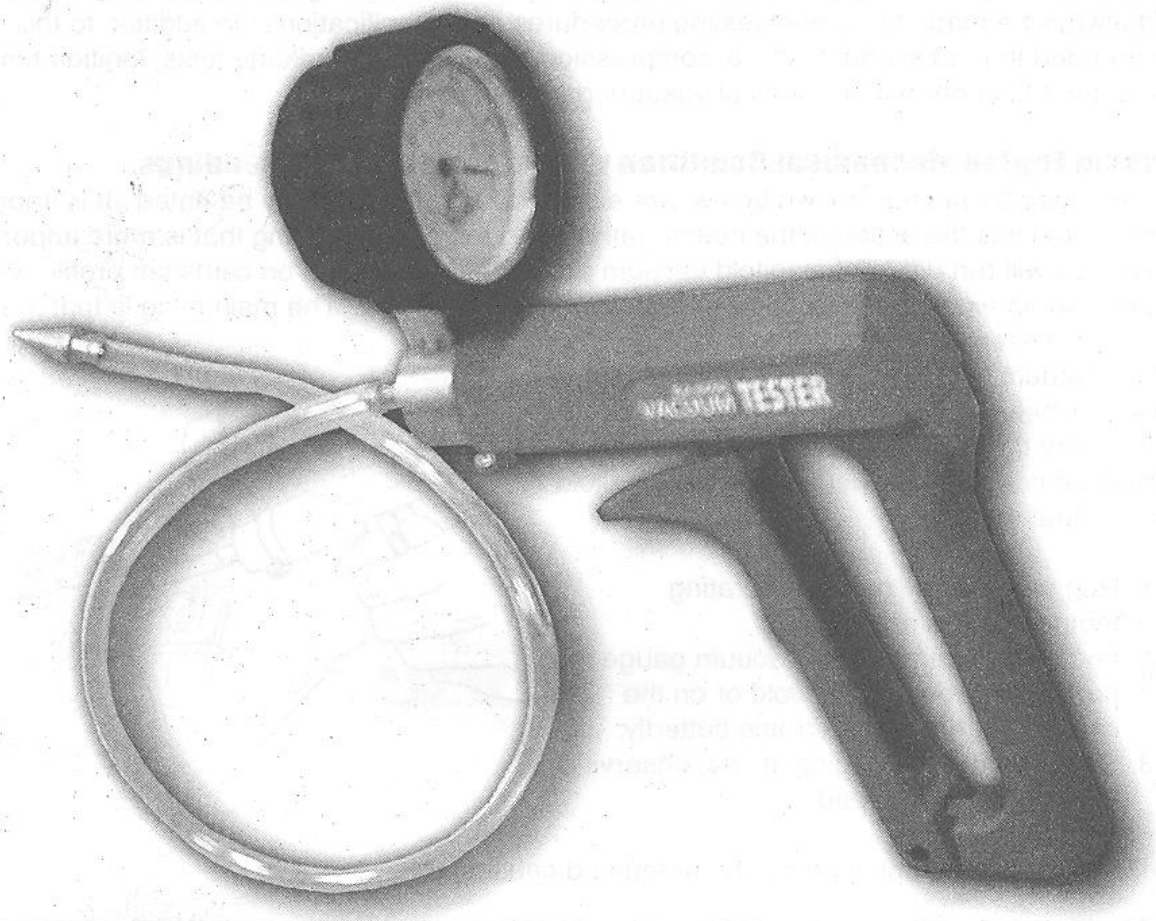
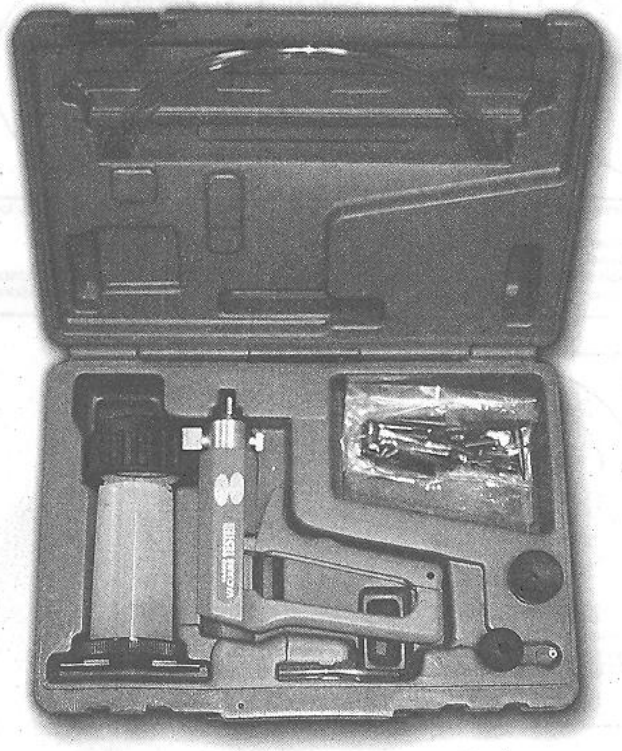
AUTOMOTIVE VACUUM TEST KIT

INSTRUCTION MANUAL





CONTENTS

- Vacuum Pump
- Fluid Container
- Transfer Cap
- 2 x 500mm PVC Vacuum Hoses
- 1 x 100mm PVC Vacuum Hose
- 1 x 70mm Container Hose
- 12 x Assorted Vacuum Hose Fittings
- 3 x Brake Bleeder Fittings
- 1 x Instruction Manual
- 1 x Blow Moulded Case

INTRODUCTION

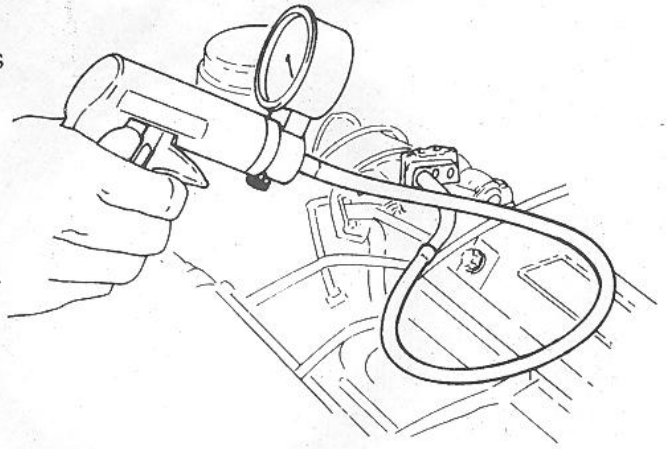
The use of a vacuum gauge is so often overlooked when determining mechanical condition and carrying out fault diagnosis on internal combustion engines. Monitoring actual manifold vacuum is invaluable when troubleshooting engine faults. This can only be done using a good quality vacuum gauge and with this coupled to a hand-operated vacuum pump, it allows static testing of all types of vacuum operated systems.

Set out on following pages are applications that the TestVac vacuum pump can be used for, but it must always be remembered that these are examples only and reference to manufacturers repair manuals should always be made for correct testing procedures and specifications. In addition to this, it is always recommended that additional tests, ie. compression tests, cylinder leakage tests, ignition timing checks etc. be carried out to confirm indications of vacuum gauge readings.

Analysing Engine Mechanical Condition via Manifold Vacuum Readings

Note: The needle readings shown below, are examples only of what may be noted. It is important to remember that it is the action of the needle rather than the actual reading that is more important. Varying engine types will run different manifold vacuum pressures, depending on camshaft profile, valve overlap, timing etc, so an exact good vacuum reading cannot be specified. The main thing is that the needle reading is between 16 to 21 inHg and steady.

Manifold vacuum is also affected by altitude with the general rule being that it will drop approximately 1 inHg for every thousand feet above sea level so this also must be considered when assessing manifold vacuum actual readings.

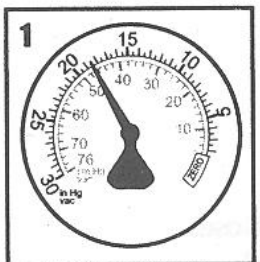


Step 1. Run engine until normal operating temperature is reached.

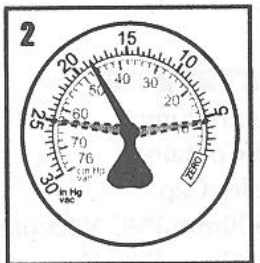
Step 2. Locate and connect the vacuum gauge to a port directly on the manifold or on the carburettor below the throttle butterfly.

Step 3. Start and run the engine at idle, observing the gauge needle reading.

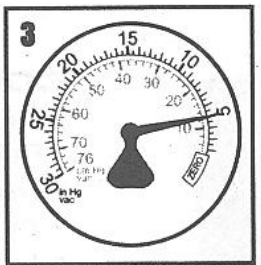
The following are readings that may be noted and causes.



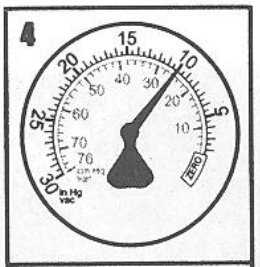
READING: 16-21 inHg with needle steady
CAUSE: Normal



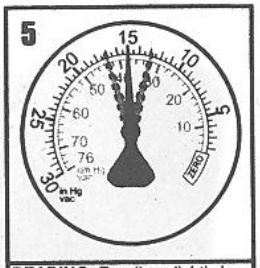
READING: When the throttle is suddenly opened then released, the needle should drop to below 5inHg then bounce up to approximately 25inHg settling back to original reading
CAUSE: Normal



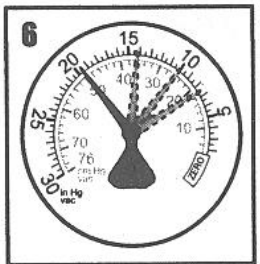
READING: Reading extremely low but steady
CAUSE: Leaking intake manifold system. Faulty manifold gasket, carburettor base gasket, split vacuum hose, seized open EGR value, etc.



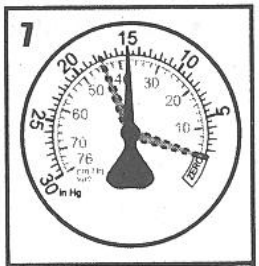
READING: Reading low but steady
CAUSE: Retarded ignition timing. Confirm using timing light and reset to manufacturers specification



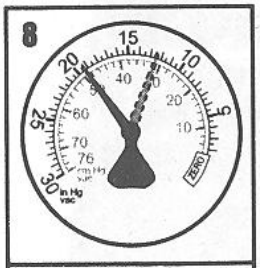
READING: Reading slightly low and fluctuating slowly
CAUSE: Over lean or rich mixture.
Check and reset in accordance to manufacturers specifications



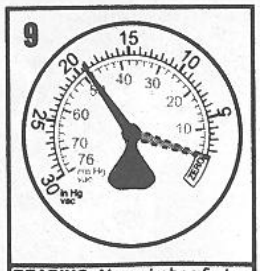
READING: Regular fluctuation between normal and low readings.
CAUSE: Blown head gasket between two adjacent cylinders carry out cylinder leakage test



READING: Readings slightly lower than for normal engine including when throttle is suddenly opened then released
CAUSE: Worn piston rings. Carry out compression test



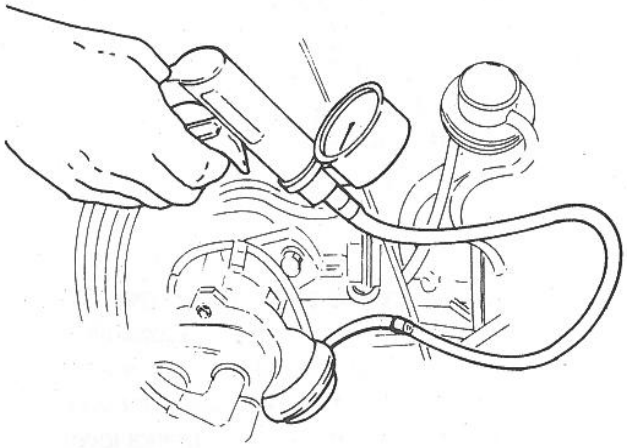
READING: Regular drop between normal and low reading
CAUSE: Burnt valve



READING: Normal when first started but drops rapidly with RPM held at 3,000
CAUSE: Restriction in exhaust system

Ignition System Vacuum Advance

On standard points and some electronic ignition systems there are two types of advance methods used, both of which must function correctly to obtain maximum performance and fuel economy.
The first method is Mechanical or Centrifugal, which operates by the use of weights located in the base of the distributor. The weights throw outwards advancing ignition timing as engine RPM increases. This is tested by firstly removing the vacuum advance line to disable the system, then with a timing light connected run the engine RPM up checking that the timing advances in accordance with the manufactures specification.



The second method is Vacuum Advance, which senses engine load via manifold vacuum. A vacuum diaphragm is mounted onto the distributor and connected to a rotating internal base plate which advances or retards timing as required to suit varying engine loads. To test this system for correct operation again with the timing light connected raise the engine RPM and check timing advance against manufacturer specifications.
In the event that the vacuum advance is not operating, remove the vacuum line from the distributor advance mechanism. Connect the TestVac pump and create a 5 – 10 inch vacuum, monitoring the timing at the same time. If a timing advance is noted this confirms that the vacuum diaphragm and mechanical links are in order and the fault is a vacuum supply. To confirm this connect the TestVac to the vacuum supply line and check the gauge reading. No vacuum should be noted at idle but when the engine RPM is increased a vacuum increase should also be noted. If this does not occur, trace the vacuum line back checking for restrictions and breaks.

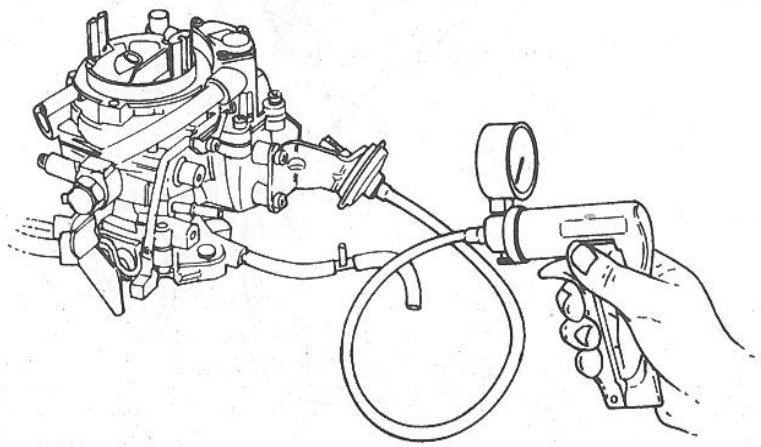
FUEL SYSTEMS

Testing Mechanical Fuel Pumps

The TestVac can be used to evaluate the condition of mechanical fuel pumps by testing the vacuum that it is able to create.
Locate and remove the suction line from the pump. Connect the TestVac to the suction port of the pump, start and run the engine at idle. The vacuum reading that should be noted will vary slightly on different makes and models but as a general rule approximately 15inHg should be created. This should also be held for approximately 1 minute after engine shut down. If this vacuum reading is not achieved or the vacuum drops off immediately with the engine shut down , the fuel pump requires either overhaul or replacement.

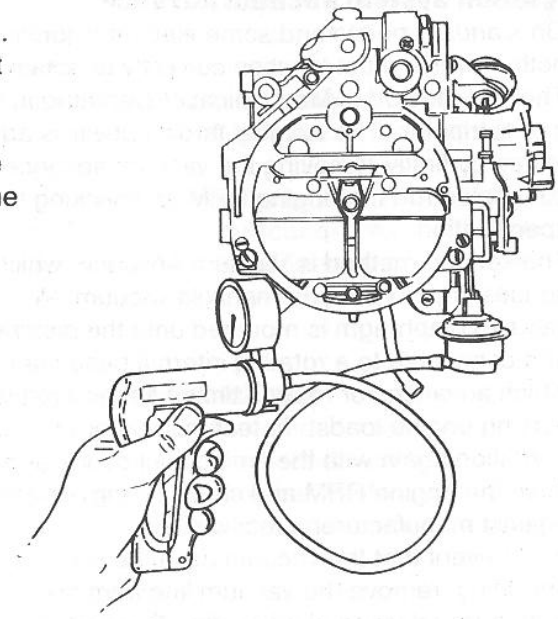
Carburettors

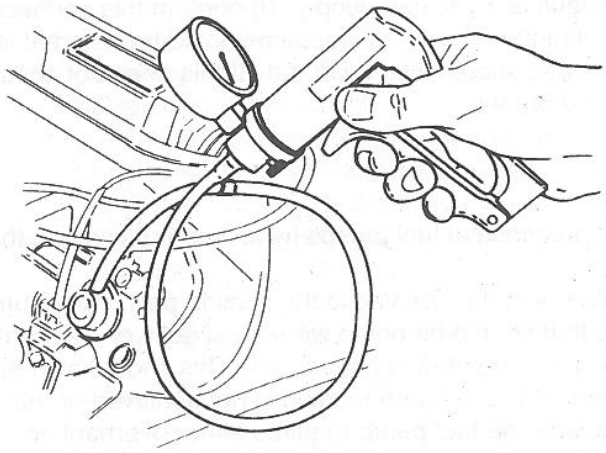
There are many different types of vacuum control systems used on carburettors. Using the TestVac, allows quick and accurate testing of these systems. Listed below are just two examples of tests that can be carried out



Example 1.
Testing a Choke Break Diaphragm.
With the engine at normal operating temperature but not running, disconnect the vacuum line to the diaphragm module. Connect the TestVac pump and apply approximately 15inHg and allow to sit for 30 seconds. No drop in gauge reading should be noted. With the vacuum still applied ensure that the choke butterfly is pulled to the fully open position.

Example 2:
Testing Vacuum Operated Carburettor Secondary Barrel. With the engine at normal operating temperature but not running, remove the vacuum line from the secondary diaphragm module. Attach the TestVac pump, hold the throttle and secondary air valve flaps open. Operate the hand pump whilst observing free and easy opening of the secondary throttle butterfly.



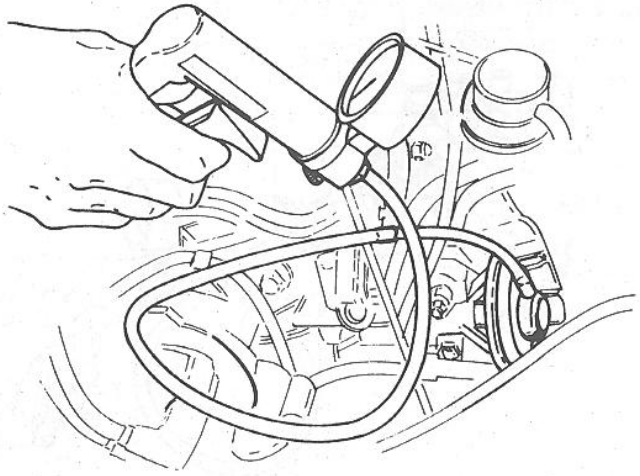


Testing Fuel Injection Pressure Regulator

Multi point fuel injection rail pressure must vary to suit changing engine loads and fuel delivery requirements. This is done using a vacuum operated regulator which is connected to the engine manifold vacuum to sense the varying loads.
To test the fuel rail pressure, a gauge is attached to the rail, then engine loads must be created to vary engine manifold vacuum.
Simply remove and block off the vacuum supply line to the pressure regulator, connect and operate the vacuum pump to simulate vacuum pressures in accordance with the manufacturers specifications and note variation in fuel pressure reading.

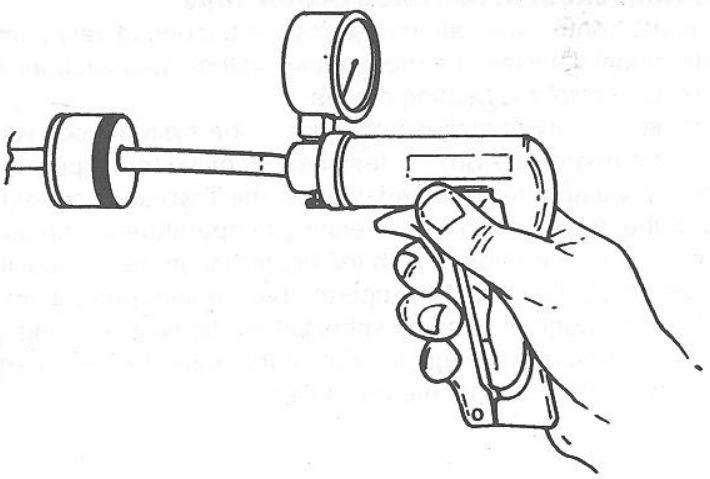
Testing Emission Control Exhaust Gas Recirculation Valves (EGR)

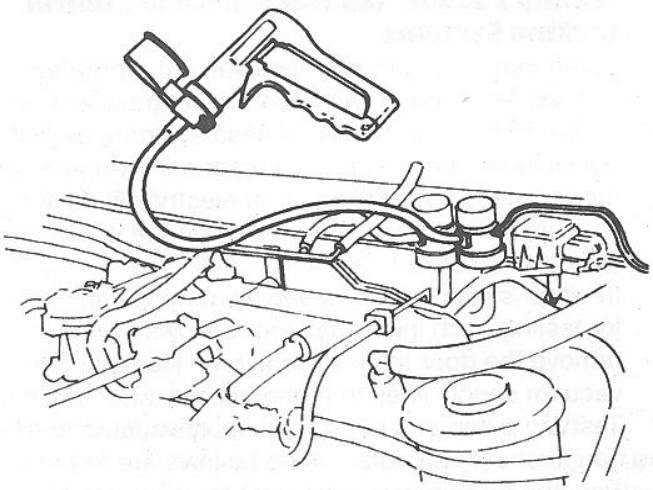
Start engine and run at idle until normal operating temperature is reached. Remove the vacuum line from the EGR valve and attach the TestVac Vacuum Pump. Operate the hand pump to apply approximately 15inHg. If the EGR Valve is working correctly the engine idle will become rough. If the idle remains unchanged the valve is possibly seized in the closed position. If the vacuum is not held, the diaphragm in the valve is fractured.



Testing One Way Valves

Many vacuum operated circuits use in line one way valves to apply vacuum in one direction only. To test the function of the valve remove it from the circuit. Attach the TestVac Vacuum Pump and operate to apply vacuum. In one direction the valve must hold vacuum and in the opposite direction it must not.





Testing Electrically Operated Vacuum Solenoids

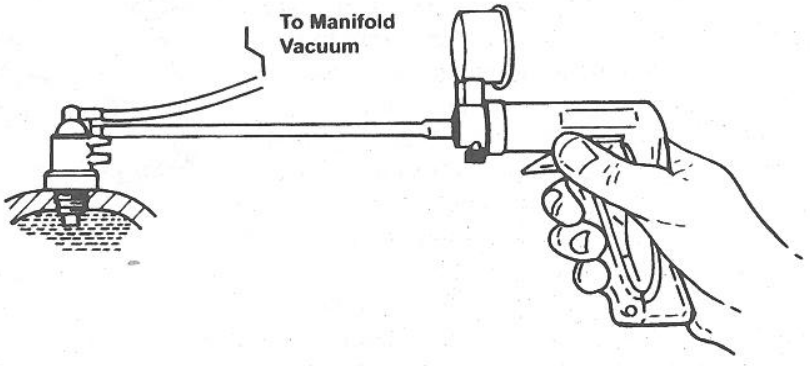
Electrically operated vacuum solenoids are commonly used in control circuits for air conditioning / ventilation systems, emission control systems, idle step up systems etc and testing the function of these when using TestVac is extremely simple.

Locate the solenoid to be tested and remove the line that goes to the component being tested. Connect the TestVac to the solenoid port and start the engine. With the system turned off there should be a zero gauge reading. Now turn the system to the 'on' position and a gauge reading equal to the manifold vacuum should be noted. If no reading exists remove the vacuum supply line and test for manifold vacuum at this line. If the vacuum does exist this indicates that the solenoid is faulty or it is not receiving a 'switch on' voltage (use a multimeter to test this). If no vacuum exists trace the supply line back to the vacuum source checking for kinks and breaks.

Testing Thermal Vacuum Switches

There are many vacuum controlled circuits that must only operate when the engine reaches normal operating temperature. This is done using thermal switches that remain in an 'off' position until a given temperature is reached.

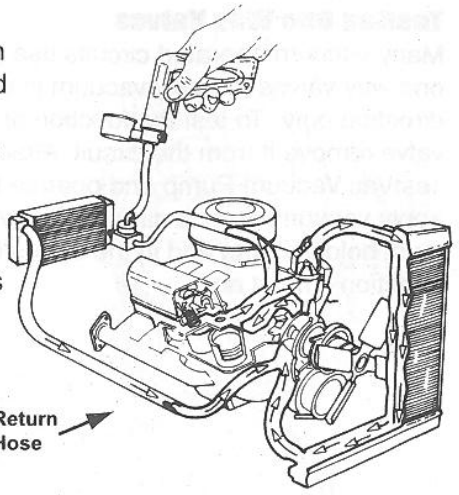
To test this type of switch, remove the vacuum supply line coming from the manifold to the switch and test for manifold vacuum. If this vacuum is correct refit the supply line to the thermal switch and remove the opposing line from the switch. Attach the TestVac unit to the port and start the engine. With a cold engine no reading should be noted. When the engine reaches normal operating temperature manifold vacuum reading should be noted.

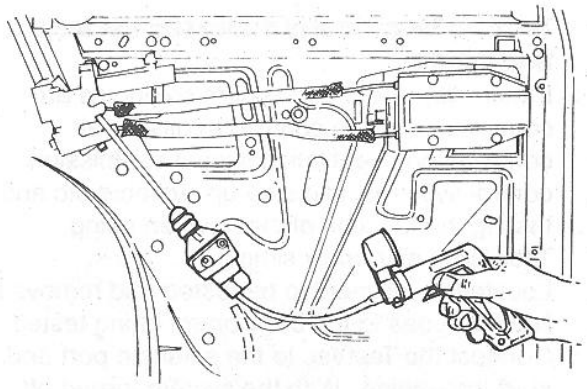


Testing Vacuum Operated Heater Taps

Climate control ventilation systems are becoming very common on late model vehicles and most of the systems use vacuum operated taps to control the heating modes.

On the majority of makes and models, the system uses vacuum to turn the heater tap 'on'. To test these remove the supply line from the tap vacuum module and connect the TestVac Vacuum Pump. With the engine at normal operating temperature locate and feel the heater return hose. With the heater tap in the 'off' position, this hose should be cold. Now operate the vacuum pump to open the tap. The gauge reading must hold. If the tap is in working order, the return hose will begin to heat. If the hose does not begin to heat this indicates that the tap is faulty



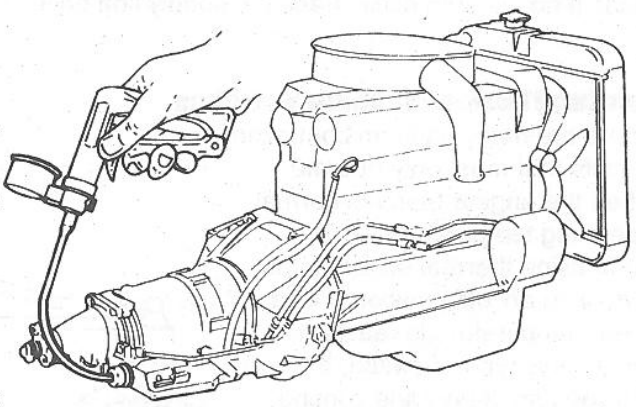


Testing Vacuum Operated Remote Central Locking Systems.

Some makes and models use vacuum operated bellows mounted in each door, to centrally lock and unlock the vehicles doors. These systems use either manifold vacuum stored in a reservoir for use when the engine is not running or an electrically driven vacuum pump which operates when the doors are locked or unlocked.

In either system, the TestVac Vacuum Pump is ideal for testing each individual door bellows. To do this, remove the door trims as required. Remove the vacuum supply lines from the bellows and attach the TestVac pump and operate to apply vacuum to the bellows. Allow to sit for 30 seconds, no drop on the gauge should be noted. If the bellows are found to be in order attach the vacuum supply line to the TestVac and operate system to test for vacuum supply. If the vacuum supply does not exist or is low trace back down the lines to the vacuum supply looking for kinks, restrictions or cracked lines. Repair as required and retest.

Testing Automatic Transmission Vacuum Operated Modulator Valves



Automatic transmissions are normally equipped with a vacuum operated modulator valve in order for the automatic transmission to detect engine loads and adjust shift points to suit. The TestVac Vacuum Pump can be used to test both that the modulation valve diaphragm is serviceable and also to simulate varying engine loads so modulator pressure readings can be recorded.

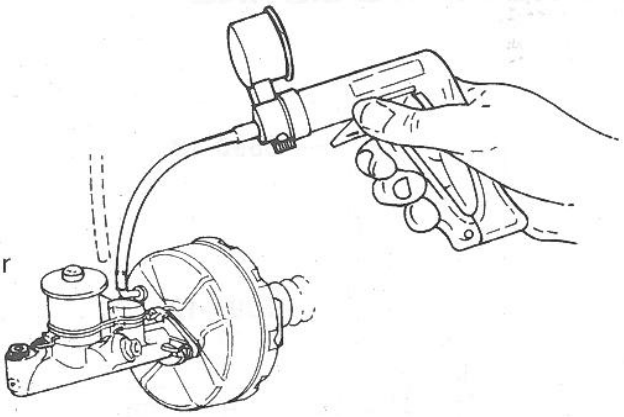
To test the modulator valve diaphragm remove the vacuum supply line from the valve and attach the TestVac vacuum pump. Operate the vacuum pump until approximately 15inHg is achieved and monitor the gauge reading for approximately 30 seconds. No vacuum drop should be noted.

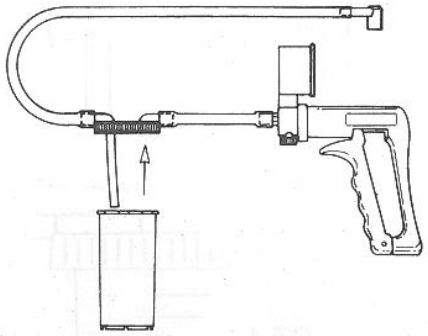
To check modulator pressure readings attach a pressure gauge to the appropriate port on the transmission. Remove the vacuum supply line from the modulator and attach the TestVac Vacuum Pump. Start and run the engine and apply vacuum pressures. Monitor readings and confirm that these are in conformance with manufacturer specifications.

BRAKING SYSTEMS

Testing Brake Booster Diaphragm

Remove vacuum supply line from brake booster fitting. Attach TestVac vacuum pump to vacuum supply port on booster. Operate pump to create approximately 15inHg in vacuum booster and allow to sit for 30 seconds. No vacuum drop should be noted on the gauge reading. If the vacuum drops this indicates that the brake booster diaphragm is faulty. In this case the booster should be removed for overhaul by an authorised repairer or replaced.





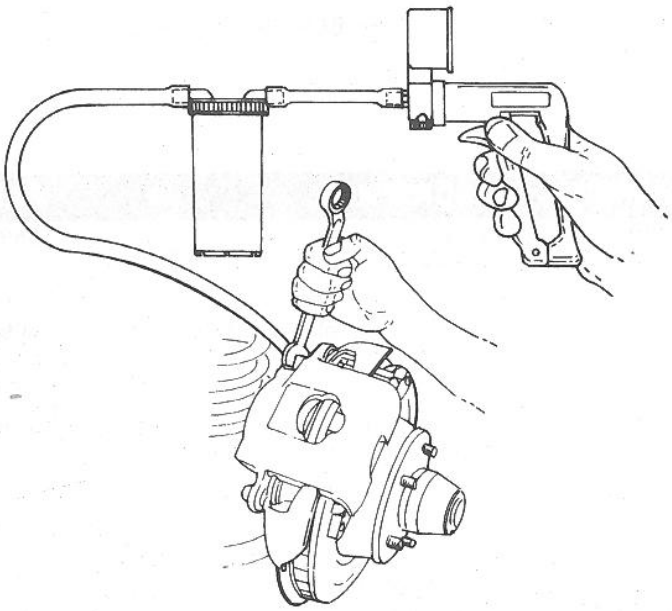
Brake Bleeding – Assembly of Brake Bleeder Kit

Ensure that vacuum pump is connected to the brake bleeder reservoir in accordance with the assembly diagram (Pictured left). Failure to do so will result in brake fluid being drawn into the vacuum pump.

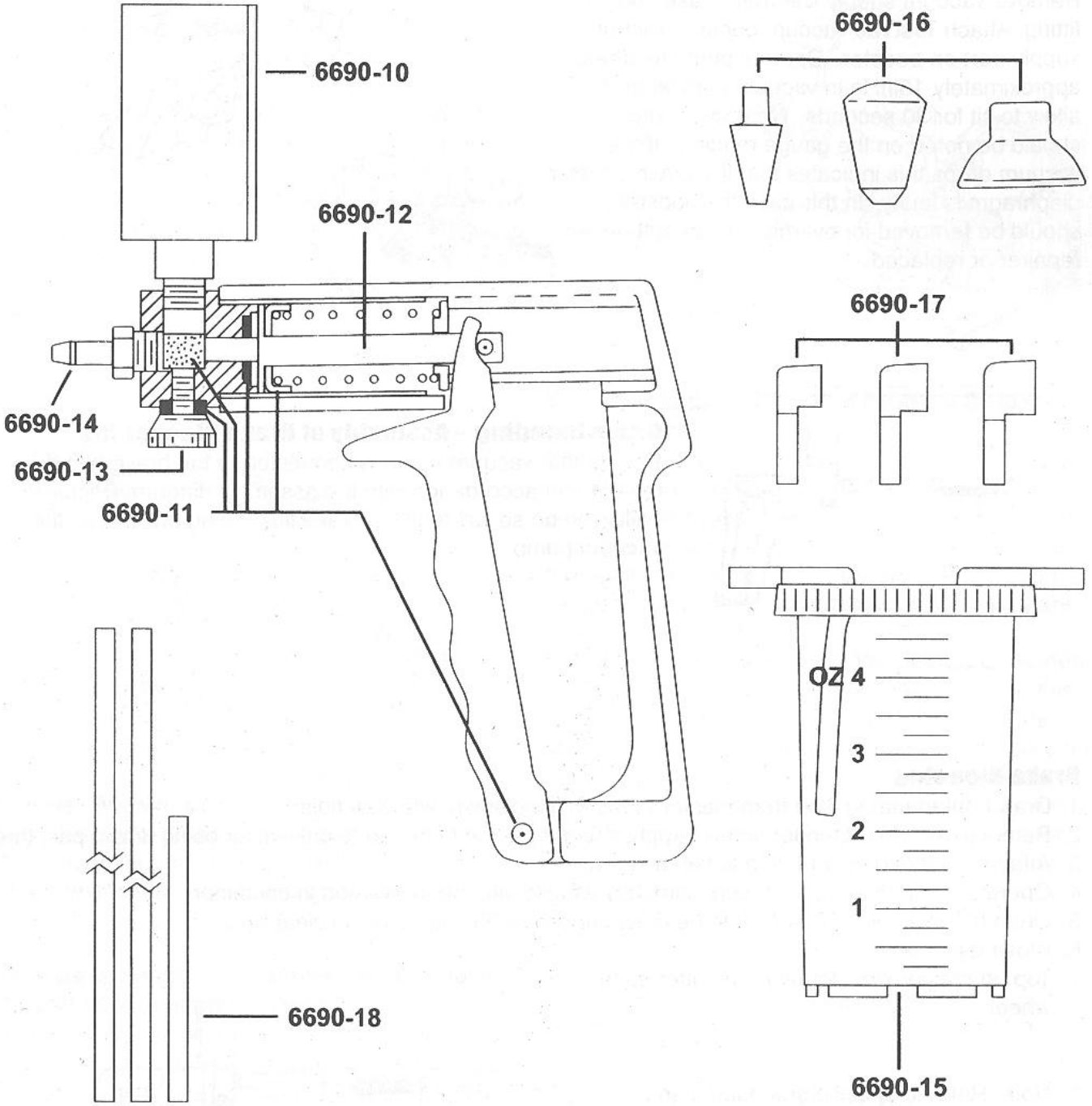
Brake Bleeding

1. Draw contaminated fluid from master cylinder. Replenish with new fluid.
2. Remove and clear bleeder screw. Apply silicone grease to thread to prevent air being drawn past thread.
3. Attach suitable bleeder fitting to bleed screw.
4. Operate vacuum pump until approximately 21inHg vacuum is created in container.
5. Open bleed screw. Allow fluid to be drawn until new fluid is visible in clear hose.
6. Close bleed screw.
7. Top up master cylinder reservoir after each wheel.

* Note: Refer to specific procedures and instructions from the vehicle manufacturers service manual.
* Empty bleeder container as required. Do not allow container to overfill as brake fluid will be drawn into vacuum pump.
* After bleeding, test brake performance.
* Clean bleeder components 'with water only' after use.



SPARE PARTS LISTING



PART No.	DESCRIPTION	PART No.	DESCRIPTION
6690-10	Gauge	6690-15	Container Container Cap 3.6 x 70mm Hose
6690-11	Repair Kit - Cup Check Valve Release Valve 'O' Ring Filter Handle Roll Pin	6690-16	Fittings Kit - 12 Assorted Fittings
		6690-17	Brake Bleeder Fittings Kit - 3 x Fittings 'A' 'B' 'C'
6690-12	Piston/Rod Assembly - Piston Rod Cup Spring Washer Handle Roll Pin	6690-18	Hose Kit - 2 x 6mm x 9mm x 500mm PVC hose 1 x 6mm x 9mm x 100mm PVC hose
6690-13	Release Valve Screw		
6690-14	Hose Fitting		