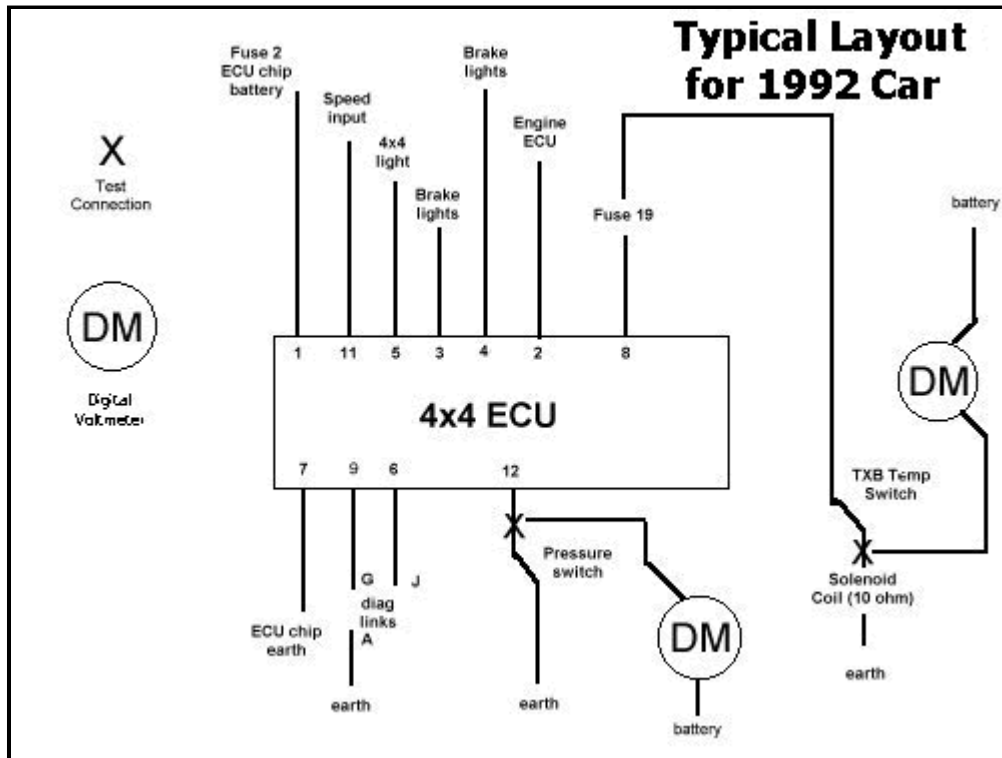


Vauxhall Cavalier/Opel

600. Electrical & Functional Testing of the Transfer Box



Schematic drawing of a typical ECU showing the external connections. Variations will depend on the age of the vehicle but the basic function is the same.

Description by ECU pin number

pin 1 - The ECU chip draws its power from fuse 2 (20 Amp). (not fuse 19).

pin 2 - is the input from the engine ECU. It tells the 4x4 ECU if the engine is running.

pins 3 & 4 - Each of these inputs are from the two brake light switches at the brake pedal. One circuit is made when the pedal is operated and the other breaks. (Its a double check)

pin 5 - is the output to the dash panel and the 4x4 warning light.

Pin 6 - is earthed when interrogating for ECU for fault codes with the diagnostic plug under the bonnet (A+J). When the diagnostic plug is not required it is parked in its holder.

Pin 7 - is the ECU chip earth supply.

Pin 8 - always expects to see the earth from the other side of the solenoid coil, except when supplying a battery to operate the solenoid (4WD required). If fuse 19 is not in situ or the 'one shot' over temperature sensor (on the txb) is operated then the solenoid and 4WD cannot operate. (Fault codes will be stored under fault conditions)

pin 12 - When 4WD is commanded, by the ECU (see pin 8), and if the correct pressure is applied to the txb, from the steering pump and accumulator fluid circuit, then the pressure switch operates to remove the earth from pin 12. When the solenoid (pin 8) releases, the fluid pressure is released back to the accumulator, and the earth is reapplied to pin 8, by the pressure switch. (Fault codes will be stored under fault conditions)

Electrical & Functional Testing

To test the basic functions of the txb connect a digital meter to the pressure switch as shown.

This can be achieved by connecting one lead to the non-earth side of the pressure switch, usually the brown/green wire (Fig.1). The other lead should be connected to a fused battery supply and the meter extended to the passenger seat so it may be observed under road test conditions.

CAUTION: Do not use the handbrake while car is in motion.
CAUTION: Take extreme care when road testing, particularly on the public highway.

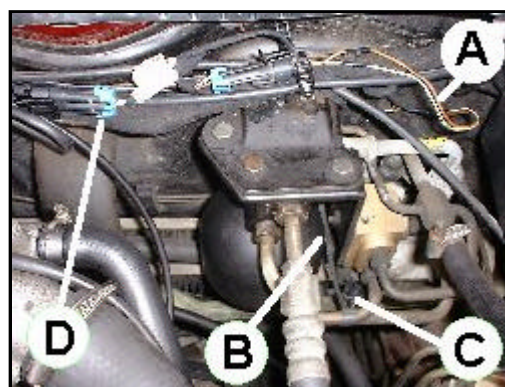


Figure 1

The accumulator assembly showing the electrical connections.

- A. Connection wires from plug to back of solenoid.
- B. Wires to the pressure switch ...
- C. ...Connector.
- D. Connector for the txb temperature switch.

Basic electrical check of txb - engine running.

	Meter Reads	(12v = batt. voltage) (0v = nearly earth)
601 Ignition off	12V	No Pressure
602 Ignition on (engine not started)	12V	No Pressure
603 Start Engine	0V	= 4WD engaged
604 Drive Car to less than 16 MPH - (say 10 MPH), and apply brakes lightly.	0V	= 4WD remains engaged
605 Drive Car to over 16 MPH - (say 25 MPH), and apply brakes lightly.	12V	= 2WD
606 Release brakes.	0V	= 4WD re-engaged
607 Return to base and stop the engine	-	-

Basic electrical check of txb - engine not running.

608 Ignition off	12V	-
609 Ignition on (engine not started)	12V	No txb Pressure
610 Lightly apply footbrake	0V	Accumulator Pressure applied to txb
611 Release footbrake	12V	Pressure released from txb
612 Repeat 10- & 11 - until meter remains at 12v	-	Not enough pressure left in accumulator
613 Switch off ignition	12V	-
614 Start engine	12V to 0V	Change takes approx. 10 seconds while accumulator recharges.

The txb electrical and fluid functioning is correct if all the above conditions are met without exception and the 4x4 warning lamp remains extinguished, except when starting the engine, as would be normally expected.

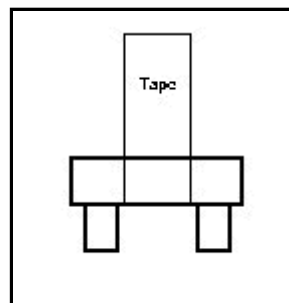
Leave the meter connected for the mechanical checks - para's 615-623

To check the rolling mechanical function of the txb clutch and viscous coupling. (vehicle driven)

CAUTION: Take extreme care when road testing, particularly on the public highway.

CAUTION: Read all para's. 615-623 before proceeding.

615 With the ignition OFF, expose the fuse panel, withdraw fuse 19 and place a piece of electrical tape round the centre of the fuse and replace the fuse (diagram). The tape should be long enough to grasp and will aid removal of the fuse under road test conditions.



616 Start the car and find a reasonably sharp corner (say 80 degrees) or open flat ground.

617 Drift round the corner. (only necessary to be travelling at about 15-20 MPH).

618 After exiting the corner, gently accelerate and, at the same time, withdraw fuse 19. - i.e. as soon as possible after the car has been straightened up.

619 A 'thump' will be heard and the steering may momentarily 'judder'. The 4x4 panel light will permanently glow.

620 If the txb is operating correctly, the clutch will have been engaged and the viscous coupling will be applying power to the rear wheels. The result will be a 'thump' as the txb clutch immediately releases. The rate of acceleration will determine the 'size' of the 'thump'. If the meter is still connected from the electrical checks the reading will change from 0V to 12V immediately fuse 19 is removed.

621 Stop the car, switch off, replace the fuse. Restart the engine to prove the dash light goes out, as normal. Note the txb will not operate while the dash alarm is glowing.

622 A fault code 43 or 44 will have been stored and you may wish to expel it. (Ign. on/off 25+ times or battery disconnected for 10 minutes - whichever works).

623 The box may be considered functioning correctly if the 'thump' is heard when fuse 19 is removed.

To check the mechanical function of the txb clutch and viscous coupling. (txb in situ & vehicle stationary)

630 This test is carried on the vehicle while jacked up one side and with/without the engine running. Additional tools required are torque wrench, approx. 50 ft/lbs.

631 Jack up the car on one side and place 'axle' stands (front & rear wheel), having blocked the other wheels against movement.

632 With the engine and handbrake off, turn each of the raised wheels by hand and confirm that turning the front wheel does NOT turn the rear wheel, and vice-versa. (txb not engaged)

633 Leaving the handbrake off, start the engine.

634 Repeat the test in para 632 and confirm that turning the front wheel DOES turn the rear wheel and vice/versa. (txb engaged)

635 Leaving the engine running, apply the handbrake.

636 Connect the torque wrench, set at 50 ft/lbs, to one of the wheel nuts of the raised front wheel.

637 Gently apply tension to the torque wrench. As it approaches the 'click point' the front wheel should turn slowly and smoothly.

638 If the torque test is suspect then any noise e.g. grinding from the txb clutch or coupling, may be detected by repeating the test with the ignition on (engine not started) and a very light touch on the footbrake, by a helper. (Just enough to operate the 'brake light' switches).

Explanation

1. Without the engine running the txb is not engaged and the test will prove this is the case by showing the front and rear wheels are independent.

2. With the engine running the txb engages and the front and rear wheels will turn together.

3. With the engine running and the handbrake on, the 50 ft/lb torque will turn the viscous coupling provided the txb clutch is fully engaged. If there is little or no resistance either the clutch is slipping/not engaged properly, or the viscous coupling is not delivering the drive required. If the movement is not smooth the clutch may be slipping.

23rd October 2001