

DTC P0973 the TCM detects a continuous open or short to ground in the 1-2 shift solenoid valve circuit

Circuit Description

The 1-2 shift solenoid valve is located in the control valve body of the transmission. The transmission control module (TCM) selects the required gear by turning the appropriate solenoid ON or OFF, enabling the transmission to shift. Refer to Shift Solenoid Valve State and Gear Ratio on page 7-3. The TCM provides voltage to the solenoid through High Side Driver 2 (HSD2). The TCM uses a second driver to control the solenoid ground circuit. The controlled ground driver reports feedback voltage to the TCM. When the TCM commands the 1-2 shift solenoid valve ON, the voltage of the control circuit should be approximately 0 volts. When the TCM commands the 1-2 shift solenoid valve OFF, the voltage of the control circuit should be approximately system voltage. When the TCM detects a continuous open or short to ground in the 1-2 shift solenoid valve circuit, then DTC P0973 sets. DTC P0973 is a type B DTC.

Conditions for Running the DTC

- The engine run time is greater than 5 seconds.
- HSD2 is commanded ON.

Conditions for Setting the DTC

DTC P0973 sets when either of the following conditions occurs for 4.3 seconds:

- The TCM detects an open in the 1-2 shift solenoid valve circuit when HSD2 is commanded ON.
- The TCM detects a short to ground in the 1-2 shift solenoid valve circuit when HSD2 is commanded OFF.

Action Taken When the DTC Sets

- Powertrain braking is disabled at the time that the TCM first detects the failure, before the DTC sets.
- The TCM requests the ECM to illuminate the malfunction indicator lamp (MIL) during the second consecutive drive trip in which the Conditions for Setting the DTC are met.

- The TCM turns off power to all solenoids.
- The transmission will operate in fifth gear if the vehicle has successfully completed a 1-2 upshift in the current ignition cycle. If the vehicle has not completed a 1-2 upshift in the current ignition cycle, the transmission will operate in fourth gear.
- The TCC commands maximum line pressure.
- The TCM freezes transmission adaptive functions.
- Torque management is inhibited.
- At the time of the first failure, the TCM records the operating conditions when the Conditions for Setting the DTC are met. The TCM stores this information as a Failure Record.
- At the time of the second failure, the ECM records the operating conditions when the Conditions for Setting the DTC are met. The ECM stores this information as a Freeze Frame.
- The TCM stores DTC P0973 in TCM history.

Conditions for Clearing the MIL/DTC

- The ECM turns OFF the MIL after the sixth consecutive drive trip in which the TCM does not send a MIL illumination request.
- A scan tool can clear the MIL/DTC.
- The TCM clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without an emission related diagnostic fault occurring.
- The TCM cancels the default actions when the ignition is OFF long enough in order to power down the TCM.

Test Description

The number below refers to the step number on the diagnostic table.
2. Listen for an audible click when the solenoid energizes.

DTC P0973

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information

Step	Action	Value(s)	Yes	No
2	1. Install a scan tool. 2. Turn ON the ignition with the engine OFF. Important: • Before clearing the DTC, use the scan tool in order to record the ECM Freeze Frame and the TCM Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the ECM and the TCM. • Using the Clear Info function erases stored DTCs in both the ECM and TCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Use the scan tool in order to command the 1-2 shift solenoid ON and OFF. Does the solenoid click?	—	Go to Step 9	Go to Step 3
3	1. Turn OFF the ignition. 2. Disconnect the AT 20-way inline harness connector. 3. Install the J 45681 jumper harness to the TCM side of the 20-way connector. 4. Turn ON the ignition with the engine OFF. 5. With the test lamp connected to ground, probe the solenoid supply voltage circuit of the J 45681. Does the test lamp illuminate?	—	Go to Step 4	Go to Step 7

Step	Action	Value(s)	Yes	No
4	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Install the J 45681 to the transmission side of the 20-way connector. 3. Using the DMM, measure the resistance between the solenoid supply voltage circuit and the 1-2 Shift Solenoid valve control circuit of the J 45681. <p>Refer to Component Resistance. Is the resistance within the specified range?</p>	15.0–20.3 W	Go to Step 5	Go to Step 8
5	<p>Using the DMM, measure the resistance between the solenoid supply voltage circuit of the J 45681 and ground. Is the resistance greater than the specified value?</p>	50K W	Go to Step 6	Go to Step 8
6	<ol style="list-style-type: none"> 1. Disconnect the TCM. 2. Test the 1-2 solenoid valve control circuit for the following conditions: <ul style="list-style-type: none"> • Open circuit • Short to ground Refer to Testing for Continuity and Testing for Short to Ground in Wiring Systems. <p>Did you find a condition?</p>	—	Go to Step 10	Go to Step 9
7	<ol style="list-style-type: none"> 1. Turn OFF the ignition. 2. Disconnect the TCM. 3. Test the solenoid supply voltage circuit from the TCM to the AT Inline 20-way connector for an open circuit. Refer to Testing for Continuity in Wiring Systems. <p>Did you find a condition?</p>	—	Go to Step 10	Go to Step 9

Step	Action	Value(s)	Yes	No
8	<p>1. Remove the transmission oil pan.</p> <p>2. Test the solenoid supply voltage circuit from the 20-way connector to the 1-2 shift solenoid connector for the following conditions:</p> <ul style="list-style-type: none"> • Open circuit • Short to ground Refer to Testing for Continuity and Testing for Short to Ground 2 in Wiring Systems. <p>Did you find a condition?</p>	—	Go to Step 11	Go to Step 12
9	<p>Replace the TCM. Refer to Transmission Control Module Replacement.</p> <p>Is the action complete?</p>	—	Go to Step 13	—
10	<p>Perform the necessary wiring repairs. Refer to Wiring Repairs in Wiring Systems. Is the action complete?</p>	—	Go to Step 13	—
11	<p>Replace the AT internal transmission wiring harness. Replacement. Is the action complete?</p>	—	Go to Step 13	—
12	<p>Replace the 1-2 shift solenoid valve. Refer to 1-2 Shift Solenoid Replacement. Is the action complete?</p>	—	Go to Step 13	—
13	<p>Perform the following procedure in order to verify the repair:</p> <ol style="list-style-type: none"> 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Select Specific DTC. 5. Enter DTC P0973. <p>Has the test run and passed?</p>	—	Go to Step 14	Go to Step 2
14	<p>With the scan tool, observe the stored information, capture info and DTC info. Does the scan tool display any DTCs that you have not diagnosed?</p>	—	Go to Diagnostic Trouble Code List -Vehicle in Vehicle DTC Information	System OK