

Section U2

FUEL EVAPORATION EMISSION CONTROL SYSTEM

Printed in Great Britain

January 1973

In order to comply with regulations governing the emission of fuel vapour in the United States of America and Canada, an efficient Fuel Evaporation Emission Control System has been designed and is fitted to cars produced during 1973.

The Fuel Evaporation Emission Control System eliminates direct venting of the fuel tank and carburetters, thus preventing the release of unburnt hydro-carbons into the atmosphere.

Fuel vapours are collected from the fuel tank and carburetters and stored in an activated charcoal canister. The canister is purged whenever the engine is running and the stored fuel vapours are extracted from the charcoal and burnt in the engine.

A diagrammatic illustration of the system can be seen in Figure U7.

The engine compartment components are clearly shown in Figure U8 and the fuel tank components in Figure U11.

Fuel evaporation loss control canister

The large centre section of the canister contains the dust-free activated carbon and accommodates nylon filter connectors which connect the canister to the various fuel vapour emission sources on the car (i.e. the carburetter weakener unit, float chamber vent and fuel tank vent).

The function of the activated carbon is to absorb and retain fuel vapour from the carburetter float chambers and fuel tank.

At either end of this section of the canister are thin discs of polyurethane filter.

The lower compartment of the canister is the purge chamber and is connected to the engine induction system via the purge line filter and line restrictor. It is operative whenever the engine is running, and its function is to draw air through the carbon, extracting the fuel vapour for consumption in the engine. The upper section of the canister is open to the atmosphere

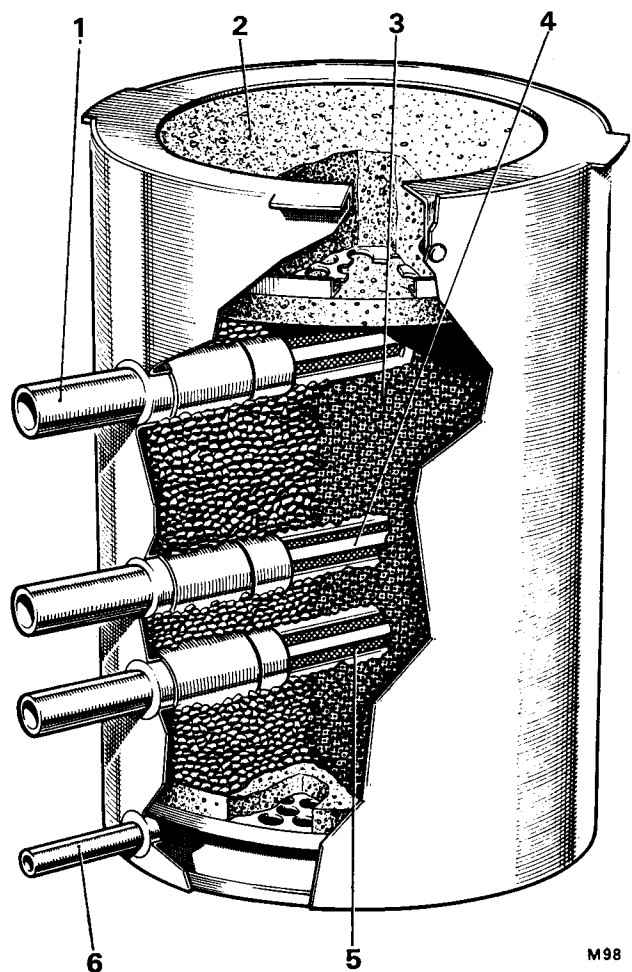


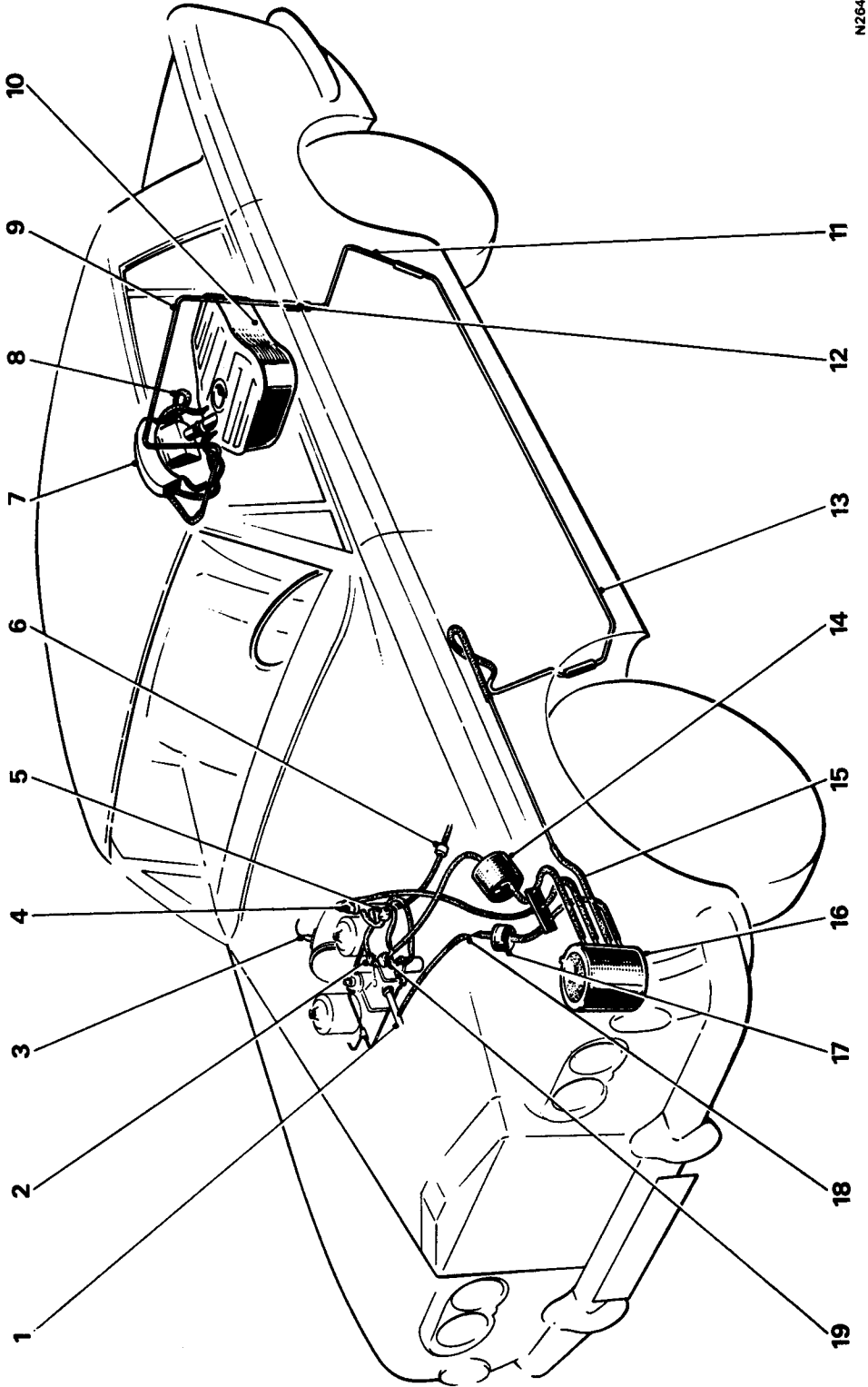
FIG. U6 FUEL EVAPORATION LOSS CONTROL CANISTER

- 1 Weakener connection
- 2 Polyurethane filter
- 3 Carbon
- 4 Float chamber vent connection
- 5 Fuel tank vent connection
- 6 Purge line connection

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FIG. U7 FUEL EVAPORATION EMISSION CONTROL SYSTEM—GENERAL VIEW

- | | | |
|----------------------------------|-------------------------------------|--------------------------------------|
| 1 Gulp valve pipe | 8 Relief valve hose | 14 Weaker filter |
| 2 Weakening device | 9 Luggage compartment pipe | 15 Canister to wing hose |
| 3 Bi-metal switch | 10 Fuel tank assembly | 16 Evaporation loss control canister |
| 4 Float chamber vent valve | 11 Luggage compartment to sill pipe | 17 Purge line filter |
| 5 Weakening device cut-off valve | 12 Vent pipe hose | 18 Purge line restrictor |
| 6 Float chamber drain valve | 13 Fuel vapour line | 19 Anti 'run-on' solenoid |
| 7 Fuel trap assembly | | |

and houses a polyurethane foam filter to ensure that the air drawn through the carbon is clean.

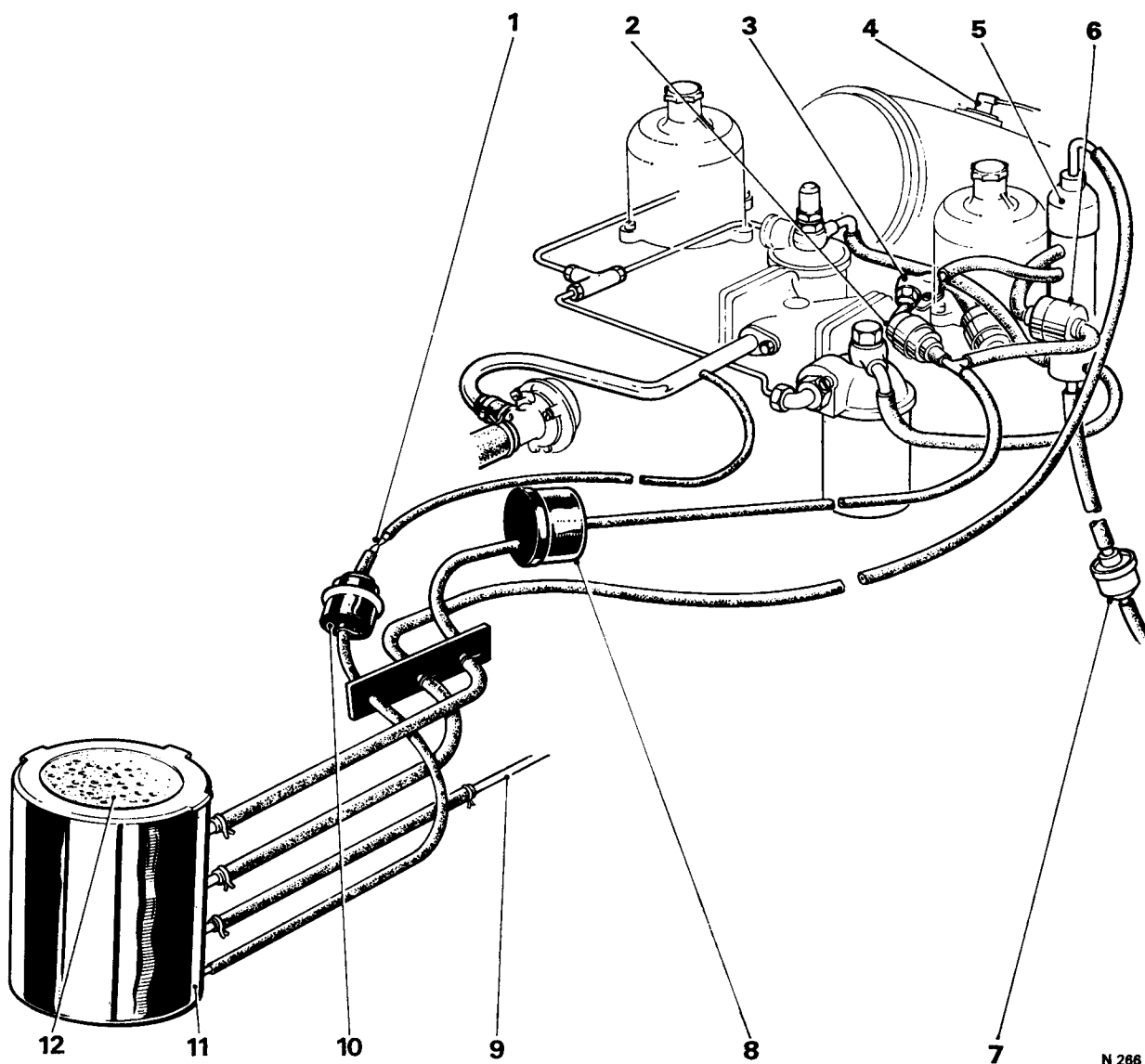
Polyurethane foam filter element—To renew

It is not necessary to remove the canister from the car in order to extract the polyurethane foam filter element. A detachable cover is situated in the left-hand

valance, adjacent to the blower motor resistances (see Fig. U9).

1. Unscrew the four screws retaining the access cover, lift off the cover and withdraw the filter element from the top of the canister.

When fitting a new filter element, ensure that it is correctly positioned inside the retaining rim of the canister. Fit the access cover and tighten the setscrews.



**FIG. U8 FUEL EMISSION CONTROL SYSTEM—
ENGINE COMPARTMENT FITTINGS**

- | | |
|--|--------------------------------------|
| 1 Purge line restrictor | 7 Float chamber drain valve |
| 2 Anti 'run-on' solenoid | 8 Weakener filter |
| 3 Weakener unit | 9 Vent from fuel trap |
| 4 Bi-metal switch | 10 Purge line filter |
| 5 Fuel receiver and float chamber vent valve | 11 Evaporation loss control canister |
| 6 Weakener cut-off valve | 12 Polyurethane filter |

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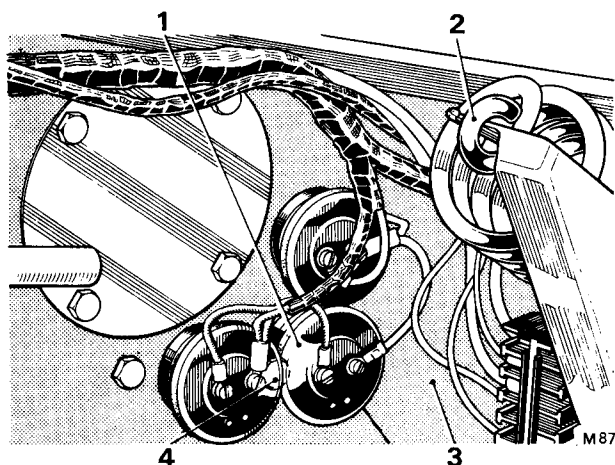


FIG. U9 SETSCREWS SECURING CONTROL CANISTER AND ACCESS COVER

- 1 Blower motor resistances
- 2 Bonnet hinge spring
- 3 Valance
- 4 Securing setscrew (hidden by blower motor resistances)

**Fuel evaporation loss control canister
—To remove**

The canister is mounted under the left-hand front wing and is removed as follows.

1. Remove the front left-hand road wheel as described in Chapter R—Wheel—To remove.

Note Left-hand front is determined when viewed from the driver's seat.

2. Position suitable stands under the raised portion of the car as a safety precaution.
3. Remove the front section of the underwing sheet by unscrewing the $\frac{7}{16}$ in. A/F nut and bolt, and the 16 small screws situated around the sheet.
4. The canister will be clearly visible.
5. Using special pliers (RH 8090), remove the steel retaining clips and detach the four rubber hoses connected to the canister.
6. Inside the engine compartment adjacent to the blower motor resistances (*see Fig. U9*), locate the six $\frac{7}{16}$ in. A/F setscrews. Unscrew the lower four setscrews and withdraw the canister from beneath the wing.

**Fuel evaporation loss control canister
—To fit**

Fit the canister by reversing the procedure described for removal, noting the following points.

1. Ensure that the rubber hoses are in a good condition and new hose retaining clips are used.

2. Ensure that the underwing sheet is sealed with Bostik Sealing Compound 771.

Purge line

The purge line consists of a rubber hose, passing from the lowest connection on the canister through the valance junction piece to the gulp air pipe situated between the gulp valve and carburetter 'Tee' piece. Incorporated into this hose is the purge line filter and restrictor.

When the engine is running, air drawn through the canister filter and carbon picks up the stored fuel vapours and passes them via the hose, to the induction manifold. The restrictor in the line controls the flow rate at between 50 cu. ft. per hr. and 70 cu. ft. per hr. to maintain carburetter metering accuracy and the paper element line filter is fitted to prevent blockage of the restrictor.

Purge line filter—To remove

1. Using special pliers (RH 8090) remove the two steel retaining clips (if fitted) situated on either side of the unit.
2. Slacken the 2 B.A. setscrew which secures the nylon retaining clip.
3. Withdraw the component from the clip.

Purge line filter—To fit

Fit the purge line filter by reversing the procedure given for removal noting the following points.

1. Ensure that the rubber hoses are in a good condition and new hose retaining clips are used.

*** Purge flow rate—To check**

Check the purge flow rate as follows.

1. Disconnect the hose from the engine side of the purge line filter and insert a flowmeter and stand assembly (RH 8725) in to the line. The flowmeter is a rotameter type capable of measuring 50/70 cu. ft./hr. Pressure drop across the meter is not to exceed 2 in. Hg.
2. Check the flowmeter reading with the engine idling. The flow reading should be between 50 cu. ft./hr. and 70 cu. ft./hr.
3. If the flow is incorrect fit a new restrictor and repeat Operation 2.
4. Remove the flowmeter and reconnect the hose to the purge line filter.

Purge line restrictor—To remove

1. Hold the restrictor firmly and slide the rubber hosing from both ends.

Purge line restrictor—To fit

Fit the restrictor by reversing the procedure given for removal, noting the following point.

1. Ensure that the purge line restrictor is fitted into the line correctly. This can be determined by comparing the diameters of the restrictor ends with those of the rubber hoses.

Weakener line

The weakener line connects the weakener unit with the evaporation loss control canister (see Fig. U8). With the engine running under light throttle opening a depression is created in this line, so allowing air to pass from the canister to the weakener unit.

A filter incorporated in the line prevents blockage of the weakener unit.

During 'hot soak' conditions fuel vapour can pass along this pipe from the float chamber to be stored in the carbon filled canister.

Weakener filter—To remove

1. Slacken the worm drive clip which retains the weakener filter to the bracket.
2. Withdraw the filter.

Weakener filter—To fit

Fit the weakener filter by reversing the procedure given for its removal noting the following points.

1. Ensure that the rubber hoses are in good condition.
2. If clips have been fitted previously, ensure that new clips are fitted.
3. Ensure that the inlet pipe for the unit which is off-set from the centre is facing the front of the car and is in its lowest position (see Fig. U8).

Float chamber vent line

The carburettor float chambers are vented to the evaporation loss control canister through the float chamber vent line (see Fig. U8). Incorporated in the line is a non-return valve which maintains a depression in the float chamber during light throttle operation.

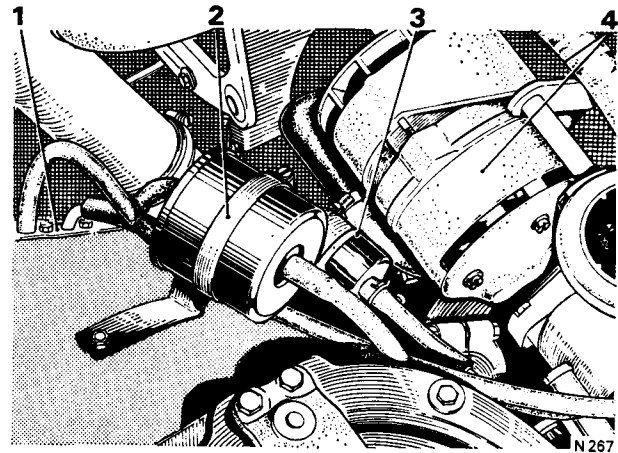


FIG. U10 POSITION OF MIXTURE WEAKENING DEVICE FILTER AND PURGE LINE FILTER

- 1 Connections through valance to the fuel evaporation loss control canister
- 2 Fuel mixture weakening device filter
- 3 Purge line filter
- 4 Alternator

The vent valve cannot be serviced and if its operation is suspect a new vent valve should be fitted.

Float chamber vent valve—To remove

1. Remove the rubber hose connection.
2. Withdraw and discard the retaining split pin.
3. Withdraw the vent valve from the top of the fuel receiver.

Float chamber vent valve—To fit

Fit the vent valve by reversing the procedure given for its removal noting the following points.

1. Ensure that the rubber 'O' ring at the top of the fuel receiver is in good condition, renew if the slightest doubt exists.
2. Use a new split pin to retain the vent valve in position.

Fuel receiver

The fuel receiver is situated adjacent to the ignition distributor and coil (see Fig. U23).

The unit should not require removal under normal circumstances. However, should the need arise the ignition distributor, coil and weakener cut-off solenoid valve should all be removed before unscrewing the two $\frac{1}{2}$ in. A/F setscrews which secure the fuel receiver bracket in position.

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Fuel tank assembly

The fuel tank assembly consists of the fuel tank, expansion tank and fuel trap assembly (see Fig. U11).

The fuel tank is vented from three positions to a fuel trap assembly which is mounted above the fuel

filler. One vent is from the fuel filler neck and the other two vents from the fuel tank.

From the fuel trap, a vent line passes under the floor of the car to the evaporation loss control canister.

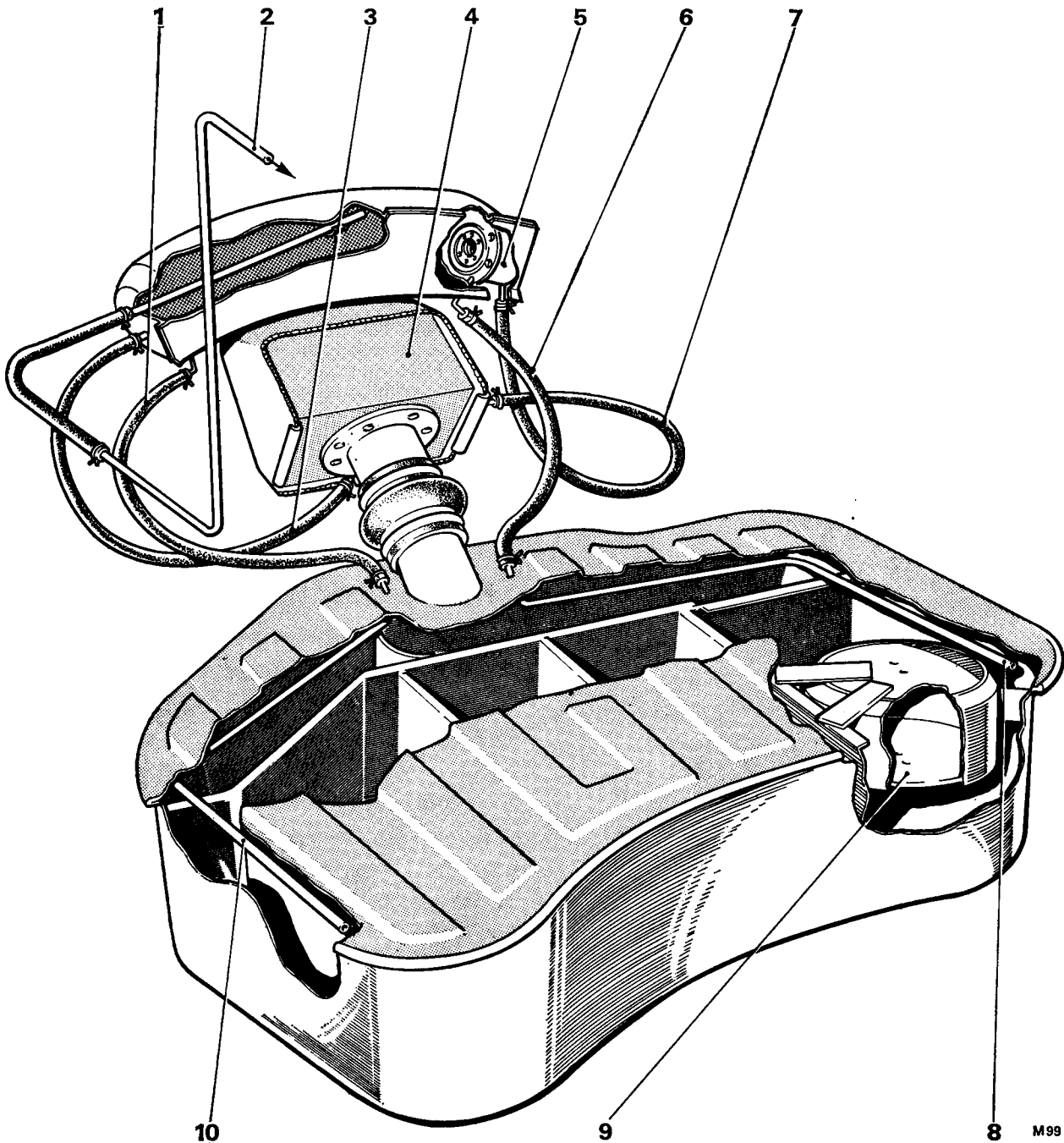


FIG. U11 FUEL EVAPORATION EMISSION CONTROL SYSTEM—FUEL TANK

- 1 Fuel trap drain
- 2 Connection to evaporation loss control canister
- 3 Filler vent neck

- 4 Fuel filler box
- 5 Combined relief and vacuum valve

- 6 Fuel trap drain
- 7 Valve vent
- 8 Vent pipe
- 9 Expansion tank
- 10 Vent pipe

Fuel tank

The fuel tank (*see Fig. U11*) is similar to that fitted to standard cars, except that two vent pipes, 0.375 in. (9.525 mm.) diameter, are rigidly attached to the underside of the fuel tank top plate. The open ends of the vents terminate inside the tank at the front and rear. The outer ends of the two vent pipes terminate adjacent to the fuel filler neck.

A 6.7 U.S. pt. (5.5 Imp. pt., 3,125 litres) capacity expansion tank situated within the main fuel tank inhibits complete filling and provides additional fuel expansion volume to contend with extreme temperature conditions.

When a vehicle is being filled with fuel, automatic cut-off could completely fill the tank leaving only the filler neck, vent connector pipes and fuel trap to accommodate the expansion of the fuel. The expansion tank is situated in the upper part of the fuel tank and as the fuel level rises above the lower part of the expansion tank it flows inside through the two small holes in the base. Two additional holes in the top of the expansion tank allow air to escape.

At normal rates of filling it takes approximately 3 minutes to fill an empty tank whereas it takes approximately 9 minutes for the levels in both the main and expansion tanks to stabilise. After this time the main tank will have transferred 6.7 U.S. pt. (5.5 Imp. pt., 3,125 litres) to the expansion tank leaving the equivalent air space in the main tank for expansion.

Fuel tank—To remove

To remove the fuel tank proceed as described in Section K1—Fuel System (Early cars) noting that Operation 6 should be omitted and Operation 6 as follows should be carried out.

6. Using a pair of special pliers (RH 8090), remove the steel clips from the two rubber hoses situated one on either side of the fuel filler neck.

Withdraw the rubber hoses from the pipes.

Fuel tank—To fit

Note Prior to assembly, apply 'Hylomar' sealing compound to the fuel tank filler head union and tube assembly. Also spray 'Hylomar' on both sides of the fuel tank level unit joint.

Fit the fuel tank by reversing the procedure given for its removal noting the following points.

1. Ensure that the two rubber vent hoses are in good condition.

2. New steel clips should be used to secure the rubber vent hoses to the metal pipes on either side of the filler neck base.

Fuel trap assembly

The fuel trap (*see Fig. U11*) has a capacity of 4.00 U.S. pt. (3.25 Imp. pt., 1.87 litres).

The fuel trap acts as a liquid separator and prevents liquid fuel from being transferred to the control canister under severe driving manoeuvres when the fuel tank is full or during expansion of the fuel at high ambient temperatures.

The tank vent pipes are fed to the lower ends of the banana-shaped fuel trap. These pipes also serve as drain pipes for any fuel in the trap.

The filler tube is vented into the forward end of the fuel trap.

An outlet pipe is attached to the interior of the fuel trap and the other end is connected via metal and rubber pipes to the evaporation loss control canister.

A combined relief and vacuum valve in the fuel trap prevents any excessive pressure build-up due to vaporisation, or depression as the fuel is consumed, should the vent line to the evaporation loss control canister become blocked.

Fuel trap assembly—To remove

1. Disconnect the battery.
2. Remove the carpet and underlay in the luggage compartment.
3. Remove the tool kit (*see Chapter R—Wheels and Tyres, Fig. R10*).
4. Remove the fuel filler door release ring.
5. Unscrew the five 'Phillips' headed screws from the side carpet; four secure the brackets retaining the tool kit and the fifth is positioned at the front of the side carpet.
6. Release the 'Tenax' clip situated adjacent to the rear lamps access point.
7. Remove the side carpet and the carpet covering the fuel filler neck.
8. Using special pliers (RH 8090) remove the steel clips from the rubber hoses. Withdraw the hoses from their respective pipes.
9. Unscrew and remove the three 2 B.A. setscrews securing the fuel trap assembly.
10. Slowly move the fuel trap rearward and downward until the lower end can be turned into the luggage compartment and the assembly withdrawn from the car.

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Fuel trap assembly—To fit

Fit the fuel trap assembly by reversing the procedure given for its removal noting the following points.

1. Ensure that the rubber hose connections are in good condition.
2. Ensure that new steel retaining clips are used.

Fuel trap relief and vacuum valve —To remove

1. Remove the fuel trap assembly as described in Fuel trap assembly—To remove.
2. Unscrew the retaining setscrews, taking care not to lose the washers.
3. Withdraw the relief and vacuum valve.

Fuel trap relief and vacuum valve—To fit

Fit the relief and vacuum valve by reversing the procedure given for its removal, noting the following points.

1. Ensure that the joint faces of the relief and vacuum valve and fuel trap assembly are clean and in good condition.
2. Fit a new gasket.

Fuel evaporation emission control system —To leak check

To test the fuel evaporation emission control system and pipes (i.e. fuel tank, fuel trap assembly and pipes, etc.) for leaks, proceed as follows.

1. Blank off the lower end of the relief valve hose (see Fig. U8 item 8).
2. Connect an air pressure supply (with a manometer tapping) to the lower end of the fuel trap to boot pipe (item 9) in place of the vent pipe hose (item 12).
3. Using a pressure regulator apply a pressure of 1.5 lb/sq. in. (41 ± 2 in. H₂O) to the system and close the pressure supply.
4. Check manometer after 5 minutes. If the level has fallen by more than 0.5 in. check all joints including petrol level transmitter to tank joint with soap solution.
5. After rectifying any leaks repeat the pressure test. When the system is satisfactory connect the fuel trap to boot pipe (item 9) and the boot to sill pipe (item 11) using the rubber vent pipe hose (item 12).
6. Detach the canister to wing hose (item 15) from the evaporation loss control canister and connect to the test equipment. Repeat Operation 3 to the same acceptance limits.
7. Rectify any leaks and repeat the pressure test. If the system is now satisfactory connect the canister to wing hose (item 15) to the evaporation loss control canister.