valve, which directs flow to the lower port of the pawl cylinder, holding the pawl in the engaged position.

In the Park Brake **off** position, node 4 directs voltage to the other end of the pawl directional control valve, which directs flow to the upper port of the pawl cylinder, holding the pawl in the disengaged position.

Drum Motors

See Figure 5-3 on page 5-6.

Drum 1 and Drum 2 Motor

Drums 1 and 2 are driven by variable-displacement motors. (See EDC below).

Provision for motor cooling is not required. Normal working flow is sufficient for cooling.

Electronic Displacement Control (EDC)

Motor displacement is varied by the internal EDC solenoid valve acting on an internal hydraulic actuator. The actuator is controlled by the solenoid until the system pressure reaches the setting of the pressure compensated override (see PCOR below).

When the control handle is in the center position, the motor is at maximum displacement (high torque, low speed). When the control handle is moved off center, the control system outputs a proportional voltage signal (4.5–10Vdc) to the EDC valve's solenoid, which shifts the valve's spool in accordance with crane programming. The valve spool shifts to allow flow to or from the actuator, which moves the swashplate. The valve spool is also mechanically connected to the actuator by a spring.

Control input for the control signal is the 1–5V from the pressure transducer.

The solenoid coil normally draws 180mA–450mA at 70°F (21°C).

Time Delay orifice—An orifice in the flow to the EDC actuator dampens the response time of the actuator, and by extension, dampens motor response to changes in control handle position and load. This helps dampen any abruptness in motor operation during changes in control handle position.

The orifice will restrict flow in and flow out of the servo chamber, resulting in lag in both directions.

Pressure Compensation Override (PCOR)

The PCOR ensures that the motor delivers sufficient torque when required. When working pressure (a reflection of load) reaches 4,057 psi (280 bar), the PCOR begins shifting the EDC actuator toward maximum displacement. It does this by using the working pressure to shift the spool, which redirects to tank the pilot circuit that supplies the barrel end of the actuator. This causes the actuator to retract, moving the swashplate for a larger displacement.

The valve is fully open at the maximum system pressure.

Counterbalance with Pilot-Operated Relief

Attached to the motor is a counterbalance proportional valve to which the working pressure hoses are connected. The purpose of the valve is to:

- ensure that the hoist powers down
- hold the load when the control handle is in center
- ensure smooth start, stop, and changes in hoist speed
- relieve momentary excess pressure that may occur when bringing a heavy load to a quick stop.

The valve functions differently in each direction:

Lowering and holding a load—When flow is in the lowering direction, the counterbalance valve functions as a hydraulically operated proportional spool valve which checks motor outflow in one position and in the other position allows motor outflow.

When there is no working pressure (handle in center), a check valve halts hydraulic flow in the return side of the **down** circuit. This prevents the hoist motor from turning in the **down** direction. As the control handle is moved off-center in the **up** direction, the working pressure begins to act on the valve, which begins to shift to the unchecked position to allow motor outflow.

When the control handle is moved toward center, the counterbalance valve begins to close, slowing the load. At center, the check valve is again closed, preventing motor outflow and downward movement of the load.

An orifice in the unchecked circuit prevents abruptness in starting and changes in hoist speed.

Pilot-operated relief valve—This relief valve protects the motor from excessive pressure, such as might occur when bringing a heavy load to a quick stop when lowering. The valve is factory set to 5,800 psi (400 bar).

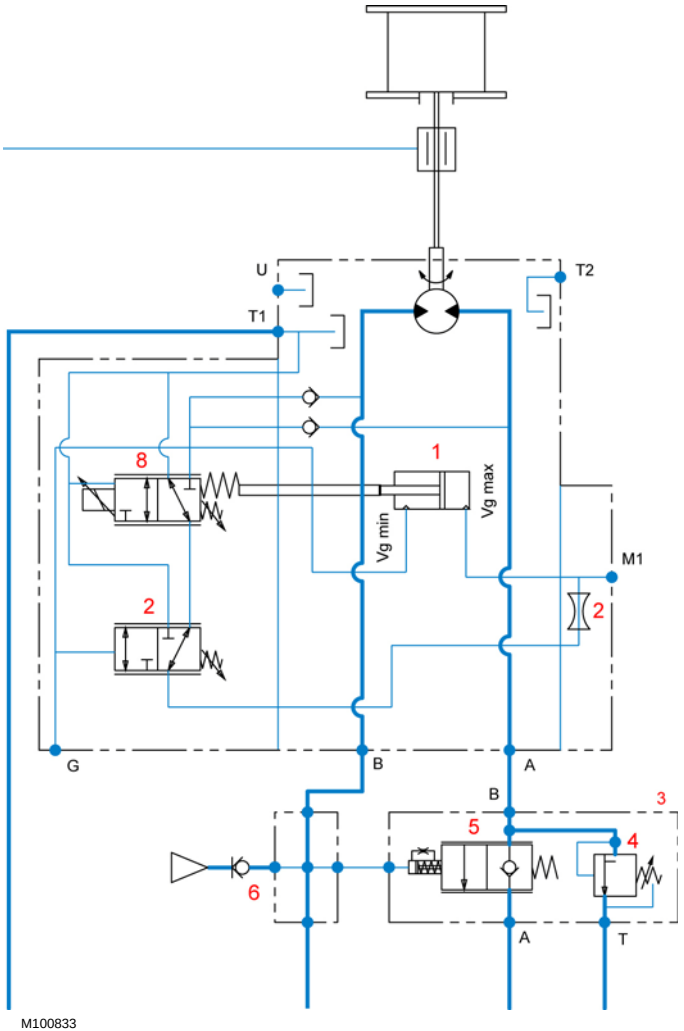
Raising a load—When system flow is in the **up** direction, the counterbalance valve remains in the unchecked position and has no effect on operation.

Anti-Cavitation

This valve is normally checked except in the event a heavy load is brought to a quick stop that momentarily drives the motor faster than return fluid can enter the low-pressure side of the motor. In this circumstance, a source of additional return flow is pulled through the anti-cavitation check valve. The return source is at tank-return-line pressure.

Test Meter Port

Port M1 is in the PCOR output pilot circuit to the EDC hydraulic cylinder.



Working Flow

Pilot or other non-working flow

Item	Description
1	EDC Actuator
2	Time Delay Orifice
3	Counterbalance Valve Assembly
4	Relief Valve
5	Counterbalance Valve
6	Anti-Cavitation Valve
7	Pressure Compensation Relief Valve (PCOR)
8	Electronic Displacement Control (EDC) Valve

For continuation of hydraulic circuits, see Figure 5-2 on page 5-2.

Figure 5-3 Hoist Drum 1 and 2 Motor Hydraulic Diagram