

# Description

## Lock-up System

### Lock-up Clutch

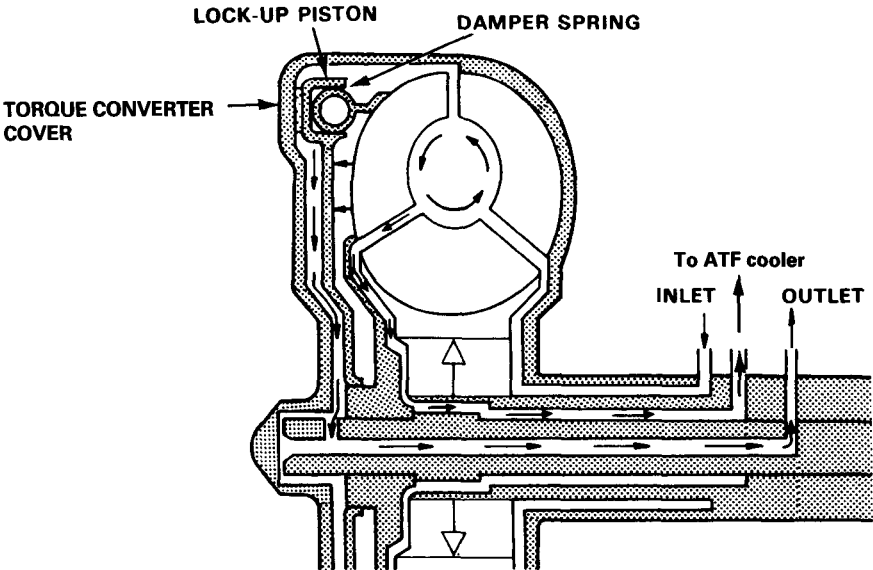
#### 1. Operation (clutch on)

With the lock-up clutch on, fluid in the chamber between the converter cover and lock-up piston is discharged, and the converter fluid exerts pressure through the piston against the converter cover. As a result, the converter turbine is locked on the converter cover firmly. This bypasses the converter, placing the vehicle in direct drive.

#### Power flow

The power flows by way of:

Engine  
↓  
Drive plate  
↓  
Torque converter cover  
↓  
Lock-up piston  
↓  
Damper spring  
↓  
Turbine  
↓  
Mainshaft

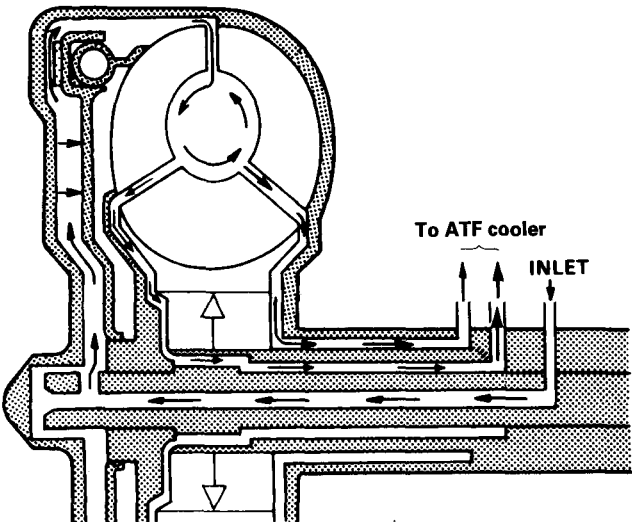


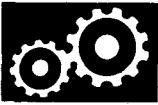
#### 2. Operation (clutch off)

With the lock-up clutch off, fluid flows in the reverse of CLUTCH ON. As a result, the lock-up piston moves away from the converter cover, and the torque converter lock-up is released.

#### Power flow

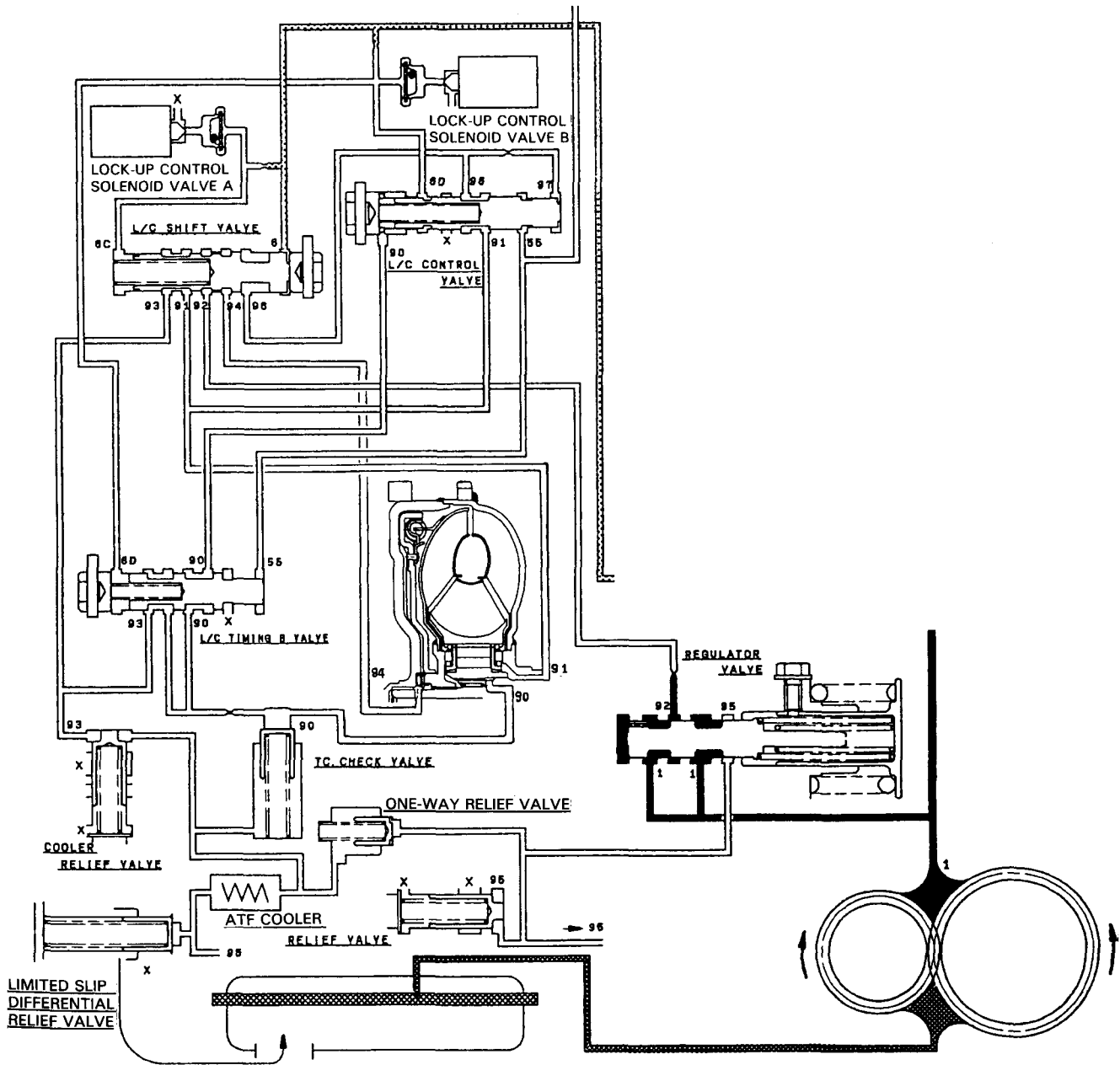
Engine  
↓  
Drive plate  
↓  
Torque converter cover  
↓  
Pump  
↓  
Turbine  
↓  
Mainshaft





In **3/M** position and **D** position (2nd, 3rd, and 4th gear), pressurized fluid is drained from the back of the torque converter through a passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the main-shaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, the TCM optimizes the timing of the lock-up system. Under certain conditions, the lock-up operation is applied during deceleration, in **3/M** position in (2nd, 3rd, and 4th gear), and in **D** position (3rd and 4th gears).

The lock-up shift valve controls the range of lock-up according to lock-up control solenoid valves A and B, and throttle valve B. When lock-up control solenoid valves A and B activate, modulator pressure changes. Lock-up control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the TCM.



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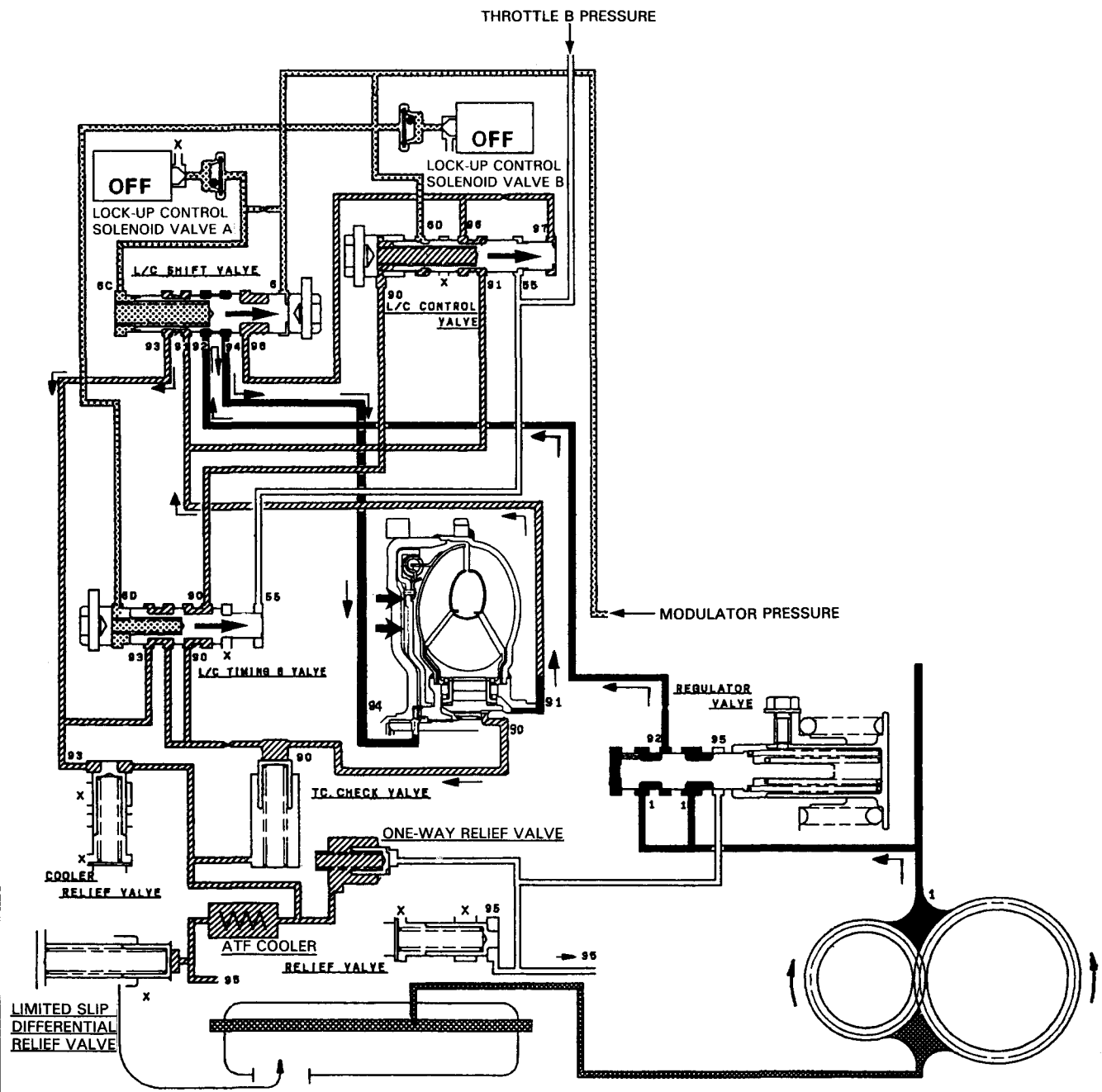
# Description

## Lock-up System (cont'd)

### No Lock-up

Pressurized fluid regulated by the modulator works on both ends of the lock-up shift valve and on the left side of the lock-up control valve. Under this condition, the pressure on both ends of the lock-up shift valve are equal, and the shift valve is moved to the right side by valve spring tension. Fluid from the ATF pump flows through the left side of the lock-up clutch to the torque converter; the lock up clutch is OFF.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.





# Description

## Lock-up System (cont'd)

### Half Lock-up

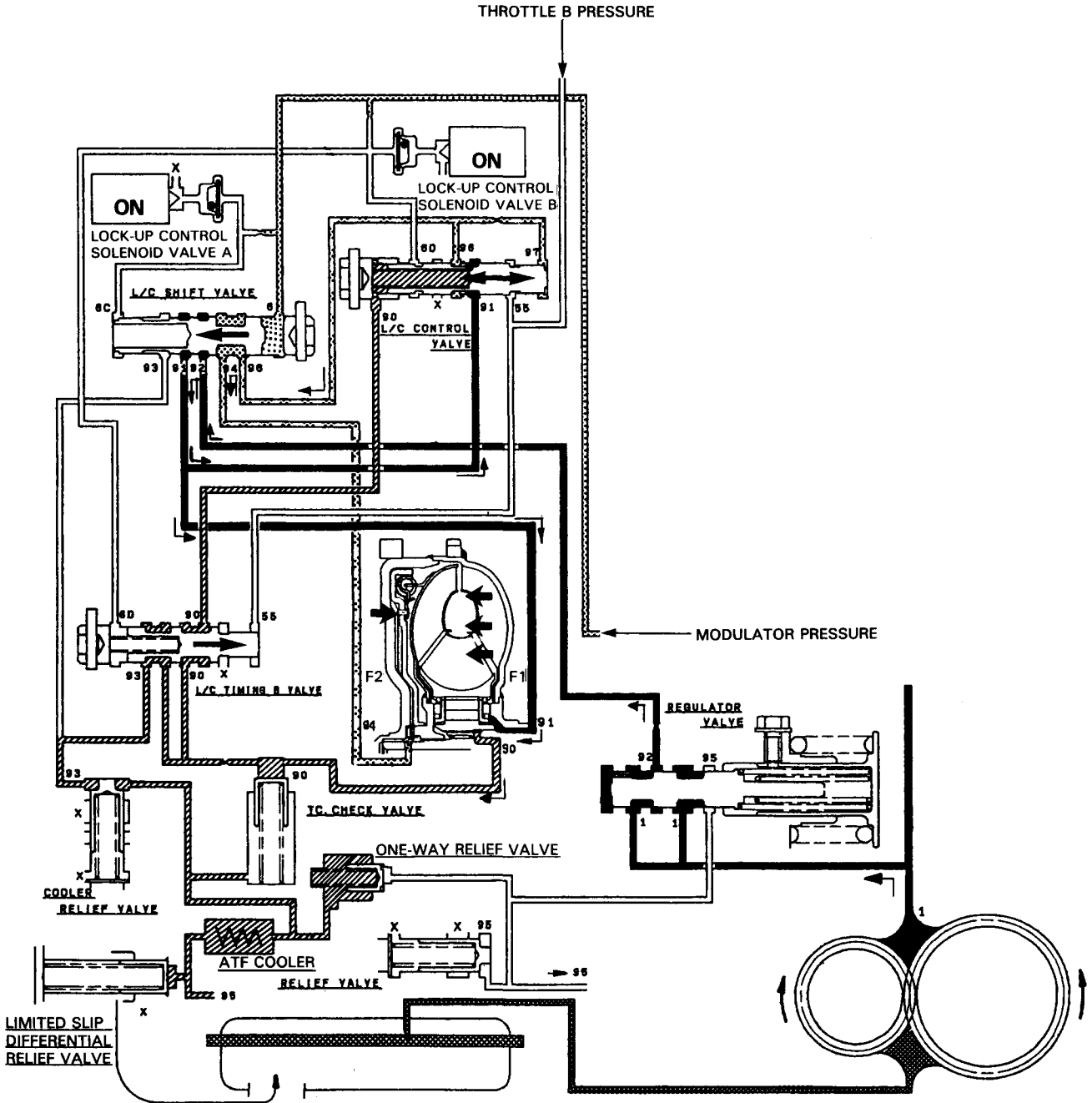
Lock-up Control Solenoid Valve A: ON    Lock-up Control Solenoid Valve B: ON

Modulator pressure is released by solenoid valve B, causing modulator pressure in the left cavity of the lock-up control valve to lower.

Also, modulator pressure in the left cavity of the lock-up timing valve B is low. Throttle B pressure is still low at this time, so, lock-up timing valve B is kept on the right side by spring force.

With lock-up control solenoid valve B turned ON, the lock-up control valve is moved somewhat to the right side, causing back pressure (F2) to lower. This allows move fluid (F1) to work on the lock-up clutch to engage the clutch. Back pressure (F2), which still exists, prevents the clutch from engaging fully.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.





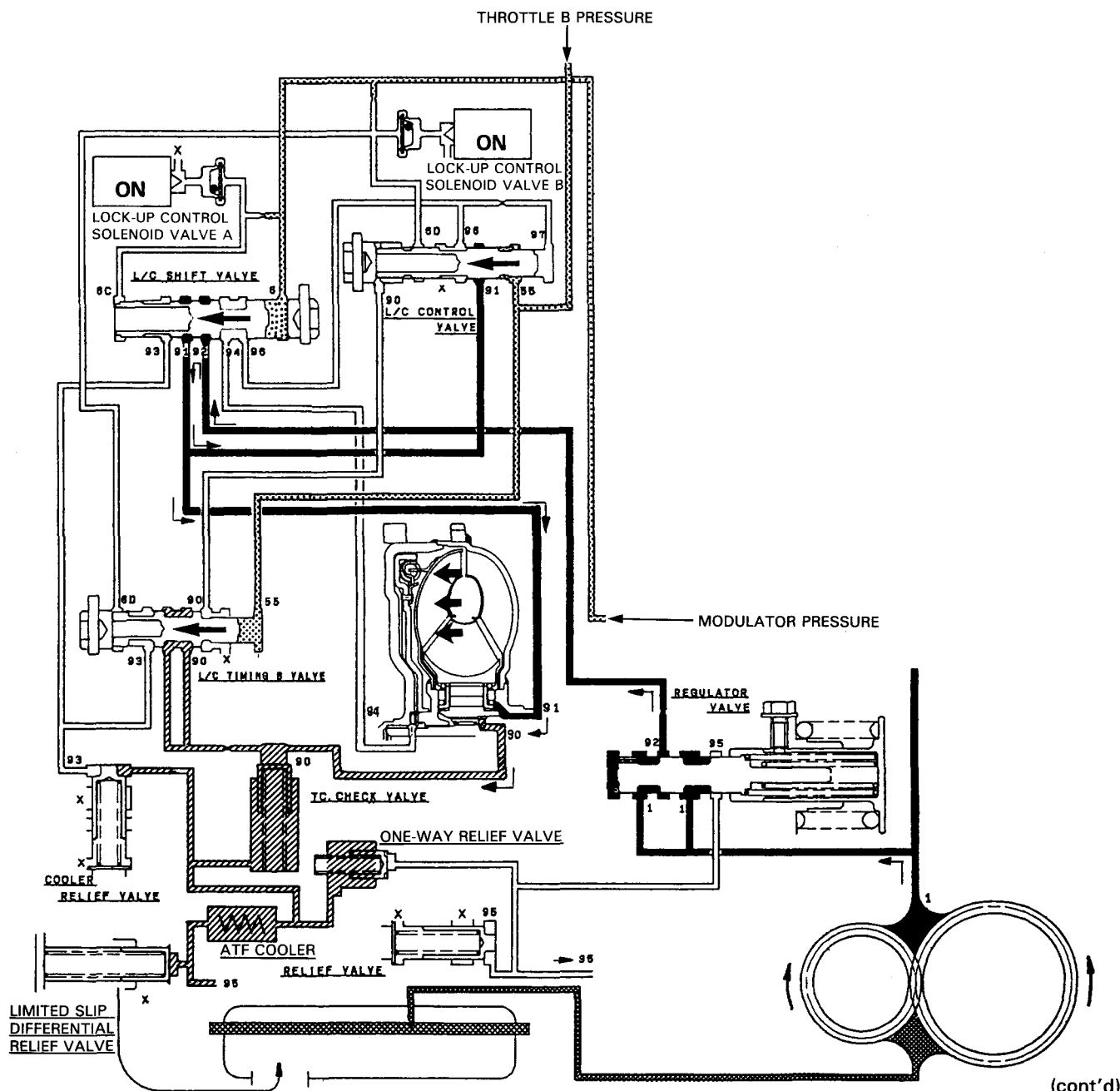
### Full Lock-up

Lock-up Control Solenoid Valve A: ON      Lock-up Control Solenoid Valve B: ON

When the vehicle speed further increases, the throttle B pressure is increased in accordance with the throttle opening. The lock-up timing valve B overcomes the spring force and moves to the left side. Also this valve closes the fluid port leading to the torque converter check valve.

Under this condition, the throttle B pressure working on the right end of the lock-up control valve becomes greater than that on the left end (modulator pressure in the left end has already been released by the solenoid valve B); i. e., the lock-up control valve is moved to the left side. As this happens, the torque converter back pressure is released fully, causing the lock-up clutch to be engaged fully.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



(cont'd)

# Description

## Lock-up System (cont'd)

### Deceleration Lock-up

Lock-up Control Solenoid Valve A: ON      Lock-up Control Solenoid Valve B: Duty Operation (ON ↔ OFF)  
The TCM switches the solenoid valve B to ON and OFF alternately at high speeds under certain conditions.  
The slight lock-up and half lock-up regions are maintained so as to lock the torque converter properly.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.

