



Technical Bulletin

DON'T BYPASS OTHER **TCC** CONCERNS

In our last issue, we looked at common Torque Converter Clutch (TCC) control component wear that often causes TCC problems in a typical lock-up system. This issue will focus on Bypass Clutch Control systems and how component wear will cause TCC-related problems in this design as well.

Typical lock-up torque converters have two oil circuits to keep the converter charged with oil and to control release/apply of the torque converter clutch. Systems with a bypass clutch control valve (commonly found in Ford transmissions as well as some others) use three oil circuits. Oil flows into the rear of the torque converter (converter impeller or CI), then flows through the converter turbine (CT) and exits. Oil flow in the CI and CT circuits is the same as in a non lock-up converter in that the direction of oil flow through these circuits never changes. The 3rd oil circuit is called Converter Bypass (or CBY) and is used to control apply/release of the converter clutch.

From the moment the engine is first started oil is fed into the converter through both the CI (con-

verter impeller) and the CBY bypass oil circuits. Oil exits the converter through the CT (converter turbine) oil circuit. Bypass oil flows between the torque converter front cover and the lock-up piston. This keeps the TCC piston pushed away from the front cover in the TCC released position. Figure 1 shows a typical Ford bypass torque converter in the TCC released mode.

To apply the torque converter clutch, the PCM controls the TCC solenoid to change the position of the by-pass valve and reduces CBY pressure. As the by-pass valve moves, it restricts oil entering the converter through the CBY circuit and allows pressure remaining between the front cover and the TCC piston to exhaust. Figure 2 shows the By-Pass system with the converter applied.

Common TCC Bypass-Related Concerns:

In this style system, the bypass clutch control valve is the last in line to send TCC oil pressure signal to the converter. Adequate pressure and volume must be available to the bypass valve for it to establish TCC control.

(continued on the next page)

CONTENTS

APPLICATION / COMPLAINTS	PAGE
AOD-E 4R70 Delayed lock-up, shudder condition	3
AXOD TCC apply and release problems, code 628	4
AXOD-E Excessive cooler circuit oil loss	5
AX4N No TCC apply and code 628	6
CD4E Codes 628/1744/1740, lube oil loss	7
VW 01M, 01N, 01P, 099 Engine stall during stop or N-D engagement	8
41TE 42LE Converter shudder and failure	9
4L60-E Wrong gear starts, solenoid codes, clutch/band failure	10
4L89-E Wrong gear starts, solenoid codes, clutch/band failure	11

(continued)

Low converter pressure (CT) is the equivalent of low TCC apply pressure and results in TCC slip. Low converter pressure can be caused by a reduced volume of oil being fed to the converter due to problems in the valve body, pump, and torque converter, as well as external electronic controls.

Valve body bore wear at the bypass sleeve or plunger, bypass valve, and converter regulator valves results in lower overall converter pressure or TCC apply pressure and limits the bypass valve's ability to control converter bypass oil. Some common effects due to valve body bore, bypass valve, sleeve and plunger wear include:

- Regulated converter charge oil can leak to exhaust
- Cooler oil leakage
- Lube system failure, which can contribute to bushing and planet failure
- Torque converter clutch apply & release problems like no lock-up, delayed lock-up and shudder conditions

High Converter pressure from a stuck converter regulator valve or high line pressure can crack a TCC piston and result in a TCC slip code.

Valve body pressure regulator bore wear as well as trouble codes, FMEM (PCM failure mode) can also result in lower converter pressure. Low pump volume or high line pressure causes the pressure regulator valve to restrict converter charge.

Figure 1 BYPASS CONVERTER TCC OFF

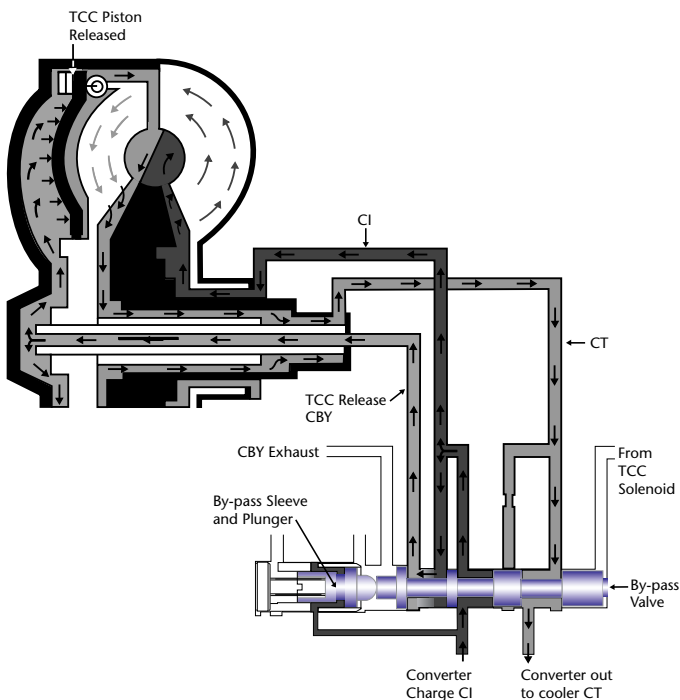
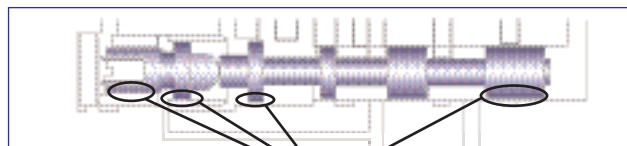
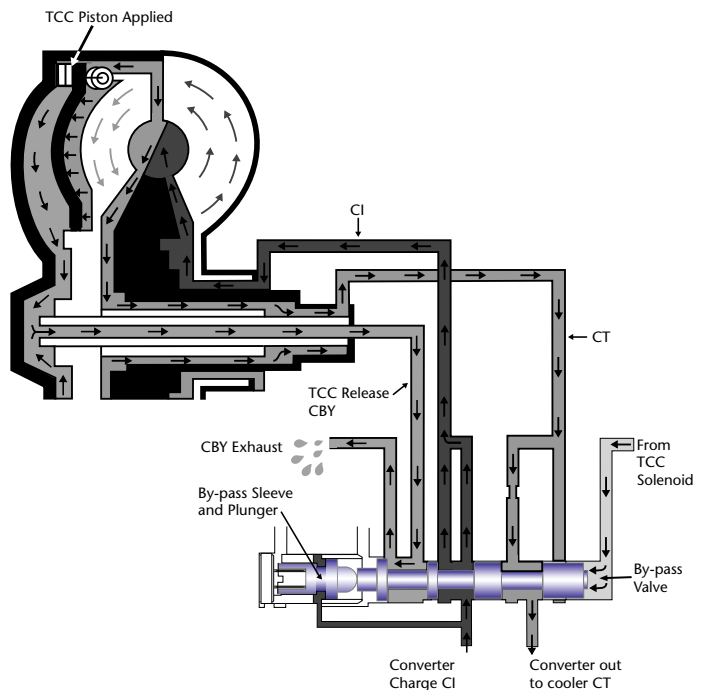


Figure 2 BYPASS CONVERTER TCC ON



Look for wear