

Allison Transmission (A 629 540 43 00)

CHECK TRANS LIGHT (1)

The electronic control system is programmed to inform the operator of a problem with the transmission system and automatically take action to protect the operator, vehicle, and transmission. When the Electronic Control Unit (ECU) detects a problem condition, the ECU restricts shifting, turns on the CHECK TRANS light on the instrument panel, and registers a diagnostic code.

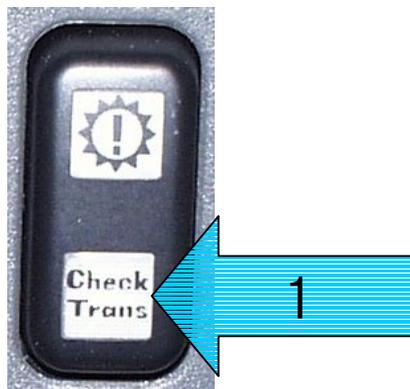
NOTE: For some problems, diagnostic codes may be registered without the ECU activating the CHECK TRANS light. Your Allison Transmission authorized service outlet should be consulted whenever there is a transmission-related concern. They have the equipment to check for diagnostic codes and to correct problems which arise.

Each time the engine is started, the CHECK TRANS light will illuminate, then turn off after a few seconds. This momentary lighting is to show that the status light circuits are working properly. If the CHECK TRANS light does not illuminate during ignition, or if the light remains on after ignition, the system should be checked immediately.

Continued illumination of the CHECK TRANS light during vehicle operation (other than start-up) indicates that the ECU has signaled a diagnostic code. Illumination of the CHECK TRANS light is accompanied by a flashing display from the shift selector. The shift selector display will show the actual range attained and the transmission will not respond to shift selector requests.

The indications from the shift selector are provided to inform the operator that the transmission is not performing as designed and is operating with reduced capabilities. Before turning the ignition off, the transmission may be operated for a short time in the selected range in order to “limp home” for service assistance. Service should be performed immediately in order to minimize the potential for damage to the transmission.

When the CHECK TRANS light comes on and the ignition switch is turned off, the transmission will remain in **N** (Neutral) until the condition causing the CHECK TRANS light is corrected. Generally, while the CHECK TRANS light is on, upshifts and downshifts will be restricted and **direction changes will not occur**. Lever and pushbutton shift selectors do not respond to any operator shift requests while the CHECK TRANS light is illuminated. The lockup clutch is disengaged when transmission shifting is restricted or during any critical transmission malfunction.



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DIAGNOSTIC CODES

Continued illumination of the **CHECK TRANS (1)** light during vehicle operation (not start-up) indicates the ECU has signaled a diagnostic code. Poor performance may activate a code without illuminating the **CHECK TRANS (1)** light. Up to five diagnostic codes can be recorded. Diagnostic codes can be read and cleared by two methods: by using the shift selectors (2) shown below or using the Pro-Link ® 9000 Diagnostic Tool. Use of the Pro-Link ® 9000 Diagnostic Tool is described in the instruction manual furnished with each tool. Basic information on code reading, code clearing and troubleshooting is covered in this DIAGNOSIS section. More detailed information is available in the Troubleshooting Manual shown in the Service Literature section.



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Diagnostic codes are numerical indications relating to a malfunction in transmission operation. Each code consists of a two-digit main code and a two-digit subcode. These codes are logged in a list in the ECU memory with the most severe or otherwise most recent code listed first. A maximum of five codes (numbered d1–d5) may be listed in memory at one time. As codes are added, the oldest nonactive code is dropped from the list. If all codes are active, the code with the lowest priority that is not included on the severity list is dropped from the list. Access to the diagnostic codes and code information is through the pushbutton and lever shift selectors or the diagnostic data reader.

The ECU separately stores the active and historical (nonactive) codes. An active code is any code that is current in the ECU decision-making process. Historical codes are codes that are retained in the ECU's memory and will not necessarily affect the ECU decision-making process. Historical codes are useful in determining if a problem is isolated, is intermittent, or results from a previous malfunction.

DIAGNOSTIC CODE DISPLAY PROCEDURE

Diagnostic codes can be read and cleared by two methods:

- With the pushbutton or lever shift selector
- With the Pro-Link ® 9000 Diagnostic Data Reader. The use of the Pro-Link ® 9000 diagnostic tool is described in the instruction manual furnished with each tool.

Diagnostic codes are displayed as follows:

The code list position is the first item displayed, followed by the main code and the subcode. Each item is displayed for about one second. The display cycles continuously until the next code list position is accessed by pressing the MODE button. The following list represents the display cycle using code 25 11 as an example:

1. Code list position – d, 1
2. Main code – 2, 5
3. Subcode – 1, 1
4. Cycle repeats – d, 1

To view the second, third, fourth, and fifth positions (d2, d3, d4, d5), momentarily press the MODE button. Momentarily press the MODE button after the fifth position is displayed to restart the sequence of code list positions.

If a listed code is active, the LED indicator next to the MODE button is illuminated. Any code position which does not have a diagnostic code logged will display “ - ” for both the main and subcodes.

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Pushbutton Shift Selector

- Bring the vehicle to a stop at a safe location.
- Apply the parking brake.

To Display Stored Codes:

- Simultaneously press the (Up) and (Down) arrow buttons once to access the diagnostic display mode – press the buttons twice if a transmission oil level sensor is installed.
- Observe the digital display for codes (codes will appear one digit at a time).
- Press the MODE button to see the next code – repeat for subsequent codes.

NOTE: Be sure to record all codes displayed before they are cleared. This is essential for troubleshooting.

To Clear Active Indicators and Resume Vehicle Operation:

- Press and hold the MODE button for approximately three seconds until the mode indicator (LED) flashes. Release the MODE button and active indicators such as the CHECK TRANS light will not be illuminated. Some codes are self-clearing and others require ignition cycles to clear.

NOTE: If the condition that caused the code is still present, the code will again become active.

To Exit The Diagnostic Mode:

- Press the (Up) and (Down) arrow buttons at the same time, or press **N** (Neutral).

After a fixed number of ignition cycles, a code may be deleted from memory if it has not recurred.

The shift selector diagnostic mode will end automatically after two minutes without operator input.

DIAGNOSTIC CODE LISTINGS AND PROCEDURES

The following table presents information about the diagnostic codes which may occur during the operation of the transmission. For additional information, refer to TS2973EN Troubleshooting Manual for WTEC III Controls.

Table 7. Code Listings And Procedures (A 629 540 43 00)

| CODES | | QUICK CHECKS |
|-------------------------------------|----------|--|
| MAIN CODE | SUB CODE | |
| 13 | 12 | 1. Check: <ul style="list-style-type: none"> a. Battery direct ground and power connections are tight and clean. b. Vehicle batteries are charged. c. Vehicle charging system is not over- or under-charging. d. VIM fuse is good. e. VIM connections are tight, clean, and undamaged. f. Vehicle manufacturer supplied wiring is correct. g. ECU connectors are tight, clean, and undamaged. |
| ECU Input Voltage Low | | |
| 13 | 13 | |
| ECU Input Voltage Medium Low | | 1. Check: <ul style="list-style-type: none"> a. Is transmission equipped with oil level sensor? b. Engine speed sensor, output speed sensor, temperature sensor, and oil level sensor are working correctly. c. Wiring harness has no opens, shorts to ground, or shorts to battery. |
| 13 | 23 | |
| ECU Input Voltage High | | |
| 14 | 12,23 | |
| Oil Level Sensor | | |

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| CODES | | QUICK CHECKS |
|------------------------------------|--------------------------------|--|
| MAIN CODE | SUB CODE | |
| 21 | 12,23 | <p>1. Check:</p> <ul style="list-style-type: none"> a. TPS connector is properly connected. b. End of TPS cable is pulled out properly. c. Engine fuel lever is in idle position. d. Engine fuel lever provides proper amount of stroke on TPS cable. e. Wiring harness to TPS has no opens, shorts between wires, or shorts to ground. f. TPS for proper operation and resistance readings. |
| Throttle Position Sensor | | |
| 22 | 14, 15, 16 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Speed sensors and connectors are tight, clean, and undamaged. b. Wiring harness to sensors has no opens, shorts between wires, or shorts to ground. |
| Speed Sensors | | |
| 23 | 12, 13, 14, 15, 16 | <p>1. Check:</p> <ul style="list-style-type: none"> a. ECU connectors are tight, clean, and undamaged. b. Shift selector connector is tight, clean, and undamaged. c. Wiring harness has no opens, shorts between wires, or shorts to ground. <p>2. Shift selector(s) for proper operation.</p> |
| Shift Selectors | | |
| 24 | 12 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Air temperature is below -32°C (-25°F) <ul style="list-style-type: none"> 1) If yes, this is a correct response for temperature. 2) If no, check that main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. |
| Sump Fluid Temperature Cold | | |
| 24 | 23 | <p>1. Verify the overheat situation. Check:</p> <ul style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. <ul style="list-style-type: none"> 1) If fluid level is incorrect — correct fluid level. 2) If fluid level is correct — check for cause of overheating. <p>2. Check if ECU and transmission connectors are tight, clean, and undamaged.</p> |
| Sump Fluid Temperature Hot | | |
| 25 | 00, 11, 22, 33, 44, 55, 66, 77 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Speed sensor connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Fluid level is correct. d. Wiring harness to sensor has no opens, shorts between wires, or shorts to ground. |
| Output Speed Sensor | | |

Table 7. Code Listings And Procedures (A 629 540 43 00)

| CODES | | QUICK CHECKS |
|--|------------------------|--|
| MAIN CODE | SUB CODE | |
| 26 | 00, 11 | <p>1. Check:</p> <ul style="list-style-type: none"> a. TPS for proper operation, related harness for opens and shorts. b. Serial connection to engine is tight, clean, and undamaged. c. SCI wiring harness has no opens or shorts. |
| Throttle/Engine Coolant Source Not Detected | | |
| 32 | 00, 33, 55, 77 | <p>1. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check:</p> <ul style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. <p>2. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness has no opens, shorts between wires, or shorts to ground. |
| C3 Pressure Switch Open | | |
| 33 | 12, 23 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness has no opens, shorts between wires, or shorts to ground. |
| Sump Oil Temperature Sensor Failure | | |
| 34 | 12, 13, 14, 15, 16, 17 | <p>1. If able, recalibrate ECU, if not, replace ECU.</p> |
| EEPROM | | |
| 35 | 00, 16 | <p>1. Check:</p> <ul style="list-style-type: none"> a. ECU connectors are tight, clean, and undamaged. b. VIM connectors are tight, clean, and undamaged. c. Vehicle manufacturer supplied wiring has correct power and ground connections. d. Power connections are battery direct. e. Ground connections are battery direct. f. Ignition switch connections are correct. |
| Power Interruption Real Time Write Interruption | | |
| 36 | 00 | <p>1. If able, recalibrate ECU; if not, replace ECU.</p> |
| Hardware/Software Not Compatible | | |

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| CODES | | QUICK CHECKS |
|---|--|---|
| MAIN CODE | SUB CODE | |
| 42 | 12, 13, 14, 15, 16, 21 22, 23, 24, 26 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness is not pulled too tight, and there is no damage, chafing, or screws through harness. d. Wiring harness has no opens, shorts between wires, or shorts to ground. e. Unauthorized repairs have not been made. <p>2. Change harness (optional).</p> |
| Short to Battery in Solenoid Circuit | | |
| 44 | 12, 13, 14, 15, 16, 21, 22, 23, 24, 26 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness has no opens, shorts between wires, or shorts to ground. |
| Solenoid Circuit Short to Ground | | |
| 45 | 12, 13, 14, 15, 16, 21, 22, 23, 24, 26 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness has no opens or shorts. |
| Solenoid Circuit Open | | |
| 46 | 21, 26, 27 | <p>1. Check:</p> <ul style="list-style-type: none"> a. Main transmission connector is tight, clean, and undamaged. b. ECU connectors are tight, clean, and undamaged. c. Wiring harness has no opens, shorts between wires, or shorts to ground. <p>2. Replace ECU.</p> |
| Solenoid Overcurrent | | |
| 51 | 01, 10, 12, 21, 23, 24, 35, 42, 43, 45, 46, 53, 64, 65, XY* | <p>1. Check:</p> <ul style="list-style-type: none"> a. Output and turbine speed sensor connectors are tight, clean, and undamaged. b. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. <p>2. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check:</p> <ul style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. |
| Offgoing Ratio Test (During Shift) | | |
| <p>* Additional codes could be logged for other shifts where X indicates range shifted from and Y indicates range shifted to.</p> | | |

Table 7. Code Listings And Procedures (A 629 540 43 00)

| CODES | | QUICK CHECKS |
|---|---|---|
| MAIN CODE | SUB CODE | |
| 52 | 01, 08, 32, 34, 54, 56, 71, 72, 78, 79, 99, XY* | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Output and turbine speed sensor connectors are tight, clean, and undamaged. b. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. c. Main wiring harness to transmission has no shorts between wires or shorts to ground. 2. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. |
| Offgoing C3 Pressure Switch Test (During Shift) | | |
| 53 | 08, 18, 28, 29, 38, 39, 48, 49, 58, 59, 68, 69, 78, 99, XY* | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Turbine and engine speed sensor connectors are tight, clean, and undamaged. b. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. 2. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. |
| Offgoing Speed Test (During Shift) | | |
| 54 | 01, 07, 10, 12, 17, 21, 23, 24, 27, 32, 34, 35, 42, 43, 45, 46, 53, 54, 56, 64, 65, 70, 71, 72, 80, 81, 82, 83, 85, 86, 92, 93, 95, 96, XY* | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Turbine and output speed sensor connectors are tight, clean, and undamaged. b. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. 2. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> a. Correct dipstick is installed. b. Fluid level is correct. 3. EEPROM calibration is correct for the transmission. |
| Oncoming Ratio Test (After Shift) | | |
| <p>* Additional codes could be logged for other shifts where X indicates range shifted from and Y indicates range shifted to.</p> | | |

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| CODES | | QUICK CHECKS |
|---|---------------------------------------|--|
| MAIN CODE | SUB CODE | |
| 55 | 07, 17, 27, 87, 97, XY* | <p>Oncoming C3 Pressure Switch Test (After Shift)</p> <ol style="list-style-type: none"> Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> Correct dipstick is installed. Fluid level is correct. Check: <ol style="list-style-type: none"> Output and turbine speed sensor connectors are tight, clean, and undamaged. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. Check: <ol style="list-style-type: none"> Transmission connector is tight, clean, and undamaged. ECU connectors are tight, clean, and undamaged. C3 pressure switch wiring has no opens, shorts between wires, or shorts to ground. |
| 56 | 00, 11, 22, 33, 44, 55, 66, 77, | <p>Range Verification Ratio Test</p> <ol style="list-style-type: none"> Check: <ol style="list-style-type: none"> Turbine and output speed sensor connectors are tight, clean, and undamaged. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. Transmission connector is tight, clean, and undamaged. ECU connectors are tight, clean, and undamaged. Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> Correct dipstick is installed. Fluid level is correct. |
| 57 | 11, 22, 44, 66, 88, 99 | <p>Range Verification C3 Pressure Switch Test</p> <ol style="list-style-type: none"> Let vehicle idle with parking brake applied, wheels chocked, and vehicle level. Check: <ol style="list-style-type: none"> Correct dipstick is installed. Fluid level is correct. Check: <ol style="list-style-type: none"> Output and turbine speed sensor connectors are tight, clean, and undamaged. Speed sensor wiring harness has no opens, shorts between wires, or shorts to ground. Check: <ol style="list-style-type: none"> Transmission connector is tight, clean, and undamaged. ECU connectors are tight, clean, and undamaged. C3 pressure switch wiring has no opens, shorts between wires, or shorts to ground. |
| <p>* Additional codes could be logged for other shifts where X indicates range shifted from and Y indicates range shifted to.</p> | | |

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| CODES | | QUICK CHECKS |
|---|--|--|
| MAIN CODE | SUB CODE | |
| 61 Retarder Over Temperature | 00 | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Fluid level is correct. b. Retarder apply system is not allowing retarder and throttle to be applied at the same time. c. Fluid cooler is adequately sized for load. |
| 62 Retarder Temperature Sensor, Engine Coolant Sensor | 12, 23, 32, 33, | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Retarder temperature measured with DDR is consistent with code: or determine if code is active using shift selector. b. Sensor connector is tight, clean and undamaged. c. ECU connectors are tight, clean, and undamaged. d. Temperature sensor circuit has no opens, shorts between wires, or shorts to ground. e. Serial connection to engine computer is tight, clean, and undamaged. f. SCI wiring harness has no opens or shorts. |
| 63 Input Function Fault | 00, 26, 40, 41, 47 | <ol style="list-style-type: none"> 1. Check input wiring, switches, and connectors to determine why input states are different. |
| 64 Retarder Modulation Request Device Fault | 12, 23 | <ol style="list-style-type: none"> 1. Use DDR to read retarder counts and identify problem wires. Check wiring for short to battery, ground wire open, or short to ground. |
| 66 Serial Communications Interface Fault | 00, 11, 22 | <ol style="list-style-type: none"> 1. Check: <ol style="list-style-type: none"> a. Serial connection to engine computer is tight, clean, and undamaged. b. SCI wiring harness has no opens, shorts, or shorts to ground. c. If DDR is not available, also be sure that transmission ECU connections are tight, clean, and undamaged. |
| 69 ECU Malfunction | 27, 28, 29, 33, 34, 35, 36, 39, 41, 42, 43 | <ol style="list-style-type: none"> 1. Clear diagnostic code and retry vehicle start. 2. If code recurs, reprogram or replace ECU. |
| 70 Software Problem | 12, 13, 14 | |

ABBREVIATIONS AND DEFINITIONS



ABBREVIATIONS AND DEFINITIONS

| | |
|--------|--|
| ABS | Anti-lock B rake S ystem — OEM-provided means to detect and prevent wheel stoppage to enhance vehicle handling. Retarder and engine brakes will not apply when ABS is active. |
| C3PS | C3 Pressure S witch — Pressure switch to signal the presence or absence of pressure in the C3 clutch-apply circuit. |
| CT | Closed T hrottle |
| DDR | D iagnostic D ata R eaders — Diagnostic tool; most current version is the Pro-Link [®] 9000 made by MicroProcessor Systems, Inc. Used to interrogate the ECU for diagnostic information and for reprogramming I/O packages in a calibration. |
| DNA | D oes N ot A dapt — Adaptive shift control is disabled. |
| DNS | D O N OT S HIFT — Refers to the D O N OT S HIFT diagnostic response during which the C HECK T RANS light is illuminated and the transmission will not shift and will not respond to the Shift Selector. |
| ECU | E lectronic C ontrol U nit (also commonly referred to as the “computer”) |
| EEPROM | E lectronically E rasable P rogrammable R ead O nly M emory |
| J1587 | Engine/transmission serial data communications link. |
| J1939 | High-speed vehicle serial data communications link. |
| LED | L ight- E mitting D iode — Electronic device used for illumination. |
| NNC | N eutral N o C lutches — Neutral commanded with no clutches applied. |
| OEM | O riginal E quipment M anufacturer — Maker of vehicle or equipment. |
| OLS | O il L evel S ensor — Electronic device (optional) on control module for indicating transmission fluid level. |
| PD | P owered D ownshift — A downshift forced by applying brakes with the throttle applied. Allison Transmission does not recommend this procedure. |
| PT | P art T hrottle |

ABBREVIATIONS AND DEFINITIONS *(cont'd)*

| | |
|-----------------|---|
| PTO | Power Takeoff |
| SCI | Serial Communication Interface — Used to transmit data and messages between the diagnostic tool and the ECU and other systems such as electronically-controlled engines. |
| ST | Step Thru — A downshift forced by applying WOT, just prior to a CT downshift. |
| TID | TransID — A feature which allows the ECU to know the transmission configuration and provide the corresponding calibration required. |
| TPS | Throttle Position Sensor — Potentiometer for signaling the position of the engine fuel control lever. |
| V | Version — Abbreviation used in describing ECU software levels. |
| VIM | Vehicle Interface Module — A watertight box containing relays and fuses — interfaces the transmission electronic control system with components on the vehicle. |
| WOT | Wide Open Throttle |
| WT | World Transmission |
| WTEC III | World Transmission Electronic Controls, Third Generation |