ROVER 3500S ENGINE MODIFICATION

Rover 3500S (1971-72)

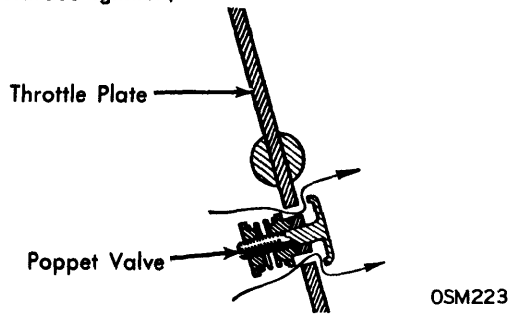
DESCRIPTION

Rover 3500S Exhaust Emission Control is achieved by alterations to carburetor and combustion characteristics, together with a special distributor and vacuum switch which provides a retarded ignition condition during normal throttle operation. In addition an automatic enrichment device, which is a fully automatic auxiliary carburetor, provides an additional air/fuel mixture in excess of that supplied by the normal carburetors when engine is below normal operating temperature.

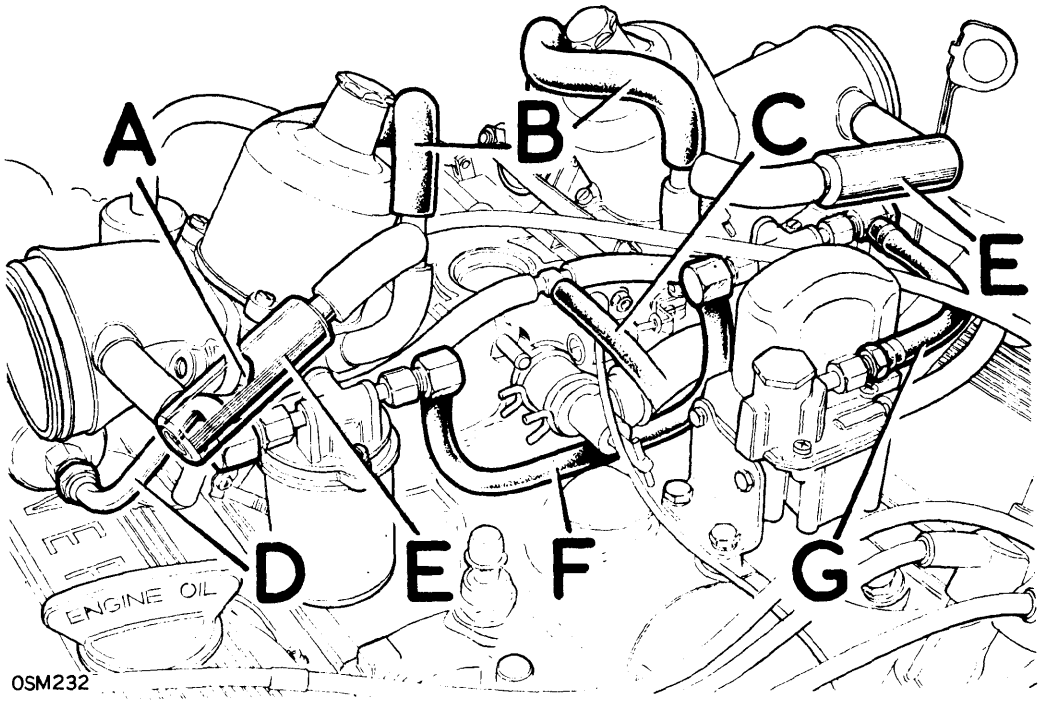
Automatic Enrichment Device – Consists of a small carburetor complete with float chamber and throttle in the form of a valve which opens or closes due to deflection of a temperature sensitive bi-metalic strip.

OPERATION

Carburetor Throttle Plate Butterfly – Throttle plate butterfly incorporates a spring loaded poppet valve. With low manifold vacuum, valve remains closed. During periods of high manifold vacuum (engine overrun with throttles closed), valve opens and prevents incorrect combustion of fuel by supplementing volume of air/fuel mixture. This, together with a vacuum retarded ignition, maintains correct combustion.



THROTTLE PLATE BUTTERFLY



A – Nuts mounting carburetor
B – Hose from crankcase emission control system
C – Hose, evaporative emission control system
D – Fuel inlet pipe
E – Temperature compensator
F – Fuel connecting pipe
G – Fuel pipe to automatic enrichment devi

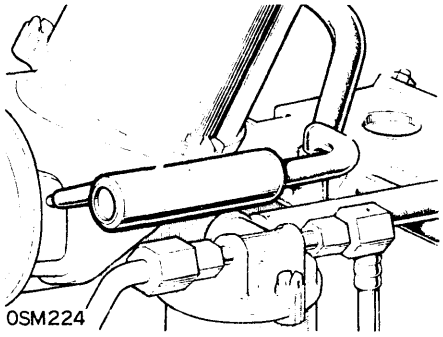
CARBURETOR EMISSION CONTROL CONNECTIONS

ROVER 3500S ENGINE MODIFICATION (Cont.)

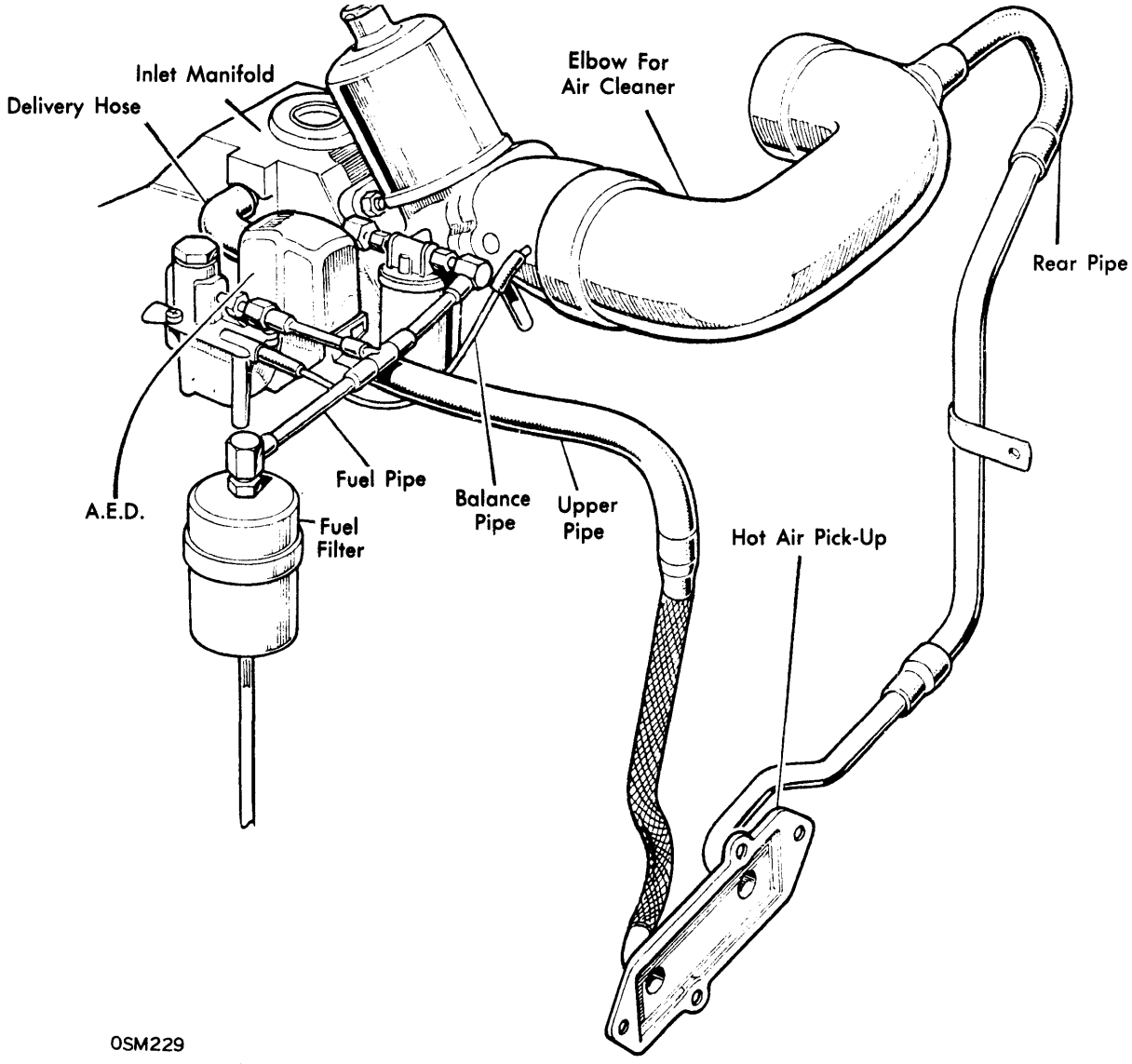
Carburetor Temperature Compensators – Each carburetor has an independently mounted temperature compensator. Temperature compensator is connected, by hoses, to air horn and carburetor base. Connection at carburetor base is shared with crankcase ventilation hose. Each compensator contains a bi-metalic valve which is sensitive to air intake temperature and allows a metered amount of air to by-pass carburetor jet, thus giving leaner mixtures at higher air intake temperatures.

Carburetor Jet Adjustment Restrictors – Each carburetor incorporates a jet restricting device which limits amount of mixture adjustment. Jet restrictors are set at factory, once set they enable only a small range of mixture control. Factory setting allows a maximum richness and any adjustment thereafter may only lean out air/fuel mixture.

Throttle Damper – Throttle damper (dashpot) is a pneumatic damper which prevents throttle valves from fully closing on rapid release of accelerator pedal.

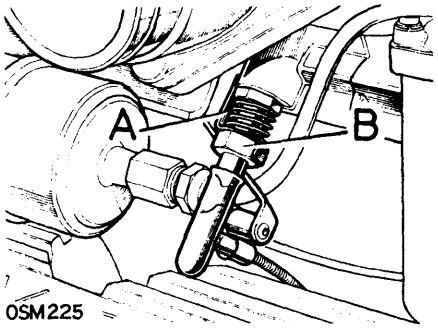


TEMPERATURE COMPENSATOR



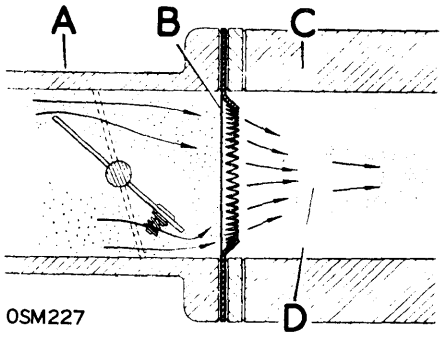
AUTOMATIC ENRICHMENT DEVICE

ROVER 3500S ENGINE MODIFICATION (Cont.)



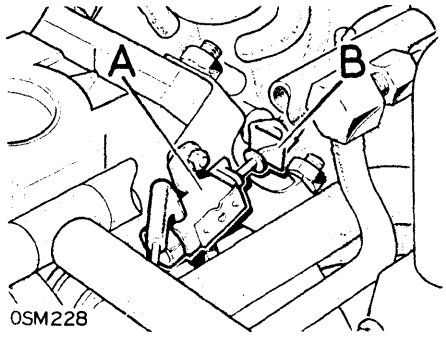
JET ADJUSTMENT RESTRICTOR

Fuel Deflector – Fuel deflector, located between carburetor and intake manifold, is a sheet of metal with a hole pressed out. The inward facing teeth cause fuel to atomize and prevents wet fuel from accumulating on manifold walls, allowing engine to function properly on leaner mixtures.



FUEL DEFLECTOR

Distributor & Vacuum Switch – Distributor vacuum retard unit, by means of a throttle controlled vacuum switch, allows normal distributor advance characteristics to be maintained when starting engine and during periods of wide open throttle. Under normal driving conditions, throttle controlled vaccum switch directs intake manifold to vacuum retard unit, which offsets centrifugal advance for optimum performance and emission control. Switch is activated by a lever on throttle linkage and is adjusted to shut off all vacuum when position of throttle linkage corresponds to an approximate engine speed of 3000 RPM.



VACUUM SWITCH

Automatic Enrichment Device – 1) Main valve and its seat form the orifice controlling amount of air/fuel mixture admitted to engine. Valve is connected to main bi-metal strip by a spindle which moves freely in a carbon bushing. Valve orifice is determined by temperature of main bi-metal strip, lower temperatures enlarge the orifice.

2) Outlet pipe is connected to intake manifold. Inlet pipe is connected to carburetor air horn by means of a hot air pick-up on exhaust manifold. Main bi-metal strip is attached to heat shroud which serves as a heat storage. It also serves as a component for adjusting main valve due to its abutting against adjusting screw.

3) Diaphragm, which is subjected to vacuum in balance chamber, prevents main valve from being drawn down, by manifold vacuum, onto its seat. Vacuum which controls diaphragm is provided by matching of orifices, one in main valve and a second in valve body.

4) Manifold vacuum causes diaphragm to raise or lower tapered fuel needle, governing size of fuel orifice which is located at lower end of jet tube in float chamber.

5) When engine is cold the bi-metal strip, governed by temperature of inlet air, determines size of main valve. Diaphragm raises fuel needle until it contacts a second bi-metal strip, fuel well will then be filled to level of fuel in float chamber.

6) When starting engine, air is drawn past a spring loaded air valve, through main valve seat, and into intake manifold. Fuel is drawn into engine through fuel orifice (enlarged by raised needle) and also through well orifice, then up jet tube to main valve.

7) When engine is running, manifold vacuum draws down diaphragm allowing fuel needle to be in its normal idling position. Manifold vacuum also draws main valve towards its seating. Engine will then run at required speed as set by adjusting screw.

8) As engine temperature rises, heated air is drawn through enrichment device. This warm air progressively expands bi-metal strip which in turn progressively closes main valve. When normal operating temperature is reached, air/fuel mixture is shut off due to main valve being closed.

9) Engine requires an additional mixture when accelerating and before normal operating temperature is reached. When carburetor throttle plates are slightly open and manifold vacuum is decreasing, main valve of enrichment device opens slightly due to a reduction of pneumatic pressure which was trying to close it. As carburetor throttle plates are further opened, vacuum is reduced allowing diaphragm to push needle upward, opening orifice and increasing fuel supply.

10) When engine is stopped, heat stored in heat shroud en sures that cooling rate of bi-metal strip is equal to cooling rat of engine. This makes sure automatic enrichment device wil only come into operation at required temperature.

MAINTENANCE

Carrburetor Temperature Compensator – Temperatu compensators are not repairable, if defective they must replaced. Replace by disconnecting hoses, make sure hose c nections are tight when installing new compensators.

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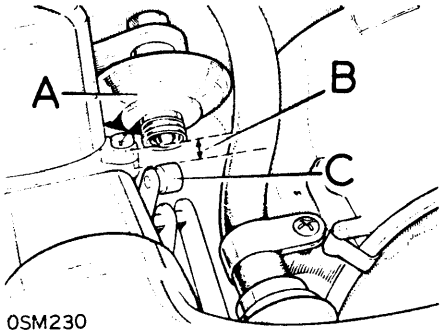


OSM230

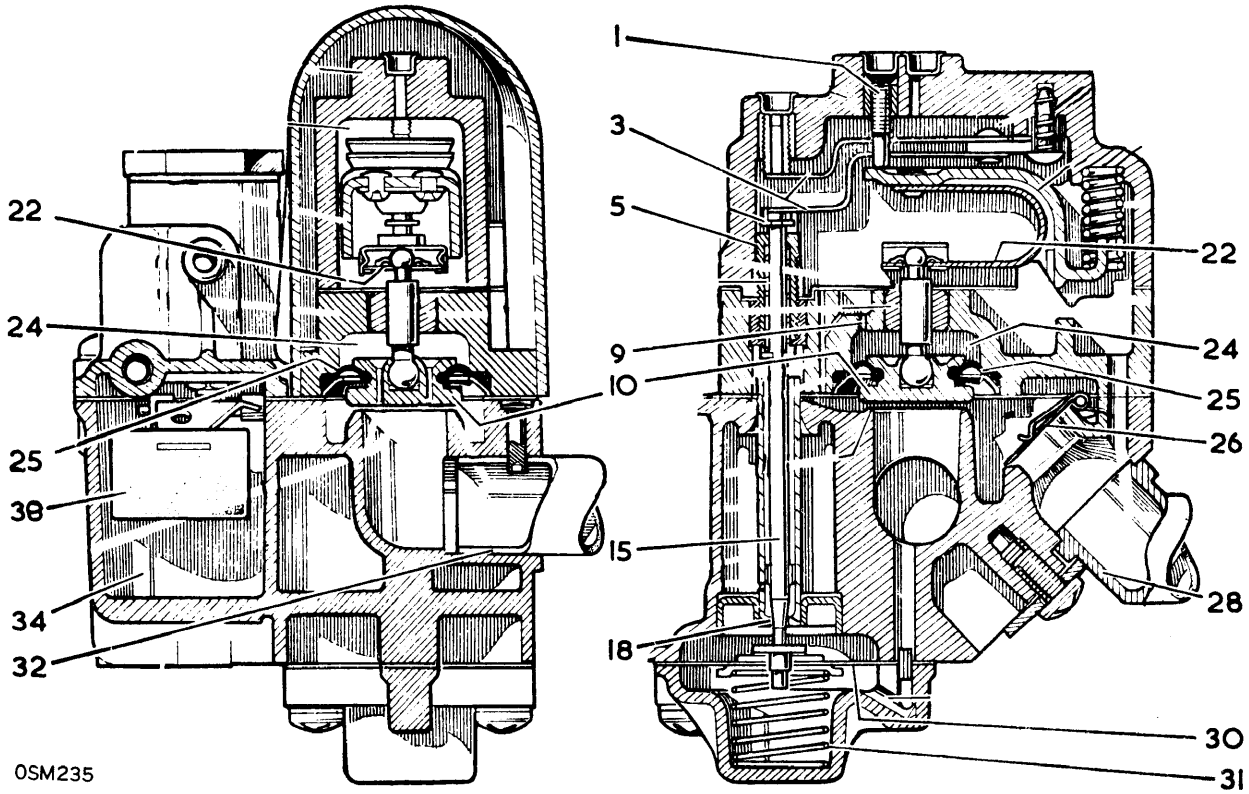
A—Throttle damper
B—Clearance .100 in. (2.5 mm)
C—Nylon roller on lever

ADJUSTING THROTTLE DAMPER

Carburetor Throttle Damper – When adjusted, delay time from point at which damper starts to operate to moment at which throttles are fully closed should be approximately one second. If time is exceeded by a significant amount, even with correct clearance, damper is defective and should be replace. Check and adjust as follows:

1) When throttle plates are fully closed, lever on throttle spindle is set so that nylon roller is contacting damper plunger. When plunger is pushed all the way in, gap between plunger and nylon roller should be .100".

2) To adjust, loosen clamping bolt on throttle lever, depress damper plunger and adjust lever until proper clearance is obtained. *NOTE – Make sure carburetor throttle plates are in idling position when adjusting damper.* Tighten clamping bolt and recheck clearance.



OSM235

1 – ADJUSTING SCREW
3 – SECONDARY BI-METAL
5 – ADJUSTING NUT
9 – ORIFICE
10 – MAIN VALVE
15 – TAPERED FUEL NEEDLE
18 – FUEL ORIFICE
22 – MAIN BI-METAL
24 – BALANCE CHAMBER
25 – DIAPHRAGM
26 – AIR VALVE
28 – INLET PIPE
30 – NEEDLE DIAPHRAGM
31 – DIAPHRAGM SPRING
32 – OUTLET PIPE
34 – FLOAT CHAMBER
38 – FLOAT

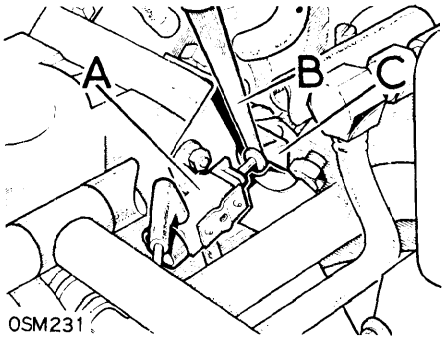
AUTOMATIC ENRICHMENT DEVICE (SCHEMATIC)

ROVER 3500S ENGINE MODIFICATION (Cont.)

Vacuum Retard Switch – *NOTE – Vacuum retard switch actuating lever, located on left carburetor spindle, should not be adjusted. Adjustment should only be made by repositioning vacuum retard switch.* Make sure throttle plates remain fully closed when adjustment is made. Adjust as follows:

1) With throttle closed, actuating lever should contact approximate center of switch plunger. Fully depress switch plunger, using a feeler gauge check clearance between plunger and actuating lever. Clearance should be .025".

2) To adjust, loosen nut located at top of switch and adjust position of vacuum retard switch, by moving switch in or out, until proper clearance is obtained.



A—Vacuum retard switch
B—Feeler gauge
C—Actuating lever

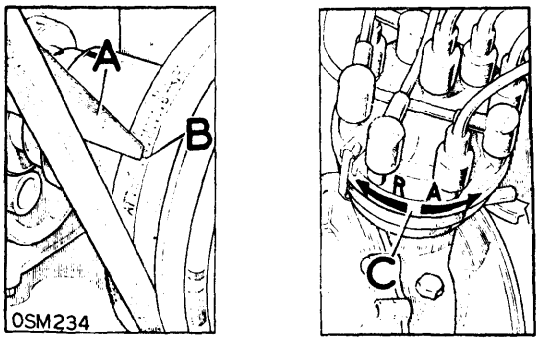
ADJUSTING VACUUM SWITCH

Ignition Timing – For correct functioning of emission control system, ignition timing should be set using a suitable timing light. Cam angle should be set using a suitable tach/dwell meter. *NOTE – Do not turn adjuster screw in center of distributor vacuum capsule.*

1) If distributor has been removed, set ignition timing statically to 6° BTDC. Start engine and set idling speed to 725-775 RPM. This idle setting should be with gear selector in "PARK" or "NEUTRAL".

2) Adjust distributor cam angle by turning hexagon adjustment screw, located at rear of distributor body, until cam angle is 26-28°.

3) To adjust ignition timing, loosen distributor clamping bolt and turn distributor until timing pointer and timing mark are lined up at 8° ATDC. This adjustment should be made with vacuum retard unit connected, and engine idling at 725-775 RPM.



A—Timing pointer
B—8° mark
C—Distributor, adjust as indicated to advance or retard

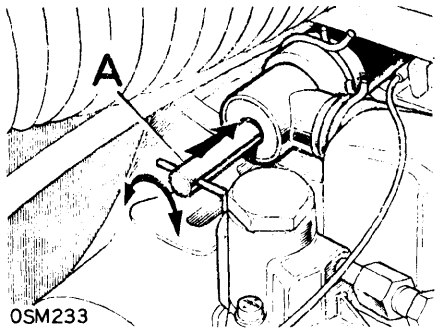
IGNITION TIMING MARKS

Carburetors – When tuning carburetors, engine must be at normal operating temperature and automatic enrichment device must be inoperative.

1) Note engine idling speed, shut off engine. Turn automatic enrichment device cut-off valve clockwise and push plunger in fully. Start engine, idling speed should be slightly lower than previously noted.

2) If engine speed drops more than approximately 50 RPM this indicates a leak in automatic enrichment device which must be corrected. Pull automatic enrichment device out fully and turn counterclockwise.

3) Remove air cleaner making sure vacuum line for air cleaner thermostatic switch to intake manifold is plugged. Using a suitable balance meter, adjust air intake on each carburetor.



A—Plunger

AUTOMATIC ENRICHMENT DEVICE (CUT-OFF VALVE)