CLUTCH AND PROPELLER SHAFT

SECTION D

CONTENTS

CLUTCH UNIT

Description

Alpine Series I and Rapier Series III cars

An 8" single dry plate A type clutch is fitted incorporating a copper impregnated graphite (MY3D) release bearing which is self-lubricating. No attention in the way of lubrication to the release bearing is necessary.

Alpine Series II, III and Rapier Series IIIA cars

An 8" single dry plate A.S. (Strap drive) type clutch is fitted.

The essential difference between this type of clutch and the A type clutch lies in the method whereby torque is transmitted from the cover to the pressure plate. Instead of the normal arrangement, wherein lugs on the pressure plate pass through slots in the cover, three pairs of spring steel straps, attached at one end to the cover and at the other, to the pressure plate, are employed. The straps are arranged tangentially so that they can deflect during clutch operation without disturbing the concentricity of the assembly, so ensuring the maintenance of the initial accurate balance. This form of construction also eliminates any friction between cover and pressure plate, thereby reducing the operating effort.

Late Alpine III, and IV, and Rapier IV cars have a diaphragm type clutch. See index.

Hydraulic withdrawal mechanism is employed, consisting of a master cylinder directly connected to the pedal (Fig. 2), and a hydraulic fluid pipe running to the operating cylinder, which in turn is attached by a rod to the withdrawal lever.

Provision for bleeding the system is made on the operating cylinder. (See item 40, Fig. 3.).

Adjustment

Alpine Series I and Rapier Series III Cars

The only external adjustment is to the operating piston rod attached to the clutch withdrawal lever. Adjustment between pedal and master cylinder is pre-set and is not provided for in service.

Adjustment, when necessary, should be effected by slackening the locknut at the back of the fork on the withdrawal lever outer end, and turning the piston rod (Fig. 1). Free movement at the outer end of the withdrawal lever should be about $\frac{3}{32}$" (2·4 mm.).

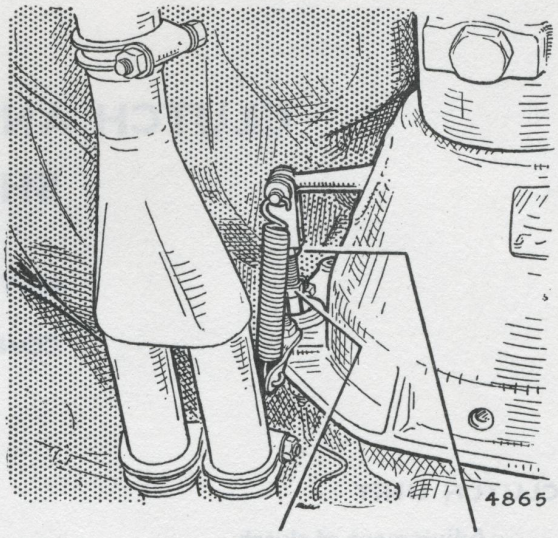

Fig. 1. *Pedal adjustment, (Adjustable clutches only)*

Alpine Series II, III and Rapier Series IIIA

There is no clearance at the clutch slave cylinder and the operating piston rod. No adjustment is necessary or provided for.

The pedal on Alpine Series II,III *and IV* cars has a two position adjustment (see inset Fig. 2). The position can be changed by securing the pedal (46) to the master cylinder push rod (58), with the clevis pin (73) in either of the two holes provided in the pedal.

MASTER CYLINDER

Description (*Alpine, Rapier III and IIIA onwards*)

This unit (Fig. 4) incorporates a fluid reservoir and a master cylinder. Directly in front of the main rubber cup (8), when the system is at rest, is a by-pass port (X) which ensures that the system is maintained full of fluid at all times, and allows full compensation for expansion or contraction of the fluid due to changes of temperature. It also serves to release additional fluid drawn into the cylinder from the annular space formed by the reduced skirt of the piston (10), through the small holes in the piston, after each application. If this additional fluid is not released to the reservoir through the

by-pass port, due either to the hole being covered by the main cup as a result of incorrect pedal adjustment, or to the holes being choked by foreign matter, pressure will build up in the system. In order that the rubber cup shall not tend to be drawn into the holes in the piston head, a piston washer (9) is interposed between the two parts; it is important that this washer be assembled as shown on the illustration.

To remove (Fig. 2)

Disconnect the pressure pipe (75) from the cylinder barrel, and the clevis pin (73) from the clutch pedal. Remove the fixing bolts and detach the cylinder and push rod. Unscrew the filler cap and drain the fluid into a clean container.

Slightly compress the external return spring (56), and remove the retaining cap (57). Slide the spring off the piston rod.

To dismantle (Fig. 4)

Push the piston (10) down the bore of the cylinder and remove the circlip (13). Withdraw the piston, piston washer (9), rubber cup (8), retainer (7) and return spring (6). Using only the fingers to prevent damage, remove the secondary cup (11) by stretching it over the end of the piston.

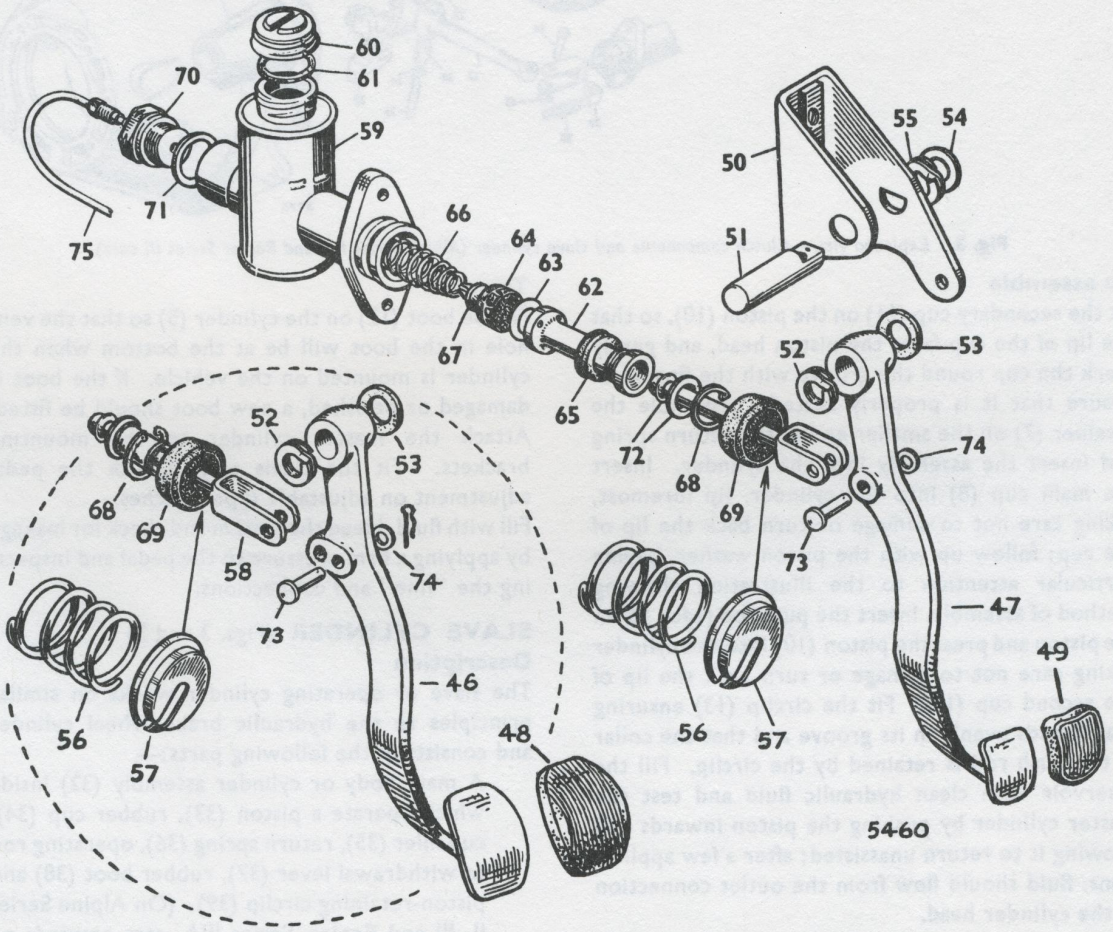

Fig. 2. *Exploded view—Master cylinder and pedal linkages (Inset Alpine Series II and III cars)*

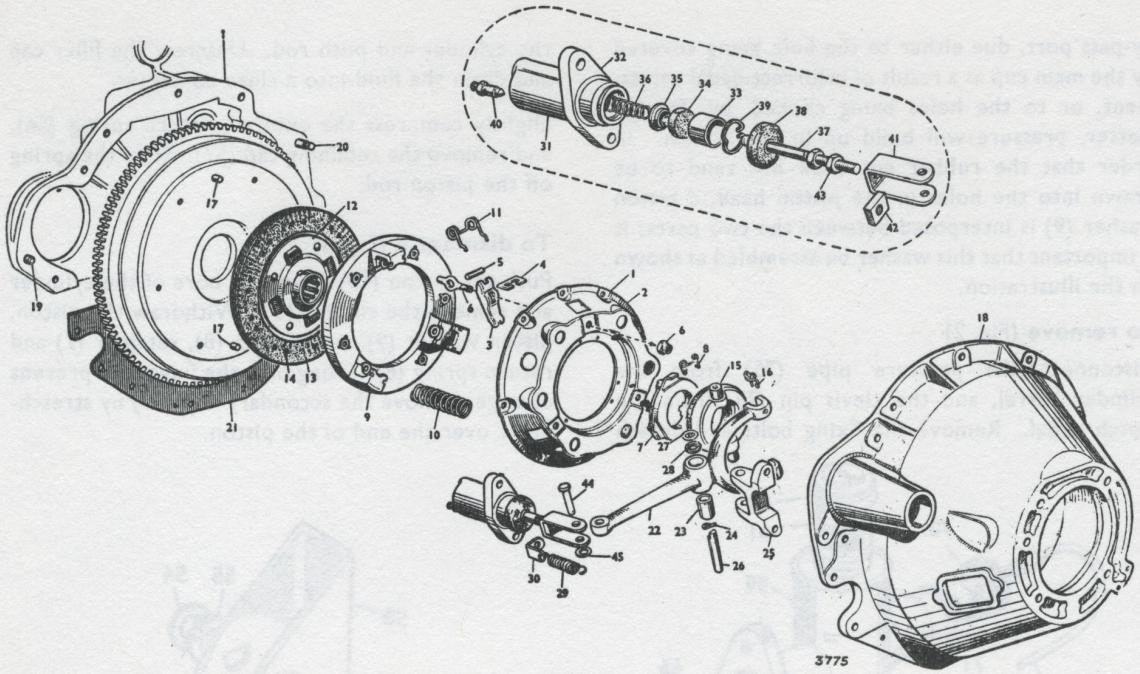

Fig. 3. *Exploded view—Clutch components and slave cylinder (Alpine Series I, II and Rapier Series III cars)*

To assemble

Fit the secondary cup (11) on the piston (10), so that the lip of the cup faces the piston head, and gently work the cup round the groove with the fingers to ensure that it is properly seated. Assemble the retainer (7) on the smaller end of the return spring and insert the assembly into the cylinder. Insert the main cup (8) into the cylinder, lip foremost, taking care not to damage or turn back the lip of the cup; follow up with the piston washer, paying particular attention to the illustration showing method of assembly. Insert the push rod (14or 15) in the piston and press the piston (10) into the cylinder taking care not to damage or turn back the lip of the second cup (11). Fit the circlip (13) ensuring that it beds evenly in its groove and that the collar in the push rod is retained by the circlip. Fill the reservoir with clean hydraulic fluid and test the master cylinder by pushing the piston inwards and allowing it to return unassisted; after a few applications, fluid should flow from the outlet connection in the cylinder head.

To refit

Fit the boot (12) on the cylinder (5) so that the vent hole in the boot will be at the bottom when the cylinder is mounted on the vehicle. If the boot is damaged or perished, a new boot should be fitted. Attach the master cylinder to the mounting brackets. Fit the clevis pin. Check the pedal adjustment on adjustable type clutches.

Fill with fluid, bleed the system and check for leakage by applying a firm pressure to the pedal and inspecting the "line" and connections.

SLAVE CYLINDER (Figs. 3 and 5)

Description

The slave or operating cylinder works on similar principles to the hydraulic brake wheel cylinder and consists of the following parts:—

A main body or cylinder assembly (32) inside which operate a piston (33), rubber cup (34), cup filler (35), return spring (36), operating rod to withdrawal lever (37), rubber boot (38) and piston-retaining circlip (39). (On Alpine Series II, III and Rapier Series IIIA cars onwards no piston-retaining circlip is fitted).

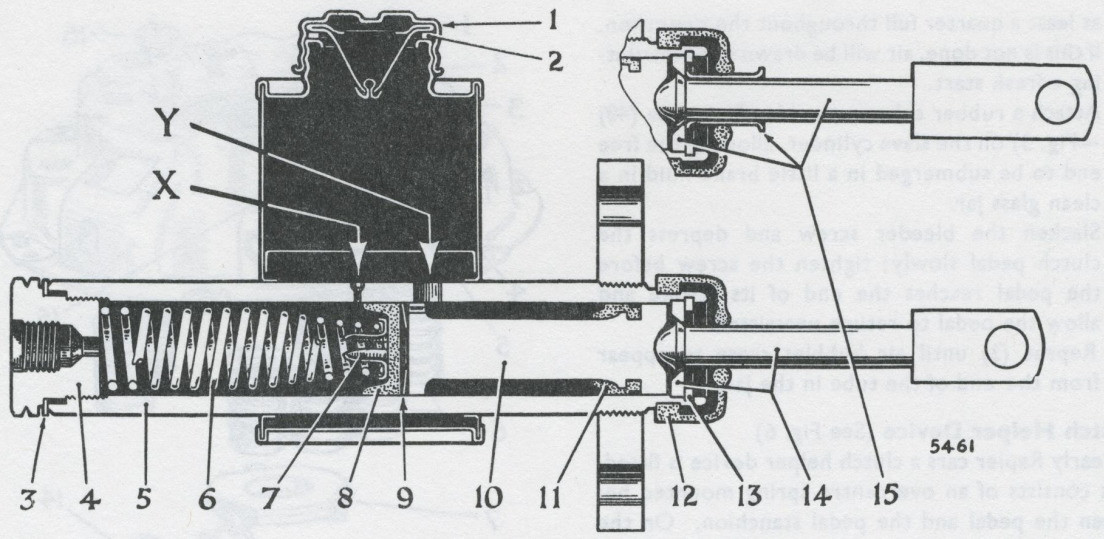

Fig. 4. *Master cylinder, sectional view*

1. Filler Cup
2. Washer
3. Outlet Plug Washer
4. Outlet Plug
5. Cylinder
6. Return Spring
7. Spring Retainer
8. Main Cup
9. Piston Washer
10. Piston
11. Secondary Cup
12. Rubber Boot
13. Stop Circlip
14. Push Rod (Alpine Series I and Rapier cars)
15. Push Rod (Alpine Series II cars)

A bleeder screw (40) provides the only means of bleeding the hydraulic system. On Alpine Series I and Rapier Series III cars the operating rod (37) affords the clutch pedal adjustment by screwing it in or out of the rectangular nut (42) which is housed in the withdrawal lever jaw (41). This linkage is locked by the nut (43).

To remove from car

Disconnect the pipe (75, Fig. 2) from the slave cylinder. Unhook the return spring at the end of the withdrawal lever and remove the slave cylinder fixing screws. The push rod (37) and boot (38) may be left attached to the car. (A return spring is not fitted to Alpine Series II, III and Rapier Series IIIA cars onwards).

To dismantle

Remove the circlip (39, Fig. 3) from the bore (Alpine Series I and Rapier Series III cars). Apply a LOW air pressure to the fluid connection to expel the internal parts.

To assemble

Fit the spring (36) in the cup filler (35) and insert these parts, spring innermost, into the bore of the body (32). Follow up with the cup (34) lip leading, ensuring that the lip is not turned back or buckled, then insert the piston (33) flat face innermost.

Fit the circlip (39) (Alpine Series I and Rapier Series III cars).

To refit

Offer up the slave cylinder to its mounting, with the push rod entering the bore and fit the fixing screws. Stretch the large end of the boot onto the body.

Adjustable cylinders are fitted to the front of the bell-housing flange. Non-adjustable cylinders to the rear.

Reconnect the pipe.

Bleed the system.

BLEEDING THE SYSTEM

As there is no check valve fitted in the clutch master cylinder, the normal bleeding procedure is not applicable; the following is the recommended method.

1. Fill the supply tank with brake fluid and keep it

at least a quarter full throughout the operation. If this is not done, air will be drawn in necessitating a fresh start.

2. Attach a rubber tube to the bleeder screw (40) —Fig. 3) on the slave cylinder, allowing the free end to be submerged in a little brake fluid in a clean glass jar.
3. Slacken the bleeder screw and depress the clutch pedal slowly; tighten the screw before the pedal reaches the end of its stroke and allow the pedal to return unassisted.
4. Repeat (3) until air bubbles cease to appear from the end of the tube in the jar.

Clutch Helper Device (See Fig. 6)

On early Rapier cars a clutch helper device is fitted. This consists of an overcentre spring mounted between the pedal and the pedal stanchion. On the pedal it is mounted at a point below the pedal fulcrum. On the pedal stanchion it is attached to a small bracket which is adjustable for position.

To adjust clutch helper device

Slacken off the bolt (A) securing the upper spring mounting bracket (B) to the pedal stanchion (C). Insert a $\frac{3}{8}$" (9·5 mm.) diameter pin in the hole (D) in the pedal stanchion.

Slide the bracket backwards or forwards as appropriate in order to achieve ·2" to ·25" (5 mm. to 6·3 mm.) offset of the spring axis to the rear of the pedal fulcrum (E) with the pedal butting the $\frac{3}{8}$" (9·5 mm.) diameter pin.

RELEASE BEARING

To remove and refit

Disconnect pipe to clutch operating cylinder.

Remove gearbox complete with bell-housing (See Section E of this manual).

Remove spring clips securing release bearing to withdrawal lever and withdraw the release bearing.

When reassembling always renew spring clips.

Reassembly is a direct reversal of the above operations.

Bleed the hydraulic system after refitting pipe.

CLUTCH DRIVEN PLATE

To remove and refit

Remove gearbox complete with bell-housing (See Section E of this manual).

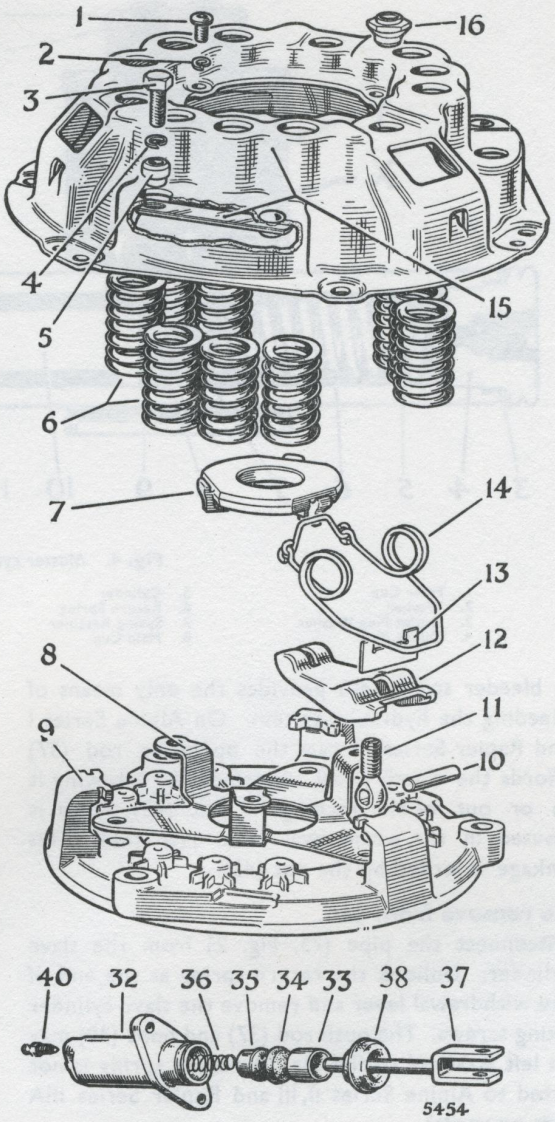

Fig. 5. *Exploded view of clutch and slave cylinder (Alpine Series II, III and Rapier Series IIIA cars).*

Remove setscrews securing clutch cover to flywheel. Slacken off evenly to prevent undue strain being applied to the cover at any one point. Remove clutch assembly and driven plate.

Note.—It is essential that the driven plate hub internal splines should not be assembled dry. For this reason a small amount of waterproof grease is

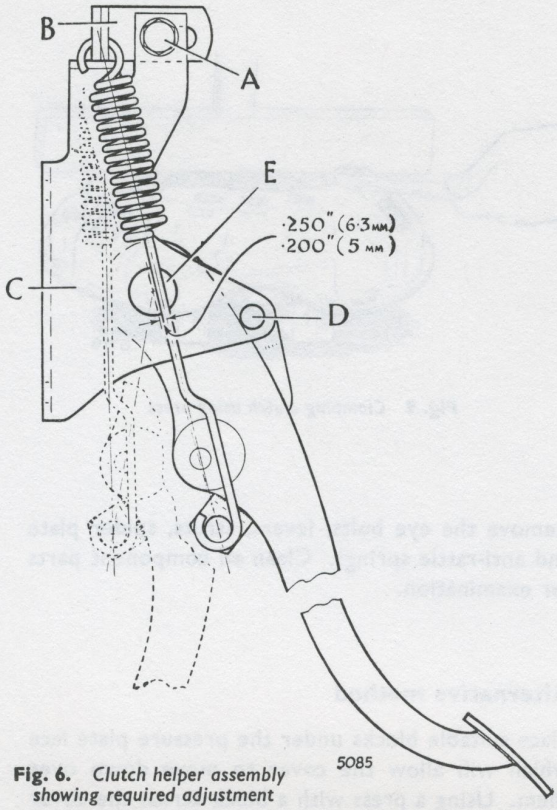

Fig. 6. *Clutch helper assembly showing required adjustment*

applied to these splines on a new driven plate as supplied. This grease is white. Always check that it is present before assembling the plate to the stem-wheel. Shell SB.2498 is suitable for this purpose.

Place driven plate in position with a suitable mandrel fitted through the hub of the plate, so that it may be located correctly when the clutch cover is fitted. **The smaller boss of the driven plate hub faces towards the flywheel.**

This procedure is most important, otherwise it will be impossible to enter the gearbox primary shaft through the clutch plate into the spigot bearing. A gearbox stem-wheel forms an ideal mandrel for this purpose.

Enter clutch cover on dowels.

Tighten the six securing setscrews evenly.

Refit gearbox, complete with bell-housing (see Section E of this manual).

Bleed hydraulic system at operating cylinder.

Note.—On a new replacement clutch assembly it will be found that there are three small L-shaped "keepers" between the release levers and the clutch cover. These are painted red and are fitted to enable a clutch unit to be fitted to a flywheel without the necessity of compressing the springs in the cover into position by means of the fixing bolts. **The L-shaped pieces must be removed after the fixing bolts have been finally tightened. Do not allow them to fall into the clutch cover.**

PRESSURE PLATE ASSEMBLY

To dismantle, reassemble and adjust

Dismantling of the cover assembly is not recommended and where possible an exchange unit should be fitted. If however, dismantling and adjusting is unavoidable, use of the Churchill Clutch Servicing Equipment No. 99A is advised.

Two methods are given, first using the 99A Equipment and an alternative method if this equipment is not available.

Before dismantling mark the release levers (12), cover and pressure plate (9) to ensure they are reassembled in the same relative positions which retains the original balance of the assembly. Renewal of the cover or pressure plate will require the assembly. Renewal of the cover or pressure plate will require the assembly to be rebalanced, using suitable equipment.

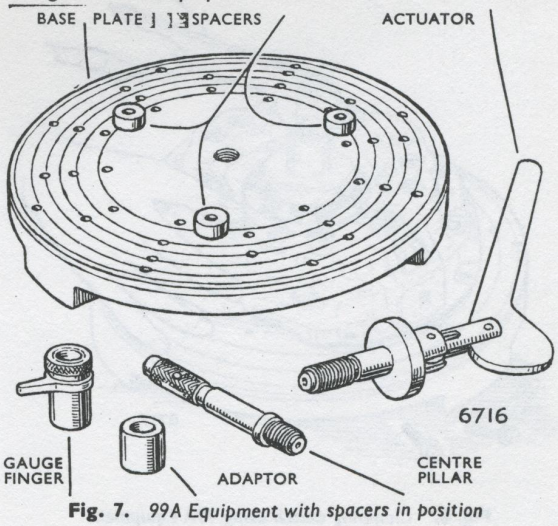

Fig. 7. *99A Equipment with spacers in position*

To dismantle

Using 99A Equipment

With the base plate on a flat surface, wipe the work face and place the No. 2 Spacers in position over the letter given on the code card. Place the clutch on the spacers while aligning the mounting holes in the cover with the appropriate tapped holes in the base, and check that the spacers are approximately below the release levers. Remove the release lever plate and screw the actuator into the centre hole in the base plate, press down the handle and clamp the cover assembly. Screw the set bolts provided firmly into the base plate through the holes in the cover. Remove the actuator.

Remove the adjusting nuts (16, Fig. 5). On Alpine Series II, III and Rapier Series IIIA cars, remove the three bolts (3, Fig. 5) securing the straps to the pressure plate, using a box spanner through the three holes in the cover, and the spider securing screws (1, Fig. 5).

Unscrew the cover clamping bolts evenly and lift off the cover.

Note the position and colour of the thrust springs.

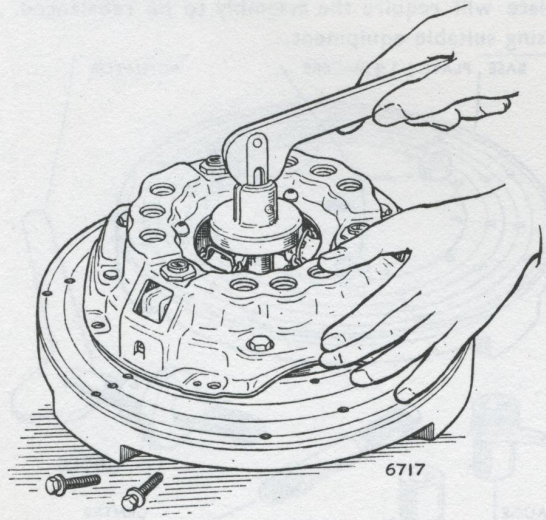

Fig. 8. *Clamping clutch using 99A Equipment*

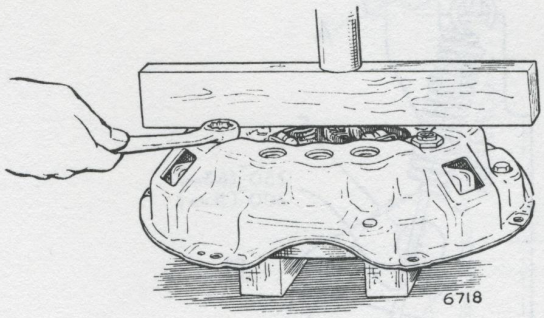

Fig. 9 *Clamping clutch using press*

Remove the eye bolts, levers, struts, spider plate and anti-rattle springs. Clean all component parts for examination.

Alternative method

Place suitable blocks under the pressure plate face which will allow the cover to move down over them. Using a press with a block across the cover compress the assembly (Fig. 9) and dismantle in the same order as in paragraph 1.

To reassemble

After carrying out the necessary servicing of component parts ensure that original components are identified for assembly to their original positions.

Points of lubrication during assembly

Cover	— Eyebolt nut seats
Release lever pins	— Total length
Struts	— Contact edges
Release lever plate	— Release lever lands

The above items to be lightly smeared with Shell S.B.2498 grease.

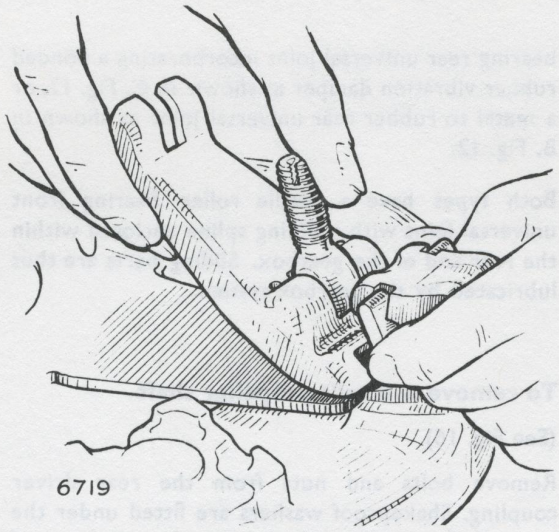

Fig. 10. *Removing the release levers*

Using 99A Equipment

Fit the spider plate (Alpine Series II, III and Rapier IIIA) and struts into position with the assembled release levers, eye bolts and pins to the pressure plate. Place the pressure plate over the spacers in position on the base plate.

Position the thrust springs (6).

With the anti-rattle springs (14) located, place the cover in position over the springs and locate the mounting holes of the cover to the tapped holes in the base plate. Fit the bolts and tighten evenly on Alpine Series II, III, Rapier IIIA before the cover is fully compressed to the base plate, fit the ferrules (5) and bolts (3) with new spring washers to the drive straps and screw the bolts lightly into the pressure plate. This allows the pressure plate to be moved in relation to the cover to obtain correct location of the straps to the pressure plate. Secure the spider (8) to the cover. Screw the cover down evenly to the base plate. Tighten the strap bolts (3) to a torque reading of 180-300 lbs./ins.

Screw the adjusting nuts onto the eyebolts until they are flush.

Alternative method

Assembly of the component parts is the same as described in the preceding paragraph, using the press and blocks in the same manner as when dismantling the assembly.

Adjusting the Release Lever Height Using 99A Equipment

With No. 2 Spacers in the correct position on the base plate and the assembly firmly bolted to the base plate. Screw in the actuator and operate the lever about a dozen times to settle the release mechanism. Remove the actuator.

Screw the centre pillar firmly into the base and place over it adaptor 99A-3 recessed face down. Fit the gauge finger. Holding the gauge finger firmly in contact with the adaptor, turn the adjusting nuts until the release levers make contact with the finger. Remove the gauge finger, adaptor and pillar, fit the actuator and again operate the levers. Replace the pillar and accessories and check the lever setting, making any necessary adjustments. Finally, lock the adjusting nuts by peening the collar of each nut into the eyebolt slot. Fit the release lever plate.

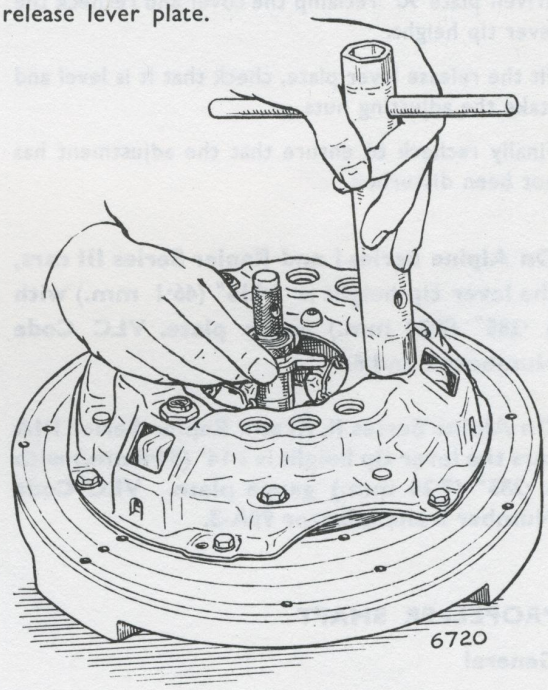

Fig. 11. *Setting height of release levers*

Alternative methods

The methods described below are not highly accurate and should only be used when the Churchill fixture is not available.

Using a new driven plate clamp the clutch assembly to a flat surface having a hole large enough to take the protruding boss of the driven plate, until the clutch cover makes firm even contact with the flat surface.

Alternatively, remove the flywheel from the engine (or use a spare flywheel) and lay flat on a surface plate. Using a scribing block measure the height of the flywheel face from the surface plate then set the scribing block pointer to a dimension as given below.

Lay a new clutch driven plate in its correct position on the flywheel. Bolt the cover assembly to the flywheel and with the scribing block adjust the release levers until the pointer makes contact with the tips. Release the cover assembly clamping bolts, turn the driven plate 90° reclamp the cover and recheck the lever tip height.

Fit the release lever plate, check that it is level and stake the adjusting nuts.

Finally recheck to ensure that the adjustment has not been disturbed.

On Alpine Series I and Rapier Series III cars, the lever tip height is 1·815″ (46·1 mm.) with a ·285″ (7·24 mm.) gauge plate. VLC Code Numbers 2 and 6.

On Alpine Series II, III and Rapier Series IIIA cars the lever tip height is 2·14″ (54·4mm.) with a ·285″ (7·24 mm.) gauge plate. VLC Code Number 2 and adaptor 99A-3.

PROPELLER SHAFT

General

A needle roller bearing propeller shaft, which is so designed that assembly is very simple, is fitted to the car. The sliding spline portion of the propeller shaft is enclosed within the rear end of the gearbox.

Later cars are fitted either with a needle roller bearing rear universal joint incorporating a bonded rubber vibration damper as shown in C, Fig. 12, or a metal to rubber rear universal joint as shown in B, Fig. 12.

Both types have a needle roller bearing front universal joint with a sliding spline enclosed within the rear end of the gearbox. Sliding parts are thus lubricated by the gearbox system.

To remove and refit propeller shaft

(See Fig. 16)

Remove bolts and nuts from the rear driver coupling. Shakeproof washers are fitted under the nuts of the bolts. Always use new shakeproof washers when refitting.

The heads of the four bolts in the coupling on the rear axle should face the differential unit.

On models fitted with the vibration damper, remove nuts from the rear axle coupling. Shakeproof washers are fitted under the nuts. Always use new shakeproof washers when refitting. On models which are fitted with the metal to rubber universal joint, two nuts and bolts are used to connect the shaft to the rear axle coupling. Note which way the bolt heads are facing so as to ensure correct replacement. Tighten to a torque of 48/53 lbs. ft. (6·6/7·3 kg. m.)

Lower and withdraw the shaft in a rearward direction.

Before refitting the shaft ensure that the splines and the sleeve of the sleeve yoke assembly are free from grit or sharp edges and are lightly lubricated.

Inspect the dust cover for damage. (Dust shields are not fitted to later models).

To dismantle and rebuild universal joints

The needle bearing type universal joints are so designed that correct assembly is a very simple

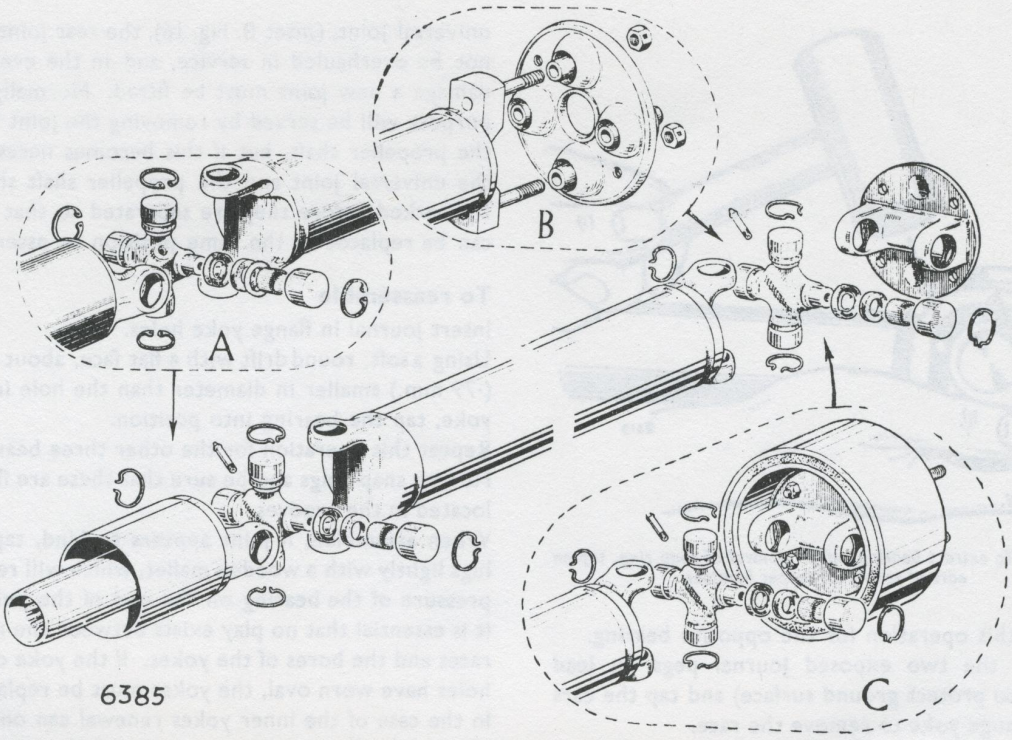

Fig. 12. *Exploded view of propeller shaft.*

matter, no hand fitting or special tools being required.

Individual parts of the needle roller bearing assemblies should not be renewed singly. If replacements are found to be necessary, the complete set of bearing parts comprising journal complete with gaskets and retainers, needle bearing assemblies and snap rings should be fitted.

On models having a propeller shaft with sealed bearings, no grease nipples are provided and no lubrication is required; a sealing washer is fitted between the cork gasket and the bearings: (see inset A of Fig. 12.).

For models which are fitted with the bonded metal to rubber universal joint at the rear end, these also do not require lubricating (see inset B of Fig. 12).

The journal and needle bearing assemblies are the only parts subject to wear after prolonged service and when it becomes necessary to replace these for any reason the work should be carried out as follows:—

To dismantle

Remove snap rings (Fig. 12) by pinching ends together with a pair of pliers. If a ring does not readily snap out of the groove, remove enamel from the yoke holes and tap the end of the bearing lightly, which will relieve pressure against the ring.

Holding the joint in one hand, tap gently with a piece of copper or copper hammer on the radius of the ear of the yoke, as shown in Fig. 13.

The needle bearing will gradually emerge and can finally be removed with the fingers. Be sure to hold the bearing in a vertical position and when free remove race from the bottom side so as to avoid dropping the needle rollers (see Fig. 14).

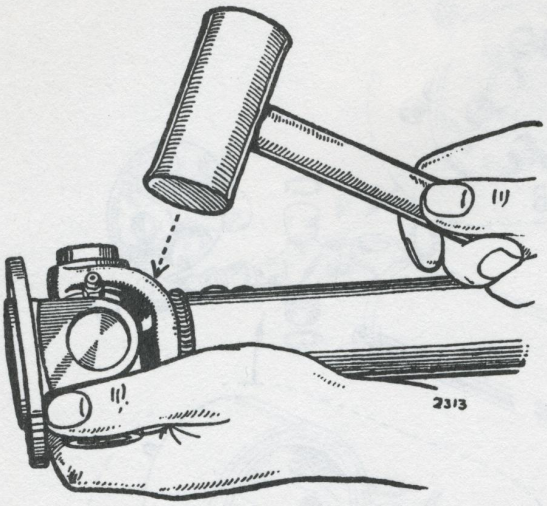

Fig. 13. *To extract bearings after removal of snap ring, tap on ears of yoke with copper hammer*

Repeat this operation for the opposite bearing.
Support the two exposed journal pegs on lead blocks (to protect ground surface) and tap the ears of the flange yoke to remove the race.
Reverse assembly and repeat the operation.
Wash all parts in petrol or paraffin.
If parts are not worn, repack the lubricated type of bearings with Shell Spirax 140 E.P. Repack the sealed type of bearings with Shell Dentax 250. Make sure that the joints of oil channels are filled with lubricant. With the rollers in position fill the race about one-third full. Should any difficulty be encountered when assembling the rollers in the housing, smear the wall of the race with vaseline. Install the new gaskets and gasket retainers on the journal assembly. The journal shoulders should be coated with shellac or other suitable jointing prior to fitting retainers so as to ensure a good oil seal. It is also useful to have spare snap rings available as replacements in the event of damaging a ring in assembling the joint.
On cars which are fitted with a rear coupling, of the type illustrated in inset C, Fig. 16, the rear universal joint is dismantled in exactly the same way as the front joint after removing the coupling. For cars which are fitted with a metal to rubber universal joint, (inset B, Fig. 16), the rear joint cannot be overhauled in service, and in the event of damage a new joint must be fitted. Normally, no purpose will be served by removing the joint from the propeller shaft, but if this becomes necessary, the universal joint and the propeller shaft should be marked before they are separated so that they can be replaced in the same position on assembly.

To reassemble

Insert journal in flange yoke holes.
Using a soft, round drift with a flat face, about $\frac{1}{32}$in. (·79 mm.) smaller in diameter than the hole in the yoke, tap the bearing into position.
Repeat this operation for the other three bearings.
Fit new snap rings and be sure that these are firmly located in the grooves.
When assembled, if joint appears to bind, tap the lugs lightly with a wooden mallet, which will relieve pressure of the bearing on the end of the journal.
It is essential that no play exists between the roller races and the bores of the yokes. If the yoke cross-holes have worn oval, the yokes must be replaced.
In the case of the inner yokes renewal can only be effected by fitting a new propeller shaft, since this yoke is welded to, and balanced with, the tubular shaft.

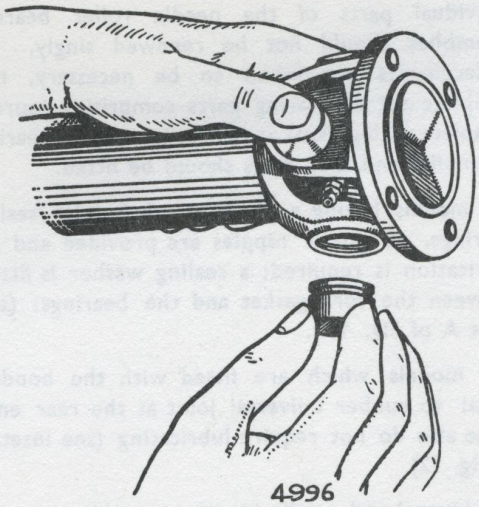

Fig. 14. *Fitting needle roller bearings*

DIAPHRAGM CLUTCH (Later Models)

Description

A single dry plate type clutch is fitted, incorporating a copper impregnated graphite release bearing which is self lubricating.

No attention with regard to lubrication is necessary.

The assembly consists of a pressed steel cover (9) and a cast iron pressure plate (4) which are linked together by three flat steel straps, (1), and a steel diaphragm spring (7). NOTE. Do not disturb the cover strap drive bolts.

The diaphragm spring is pinched between two fulcrum rings (3) which are secured to the cover by special rivets (8).

A release plate assembly (5) is attached to the cover (9) by three spring steel straps, each rivetted at one end to the cover, and at the other end to the release plate (5). Finally, three retractor clips (2) bolted to the pressure plate, clip over the rim of the diaphragm spring to ensure that the pressure plate retracts during clutch disengagement.

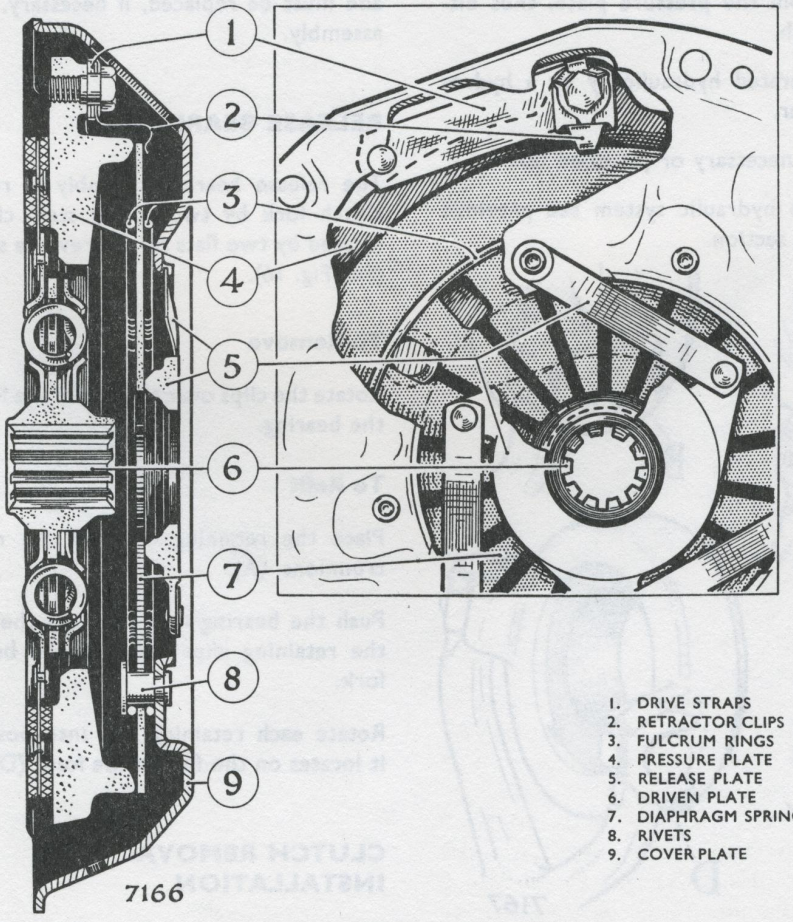

Fig. 15. *Sectional view of Diaphragm Clutch.*

Operation

When the cover assembly and driven plate is bolted to the flywheel, the diaphragm spring comes under installation load and is deflected from its free shallow coned profile to an approximately flattened condition.

This deflection, via the outer fulcrum ring, provides the load on the pressure plate. Pressure on the release plate will further deflect the diaphragm spring, retracting the periphery due to the leverage about the inner fulcrum ring.

This action results in the diaphragm spring load being relieved from the pressure plate, thus disengaging the clutch.

The clutch is operated hydraulically by a hydrostatic slave cylinder.

No adjustment is necessary or provided for.

For details of the hydraulic system see previous paragraphs in this section.

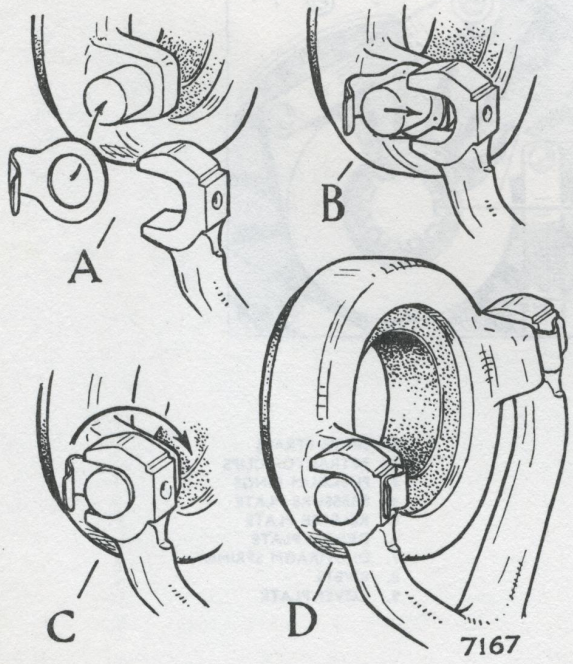

Fig. 16. *Fitting Release bearing.*

Under no circumstances must the clutch be lifted or pulled by means of the thrust plate or the straps will be bent and the alignment of the thrust plate destroyed.

Clutch Driven Plate.

To Remove and Refit. See previous paragraphs in this section.

COVER ASSEMBLY

No servicing should be attempted on this assembly, as the unit is built and balanced during manufacture, and must be replaced, if necessary, by a complete assembly.

RELEASE BEARING

The release bearing assembly is retained to the clutch fork by two spring steel clips, which are located by two flats on the reverse side of the fork. (See Fig. 16).

To Remove

Rotate the clips over the end of the fork, and detach the bearing.

To Refit

Place the retaining clips on the release bearing trunnions. (A).

Push the bearing into place on the fork (B), with the retaining clips between the bearing and the fork.

Rotate each retaining clip into position (C) until it locates on the flat on the fork. (D). (See Fig. 16).

CLUTCH REMOVAL AND INSTALLATION

See previous paragraphs in this section.

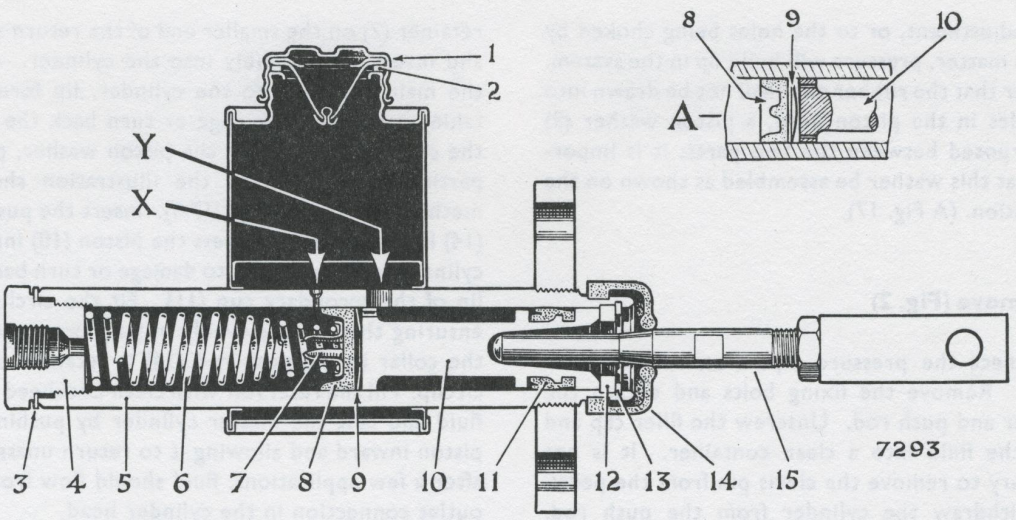

Fig. 17 *Sectional view of master cylinder*

1. FILLER CAP
2. WASHER
3. GASKET
4. OUTLET PLUG
5. BODY
6. SPRING
7. SPRING RETAINER
8. MAIN CUP
9. PISTON WASHER
10. PISTON
11. SECONDARY CUP
12. PISTON COLLAR
13. CIRCLIP
14. RUBBER BOOT
15. PUSH ROD ASSEMBLY
Y. MAIN PORT
X. BY-PASS PORT

MASTER CYLINDER (*Rapier IV and Alpine IV*)

Adjustment

Measure the clutch pedal free play, using feeler gauges between the pedal stem and the pedal stop, located behind the parcel tray. This should be .040" (1 mm.).

Adjust as follows:—

Push back the pedal return spring and cap and loosen the master cylinder push rod locking nut, preventing the push rod from turning using a spanner on the two flats on the rod.

Turn the master cylinder push rod until the correct clearance has been obtained. Turning clockwise will reduce the clearance, anti-clockwise will increase the clearance When correct, retighten the locknut.

Any alteration to the setting of the pedal stop will affect the clutch and brake pedal clearance and should remain undisturbed as far as possible. Before removing the stop (if necessary) mark the position and recheck the clutch and brake pedal clearance after refitting the stop in the position previously marked.

NOTE:

A groove is formed round the edge of the master cylinder outlet plug (see item on fig. 17). This identifies it from the brake master cylinder, which has no groove. Clutch and brake master cylinders are not interchangeable, as the clutch master cylinder has no check valve. On cars with Servo assisted Brakes the Brake Master cylinder is larger.

Description

This unit (Fig. 17) incorporates a fluid reservoir and a master cylinder. In front of the main rubber cup (8), when the system is at rest, is a by-pass port (X) which ensures that the system is full of fluid at all times, and allows full compensation for movement of the fluid due to changes of temperature. It also serves to release fluid drawn into the cylinder from the annular space formed by the reduced skirt of the piston (10), through the small holes in the piston, after each clutch application. If this additional fluid is not released to the reservoir through the by-pass port, due either to the hole being covered by the main cup as a result of incorrect

pedal adjustment, or to the holes being choked by foreign matter, pressure will build up in the system. In order that the rubber cup shall not be drawn into the holes in the piston head, a piston washer (9) is interposed between the two parts; it is important that this washer be assembled as shown on the illustration. (A Fig. 17).

To remove (Fig. 2)

Disconnect the pressure pipe from the cylinder barrel. Remove the fixing bolts and detach the cylinder and push rod. Unscrew the filler cap and drain the fluid into a clean container. It is not necessary to remove the clevis pin from the pedal, just withdraw the cylinder from the push rod. There is no circlip.

To dismantle (Fig. 17)

Push the piston (10) down the bore of the cylinder and remove the circlip (13). Withdraw the piston, piston washer (9), rubber cup (8), retainer (7) and return spring (6). Using only the fingers to prevent damage, remove the secondary cup (11) by stretching it over the end flange of the piston.

To assemble

Fit the secondary cup (11) on the piston (10), so that the lip of the cup faces the piston head, and gently work the cup round the groove with the fingers to ensure that it is properly seated. Assemble the retainer (7) on the smaller end of the return spring and insert the assembly into the cylinder. Insert the main cup (8) into the cylinder, lip foremost, taking care not to damage or turn back the lip of the cup; follow up with the piston washer, paying particular attention to the illustration showing method of assembly (Fig. 17A). Insert the push rod (14) in the piston and press the piston (10) into the cylinder taking care not to damage or turn back the lip of the secondary cup (11). Fit the circlip (13) ensuring that it beds evenly in its groove and that the collar in the push rod (14) is retained by the circlip. Fill the reservoir with clean Lockheed brake fluid and test the master cylinder by pushing the piston inward and allowing it to return unassisted; after a few applications, fluid should flow from the outlet connection in the cylinder head.

To refit

Fit the boot (12) on the cylinder (5) so that the vent hole in the boot will be at the bottom when the cylinder is mounted on the vehicle.

Attach the master cylinder to the mounting bracket. Check the pedal adjustment (see page 15), fill with fluid, bleed the system and check for leakage by applying a firm pressure to the pedal and inspecting the "line" and connections.

SLAVE CYLINDER

For details see previous paragraphs in this Section.