Vauxhall Cavalier/Opel

4 x 4 transfer box removal

NOTE: If you are removing the txb to replace it with another, or a different viscous coupling assembly, check the prop shaft to txb connection flanges are the same. The difference appears to be between 8 & 16v models.
NOTE: The exhaust system on a non-turbo is in the centre of the vehicle and may require removal rather than simply dropping the downpipe away, as is the case with the turbo variant.

SUMMARY

1. **SAFETY - FIRST DEPRESSURIZE THE ACCUMULATOR AND THEN DISCONNECT THE BATTERY**(see detail item number 101 = **dtn101**)
2. Drain Oil from the Transfer Box (txb) and the gearbox. **dtn103**
3. Check necessity to disconnect the propshaft intermediate bearing housings. **dtn105**
4. Disconnect the Propshaft. **dtn106**
5. Remove & retain the offside 'cast' support bracket. **dtn107**
6. Remove and retain the offside drive shaft. **dtn108**
7. Remove and retain the inlet manifold plastic cover. **dtn111**
8. Disconnect & move aside, the vacuum pipe connection, brake servo to inlet manifold, at the manifold end. **dtn112**
9. Disconnect & move aside, the upper heater hose connection, at the cylinder head end. **dtn113**
10. Disconnect & move aside, the main air intake hose, at the inlet end. **dtn114**
11. Disconnect & move aside, the idle bypass hose, at the manifold end. **dtn115**
12. Disconnect & move aside, the flexible high pressure hose from the accumulator block.
CAUTION: Some ATF Fluid loss) **dtn116**
13. Disconnect and retain the flexible high pressure hose from accumulator block to the txb. **dtn117**
14. Remove and retain the 3 bolts securing the gear change plate to the top of the gearbox/txb and move the plate to one side. (Limited movement) **dtn118**
15. Remove and tie up the starter to one side. **dtn121**
16. Remove & retain the large gearbox bolt above the starter. **dtn123**
17. Disconnect the txb breather pipe at the txb end. **dtn124**
18. Remove & retain the 3 uppermost bolts from the txb
CAUTION: Good fitting spanners essential **dtn125 to dtn127**
19. Remove & retain the five bolts securing the txb to gearbox, from underneath the vehicle. (Leave the lowest in place until ready to remove the txb). **dtn128**
20. Remove & retain 2 exhaust downpipe nuts/bolts/springs, move the pipe to one side and support it. **dtn129**
21. Disconnect the temperature sensor cabling and coil up the cable.
CAUTION: - FRAGILE: dtn130
22. Support weight of txb on trolley jack, remove final bolt and withdraw unit by sliding off the gearbox towards the offside. **dtn131 to dtn134**
CAUTION: - Do not damage the temperature sensor.- (£62)
CAUTION: - keep weight of the txb off the splined shafts. - No location pegs!
CAUTION: - thin 'O' ring between the two units - recover carefully.
CAUTION: - Oil seepage.

100. DETAIL

In order to remove the transfer box(txb) it is necessary to disconnect the propshaft and remove the offside front drive-shaft.

Orientation - The transfer box and the gearbox are mounted side by side. The nearside drive shaft is connected to the gearbox and the offside drive-shaft is connected to the txb (Fig.3C). The one piece propshaft connects to the rear of the txb and is flanged at both ends. It is supported by two intermediate rubber mounted bearings, bolted to the 'floor pan' and expansion is achieved by a sliding spline at the front of the shaft.

101. Depressurize the accumulator - Switch on the ignition without starting the engine. Then operate the brake pedal, on and off, at least 25 times or until the 'whooshing' in the accumulator stops. This is to ensure there is no fluid pressure in the accumulator prior to disconnection of the high pressure hoses. (More detail can be found in the system bleeding section) - When completed disconnect the battery as the starter is to be removed. (See para. 121)

102. If not working on a ramp or over a pit, jack up and place axle stands to the offside of the car (front & rear). Block both remaining wheels and release the handbrake. Note - It will be necessary to turn the propshaft in order to facilitate propshaft disconnection.
Trolley Jack & two axle stands

103. Using an 8mm Allen key, remove the drain plug from the txb and drain the oil. Note its condition and whether there are any particles in the flow. Replace the drain plug or set it aside. Note: This may be a good time to drain and change the gearbox oil as there will be a small oil loss when the txb is removed.
8mm Allen Key & Oil tray

104. Release and withdraw the six 'Allen bolts' and 'double washer plates' from the flange, where the propshaft joins the txb. This will require a 6mm 'Allen key socket' on a 1/2" drive. The space to work is restricted but a straight approach can be achieved using a short extension. Turn the propshaft as required to ease access & lock it in position with a screwdriver through the visible universal joint.
6mm Allen key socket

105. It should not be necessary to disconnect the intermediate rubber mounted prop shaft bearings. The shaft incorporates a splined coupling which can be used to shorten the prop when disconnecting from the txb. This may appear to be seized but can be facilitated by releasing the cap from the short end of the shaft, adjacent to the first rubber mounting. However, if the splines are seized then to disconnect the propshaft, from the txb, it will help to 'shorten' the shaft by releasing both intermediate bearing housings from the floor pan. There are two 13mm bolts on each. Take care to recover and note the spacing washers between the bracket and floor - these are not visible until the brackets are dropped away. (The specimen vehicle had two on each side, on the front bearing, and one each side on the rear.
13mm socket & short extension & Gas pliers

106. Locate the black plastic collar between the rear of the txb and the propshaft. Observe the lip at the rear of the coupling which is a cap, held in place by the six allen bolts. The idea is to release the large steel 'spacer' complete with the cap. The spacer contains the CV type universal joint. Using a sharp instrument, and a hammer, engage the body of the CV joint and dislodge it evenly towards the rear of the vehicle. Turn the shaft to facilitate even withdrawal.
CAUTION: If the cap is displaced some of the large ball bearings (6) will fall to the floor.
NOTE: If the universal coupling has remained intact you will see the larger lip is in fact a cap which can be knocked back off the body of the coupling to release the universal joint component parts if required. In addition there is a flush cap at the front of the joint.
NOTE: Now is a good time to check the flange sizes if a replacement box is being fitted.
Hammer & Screwdriver

107. If it is required to remove the short shaft to rebuild the CV joint, proceed to para. 108 else go to to paragraph 123.

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108. The cap on the propshaft (Fig.1-D), adjacent to the first rubber mounting, has already been released as in para.105. It will not yet be readily visible, but there is a splined nylon collar inside the cap which compresses to grip the splined shaft when the cap is tightened.

109. Move the cap and its rubber end to the rear of the shaft, i.e. towards the rubber mounted universal joint, and proceed to pull the short shaft (Fig.1-G) to the front of the vehicle to disengage the splined units. The shaft can then be taken away for overhaul/rebuilding.

110. Ensure both caps (Fig.1-A) are released from the CV joint body and if the joint is not already apart manoeuvre it to recover the six large ball bearings. The component parts are:
* The short shaft with inner CV bearing tracks on one end. (Fig.1-G)
* The screw on cap with threaded nylon insert and rubber boot. (Fig.1-D)
* The outer cage which only fits the joint one way. (Fig.1-B)
* The main body of the joint. (Fig.1-A) & (Fig.2A)
* Six ball bearings. (Fig.1-B) & (Fig.2-D)
* Two end caps. (Fig.1-A & E)
* Two rubber gaskets. (Fig.1-C) & (Fig.2-B)

111. Thoroughly clean all component parts and rebuild the joint as follows.

112. Using 'graphite' grease, grease the outer cage, ball bearings, inner cage and the main body, just enough to hold the ball bearings in place.
Graphite Grease

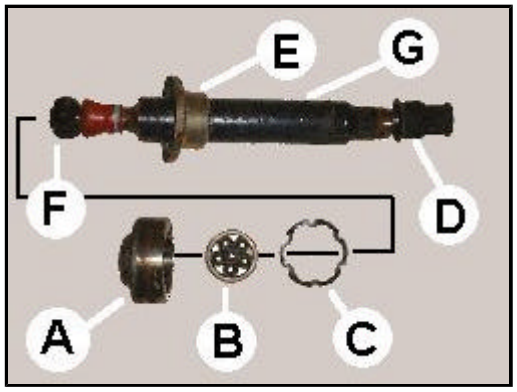

Figure 1

A. CV Joint body with front cap and seal in place.

B. The roller cage and six ball bearings.

C. Rubber gasket for the rear cap.

D. The rear cap with nylon sleeve and rubber boot intact.

E. The Rear Cap.

F. The 'spider' centre of the CV joint.

G. The short splined shaft, txb to front rubber mounting.

113. Place the outer cage over the inner 'spider' and place both into the body of the joint.

114. Tilt the shaft so as to expose one pair of the cage recesses from either side of the joint.

115. Lodge four ball bearings into the exposed cage (two each side) and manoeuvre the cage back to the straight ahead.
CAUTION: This can be a difficult operation and will not be successful until the joint is 'floating' and able to easily turn through the expected range.

116. This has got the cage seated squarely and properly mounted.

117. Repeat the exercise to expose the two remaining cages (opposite each other) and insert the remaining bearings.

118. Again, manoeuvre the assembly to its finished position where it will then be possible to move the shaft through 360

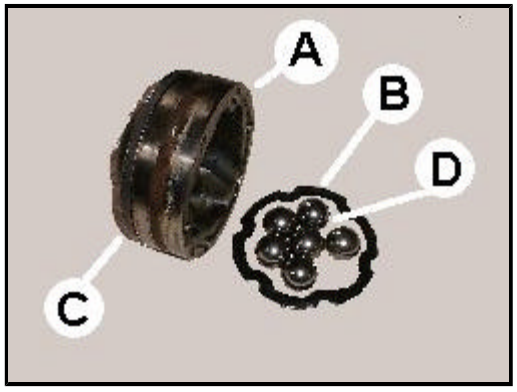

Figure 2

Close up view of CV housing.

degrees and confirm it also 'floats' backwards and forwards.

119. Pack the joint with graphite grease from both sides and replace the rubber gaskets and end caps. Tap the whole unit together and check the caps are square.
CAUTION: When placing the gaskets and caps use the six mounting bolts to ensure the gaskets line up. You do not want to be fiddling with this assembly under the vehicle.

A. CV joint housing. Note the bearing grooves.

B. Rubber end cap seal.

C. Front end cap in place.

D. Six CV ball bearings.

120. Thread the nylon sleeve into the cap, threads outermost. Turn in until almost flush with the cap. Place the rubber boot back onto the cap.

121. Refitting to the vehicle - Place the partially assembled cap onto the propshaft and offer the rebuilt short shaft to the splines and slide on.

122. It is recommended the shaft is now left in this position until the txb is refitted and the connection made at the txb. Reconnection will determine the normal length of the shaft and it is then only necessary to thread the cap back onto the short shaft and tighten.
CAUTION: Do not Forget to tighten the cap.

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123. (- and from paragraph 107) - From underneath the vehicle, remove the txb offside cast bracket which supports the txb against the cylinder block. There are three 13mm bolts to the txb (Fig.3A) and three 15mm bolts to the block. One of them is out of sight, behind a casting web, and can be reached with a 15mm socket on a short extension. There is no weight associated with taking this bracket off. The space created will facilitate sliding the txb off the gearbox towards the offside. In addition, the bracket can now be removed from the end of the starter motor (to block). (Fig.6F)
CAUTION: The battery MUST be disconnected prior to removal of the starter.
13mm & 8mm spanners - 15mm socket - Short extension - 8mm spanner - 13mm spanner - 15mm spanner

108. Remove the offside drive-shaft. The procedure is covered in the 'Haynes' workshop manual (UK), or similar. With the road-wheel off, it amounts to, removing the split pin from the shaft end and removing the 32mm nut and washer. Remove the split pin from the bottom joint and using an 18mm O/E spanner, remove the nut and split the joint. Tap the end of the drive shaft carefully to break any seal between the shaft and the hub. Using a bar, carefully tension the 'wishbone' plate down to remove the ball joint from the bottom of the leg. Then, Holding the drive-shaft, withdraw the hub from the drive-shaft. Gently tap the metal part of the inner CV joint to release the shaft from the txb. Withdraw the shaft and set aside. Inspect the outer CV boot for cracking or damage, this is a good time to replace the boot(s), if required.
32 mm deep socket - 18 mm O/E spanner - Ball joint 'splitter' - Plastic headed hammer - Drift

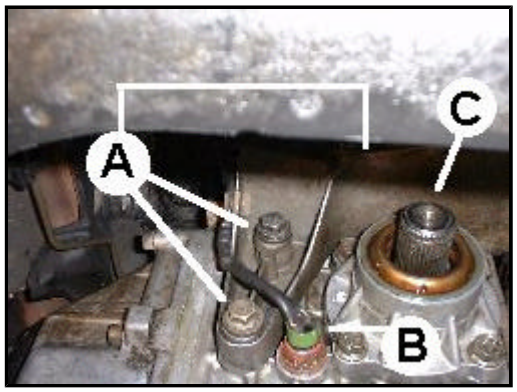

Figure 3

The txb looking up from underneath the vehicle and the offside.

A. Three cast support bracket mounting bolts

B. txb Temperature Sensor and cabling.

C. Offside drive shaft coupling, with oil seal.

109. Remove the axle stand from the rear wheel. Jack up the nearside front wheel and place axle stand. The front of the car is now off the ground.

110. You will need to make some working space under the bonnet and to the nearside rear of the engine compartment. This is the facilitate removal of the three 13mm bolts securing the top of the txb to the gearbox. The bolts are difficult to get at and it is important to get a a good fit with the spanner. Figure 2 shows a view of the working area after all the ancillary equipment has been removed.

111. Remove the cover from the 'inlet manifold'. Four Allen bolts (5mm). This will facilitate visibility and access to the top of the txb.
5mm Allen key

112. Disconnect the manifold end of the brake servo vacuum pipe and tuck out of the way.
19mm O/E spanner

113. Disconnect the upper heater hose at the head end and tuck out of the way. Prepare for a small water loss. (Provided system is closed - Rad. Cap on - engine cold)
CAUTION: Engine cold?
Screwdriver

114. Disconnect the main air intake hose between the manifold and the inter-cooler and slide it towards the front of the car.

115. Remove the small by-pass air hose end at the inlet manifold end and move out of the way.

116. Disconnect, and move out of the way, the flexible high pressure hose from the accumulator block. The other end goes to the oil cooler at the front of the vehicle.
CAUTION: Prepare for some fluid loss.
17mm O/E spanner - Quickgrip

117. One of the high pressure flexible hoses goes from the accumulator block to the top of the txb. It is guided past a similar size water hose and kept in position with a plastic clip (Fig.6E). Remove and set aside the clip. The metal part of the hose, towards the bottom, is clipped to the top of the gearbox. It will be necessary to release

the pipe from the clip as the union is released, at the txb end, to facilitate the olive removal. Carefully release the olive connection with a 17mm O/E spanner. Allow any oil to drain out into a pan placed under the txb. Disconnect at the accumulator end and recover the hose.
CAUTION: Prepare for some fluid loss.
17mm O/E Spanner

118. To create more working space, remove the three 13mm bolts securing the gear change mechanism plate to the gearbox (Fig.4C) and swing the bracket to one side. Note: this applies to & is recommended for the 6 speed gearbox which will maintain adjustment. On a five speed it may be preferable to disconnect the linkage and remove the required parts to make space.
13mm spanner

119. The top most txb mounting bolt can be seen in a small webbed recess. (Fig.4B).

120. Additional space will be required to get at the 13 mm txb bolt (top front bolt) you cannot see. It is located further round the txb housing, from the top bolt that you can see and towards the front of the vehicle. (Fig.4A.

121. Remove the two bolts securing the starter motor assembly to the block. (Caution: Now disconnect the battery - you have been warned). Tap the starter out of its housing and tie it up to the inlet manifold, out of the way. If you wish to remove the starter entirely it will be necessary to remove the electrical connections first.
17mm & 19mm spanners

122. Remove the inlet manifold to block support bar (Fig.6D) and set aside. (One end already released from the offside support casting mounting).
13mm spanner

123. Remove the large 18mm gearbox bolt from just above the starter.
18mm spanner

124. The txb filler and breather pipe is attached to the top of the txb. The top of the pipe should be found adjacent to the water header tank. Pull off the connection at the txb end.

125. Prepare to remove the three txb bolts from the top of the box. Care and a good fitting 13mm ring spanner are required. A 1/2" AF spanner was used on the specimen vehicle as it was a good fit. Remember also, that all these bolts have been 'loctited' into place so there will be a seal to overcome.
13mm ring spanner (MUST be a good fit)

126. It is vital that a proper purchase be achieved to remove the bolt. If the edges turn over it will be very difficult to remove. Remove the top and front bolts. (Fig.4A & B)

127. Remove the the third bolt which is to the rear of the top most bolt to the rear of the 'gear change plate'. It is also mounted in the opposite direction.

128. From underneath the vehicle, remove four of the five 'loctited' 13mm bolts securing the txb to the gearbox. Loosen and partially undo the lowest bolt (Fig.5B) in position until you are ready to withdraw the unit from the gearbox.
13mm ring spanner

129. Remove the two securing nuts from the manifold downpipe (Fig.6C) and drop it away from the area needed to slide the txb towards the offside. Support exhaust system to avoid damage.
13mm socket & long extension

130. Locate the only electrical connection to the txb, which is a temperature sensor (Fig.3B & 6H) on the offside and adjacent to the where the txb offside cast mounting was. Trace the two wire cable back the the bulkhead and disconnect it. Feed the cable to the bottom of the car for removal. Wind up the cable and secure to the txb prior to removal of the txb. The sensor should only be removed if considered essential.
CAUTION: The Sensor very fragile, be careful. (£62)

131. You are now ready to remove the box.
CAUTION: Do not place yourself between the box and the ground, it's heavy!

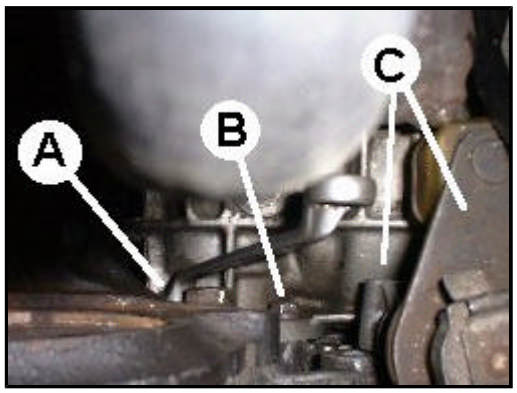

Figure 4

The txb from above and looking directly down.

A. Top front txb bolt, with spanner attached.

B. Top txb bolt.

C. Gear change plate with one bolt showing.

132. Use a trolley jack (Fig.5A) to take the weight of the txb and note most of the weight is at the propshaft coupling end. Place the jack to facilitate sliding the txb towards the offside.

133. Wearing heavy duty gloves for protection, prepare for oil seepage if the gearbox has not been drained. Remove the last of the lower bolts securing the txb to the gearbox (ref para. 128). Place a bar between the txb and the gearbox and gently break the seal or establish why you can't. When it has shifted approximately 1/4" you will become aware of a thin rubber 'O' ring at the joint face. Do not to damage it. You will also see the splined shaft exposed. Actually it's two, one inside the other.
CAUTION: Gearbox oil seepage.

134. Remove the remaining txb bolt (para. 128 refers) and with the trolley jack supporting the weight of the txb, manoeuvre it towards the offside, keeping it straight. Make sure it does not fall off the jack damaging either you or it.
CAUTION: Once the txb is off its mounting flange it must be kept straight.
CAUTION: Do not damage the temperature sensor.

135. Recover the txb for overhaul or replacement. Figure 4 shows the parts box after txb removal.

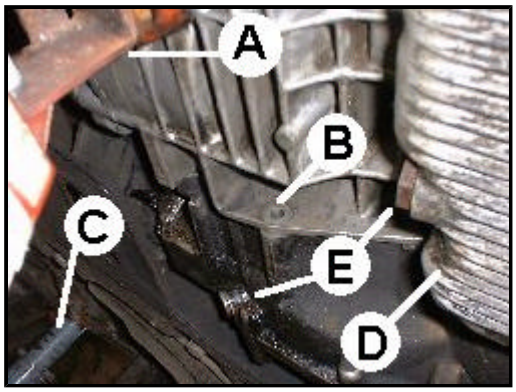

Figure 5

The txb from under the vehicle looking up from the offside.

A. Trolley Jack.

B. txb - Lower Mounting Bolt.

C. Axle Stand.

D. Sump.

E. Drain Plugs (Sump & Gearbox).

Figure 6

The parts box after the txb has been removed.
Note - The high pressure hose, txb to accumulator is not shown.

A. txb Offside 'cast' support bracket.

B. Heater hoses support bracket.

C. Exhaust downpipe studs/nuts/springs.

D. Inlet manifold support bracket.

E. Plastic clip steering hose to heater hose.

F. Starter motor support bracket.

G. txb to gearbox 'O' ring seal.

H. txb temperature sensor & cabling, if removed.

21st October 2001