Manual No. : KM-18GE
Vol. No. : TO18G-E-00

Technical Manual

(Operational Principle)

EX8000

Excavator

Service Manual (Manual No. KM-18GE) consists of the following three separate volumes;

Technical Manual (Operational Principle)	: Vol. No. TO18G-E
Technical Manual (Troubleshooting)	: Vol. No. TT18G-E
Workshop Manual	: Vol. No. W18G-E

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RADIATOR FAN MOTOR SPEED CONTROL

Function: Controls the radiator fan motor speed at two steps to maintain the engine coolant and intake air temperatures in the proper temperature range.

Operation:

1. The coolant sensor 2 (for radiator fan motor speed control) and intake air temperature sensors 1 and 2 send electrical signals to ECU depending on the detected temperatures.
2. ECU controls the radiator fan motor speed control solenoid valve according to the delivered signals in order to deliver pilot pressure oil to the radiator fan drive pump regulator. (Refer to COMPONENT OPERATION/Pump Device group for regulator operation.)
3. Thus, the delivery flow rate from the radiator fan drive pump is controlled, adjusting the radiator fan motor speed.
4. The detected data from the coolant sensor 2 and intake air temperature sensors 1 and 2 is transmitted to IDU through DLU and CAN.

Slow Speed Conditions:
Coolant temperature is 60°C (140°F) or lower, and intake air temperature is 35°C (95°F) or lower.

Fast Speed Conditions:
Coolant temperature is 65°C (149°F) or higher, or intake air temperature is 45°C (113°F) or higher.

Radiator Fan Motor Speed

	Pilot Pressure from Solenoid Valve (Current from ECU)	Radiator Fan Motor Speed (min^{-1})
Slow Speed	3.9 MPa (40 kgf/cm^2) [700 mA]	400
Fast Speed	0	1830±70

NOTE: The listed radiator fan motor speeds are those at the rated engine speed (1600 min^{-1}).

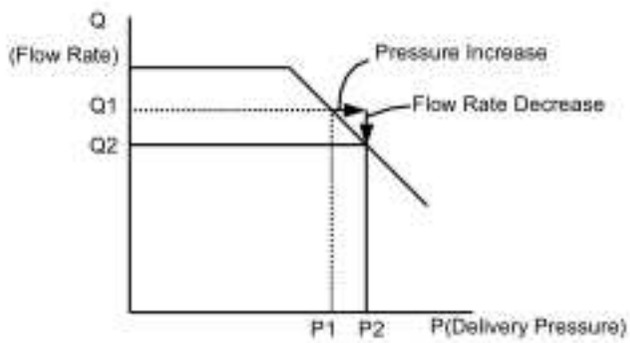
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Constant Torque Control (Main Pump, Flow Assistance Pump and Fan Motor Drive Pump)

- Overload Prevention Operation

NOTE: The illustration on the right page shows the main pump link mechanism. The fan motor drive pump link mechanism is identical to the main pump link mechanism.

1. When pump delivery pressure (P) increases from P1 to P2, compensation piston (16) pushes compensation rod (20) to the right until pushing force balances with outer spring (21) and inner spring (22).
2. Compensation rod (20) moves lever 2 (17) via pin (24). Lever 2 (17) rotates around pin (18) (secured in the housing) counterclockwise.
3. As pin (5) installed in feedback lever (12) is inserted into hole (19) on lever 2 (17), feedback lever (12) is rotated around pin (13) by lever (2) (17) clockwise, moving spool (3) to the right.
4. When spool (3) is moved, pump delivery pressure oil is routed into the large chamber of servo piston (14) through spool (3). Although the same pressure oil is routed into the small chamber, servo piston (14) moves to the right due to the difference in pressure receiving area between the servo piston ends.
5. As servo piston (14) moves, the pump swash angle is reduced so that the pump flow rate is reduced.
6. As servo piston (14) moves, feedback lever (12) is moved via pin (13). Since compensation rod (20) and lever 2 (17) do not move, feedback lever (12) is rotated around pin (5) counterclockwise, moving spool (3) to the left. Then, when the notches on spool (3) and sleeve (2) close the pressure oil passage to the large chamber of servo piston (14), servo piston (14) stops moving.
7. With the above operation, the pump flow rate decreases from Q1 to Q2, reducing the pump loads.



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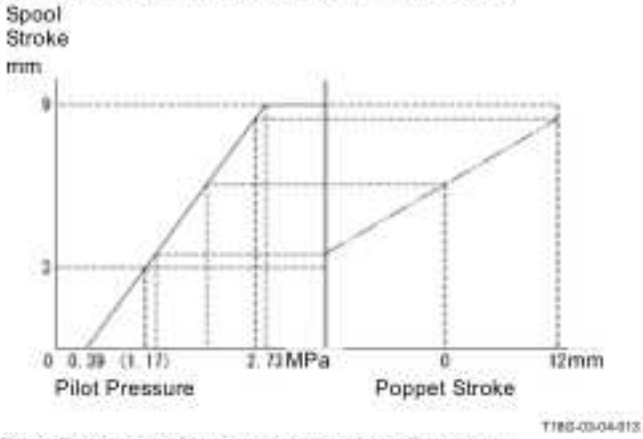
MAKE-UP VALVE

The make-up valve is provided in the flow regenerative circuit between the bottom ends and rod ends of boom cylinders, arm cylinders and bucket open/close cylinders. The make-up valve actuates during boom lower, arm roll-in and bucket open/close.

Boom Lower and Arm Retract

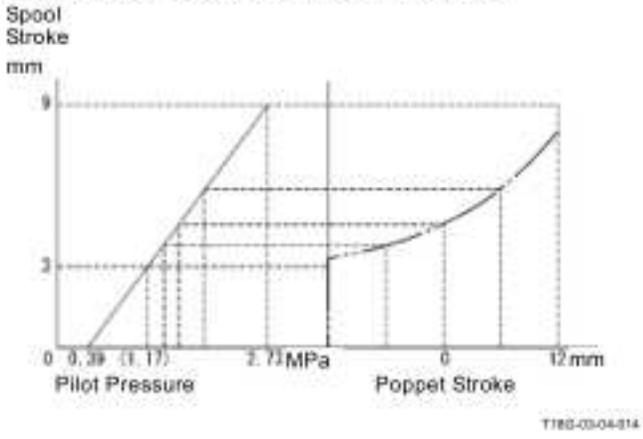
1. During boom lower or arm retract, ELU determines the target opening area by the spool in the make-up valve from the target control signal pressure, and sends the corresponding command current to the make-up solenoid valve.
2. The make-up solenoid valve supplies pilot pressure oil to the make-up valve in response to the command current to shift the spool in the make-up valve.
3. Flow rate of pressure oil from the bottom end of cylinder is adjusted by the poppet of the make-up valve, and goes to the rod end of cylinder according to the opening area by the spool.

Pilot Pressure Characteristic (Boom Lower)

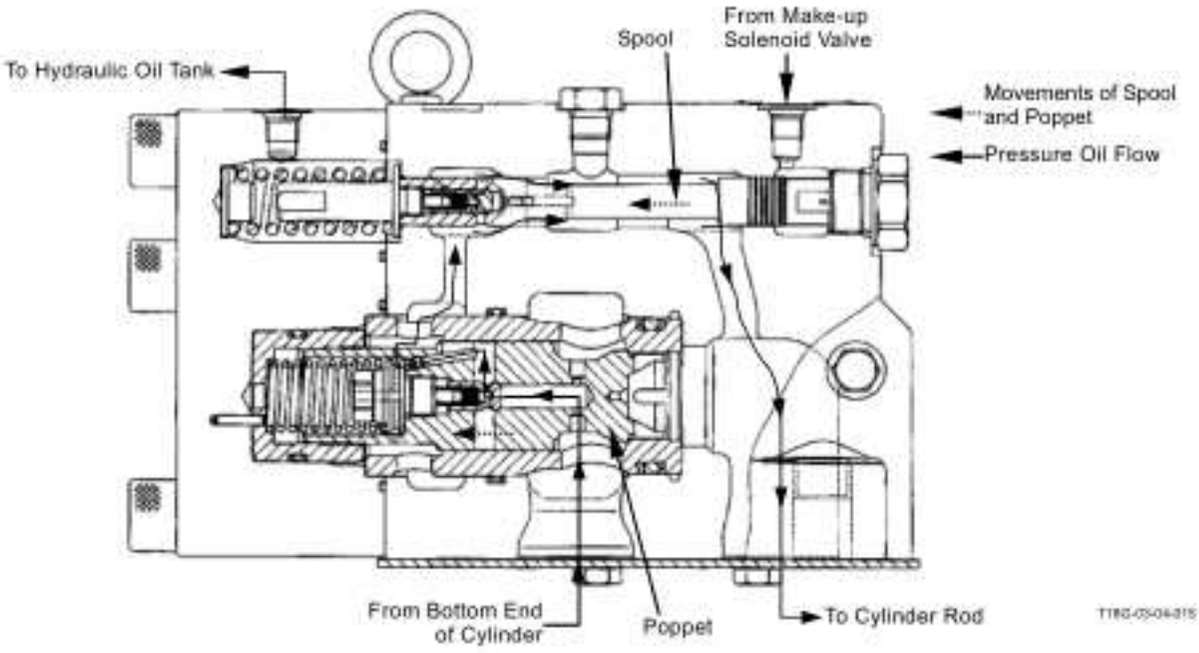


T1EG-03-04-813

Pilot Pressure Characteristic (Arm Retract)



T1EG-03-04-814



T1EG-03-04-815

NOTE: This figure shows the section of the make-up valve for boom lower.

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