Vauxhall Cavalier/Opel

4x4 Accumulator - Assembly Removal, Bulb Change & Reinstallation

This procedure is based on the specimen vehicle, a March '93 2.0l 16v Cav. Turbo, and some detail may differ to variants fitted with 4WD. It has been designed to deal specifically with changing a faulty 'Accumulator bulb' and involves removing the accumulator assembly from the vehicle, stripping it as far is reasonable, to facilitate changing the accumulator bulb, rebuilding, reinstalling into the vehicle. And finally, bleeding the steering hydraulic system.

There is also a very basic test of accumulator bulb included. The test is indicative and should not be relied on. If there is any doubt regarding the bulb it should be replaced.

Spanner sizes are quoted as a mix of metric & AF and choice was to achieve the best fit. The author believes the system should be metric but some sizes were found to be too sloppy.

800. Removal - from the vehicle

801. Switch on the ignition without starting the car and with fuse 19 in place, pump the brake pedal at least 25 times & until any 'whooshing' from the accumulator ceases. Switch off the ignition and remove fuse 19.

802. Remove the four allen bolts from the inlet cover, remove and set aside.
5mm Allen key

803. Prise up the rubber strip across the back of the bulkhead and tuck the plastic flap out of the way.

804. Remove the screw securing the relay box to the inner front wing, disconnect from the bulkhead rail and move out of the way.

805. Place drip tray under the vehicle to catch any steering oil leakage.
Drip Tray

806. Disconnect the top high pressure hose from the accumulator block. (Fig.1G) This is the high pressure supply from the steering pump.
Spanners 5/8" & 7/8" AF.

807. Disconnect the lower high pressure hose that delivers oil to the transfer box (pressure plate). (Fig.6D)
spanners 5/8" & 7/8" AF.

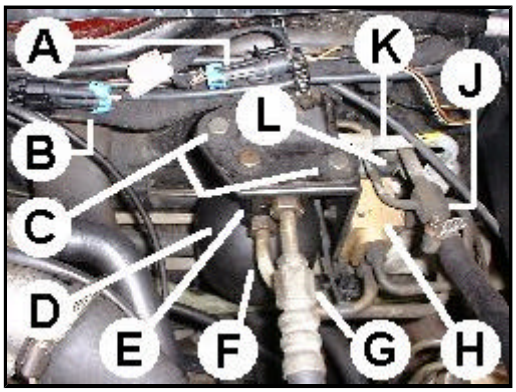


Figure 1

A general view of the Accumulator assemblies mounted on the bulkhead

A. Solenoid bulkhead connector (Do not disconnect)

B. txb temperature switch connector

C. Accumulator to mounting bracket bolts

D. Accumulator Bulb (No white band)

E. Accumulator control housing

F. Accumulator out to control block in (HP)

G. Steering pump to accumulator (HP)

H. Solenoid Control Block

J. Fluid Return Manifold

K. Accumulator out steering rack in (HP)

L. Steering rack fluid return connection

808. Disconnect the high pressure hose from the side of the accumulator. It supplies fluid to the steering rack. (Fig.1K)
NOTE: The union connection is a longer connection than normal and it may be tight or seized. If this is the case then both the hydraulic manifolds will have to be removed and when the assembly is released from the bulkhead, the connection can be wound off.

809. Disconnect the smaller hose (Fig.2C), secured by a jubilee clip. This pipe is the return from the hydraulic return manifold to the bottom of the steering reservoir 'pot'.
CAUTION: Tie up to keep the end of the hose above the level of any oil in the reservoir
Screwdriver.

810. Disconnect the single connector from the pressure switch located on the bottom of the 'control block'. (Fig.3E)

811. Release the second jubilee clip (Fig.2A) securing the small rubber ended return pipe to the hydraulic 'return manifold' and remove the pipe end. This is the pipe that runs between the steering rack (offside) and the accumulator return manifold.
NOTE: The only connections now left are the two single electrical connectors to the solenoid at the rear of the control block. (Fig.3H)

812. There are four 13mm bolts on the top of the accumulator assembly, the two outside ones (Fig.1C) secure the assembly to the right angle bracket (Fig.3J) bolted to the bulkhead. Remove these bolts supporting the weight of the unit.
Spanner 13mm

813. Manoeuvre the assembly to disconnect the two electrical connectors from the solenoid. The assembly is now disconnected. Remove to the workshop bench.

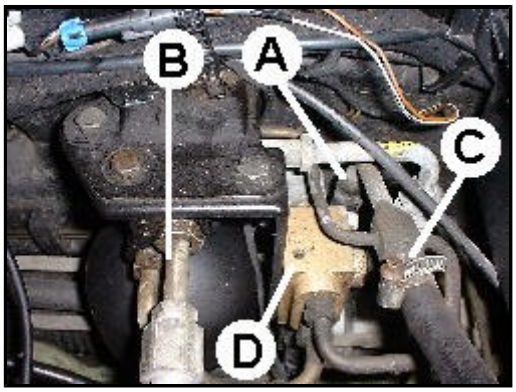


Figure 2

Accumulator hose connections & bleed screw.

A. Return hose connection from steering rack

B. Short extension - Fluid in (HP)

C. Return hose connection to reservoir

D. Bleed Screw (3mm Allen key)

815. Disassembly

816. Remove the two hydraulic manifolds. This will facilitate removing the accumulator bulb later. (Fig.3A & C)

817. **CAREFULLY** release a pipe union of the link between the accumulator block and the lower front connection to the control valve (Fig.6A).
CAUTION: Prepare for oil spillage under pressure. The author found this to be the case despite the accumulator pressure being released before work commenced.
Continue to disconnect the link, remove and set aside.

818. Remove the two bolts securing the accumulator block to the right angle bracket.

819. Remove the two allen bolts securing the solenoid control valve to the bracket and set aside. (Fig.3D)
5mm Allen Key

820. Carefully place the control valve in a vice and remove the solenoid.
Spanner 15/16" AF
CAUTION: Small copper sealing washer.

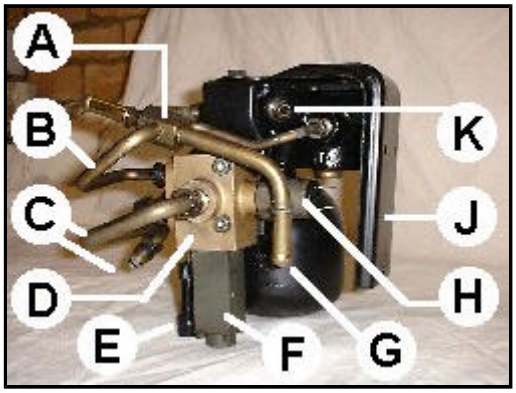


Figure 3

The Accumulator assembly.

A. Return Manifold	F. Pressure Switch
B. Return from Control Block	G. Steering Rack return
C. Control Block to txb manifold (HP)	H. Solenoid incl. two connectors
D. Solenoid Control Block	J. Bulkhead Mounting Bracket (if removed)
E. Pressure Switch electrical connector	K. Fluid outlet to steering rack (HP)

821. Because the accumulator block has been disassembled it is now possible to carefully place the block in a vice to release the accumulator bulb. The Figure 4a shows a special strap tool that should be made up, and as recommended by GM. This applies an even pressure to the bulb. This is the recommended method. However, the author used a webbing strap oil filter removal tool (Fig.4b), which has a 1/2" square drive attachment, to remove the old bulb. The bulb was released without too much pressure being applied.

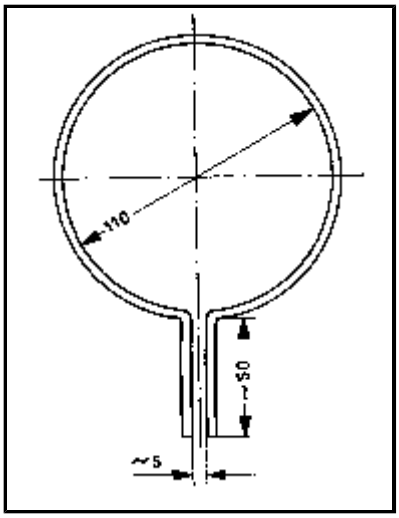


Figure 4a

Diagram to show the special tool recommended by GM. Dimensions are in mm.

Figure 4b

The Accumulator block in the vice with the webbing oil filter removal tool attached.

824.**Testing**- the Accumulator Bulb.

825. This is a very basic test, derived by the author in the certain knowledge the old bulb was faulty and the new one was good.

826. Select a twist drill that is a reasonable fit in the neck of the (old) bulb and insert the blunt end into the bulb. (As if placing the bit in a drill chuck). i.e. Cutting end outside. (Fig.5)

827. Apply some body pressure to the drill bit. The membrane inside 'sprung' quite easily with a small pressure applied. Whereas, the new bulb would not move at all under the same pressure. At £116 the author chose not to apply too much pressure to the new bulb but it certainly would not move under hand pressure, which the old one did.

Figure 5

The two Accumulator bulbs. The recall item is without white markings and the new one has a white ring.
Note the twist drill in the neck of the new bulb - see para. 826

834.**Reassembly**- using a new accumulator bulb

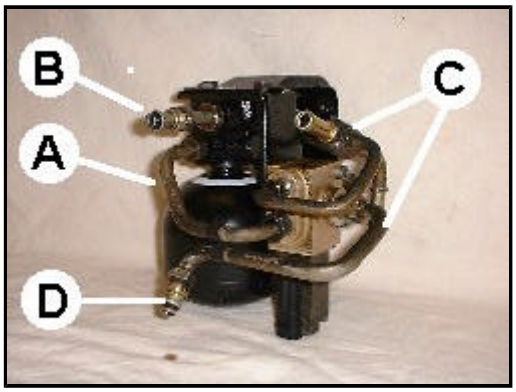
835. Apply the new rubber sealing ring (as supplied), to the accumulator bulb. Thread into place and hand tighten.

836. Using the special tool, or the webbing oil filter tool, (former recommended) very carefully tighten the bulb to 43-50 Nm (38 ft lbs), as shown in Fig.4b.

837. Refit the right angle bracket (two bolts) to the top of the accumulator block & loosely tighten.
Spanner 13mm

838. Refit the control valve to the mounting plate, two allen bolts. (Fig.3D)
5mm Allen key

839. Refit copper washer to solenoid valve and refit the solenoid to the control block, tighten. (Fig.3H)
spanner 15/16" AF



840. Refit the short hydraulic pipe between the accumulator block and control block. (Fig.6A)
Spanners 17mm& 19mm

841. Refit the short two inch metal pipe connection to the top front of the Accumulator block and tighten. (Fig.6B)

842. Refit the two remaining hydraulic manifolds to the assembly and tighten all connections with the assembly carefully held in a vice. (Fig.6C)

Figure 6

The Accumulator assembly ready for refitting to the vehicle. Shown here with the bulkhead mounting plate.

A. Short hydraulic link between the Accumulator block & the Control Valve.

B. Short metal extension pipe.

C. Two 'Manifolds'

D. Connection to txb.

850. Refitting - to the vehicle

851. Offer the assembly to the vehicle, reconnecting the solenoid electrical connections (Fig.3H) and reconnect the small rubber return hose (Figs.3G & 2A). Steering rack to the return manifold.
CAUTION: Do not forget the jubilee clip, if previously removed. Change as required.

852. Reconnect the assembly to the bulkhead mounting bracket with two bolts. (Fig.1C)
Spanner 13mm

853. Support or tie the txb high pressure supply pipe to the ABS pipework temporarily and introduce DEXTRON II steering oil to the pipe to allow any air in the pipe to be displaced while refitting the rest of the pipework.
Nylon tie

854. Reconnect the large high pressure hose, accumulator to steering rack. (Figs.1K & 3K)
Spanner 17mm

855. Reconnect the rubber hose, return manifold to bottom of the steering oil reservoir, using a new jubilee clip. (Fig.3G & 2C)
Screwdriver

856. Reconnect the high pressure hose, control block to the txb pressure plate. (Fig.6D)
CAUTION: Take care not to cross the threads of the connection.

857. Refit the Relay box and secure.

858. Refit the plastic tray and rubber strip to the top of the bulkhead.

859. If the accumulator has been replaced, locate the yellow sticky warning label that was supplied with the new bulb. Write on the label, the date the unit was changed and the current mileage. Place the label in a prominent position adjacent to the accumulator. (Fig.7) e.g. The relay box cover.

Figure 7

Shows the label supplied with the new Accumulator Bulb

860. CHECKLIST

The bulkhead mounting bracket.
13 mm
Two bolts securing accumulator assembly to mounting bracket.
13mm
Steering pump high pressure supply pipe (accumulator front & top)
7/8" AF 5/8" AF
Accumulator block to control block, metal pipe.
Spanner 17mm
Hydraulic return manifold, two jubilee connections and two pipe connections.
Spanner 13mm
High pressure feed from the accumulator to the steering rack.
Spanner 17mm
Pressure switch reconnected.
Solenoid reconnected.
Warning label fitted.

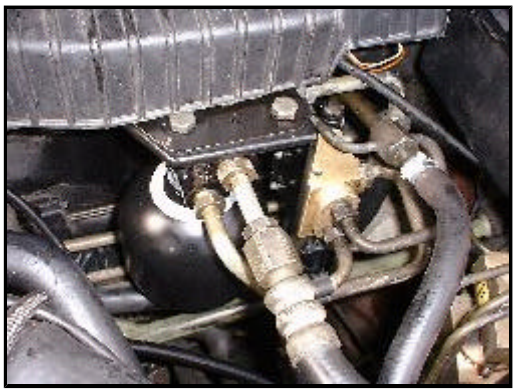


Figure 8

The re-installed Accumulator assembly.
Note the white ring now clearly visible.

870. Refilling and bleeding the hydraulic steering system
NOTE: This procedure applies to changing the accumulator only, as written here.

871. The hydraulic system should be bled with the front wheels off the ground, as recommended by GM.

872. Fuse 19 is already out and the system is not under pressure.

873. Open the control block bypass screw three turns. (Fig.2D)
3mm Allen key

874. Remove the reservoir cap and filter, fill the reservoir with DEXTRON II ATF fluid to the bottom of the filler neck.
DEXTRON II ATF Fluid.

875. Start the engine and immediately replenish the falling fluid level to the bottom of the filler neck.

876. Continue to run the engine for five minutes. (Air bubbles may be evident).

877. Turn the steering wheel to each lock in turn, holding for five seconds. Repeat a number of times.

878. Close the bypass screw (Fig.2D) for 20 seconds, open for another 20 seconds and finally close after a further 20 seconds.
CAUTION: Do not top up fluid at this stage.

878. Switch off engine and insert fuse 19.

879. Switch ignition on again without starting the engine.

880. Operate the brake pedal at least 25 times and until the 'whooshing' noise, from the accumulator stops.

881. Restart the engine and run for a minute.
CAUTION: The fluid level will drop, DO NOT top up.

882. Switch off the engine again and switch on the ignition again, and pump the brake pedal another 25 times as in para 880.

883. Now check the reservoir level is correct and top up as necessary.

884. You may wish to repeat para's 881-883 to recheck the level is correct as in para 883.

885. At this point, and at any time the accumulator is discharged, when you restart the engine the accumulator has to be recharged. This can be detected by a 'wine' from the hydraulic system, which ceases after a few seconds, and at the same time the idle speed will slightly increase and the accumulator will 'judder' momentarily. (This is good).

886. When you are certain the fluid level is correct, replace the filter pot and reservoir cap.

887. If the front of the vehicle was jacked up for the bleeding process, now would be a good time to let the car down unless you are also going to take the opportunity to change the wheels front to back. (see Do's & Dont's)

888. Road test the car.

22nd October 2001