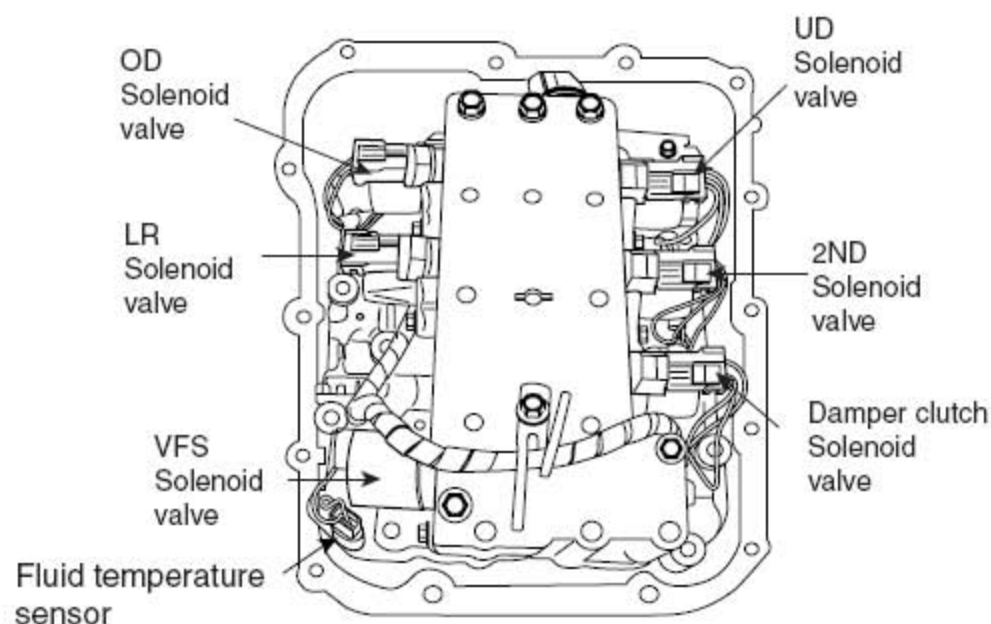


P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION



GENERAL DESCRIPTION

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by applying hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load inside the T/C. The PCM/TCM outputs duty pulses to control the Damper Clutch Control Solenoid Valve(DCCSV) and hydraulic pressure is applied to the DC according to the DCC duty ratio value. When the duty ratio is high, high pressure is applied and the Damper Clutch is locked. The normal operating range of the Damper Clutch Control duty ratio value is from 30%(unlocked) to 85%(locked).

DTC DESCRIPTION

The PCM/TCM checks the Damper Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected) the PCM/TCM judges that DCCSV circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	TORQUE CONVERTER (DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 16V > Voltage Battery > 11V • In gear state(no gear shifting) 500msec is passed from turn on the relay • A/T Relay = ON • Engine state = RUN	
Threshold value	• Feedback voltage from DCC control solenoid > vb-2V and DCC control duty is 100%	
Diagnostic Time	• More than 2 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION

Solenoid Valve for Pressure Control

- 1). Sensor type : Normal open 3-way
- 2). Operating temperature : -22~266 F(-30 C~130 C)
- 3). Frequency :
 - A)LR, 2ND, UD, OD, RED : 61.27Hz (at the ATF temp. -20 C above)
 - B) DCC : 30.64Hz
 - KM series : 35Hz
- 4). Internal resistance :
 - A) 2.7~3.4Ω (68 F or 20 C)
- 5). Surge voltage : 56 V

SIGNAL WAVEFORM

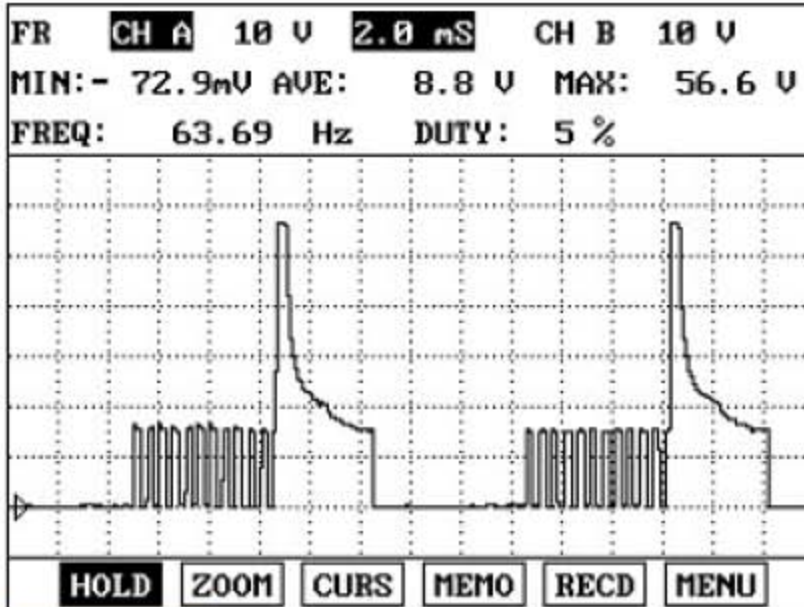
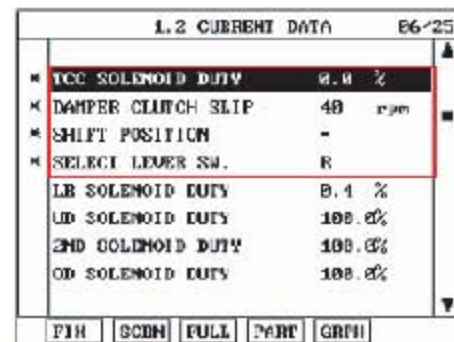
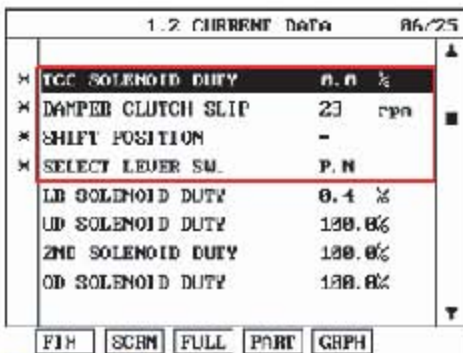


FIG.1)

FIG.1) : Operating of "DCCSV"

MONITOR SCANTOOL DATA

- 1). Connect scantool to data link connector(DLC).
- 2). Engine "ON".
- 3). Monitor the "TCC SOL. VALVE" parameter on the scantool.
- 4). Select "D RANGE" and Operate "TCC SOLENOID DUTY" more than 40%.



1.2 CURRENT DATA		86/25
* TCC SOLENOID DUTY	0.0 %	
* DAMPER CLUTCH SLIP	48 rpm	
* SHIFT POSITION	1ST GEAR	
* SELECT LEVER SW.	D	
LR SOLENOID DUTY	0.4 %	
UD SOLENOID DUTY	0.4 %	
2ND SOLENOID DUTY	100.0%	
OD SOLENOID DUTY	100.0%	

FIX SCRN FULL PART GRPH

FIG.3)

1.2 CURRENT DATA		86/25
* TCC SOLENOID DUTY	0.0 %	
* DAMPER CLUTCH SLIP	39 rpm	
* SHIFT POSITION	2ND GEAR	
* SELECT LEVER SW.	D	
LR SOLENOID DUTY	100.0%	
LD SOLENOID DUTY	0.4 %	
2ND SOLENOID DUTY	0.4 %	
OD SOLENOID DUTY	100.0%	

FIX SCRN FULL PART GRPH

FIG.4)

1.2 CURRENT DATA		86/25
* TCC SOLENOID DUTY	54.9 %	
* DAMPER CLUTCH SLIP	0 rpm	
* SHIFT POSITION	3RD GEAR	
* SELECT LEVER SW.	D	
LR SOLENOID DUTY	100.0%	
UD SOLENOID DUTY	0.4 %	
2ND SOLENOID DUTY	100.0%	
OD SOLENOID DUTY	0.4 %	

FIX SCRN FULL PART GRPH

FIG.5)

1.2 CURRENT DATA		86/25
* TCC SOLENOID DUTY	51.4 %	
* DAMPER CLUTCH SLIP	1 rpm	
* SHIFT POSITION	4TH GEAR	
* SELECT LEVER SW.	D	
LR SOLENOID DUTY	100.0%	
UD SOLENOID DUTY	100.0%	
2ND SOLENOID DUTY	0.4 %	
OD SOLENOID DUTY	0.4 %	

FIX SCRN FULL PART GRPH

FIG.6)

1.2 CURRENT DATA		86/25
* TCC SOLENOID DUTY	51.4 %	
* DAMPER CLUTCH SLIP	0 rpm	
* SHIFT POSITION	5TH GEAR	
* SELECT LEVER SW.	D	
LR SOLENOID DUTY	0.4 %	
UD SOLENOID DUTY	100.0%	
2ND SOLENOID DUTY	0.4 %	
OD SOLENOID DUTY	0.4 %	

FIX SCRN FULL PART GRPH

FIG.7)

- FIG. 1) P,N
 FIG. 2) "R"
 FIG. 3) "D 1st" gear
 FIG. 4) "2nd" gear
 FIG. 5) "3rd" gear
 FIG. 6) "4th" gear
 FIG. 7) "5th" gear

5). Does "TCC SOLENOID DUTY " follow the reference data?

YES

- ▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

- ▶ Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

- 1). Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
- 2). Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
- 3). Has a problem been found?

YES

- ▶ Repair as necessary and then go to "Verification of vehicle repair" procedure.

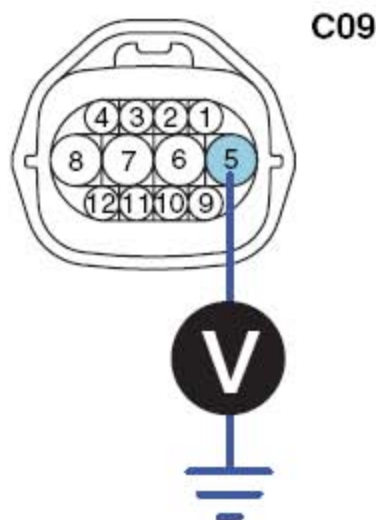
NO

- ▶ Go to "Power supply circuit inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION

- 1). Disconnect "A/T SOLENOID VALVE" connector.
- 2). Measure voltage between terminal "5" of the sensor harness connector and chassis ground.
- 3). Turn ignition switch OFF → ON

Specification: 12V is measured only for approx. 0.5sec



3. UD solenoid valve
4. 2ND solenoid valve
- 5. A/T battery**
6. A/T battery
7. VF solenoid valve(+)
8. VF solenoid valve(-)
9. DCC solenoid valve
10. RED solenoid valve
11. LR solenoid valve
12. OD solenoid valve

- 4). Is voltage within specifications?

YES

- ▶ Go to "Signal circuit inspection" procedure.

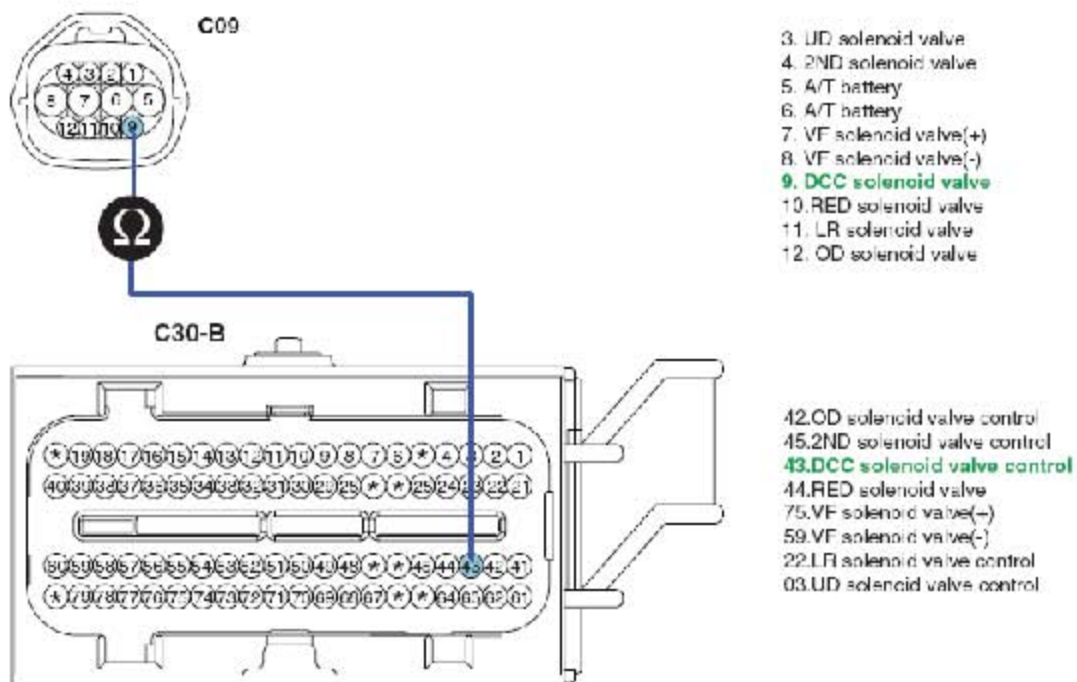
NO

- ▶ Check that A/T-20A fuse in engine room junction is installed or not blown.
- ▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION

- 1). Check signal circuit open inspection.
 - A) Ignition "OFF".
 - B) Disconnect "AT SOLENOID VALVE" connector and "PCM/TCM" connector.
 - C) Measure resistance between terminal "9" of the ATM SOLENOID VALVE harness connector and terminal "43" of the TCM harness connector.

Specification: approx. 0 Ω



- D) Is resistance within specifications?

YES

- ▶ Go to "Check signal circuit short inspection" procedure.

NO

- ▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

- 2). Check signal circuit short inspection

- A) Ignition "OFF".
- B) Disconnect "AT SOLENOID VALVE" connector and "PCM/TCM" connector.

- C) Measure resistance between terminal "9" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



- 3. UD solenoid valve
- 4. 2ND solenoid valve
- 5. A/T battery
- 6. A/T battery
- 7. VF solenoid valve(+)
- 8. VF solenoid valve(-)
- 9. **DCC solenoid valve**
- 10. RED solenoid valve
- 11. LR solenoid valve
- 12. OD solenoid valve

- D) Is resistance within specifications?

YES

- ▶ Go to "Component inspection" procedure.

NO

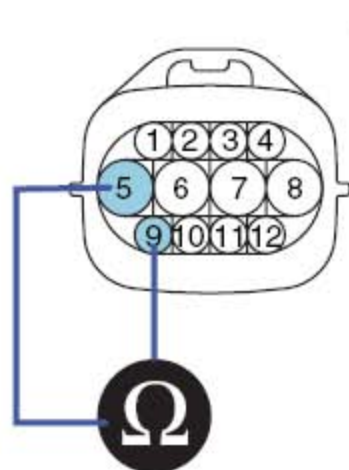
- ▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION

1). CHECK SOLENOID VALVE

- A) Ignition "OFF".
- B) Disconnect "A/T SOLENOID VALVE" connector.
- C) Measure resistance between terminal "5" and terminal "9" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.7~3.4 Ω [20 C(68 F)]



C09
Component Side

- 3. UD solenoid valve
- 4. 2ND solenoid valve
- 5. A/T battery**
- 6. A/T battery
- 7. VF solenoid valve(+)
- 8. VF solenoid valve(-)
- 9. DCC solenoid valve**
- 10. RED solenoid valve
- 11. LR solenoid valve
- 12. OD solenoid valve

D) Is resistance within specifications?

YES

- ▶ Go to "CHECK OIL PRESSURE" as below.

NO

- ▶ Replace TCC SOLENOID VALVE as necessary and go to "Verification of vehicle repair" procedure.

2). CHECK PCM/TCM

- A) Connect scantool to data link connector(DLC).
- B) Ignition "ON" & Engine "OFF".
- C) Select A/T solenoid valve actuator test and operate actuator test.
- D) Can you hear operating sound for TCC SOLENOID VALVE actuator testing function?

YES

- ▶ Go to "Verification of vehicle repair" procedure.

NO

- ▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

- 1). IG SWITCH ON
- 2). TRANSAXLE RANGE SWITCH is normal
- 3). P RANGE
- 4). Vehicle Speed 0mph(0km/h)
- 5). Throttle position sensor < 1V
- 6). IDLE SWITCH ON
- 7). ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR

After a repair, it is essential to verify that the fault has been corrected.

- 1). Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
- 2). Using a scantool, Clear DTC.
- 3). Operate the vehicle within DTC Enable conditions in general information.
- 4). Are any DTCs present ?

YES

- ▶ Go to the applicable troubleshooting procedure.

NO

- ▶ System performing to specification at this time.