Sprite/Midget

Workshop Manual Supplement on Engine Emission Control

Part 3

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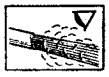
FOREWORD

This supplement provides service operatives with the information necessary to carry out the maintenance, servicing, and testing of engine emission and fuel evaporative loss control systems fitted to vehicles manufactured by the BRITISH MOTOR CORPORATION for which a certificate has been issued in accordance with the UNITED STATES CLEAN AIR ACTS and any applicable State Legislation.

Distributors and Dealers are advised to familiarize themselves with the legal requirements, in particular those concerning minimum standards of facilities, personnel, and servicing equipment.

Service operations in Workshop Manuals, where applicable, which may affect the efficiency of the emission or evaporative loss control equipment carry the following symbol, denoting that the control system must be checked on completion of the operation 

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SECTION 1

EQUIPMENT AND SERVICING

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Section 1-A

EQUIPMENT

The recommended equipment for servicing should include at least the following:

Ignition Analyser Oscilloscope
Ohmmeter
Voltmeter
Tachometer
Vacuum Gauge
Pressure Gauge (0–10 lb./sq. in.)
Carburetter Balance Meter
Cam Angle Dwell Meter
Ignition Timing Light
Engine Exhaust Combustion Analyser
Cylinder Leak Tester
Distributor Advance Tester
Carburetter Piston Loading Tool

The following equipment covers most of the requirements for engine testing and tuning vehicles fitted with exhaust emission control devices.

Equipment	*Type/Model*	*Manufacturer*
Oscilloscope Engine Tuning Set and Exhaust Gas Analyser	1020 or 720	Sun Electric Corp.
Engine Analyser	40–162	Marquette
Exhaust Gas Analyser	42–141	Marquette

Equipment made by other suppliers may also be adequate.

It is important that your test equipment has regular maintenance and calibration.

Section 1-B

SERVICING

General

The efficient operation of the exhaust emission control system is dependent on the engine being in good mechanical condition and correctly tuned to the settings given in **'TUNING DATA'.**

Tuning and test procedure for the carburetters, ignition system, and engine are given at the end of the manual. These procedures are the quickest and surest way of locating engine faults or maladjustments and are the only methods that should be used for engine tuning.

Fault diagnosis

After tuning the engine to the correct settings, check for indications of the following symptoms:

Symptons	Causes	Cure
Backfire in exhaust system	1. Leak in exhaust system	Locate and rectify leak
	2. Leaks in hoses or connections to gulp valve, vacuum sensing pipe or other inlet manifold joint	Locate and rectify leak
	3. Faulty gulp valve	Test gulp valve, and renew if faulty
	4. Leak in intake system	Locate and rectify leak
	5. High inlet manifold depression on over-run—faulty carburetter limit valve	Fit new throttle disc and limit valve assembly

Symptons	Causes	Cure
Hesitation to accelerate after sudden throttle closure	1. Low carburetter damper oil	Top up to correct level
	2. Leaks in hoses or connections to gulp valve, vacuum sensing pipe or other inlet manifold joint	Locate and rectify leak
	3. Faulty gulp valve	Test gulp valve, and renew if faulty
	4. Leak in intake system	Locate and rectify leak
Engine surges (erratic operation at varying throttle openings)	1. Leaks in hoses or connections to gulp valve, vacuum sensing pipe or other inlet manifold joint	Locate and rectify leak
	2. Faulty gulp valve	Test gulp valve, and renew if faulty
	3. Air supply to adsorption canister restricted	Check air filter pad, vent pipe, and canister for obstruction
Erratic idling or stalling	1. Carburetter damper oil low	Top up to correct level.
	2. Leaks in hoses or connections to gulp valve or vacuum sensing pipe or other inlet manifold joint	Locate and rectify leak
	3. Faulty gulp valve	Test gulp valve, and renew if faulty
	4. Incorrect carburetter settings	Reset to **TUNING DATA**
	5. Carburetter limit valve not seating	Fit new throttle disc and limit valve assembly
	6. Carburetter suction chamber damaged	Replace carburetter or components
Burned or baked hose between air pump and check valve	1. Faulty check valve	Test check valve, and renew if faulty
	2. Air pump not pumping	Test air pump; service or renew if faulty
Noisy air pump	1. Incorrect belt tension	Adjust belt tension
	2. Pulleys damaged, loose or misaligned	Tighten loose pulleys, renew damaged pulleys
	3. Air pump failing or seizing	Test air pump; service or renew if faulty
Excessive exhaust system temperature	1. Incorrect ignition timing	Recheck timing against **'TUNING DATA'**
	2. Choke control system not fully returned	Check choke mechanism for correct operation; instruct driver on correct usage
	3. Fast idle speed too high	Reset fast idle speed—see **'TUNING DATA'**
	4. Air injector missing	Remove air manifold and check injectors
	5. Air pump relief valve inoperative	Test relief valve, and renew if faulty

Symptons	Causes	Cure
Mixture requires excessive enriching to obtain correct exhaust emission readings	1. Air leak into crankcase	Locate and rectify leak
	2. Early cars—Diaphragm of crankcase control valve perforated or not correctly seated	Locate and rectify leak or control valve
	Later cars—Crankcase breather hose or connections to carburetter leaking	Locate and rectify leak
Fuel leakage	1. Fracture in fuel pipe or fuel vapour ventilation system	Locate and rectify leak
	2. Fuel filler cap not sealing	Check condition of cap and filler seal
	3. Leak on fuel filler tube or tank unit	Locate and rectify leak
Engine stops after short running periods (i.e. fuel starvation)	1. Obstructed vapour line between fuel tank and adsorption canister	Locate and clear obstruction
	2. Air supply to adsorption canister restricted	Check air filter pad, vent pipe and canister for obstruction
	3. Faulty fuel pump	Check operation and rectify fault
Engine runs after ignition is switched off	1. Fuel grade too low	Refill with correct grade fuel
	2. Ignition retarded	Reset timing to **'TUNING DATA'**
	3. Idle speed too high	Reset to **'TUNING DATA'**
	4. Fuel mixture too weak	Tune carburetter(s)

SECTION 2

CRANKCASE EMISSION CONTROL

	Section
Carburetter control system	2-D
Carburetter control system—with evaporative loss control	2-E
Valve control system—general description	2-A
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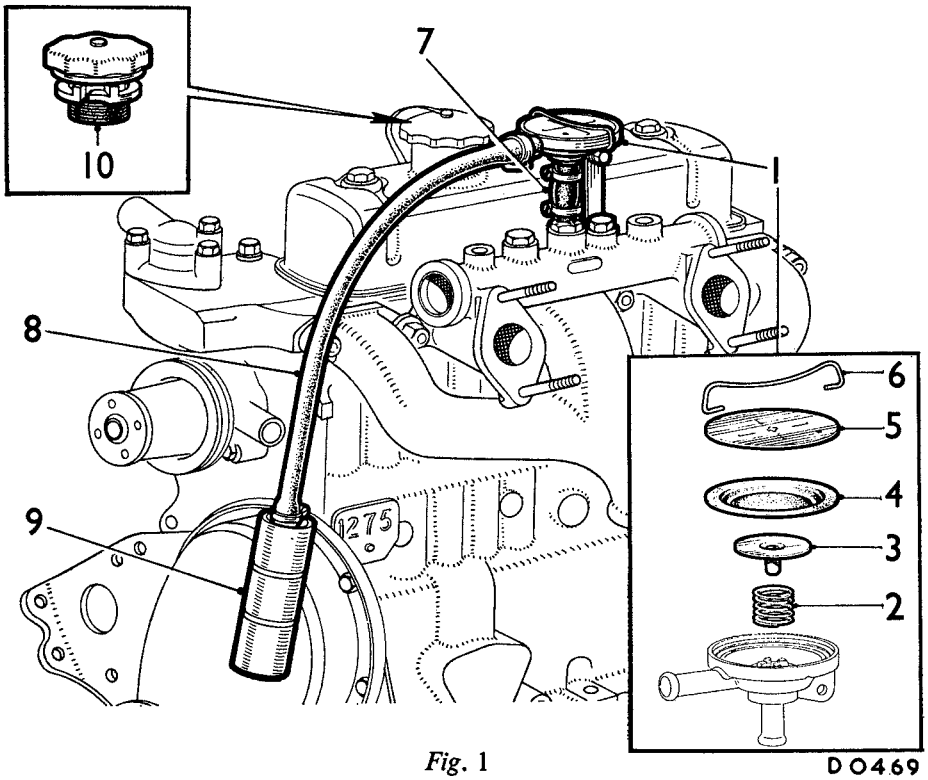

Fig. 1

A typical crankcase emission valve control system

1. Emission control valve.
2. Valve spring.
3. Metering valve.
4. Diaphragm.
5. Cover plate.
6. Spring clip.
7. Manifold connection.
8. Breather hose.
9. Oil separator.
10. Filtered filler cap.

Section 2-A

VALVE CONTROL SYSTEM—General description

The system consists of a diaphragm control valve connected by hoses between the inlet manifold and the engine crankcase. The crankcase outlet connection incorporates an oil separator to prevent oil being pulled over with the vapours leaving the crankcase. On four-cylinder engines a filtered, restricted orifice ($\frac{8}{64}$ in. diameter) in the oil filler cap provides a supply of fresh air into the crankcase as vapours are withdrawn by inlet manifold depression. Six-cylinder engines are fitted with a standard oil filler cap and a tube connected between the rocker cover oil filler tube and the air intake filter provides the supply of fresh air to the engine. The control valve diaphragm varies the opening to the inlet manifold according to the depression or pressure acting on it. With a decrease in manifold depression or when the crankcase obtains a positive pressure the diaphragm opens the valve allowing the crankcase vapours to be drawn into the inlet manifold. During conditions of high manifold depression, e.g. low engine speeds or loads, the diaphragm closes the valve and restricts the flow into the inlet manifold, thus preventing a leaning-off of the air/fuel mixture to the cylinders.

Section 2-B

VALVE CONTROL SYSTEM—Testing

(1) Warm up the engine to normal operating temperature.

(2) With the engine running at idling speed remove the oil filler cap.

(*a*) A rise in engine speed, the change being audibly noticeable, indicates that the control valve is functioning correctly.

(*b*) No rise in speed, service the control valve.

Section 2-C

VALVE CONTROL SYSTEM—Servicing

Oil filler cap (*four-cylinder engines only*)

(1) Renew every 12,000 miles or 12 months.

Control valve

(2) Disconnect the hoses and renew the valve assembly, or clean as follows:

(*a*) Remove the spring clip and withdraw the cover plate, diaphragm, metering valve and spring.

(*b*) Clean all metal parts with a solvent (trichlorethylene, fuel, etc.). **Do not use an abrasive.** If deposits are difficult to remove, immerse in boiling water before applying the solvent.

(*c*) Clean the diaphragm with a detergent or methylated spirit (denatured alcohol).

(*d*) Examine the parts thoroughly for wear or damage, and renew where necessary.

(*e*) Reassemble the valve ensuring that the metering valve fits correctly in its guides and the diaphragm is correctly seated.

(*f*) Refit the valve and check its operation.

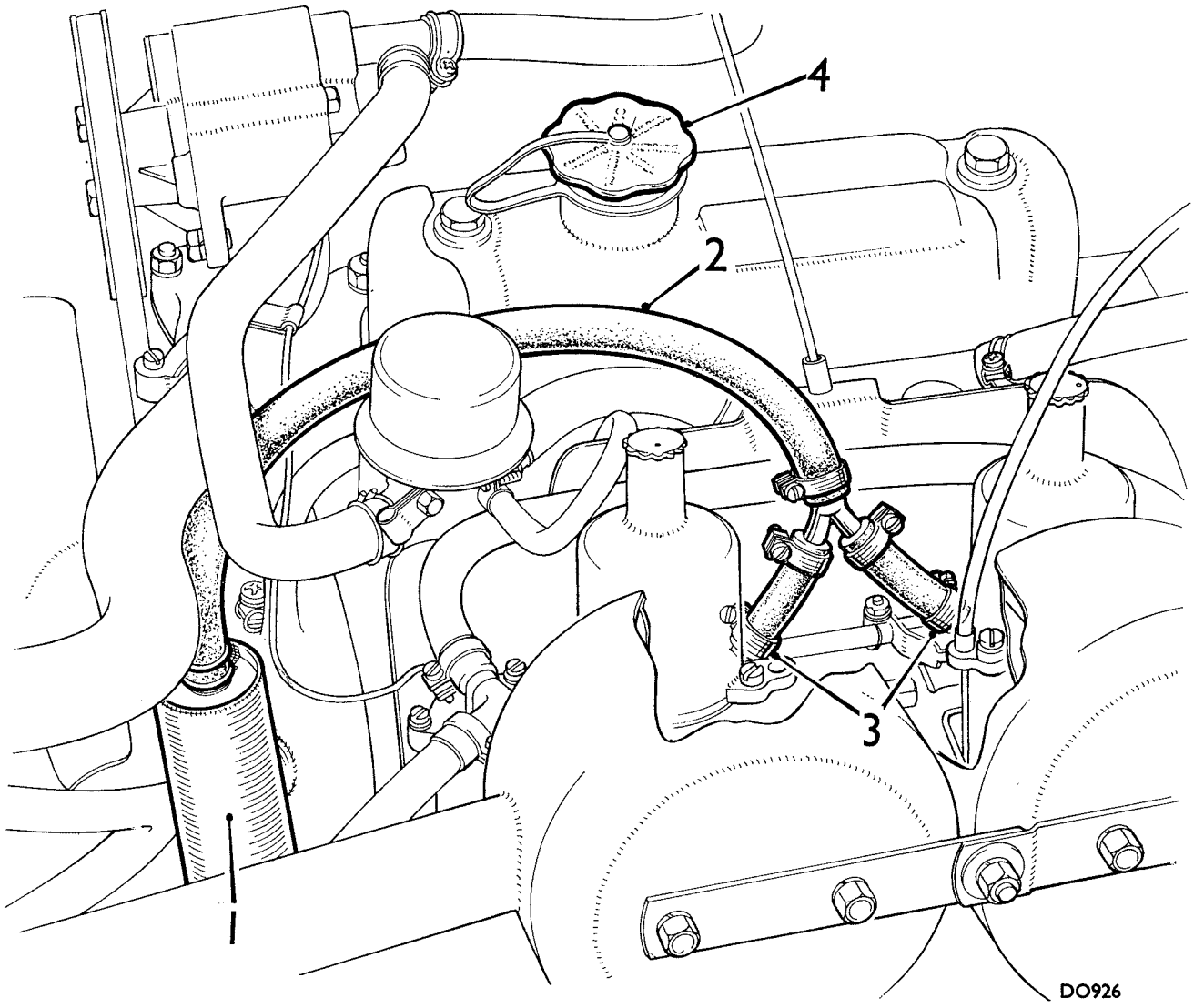

Fig. 2
Carburetter control system

1. Oil separator.
2. Breather hose.
3. Carburetter chamber connection.
4. Filtered filler cap.

Section 2-D

CARBURETTER CONTROL SYSTEM

Description

With this system the engine breather outlet is connected by hoses to the controlled depression chamber; the chamber between the piston and the throttle disc valve, of the carburetter(s). Engine fumes and blow-by gases are drawn from the crankcase by the depression in this chamber, through an oil separator incorporated in the engine outlet connection, and from there to the inlet manifold. Fresh air is supplied to the engine through the combined oil filler cap and filter (four-cylinder engines) or through the air intake filter (six-cylinder engines).

Servicing

The oil filler cap (four-cylinder engines only) must be renewed every 12,000 miles (20000 km.) or 12 months; no other service is required.

If a failure of the system is suspected, check the hoses and connections for leaks and obstructions. An indication of a failure is loss of crankcase depression.

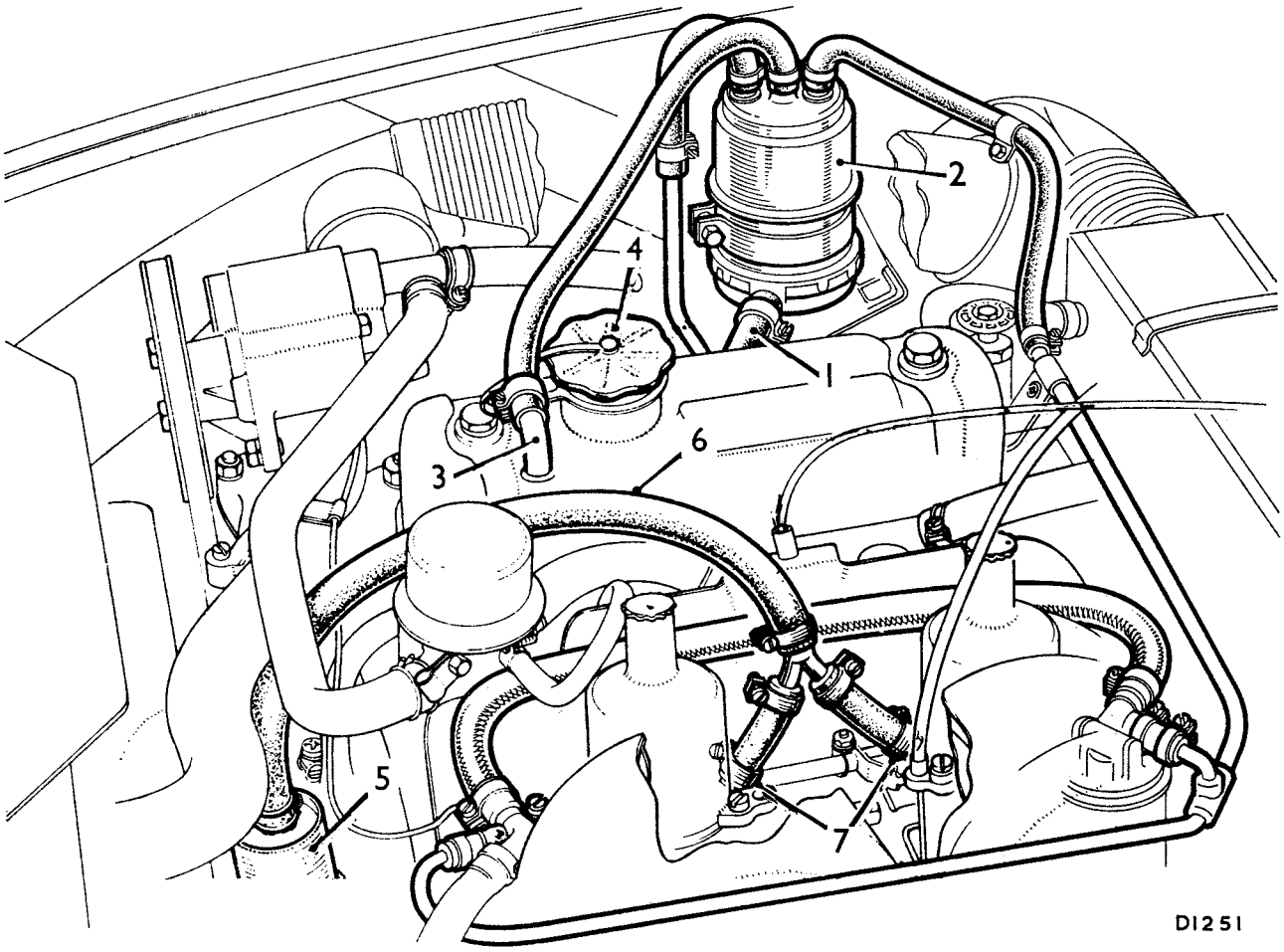

Fig. 3

A carburetter control system with fuel evaporative loss control

1. Ventilation air intake.
2. Absorption canister.
3. Restricted connection to rocker cover.
4. Sealed oil filler cap.
5. Oil separator.
6. Breather hose.
7. Carburetter chamber connections.

Section 2-E

CARBURETTER CONTROL SYSTEM— with evaporative loss control

This system incorporates most of the components of the carburetter control system, with the exception of the combined oil filler cap and filtered air intake. Its operation differs in that air for engine breathing is drawn through the filtered adsorption canister of the evaporative loss control system into the engine valve rocker cover. A restrictor in the rocker cover connection reduces the air flow to ensure crankcase depression under all conditions.

Engine fumes and blow-by gases are drawn from the crankcase, through an oil separator, into the inlet manifold by the controlled depression chamber of the carburetter.

Servicing

No direct servicing of the system is required. The air intake filter pad in the absorption canister is renewed at the intervals required by the fuel evaporative loss control.

If a failure of the system is suspected, check the hoses and connections for leaks and obstruction. An indication of a failure is loss of crankcase depression.

SECTION 3

EXHAUST EMISSION CONTROL
(Exhaust Port Air Injection)

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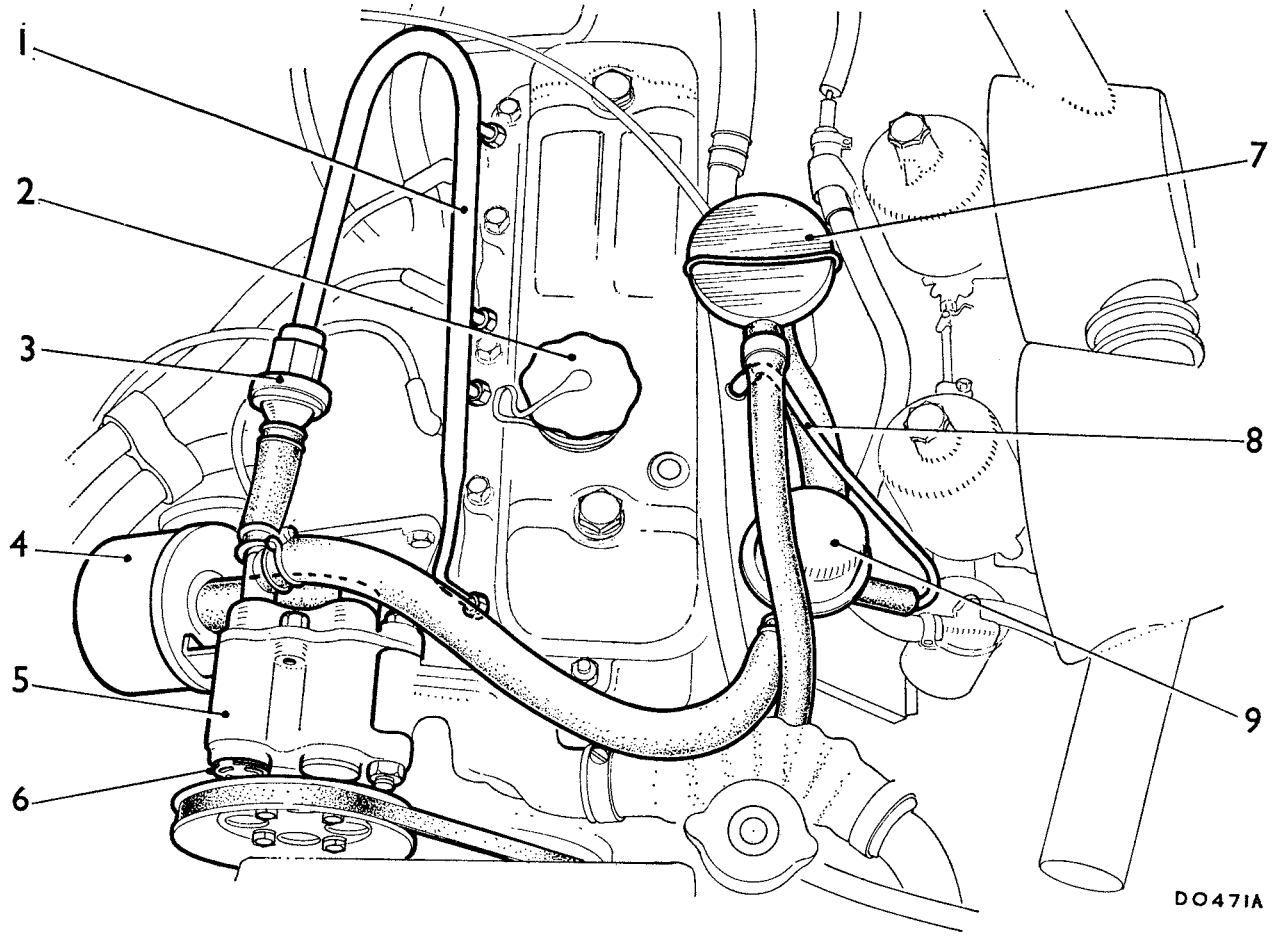

Fig. 1

A typical engine emission control system layout

1. Air manifold.
2. Filtered oil filler cap.
3. Check valve.
4. Emission air cleaner.
5. Air pump.
6. Relief valve.
7. Crankcase emission valve.
8. Vacuum sensing tube.
9. Gulp valve.

Section 3-A

GENERAL DESCRIPTION

Air is pressure-fed from an air pump via an injection manifold to the cylinder head exhaust port of each cylinder. A check valve in the air delivery pipe prevents blow-back from high pressure exhaust gases. The pump also supplies air through a gulp valve to the inlet manifold to provide air during conditions of deceleration and engine over-run.

IMPORTANT. The efficient operation of the system is dependent on the engine being correctly tuned. The ignition and spark plug settings, valve clearances, and carburetter adjustments given for a particular engine (see **'TUNING DATA'**) must be strictly adhered to at all times.

Air pump

The rotary vane type air pump is mounted on the front of the cylinder head and is belt driven from the water pump pulley. Provision is made for tensioning the belt.

Air is drawn into the pump through a dry-type renewable element filter. A relief valve in the pump discharge port allows excessive air pressure at high engine speeds to discharge to the atmosphere.

Check valve

The check valve, fitted in the pump discharge line to the injection manifold, protects the pump from the back-flow of exhaust gases.

The valve shuts if the air pressure ceases while the engine is running; for example, if the pump drive belt should break.

Gulp valve

The gulp valve, fitted in the pump discharge line to the inlet manifold, controls the flow of air for leaning-off the rich air/fuel mixture present in the inlet manifold immediately following throttle closure after running at full throttle opening (i.e. engine over-run).

A sensing pipe connected between the inlet manifold and the gulp valve maintains manifold depression directly to the underside of the diaphragm and through a bleed hole to the upper side. Sudden increases in manifold depression which occur immediately following throttle closure act on the underside of the diaphragm which opens the valve and admits air to the inlet manifold. The

bleed hole allows the differences in depression acting on the diaphragm to equalize and the valve closes.

On some engines a restrictor is fitted in the air pump discharge connection to the gulp valve, to prevent surging when the gulp valve is operating.

Carburetter

The carburetters are manufactured to a special exhaust emission control specification and are tuned to give optimum engine performance with maximum emission control.

A limit valve is incorporated in the carburetter throttle disc which limits the inlet manifold depression ensuring that under conditions of high inlet-manifold depression the mixture entering the cylinders is at a combustible ratio.

Section 3-B

AIR PUMP (four-cylinder engines)

Drive belt tension

When correctly tensioned, a total deflection of ½ in., under moderate hand pressure, should be possible at the midway point of the longest belt run between the pulleys.

To tension the belt:

(1) Slacken the air pump mounting bolt and adjusting link bolts (see Fig. 3).

(2) Using hand pressure only, move the pump in the required direction until the correct tension is obtained.

(3) Tighten the mounting and adjusting bolts to a torque figure of 10 lb. ft.

Testing

(1) Check the drive belt for correct tensioning.

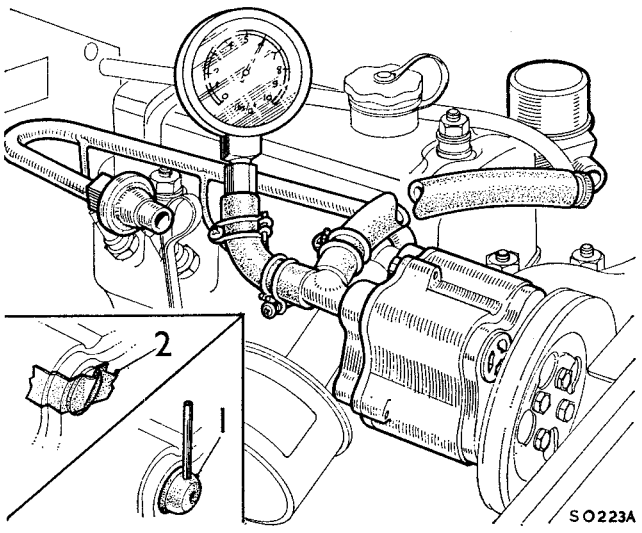

Fig. 2

The pressure gauge connected (four-cylinder engines)

1. Relief valve test tool. 2. Tape used to duct air.

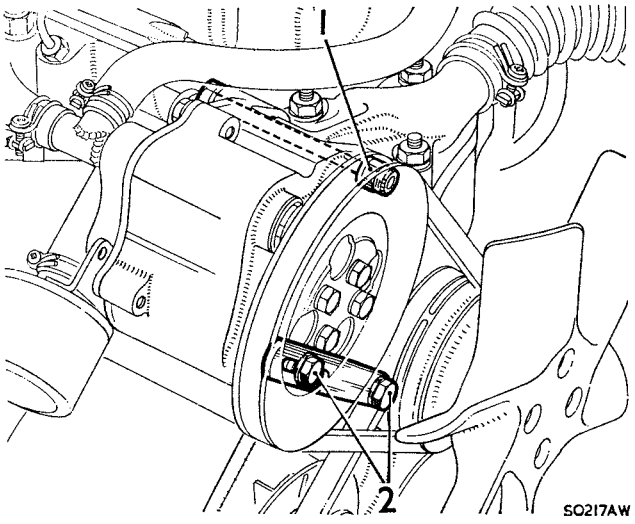

Fig. 3

Air pump (four-cylinder engines)

1. Pump mounting bolt. 2. Adjusting link bolts.

(2) Connect a tachometer to the engine in accordance with the instrument-maker's instructions.

(3) Disconnect the gulp valve air supply hose at the gulp valve and securely plug the hose.

(4) Disconnect the air manifold supply hose at the check valve, and connect a pressure gauge to the hose (see Fig. 2).

(5) Run the engine at the air pump test speed given in **'TUNING DATA'**: a gauge reading of not less than 2·75 lb./sq. in. should be registered.

(*a*) If a lower reading is obtained, remove, dismantle and clean the pump air cleaner. Reassemble using a new element, refit the air cleaner and repeat the test.

(*b*) If the reading is still unsatisfactory, temporarily blank off the relief valve and repeat the test; if the reading is now correct, renew the relief valve.

(*c*) If a satisfactory reading is still unobtainable, remove and service the air pump.

(6) Stop the engine and fit a temporary air duct over the face of the relief valve. Two methods of doing this are shown in Fig. 2. The tool (1) may be fabricated from grommet (Part No. 1B 1735) and a short length of metal brake tube, or (2) by using a piece of adhesive tape to form the duct.

DO NOT ATTEMPT TO CHECK AIR FLOW FROM THE RELIEF VALVE BY PLACING A FINGER BETWEEN THE VALVE AND THE DRIVING PULLEY.

(*a*) Start the engine and slowly increase the speed until air flow from the relief valve duct is detected, when a gauge reading of 4·5 to 6·5 lb./sq. in. should be registered.

(*b*) If the relief valve fails to operate correctly, remove the pump and renew the valve.

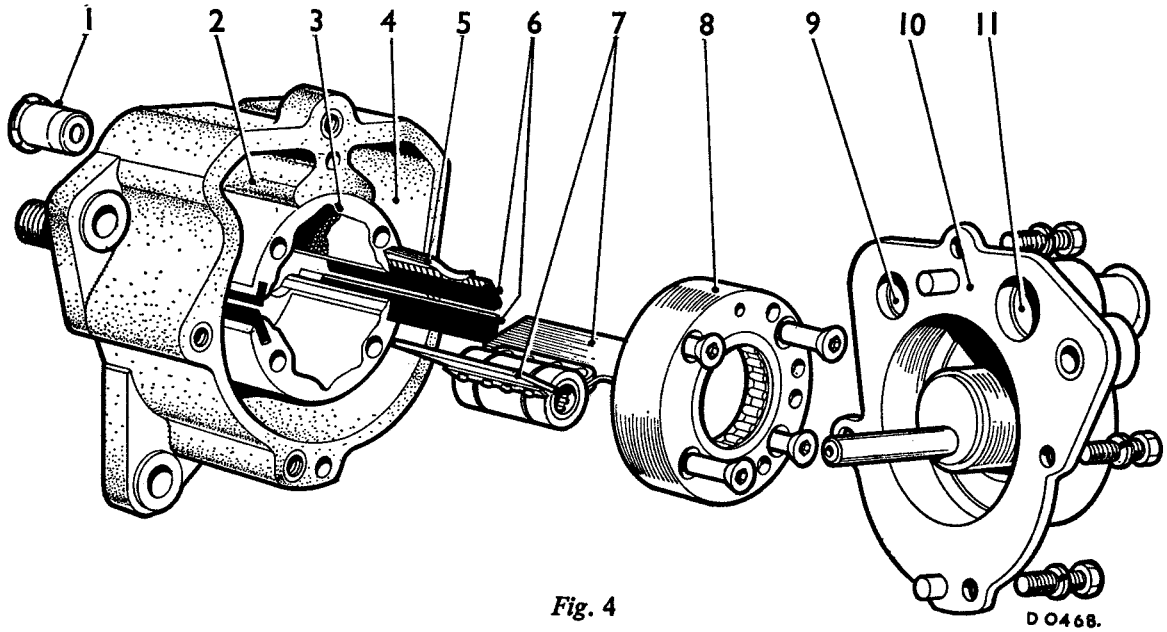

Fig. 4

The air pump (four-cylinder engines)

1. Relief valve.
2. Inlet chamber.
3. Rotor.
4. Outlet chamber.
5. Spring.
6. Carbons.
7. Vane assemblies.
8. Rotor bearing end plate.
9. Outlet port.
10. Port-end cover.
11. Inlet port.

Removing

(1) Disconnect the air hoses from the pump connections and remove the air cleaner.
(2) Slacken the mounting and adjusting link bolts and slip the drive belt from the pump pulley.
(3) Remove the top adjusting link bolt and the nut securing the pump mounting bolt.
(4) Support the pump, withdraw the mounting bolt and lift the pump from the engine.

Dismantling

(1) Remove the four port-end cover retaining bolts and withdraw the cover.
(2) Remove the four screws securing the rotor bearing end plate to the rotor and remove the end plate.
(3) Lift out the vane assemblies.
(4) Remove the carbon and spring assemblies from the rotor.

Servicing

(1) Wipe the interior and components of the pump clean, using a lint-free cloth.

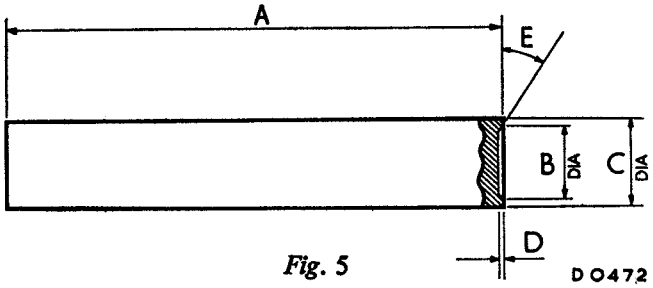

Fig. 5

The dimensions of the relief valve replacing tool

A = 5 in. B = ·986 in. C = 1·062 in.
D = ·05 in. E = 30°.

(2) Clean the vane carrier roller bearings and the rotor end plate bearing and repack the bearings with Esso 'Andok' 260 lubricant.
(3) Inspect the vane assemblies for signs of having fouled the pump wall, and for grooving in area of contact with the carbons. Renew worn or damaged vanes.
(4) Fit new carbons (the original springs may be reused if serviceable). Note that the slots which carry the carbon and springs are the deeper ones, and the carbons are all fitted with the chamfered edge to the inside.

Reassembling

(1) Reassemble the pump by reversing the dismantling procedure and noting that the underside of the heads of the rotor bearing end plate screws must be smeared with 'Locktite' before tightening.

Refitting

(1) Position the pump in the mounting bracket and fit, but do not tighten, the pump mounting bolt.
(2) Screw in, but do not tighten, the adjusting link bolt.
(3) Fit and tension the drive belt.
(4) Reconnect the hoses and refit the air cleaner.

Relief valve—replacing

(1) Remove the air pump.
(2) Remove the pump pulley.
(3) Pass a ½-in. diameter soft metal drift through the pump discharge connection so that it registers against the relief valve, and drive the valve from the pump.

(4) Fit a new copper seating washer to the new relief valve and enter the valve into the pump body.
(5) Using a tool made to the dimensions shown in Fig. 5, drive the valve into the pump until the copper seating washer is held firmly, but not compressed, between the valve and the pump.
(6) Refit the pulley and refit the air pump.

Section 3-C

AIR PUMP (six-cylinder engines)

Drive belt tension

When correctly tensioned, a total deflection of ½ in., under moderate hand pressure should be possible at the midway point of the longest belt run between the pulleys.

To tension the belt:

(1) Slacken the air pump mounting bolt and adjusting link bolts (see Fig. 6).
(2) Using hand pressure only, move the pump in the required direction until the correct tension is obtained.
(3) Tighten the mounting and adjusting link bolts to a torque figure of 10 lb. ft.

Testing

Faulty operation of the air pump is indicated by excessive pump noise. If excessive noise is present and the air pump is suspected, remove the air pump drive belt and run the engine to check that the noise is not from another source. If this check shows that the air pump is excessively noisy renew the air pump assembly or proceed as follows:

(1) Check the drive belt for correct tensioning.
(2) Run the engine at idle speed and check the air supply hoses and connections for leaks and for intermittent contact with other parts of the vehicle.

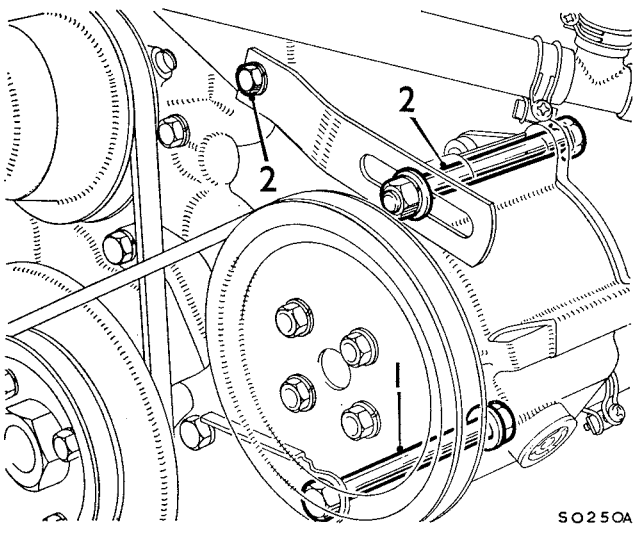

Fig. 6

Air pump (six-cylinder engines)

1. Pump mounting bolt. 2. Adjusting link bolts.

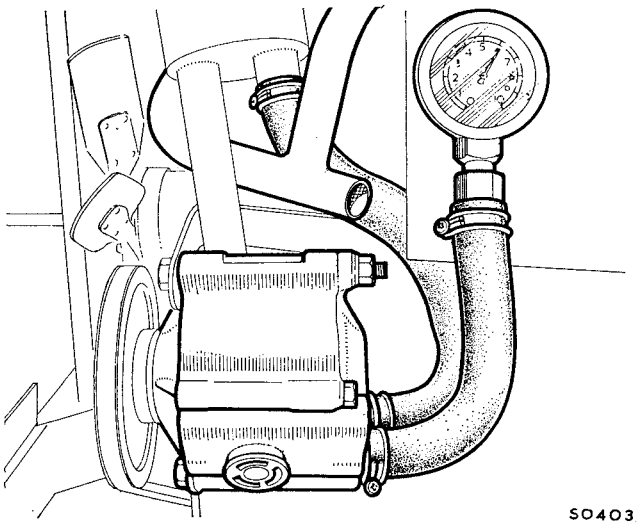

Fig. 7

The pressure gauge connected (six-cylinder engines)

(3) Connect a tachometer to the engine in accordance with the instrument maker's instructions.
(4) Disconnect the air supply hose tee connection from its connection with the air pump discharge hose.
(5) Connect a pressure gauge to the air pump discharge hose (see Fig. 7).
(6) Run the engine at the air pump test speed given in 'TUNING DATA'. A gauge reading of not less than 2·75 lb./sq. in. should be registered.
   (*a*) If a lower reading is obtained, remove, dismantle, and clean the pump air cleaner. Reassemble using a new element, refit the air cleaner, and repeat the test.
   (*b*) If the reading is still unsatisfactory, temporarily blank off the relief valve and repeat the test; if the reading is now correct, renew the relief valve.
   (*c*) If a satisfactory reading is still unobtainable the air pump assembly must be replaced.
   (*d*) From idling speed, slowly increase the engine speed until air flow from the relief valve is detected, this should occur before the gauge reading exceeds 10 lb./sq. in.
   (*e*) If the relief valve fails to operate correctly, remove the pump and renew the valve.
(7) If the foregoing tests fail to remedy or locate the cause of the air pump noise renew the air pump assembly.

Removing

(1) Disconnect the hoses from the pump connections and remove the air cleaner.
(2) Slacken the mounting and adjusting link bolts and slip the drive belt from the pump pulley.
(3) Remove the nut from the adjusting link bolt, support the pump and withdraw the bolt.
(4) Unscrew the mounting bolt and remove the pump.

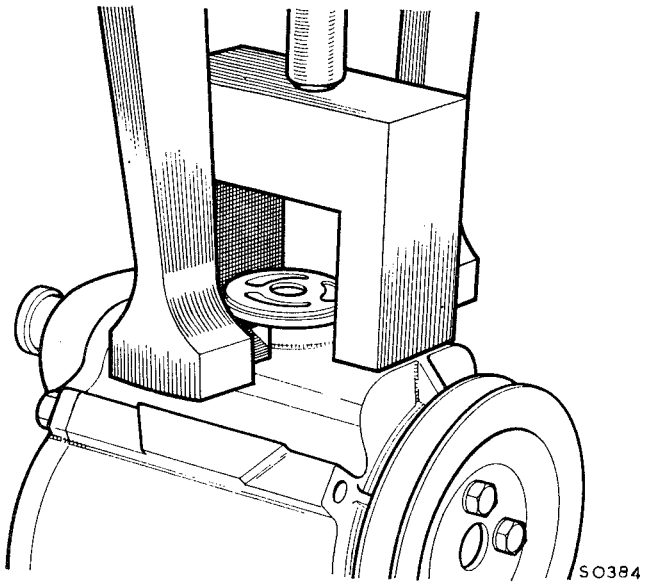

Fig. 8

Removing the relief valve (six-cylinder engines)

Relief valve—replacing

(1) Remove the air pump.

(2) Using a gear puller and a fabricated bridge as shown in Fig. 8, withdraw the relief valve from the pump body.
DO NOT HOLD THE PUMP BY CLAMPING IT IN A VICE.

(3) Enter the new relief valve into the pump body.

(4) With a protective plate over the valve, carefully drive the valve into the pump until its flange registers lightly on the pump body.

(5) Insert the pressure setting plug into the relief valve, using a suitable tool, apply pressure to the centre of the plug until the legs of the plug lock under the relief valve cage.

Section 3-D

CHECK VALVE

Removing

(1) Disconnect the air supply hose from the check valve connection.

(2) Hold the air manifold connection to prevent it twisting and unscrew the check valve.

Testing

(1) Blow through the valve, orally, in turn from each connection. Air should only pass through the valve when blown from the air supply hose connection. If air passes through when blown from the air manifold connection, renew the check valve.
On no account may an air blast be used for this test.

Refitting

(1) Hold the air manifold connection to prevent it twisting, screw in and tighten the check valve.

(2) Reconnect the air supply hose to the check valve.

Section 3-E

AIR MANIFOLD AND INJECTORS

Testing

(1) Disconnect the air manifold from the cylinder head connections.

(2) Slacken the air supply hose clip at the check valve connection.

(3) Rotate the manifold about its connection axis until the injector connections are accessible.

(4) Tighten the air supply hose clip.

(5) Run the engine at idle speed and observe the flow of air from each of the manifold connection tubes. Should the flow of air from any of the connections be restricted, remove the manifold and clear the obstruction using an air blast.

(6) With the engine running at idle speed, check that exhaust gases blow from each of the cylinder head injectors.

IMPORTANT.—The injectors may be free in the cylinder head and care must be taken to ensure that they are not displaced during this test.

To clear a restricted injector:

(*a*) Crank engine until the exhaust valve below the injector is closed.

(*b*) Using a hand drill (not power-driven), pass a $\frac{1}{8}$-in. drill through the injector bore, taking care that the drill does not contact the exhaust valve stem after passing through the injector. Damage may result if a power-driven drill is used.

(*c*) Insert an air-blast nozzle into the injector connection to clear carbon dust from the exhaust port.

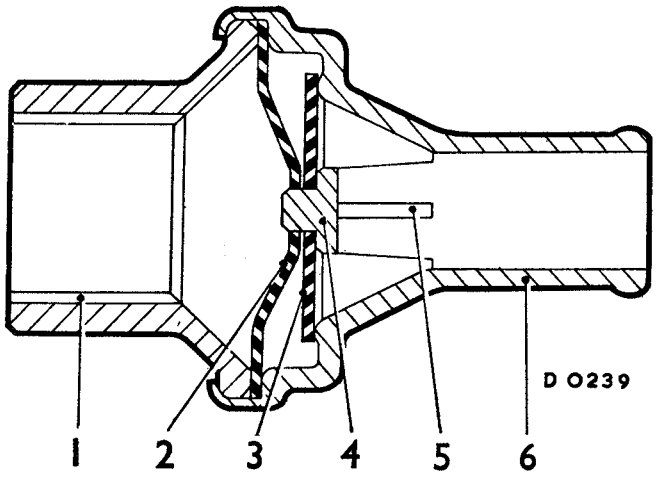

Fig. 9

A section through the check valve

1. Air manifold connection.
2. Diaphragm.
3. Valve.
4. Valve pilot.
5. Guides.
6. Air supply connection.

Section 3-F

GULP VALVE

Testing

(1) Disconnect the gulp valve air supply hose from the air pump connection.

(2) Connect a vacuum gauge, with a tee connection to the disconnected end of the gulp valve air hose.

(3) Start the engine and run it at idle speed.

(4) Temporarily seal the open connection on the gauge tee and check that a zero gauge reading is maintained for approximately 15 seconds; if a vacuum is registered, renew the gulp valve. It is most important that the engine speed is not increased above idling during this test.

(5) With the gauge tee connection temporarily sealed, operate the throttle rapidly from closed to open; the gauge should then register a vacuum. Repeat the test several times, temporarily unsealing the tee piece connection to destroy the vacuum before each operation of the throttle. If the gauge fails to register a vacuum, renew the gulp valve.

Removing

(1) Disconnect the air hoses.

(2) Unscrew the mounting screw and remove the gulp valve.

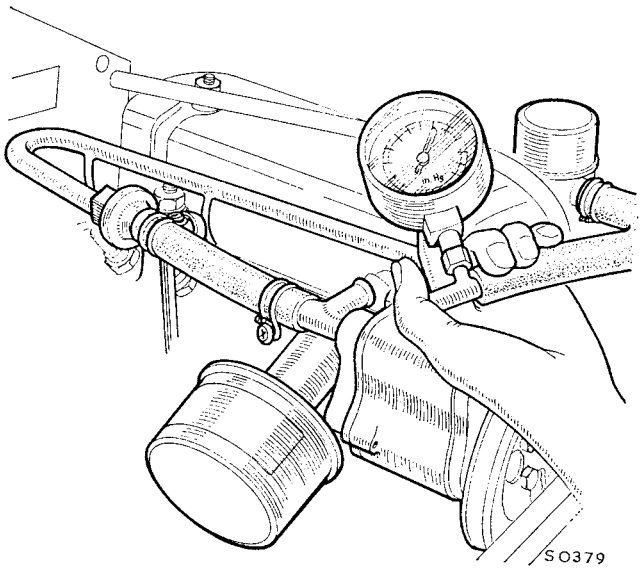

Fig. 10

The vacuum gauge connected for testing the gulp valve

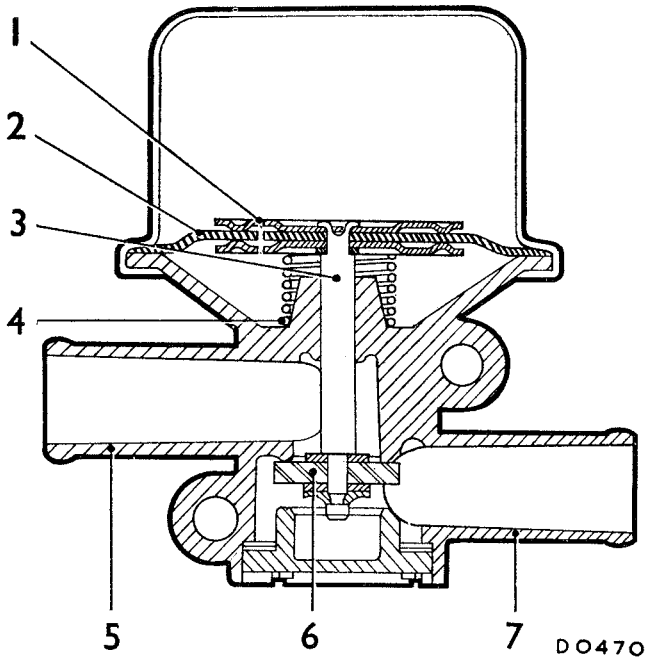

Fig. 11

A section through the gulp valve

1. Metering balance orifice.
2. Diaphragm.
3. Valve spindle.
4. Return spring.
5. Inlet manifold hose connection.
6. Valve.
7. Air pump hose connection.

Refitting

(1) Reverse the removing procedure.

Section 3-G

LIMIT VALVE (INLET MANIFOLD DEPRESSION)

Testing

(1) Disconnect the gulp valve sensing pipe from the inlet manifold.

(2) Connect a vacuum gauge to the sensing pipe connection on the inlet manifold.

(3) Connect a tachometer in accordance with the instrument maker's instructions.

(4) Warm the engine at fast idle speed until normal operating temperature is reached.

(5) Increase the engine speed to 3,000 r.p.m. then release the throttle quickly; the vacuum gauge reading should immediately rise to between 20·5 and 22 in. Hg. If the gauge reading falls outside these limits the carburetter must be removed and the throttle disc and limit valve assembly renewed. After refitting, the carburetter must be tuned as described in Section 4-A.

Section 3-H

RUNNING ON CONTROL VALVE

The solenoid operated valve is connected by hoses between the adsorption canister ventilation connection of the evaporative loss control system and the inlet manifold. A third hose connected to the valve is open to atmosphere for canister ventilation while the engine is running normally. The electrical circuit of the solenoid is connected through the ignition switch and an oil pressure operated switch.

The valve is fitted to prevent prolonged running on (dieseling) which may occur when using low octane fuels.

Operation

When the ignition is switched off the solenoid is energized through an oil pressure switch and the valve closes, shutting off the ventilation connection and opening the connection to the inlet manifold. Inlet manifold depression then acts on the fuel in the carburetter float chamber(s) to prevent fuel flow and the engine is stopped by fuel starvation.

Testing

If the running on valve is suspected of being faulty the control electrical circuit and operation of the valve should be checked as follows:

(1) Check the control valve line fuse.
(2) Turn the ignition switch to the off position.
(3) Disconnect the control valve electrical lead at the oil pressure switch.
(4) Touch the disconnected lead to a good earth point on the vehicle. If the control electrical circuit and valve are satisfactory, the valve will be heard to operate as the control lead is earthed.

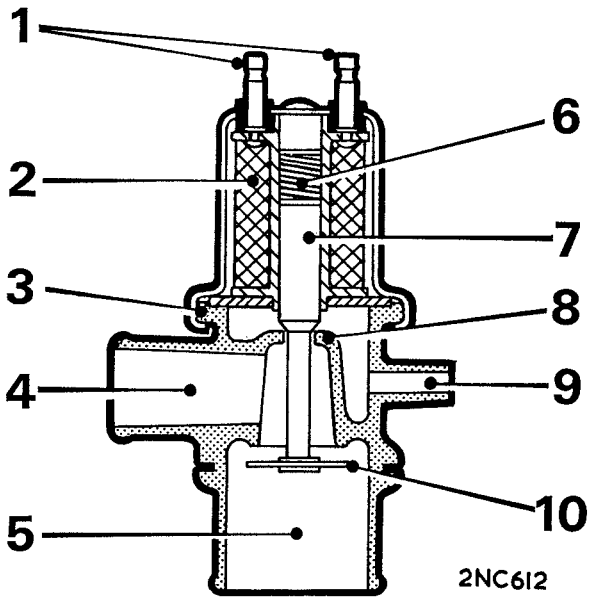

Fig. 12
A section through the running on control valve

1. Electrical terminals.
2. Solenoid.
3. Valve body.
4. Adsorption canister hose connection.
5. Air vent hose connection.
6. Spring.
7. Valve spindle.
8. Primary valve.
9. Inlet manifold hose connection.
10. Secondary valve.

SECTION 3A

EXHAUST EMISSION CONTROL
(Engine Modifications System)

	Section
Air bleed temperature compensator	3A-D
Air intake	3A-C
Air intake temperature control	3A-E
General description	3A-A
Throttle damper	3A-B

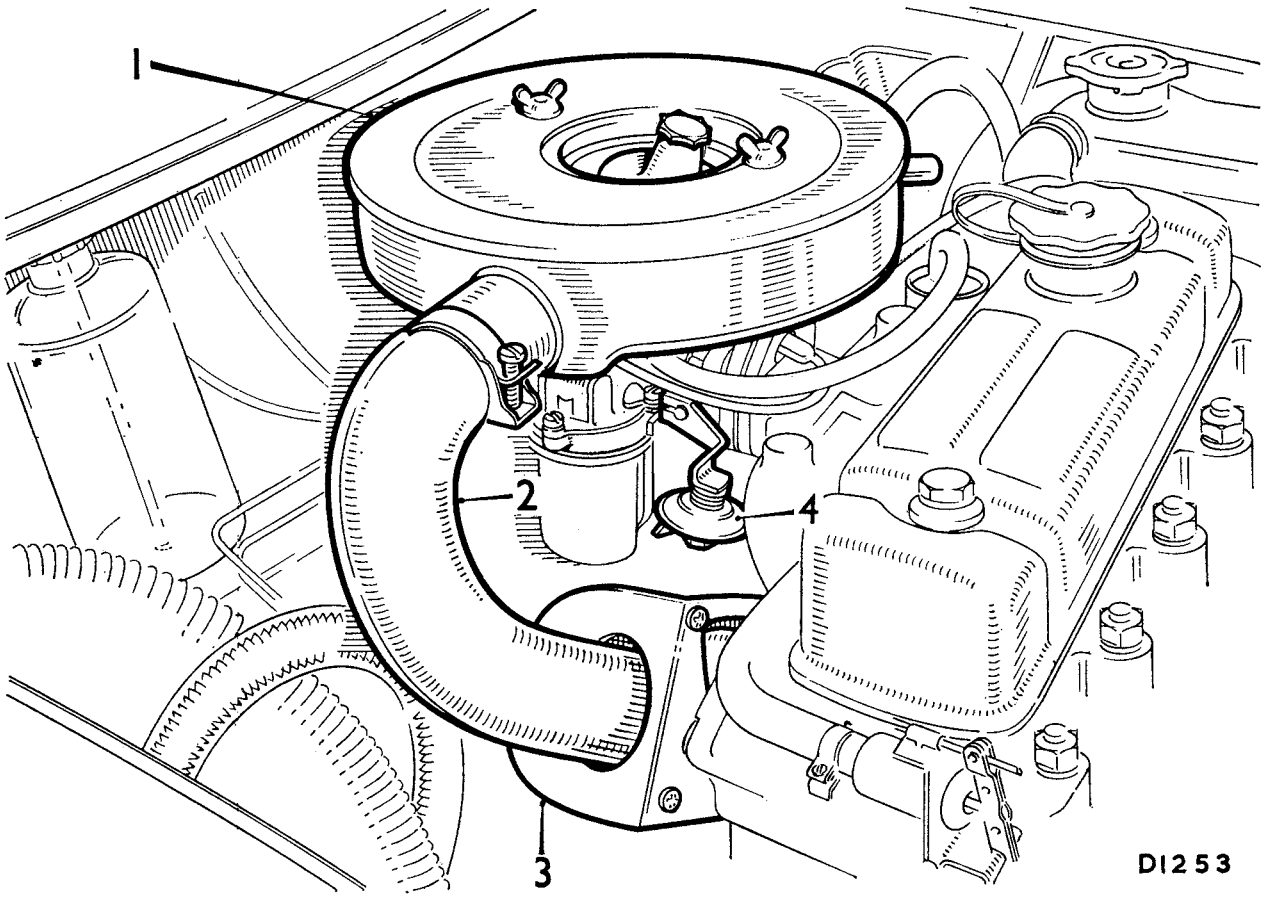

Fig. 1
An engine modification exhaust emission control system showing the air intake tube in the low ambient temperature operating position

1. Air cleaner.
2. Air intake tube.
3. Manifold shroud.
4. Throttle damper.

Section 3A-A

GENERAL DESCRIPTION

This system incorporates modifications to a high compression ratio engine and using a carburetter manufactured to a special exhaust emission control specification.

IMPORTANT. The efficient operation of the system is dependent on the engine being correctly tuned. The settings given for a particular engine (see **'TUNING DATA'**) must be strictly adhered to at all times.

Carburetter

The carburetter is tuned to give optimum engine performance with maximum exhaust emission control.

A limit valve is incorporated in the carburetter throttle disc which limits the inlet manifold depression ensuring that under conditions of high inlet-manifold depression the air/fuel mixture entering the cylinders is at a combustible ratio.

Throttle damper

A damper is fitted to act on the throttle lever as it returns to the closed position ensuring a gradual closing of the throttle valve giving smooth deceleration. Provision is made for adjusting the damping effect; the correct setting is given in **'TUNING DATA'.**

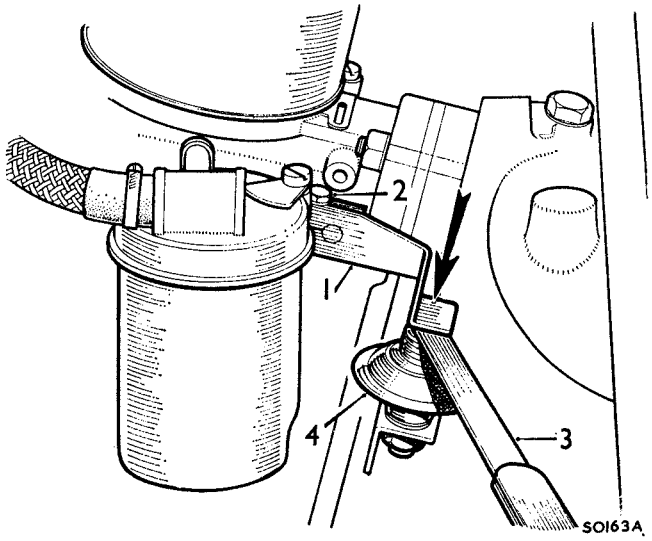

Fig. 2
Adjusting the throttle damper setting

1. Throttle lever.
2. Clamp screw
3. Feeler gauge.
4. Throttle damper.

Air intake

In low ambient temperature conditions the intake tube of the air cleaner is positioned in a shroud formed over a section of the exhaust manifold. Air drawn through the cleaner to the carburetter is warmed by heat given off by the manifold.

In high ambient temperature conditions the air intake tube is positioned away from the manifold and air entering the carburetter is drawn into the air cleaner from the engine compartment at ambient temperature.

Section 3A-B

THROTTLE DAMPER

Adjusting

(1) Slacken the clamp nut on the damper operating lever.
(2) Insert a feeler gauge (see **'TUNING DATA'**) between the damper plunger and the operating arm.
(3) With the carburetter throttle disc valve in the fully closed position, press the operating lever down until the plunger is fully depressed.
(4) Hold the lever in this position and tighten the clamp nut.
(5) Remove the feeler gauge.

Section 3A-C

AIR INTAKE

Repositioning

(1) Slacken the intake tube securing clip.
(2) Slacken the air cleaner wing nuts.
(3) Withdraw the intake tube from the air cleaner and manifold shroud.
(4) Refit the intake tube with its entry positioned adjacent to the end of the rocker cover.
(5) Tighten the wing nuts and securing clip.

Section 3A-D

AIR BLEED COMPENSATOR

Description

An air bleed temperature compensator is fitted to some engines equipped with twin type HS carburetters required to conform with European E.C.E. or E.E.C. exhaust emission control regulations.

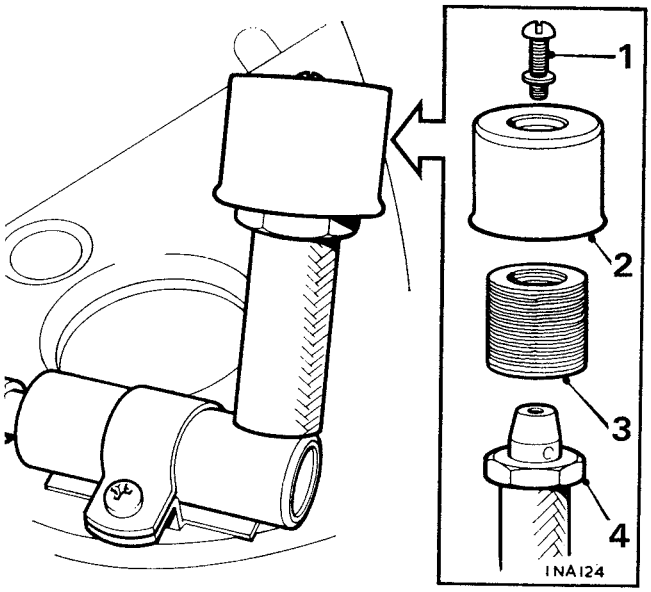

Fig. 3
The air bleed temperature compensator (showing the cap type air filter components)

1. Cap retaining screw.
2. Filter cap.
3. Filter element.
4. Filter base.

The air bleed temperature compensator is fixed to the underside of the carburetter air cleaner and consists of a bi-metal air control valve and an air filter. It is connected by hoses to the constant depression chambers, between the piston and the throttle disc valve, of the carburetters.

With an increase in engine or engine compartment air temperature, the valve will open and allow air at ambient temperature to be drawn through the air filter and into the carburetter constant depression chambers.

The controlled admission of air into the carburetter chambers reduces the velocity and volume of air passing the needles of the carburetters, causing the pistons to fall and subsequently reduce the amount of fuel supplied, thus giving a constant air/fuel mixture ratio.

Servicing

The air bleed temperature compensator air filter must be renewed every 12,000 miles (20000 km.) or 12 months.

(1) Disconnect the air cleaner to carburetter hoses.
(2) Remove the air cleaner.
(3) *Push-on type filters:* withdraw and discard the filter. *Cap type filters:* unscrew the filter cover retaining screw, remove the cover, and discard the filter element. Clean the base and cover of the filter, fit a new element, refit the cover and retaining screw.
(4) Refit the air cleaner and reconnect the hoses.

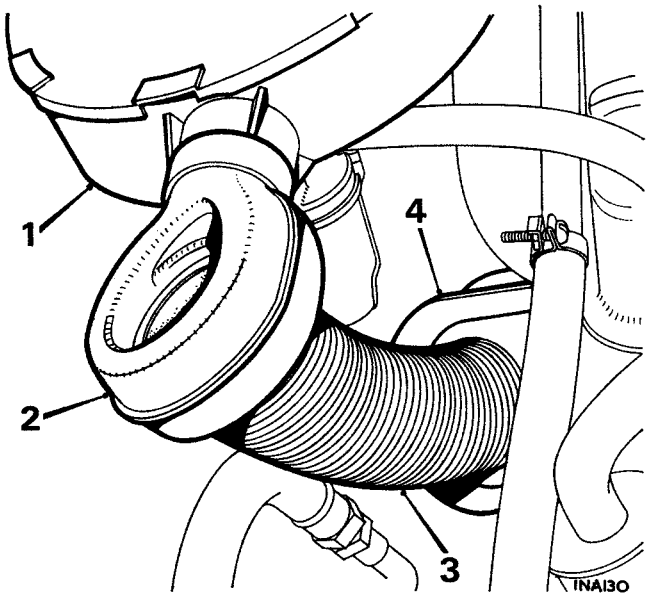

Fig. 4
The air intake temperature control

1. Air cleaner.
2. Air intake temperature control.
3. Air intake tube.
4. Exhaust manifold shroud.

Section 3A-E

AIR INTAKE TEMPERATURE CONTROL

An air intake temperature control is fitted to some engines equipped with single Type H.S. carburetters required to conform with European E.C.E. or E.C.C. exhaust emission control regulations.

The control consists of a bi-metal operated valve, fitted in the air intake of the carburetter air cleaner, and is designed to maintain the temperature of the ingoing air within predetermined limits.

When the engine is cold, air is drawn into the air cleaner from the shrouded area adjacent to the exhaust manifold. As the temperature of the air entering the air cleaner rises, the valve opens and admits cooler air at ambient temperature to mix with the hot air and maintain a constant temperature.