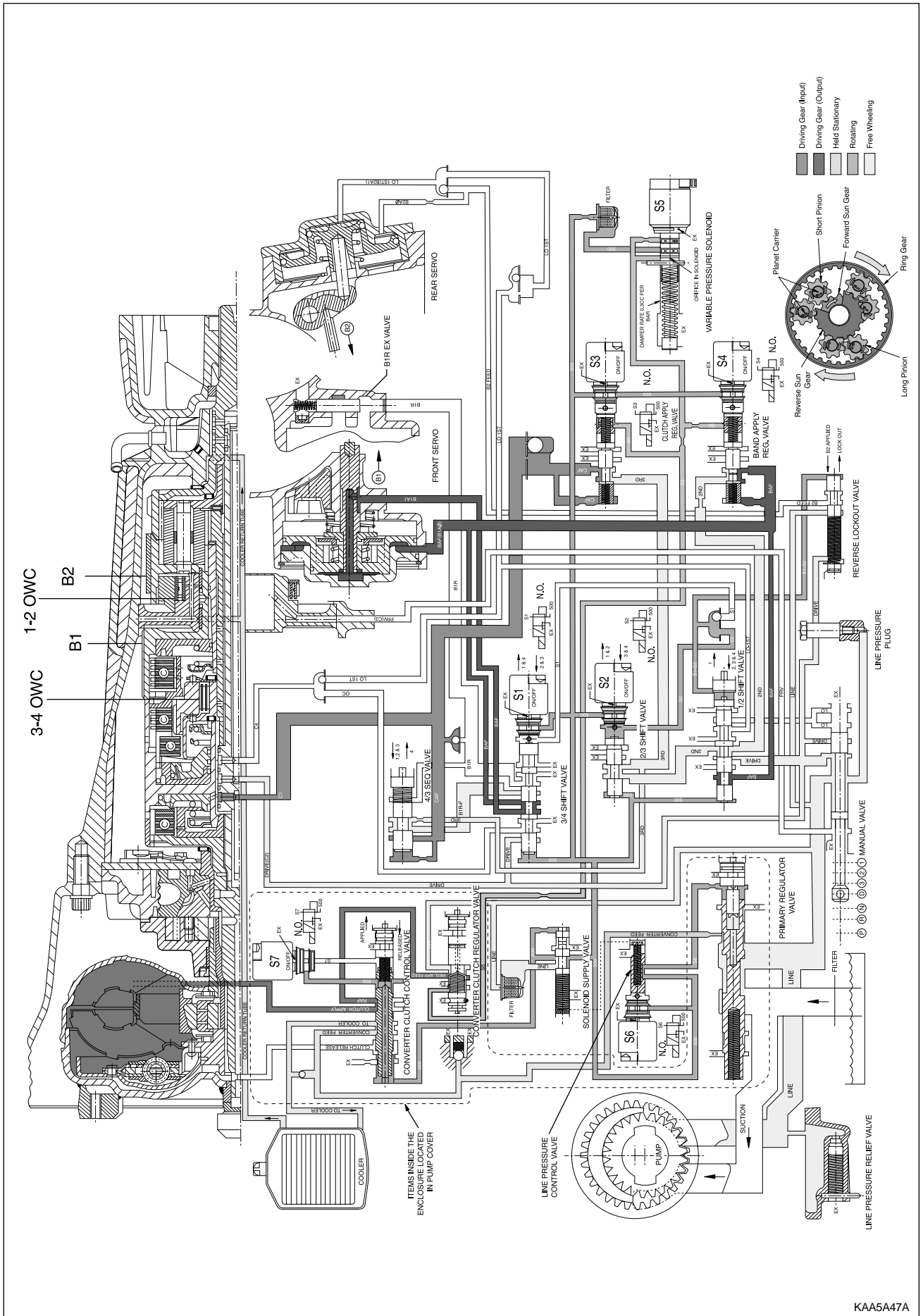


DRIVE 4 LOCK UP



KAA5A47A

Power Flow - Drive 4 Lock Up

In Drive 4 Lock Up, transmission drive is the same as for Drive 4 but with the application of the converter lock up clutch to provide positive no-slip converter drive.

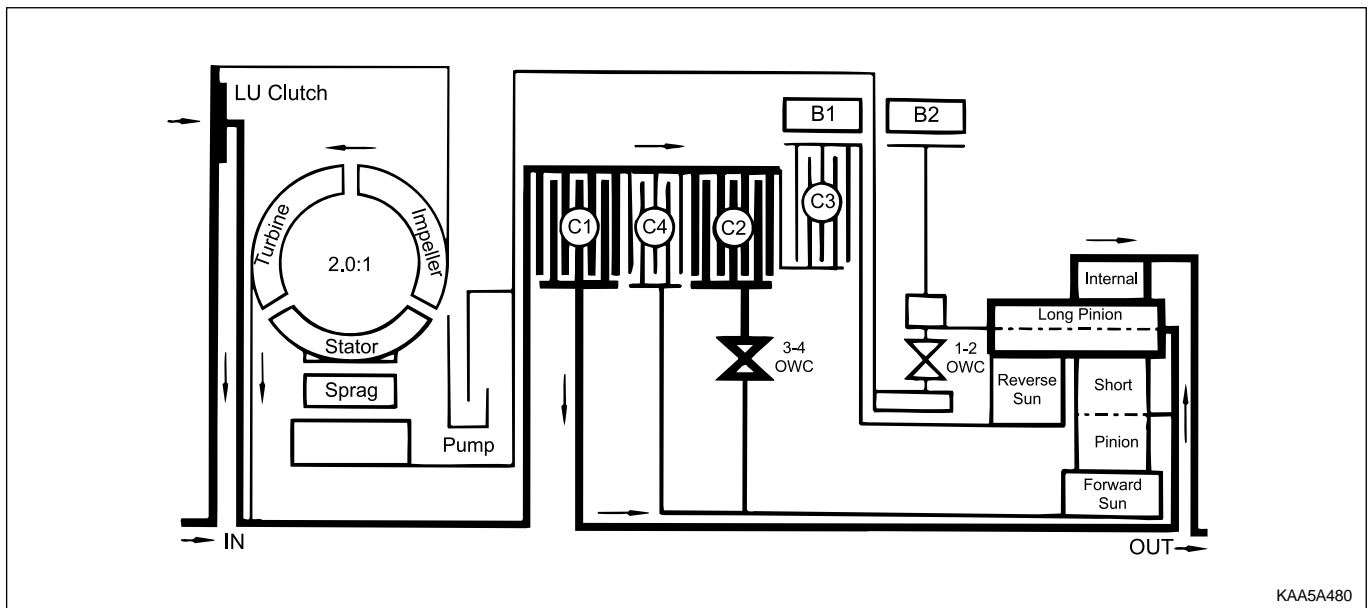
Control

To maintain this arrangement in the steady state solenoids and valves are activated as follows;

- When S7 is switched ON, S7 feed oil to the converter clutch control valve is switched OFF and allowed to exhaust through the S7 solenoid. This allows the valve to move to the clutch engage position.

- Regulated apply feed oil, driven from drive oil at the converter clutch regulator valve, is directed by the converter clutch control valve to the engage side of the converter clutch.
- Converter clutch release oil is exhausted at the converter clutch control valve.
- Converter feed oil is re-routed by the converter clutch control valve directly to the oil cooler and lubrication circuit.

Gear State	ELEMENTS ENGAGED								
	C1	C2	C3	C4	B1	B2	1-2 OWC	3-4 OWC	LU CLUTCH
Drive 4 Lock Up	X	X	-	-	X	-	-	-	-



DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSIS

BASIC KNOWLEDGE REQUIRED

You must be familiar with some basic electronics to use this section of the Service Manual. They will help you to follow diagnostic procedures.

Notice: Lack of the basic knowledge of this transmission when performing diagnostic procedures could result in incorrect diagnostic performance or damage to transmission components. Do not, under any circumstances, attempt to diagnose a transmission problem without this basic knowledge.

Notice: If a wire is probed with a sharp instrument and not properly sealed afterward, the wire will corrode and an open circuit will result.

Diagnostic test probes are now available that allow you to probe individual wires without leaving the wire open to the environment. These probe devices are inexpensive and easy to install, and they permanently seal the wire from corrosion.

Special Tools

You should be able to use a Digital Volt Meter (DVM), a circuit tester, jumper wires or leads and a line pressure gauge set. The functional check procedure is designed to verify the correct operation of electronic components in the transmission. This will eliminate the unnecessary removal of transmission components.

FUNCTIONAL CHECK PROCEDURE

Begin with the Functional Check Procedure which provides a general outline of how to diagnose automatic transmission. The following functional check procedure will indicate the proper path of diagnosing the transmission by describing the basic checks and then referencing the locations of the specific checks.

- Check the fluid level according to the Fluid Level Service Procedure.
- Check the transmission fluid leak.
- Check if the transmission fluid is not burnt by smell.
Notice: The specific fluid used in this transmission turns brown during normal operation. Brown fluid does not indicate a transmission fault.
- Ensure that the transmission is not in Limp Home Mode (LHM).
- Check the battery terminals and the earth connections for corrosion or looseness.
- Check that the cooler flow is not restricted.
- Check all electrical plug connections for tightness.
- Use on-board diagnostic tool or a scan tool to see if any transmission trouble codes have been set.

Refer to the appropriate "Diagnostic Trouble Code (DTC)" information and repair the vehicle as directed. After repairing the vehicle, perform the road test and verify that the code has not set again.

- Perform the Electrical/Garage Shift Tests.
- Perform the Road Test Procedure in this section.
- Inspect the oil and check for metal or other contaminants in the oil pan.

TRANSMISSION FLUID LEVEL SERVICE PROCEDURE

This procedure is to be used when checking a concern with the fluid level in a vehicle. A low fluid level will result in slipping and loss of drive/ reverse or delay on engagement of drive/ reverse when the vehicle is cold.

The vehicle is first checked for transmission diagnostic messages on the scan tool. If the oil level is low, it is possible to register a vehicle speed signal fault.

The vehicle is to be test driven to determine if there is an abnormal delay when selecting drive or reverse, or loss of drive. One symptom of low fluid level is a momentary loss of drive when driving the vehicle around a corner. Also when the transmission fluid level is low, a loss of drive may occur when the transmission fluid temperature is low.

If there is no loss of drive when the vehicle is driven warm and a vehicle speed signal fault is registered, then fluid should be added to the transmission.

When adding or changing transmission fluid use only Castrol TQ 95 automatic transmission fluid. The use of incorrect fluid will cause the performance and durability of the transmission to be severely degraded.

Fluid Level Diagnosis procedure

1. If the vehicle is at operating temperature allow the vehicle to cool down for two hours, but no greater than four hours. Or if the vehicle is at cool status, start the engine and allow the engine to idle for approximately 5 minutes or, if possible, drive the vehicle for a few kilometers. This will allow the transmission to be within the correct temperature range. Transmission fluid level should be checked at temperature 50 - 60 °C (82 - 140 °F).

Caution: Removal of the fluid filler plug when the transmission fluid is hot may cause injury if fluid drains from the filler hole.

2. With the brake pedal pressed, move the gear shift control lever through the gear ranges, pausing a few seconds in each range. Return the gear shift control lever to P (Park). Turn the engine OFF.

3. Park the vehicle on a hoist, inspection pit or similar raised level surface. The vehicle must be control level to obtain a correct fluid level measurement.
4. Place a fluid container below the fluid filler plug.
5. Clean all dirt from around the fluid filler plug. Remove the fluid filler plug. Clean the filler plug and check that there is no damage to the 'O' ring.
 - If fluid drains through the filler hole the transmission may have been overfilled. When the fluid stops draining the fluid level is correct. Install the fluid filler plug and tighten it to 33 N•m (24 lb-ft).
 - If fluid does not drain through the filler hole, the transmission fluid level may be low. Install the filler pump into the filler hole. Lower the vehicle with the filler pump still connected and partially fill the fluid through the filler hole.
Start the vehicle in P (Park) with the parking brake and the brake applied. With the engine idling, move the gear shift control lever through the gear ranges, pausing a few seconds in each range and adding the fluid until gear application is felt.
Return the gear shift lever to P (Park).
Turn the engine OFF and raise the vehicle. When the three minutes passed after the engine stopped, remove the filler pump.
Check if the fluid level is aligned with the bottom of the filler hole. If not, add a small quantity of fluid to the correct level. Install the fluid filler plug and tighten it to 33 N•m (24 lb-ft).
6. When the fluid level checking procedure is completed, wipe any fluid around the filler plug with a rag or shop towel.

Fluid Level Set After Service

1. Depending on the service procedure performed, add the following amounts of fluid through the filler plug hole prior to adjusting the fluid level:

Converter empty	8.0 liters (8.5 quarts)
Converter full	3.8 liters (4.0 quarts)
2. Follow steps 1 through 4 of the Fluid Level Diagnosis Procedure.
3. Clean all dirt from around the fluid filler plug. Remove the fluid filler plug. Clean the filler plug and check that there is no damage to the 'O' ring.
4. Lower the vehicle with the filler pump still connected and start the vehicle in P (Park) with the parking brake and the brake applied. With the engine idling, move the gear shift control lever through the gear

ranges, pausing a few seconds in each range and adding the fluid until gear application is felt.

Then add an additional 0.5 litres of fluid. Return the gear shift lever to P (Park). Turn the engine OFF and raise the vehicle. Install the fluid filler plug and tighten it to 33 N•m (24 lb-ft).

5. Drive the vehicle at 3.5 to 4.5 kilometers with light throttle so that the engine does not exceed 2500 rpm.
This should result in the transmission temperature being in the range 50 - 60 °C (82 - 140 °F). With the brake applied, move the shift lever through the gear ranges, pausing a few seconds in each range at the engine idling.
6. Return the gear shift lever to P (Park).
Turn the engine OFF and raise the vehicle on the hoist, if applicable, ensuring the vehicle is level. When the three minutes passed after the engine stopped, remove the filler plug.
Check if the fluid level is aligned with the bottom of the filler hole. If not, add a small quantity of fluid to the correct level. Install the fluid filler plug and tighten it to 33 N•m (24 lb-ft).
7. Wipe any fluid around the filler plug with a rag or shop towel.

FLUID LEAK DIAGNOSIS AND REPAIR

The cause of most external leaks can generally be located and repaired with the transmission in the vehicle.

Methods for Locating Leaks

General Method

1. Verify that the leak is transmission fluid.
2. Thoroughly clean the suspected leak area.
3. Drive the vehicle for approximately 25 km (15 miles) or until the transmission reaches normal operating temperature (88 °C, 190 °F).
4. Park the vehicle over clean paper or cardboard.
5. Turn the engine OFF and look for fluid spots on the paper.
6. Make the necessary repairs to correct the leak.

Powder Method

1. Thoroughly clean the suspected leak area.
2. Apply an aerosol type powder (foot powder) to the suspected leak area.
3. Drive the vehicle for approximately 25 km (15 miles) or until the transmission reaches normal operating temperature (88 °C, 190 °F).
4. Turn the engine OFF.
5. Inspect the suspected leak area and trace the leak path through the powder to find the source of the leak.

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6. Make the necessary repairs.

Dye and Black Light Method

1. Add dye to the transmission through the transmission fluid filler plug. Follow the manufacturer's recommendation for the amount of dye to be used.
2. Use the black light to find the fluid leak.
3. Make the necessary repairs.

Repairing the Fluid Leak

Once the leak point is found the source of the leak must be determined. The following list describes the potential causes for the leak:

- Fasteners are not torqued to specification.
- Fastener threads and fastener holes are dirty or corroded.
- Gaskets, seals or sleeves are misaligned, damaged or worn.
- Damaged, warped or scratched seal bore or gasket surface.
- Loose or worn bearing causing excess seal or sleeve wear.
- Case or component porosity.
- Fluid level is too high.
- Plugged vent or damaged vent tube.
- Water or coolant in fluid.
- Fluid drain back holes plugged.

ELECTRICAL / GARAGE SHIFT TEST

This preliminary test should be performed before a hoist or road test to make sure electronic control inputs are connected and operating. If the inputs are not checked before operating the transmission, a simple electrical condition could be misdiagnosed as a major transmission condition.

A scan tool provides valuable information and must be used on the automatic transmission for accurate diagnosis.

1. Move gear shift control lever to P (Park) and set the parking brake.
2. Connect scan tool to Data Link Connector (DLC) terminal.
3. Start engine.
4. Turn the scan tool ON.
5. Verify that the appropriate signals are present. These signals may include:
 - ENGINE SPEED
 - VEHICLE SPEED

- THROTTLE POSITION
- ACCEL. PEDAL POSITION
- TRANSMISSION GEAR STATE
- GEAR SHIFT LEVER POSITION
- TRANSMISSION FLUID TEMPERATURE
- CLOSED THROTTLE POSITION LEARN
- OPEN THROTTLE POSITION LEARN
- CLOSED ACCEL. PEDAL POSITION LEARN
- OPEN ACCEL. PEDAL POSITION LEARN
- A/C COMPRESSOR STATUS
- KICKDOWN SWITCH STATUS
- 4WD STATUS
- MODE SWITCH
- THROTTLE POSITION VOLTAGE
- GEAR SHIFT LEVER POSITION VOLTAGE
- TRANS. FLUID TEMPERATURE VOLTAGE
- A/C SWITCH
- KICKDOWN SWITCH VOLTAGE
- 4WD LAMP LOW VOLTAGE
- 4WD LAMP HIGH VOLTAGE
- MODE SWITCH VOLTAGE
- BATTERY VOLTAGE

6. Monitor the A/C COMPRESSOR STATUS signal while pushing the A/C switch.
 - The A/C COMPRESSOR STATUS should come ON when the A/C switch is pressed, and turn OFF when the A/C switch is repushed.
7. Monitor the GEAR SHIFT LEVER POSITION signal and move the gear shift control lever through all the ranges.
 - Verify that the GEAR SHIFT LEVER POSITION value matches the gear range indicated on the instrument panel or console.
 - Gear selections should be immediate and not harsh.
8. Move gear shift control lever to neutral and monitor the THROTTLE POSITION signal while increasing and decreasing engine speed with the accelerator pedal.
 - THROTTLE POSITION should increase with engine speed.

ROAD TEST PROCEDURE

- Perform the road test using a scan tool.
- This test should be performed when traffic and road conditions permit.
- Observe all traffic regulations.

ELECTRONIC ADJUSTMENTS

Idle Speed Adjustments

Carry out the adjustments to the idle speed as detailed in the workshop manual.

Vehicle Coding

The vehicle coding is integrated as part of the diagnostic software. A scan tool has the function to code the vehicle through the K-line.

Throttle Clearing

The learnt throttle clearing routine uses the mode switch and gear lever. Carry out the following steps to complete the automated throttle clearing procedure:

1. Switch ignition 'ON' with handbrake applied and engine 'OFF'.
2. Select the selector lever to 1st gear and 'WINTER' mode.
3. Move the selector lever to 2nd gear and 'ECONO' or 'POWER' mode.
4. Move the selector lever to 3rd gear and 'WINTER' mode.

Throttle Position Calibration

Should the throttle position data stored in the TCU be lost or be out of specification, as indicated by a diagnostic trouble message, it may be re-established by the following procedure.

- Check that the hot engine idle speed is within specification.
- Allow the engine to idle in 'Drive' for 60 seconds with the air conditioner (if fitted) turned off. The closed throttle reference point in the TCU has now been set.
- Switch the engine off but leave the ignition on. Hold the accelerator pedal on the floor for 60 seconds. The wide open throttle reference point in the TCU has now been set.

SYMPTOM DIAGNOSIS

DRIVE FAULTS

Condition	Possible Causes	Action
No Drive in D	<ul style="list-style-type: none"> • Insufficient auto transmission fluid. • Blocked feed in C1/C2 cylinder. • 'Z' link displaced. • Primary Regulator Valve (PRV) jammed open. • Overdrive shaft or input shaft seal rings failed. • 3-4 or 1-2 One Way Clutch (OWC) installed backwards or failed. • C2 piston broken or cracked. 	<ul style="list-style-type: none"> • Check the fluid level. Top up as necessary. • Inspect and clean C1/C2 feed. • Reinstall/renew the 'z' link. • Remove, clean and re-install the PRV. • Inspect and replace as necessary. • Inspect and replace as necessary. • Inspect and replace as necessary.
No Drive in Reverse No engine braking in Manual 1 Engine braking in Manual 1 is OK	<ul style="list-style-type: none"> • Rear band or servo faulty. • Failure in C3, C3 hub or C1/C2 cylinder. • Damaged input shaft sealing rings. 	<ul style="list-style-type: none"> • Check servo adjustment or replace rear band as necessary. • Check for failure in C3, C3 hub or C1/C2 cylinder. Repair as necessary. • Inspect and replace as necessary.
No drive in Drive and Reverse	<ul style="list-style-type: none"> • Jammed Primary Regulator Valve (PRV). • Damaged/broken pump gears. • Dislodged output shaft snap ring. 	<ul style="list-style-type: none"> • Inspect and clean PRV. • Inspect and replace pump gears as necessary. • Inspect and repair as necessary.

FAULTY SHIFT PATTERN

Condition	Possible Causes	Action
2-3 shift only (no 4th or 1st)	<ul style="list-style-type: none"> • S1 always OFF. 	<ul style="list-style-type: none"> • Inspect S1. Repair or replace as necessary. • Check for 12 Volts applied to S1 at all times or for wiring fault.
1-4 shift only 1-3-4 (Delayed 1-2 shift)	<ul style="list-style-type: none"> • S1 always ON. 	<ul style="list-style-type: none"> • Inspect S1. Repair or replace as necessary. • Check for 12 Volts applied to S1 at all times or for wiring fault.
4-3 shift only	<ul style="list-style-type: none"> • S2 always OFF. 	<ul style="list-style-type: none"> • Inspect S2. Repair or replace as necessary. • Check for open circuit or wiring fault.
1-2-Neutral (1st over run)	<ul style="list-style-type: none"> • S2 always ON. 	<ul style="list-style-type: none"> • Inspect S2. Repair or replace as necessary. • Check for open circuit or wiring fault.
1-3 shift only	<ul style="list-style-type: none"> • B1 failed. • Loose band adjustment. • Front servo piston or seal failed. • S1/S2 ball misplaced, 	<ul style="list-style-type: none"> • Inspect and repair as necessary. • Inspect and adjust as necessary. • Inspect and repair as necessary. • Inspect and replace or refit as necessary
1-3-4 only	<ul style="list-style-type: none"> • Smaller 'O' ring on front servo piston failed or missing. • 2-3 shift valve jammed. 	<ul style="list-style-type: none"> • Inspect 'O' ring. Refit or replace as necessary. • Inspect the 2-3 shift valve. Repair or replace as necessary.
1-2-1 only	<ul style="list-style-type: none"> • C1 clutch failed or slipping in 3rd and 4th. (Gives 1st in 3rd and 2nd in 4th.) 	<ul style="list-style-type: none"> • Inspect C1 clutch. Repair or replace as necessary.
No manual 4-3, 3-2 or 2-1	<ul style="list-style-type: none"> • Over-run Clutch (OC) /low ball misplaced. 	<ul style="list-style-type: none"> • Inspect ball. Refit or replace as necessary.
No manual 1st	<ul style="list-style-type: none"> • Rear band slipping when hot. • Reverse/Low-1st ball misplaced. • Rear servo inner 'O' ring missing. 	<ul style="list-style-type: none"> • Inspect rear band adjustment. Adjust as necessary. • Inspect ball. Refit or replace as necessary. • Inspect 'O' ring. Refit or replace as necessary.
1st gear only or 2nd,3rd, and 4th only	<ul style="list-style-type: none"> • 1-2 shift valve jammed. 	<ul style="list-style-type: none"> • Inspect the 1-2 shift valve. Repair or replace as necessary.
1st and 2nd only or 1st, 3rd and 4th only	<ul style="list-style-type: none"> • 2-3 shift valve jammed. 	<ul style="list-style-type: none"> • Inspect the 2-3 shift valve. Repair or replace as necessary.
1st, 2nd and 4th only or 1st, 2nd, and 3rd (tied up in 3rd)	<ul style="list-style-type: none"> • Inhibitor switch fault, 1-2-3 only. • 3-4 shift valve jammed. 	<ul style="list-style-type: none"> • Inspect inhibitor switch. Repair or replace as necessary. • Inspect the 3-4 shift valve. Repair or replace as necessary.

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Condition	Possible Causes	Action
Harsh 2-3 shift	<ul style="list-style-type: none"> ● Jammed band 1 release valve. ● Faulty S3 or S2 solenoid. ● Faulty clutch apply regulator valve. ● Missing or damaged clutch apply feed ball. ● Damaged input shaft sealing rings. ● Damaged C1 piston 'O' rings. ● Damaged or dislodged C1 piston bleedball. 	<ul style="list-style-type: none"> ● Inspect the release valve. Repair or replace as necessary. ● Inspect S3 or S2. Repair or replace as necessary. ● Inspect the regulator valve. Repair or replace as necessary. ● Inspect the ball. Refit or replace as necessary. ● Inspect the sealing rings. Refit or replace as necessary. ● Inspect the 'O' rings. Refit or replace as necessary. ● Inspect the bleed ball. Refit or replace as necessary.
Harsh 3-4 shift	<ul style="list-style-type: none"> ● Faulty S1 or S4 solenoid. ● Jammed band 1 release valve. ● Incorrect front band adjustment. ● Damaged front servo piston 'O' rings. ● Faulty or damaged variable pressure solenoid (S5). ● Faulty band apply regulator valve. 	<ul style="list-style-type: none"> ● Inspect S1 or S4. Repair or replace as necessary. ● Inspect the release valve. Repair or replace as necessary. ● Inspect the band. Adjust as necessary. ● Inspect the 'O' rings. Refit or replace as necessary. ● Inspect S5. Repair or replace as necessary. ● Inspect the regulator valve. Repair or replace as necessary.

SHIFT QUALITY FAULTS

Condition	Possible Causes	Action
All Shifts Firm	<ul style="list-style-type: none"> • Incorrect auto transmission fluid (ATF). • S5 faulty won, or incorrectly fitted. • Band apply and clutch apply regulator springs misplaced. 	<ul style="list-style-type: none"> • Drain and fill with specified ATF. • Check that S5 is fitted correctly, or replace S5. • Inspect band apply and clutch apply regulator springs. Refit or replace as necessary
Manual 4-3-2-1 is soft delayed or missing	<ul style="list-style-type: none"> • Over-run Clutch (OC) /Low-1st ball misplaced. • C4 clutch worn or burnt. • C4 wave plate not lined up with the holes in the piston. 	<ul style="list-style-type: none"> • Inspect the ball. Refit or replace as necessary. • Inspect C4 clutch. Replace or repair as necessary. • Check the alignment. Realign as necessary.
Firm 1-2 Hot	<ul style="list-style-type: none"> • S5 worn. 	<ul style="list-style-type: none"> • Inspect S5 and replace as necessary.
4th Tied up	<ul style="list-style-type: none"> • Incorrect C4 pack clearance. • Damaged C4 clutch. • Cracked C2 piston (leaking into C4). 	<ul style="list-style-type: none"> • Check the clearance and adjust as necessary. • Inspect C4. Repair or replace as necessary. • Inspect piston. Repair or replace as necessary.
Tied up on 2-3	<ul style="list-style-type: none"> • Incorrect band adjustment • Front servo plastic plug missing • B1R spring broken. 	<ul style="list-style-type: none"> • Inspect and adjust band as necessary. • Replace the plug. • Replace the spring.
Flare on 2-3	<ul style="list-style-type: none"> • B1R spring/plug left out. • C1/B1R ball misplaced. • C1 clutch damaged. • Restriction in C1 feed. • C1 piston check ball jammed. • Overdrive or input shaft sealing rings damaged. 	<ul style="list-style-type: none"> • Replace the spring/plug. • Refit the ball. • Inspect the clutch. Repair the clutch as necessary. • Inspect and clean C1 feed. • Replace the piston. • Inspect and replace the sealing rings and/or shaft as necessary.
Slips in 4th	<ul style="list-style-type: none"> • C1/B1R ball misplaced. • Overdrive or input shaft sealing rings damaged. • C1 clutch damaged. 	<ul style="list-style-type: none"> • Inspect and replace the ball. • Inspect and replace the sealing rings and/or shaft as necessary. • Inspect and repair the C1 clutch as necessary.
Slips in reverse, no manual 1st	<ul style="list-style-type: none"> • Rear band incorrectly adjusted or damage • Low-1st check ball misplaced. 	<ul style="list-style-type: none"> • Inspect and adjust or replace rear band. • Inspect and re-fit the ball.
Flare on 4-3, Flare on 3-2	<ul style="list-style-type: none"> • 4-3 sequence valve in backwards. 	<ul style="list-style-type: none"> • Refit the valve.
Firm Manual low shift-high line press.	<ul style="list-style-type: none"> • Low-1st check ball misplaced. 	<ul style="list-style-type: none"> • Replace the ball.

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Condition	Possible Causes	Action
Harsh 1-2 shift	<ul style="list-style-type: none"> • Faulty inhibitor switch. • Faulty throttle position sensor. • Incorrect front band adjustment. • Damaged front servo piston 'O' rings. • Faulty or damaged variable pressure solenoid (S5). • Faulty S1 or S4 solenoid. • Faulty Band Apply Regulator (BAR) valve. • Misassembled front servo return spring. 	<ul style="list-style-type: none"> • Check the resistance. Replace the inhibitor switch as necessary. • Inspect and replace the sensor as necessary. • Inspect and adjust the band as necessary. • Inspect and replace the 'O' rings as necessary. • Inspect, repair or replace S5 as necessary. • Inspect, repair or replace S1 or S4 as necessary. • Inspect, repair or replace the BAR as necessary. • Inspect and repair as necessary.
Stalls when Drive Or Reverse	<ul style="list-style-type: none"> • Jammed Converter Clutch Control Valve (CCCV). 	<ul style="list-style-type: none"> • Inspect and clean CCCV.
Selected Shudder on Rolldown	<ul style="list-style-type: none"> • Faulty solenoid 7. 	<ul style="list-style-type: none"> • Inspect, repair or replace as necessary.

AFTER TEARDOWN FAULTS

Condition	Possible Causes	Action
C2 burnt	<ul style="list-style-type: none"> • Gear shift lever linkage out of adjustment. • S6 foiled - stuck low. • Overdrive/output shaft sealing rings damaged. • C2 piston cracked. 	<ul style="list-style-type: none"> • Inspect, repair C2 and adjust the linkage as necessary. • Repair C2. Inspect, repair or replace S6 as necessary. • Repair C2. Inspect, replace the sealing rings and/or shaft as necessary. • Repair C2. Inspect, repair or replace the C2 piston as necessary.
C4 burnt	<ul style="list-style-type: none"> • Incorrect C4 pack clearance. • C4 wave plate not lined up properly. • Overdrive or output shaft sealing rings damaged. • C2 piston cracked. • Over-run Clutch (OC) /low-1st ball misplaced. 	<ul style="list-style-type: none"> • Inspect C4 and repair as necessary. • Inspect and adjust the C4 pack clearance as necessary. • Repair C4. Inspect and realign the wave plate as necessary. • Repair C4. Inspect and realign the sealing rings and/or shaft as necessary. • Repair C4. Inspect and replace the C2 piston as necessary. • Repair C4. Inspect and refit the ball as necessary.
B1 burnt	<ul style="list-style-type: none"> • B1R spring broken. • Input shaft sealing ring cut. • C1/B1R ball misplaced. 	<ul style="list-style-type: none"> • Inspect and repair B1 and replace the spring as necessary. • Replace sealing ring. • Repair B1. Refit the ball as necessary.
C1 burnt	<ul style="list-style-type: none"> • B1R spring left out. • Overdrive or input shaft sealing rings damaged. • C1 piston cracked. • Ball capsule jammed. • 4-3 sequence valve in backwards. • Clutch Apply Feed (CAF) /B1R ball left out. 	<ul style="list-style-type: none"> • Inspect and repair C1 and replace the spring. • Repair C1. Inspect and replace the sealing tongs and/or shaft as necessary. • Repair C1. Inspect and replace the C1 piston as necessary. • Repair C1. Inspect and refit the capsule as necessary. • Repair C1. Inspect and refit the valve as necessary. • Repair C1. Inspect and replace the ball as necessary.
B2 burnt (Slips in reverse - no manual 1st)	<ul style="list-style-type: none"> • Rear band incorrectly adjusted or damaged. • Reverse-low/first ball misplaced. 	<ul style="list-style-type: none"> • Inspect and adjust the band as necessary. • Inspect and refit the ball as necessary.

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Condition	Possible Causes	Action
Firm converter lock or unlock	<ul style="list-style-type: none">• Input shaft 'O' ring missing or damaged.• Converter clutch regulator valve in backwards.	<ul style="list-style-type: none">• Inspect and replace the 'O' ring as necessary.• Inspect and refit the valve as necessary.
No lock up at light throttle	<ul style="list-style-type: none">• Input shaft 'O' ring missing or damaged.• C1 bias valve in backwards.	<ul style="list-style-type: none">• Inspect and replace the 'O' ring as necessary.• Inspect and refit the valve as necessary.

BLANK

TROUBLE CODE DIAGNOSIS - GASOLINE VEHICLE

TCM DIAGNOSTIC SYSTEM OVERVIEW

Notice: To prevent Transmission Control Module (TCM) damage. The ignition key must be OFF when disconnection or reconnection the power to the TCM (for example battery cable, TCM pigtail connector, TCM fuse, jumper cables, etc.).

When the TCM detects a system fault, a Diagnostic Trouble Code (DTC) is set in the TCM. This code is present while the fault conditions are met and is stored as a 'History DTC' until cleared. Condition for setting and clearing each TCM DTC are provided in the relevant sections.

In the case where the vehicle type is certified for Euro On-Board Diagnostic (EOBD) compliance, the Engine Control Module (ECM) provides the communication link

to the EOBD scan tool to pass on any EOBD relevant codes from the TCM. The table below contains a list of all supported DTCs and the classification of each for EOBD purposes. Where a type B DTC has been set in an EOBD vehicle, the response to the fault may include action by the ECM, including the illumination of the Malfunction Indicator Lamp (MIL). Refer to *Section 1F, Engine Control*, for details on EOBD system function, checks and fault clearing.

CLEARING TROUBLE CODES

TCM DTCs should be cleared after repairs have been completed. Some diagnostic tables will tell you to clear the codes before using the chart, which will help to find the cause of the problem more quickly. Always note the DTCs present before clearing - this information may be helpful in the diagnostic process."

DIAGNOSTIC TROUBLE CODES

DTC	Description	Type
P0706	Transmission Range Sensor Circuit Range/Performance	B
P0707	Transmission Range Sensor Circuit Low input	B
P0708	Transmission Range Sensor Circuit High input	B
P0710	Transmission Fluid Temperature Sensor Circuit Malfunction	D
P0790	Normal/Performance Switch Circuit Malfunction	D
P1703	Engine Speed Signal Error	D
P1704	Shaft Speed Signal Error	D
P1708	TCM Supply Voltage Low	D
P1709	TCM Supply Voltage High	D
P1712	Kickdown Switch Circuit Malfunction	D
P1713	Pedal Signal Error	D
P1714	EEPROM Vehicle Code Error	D
P1715	VPS Offset Error	D
P1717	RAM Error	D
P1718	ROM Error	D
P1719	CAN Bus Error	D
P1720	EEPROM Error	D
P1721	Throttle Signal Error	D
P1722	Vehicle Type Determination Error	D
P1733	Solenoid 1 Circuit Open	D
P1734	Solenoid 2 Circuit Open	D
P1735	Solenoid 3 Circuit Open	D
P1736	Solenoid 4 Circuit Open	D
P1737	Solenoid 5 Circuit Open	D

DIAGNOSTIC TROUBLE CODES (Cont'd)

DTC	Description	Type
P1738	Solenoid 6 Circuit Open	D
P1739	Solenoid 7 Circuit Open	D
P1741	Solenoid 1 Circuit Short	D
P1742	Solenoid 2 Circuit Short	D
P1743	Solenoid 3 Circuit Short	D
P1744	Solenoid 4 Circuit Short	D
P1745	Solenoid 5 Circuit Short	D
P1746	Solenoid 6 Circuit Short	D
P1747	Solenoid 7 Circuit Short	D

DTC Types

Each DTC is directly related to a diagnostic test. The Diagnostic management system sets DTCs based on the failure of the tests during a driving cycle or cycles. The following are the two types of DTCs and the characteristics of those codes;

Type B

- Emissions related.
- EOBD system "Armed" after one driving cycle with a fail.
- EOBD system "Disarmed" after one driving cycle with a pass.
- Illuminates the MIL on the second consecutive driving cycle with a fail.

- TCM stores a history DTC on the first driving cycle with a fail.
- EOBD system stores a history DTC on the second consecutive driving cycle with a fail, (the DTC will be armed after the first fail).
- EOBD system stores a freeze frame on the second consecutive driving cycle with a fail, (if empty).

Type D

- Non-Emissions related.
- Does not request illumination of any lamp.
- Stores a history DTC on the first driving cycle with a fail.
- EOBD system does not store a freeze frame.

TROUBLE CODE DIAGNOSIS - DIESEL VEHICLE

TCM DIAGNOSTIC SYSTEM OVERVIEW

Notice: To prevent Transmission Control Module (TCM) damage. The ignition key must be OFF when disconnection or reconnection the power to the TCM (for example battery cable, TCM pigtail connector, TCM fuse, jumper cables, etc.).

When the TCM detects a system fault, a Diagnostic Trouble Code (DTC) is set in the TCM. This code is present while the fault conditions are met and is stored

as a 'History DTC' until cleared. Condition for setting and clearing each TCM DTC are provided in the relevant sections.

CLEARING TROUBLE CODES

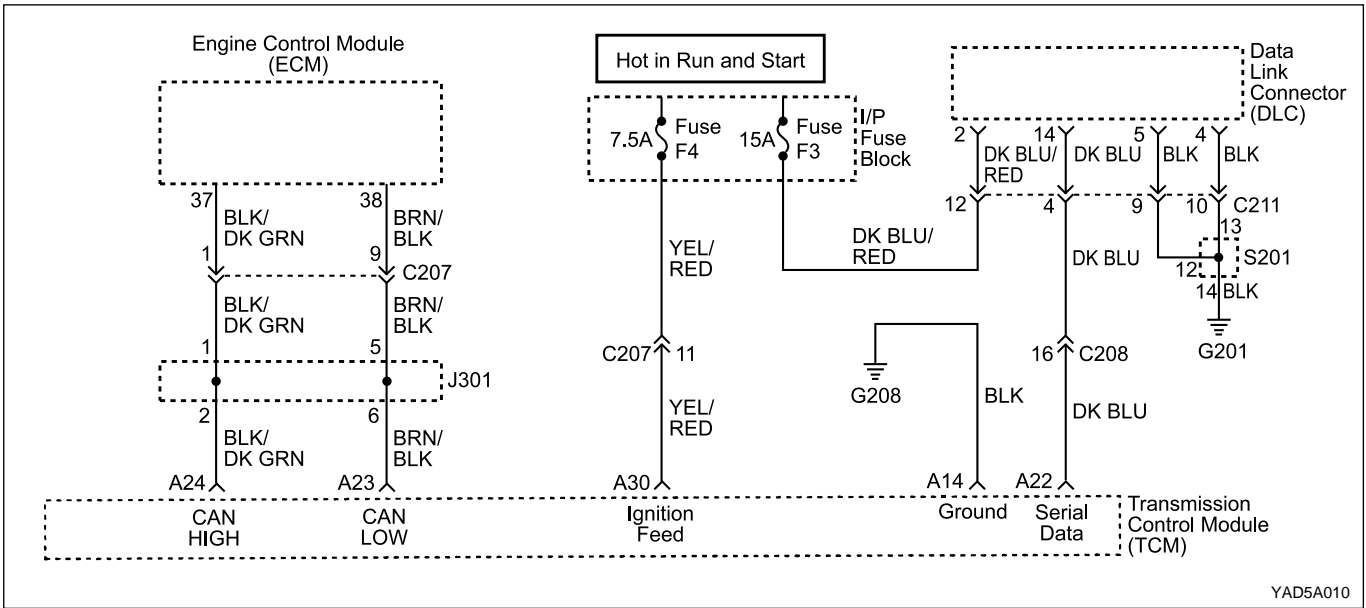
TCM DTCs should be cleared after repairs have been completed. Some diagnostic tables will tell you to clear the codes before using the chart, which will help to find the cause of the problem more quickly. Always note the DTCs present before clearing - this information may be helpful in the diagnostic process."

DIAGNOSTIC TROUBLE CODES

DTC	Description
P0707	Transmission Range Sensor Circuit Low Input
P0708	Transmission Range Sensor Circuit High Input
P0710	Transmission Fluid Temperature Sensor Circuit Malfunction
P0790	Normal/Performance Switch Circuit Malfunction
P1703	Engine Speed Signal Error
P1704	Shaft Speed Signal Error
P1708	TCM Supply Voltage Low
P1709	TCM Supply Voltage High
P1710	Air Conditioning Switch Circuit Malfunction
P1712	Kickdown Switch Circuit Malfunction
P1714	EEPROM Vehicle Code Error
P1715	VPS Offset Error
P1716	Throttle Not Learnt Error
P1717	RAM Error
P1718	ROM Error
P1720	EEPROM Error
P1721	Throttle Signal Error
P1722	Vehicle Type Determination Error
P1733	Solenoid 1 Circuit Open
P1734	Solenoid 2 Circuit Open
P1735	Solenoid 3 Circuit Open
P1736	Solenoid 4 Circuit Open
P1737	Solenoid 5 Circuit Open
P1738	Solenoid 6 Circuit Open
P1739	Solenoid 7 Circuit Open
P1741	Solenoid 1 Circuit Short
P1742	Solenoid 2 Circuit Short
P1743	Solenoid 3 Circuit Short
P1744	Solenoid 4 Circuit Short

DIAGNOSTIC TROUBLE CODES (Cont'd)

DTC	Description
P1745	Solenoid 5 Circuit Short
P1746	Solenoid 6 Circuit Short
P1747	Solenoid 7 Circuit Short



TCM DIAGNOSTIC SYSTEM CHECK

Circuit Description

The Transmission Control Module (TCM) Diagnostic System Check is the starting point for any driveability complaint diagnosis. Before using this procedure, perform a careful visual/ physical check of the Transmission Control Module (TCM) and the transmission grounds for cleanliness and tightness.

The TCM Diagnostic System Check is an organized approach to identifying a problem created by an electronic transmission control system malfunction.

Diagnostic Aids

An intermittent fault may be caused by a poor connection, rubbed-through wire insulation or a wire broken inside the insulation. Check for poor connections or a damaged harness. Inspect the TCM harness and connections for improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wire connection, and damaged harness.

TCM Diagnostic System Check

Step	Action	Value(s)	Yes	No
1	1 Turn the ignition OFF. 2. Install the scan tool. 3. Turn the ignition ON, with the engine OFF. 4. Attempt to display the Transmission Control Module (TCM) Data List with the scan tool. Does the scan tool display the TCM data?	-	Go to Step 2	Go to Step 3
2	Select the Trouble Code with the scan tool. Are any Diagnostic Trouble Codes (DTCs) stored?	-	Go to applicable DTC table	System OK, Check Complete