BRITISH LEYLAND

# SERVICE DIVISION

# DEALER TRAINING

**AID #** S1034

**SUBJECT:** 1977 EMISSIONS

**MODEL:** TRIUMPH TR7

AUSTIN JAGUAR MG LAND ROVER TRIUMPH

# I N D E X

## P R E F A C E

Your attention is drawn to the fact that the emission systems fitted to Triumph vehicles must not be changed or tampered with thereby rendering the system inoperative. If all instructions and specifications are followed as suggested, the vehicle performance will be satisfactory.

The information contained in this booklet is provided as an easy reference guide for technicians. More detailed information is available in the appropriate Workshop Manual.

**HIGH ALTITUDE VEHICLES**

VEHICLES SOLD IN HIGH ALTITUDE AREAS MUST HAVE THE CARBURETORS ADJUSTED TO MEET CO SPECIFICATIONS WHEN DESCENDING TO LOW ALTITUDE REGIONS. WHEN RETURNING TO HIGH ALTITUDE AREAS THE CARBURETORS MUST AGAIN BE READJUSTED. THESE ADJUSTMENTS ARE ACCOMPLISHED BY MOVING THE MAIN METERING NEEDLE.

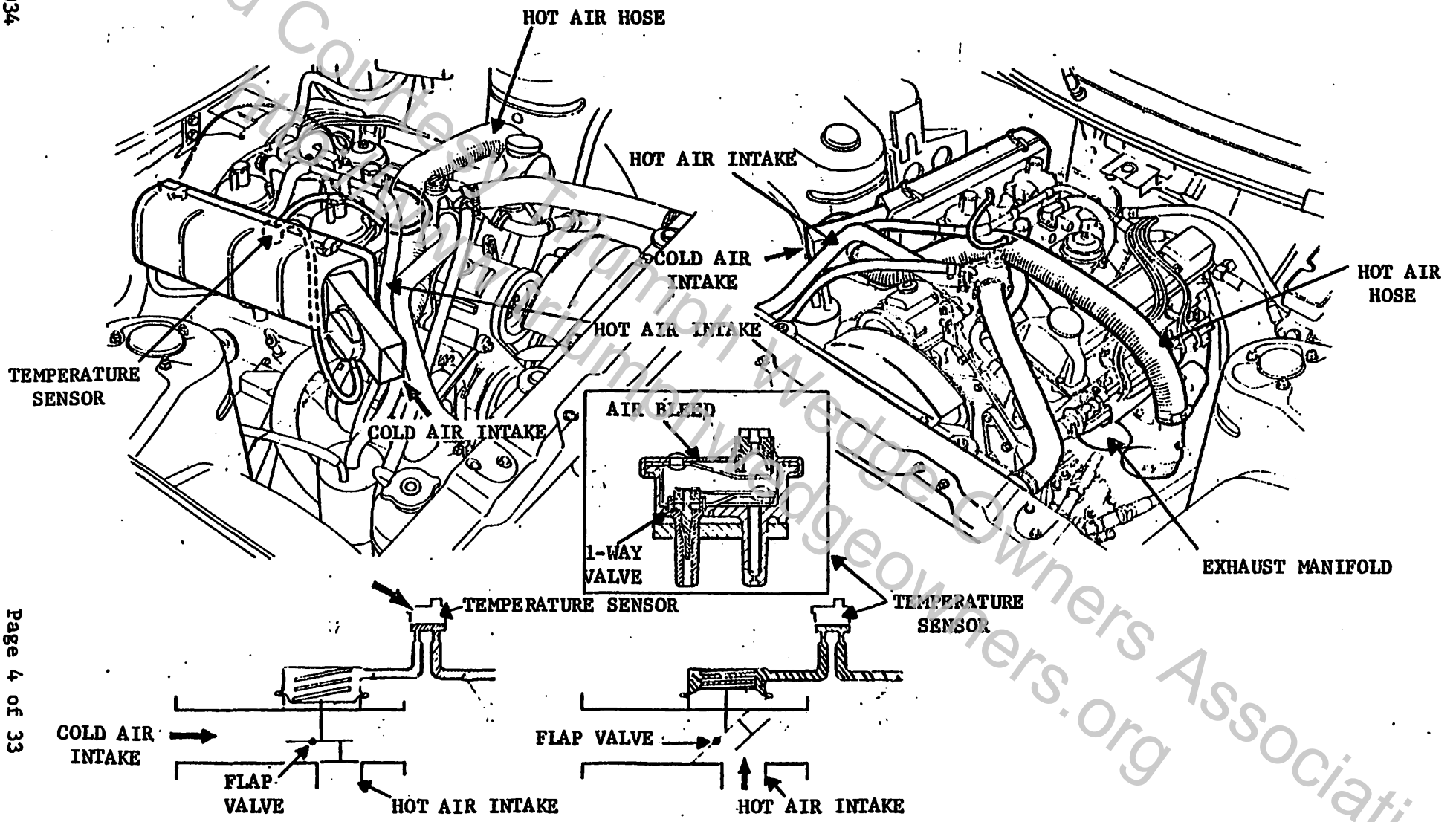
## SPECIFICATIONS

Common specifications except where indicated.

| | TR7 |
|---|---|
| Carburetor Type | 2 - 175 CDFEVX |
| Needle | B1DH (Fed.) - B1EP (Calif.) |
| Bias | To Air Cleaner |
| Spring Color | Red |
| CO Reading (Air Injection Disconnected, Plug Line) | 4% ± 2% |
| Idle Speed | 800 ± 100 r.p.m. |
| Fast Idle Gap/Speed | |
| Firing Order | 1-3-4-2 |
| Distributor Type | 47DE4 |
| Air/Point Gap | .014-.016 @ 180° From Rotor Electrode |
| Dwell | Fixed |
| Plug Type | Champion N12Y |
| Plug Gap | .025" |
| Ignition Timing Idle | 10° BTDC |
| Valve Clearance | .008" Inlet .018" Exhaust (Cold) |
| Nominal Compression Ratio | 8.0 : 1 ± .5 |
| Auto. Choke Needle | 101 |
| Throttle | A |
| Air Pump Pressure | 8.2 - 10.5 lb/in$^2$ |

## HEATED AIR INTAKE - FEDERAL

The air intake temperature control system is designed to maintain the air temperature entering the carburetor at a constant temperature by blending hot and cold air. A temperature sensitive bi-metal valve controls a flap valve which regulates the amount of air entering from the hot and cold air inlets maintaining the air at a controlled temperature. To avoid stalling the engine when cold during sudden increases in engine speed, a one-way check valve is fitted into the sensor unit which maintains a vacuum preventing the flap valve from moving to the cold position.

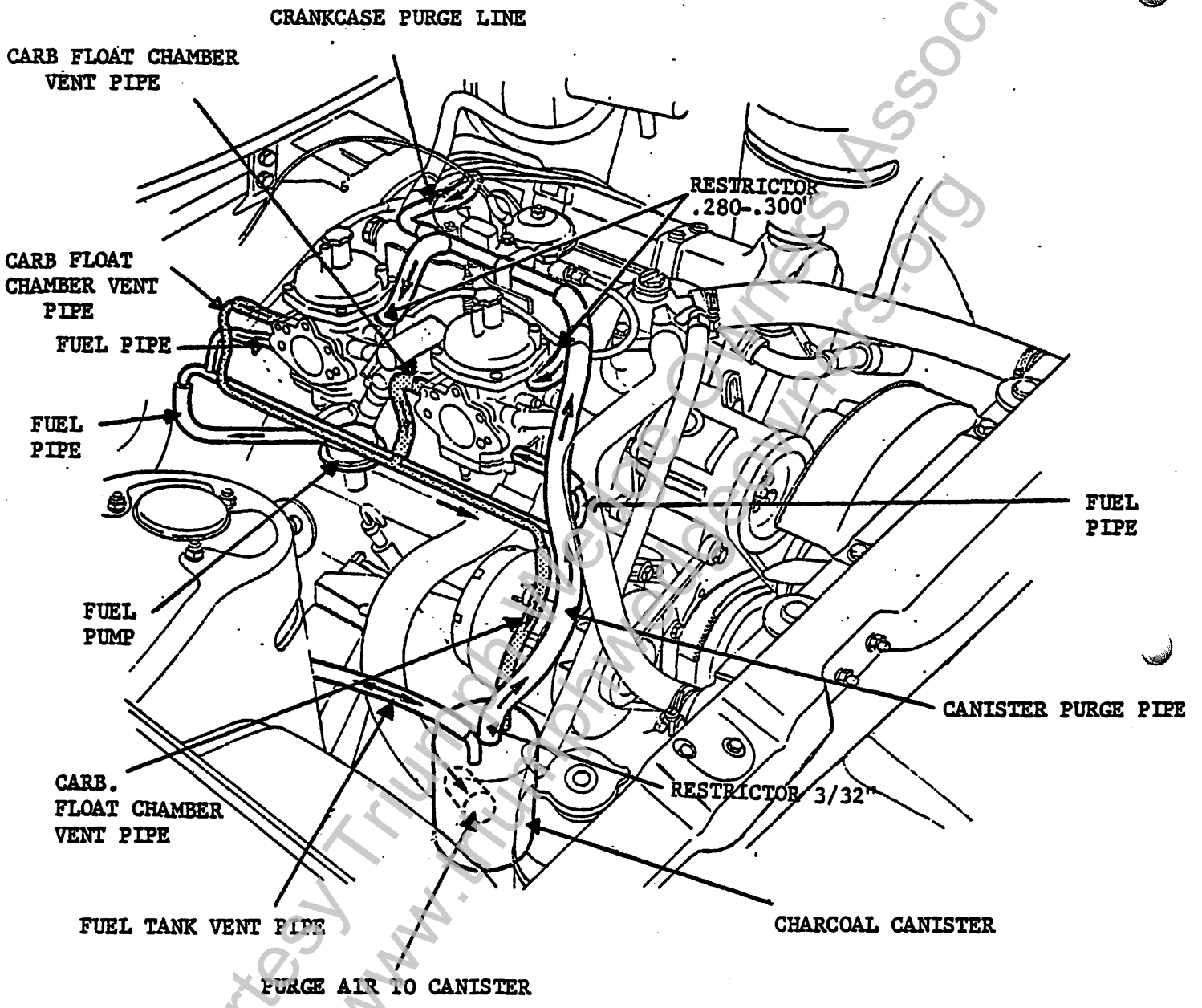


Testing

1. Check all vacuum hoses for security and leaks.
2. With engine cold, check that flap valve is in the cold air position, i.e. parallel with the snorkel tube.
3. Start engine and allow to idle for a few seconds. The flap valve should move immediately to the hot air position.
4. With the flap valve in the hot air position, increase the engine speed suddenly and hold for a few seconds. Ensure flap valve has remained in hot air position.
5. Warm engine to ensure flap moves to cold air position as the temperature rises.

## POSITIVE CRANKCASE VENTILATION SYSTEM

When the engine is running, vapors from the crankcase are drawn through a pipe into the low depression area of the carburetor and recycled through the engine induction system. With the engine at rest, the vapors are vented to and stored in the charcoal canister.




Testing

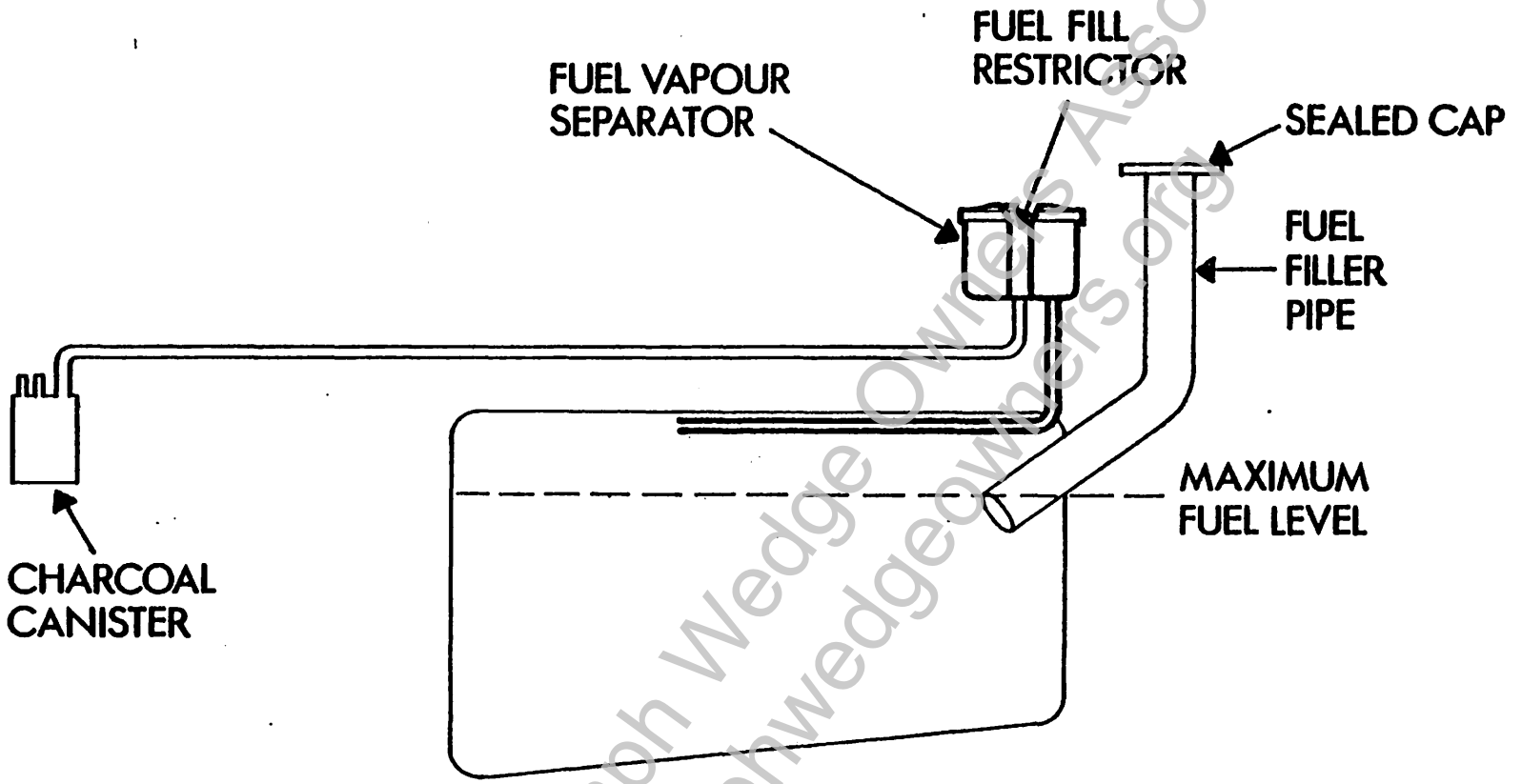
Ensure restrictors are clear. Check hoses for blockage, security and signs of deterioration.

## EVAPORATIVE LOSS CONTROL SYSTEM

The evaporative loss control system is designed to prevent fuel vapor venting to the atmosphere. Fuel vapors from the fuel tank and carburetor float bowl(s) are vented to and stored in the charcoal canister while the engine is stationary. With the engine running, the fuel vapors are drawn into the low depression area of the carburetor via the crankcase purge line and recycled through the induction system.

The fuel tank has a restricted fill allowing approximately 1 gallon of the fuel tank volume for expansion. To achieve this, the fuel fill is restricted by two notches in a seat on which a tapered plug rests in the fuel/vapor separator which permits only a small flow, i.e. those likely to occur with fuel vapor, or replacement air, as fuel is used, but not large enough to vent the tank during filling conditions. A small vapor separator is also in circuit. Vapors from the tank and float bowl are piped to the canister and then recycled through the induction system.

The charcoal canister should be replaced at 50,000 mile intervals.




LIMITED FILL FUEL TANK

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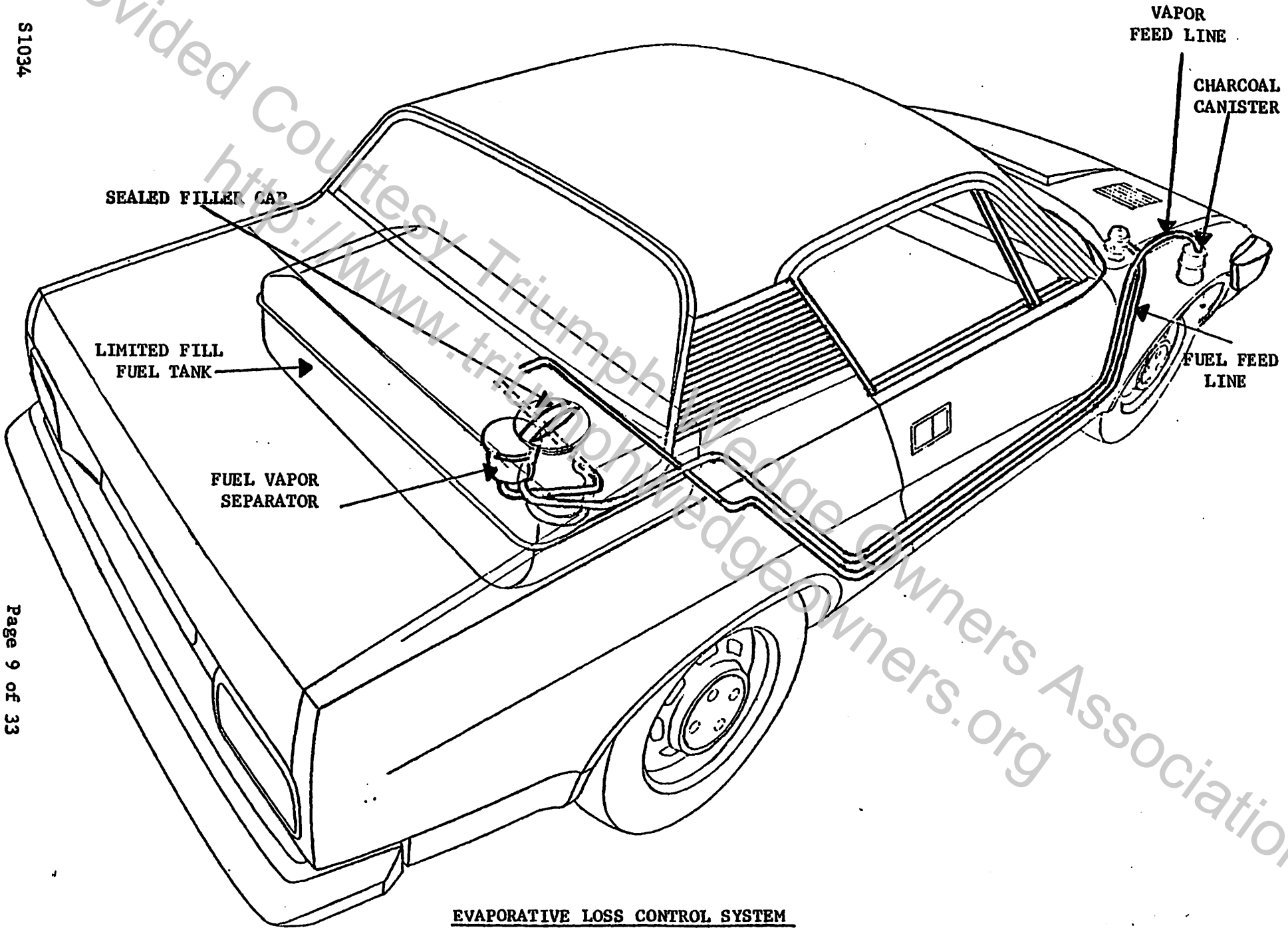
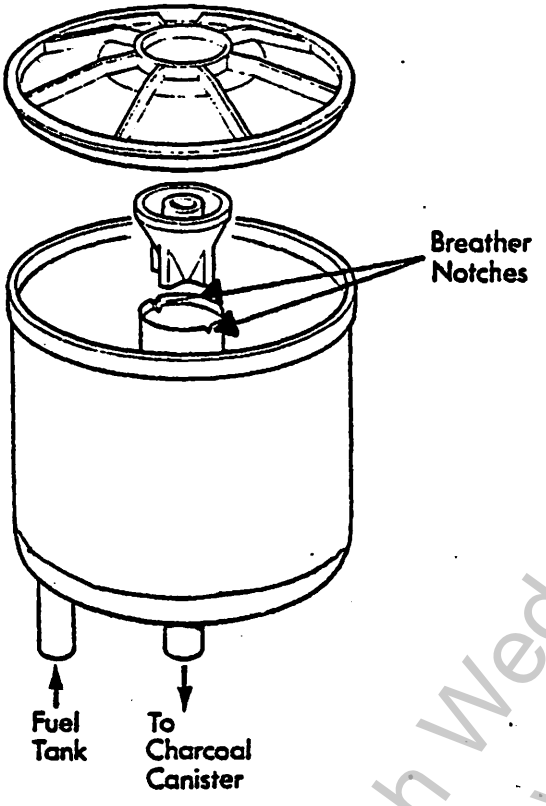
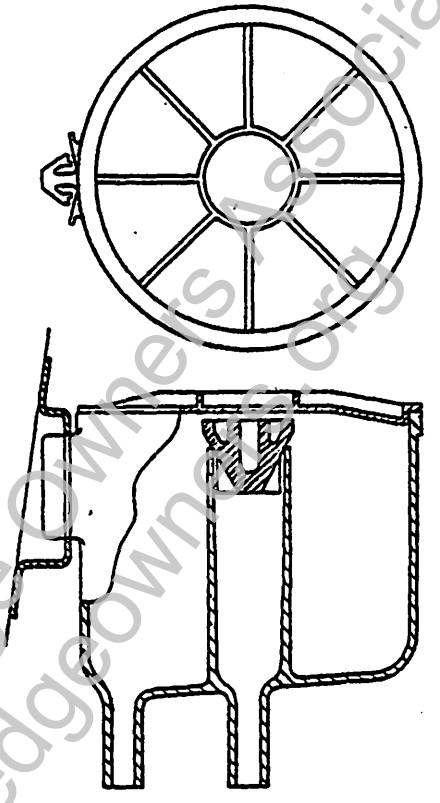
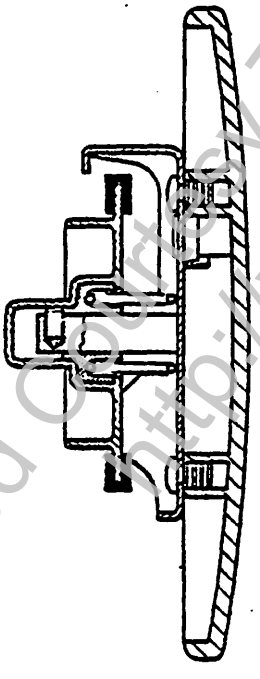


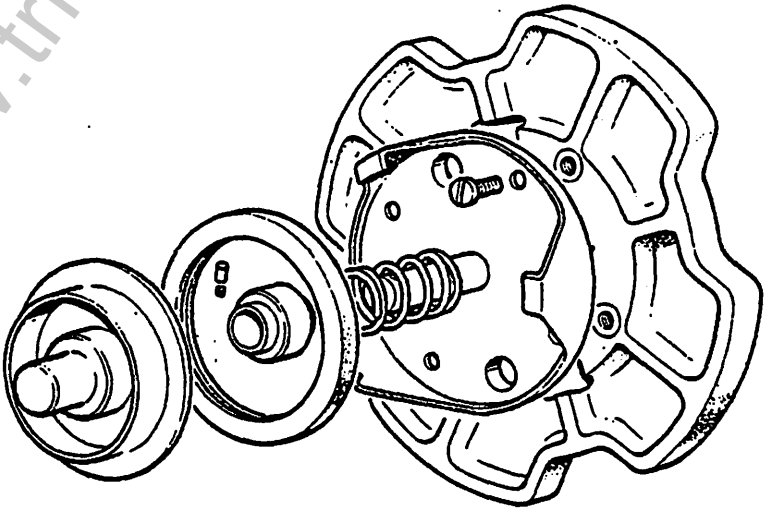

EVAPORATIVE LOSS CONTROL SYSTEM



VAPOR SEPARATOR



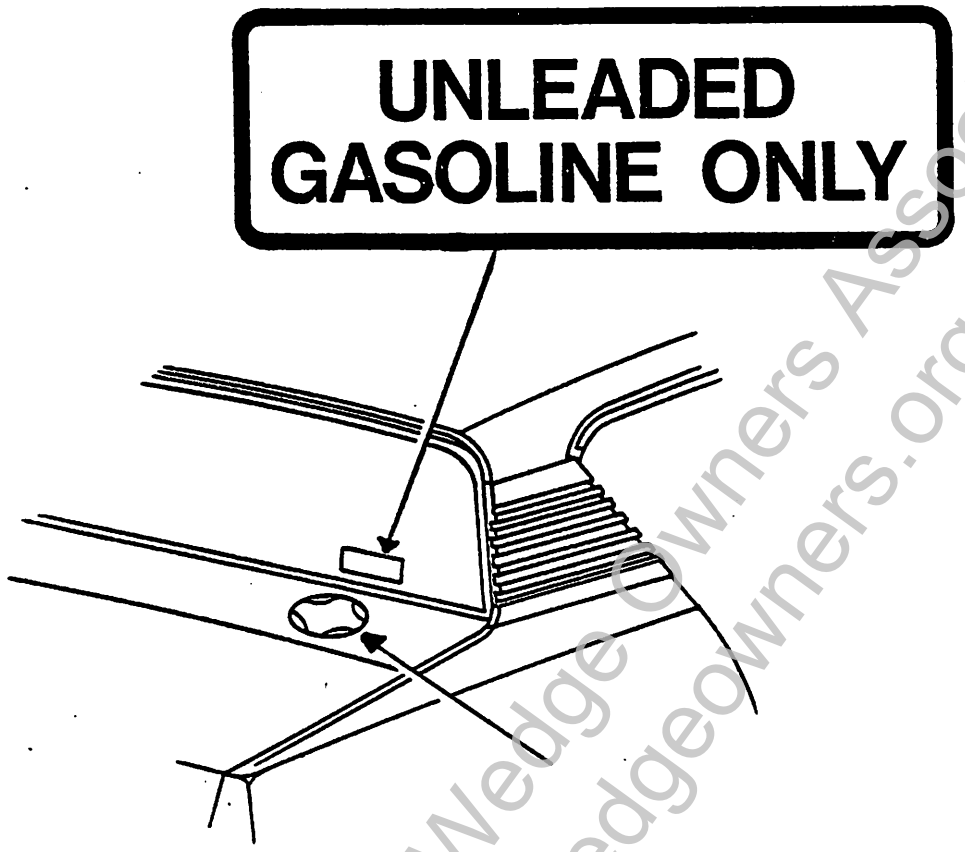


FUEL CAP

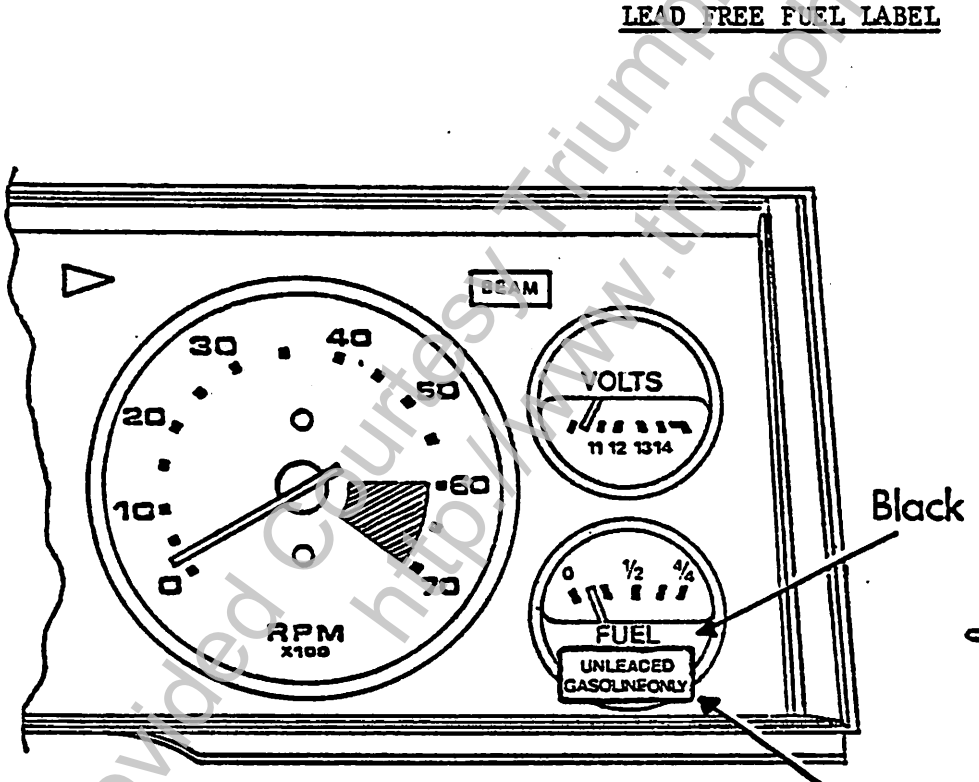
**Testing**

Same as listed under positive crankcase ventilation system. Also check fuel filler cap for good sealing qualities.

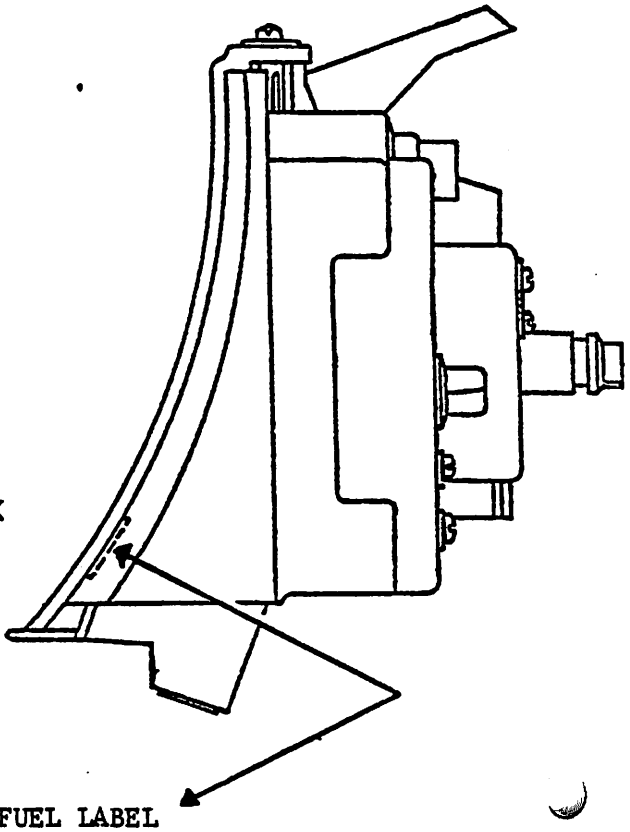
**LEAD FREE LABELS** 91 octane fuel rating.




LEAD FREE FUEL LABEL



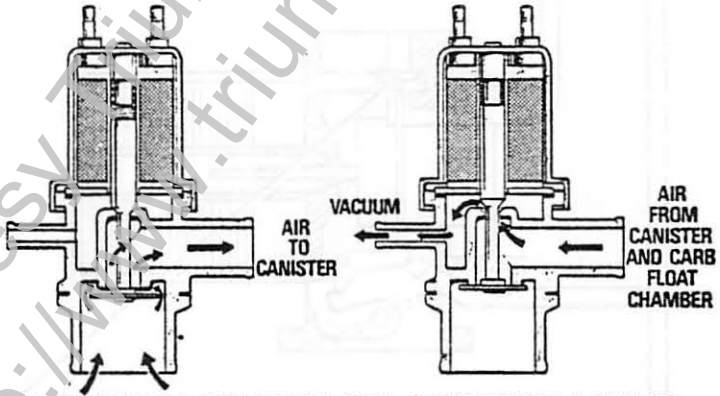

Black



FUEL LABEL
FIXED TO REAR FACE OF LENS

## ANTI-RUN-ON VALVE

To prevent a tendency for the engine to 'run-on' after the ignition is switched off, an anti-run-on valve is fitted into the charcoal canister vent line. When the ignition is switched OFF, a voltage is applied to the anti-run-on valve solenoid. The solenoid closes the canister vent and simultaneously allows a slight depression to the top of the float bowl which equals the depression already present in the low depression area of the carburetor thus preventing fuel flow across the mixture needle. As the oil pressure drops to zero, an oil pressure switch breaks the circuit and de-energizes the solenoid - ready for restarting.




OPERATION OF RUN ON CONTROL VALVE

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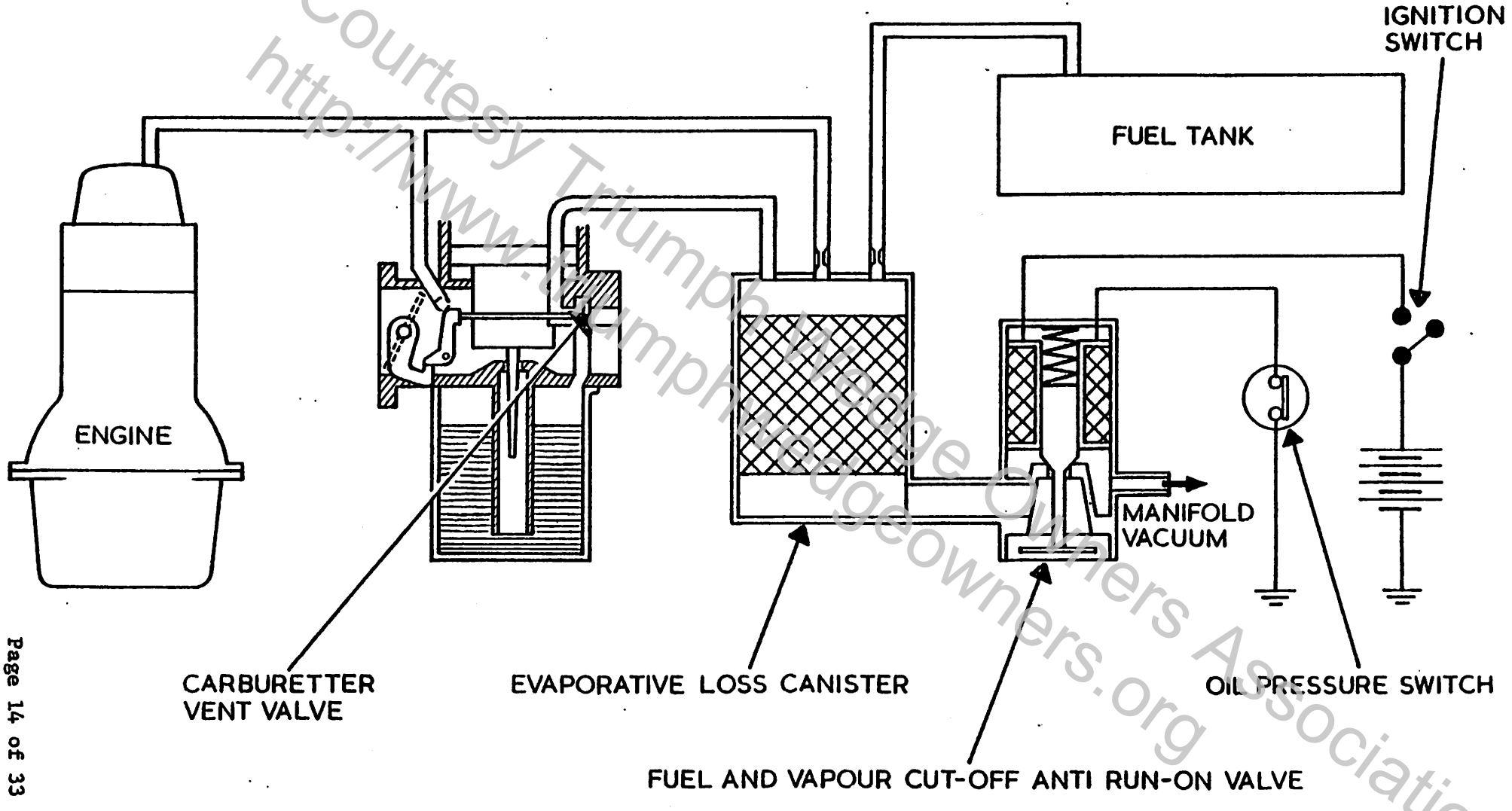
DIAGRAMMATIC ARRANGEMENT OF FUEL
AND VAPOUR CUT-OFF ANTI RUN-ON SYSTEM



Testing

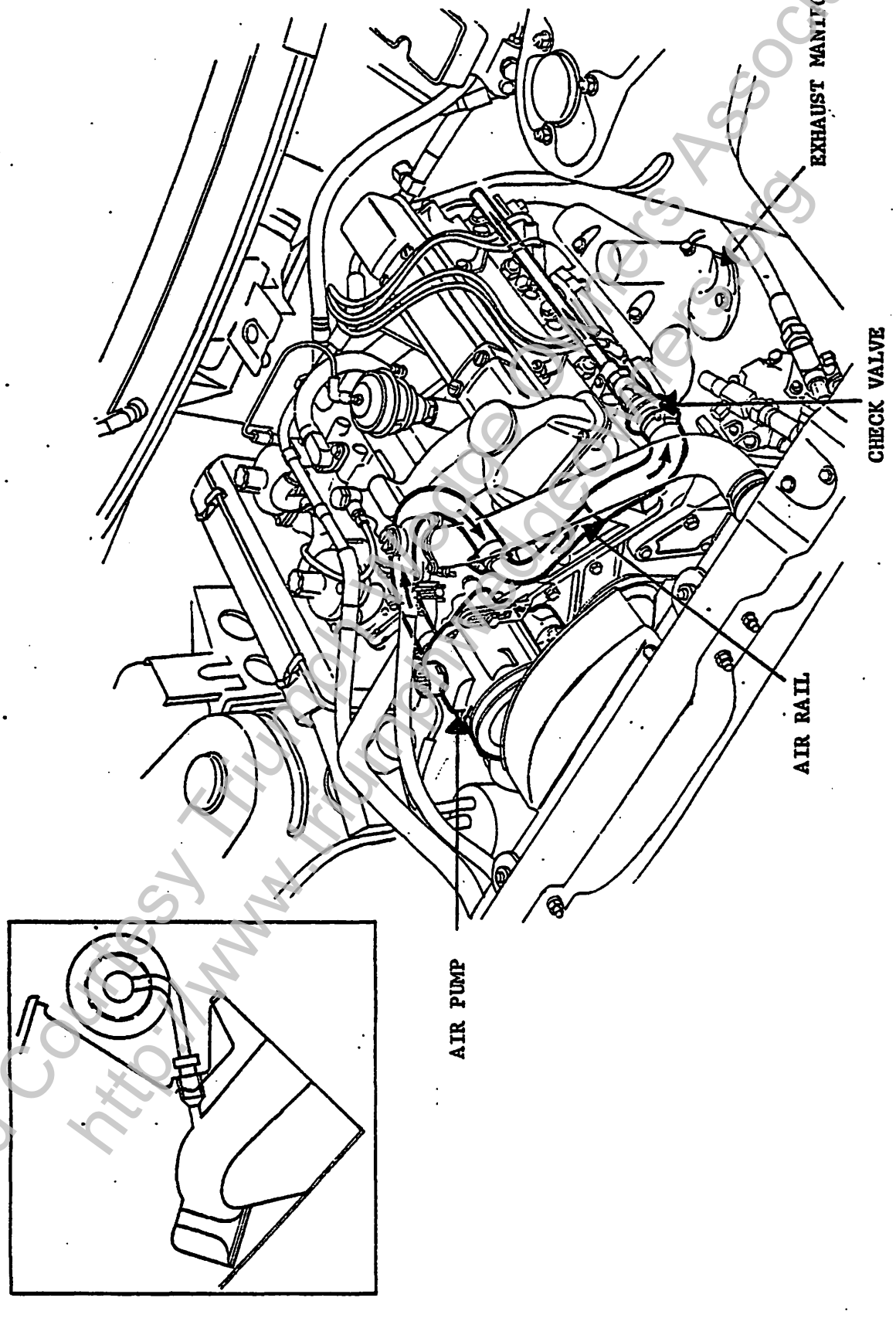
With engine running, apply 12 volts to solenoid terminal. If engine does not stop, valve, wiring, ignition switch and oil pressure switch are suspect.

NOTE: If vent valve is not correctly adjusted, air will bleed into float chamber preventing vacuum - hence engine shutdown even if valve is operating correctly.

## AIR INJECTION SYSTEM

A belt driven air pump supplies air under pressure through a non-return check valve through an air manifold to the exhaust ports just above the exhaust valve heads. The air combines with exhaust gases to continue the oxidation process in the exhaust system. The non-return check valve prevents reverse flow in the air injection manifold when exhaust gas pressure exceeds air supply pressure.

A relief valve is mounted on the side of the air pump and dumps part of the air at high speed to prevent pump damage.



Testing

DRIVE BELTS

Check condition and adjustment of drive belt. Adjustment should be 3/4 - 1" deflection at the mid point of its longest run.

PUMP AND RELIEF VALVE

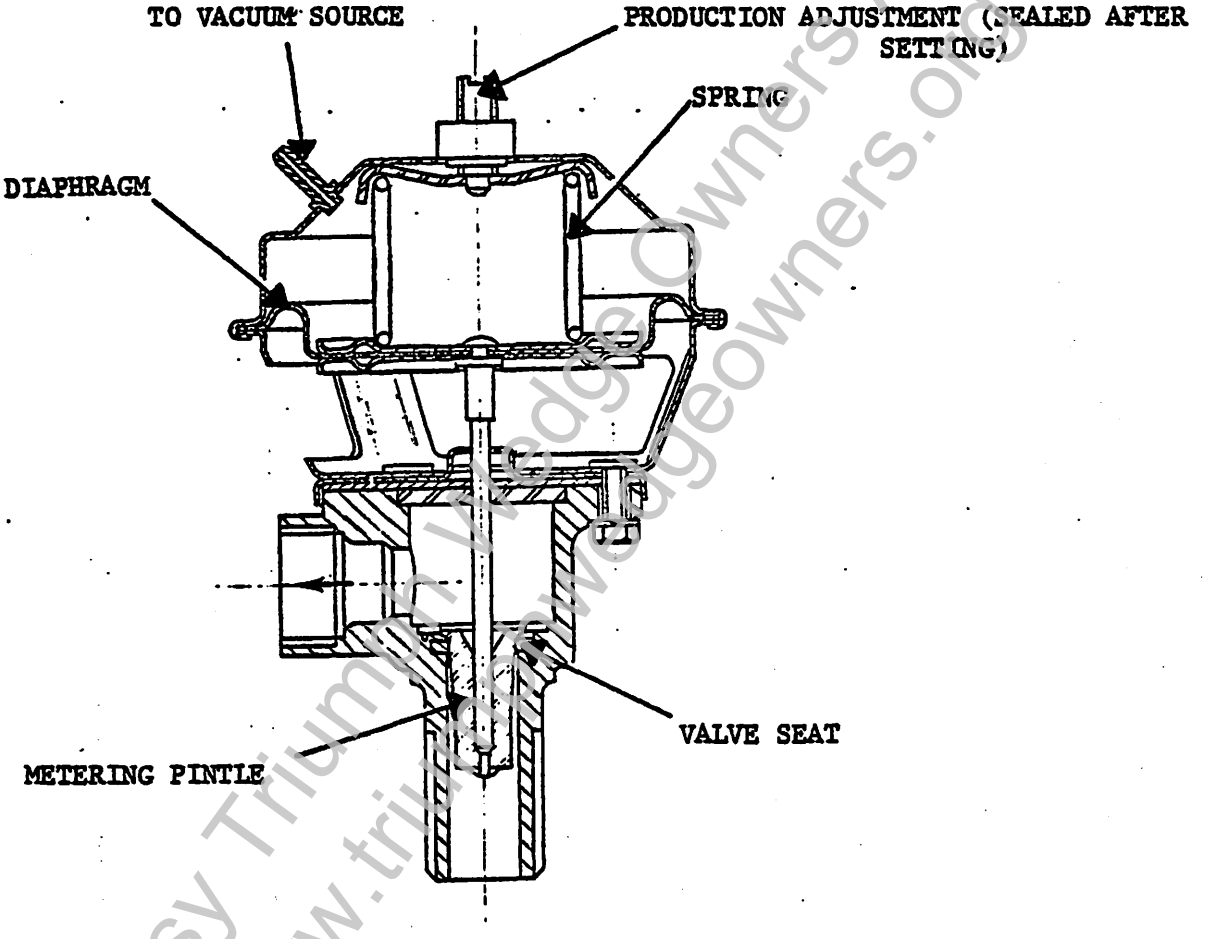
Check that relief pressure operates at 8.2 - 10.5 lbs/in. by using a pressure gauge between the pump and check valve. If air is not relieved at the specified figures, renew valve. If pump pressure does not reach minimum figure, replace pump.

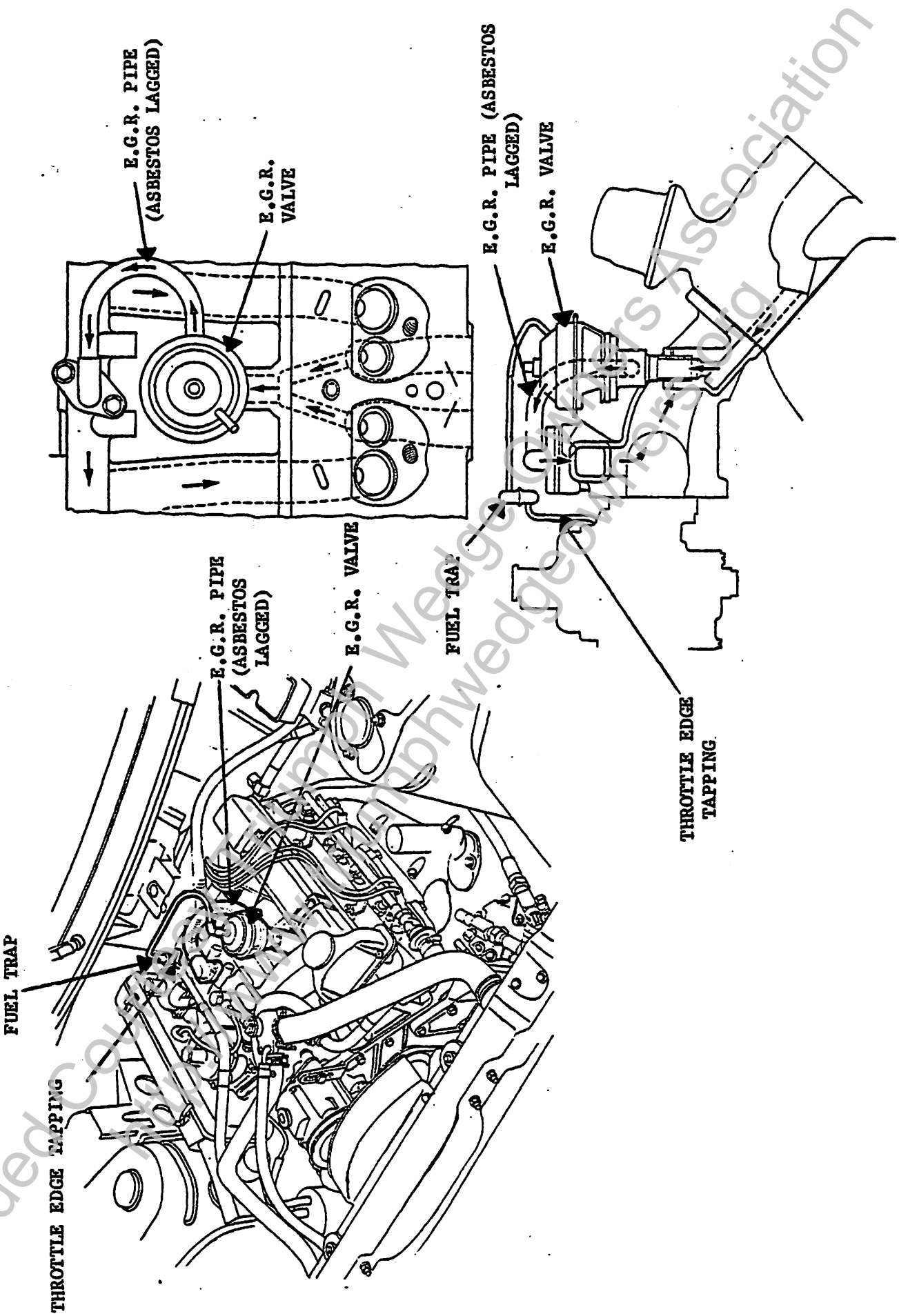
CHECK VALVE

Remove check valve. Blow through the valve orally. Should allow flow pump to manifold end, no flow manifold to pump end. Ensure hose is free from restrictions.

EXHAUST GAS RECIRCULATION SYSTEM

This system is fitted to reduce emissions of oxides of nitrogen. The EGR valve is mounted into the exhaust manifold and controls flow of exhaust gases into the intake manifold. The control signal is taken from a throttle edge tapping which gives no recirculation at idle speed or full load, but gives a varying amount of recirculation between these two extremes depending on the vacuum signal and metering profile of the valve.





Testing

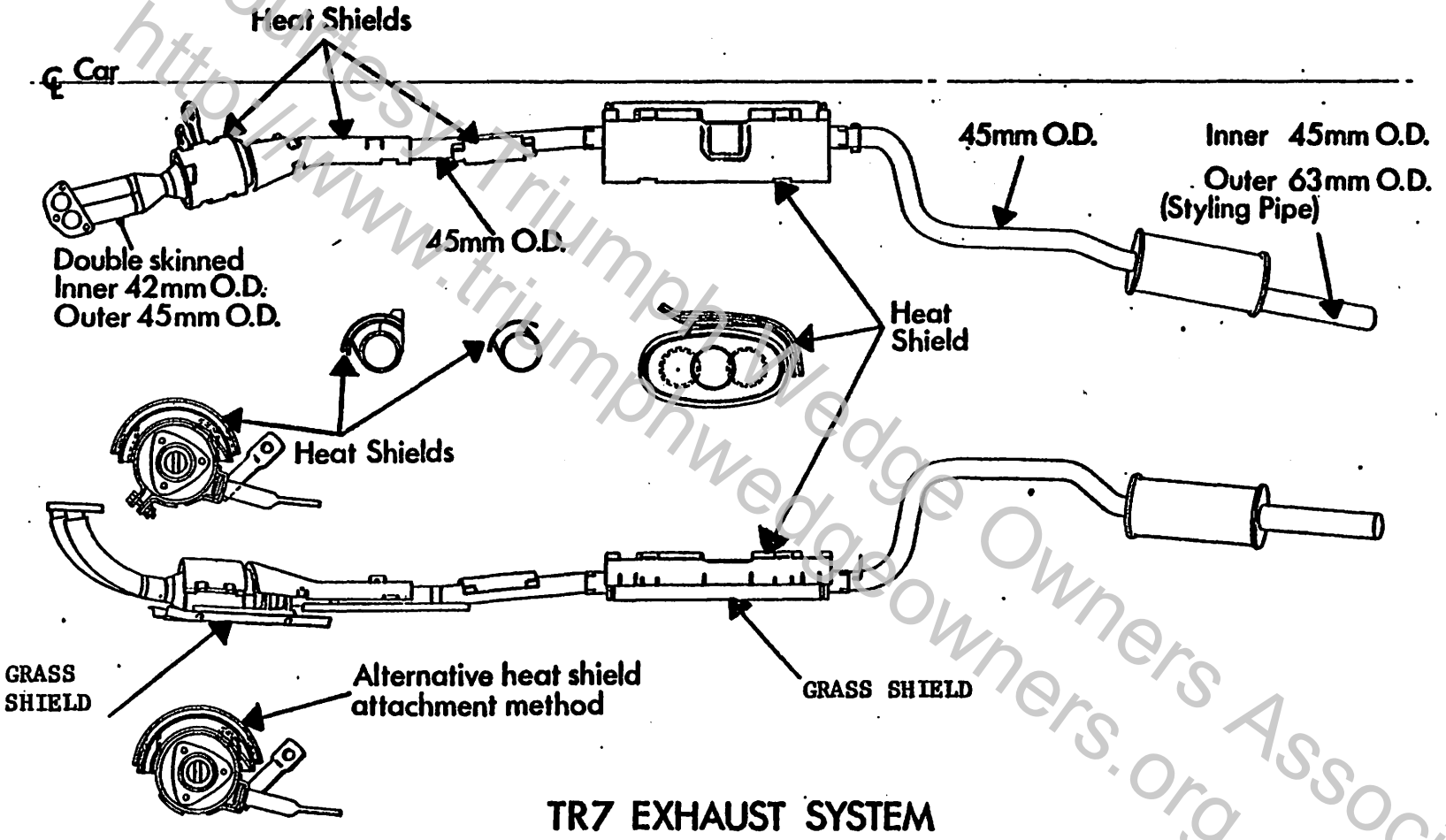
1. Check all lines and connections for security.
2. Bring engine to normal running temperature. Ensure choke is 'OFF'. Open and close the throttle several times. The valve should open and close with change of r.p.m. and should close immediately - the throttle is closed.
3. Using a vacuum tester (Mighty Vac.) ensure the valve diaphragm retains a vacuum when open.

SERVICING EGR

1. Remove EGR valve.
2. Clean base of valve with wire brush.
3. Using a spark plug cleaner, clean the valve seat and metering valve by holding the diaphragm upward with the fingers. Blast the valve at 30 second intervals until clean.
4. Remove all traces of carbon and cleaning compound with an air line.
5. Examine ports in manifold. Light deposits are acceptable. If heavy deposits have accumulated, the manifold must be removed when cleaning.
6. Refit EGR valve.
7. Check condition and refit all lines and pipes.
8. Check function of the valve as follows:
9. Bring engine to normal running temperature. Ensure choke is fully off.
10. Open and close throttle and observe valve which will open and close

with changes in engine speeds.

11. If operation of valve doesn't appear satisfactory, apply a vacuum with an auxiliary pump or (Mighty Vac.). Diaphragm should hold vacuum until released.
12. Reset EGR service interval indicator with special key. Service the EGR system every 50,000 miles.




TR7 EXHAUST SYSTEM

## OPERATION OF THE CATALYST UNIT

A chemical reaction which converts carbon monoxide and hydrocarbon to less harmful carbon dioxide and water (steam), takes place when air is injected into hot exhaust gas. This is effectively a continuation of the burning process. Hot exhaust gas passes through the catalyst unit which speeds up this conversion process. This process generates more heat which in itself assists in conversion. The hotter the exhaust gases the more readily convertible they are to carbon dioxide and water or conversely when the exhaust gases become cool they do not convert.

The catalyst unit consists of a ceramic matrix block coated with a Platinum based compound which remains unchanged during the conversion process. The exact mechanism by which this happens is a complex chemical process.

Over extended mileage, the pores on the surface of the block become coated and the effectiveness of the unit is reduced and should, therefore, be replaced. Similarly lead compounds clog the pores which render the catalyst ineffective.

## ADVANTAGES OF THE CATALYST

With use of the catalyst some other emission control devices can be eliminated or modified, i.e. thermostatic vacuum swith eliminated. Ignition timing need not be as retarded. Carburetion can be set at a richer setting giving better driveability and about 10% better fuel economy.

## DISADVANTAGES OF THE CATALYST

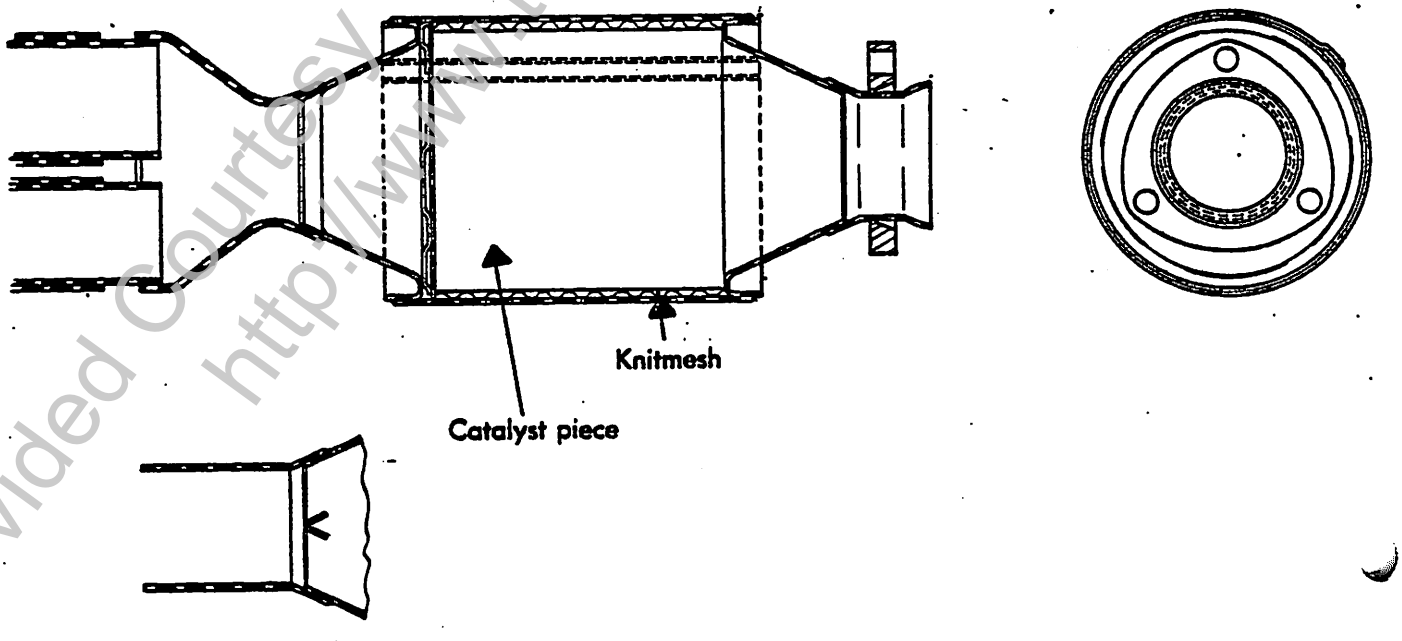
Catalyst equipped cars must be run on unleaded fuel otherwise the catalyst

will be rendered ineffective. In an emergency, the catalyst would accept leaded fuel, however, Federal Law provides stiff penalties for pumping leaded fuel into vehicles so equipped. Fines as high as $10,000. per day for each and every day of violation could be imposed on the refiner, distributor, retailer, employees or agents. The fuel filler size also inhibits acceptance of leaded fuel nozzles.

It is hazardous to park over any combustible materials, i.e. leaves, accumulated oil droppings, because of the danger of fire caused by the catalyst temperature (1100-1300°C).

The catalyst unit must be replaced at 50,000 mile intervals.

CATALYST



A label with this information will appear on the sun visor of every car:

BRITISH LEYLAND LTD.

CATALYTIC CONVERTER PRECAUTIONS

Your British Leyland car is equipped with a Catalytic Converter which is an important element in the emission control system required on this car to obtain very low emission levels.

IT IS IMPORTANT TO KEEP YOUR CAR IN PROPER OPERATING CONDITION
FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE CATALYTIC CONVERTER

If an engine malfunction should occur, particularly involving engine misfire or other noticeable loss of performance, do not continue to operate your car . . . have it serviced promptly. Continued operation of your car with severe malfunction could cause the Converter to overheat with possible damage to Converter and car.

Do not operate, idle, or park this car in areas where combustible materials such as grass or leaves can come in contact with the hot exhaust system. Under certain wind or weather conditions these materials could be ignited by a hot exhaust system.

REFER TO YOUR OWNER'S HANDBOOK FOR DETAILS

THE FOLLOWING INFORMATION WILL BE STATED IN THE OWNER'S HANDBOOK

CATALYTIC CONVERTOR PRECAUTIONS

1. Use unleaded gasoline only. This is essential to maintain the efficiency of the emission control system. Unleaded gasoline has the additional advantage that it minimizes spark plug fouling, thereby giving improved engine performance.

2. Do not tamper with the engine settings. The settings have been established to ensure that your vehicle will meet stringent exhaust emission regulations.

   Incorrect engine settings could cause excessively high catalytic convertor temperatures which may result in damage to the convertor and car. Take your car to your British Leyland dealer, or other qualified service facilities, if you feel your vehicle requires adjustments to the engine settings.

3. Have your car maintained in accordance with the service schedules outlined in your Owner's Handbook. A correctly tuned engine minimizes exhaust emissions and achieves the optimum performance and fuel economy.

4. Do not continue to operate your car if you detect any engine malfunction. Misfire, loss of engine performance, engine run on, may cause unusually high catalytic convertor temperatures which may result in damage to the convertor and car if any such engine malfunctions are not rectified immediately.

5. Do not leave your car unattended with the engine running at any time.

6. The use of a catalytic convertor increases exhaust system temperatures (particularly under engine malfunction). Do not operate or park your car in areas where combustible materials such as dry grass or leaves may come in contact with the exhaust system. The exhaust system could ignite such materials under certain weather conditions.

7. The car is designed for normal road use. The following are examples of abuses which could damage the catalytic convertor and car and may lead to a dangerous condition due to excessively high catalytic convertor temperatures.

    1. Competition use.
    2. Off highway use.
    3. Excessive engine revs.
    4. Overloading vehicle.
    5. Excessive towing loads.
    6. Switching off engine and coasting in gear.

8. Do not run the engine with a spark plug lead disconnected or a spark plug removed or use any device that requires an insert into a spark plug hole in order to generate air pressure (e.g. tire pump, paint spray attachment, etc.) as this could also result in catalytic convertor damage.

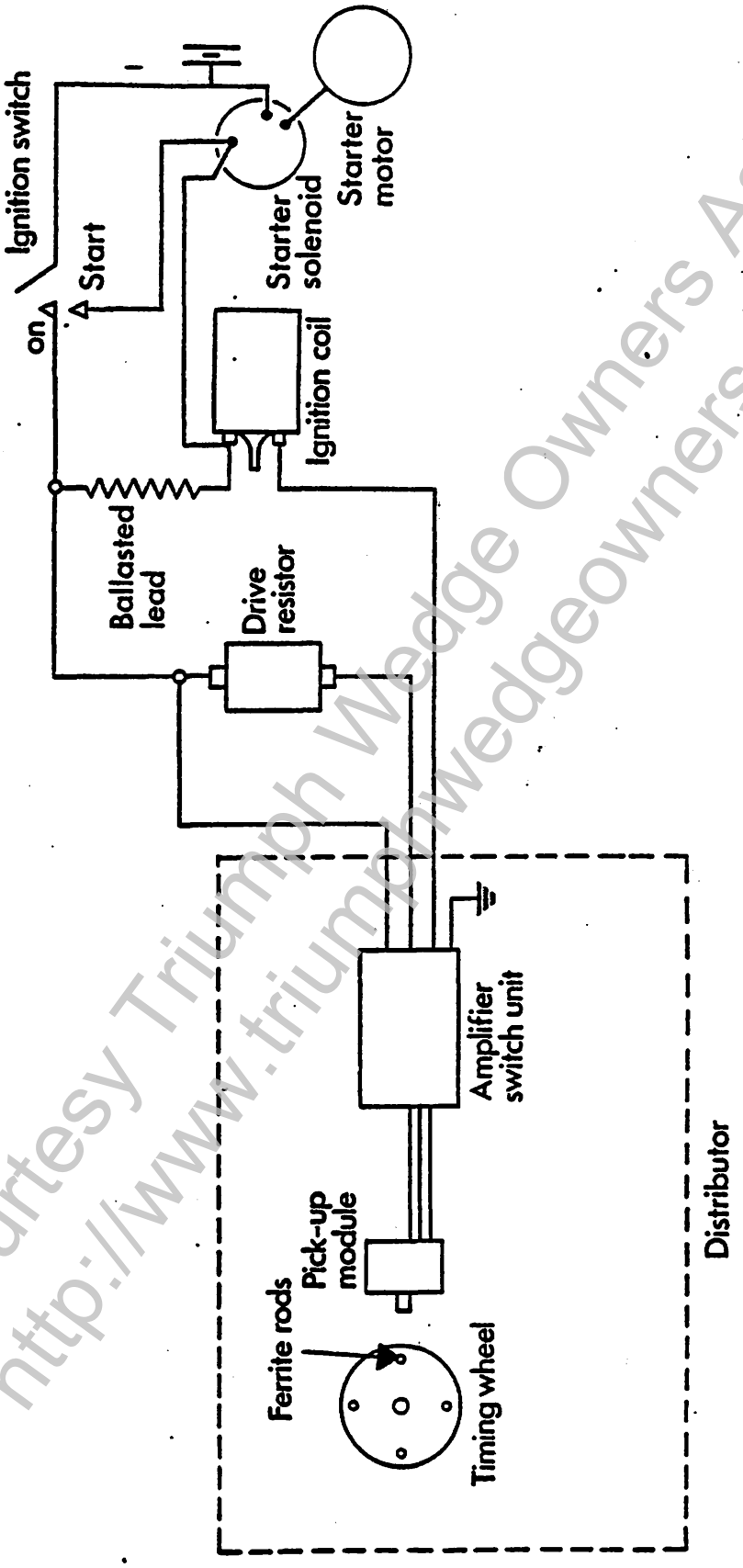
9. Do not push or tow your car to start it. Use jumper cables. Under certain conditions, pushing or towing could damage the catalytic convertor.

10. The catalytic convertor contains a ceramic material. Avoid heavy impacts on the convertor casing.

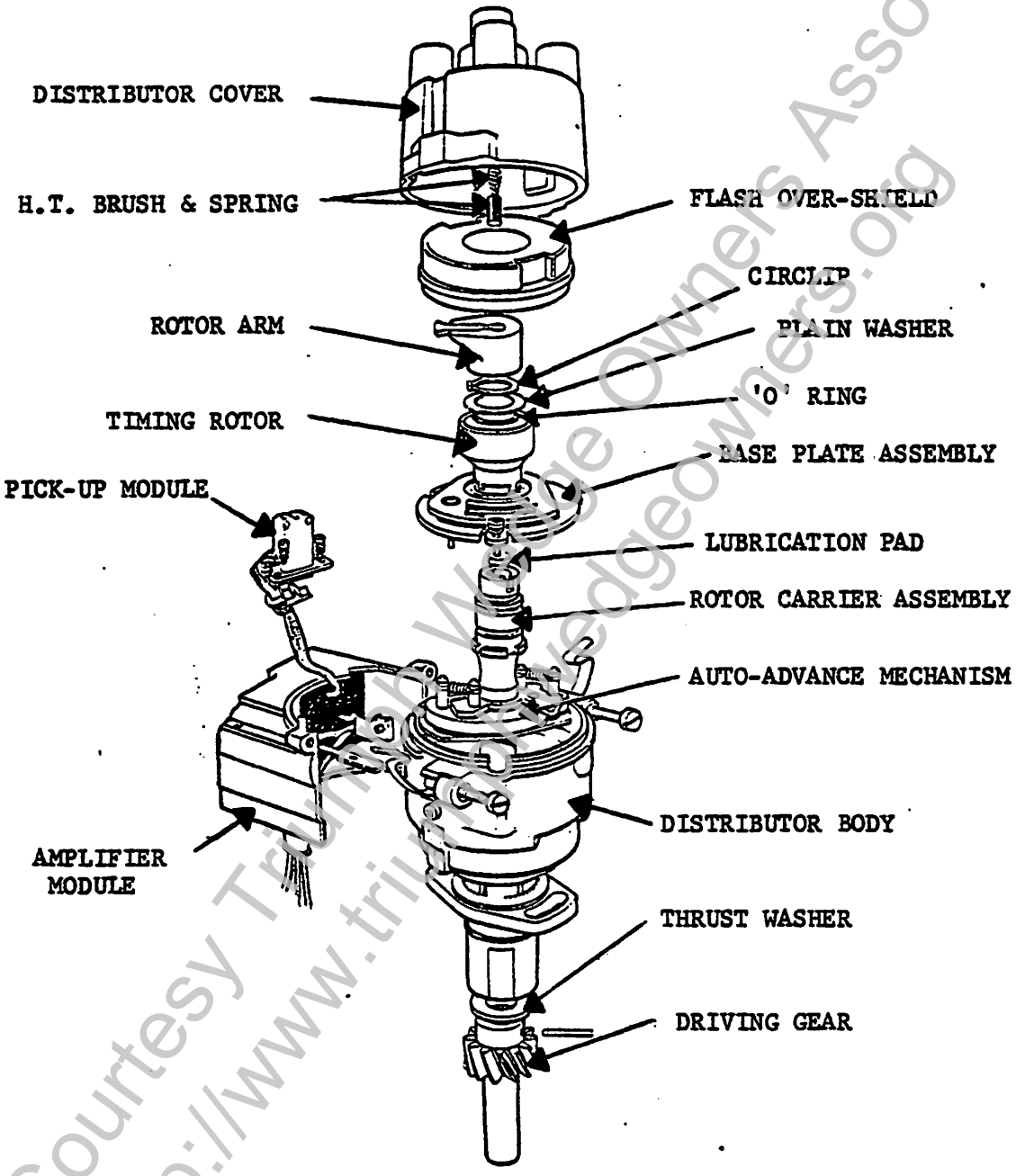
## IGNITION SYSTEM

The system is electronic with no contact breaker points. The coil is energized via a power transistor. As a timing rotor containing ferrite rods passes across the coil of the pick-up module, the oscillator breaks into high frequency. The signal switches off the power transistor. The primary circuit of the ignition coil is broken everytime the ferrite rod passes across the pick-up coil producing a high voltage in the secondary winding and a spark at the plug in the normal manner.

A six volt coil is used in series with a ballast resistor wire for normal running. The resistor is short circuited when the solenoid is in operation. Centrifugal advance is by weights which modify the position of the base plate.




SYSTEM DIAGRAM OF ELECTRONIC IGNITION




ELECTRONIC IGNITION

PRECAUTIONS

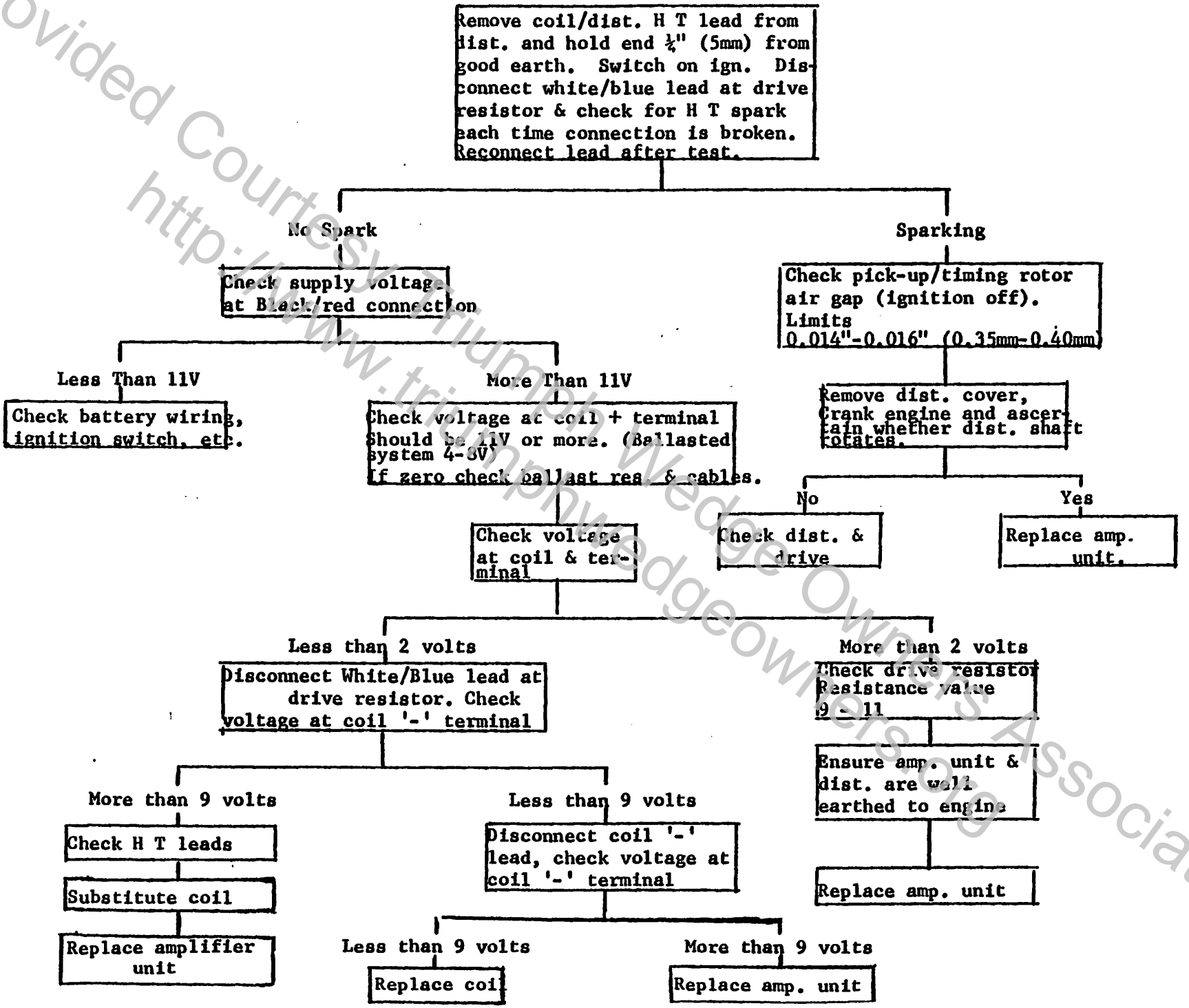
1. DO NOT connect the white leads with either a blue or black sleeve direct to the positive supply.
2. Always ensure the ignition is 'off' when setting the air gap between the pick-up and timing rotor.

TESTING TO LOCATE CAUSE OF MISFIRE

When checking for possible causes of misfire, it is advisable to check the ignition system in the order listed below:

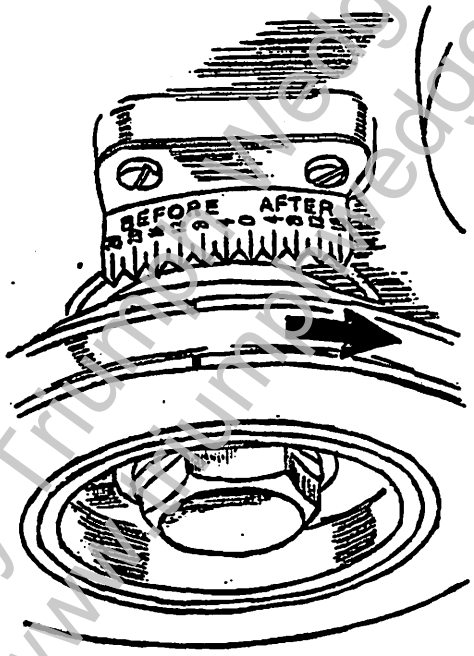
1. Check all connections. Ensure HT leads are a tight fit inside towers and ascertain all LT connections are clean and tight.
2. Test spark plugs and check gaps.
3. Check HT leads. Inspect for signs of tracking, broken or damaged cables, etc.
4. Check distributor cover for signs of tracking inside and out. Clean and examine HT brush, electrodes, etc.
5. Check rotor arm for tracking.
6. Check pick-up/timing rotor air gap (ensure ignition is switched off).
7. Check coil tower for signs of tracking, etc.
8. Substitute ignition coil.
9. Substitute amplifier unit.

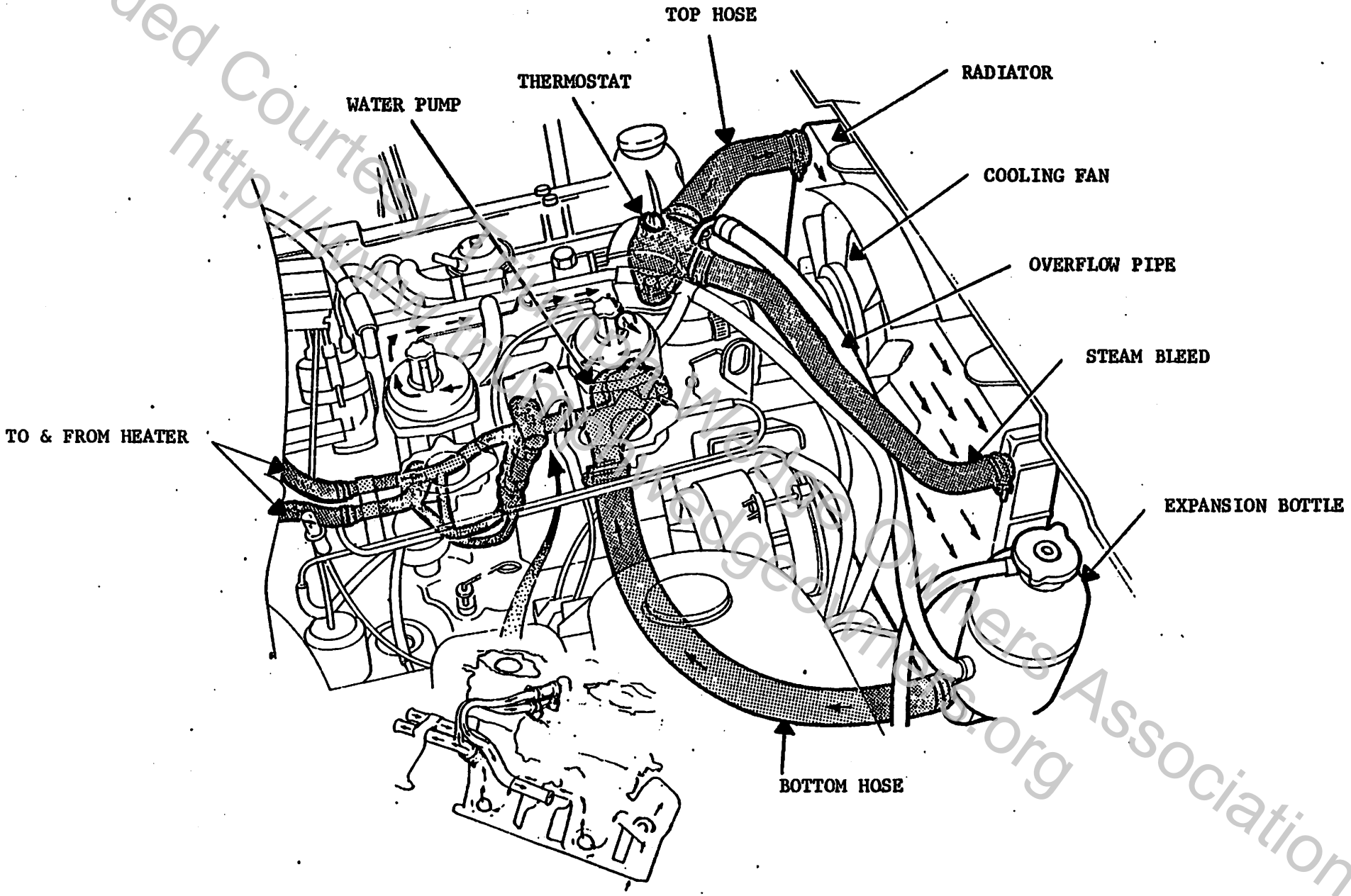
## TEST CHART FOR COMPLETE FAILURE



SETTING IGNITION TIMING

Run engine at idle. If timing is not 10° BTDC, slacken distributor clamp bolt and rotate distributor until 10° BTDC is obtained.






COOLING SYSTEM