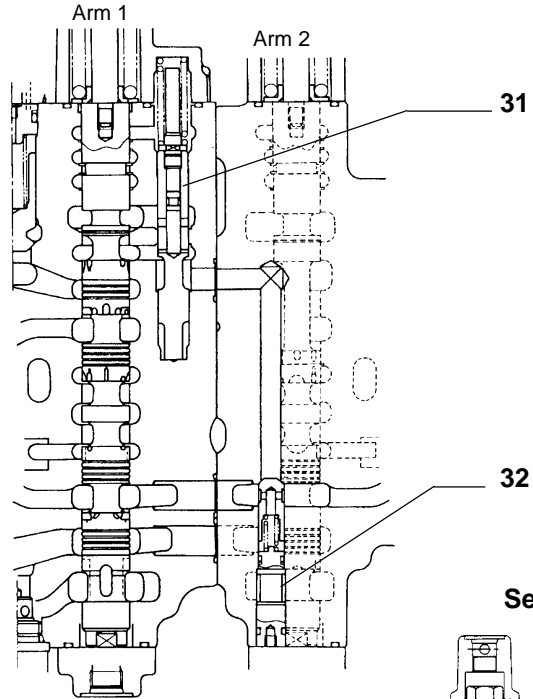


1 - Valve Plate
2 - Rotor
3 - Plunger

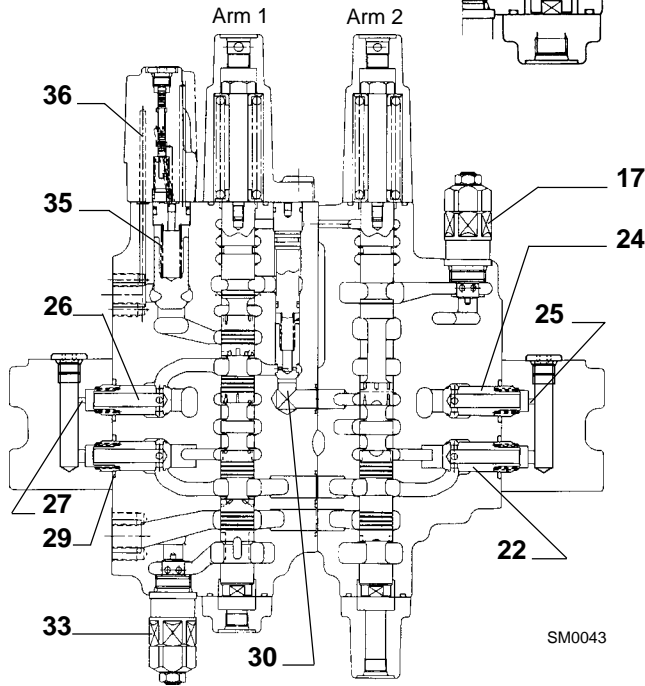
4 - Shoe
5 - Swash Plate
6 - Shaft

CONTROL VALVE

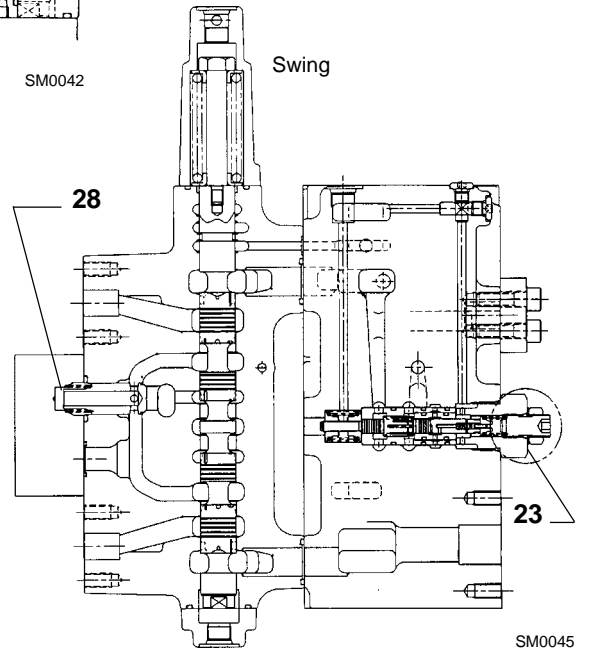
Section E (2)



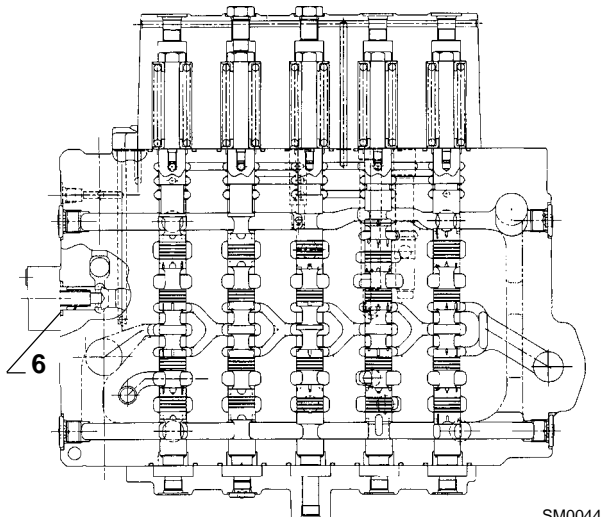
Section E (1)



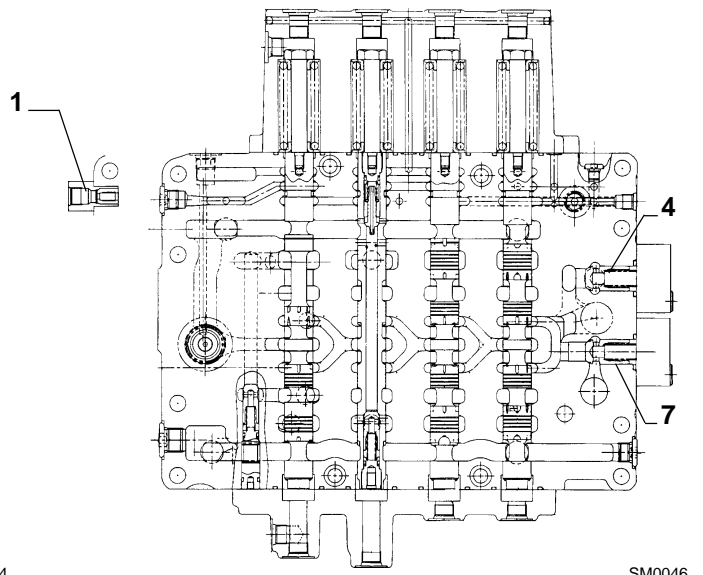
Section F



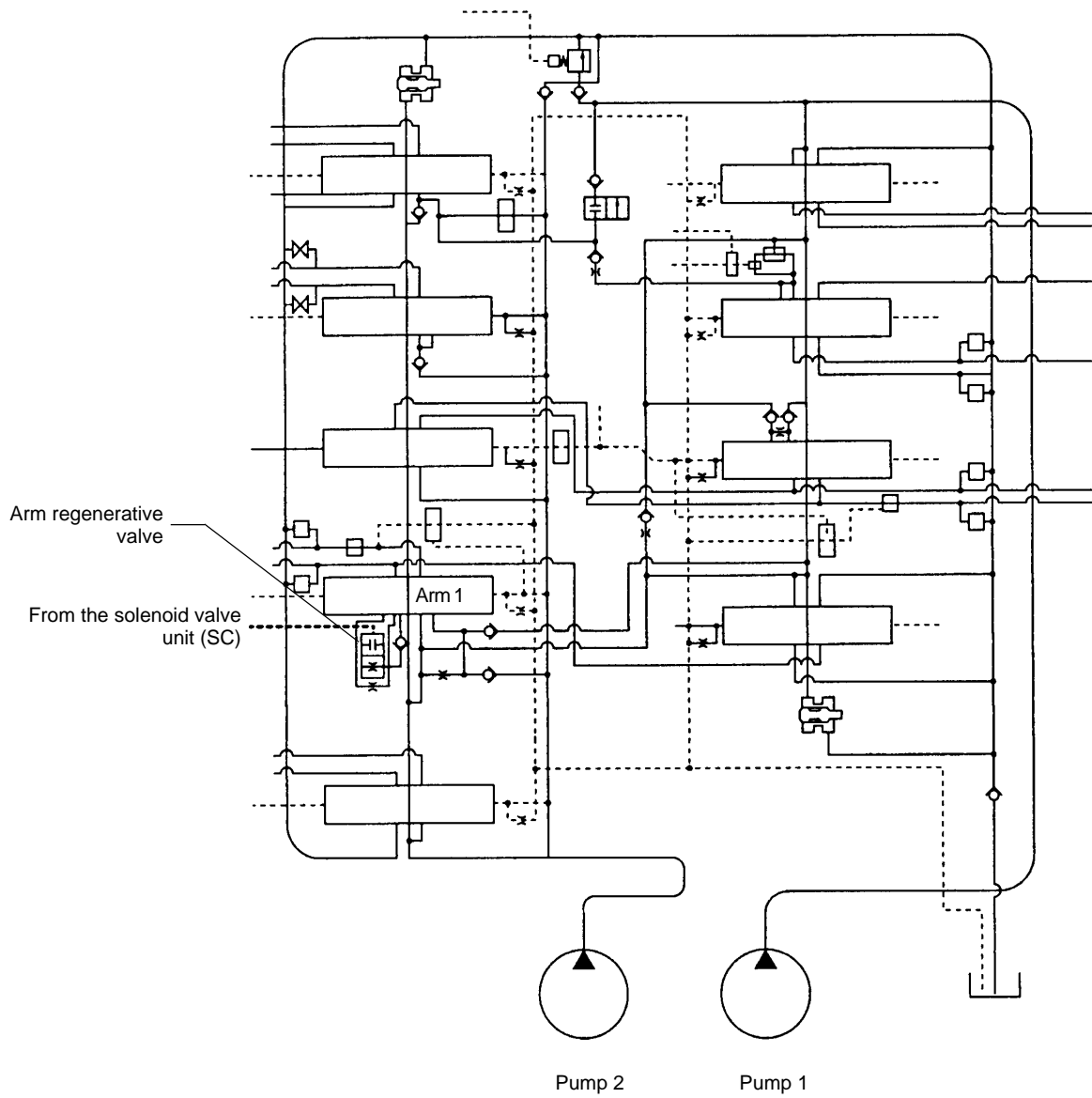
Section G



Section H



CONTROL VALVE



PILOT VALVE

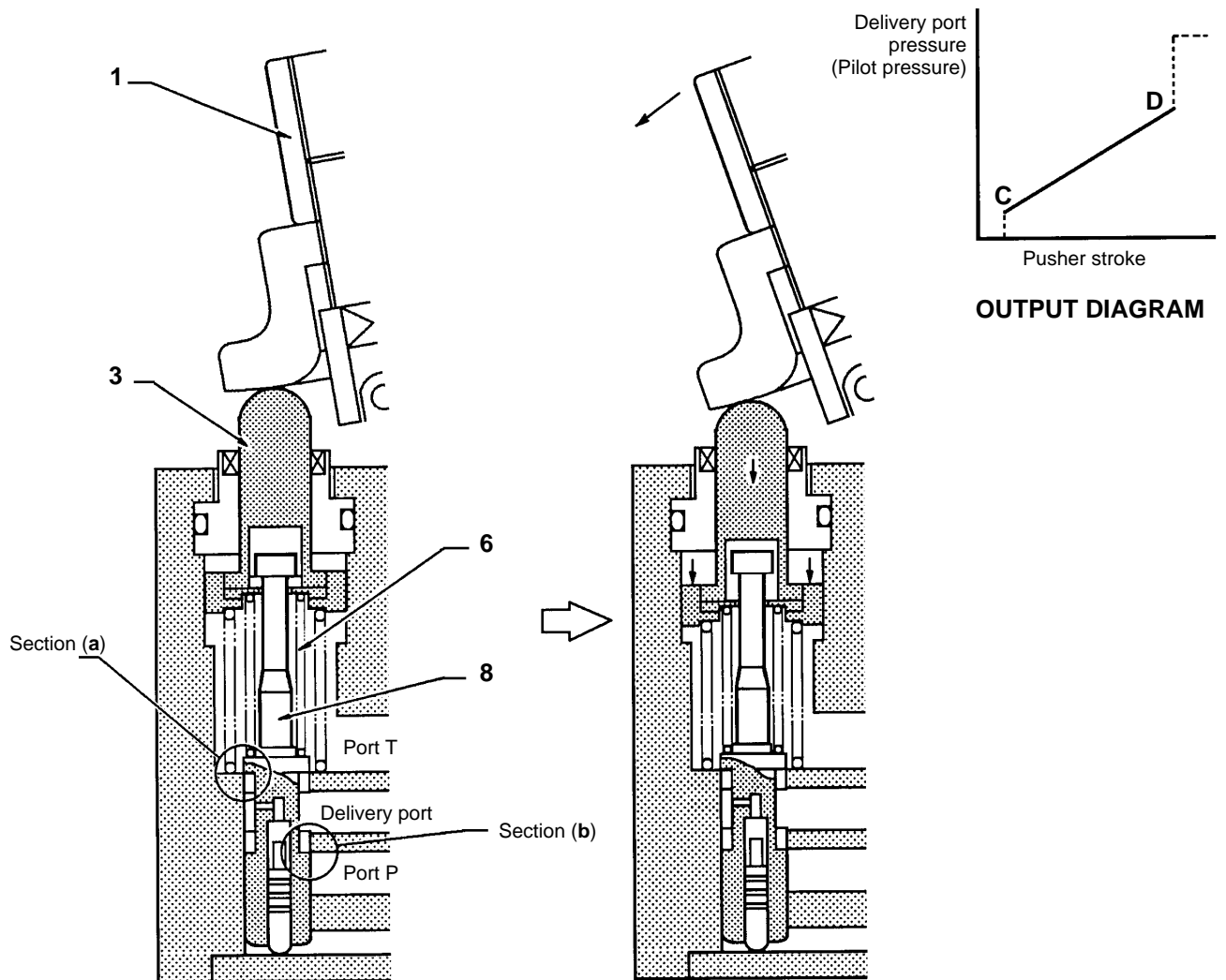
Operation corresponding to the control lever stroke
(Corresponding to C to D in the output diagram):

As control lever (1) is moved further to push pusher (3) downward, spool (8) is pushed down to open the notch at section (b), increasing oil pressure at the delivery port.

As pressure increases, the force to push up spool (8) increases. Then, when force to push up spool (8) exceeds the setting force of balance spring (6), spool (8) starts to move upward, compressing balance spring (6).

When spool (8) moves upward until the clearance at section (a) opens, the delivery port is opened to port T, stopping oil pressure increase at the delivery port and stopping movement of spool (8).

Accordingly, when compressed by pusher (3), spring force of balance spring (6) increases in proportion to the pusher stroke, Then, oil pressure increases to counteract against this spring force.



1 - Control Lever
3 - Pusher

6 - Balance Spring
8 - Spool

TRAVEL DEVICE

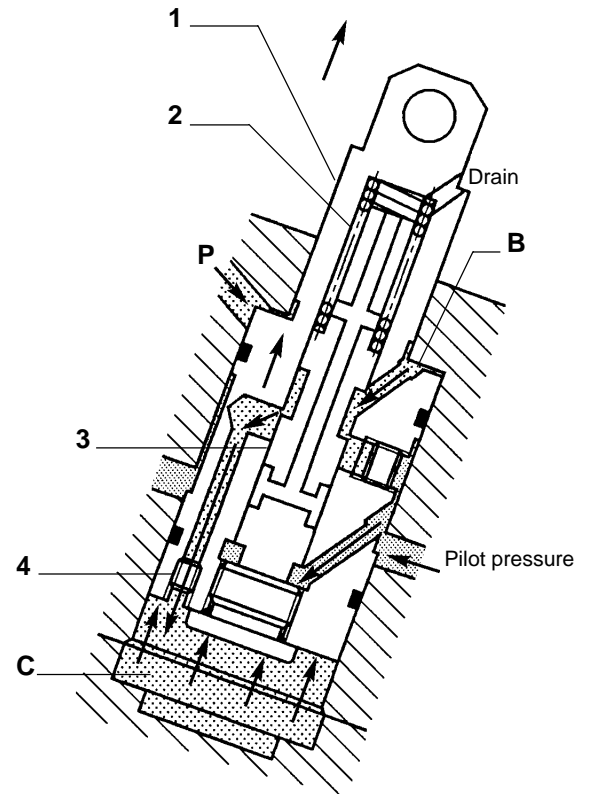
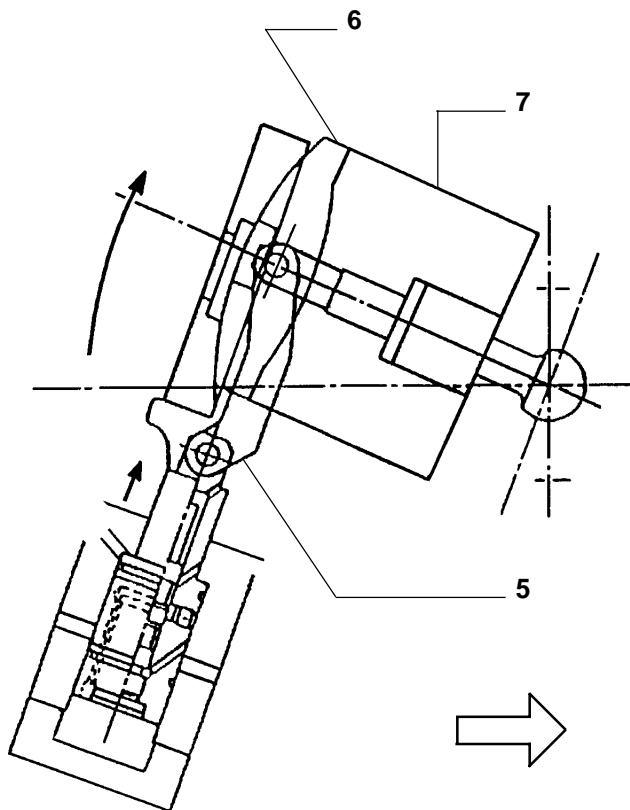
Travel Speed Selection

Servo piston (1) is interconnected to valve plate (6) via link (5) so that when servo piston (1) is moved, swash angle of rotor (7) is shifted through valve plate (6), leading to travel speed change.

• Slow speed 

When the slow speed travel mode is selected, the MC (Main Controller) does not send out an electronic control signal to the solenoid valve unit (SI). Therefore, speed change pilot pressure is not routed to servo piston (1). Thus, spool (3) is held down by spring (2). Then, pressure oil P from the motor port is led to both chambers "B" and "C".

Since the pressure-receiving area in chamber "C" is larger than that in chamber "B", servo piston (1) moves upward, increasing swash angle to the maximum. Accordingly, as the stroke of the plungers in the motor is increased, slower revolution of the travel motor for low speed mode is obtained.



- 1 - Servo Piston
- 2 - Spring
- 3 - Spool
- 4 - Orifice

- 5 - Link
- 6 - Valve Plate
- 7 - Rotor

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