Transmission Hydraulics Stages of Initialization

Matthew Whitten
Brookhaven College

Starting the hydraulic system.

- When a vehicle is started is there fluid in every space it needs to be?
  - No. What happens to fluid when it is not being pushed up? It falls
- Does a transmission instantly have the fluid pressure and flow it needs to operate?
  - No. It needs at most 3 seconds to fill the circuits for operation.

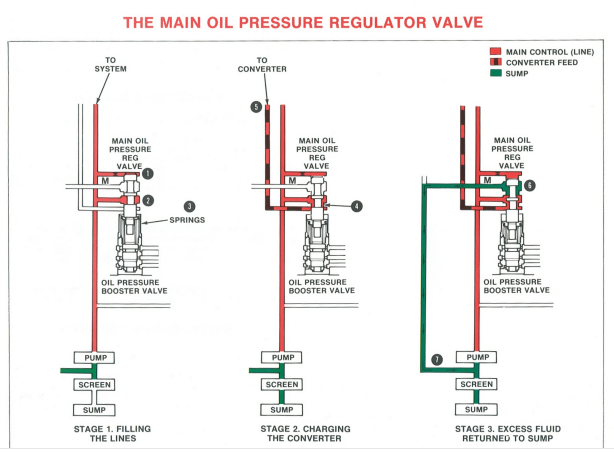
Stages of initialization

- These are common across most vehicle lines.
- These stages start the most basic operation of any hydraulic automatic transmission.
- Consists of three stages.

What are these stages?

- Before anything can fill anything how do we deliver the fluid within the transmission?
  - The lines, cavities, and hydraulic circuits must be filled.
- What connects the power source (engine) to the transmission?
  - Torque converters do not work when there is air in the mix.
- At idle there may me excessive fluid when nothing is used, where can we deposit this fluid?
  - sump

Three Stages of Initialization



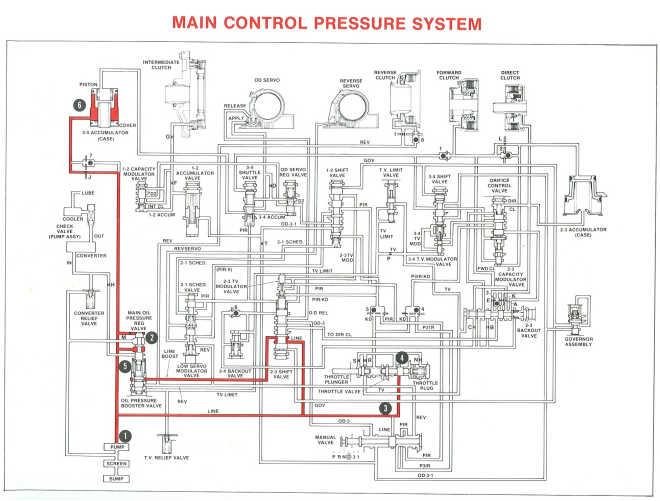
First stage of Initialization

- Filling of the hydraulic circuits, lines, and cavities.
- On a previously started transmission this process is almost instantaneous.
- What can cause this process to take longer than it is designed for? (faults)
  - Discuss.

Second stage of initialization

- The torque converter is the connection between the engine to the transmission.
- It only operates when it is full of fluid.
- When a vehicle is shutdown the torque converter does not drain completely.
- There may be residual air bubbles in the fluid then the pressure of operation stops the air pushes out some fluid.
- Transmissions use a torque converter anti-drainback valve to prevent the draining.

2nd stage



3rd stage
Balanced Valve operation

- Excess fluid under low pressure is bleed back into the pan/sump.
- The main pressure regulator valve balances spring/boost pressure against line pressure.
- At idle spring/boost pressure is low so the low rpm line pressure can overcome the spring/boost and bleed back into the sump.
- When you accelerate boost pressure increases, this traps the now increasing line pressure. (no more dump to sump)

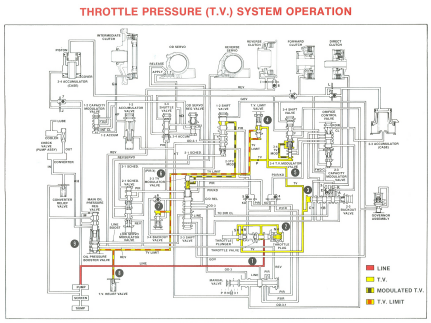
Types of control pressures

- Line pressure
- Throttle pressure
- Governor pressure

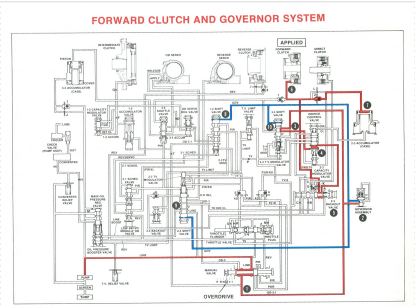
Line Pressure

- Line pressure out of the pump is related to engine rpm.
- System line pressure is controlled by the main regulator valve

Throttle pressure



- Controlled by the customer/driver

Governor

- Controlled by speed of the vehicle.