

REBUILDING THE GIRLING VACUUM BRAKE SERVO UNIT

In the interest of disseminating useful information on the maintenance and repair of parts used in Lotus cars, the following is excerpted from the service kit instructions for the rebuilding of the Girling vacuum brake servo unit. These instructions and the accompanying comments are courtesy of Tom Dill.

The replacement of the vacuum brake servo unit at a rather high cost can be avoided by replacing all seals as contained in the service kit providing THE INTERNAL WORKING SURFACES ARE IN GOOD CONDITION. It is important that there should be NO sign of corrosion, pitting, scoring, or steps on piston rod, pistons, or bores and the surfaces should be smooth to the touch.

CLEANLINESS & CARE

When dismantling, absolute cleanliness is essential. Wash the hands and lay out a clean sheet of paper on which to work and place the parts. Take care of all highly finished working surfaces on pistons, rods, and bores. Clean hydraulic parts with Girling Cleaning Fluid, alcohol, or Castrol Girling Brake and Clutch Fluid (I use rubbing alcohol.) and do not allow any other fluid, oil, or grease to touch them. Special care should be exercised when removing and fitting the circlip in the hydraulic output cylinder and when assembling the vacuum cylinder to the body

The unit may be considered in five parts:

- 1) The air filter.
- 2) The vacuum cylinder which supplies the force to operate the output cylinder.
- 3) The valve chest which houses the valves, controlling the movement of air to and from the vacuum cylinder.
- 4) The valve control piston occupying the upper bore of the body.
- 5) The hydraulic output cylinder from which the pressure is applied to the brakes.

THE AIR FILTER

The element, of moulded cellular construction, should be changed whenever replacement brake shoes are fitted and on the occasion when the servo unit is overhauled.

Press aside the spring clip and remove the cover. The filter element is then quite loose and should be discarded. Clean the baseplate. Place a new element in position and replace the cover and clip.

DISMANTLING THE UNIT

To service the unit, the vacuum cylinder must be dismantled first.

THE VACUUM CYLINDER

Hold the unit in a vise by the mounting lugs on the body. Remove the screws in the flange, supporting the cover against the pressure of the piston return spring. Relieve the pressure gradually allowing the spring to push out the piston. (Watch out for one pint of trapped brake fluid.) The removal of the piston assembly and spring will reveal the screws at the bottom of the cylinder which fastens the cylinder to the body. Remove screws, and the cylinder, with the now loose clamp plate inside, can be separated from the body.

THE VALVE CHEST

With the light alloy body of the unit still in the vise, the valve chest should be dismantled. Remove the four cover screws and lift off the cover with tube attached. Inside, remove the two valve retainer screws and lift out the flat horseshoe spring and valve retainer. The rocking lever with nylon valves attached will be held by the spring loaded control piston. Apply pressure to the plug in the control cylinder bore to move the control piston sufficiently to release the rocking lever and allow it to be lifted out of the valve chest. Clean all parts. No replacements should be necessary (True).

VALVE CONTROL CYLINDER

The valve control cylinder is the upper bore in the piston body. If the piston spring has not already partly pushed out the plug which seals the end of the control cylinder, tap the face of the body on a wooden surface to jar out the plug. (Don't be fooled. Neither of the ones I rebuilt were pushed out, but come out easily. Don't damage. See Fig. 1) The control piston can then be lifted from the bore.

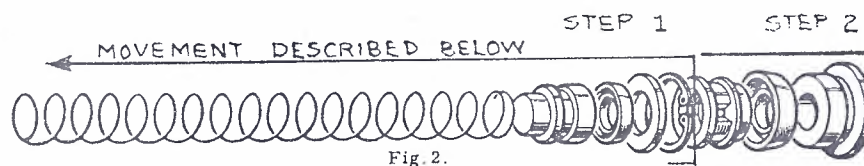
Dismantle the control piston (Fig. 1) assembly by compressing the spring and pushing off the circlip which released the retaining cups and spring. Remove the seals (and the seal from the plug) clean the parts and lubricate with clean brake fluid. Fit the seals with the lips facing away from the center hole, refit the cups, spring, and circlip ready for insertion in the body. Clean and fit a new seal to the end plug. If the control piston is in two parts it should be replaced by the later type shown. The new piston and auxiliary parts are available as a separate kit.

Discard the two pistons with the seals, the spring, nylon washer, and the end plug. Lubricate the new pistons with brake fluid and fit the two seals with the lips away from the central hole. Fit the caps, spring, and circlip in the order shown in the illustration. Fit a new seal to the new end plug.



THE OUTPUT CYLINDER (Fig. 2)

The shouldered end of the piston rod bearing bush stands proud of the body face, and enables the bush to be lifted from the bore. Immediately below it is the gland seal which is removed by a hooked wire. The nylon seal spacer can be shaken out of the bore. The circlip (trickiest of all) and the abutment washer it retains, can now be seen, and circlip pliers will be needed. (I used the "common" circlip pliers which come with a small plastic box of tips. Use the tips with the best matching tip O.D. and extend them beyond normal and clamp with screws carefully!) Locate the ends of the pliers in the holes in the circlip. Squeeze the circlip pliers until the circlip is fully compressed and, holding the pliers tightly (Amen), carefully lift out the circlip, making quite sure the bore is not damaged in the process. The piston spring will push out the washer and piston. Discard the piston. Thoroughly clean the body and lubricate the bores with brake fluid before assembly.



ASSEMBLING THE UNIT

THE OUTPUT CYLINDER

Fit the new piston into the end of the spring and lubricate with brake fluid. Confirm that the seal around the piston has the larger diameter nearer the reduced end of the piston. Insert the spring into the bore, and place the abutment washer on top of the piston. Ease the piston into the bore. Take care to keep the piston "square" or it will cross-bind. It should be "worked" into the bore so that the seal enters without damage. No undue force should be used. Fit the circlip onto the circlip pliers and compress the circlip fully. (With a steady hand, as one is compressing the circlip with pliers in hand, one forces the spring-loaded assembly ahead of him until "click" viola! Circlip in place in one fell swoop!) This operation should not be hurried; the circlip pliers should be quite secure on the circlip before the circlip is removed or replaced, as there is considerable danger of damaging the bore if care is not exercised.

Drop the seal spacer into the bore, large end first, ease in the gland seal, lips first, and finally fit the bearing bush.

THE CONTROL CYLINDER

Lubricate the bore with brake fluid and insert the control piston, aligning the hole in the piston with that in the valve chest. Press in the sealing plug.

THE VALVE CHEST

Insert the rocking lever with the valves attached so that the spring location above one of the valves is furthest from the re-

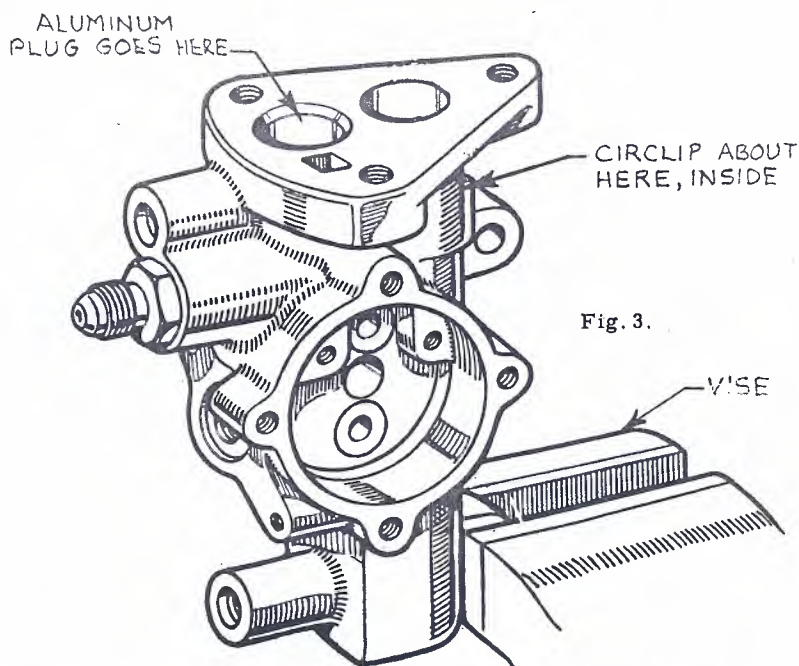
taining screws. The round end of the lever should fit into the hole in the control piston. Press in the control cylinder plug to enable the lever to enter easily. Place the spring and valve retainer in position, insert the screws with lockwashers and tighten home.

Place the new cover gasket in position and fit the cover, with pipe attached. Insert and tighten the four fixing screws.

THE VACUUM CYLINDER

The assembled body must be in the vise, the mounting face uppermost with a new gasket placed in position. Locate the vacuum cylinder on the mounting face with the center hole over the projecting bearing bush, and the vacuum pipe in the new rubber grommet in the flange. Position the clamp plate inside the cylinder and insert the three screws with washers and screw in just finger tight. Before tightening the screws place the piston and piston return spring in position and push it down through the full stroke several times to align the bearing bush. Remove the piston and spring and tighten the three screws, taking care not to move the vacuum cylinder in the process.

Remove the sponge rubber backing ring from the piston washer (pulls out easily) and fit the new one from the kit. Smear the piston rod with brake fluid before inserting, and apply to the leather seal on the piston the special lubricant supplied with the kit. Place the cover plate (with the new gasket) on top of the piston and press down, taking care the piston rod enters the bush without damage. Fit the nuts and bolts round the flange and tighten securely. The unit is now complete and ready for fitting to the car. If it is not fitted immediately the ports should be plugged or taped over to prevent the entry of any foreign matter.



THE VACUUM CYLINDER