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**BS0245**
**Brake Fluid Condition Tester**

**BS5800**
**Detaching Tool**

**BS9870**
**30mm Disc Brake Spreader**

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# BS5582
# VACUUM PUMP AND BRAKE BLEEDER KIT
## Instructions

## FEATURE

Designed to assists in locating and identifying system faults.
Applications include fuel, ignition, transmission, emissions, clutch bleeding and engine mechanical condition.
The manual pump with pressure gauge also allows testing of many vacuum operated systems.
Supplied complete with three connector sizes for cars, commercial vehicles and motorcycles.
Die cast body with gauge and accessory kit.
Easily dismantled for cleaning.
Supplied in metal 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 coupled with a hand-operated vacuum pump, It allows static testing of all types of vacuum operated systems.

Set out on following pages are the applications that the vacuum pump can be used. 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 be conducted such as. Compression tests, Cylinder leakage tests, Ignition timing checks etc, be carried out to confirm indications of vacuum gauge readings.The kit includes case, Vacuum pump, 120ml fluid reservoir, tubing and various adaptors for brake bleeding. The hand operated pump creates a vacuum which rapidly pulls the fluid through the system via the bleed nipple into the fluid reservoir, eliminating the need to use the brake lever or pedal.

Easy to use as the stored vacuum created in the reservoir allows both hands free to work on the bleed nipple and spanner. As it is a vacuum drawing the fluid, as opposed to pressure pushing it and eliminates the brake fluid finding its way out round the threads of the nipple or leaking out of the pipe. So much easier and cleaner.

Perfect not only for bleeding, but also for replacing old fluid in the system with new. Important on all ABS equipped vehicles. Perfect for use on cars as well as bikes. Where as you might normally avoid stripping your calliper down because bleeding it afterwards is such a nightmare - this makes it ridiculously easy. Even on systems notoriously difficult to bleed. You will be amazed at the difference in your brakes just by servicing your callipers.



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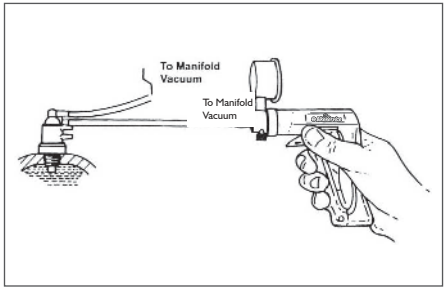
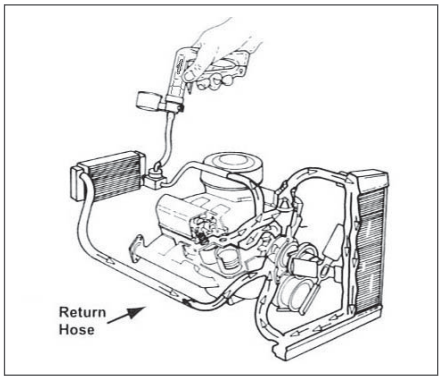
## TESTING THERMAL VACUUM SWITCHES




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 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 motorcycle 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 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.





## COMPONENT IDENTIFICATION


**Contents:**

- A Vacuum pump and gauge. (76 cm/Hg, 30 inch/Hg)
- B Fluid Reservoir. (120 ml / 4 oz)
- C 2pc extension tubes. (I.D.) ϕ 5mm, (O.D.) ϕ 8mm, (Length) 50cm.
- D Extension tubes. (I.D.) ϕ 5mm, (O.D.) ϕ 8mm, (Length) 10cm.
- E Extension tubes. (I.D.) ϕ 4mm, (O.D.) ϕ 7mm, (Length) 7cm.
- F 16pc tubes adaptor and hose fittings in case.

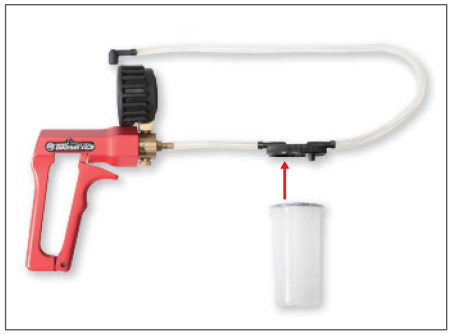

3pc brake bleeder fittings,for brake adaptor.


2pc suction adaptor.
8.5mm x 25mm cone suction adaptor is used for port in engine or inner structure.
31mm surface suction adaptor is used for surface on engine or other surface structure.

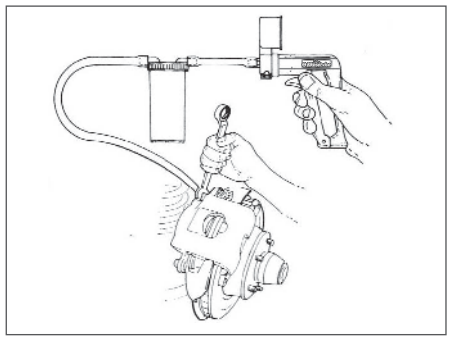
11pc hose cone fitting, used ϕ 4mm - ϕ 12mm hose and tube connectors.

## BRAKING SYSTEM WORKING

**Brake Bleeding Assembly**
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**
If bleeding is to be done by one person with a hand vacuum pump type bleeder, perform the following.

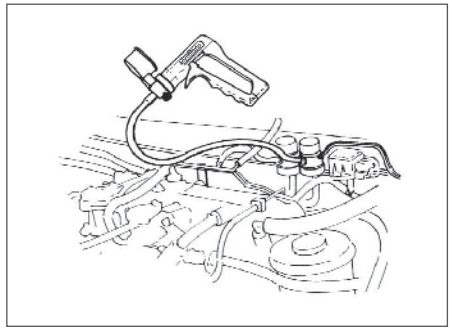


A. Position the vacuum pump, appropriate size wrench for the bleeder screw, and catch rags at the caliper and remove the rubber boot from the brake bleeder.
B. Connect the vacuum pump to the tip of the brake bleeder .
Find the adaptor that will provide a tight seal on the brake bleeder.
C. Pump the vacuum pump about 10 times and open the brake bleeder.
Operate vacuum pump until approximately 21 in/Hg vacuum is created in container.
D. As fluid comes out of bleeder into the container, continue to pump the vacuum pump, until clean brake fluid starts to come out of the bleed screw.
E. If the container fills prior to getting clean fluid, stop bleeding by closing the bleeder and empty the vacuum pump container and start bleeding again.
F. When clean fluid comes out of the bleed screw, close the bleed screw.
G. Wipe up any spilled brake fluid with a rag.



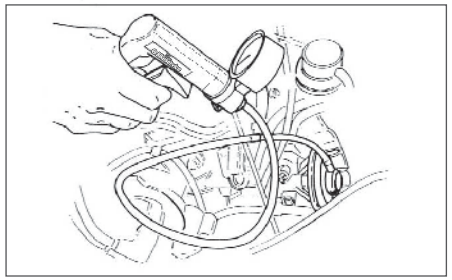


## TESTING ELECTRICALLY OPERATED VACUUM SOLENOIDS



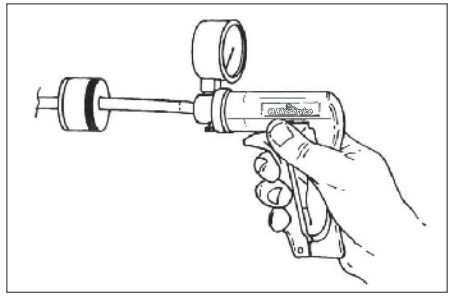
Electrically operated vacuum solenoids are commonly used in control circuits for air conditioning / ventilation systems, emission control systems, idle step up systems etc and the function testing of these is extremely simple.
Locate the solenoid to be tested and remove the line that goes to the component being tested.
Connect 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.
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 EMISSION CONTROL EXHAUST GAS RECIRCULATION VALVES [EGR]



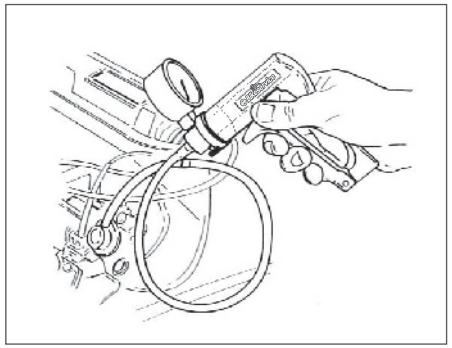
Start engine and run at idle until normal operating temperature is reached. Remove the vacuum line from the EGR valve and attach to the Vacuum Pump. Operate the hand pump to apply approximately 15 in/Hg. If the EGR Valve is working correctly the engine idle will become rough. If the idle remains unchanged 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



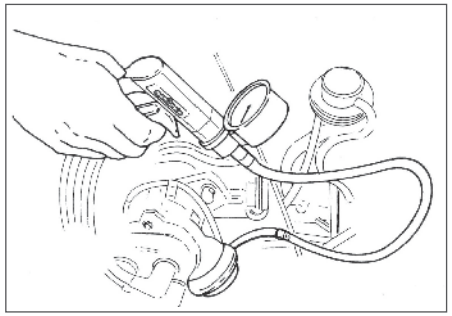
Many vacuum operated circuits use in line one way valves to apply vacuum in one direction only. To test the function of the valve remove it from the circuit. Attach the Vacuum Pump and operate to apply vacuum. In one direction the valve must hold vacuum and in the opposite direction it must not.

**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 any variation in fuel pressure reading.

## 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 manufacturers 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 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 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.

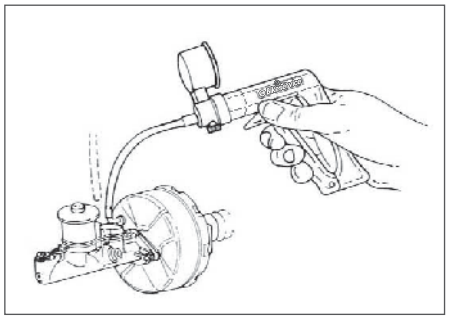




**Note**

Refer to specific procedures and instructions from the motorcycle manufacturers service manual.
Once the bleeder is opened the person holding the brake will feel the pedal go to the floor.
This is perfectly normal and they should NOT remove their foot from the pedal until directed to do so by the person doing the bleeding. If they release the brake while the bleeder is open, air will be drawn into the brake system making it more difficult to vent.
Empty bleeder container as required.
Do not allow the 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.

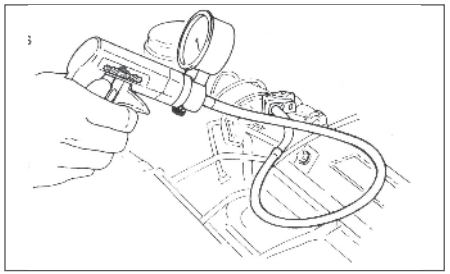
**Testing Brake Booster Diaphragm**



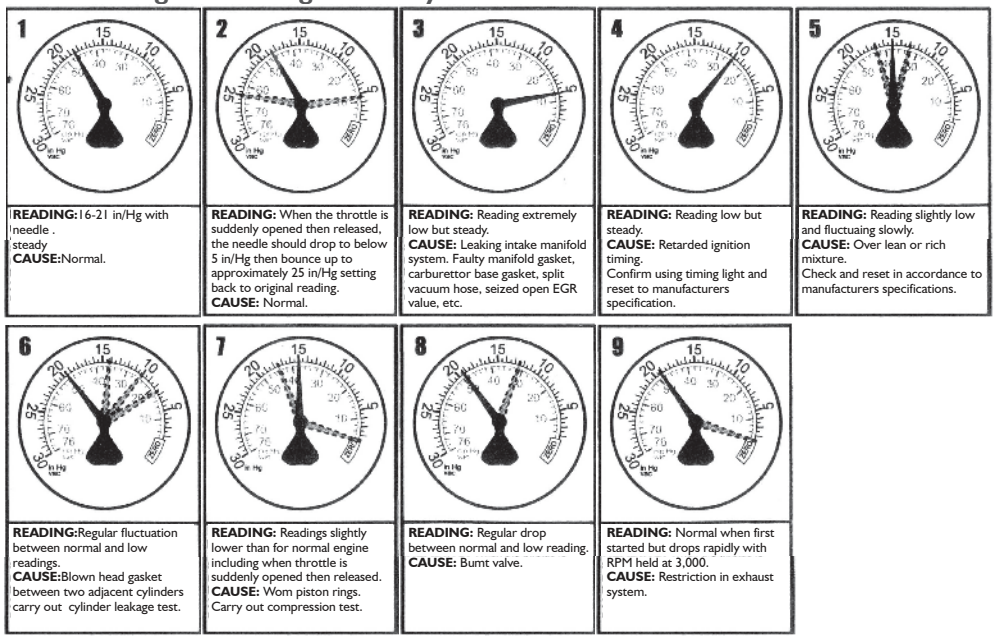
Remove the vacuum supply line from brake booster fitting.
Attach the vacuum pump to vacuum supply port on booster.
Operate pump to create approximately 15 in/Hg in vacuum booster and allow to sit for 30 seconds.
No vacuum drop should be noted on the gauge reading. If the vacuum drops this indicates that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

## ANALYSING ENGINE MECHANICAL CONDITION

A. Run engine until normal operating temperature is reached.
B. Locate and connect the vacuum gauge to a port directly on the manifold or on the carburettor below the throttle butterfly.
C. Start and run the engine at idle, observing the gauge needle reading.



### The following are readings that may be noted and causes




**Note**

The needle readings shown above, are examples only of what may be noted. It is important to remember the action of the needle rather than the actual reading, as varying engine types will run different manifold vacuum pressures, specified 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 in/Hg and steady. Manifold vacuum is also affected by altitude with the general rule being that it will drop approximately 1 in/Hg for every thousand feet above sea level so this also must be considered when assessing manifold vacuum actual readings.



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## FUEL SYSTEMS

**Testing mechanical fuel pumps**

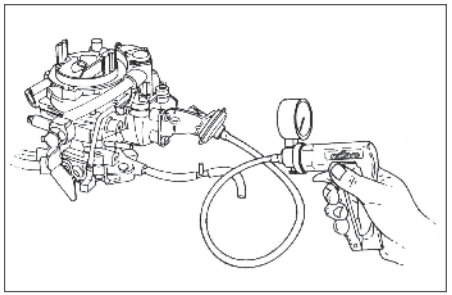
The pump can be used to evaluate the condition of mechanical fuel pumps being tested by the vacuum that it is able to create.
Locate and remove the suction line from the pump. Connect to the suction port of the pump, start and run the engine at idle. The vacuum reading that should be noted will vary slightly on different makes and models but as a general rule approximately 15 in/Hg 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 pump, 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 pump and apply approximately 15 in/Hg 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 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.