FORD AX4S
NEW INTERNAL COOLER BYPASS CIRCUIT

CHANGE: Beginning at the start of production for 1999 models, Ford Motor Company introduced a new Internal Cooler Bypass Hydraulic Circuit into the Valve body assembly.

REASON: For better durability in the event of a plugged cooler.

PARTS AFFECTED:

(1) MAIN SPACER PLATE AND GASKETS - The Main Spacer Plate and gaskets changed to accommodate the new hole configurations to connect to the Internal Cooler Bypass Circuit. See Figure 1 for a comparison of previous design to new design.

(2) MAIN VALVE BODY - The Main Valve body had casting changes and redesigned relief valves and springs to accommodate the Cooler Bypass Circuit. See Figures 2 and 3 for the previous and new design valve body castings. ***Note: notice that the spring for Relief Valve #1 is "weaker" than the spring for Relief Valve #2.***

(3) CHANNEL PLATE - The Channel Plate also had worm track changes to accommodate the valve body and spacer plate changes. The new design Channel Plate can be identified with the Rough Forging number of "YF2P," as shown in Figure 4.
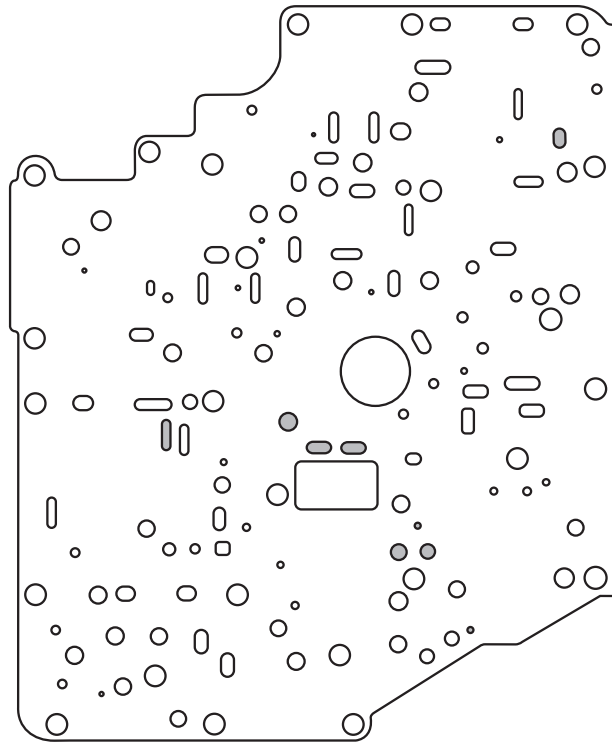
HOW DOES IT WORK?

See Figure 5 for a Partial Hydraulic Circuit Diagram showing normal cooler flow with the New Cooler Bypass Circuit.
See Figure 6 for a Partial Hydraulic Circuit Diagram showing the New Internal Cooler Bypass Circuit in use.
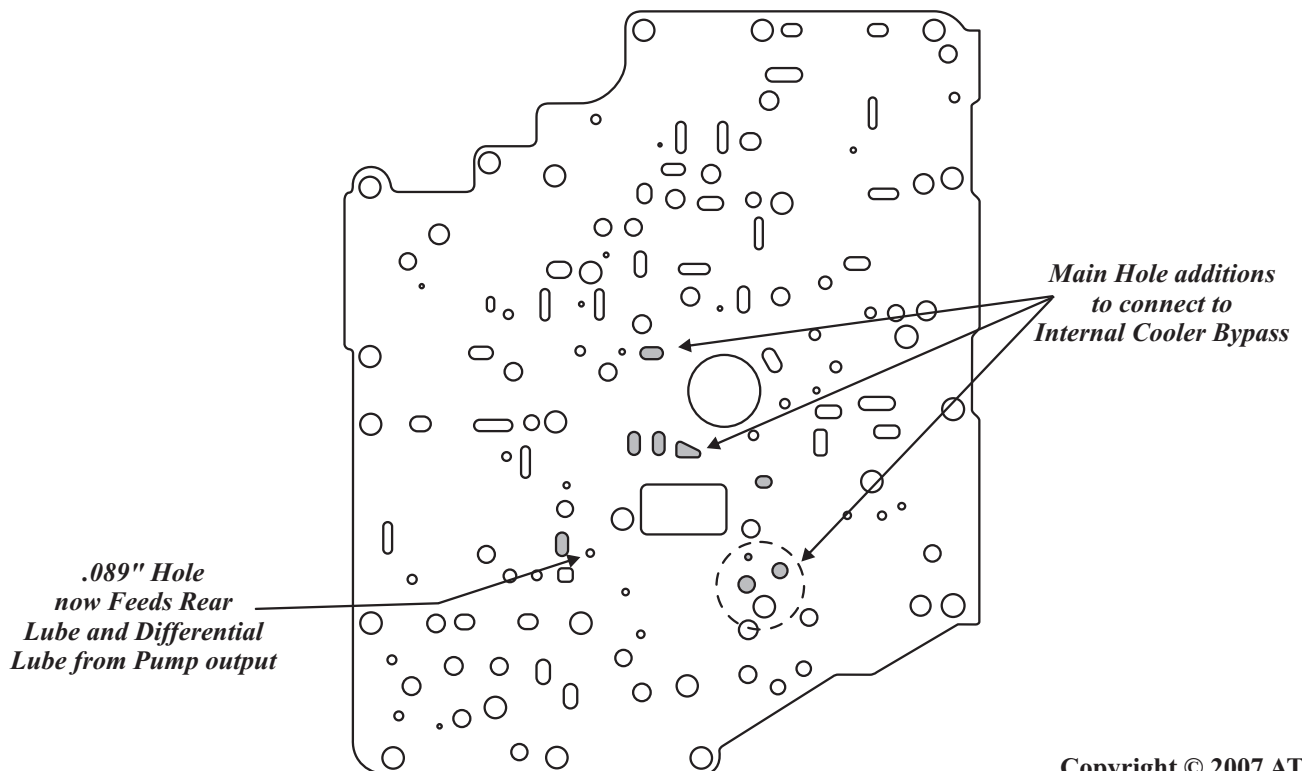
INTERCHANGEABILITY:

None of the new design parts will interchange with the previous design parts.
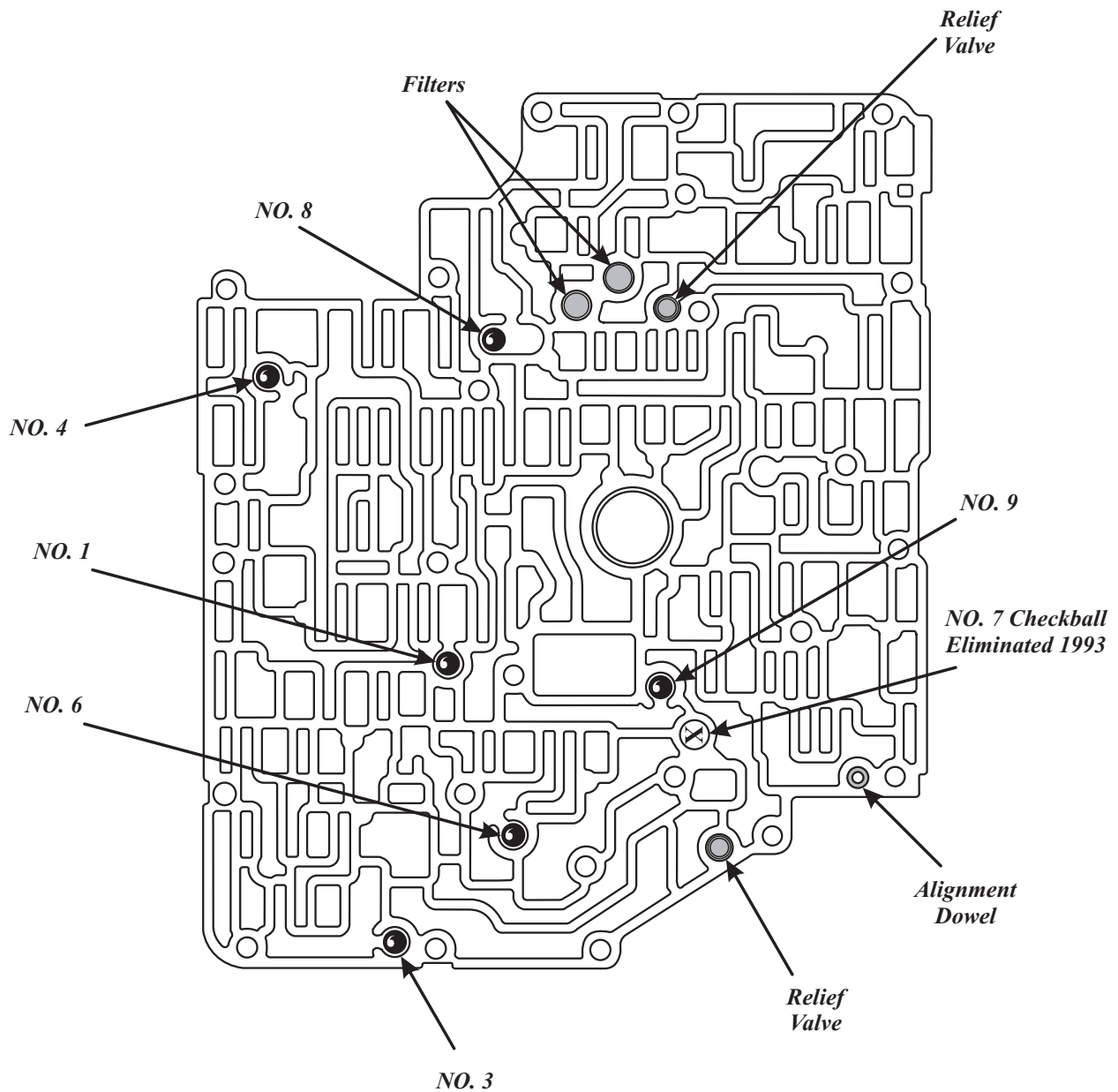
PREVIOUS SPACER PLATE IDENTIFICATION

NEW DESIGN SPACER PLATE IDENTIFICATION

*Main Hole additions
to connect to
Internal Cooler Bypass*

*.089" Hole
now Feeds Rear
Lube and Differential
Lube from Pump output*

Figure 1

AXODE (AX4S) 1993-1998
CHECKBALL AND RELIEF VALVE LOCATIONS

Relief Valve

Filters

NO. 8

NO. 4

NO. 9

NO. 1

NO. 7 Checkball Eliminated 1993

NO. 6

Alignment Dowel

Relief Valve

NO. 3

Figure 2

AX4S 1999 & UP
CHECKBALL AND RELIEF VALVE LOCATIONS

Relief Valve #1

Filters

NO. 8

NO. 4

NO. 9

NO. 1

Relief Valve #2

NO. 6

Alignment Dowel

Passage to Planetary lube cast shut
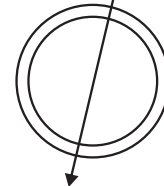
Passage change for bypass

NO. 3
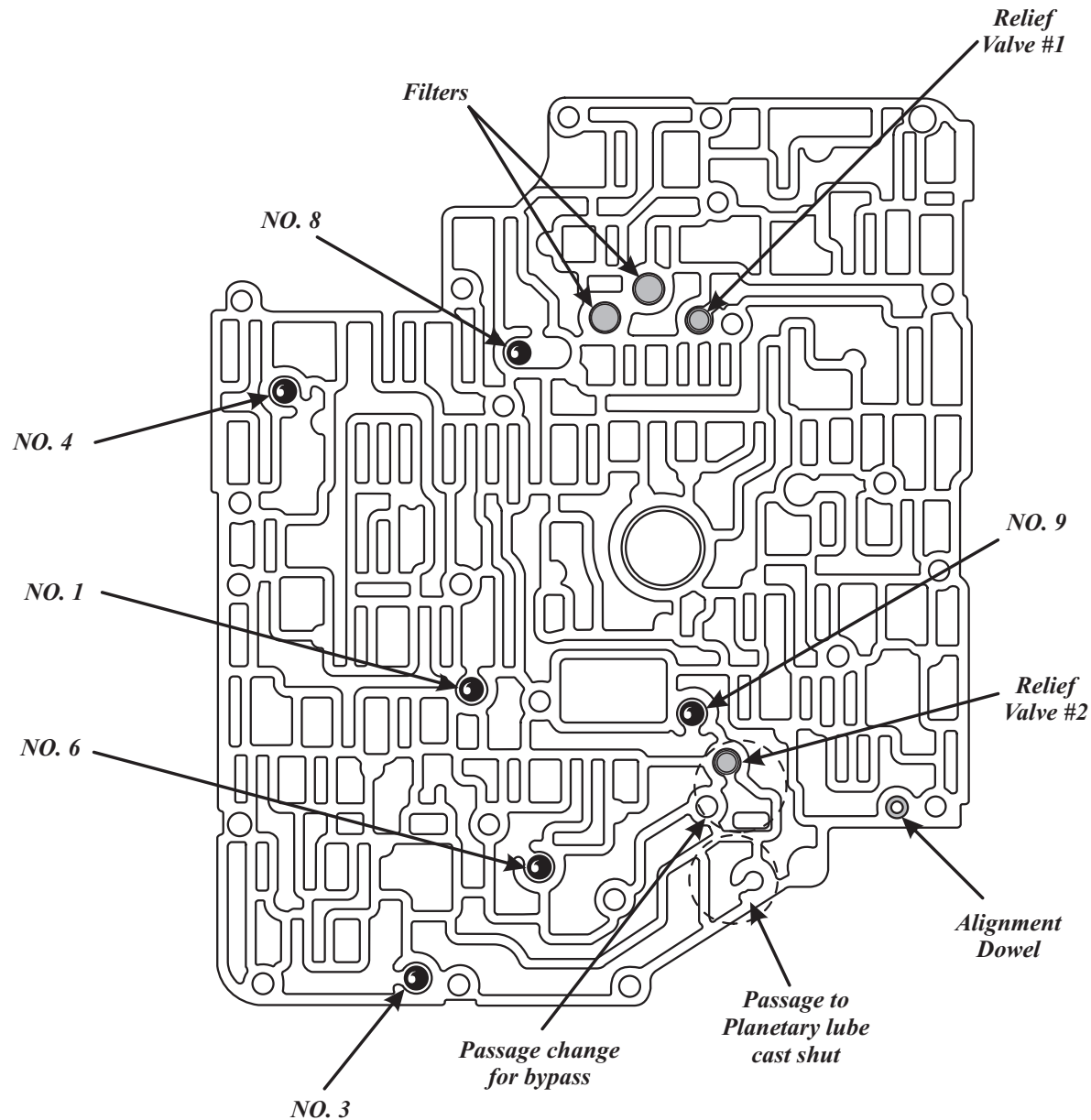
Relief Valve #1 spring dimensions - Overall Length .530"- Wire Diameter.018"
Relief Valve #2 spring dimensions - Overall Length .580"- Wire Diameter.030"

Copyright © 2007 ATSG

Figure 3

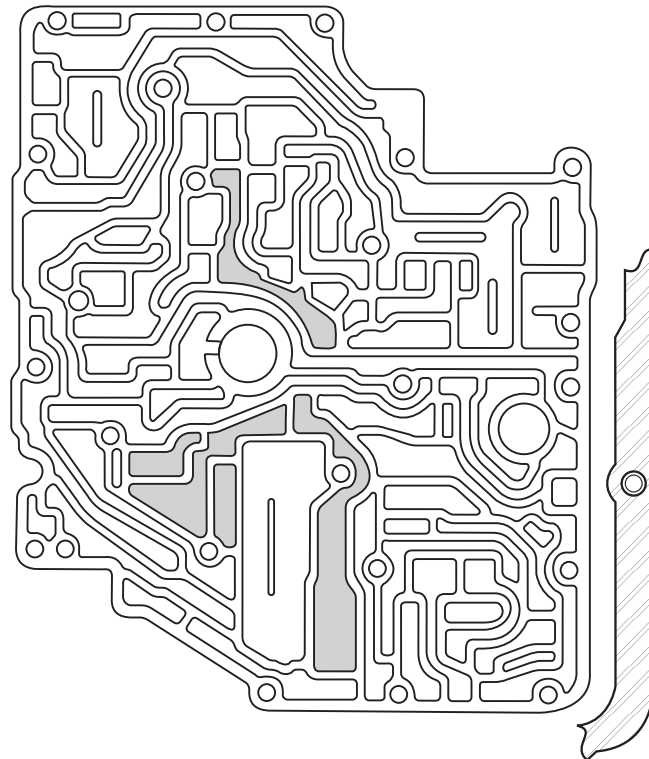**PREVIOUS DESIGN CHANNEL PLATE PASSAGES**
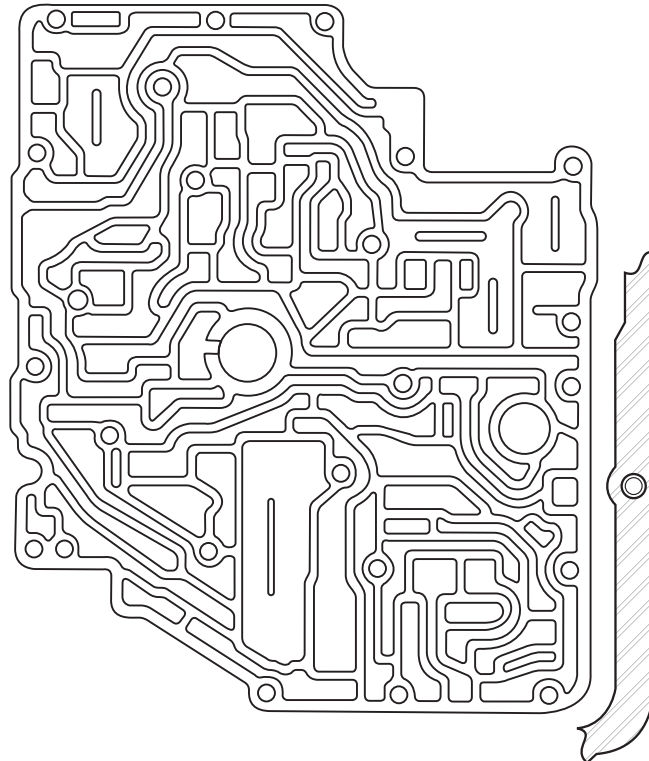
*Channel plate I.D.
(F6DP)*

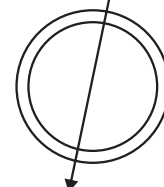**RF-F6DP-7G234AA**

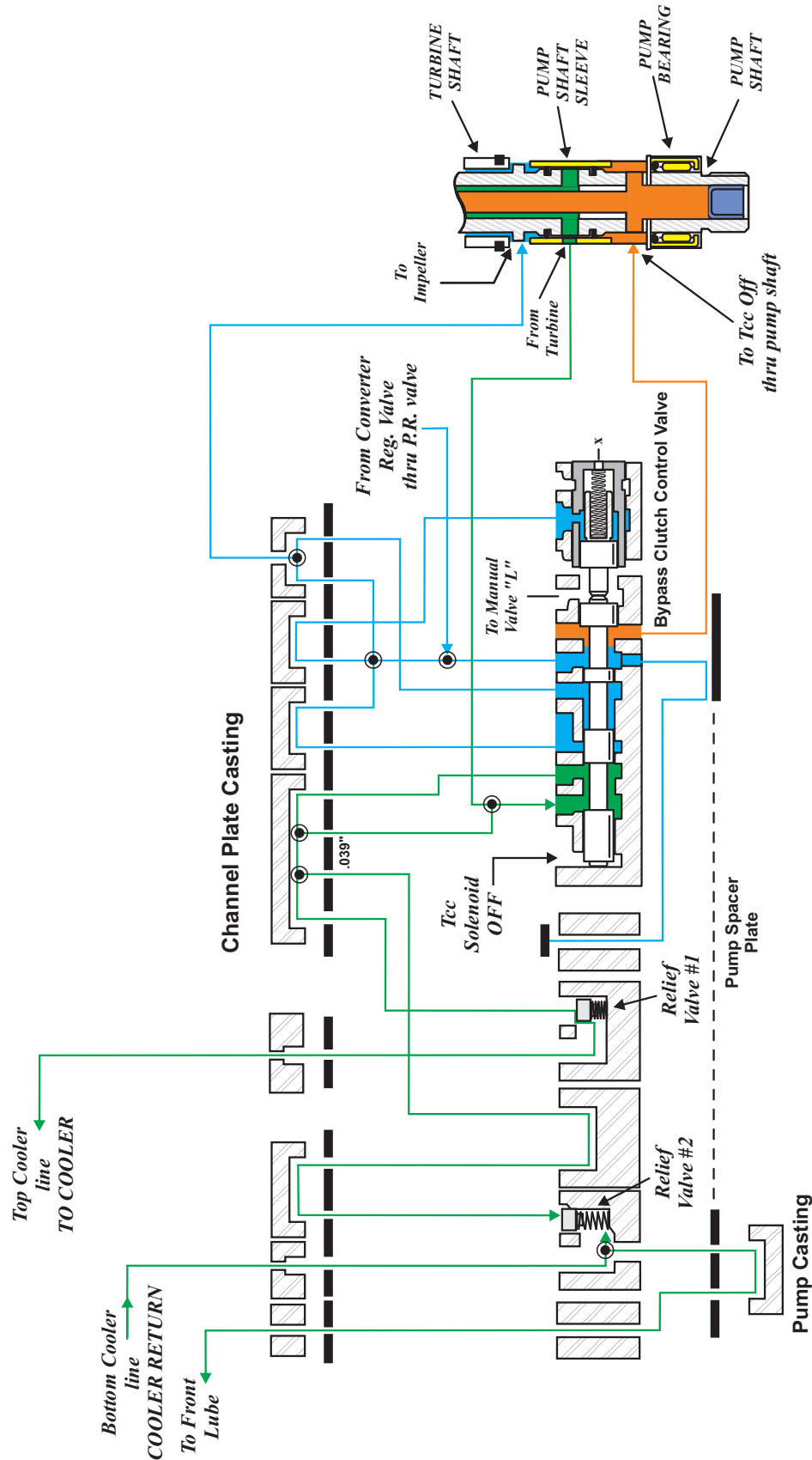**NEW DESIGN CHANNEL PLATE PASSAGES**

*Channel plate I.D.
(YF2P)*

RF-YF2P-7G234AA

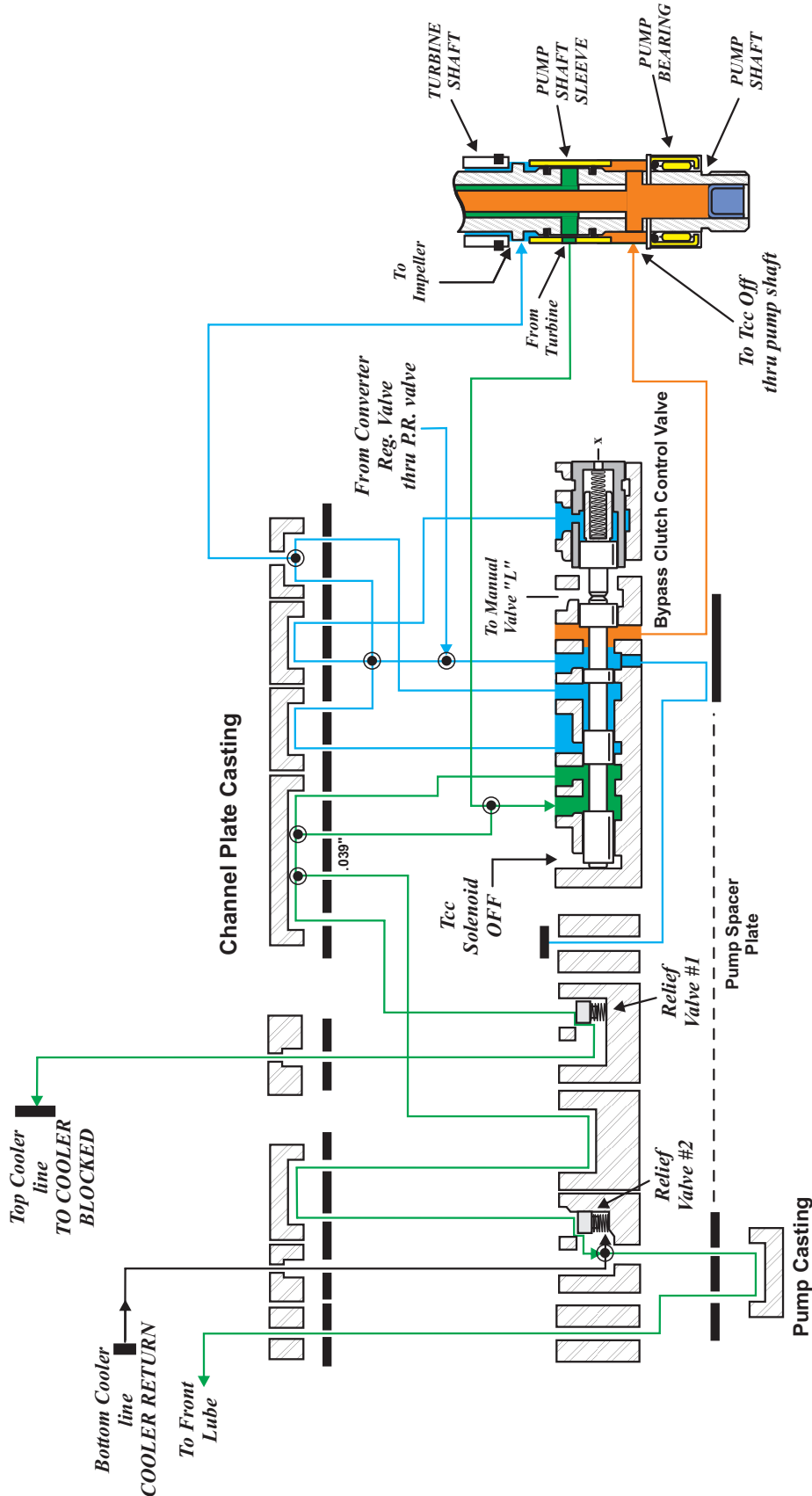*Passage changes are highlighted in grey*

Copyright © 2007 ATSG

Figure 4

COOLER BYPASS PARTIAL SCHEMATIC (*Not in use*)

TURBINE SHAFT

PUMP SHAFT SLEEVE

PUMP BEARING

PUMP SHAFT

To Impeller

From Turbine

To Tcc Off thru pump shaft

From Converter Reg. Valve thru P.R. valve

To Manual Valve "L"

Bypass Clutch Control Valve

x

Channel Plate Casting

.039"

Tcc Solenoid OFF

Pump Spacer Plate

Relief Valve #1

Top Cooler line TO COOLER

Relief Valve #2

Pump Casting

Bottom Cooler line COOLER RETURN

To Front Lube

Summary: To Cooler oil comes from the Turbine Circuit in the torque converter, flows thru the Bypass Clutch Control Valve and strokes Relief Valve #1 against its spring then travels thru the Top cooler line to the Cooler. This same Cooler oil comes back thru the bottom cooler line, seats Relief Valve #2 against the spacer plate and enters the Front Lube Circuit.

Figure 5

COOLER BYPASS PARTIAL SCHEMATIC (*In use*)

TURBINE SHAFT

PUMP SHAFT SLEEVE

PUMP BEARING

PUMP SHAFT

To Impeller

From Turbine

To Tcc Off thru pump shaft

From Converter Reg. Valve thru P.R. valve

Bypass Clutch Control Valve

x

To Manual Valve "L"

Bypass Clutch Control Valve

Channel Plate Casting

.039"

Tcc Solenoid OFF

Pump Spacer Plate

Relief Valve #1

Relief Valve #2

Pump Casting

Top Cooler line
TO COOLER BLOCKED

Bottom Cooler line
COOLER RETURN

To Front Lube

Summary:: To Cooler oil comes from the Turbine Circuit in the torque converter, flows thru the Bypass Clutch Control Valve and strokes Relief Valve #1 against its spring then travels thru the Top cooler line to the Cooler. If the Cooler is blocked, this same Cooler oil builds up and strokes Relief Valve #2 against its spring connecting To Cooler to the Front Lube Circuit Bypassing the Cooler.

Copyright © 2007 ATSG

Figure 6