Brake systems and servos on the MGBGTV8 and RV8

Peter Garton (Woodcote Green 1238) from Germany started a thread on the V8BB in August 2007 by posting a message wondering what would happen if the brake servo on his RV8 were to fail. This note brings together the responses to that thread, particularly from Bob Owen. (Jan 08)

Servo failure on the MGBGTV8 model has been an important topic for members with the original Factory V8 as the servos on most cars are now approaching 35 years old! Bob Owen posted a response on the V8BB commenting "the problem described in V8NOTE228 is one I have experienced with a servo failure and loss of brakes on my chrome bumper MGBGTV8. To my knowledge that is just one of a dozen or so similar episodes suffered by other V8 enthusiasts. So far as we know, fortunately all have survived! The fault – servo related brake failure - only happens with remote or indirect servos as fitted to many cars in the 60s and 70s as enhancements to existing non-servo braking systems".

Remote or indirect servos

Remote or indirect servos sense the FLUID pressure and assist this - see the extract from the service manual to see the principle of operation. Their advantage is that they can be placed anywhere in the system and do not have to be at the pedal. The remote type is sensing fluid pressure and assisting via a diaphragm with vacuum from the inlet manifold and the two are separated by a seal.

This rubber seal is overlooked when the brakes are serviced and leakage at the seal produces no tell-tale fluid seeps or brake pull. This is because the fluid leaks are drawn into the engine or stay in the large bowl of the servo. Moreover, the engine vacuum is ALWAYS there to draw fluid through the servo seal, unlike other brake seals which only experience a pressure differential under actual braking. Consequently a servo seal leak can be quietly emptying your brake master cylinder reservoir as you sail along the motorway and the first you know of a serious loss of fluid is when you apply the brakes at the exit - and find you do not have any! This happened to one of Bob Owen's Low Brake Fluid Sensor customers; faced with a loss of brakes at a motorway exit he decided he did not really want to get off there anyway and would go along the hard shoulder for a while . . . handbrake on . . . and a spine chilling cold sweat!

Single or split/dual brake lines

Later cars have dual braking systems each serving two wheels so, even if the car is fitted with a remote servo, this failure mode would still leave diagonal wheel brakes operational.

Direct servos

These are direct acting servos designed as part of the braking system and are activated mechanically and assist mechanically, so a servo failure would merely remove the servo assistance. The consequence would be the driver would have to apply a much greater pedal pressure to achieve the same braking effect.

MGBGTV8 braking system

The V8 has a hydraulic braking system comprising a **remote or indirect servo** on a **single circuit braking system**. So a serious servo leak or a failure on the single brake circuit can lead to a complete loss of brakes. Consequently there is a real need to maintain the brake hoses, the brake master cylinder seals, the brake slave cylinder seals and the flexible brake hoses, not to mention the servo itself. The Low Brake Fluid Sensor developed by Bob Owen was devised to try and provide some warning by monitoring brake fluid levels in the master cylinder reservoir and sounding an alarm if levels fall. But even the LBFS cannot provide protection against a catastrophic loss of fluid as the LBFS cannot respond fast enough to provide a warning of sudden fluid losses. Only a preventative maintenance approach using regular, thorough inspections and renewals of the braking system and key components can do that. Renewing your servo, or at least reconditioning it with a service kit, is a prudent measure. Relying on the "if it ain't broke, don't fix it" approach with your V8 servo is not wise.

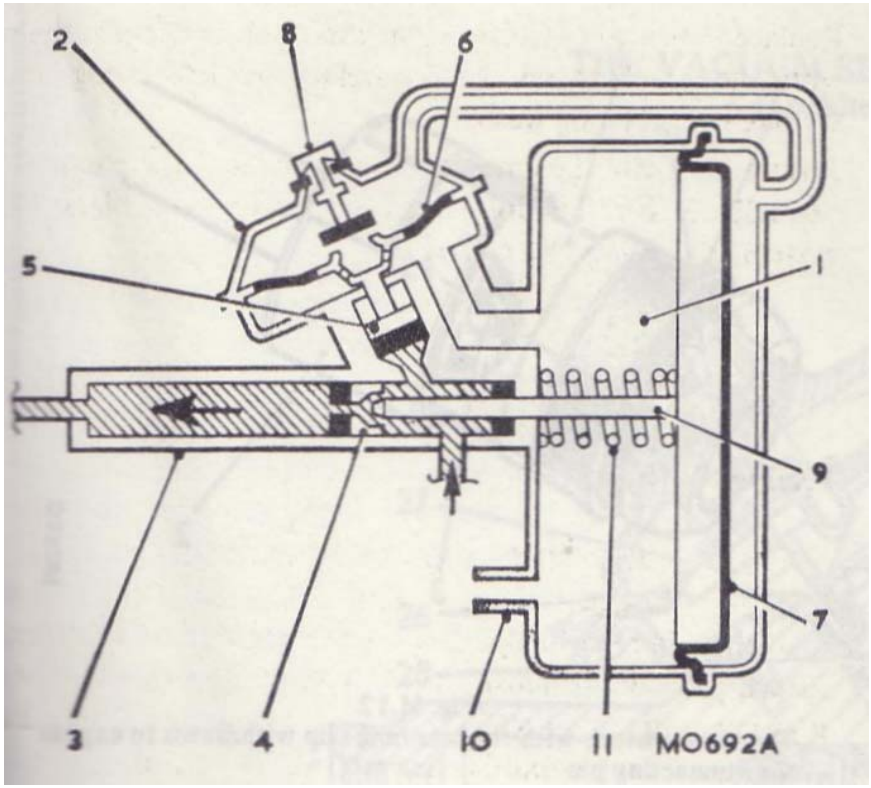
RV8 braking system

The RV8 has a hydraulic braking system comprising a **direct acting vacuum operated servo** on a **dual circuit braking system**. The dual system is split front to rear with the primary system operating the rear drums and the secondary system operating the front calipers. Failure of the direct acting servo would just mean you needed two and a half times the pedal pressure for the same braking effect - actually 2.56 times as this is the servo gain. Both brake circuits would still work so you would still have fully effective brakes, but much heavy pedal pressure would be needed without the usual servo assistance.

The RV8 Technical Reveal states on page 14 that the 38DA servo on the **RV8 is a non serviceable part** so either you replace it at specified intervals or replace it when it fails since failure is not intrinsically dangerous. Clearly the braking system on the RV8 is a considerable improvement on the earlier system used in the MGBGTV8 some twenty years earlier and provides better protection against the consequences of brake component or system failures.

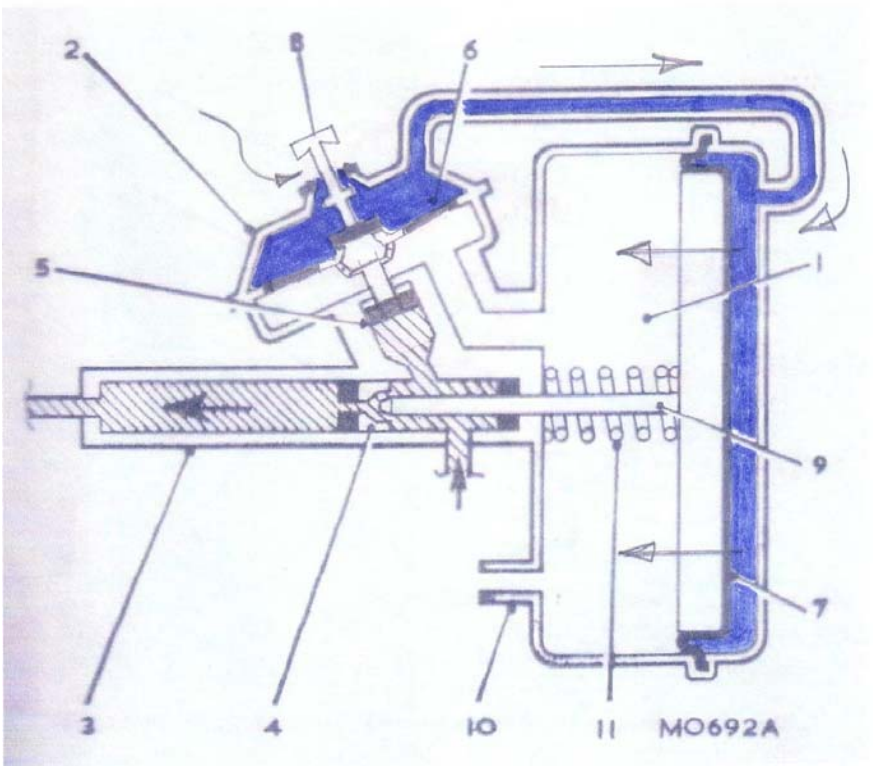
The hydraulic braking system comprises a **direct acting vacuum operated servo**, a tandem master cylinder, front disc brakes and self-adjusting rear drum brakes. A pressure reducing valve in the rear brake fluid line controls pressure application to the rear brakes and reduces the possibility of the rear wheels locking. The **system is split front to rear** with the primary system operating the rear drums and the secondary system operating the front calipers. Each front brake caliper is of the four piston type, actuated from a single fluid input adjacent to a single bleed screw. Brake pad anti-rattle springs are secured by the pad retaining pins and all pads are fitted with adhesive backing shims. Each rear drum brake incorporates a single double-acting cylinder, acting on one leading and one trailing brake shoe. The direct acting brake servo unit applies pressure to the master cylinder via a push rod. A detailed explanation of the operation of the servo, master cylinder and pressure reducing valve is set out in the section Brakes on page 7 of the RV8 Repair Manual AKM7153ENG.

How does the Lockheed servo work on the MGBGTV8?



A schematic diagram showing the principle of operation and the main components of the vacuum servo unit. The hatched area represents brake fluid.

The vacuum operated servo unit consists of three main components, namely the **vacuum cylinder** (**1**), the **air valve assembly** (**2**) and the slave cylinder (**3**) which is connected to the hydraulic circuit between the master cylinder and slave cylinders at the wheels. Under light braking fluid is allowed to pass directly to the wheel cylinders via the hollow centre of the **slave piston** (**4**) and no braking assistance is obtained; fluid pressure acting on the **air valve piston** (**5**) closes the diaphragm (**6**), thus separating the chamber behind the **main servo diaphragm** (**7**) from the one in front.



Under heavier braking further movement of the air valve piston opens the air valve and allows air to enter the chamber behind the main diaphragm, destroying the vacuum in that compartment. Air at atmospheric pressure is shown in blue.

Under heavier braking, further movement of the air valve piston opens the air valve and allows air at atmospheric pressure to enter the chamber behind the main diaphragm, destroying the vacuum. The **central rod** (**9**) is thus pushed to the left, sealing the hollow centre of the slave piston and pushing it down its bore, so increasing the fluid pressure at the wheel cylinders. When the brake pedal is released, the pressure beneath the air valve piston is destroyed, the **diaphragm** (**6**) re-opens and the air valve closes. Via the **non-return valve** (**10**), a suspended vacuum is recreated around the main diaphragm. Under the action of the **spring** (**11**), the diaphragm and push-rod, and thus the slave piston, are returned to their original positions, and the pressure in the wheel cylinders is lost.

Bob Owen notes “the **crucial seal separating the brake fluid in the V8 servo from the vacuum of the manifold** is the one around **piston** (**5**) in the cutaway diagram”. If that seal goes then the fluid can vanish quite rapidly!