**Torqshift 6/6R140 High Pitch Noise/Pump Whine**

If you have a high pitch noise when the engine is running there are a few things to check.

1. Check line pressure with gauge. Is the pressure gauge smooth?
   - If yes, the pressure regulator system is in good shape and no air is entering the system.
   - If no, inspect for cracked filer or poor seal. A cross leak or place for air to be sucked into system.

2. Is the noise there sitting still and in gear?
   - If yes, Inspect converter and converter hub bearing and pump.
   - If no, inspect transmission gear train and drive train. This bulletin does not apply.

3. Is the noise there whenever the engine is running?
   - If yes, Check converter hub bearing and pump.
   - If no this bulletin does not apply.

Ford 6R140 transmission has no pump bushing. Ford now uses a bearing like some of the Mercedes transmission. This bearing is also failing with low miles as seen in figure 1. Inspect the bearing for pitting and wear marks. At the time of this bulletin the bearing is only sold as part of the complete pump.
Transmission: Jeep RE
Subject: Electrical Circuit Test
Application: Jeep
Issue Date: April, 2014

1993 ½ To 1995 Jeep RE Transmission Circuit Test
Typical Wire Diagram
(Wire Colors May Vary Per Model Year All Circuits Should Identified By Pin Number)

The following diagrams are derived from information that has been carefully compiled from industry sources known for their reliability and should be accurate. Always verify the circuits be tested with factory manuals whenever possible.
1993 ½ To 1995 Jeep RE Transmission Circuit Test

Typical Wire Diagram
(Wire Colors May Vary Per Model Year All Circuits Should Be Identified By Pin Number)

QUICK TEST FOR ONE SOLENOID
CODE SET & RELAY CHECKS OK

Code List:
21 = Governor Press.
22 = O/D (3-4) Sol.
23 = TCC (lockup)

JUMP 12 VOLTS WITH A FUSED LINK TO ONE PIN ON A KNOWN GOOD SOLENOID JUMP THE OTHER PIN TO THE CUT WIRE ON THE PCM C1 CONNECTOR

(Pin ID Changes 1995 To E1 to F16)
RE Transmission Circuit Test

Typical Wire Diagram 1996 Vehicles
(Trans Relay Powered by C1 Connector)

(Wire Colors May Vary Per Model Year All Circuits Should Identified By Pin Number)

Connect known good solenoids to harness from PCM

Fused IGN (ST/RUN) Fused B (+) Ground Ground Var Sol CTRL TCC Sol CTRL O/D Sol CTRL Trans Relay CTR

Solenoids

O/D Sol TCC Sol GOV. Sol

Internal Wire Harness

Trans Control Rly Output Variable Force Solenoid Control O/D Solenoid Control

Transmission Assembly

O/D & TCC Solenoid = 25-40 ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms / 4 - 2.4 amps

Powertrain Control Module (Right Side of Safety Wall)

Power Distribution Center

Connect

Known Good

Solenoids To

Harness From

PCM

Face View

Case Connector

Disconnect Transmission Connector

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)
RE Transmission Circuit Test

Typical Wire Diagram 1996 Vehicles
(Trans Relay Powered by C1 Connector)

(Wire Colors May Vary Per Model Year All Circuits
Should Identified By Pin Number)

QUICK TEST FOR ONE SOLENOID
CODE SET & RELAY CHECKS OK

1. Jump 12 Volts
   With A
   Fused Link
   To One Pin On
   A Known Good
   Solenoid

2. Jump The Other
   Pin To The Cut
   Wire On The PCM C2
   Connector

O/D & TCC Solenoid = 25-40
ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms
/ 4 - 2.4 amps

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)

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RE Transmission Circuit Test
Typical Wire Diagram 1997 to 2003
(Trans Relay Powered by C3 Connector)
(Wire Colors May Vary Per Model Year All Circuits Should Identified By Pin Number)

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)

#1602 Jeep RE
Electrical Circuit Test

KEY ON ENGINE
OFF/OR RUNNING
(SYSTEM DEPENDANT)

HOT AT ALL TIMES
POWER DISTRIBUTION CENTER

HOT ST/RUN
JUNCTION BLOCK
FUSE 9 16A
FUSE M 16A

POWERTRAIN CONTROL MODULE
(RIGHT SIDE OF SAFETY WALL)

1 5 76
TRANS CTRL RLY OUTPUT
VAR FORCE SOLENOID CONTROL
O/D SOLENOID CONTROL
TCC SOLENOID CONTROL

INTERNAL WIRE HARNESS

C2 WHITE
C3 GREY

Connect Known Good Solenoids to Harness From PCM

2001 & Up No Relay May Have IPM
INTERGRATED POWER MODULE

Face View
Case Connector

DISCONNECT TRANSMISSION CONNECTOR

Generaton Joint Connector

O/D & TCC Solenoid = 25-40 ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms / 4 - 2.4 amps
Jeep RE
Electrical Circuit Test

RE Transmission Circuit Test
Typical Wire Diagram 1997 to 2003
(Trans Relay Powered by C3 Connector)
(Wire Colors May Vary Per Model Year All Circuits
Should Identified By Pin Number)

QUICK TEST FOR ONE SOLENOID
CODE SET & RELAY CHECKS OK

KEY ON ENGINE
OFF/OR RUNNING
(SYSTEM DEPENDANT)

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)

HOT ST/RUN
FUSE 9 16A
JUNCTION
BLOCK
HOT AT ALL TIMES
POWER DISTRIBUTION CENTER

CUT WIRE
CLOSE TO
PCM

POWERTRAIN
CONTROL
MODULE
(RIGHT SIDE OF
SAFETY WALL)

FUSED IGN (ST/RUN)
FUSED B (+)
GROUND
GROUND
VAR SOL CTRL
TCC SOL CTRL
O/D SOL CTRL
TRANS RELAY CTR
GENERATOR OUTPUT
GENERATOR

TRANS RELAY
S115
INTERGRATED
POWER MODULE

2001 & Up No Relay
May Have IPM

BATTERY

JUMP 12 VOLTS
WITH A
FUSED LINK
TO ONE PIN ON
A KNOWN GOOD
SOLENOID
JUMP THE OTHER
PIN TO THE CUT
WIRE ON THE PCM C2
CONNECTOR

O/D & TCC Solenoid = 25-40
ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms
/ 4 - 2.4 amps

C2 C3
WHITE GREY

Face View
Case Connector

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48 RE “Diesel Only” Transmission Circuit Test

Typical Wire Diagram 2004 & Up

(Wire Colors May Vary Per Model Year All Circuits Should Identified By Pin Number)

KEY ON ENGINE
OFF/OR RUNNING
(SYSTEM DEPENDANT)

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)

POWER DISTRIBUTION CENTER
2006 & Up No Relay (Integrated Power Module)

HOT ST/RUN
HOT AT ALL TIMES

FUSE 9
FUSE M
16A

TRANS RELAY

INTERGRATED
POWER MODULE

30: Battery Power
85: ECM Ground
86: Ignition Power
87: Pin 1 Trans

Face View

Case Connector

DISCONNECT
TRANSMISSION
CONNECTOR

O/D & TCC Solenoid = 25-40 ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms / 4 - 2.4 amps

Engine Control Module C2

Wire Side
Jeep RE Electrical Circuit Test

48 RE “Diesel Only” Transmission Circuit Test
Typical Wire Diagram 2004 & Up
(Wire Colors May Vary Per Model Year All Circuits Should Identified By Pin Number)

KEY ON ENGINE OFF/OR RUNNING (SYSTEM DEPENDANT)

Code List:
P0748 = Governor Press.
P0753 = O/D (3-4) Sol.
P0743 = TCC (lockup)

QUICK TEST FOR ONE SOLENOID
CODE SET & RELAY CHECKS OK

JUMP 12 VOLTS WITH A FUSED LINK TO ONE PIN ON A KNOWN GOOD SOLENOID JUMP THE OTHER PIN TO THE CUT WIRE ON THE ECM C2 CONNECTOR

O/D & TCC Solenoid = 25-40 ohms / 0.48 - 0.30 amps
Governor Solenoid = 3-5 ohms / 4 - 2.4 amps

Wire Side
A960
L/R, No.2, No.3, and No.4 Sprag Assembly
The low/reverse sprag freewheels counter clockwise and locks clockwise while holding the inner race. If the sprag is installed incorrect a no forward gear in drive and/or a bind on the 1-2 shift.

Hold the inner race. The outside flange will turn freely counter clockwise and locks clockwise.

After installing the sprag into the case, install the snap ring on top of the low/reverse sprag assembly.
A960
L/R, No.2, No.3, and No.4 Sprag Assembly

Install the No. 2 sprag assembly and thrust washers. The No. 2 sprag assembly rotates freely clockwise and locks counter clockwise. If installed wrong a no 2nd gear and/or bind on the 2-3 shift.

Make sure the sprag assembly turns freely clockwise and locks counter clockwise.
L/R, No.2, No.3, and No.4 Sprag Assembly

Install the 3rd brake cylinder and snap ring into the case. Check the oil pressure apply hole, make sure it lines up. Cylinder #3 aligns with the oil pressure apply hole of the transmission case. Install the No. 3 sprag assembly into the case as shown. All four tabs must be up! The inner race should rotate freely in a clockwise rotation.

All four tabs must be up! The inner race should rotate freely in a clockwise rotation.
A960
L/R, No.2, No.3, and No.4 Sprag Assembly

Install the input shaft assembly into the direct and the reverse clutch drum. Install the No. 4 sprag assembly into the input clutch drum. With the sprag installed hold the coast clutch hub, the sprag assembly should turn freely clockwise and locks counter clockwise.

Make sure the sprag assembly turns freely clockwise and locks counter clockwise.
Lineartronic CVT Gen 1
Secondary Pressure and Transfer Clutch Pressure Testing

Warning: You need a 1000 PSI gauge and hose to test secondary pressure. I would suggest using a transducer for added safety.

To check secondary pulley pressure (line pressure) we are going to need to remove the pressure plug on the passenger’s side of the transmission shown in figure 1. The fitting threads on the secondary pressure plug are 14mm x 1.5mm. The pressure is high and we need a 1000 PSI gauge set. I would recommend the use of a transducer or the Subaru testing equipment.

The Subaru part numbers for testing equipment:

18801AA000 gauge
18681AA000 fitting
498897700 adaptor set

Figure 1
Lineartronic CVT Gen 1
Secondary Pressure and Transfer Clutch Pressure Testing

With the transducer or gauge hooked up check and record pressure readings at idle in park, reverse, neutral and drive. Then test reverse at stall and drive at stall. In figure 2 is the chart for line pressure specification for reference. If line pressure is low some of the area’s to look at would be a plugged filter, bad pump and leaks in the secondary pulley circuit.

<table>
<thead>
<tr>
<th>Range</th>
<th>Throttle</th>
<th>Brake</th>
<th>Secondary Line Pressure PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stall</td>
<td>Drive, Reverse</td>
<td>Full Open</td>
<td>On</td>
</tr>
<tr>
<td>Idling</td>
<td>Park, Neutral</td>
<td>Full Close</td>
<td>Off</td>
</tr>
</tbody>
</table>

**Figure 2**

Transfer clutch pressure

In figure 3 is the transfer clutch pressure port. Install gauge or transducer in port. With scan tool enter FWD mode and test should show 0 psi on tap in all ranges. If pressure is shown, there may be a problem with transfer clutch control solenoid or valve.

**Figure 3**
In normal AWD mode test port at stall in manual 2nd mode, 60% accelerator position and idle. In figure 4 is pressure specification chart to compare results.

<table>
<thead>
<tr>
<th>Range</th>
<th>Duty Cycle %</th>
<th>TPS %</th>
<th>AWD Mode</th>
<th>FWD Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park, Neutral</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Manual 2nd</td>
<td>95-100%</td>
<td>100%</td>
<td>145-174 PSI</td>
<td>0</td>
</tr>
<tr>
<td>Manual 2nd</td>
<td>60%</td>
<td>&lt;&lt;&lt;</td>
<td>58-102 PSI</td>
<td>0</td>
</tr>
<tr>
<td>Manual 2nd</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
</tr>
</tbody>
</table>

<<< Adjust throttle percent to achieve 60% accelerator position on scan tool at the transfer case duty cycle PID.
Hondas with External MLPS Switch
Rough/Delayed Engagement, Range Indicator Problems

After overhaul you may experience delayed or rough engagements into forward or reverse. Gear range indicator light problems may also occur.

The cause of these complaints is a loose fit between the manual lever selector shaft into the MLPS switch. This happens when the case cover is being installed. The technician sees that the roll pin on the selector shaft is not lined up with the key way in the case cover. A pair of pliers is used to rotate the shaft into position. Twisting the shaft with pliers or vise grips will collapse the shaft causing a loose fit. Simply spread the shaft open to obtain a good fit between the shaft and MLPS switch.
TH400
Diagnosing Late Shifts or No Kick Down
An oldie but a goodie that has plagued many technicians. When a 400 has late shifts, it either has no vacuum to the modulator or the detent solenoid is active (solenoid is open or leaks). If there’s no kick down it’s usually an inactive detent solenoid (solenoid stuck closed or no current). A quick way to find out what’s at fault is with a pressure gauge.

Late Shifts
Measure the line pressure in neutral and drive. The pressure readings should be the same in both ranges 55-80lbs. If the line pressure jumps to 95-105 in drive and drops back to 55-80lbs when the lever is placed back in neutral, the detent solenoid circuit is active and is the cause of the late shifts. If the line pressure is high in neutral and in drive, it’s a vacuum flow or modulator related problem.

Causes of Late Shifts-Active Solenoid Circuit (High Pressure in Drive Only)
1-The solenoid is stuck open
2-Solenoid bolts are loose
3-Has a gasket installed on with an “open winding solenoid”
4-Separator plate feed orifice is missing, covered or plugged
5-Detent regulator valve stuck open
6-The solenoid gasket is missing or leaking on a “closed winding soleonid”
7-Has battery current to the solenoid with accelerator pedal in closed throttle position

No Kick-Down and Early WOT Shifts
Attach a remote starter switch to the battery positive post and to the soleonid case connector. Line pressure should be 55-80lbs in neutral. Place the lever in the drive position and energize the solenoid, check the line pressure. If there’s no increase in line pressure while in drive with solenoid energized see “inactive solenoid” causes.
Inactive Solenoid Circuit Causes: No Kick Down and Early WOT Shifts
1-The solenoid is stuck closed
2-The separator plate feed orifice is too big
3-Detent regulator valve is stuck closed

If there’s a line pressure increase in drive with remote stater switch, repeat the test using the vehicle’s electrical system to energize the solenoid. When using the vehicle electrical system, if there is still no pressure increase then there is a blown fuse, bad switch or a resistance problem. The late GM trucks from 1987 on utilize a TPS triggered relay that commonly fails.

Open Winding Solenoid

Closed Winding Solenoid

Open winding solenoids have a rubber gasket molded into the mounting flange. If the metal gasket is installed, it will create a leak in the circuit and cause late shifts.

Closed winding solenoids require a gasket. If the gasket is left out it will cause late shifts.

If you have one that will not kick down, has line pressure increase with solenoid energized. Remove the gear and valve from the governor. Blow air through the gear end of valve, air must exit at balance port.
When working on any GM transmission. High line pressure from a pressure regulator problem will only cause rough shifts, never late shifts.

The 400 detent solenoid is tied into the modulator circuit. A leak in the solenoid circuit will cause a pressure boost created by the modulator circuit in drive only and late shifts.

Solenoid Feed Orifice

.024” - .028”
A4CF2
Solenoid and Clutch Apply Chart

<table>
<thead>
<tr>
<th>Range</th>
<th>PCSV-A (OD &amp; L/R)</th>
<th>PCSV-B (2nd &amp; R)</th>
<th>PCSV-C (UD)</th>
<th>PCSV-D TCC</th>
<th>On/Off Solenoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park,Neutral</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Reverse</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>D, 1st</td>
<td>*OFF-ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>*ON-OFF</td>
</tr>
<tr>
<td>D, 2nd</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>D, 3rd</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>D, 4th</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>S - 1st</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

* Changes as speed increases in drive position

**PCSV-A:** When the oil pressure is required for OD clutch or Low & reverse brake, this solenoid valve must be off.

**PCSV-B:** When the oil pressure is required for 2nd brake or Reverse clutch, this solenoid valve must be off. If the manual valve ‘R’ position is selected, the pressure will be applied to the reverse clutch. That is the reason why the reverse clutch is not engaged in 2nd and 4th gear (PCSV-B off condition)

**PCSV-C:** When this solenoid valve is off, UD clutch will be engaged.

**PCSV-D:** When this solenoid is off, the damper clutch is released.

**SCSV (On/Off):** When this solenoid valve is off, LR brake pressure is released and the OD clutch pressure is applied. That is the reason why the 3rd gear failsafe (mechanically failed 3rd gear condition) is possible when the all solenoid valves are off including this solenoid valve.

**VFS Solenoid Valve:** Changes the line pressure according to throttle open angle (engine load) and shift ranges.
## A4CF2
Solenoid and Clutch Apply Chart

<table>
<thead>
<tr>
<th>Ranges</th>
<th>UD Clutch</th>
<th>OD Clutch</th>
<th>Reverse Clutch</th>
<th>L/R Brake</th>
<th>2nd/4th Brake</th>
<th>OWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park, Neutral</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse</td>
<td>ON</td>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>Drive 1st</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive 2nd</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>Drive 3rd</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>Drive 4th</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>2 1st</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>2 2nd</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>ON</td>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of A4CF2 transmission components](image-url)
ZF5HP24 Slips In Reverse

Do you have a Land Rover, Jag or BMW that slips in reverse? Have you already tried another valve body, solenoids and/or a new C clutch drum and it still slips? Have a look at the C clutch drum shaft bushings.
The C clutch drum shaft bushings not only provide support for the shaft and drum. The bushings are also critical seals for the reverse hydraulic circuit. Most often the bushings may have an appearance of “in good condition”. You should always place the C drum shaft over the input planet shaft and check the bushing fit one end at a time.

If the bushings are worn reverse oil will be dumped into the lube circuit and pan. Replacement bushings are available. The o-rings and teflon sealing rings are equally important as well.