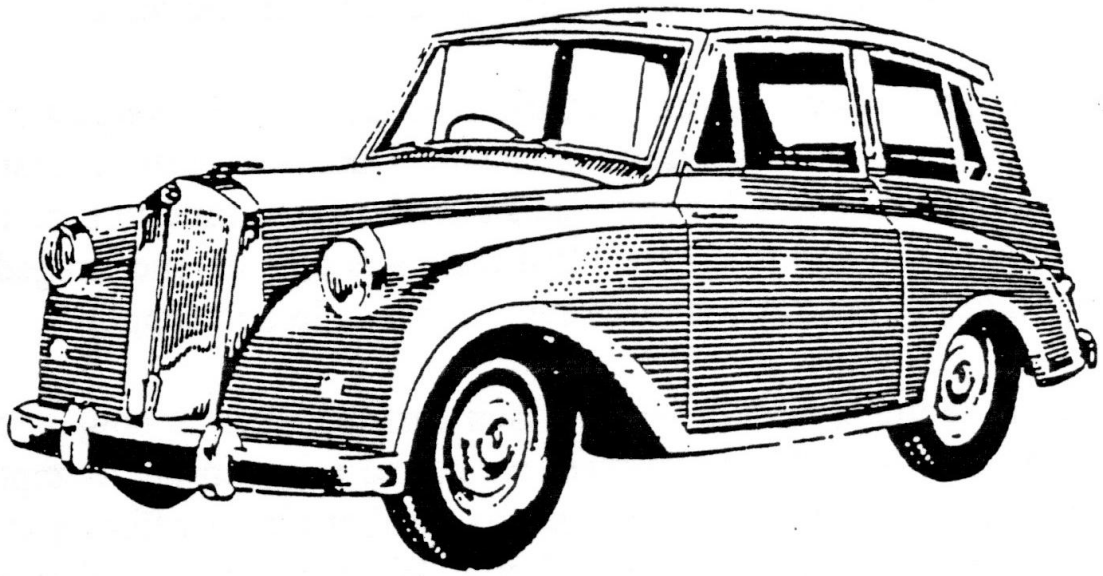
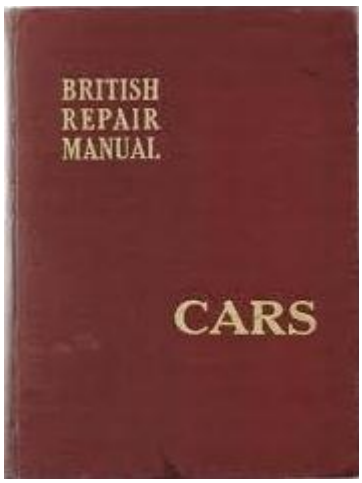
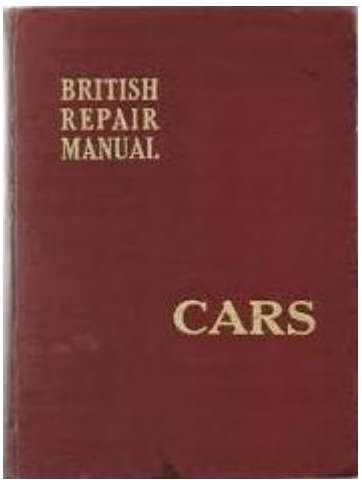


TRIUMPH MAYFLOWER CLUB

BRITISH REPAIR MANUAL: APPENDICES





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SOLEX MODELS 30FAI and 30FAIO DOWNDRAUGHT CARBURETTORS

TECHNICAL NOTES.

Bi-Starter.

The Solex "bi-starter" unit is a small auxiliary carburettor integral with the main carburettor to ensure easy starting from cold and to assist "getaway" until the engine is warm enough to function satisfactorily without its aid.

It has two adjustable units to provide a correct balance of air and petrol for the above purposes. The air jet (Ga) meters the air supply. The petrol jet (Gs) meters the petrol.

It is to be emphasised that the bi-starter should be operated in two positions during the process of starting from cold and driving away, as follows:-

(a) To start the engine when cold, pull out fully the dashboard control to which the bi-starter lever is connected. In this position it gives a very rich mixture, which is essential for cold starting.

(b) Almost immediately after starting, the engine begins to warm up and the dashboard control should be pushed into the "bi-starter" position, i.e., approximately halfway, when a marked resistance will be felt indicating that the control position has been reached as determined by the location of the spring ball (sb) in a notch in the rotating valve disc (dd) provided to register at the correct position. At this stage the mixture strength is considerably reduced, for the volume of air inspired by the engine increases proportionately with the rise in engine speed as it continues to warm up, whilst the petrol supply is restricted. The mixture strength is thus sufficient to ensure immediate ''getaway" without risk of the engine stalling as the accelerator is depressed.

(c) As soon as the engine is warm enough (usually after driving a few hundred yards) to dispense with the aid of the bi-starter, the dashboard control must be pushed fully home, thus putting the starting device completely out of action.

Slow Running (Idling).

When idling the mixture is provided by the pilot jet (g), the air bleed (u) and the volume control screw (W), the last decreasing the mixture strength by clockwise rotation and vice versa.

Normal Running.

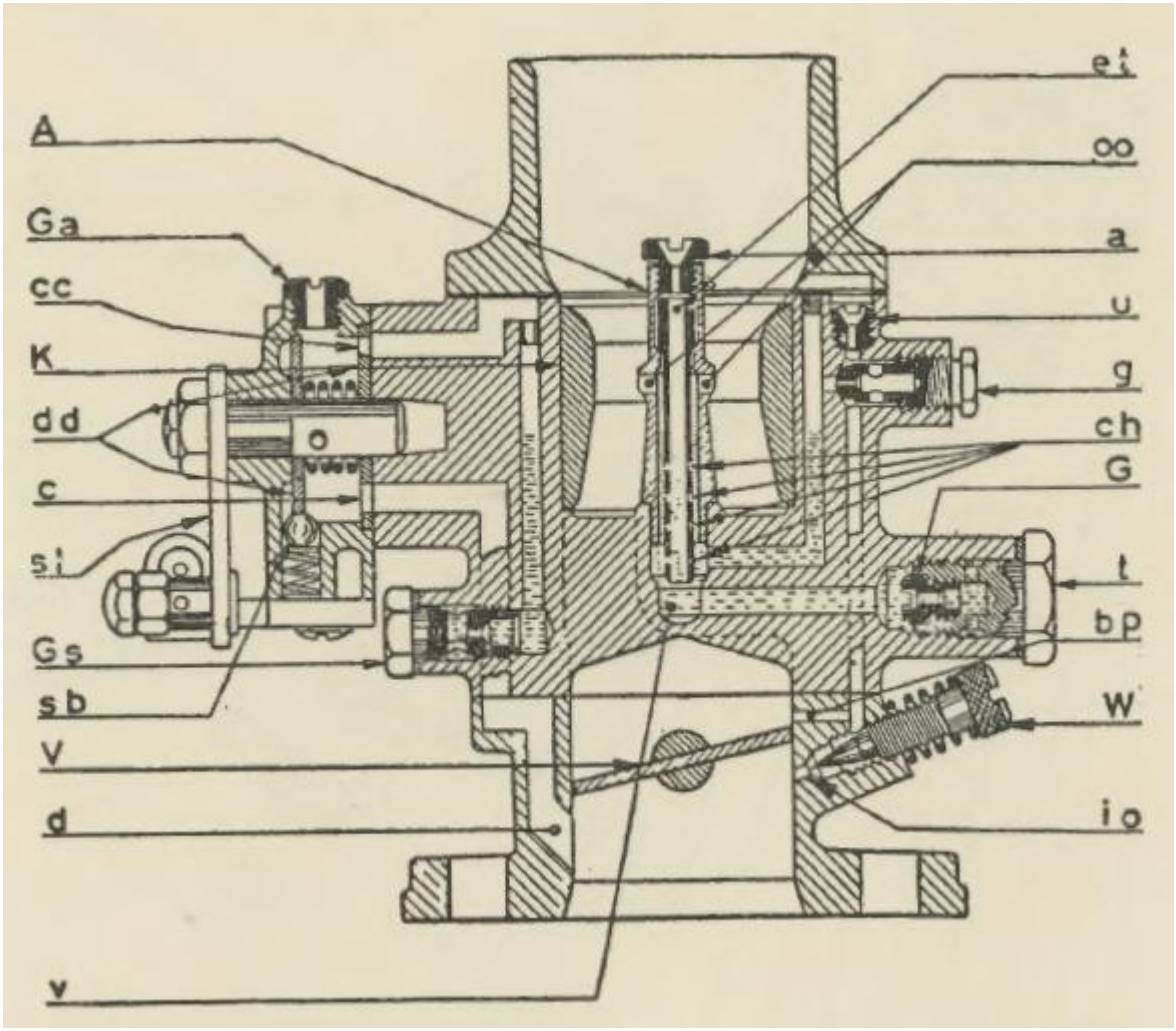
For normal running above idling speed the engine is provided with the correct mixture for all speeds by the main spraying assembly. The petrol is provided by the main jet (G) and the main air supply for disintegration of the petrol by the choke tube (K). The correct balance of mixture is further automatically maintained by an additional air supply in the form of a calibrated jet, called the air correction jet (a).

It is not possible in the illustration to show the float chamber, but it is of conventional design carrying a float which closes a needle valve when the petrol from the float chamber passes through the main jet (G) into the spraying well (A) via the reserve well (v) where it meets air drawn downwards via the calibrated air correction jet (a). This passes out through the emulsion holes (eh) into the annulus, where an emulsion is formed with the petrol, and the resultant mixture rises to the four spraying orifices, of which two are shown (oo) in the waist of the choke tube (K). Here the emulsion is absorbed by the main air current and passes down to the induction pipe of the engine via the butterfly throttle (V).

Setting the Idling.

The idling is effected by petrol drawn from the reserve well (v) via a small channel which will be seen emerging there from immediately above the larger horizontal lead from the main jet. This it will be noted, turns upwards and eventually passes through the pilot jet (g) into the downwards tract communicating with the idling orifice (io) controlled by the spring loaded and knurled-headed taper screw (W). It will be noted that this orifice is on the engine, i.e., suction side, of the throttle butterfly.

A branch lead communicates with another orifice (bp) which enters the airway slightly on the atmospheric side of the almost closed throttle.



Ga.—Starter air jet.
d.—Starter mixture delivery duct.
cc.—Starter valve duct.
dd.—Spring loaded disc valve.
c.—Starter mixture exit duct.
si.—Starter lever.
Gs.—Starter petrol jet.
sb.—Spring ball (bi-starter position).
A.—Spraying well.
a.—Air correction jet.
et.—Emulsion tube.
oo.—Spraying orifices.
u.—Pilot jet air bleed.
g.—Pilot jet.
ch.—Emulsion holes.
G.—Main jet.
t.—Main jet holder.
K.—Choke tube.
bp.—By-pass.
W.—Volume control screw.
io.—Idling mixture orifice.
V.—Throttle butterfly.
v.—Reserve well.

When the throttle is in the idling position, this duct, which is termed the by-pass, acts as an air bleed upon the idling petrol supply and therefore prevents over-richness when the engine is actually idling. Directly the throttle opens, the butterfly passes to the atmospheric side of the by-pass orifice, so that both (bp) and (io) function as petrol delivery orifices, thereby proportionately enriching the output at the transfer position between the pilot and main supplies and preventing a lean spot which might otherwise occur.

Adjusting the Idling.

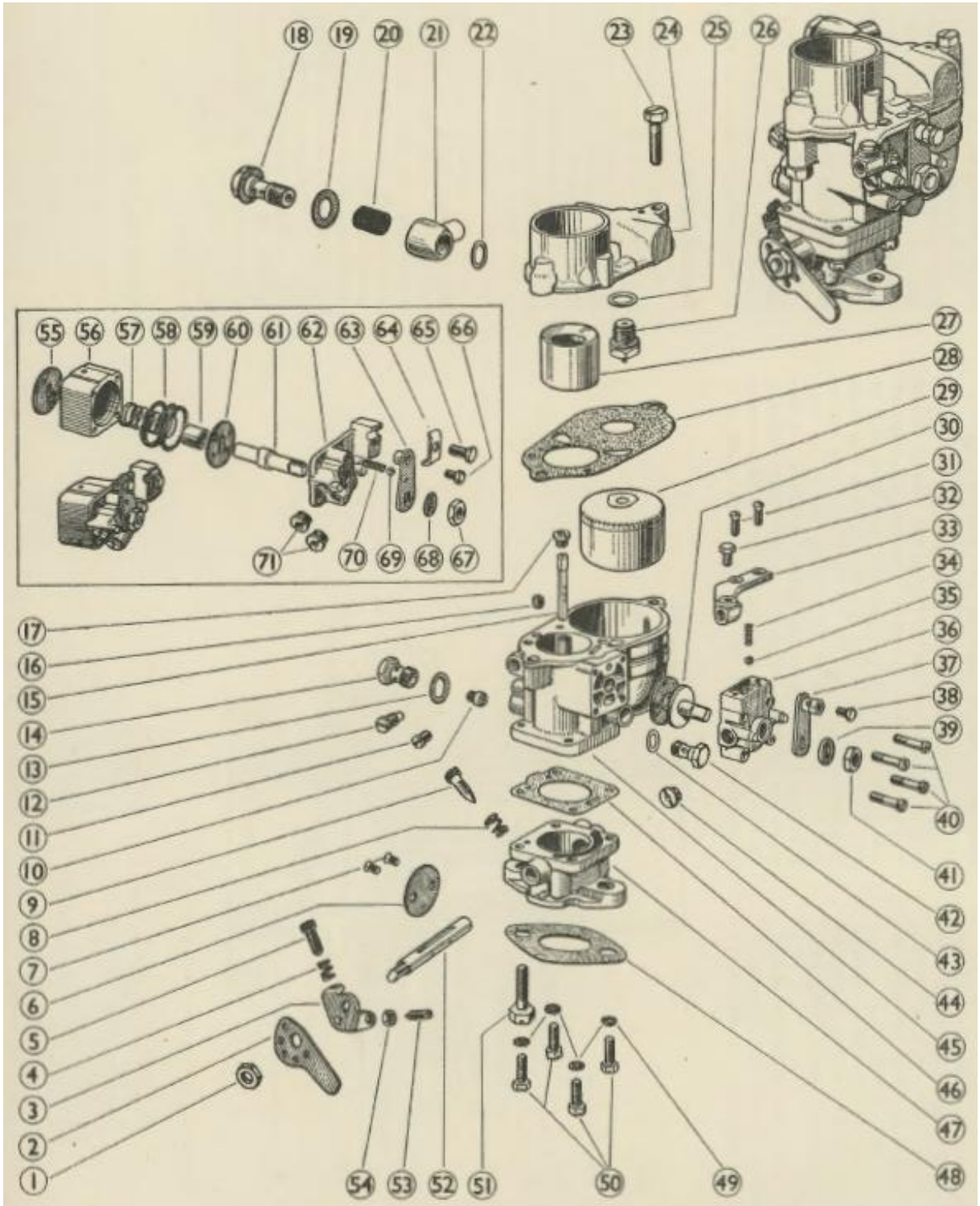
This adjustment is of considerable importance, and depends upon the mechanical perfection of the engine. Compressions should be equal, ignition in good order, and the induction system free from air leaks. The throttle "pull-off" spring must pull the throttle back to its stop, i.e., closed position and all nuts, screws, etc., used in the assembly of the carburettor must be tight. Note particularly that the volume control screw (W) has not been broken or distorted by over-tightening. If it has, a new screw must be obtained.

Normal adjustment is carried out as follows:-

1. Wait until the engine is hot.
2. Set the throttle adjustment screw until the idling speed is on the high side.

3. Slacken the volume control screw (W) until the engine begins to hunt.
4. Screw it in very gradually until the hunting just disappears.
5. If the engine speed is too high, reset the screw to slow it down to an idling speed of about 500 r.p.m.
6. This may cause a resumption of slight hunting. If so, then turn the volume control screw gently in a clockwise direction until the idling is perfect.

These adjustments must never be made with a cold engine.



MODELS 30 FAI BI-STARTER — 30 FAI0 ZERO STARTER.
Incorporating "21 Assembly" Spraying System.
The illustration in the panel "explodes" the zero starter as fitted to Model 30 FAI0.

30FAI CARBURETTOR.
Specification S1515.

ITEM.	DESCRIPTION.	PART No.
1.	Throttle spindle end nut	4024
2.	Throttle lever	5128/5
3.	Throttle spindle abutment plate	4019
4.	Slow running adjustment screw spring	4384
5.	Slow running adjustment screw	4023
6.	Throttle butterfly	51270
7.	Throttle butterfly fixing screw	1129
8.	Volume control screw spring	4384
9.	Volume control screw	1171
10.	Main jet	50552/6/
11.	Choke tube fixing screw	50362
12.	Pilot jet	50797/4/
13.	Main jet carrier washer	50815
14.	Main jet carrier	50820
15.	Emulsion tube	52043/L4
16.	Pilot jet air bleed	51274/1/150
17.	Air correction jet	51612/
18.	Not fitted.	
19.	Not fitted.	
20.	Not fitted.	
21.	Not fitted.	
22.	Not fitted.	
23.	Float chamber assembly screw	50239
24.	Float chamber cover	60069/2
25.	Needle valve washer	2261
26.	Needle valve	51305/17
27.	Choke tube	52846
28.	Float chamber cover gasket	51429
29.	Float	50772/1
30.	Starter valve complete	51757/C
31.	Cable support fixing screw	9698
32.	Starter cable locking screw	51760
33.	Cable support	51782
34.	Starter valve locating ball spring	51762
35.	Starter valve locating ball	51738
36.	Bi-starter body only	51784
37.	Starter lever with cable swivel	51758/C
38.	Starter cable swivel screw	51760
39.	Starter spindle washer	4031
40.	Starter body fixing screw	51421/3
41.	Starter spindle nut	4024
42.	G.S. petrol jet (starter)	52823/
43.	G.S. petrol jet washer	52825
44.	G.A. air jet (starter)	50906/
45.	Float chamber assembly	10937
46.	Throttle chamber gasket	9348
47.	Throttle chamber only	60148/2
48.	Flange washer	1557/L1
49.	Throttle chamber fixing screw washer	901
50.	Throttle chamber fixing screw	51183
51.	See item 23.	
52.	Throttle spindle	50450/L1
53.	Throttle stop screw	50537
54.	Throttle stop screw lock nut	3950
	Special Details	
	Petrol union adaptor	6524
	Petrol union adaptor washer	4124/1
	Petrol pipe union nut	5068
	Petrol pipe nipple	5066

30 FAIO CARBURETTOR
Specification S.1573/0

1.	Throttle spindle end nut	4024
2.	Throttle lever	10873
3.	Throttle spindle abutment plate	4019
4.	Slow running adjustment screw spring	4384
5.	Slow running adjustment screw	4023
6.	Throttle butterfly	51270
7.	Throttle butterfly fixing screw	3947
8.	Volume control screw spring	4384
9.	Volume control screw	1171
10.	Main jet	50552/6/
11.	Choke tube fixing screw	50362
12.	Pilot jet	50797/4/
13.	Main jet carrier washer	50815
14.	Main jet carrier	50820
15.	Emulsion tube	52043
16.	Pilot jet air bleed	51274/1/20
17.	Air correction jet	51612/
18.	Banjo bolt	4122
19.	Banjo bolt washer	4124
20.	Filter gauze	4123
21.	Banjo union	4120/18
22.	Banjo union washer	4124/1
23.	Float chamber assembly screw	50239
24.	Float chamber cover	60069/2
25.	Needle valve washer	2261
26.	Needle valve	51305/7
27.	Choke tube	52846/
28.	Float chamber gasket	51429
29.	Float	50772/3
40.	Starter body fixing screw	51421/1
42.	G.S. Petrol jet (Starter)	52823/
43.	G.S. Petrol jet washer	52825
45.	Float chamber assembly	11095
46.	Throttle chamber gasket	9348
47.	Throttle chamber only	60148/2
48.	Flange washer	1557/L1
49.	Throttle chamber fixing screw washer	901
50.	Throttle chamber fixing screw	51183
51.	See item 23.	
52.	Throttle spindle	50460
53.	Throttle stop screw	50537
54.	Throttle stop screw lock-nut	3950
55.	Starter valve	x 7631
56.	Starter body only	x 7656
57.	Starter air valve spring	x 7503
58.	Starter valve main spring	x 7183
59.	Starter spindle bush	x 7179
60.	Starter air valve	x 7655
61.	Starter spindle	x 7176
62.	Starter cover	x 7630
63.	Starter lever with cable swivel	x 10508
64.	Starter cable clip	x 50881
65.	Starter cable clip fixing screw	x 50924
66.	Starter cable swivel screw	x 51760
67.	Starter spindle nut	x 4024
68.	Starter spindle washer	x 4031/1
69.	Starter valve locating ball	x 51738
70.	Starter valve locating ball spring	x 51762
71.	G.A. air jet (starter)	x 50906
	x Items are normally supplied as a completely assembled unit only (less G.A. jets)	10778

LOCKHEED TWO LEADING SHOE HYDRAULIC BRAKES

General Description.

The Lockheed hydraulic brake equipment consists of a master cylinder of the integral barrel type, containing a reserve supply of fluid, in which hydraulic pressure is generated; single-ended internal wheel cylinders which operate the two leading shoe front brakes; single-ended internal cylinders, incorporating handbrake operating levers, which operate the leading and trailing rear brakes, and the "line" consisting of tubing, flexible hoses and unions between the master cylinder and the wheel cylinders.

Principle of Operation.

In the Lockheed hydraulic brake, the pressure exerted on the brake pedal is conveyed to the brake shoes by a column of special Lockheed fluid. Illustration, Fig. 1, shows the system with two wheel cylinders placed between the front brake shoes and one wheel cylinder between the rear brake shoes. The master cylinder has a single piston, likewise the wheel cylinders and all pistons are provided with rubber cups to maintain pressure and prevent loss of fluid.

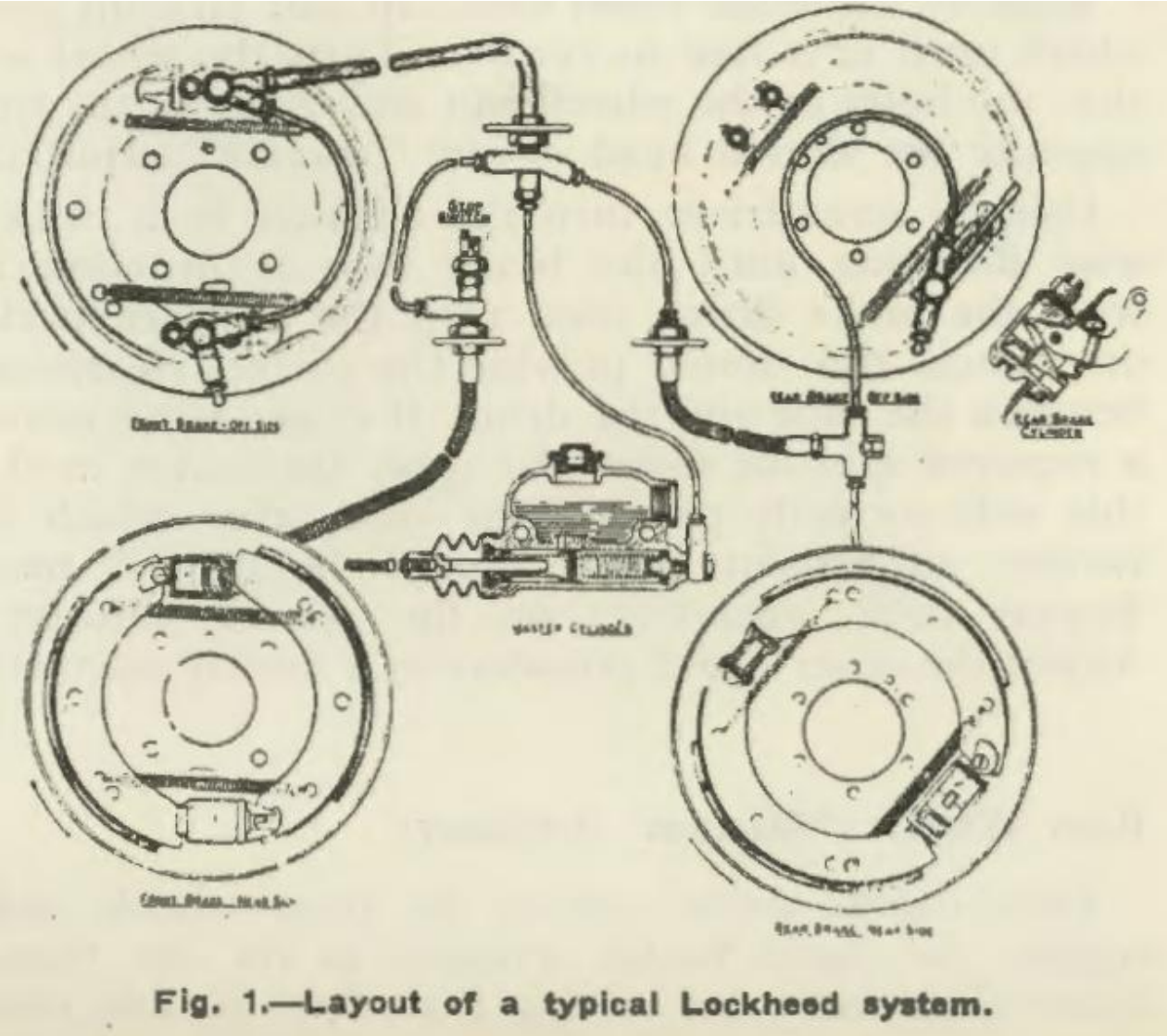


Fig. 1.—Layout of a typical Lockheed system.

When the brake pedal is operated the master cylinder piston applies a force to the fluid causing the single piston in each front wheel cylinder to apply a pressure to the leading tip of its respective brake shoe, while the trailing tip of the shoe finds a floating anchor by utilising the closed end of the actuating cylinder of the other shoe as its abutment. At the same time the rear wheel cylinder, which is free to slide in an elongated slot in the rear back plate between the tips of the leading and trailing shoes, operates on the top of the leading shoe and this shoe abuts against a fixed anchor block at the bottom of the back plate, the web of the shoe being free to slide in a slot in the block. The trailing shoe is located in a similar manner between the anchor block and the

closed end of the wheel cylinder. It is free to slide and therefore self-centring. The trailing shoe is operated by movement of the cylinder assembly as a result of the reaction of the leading shoe against the brake drum. Further effort on the pedal increases the force applied to the brake shoes.

The pressure generated in the master cylinder is transmitted with equal and undiminished force to the piston of each wheel cylinder; therefore the pressures applied to the brake shoes are identical. When the pressure on the brake pedal is released, the brake shoe pull off springs force each wheel cylinder piston back into its respective cylinder and the fluid passes back to the master cylinder ready for the next brake application.

Routine Attention.

Examine the fluid level in the master cylinder and replenish, if necessary, to keep the level half an inch below the filler cap. Do not fill completely. The addition of fluid should only be required at extremely long intervals, and a considerable fall in fluid level would indicate a leak at some point in the system which should be traced and rectified **immediately**. To check for leaks, apply firm pressure to the brake pedal and inspect the pipes and connections.

Ensure that the air vent in the filler cap is not choked; blockage at this point would cause the brakes to drag.

Adjust the brakes when the pedal travels to within one inch of the floor board before solid resistance is felt. If it is desired, adjustment may be carried out before the brake linings have worn to this extent.

Use of the Genuine Lockheed Fluid.

The special fluid used is one of the most important factors in the correct operation of the hydraulic system for no equipment will give satisfaction with incorrect fluid. When topping up or overhauling hydraulic brakes use only the genuine Lockheed brake fluid for it lengthens the life of all internal parts, acts as an efficient lubricant and operates satisfactorily under all extremes of temperature.

Flushing the System.

Should the fluid in the system become thick or gummy after many years in service, or after a vehicle has been laid up for some considerable time, the system should be drained, flushed and refilled. It is recommended that this should be carried out once every five years.

Pump all fluid out of the hydraulic system using the bleeder screw of each wheel cylinder in turn. To do this, connect one end of a rubber tube to the bleeder screw, allowing the other end to fall into a container, unscrew the bleeder one complete turn and pump the brake pedal by depressing it quickly and allowing it to return without assistance. Repeat, with a pause between each operation, until no more fluid is expelled. Discard the rubber tube.

Fill the supply tank with industrial methylated spirit and flush the system by pumping as described above. Keep the supply tank replenished until at least a quart of spirit has been passed through each wheel cylinder.

Where possible, remove the supply tank and pour off any remaining spirit.

Refill with clean Lockheed brake fluid and bleed the system as indicated below.

Note-If the system has become contaminated by the use of mineral oil, etc., the above process may not prove effective. It is recommended that the various units, including the pipe line, should be dismantled and thoroughly cleaned and that all rubber parts, including flexible hoses, should be replaced. The contaminated fluid should be destroyed immediately.

Bleeding the System.

Bleeding the system, or expelling air, is not a routine operation and should be necessary only when some portion of the hydraulic equipment has been disconnected or when fluid has been drained off.

(1) Fill the supply tank with brake fluid and keep at least a quarter full throughout the operation. Otherwise, air will be drawn in and a fresh start will be necessary.

(2) If the master cylinder used in the system is of a type fitted with a bleeder screw, commence at this unit. Slacken the bleeder screw; depress the brake pedal slowly by hand. While FLUID issues and before the pedal reaches the end of its stroke, tighten the bleeder screw.

(3) Attach a rubber tube to the bleeder screw on one of the wheel cylinders and allow the free end to be submerged in a little fluid in a clean glass jar. Open the bleeder screw one complete turn.

(4) Depress the brake pedal slowly, allowing it to return unassisted. Repeat this pumping action with a slight pause between each operation. Watch the flow of fluid in the jar and when all air bubbles cease to appear hold the pedal down firmly and securely tighten the bleeder screw.

(5) Repeat at all wheel cylinders.

Note-Clean fluid bled from the system should be allowed to stand for several hours, until it is clear of all air bubbles, before being used again. Dirty or discoloured fluid, if not contaminated may be filtered and used again.

Fig. 2.—Bleeding the front wheel cylinder.

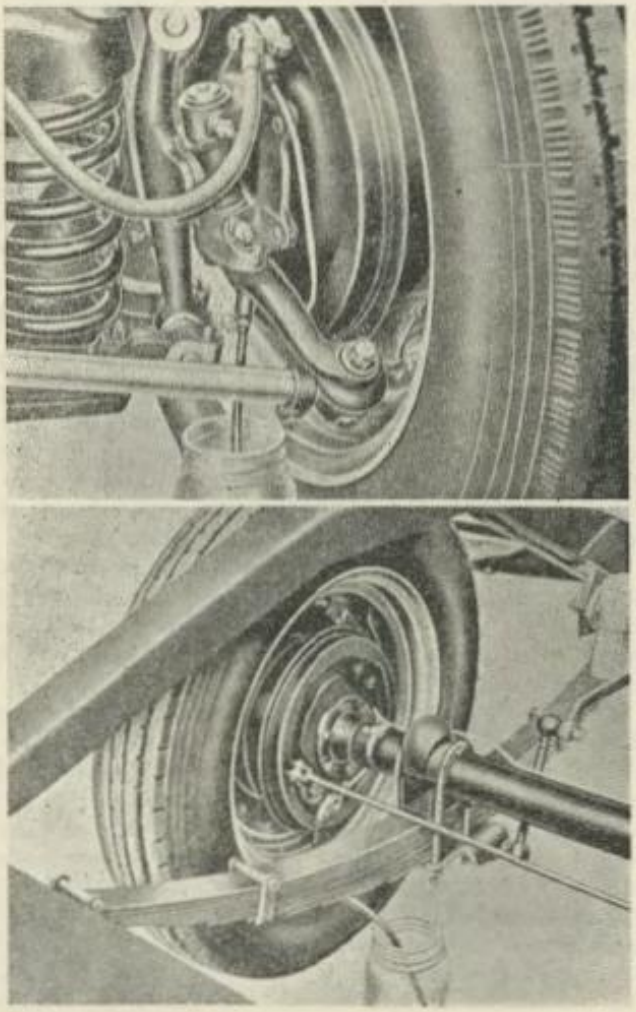


Fig. 3.—Bleeding the rear wheel cylinder.

Pedal Adjustment.

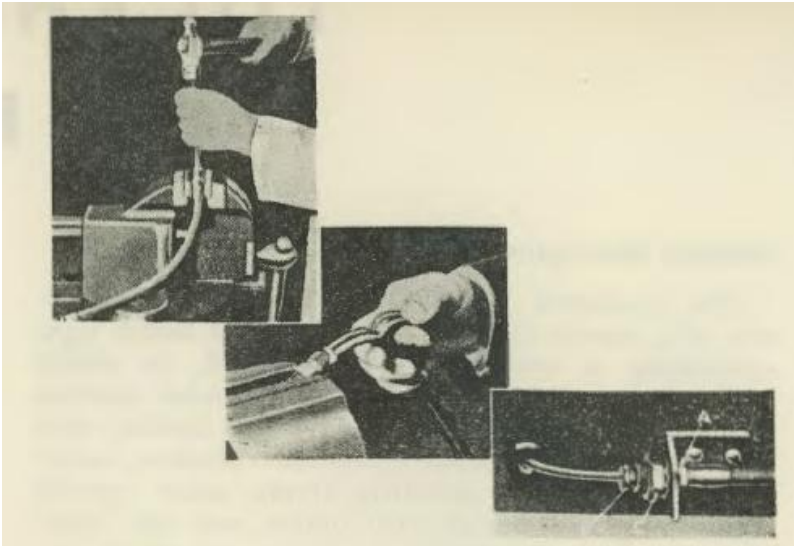
Incorrect pedal adjustment-i.e. pedal to master cylinder push-rod-may prevent the master cylinder piston returning to its stop, thereby causing the lip of the main cup to cover the bypass port. The excess fluid, drawn into the cylinder during the return stroke of the piston, will find no outlet and pressure will build up in the system causing all brakes to drag or remain on.

The correct pedal adjustment is set when the vehicle is assembled and should never need alteration. A minimum clearance of 1/32 is necessary between the pedal push-rod and the master cylinder piston which entails a margin of safety of 3/8 to 1/2 free pedal movement measured at the pedal pad. This free movement can be felt if the pedal is depressed gently by hand. Should it not be apparent, first check to make sure that the pedal is not being fouled by a displaced mat or floorboard preventing the complete return of the pedal to the off position. In the event of the adjustment having been disturbed, slacken the locknut and reset the length of the pushrod extension connecting the pedal to the master cylinder, until the pedal can be depressed the correct amount before the piston begins to move. Re-tighten the locknut.

Removing a Flexible Hose.

In some cases the cause of faulty brakes may be traced to a choked flexible hose. DO NOT attempt to clear the obstruction as shown this will only result in a damaged hose.

Replace with a new hose. Never attempt to unscrew a flexible hose by turning the end sleeve by means of a spanner without first detaching the coupling to which it is attached.



Figs. 4, 5, 6.—These three illustrations show what NOT to do. Read the text and you will see why.

BRAKE SHOE ADJUSTMENT

Front Wheels ("Micram" adjuster).

Remove the front wheel dust cap and jack up one wheel until it is free to revolve. Turn the wheel so that the holes in the

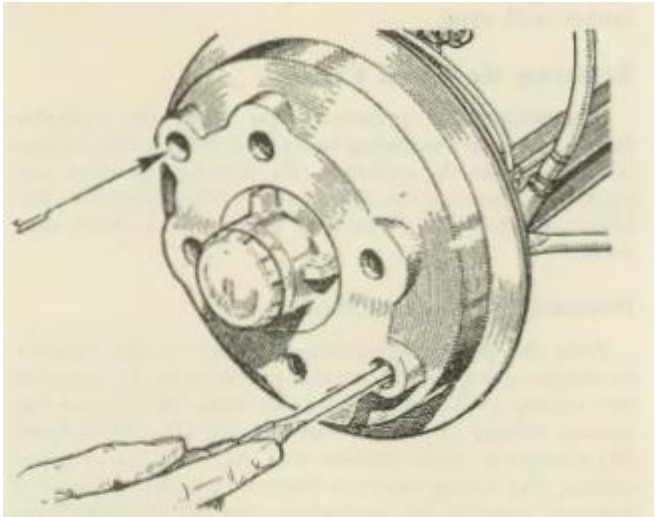


Fig. 7.—The front brake-shoes are adjusted by engaging the adjusting screws with a screwdriver through the holes provided in the brake-drum. There are separate adjusters for each shoe.

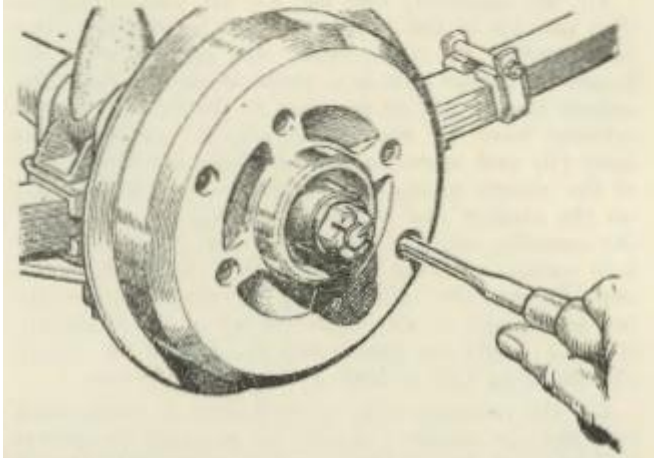


Fig. 8.—The rear brake-shoes are adjusted with a screwdriver through one of the holes in the brake-drum in a similar manner to the front brakes, but there is only one adjuster for both shoes and this adjusts the hand brake at the same time.

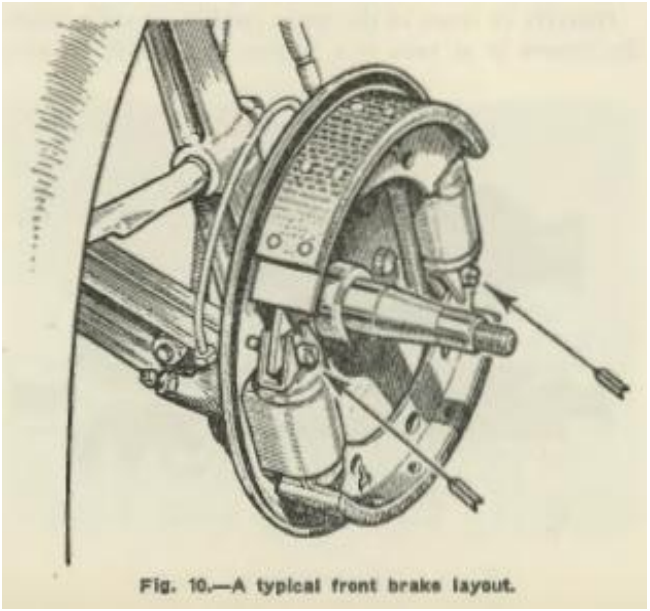


Fig. 10.—A typical front brake layout.

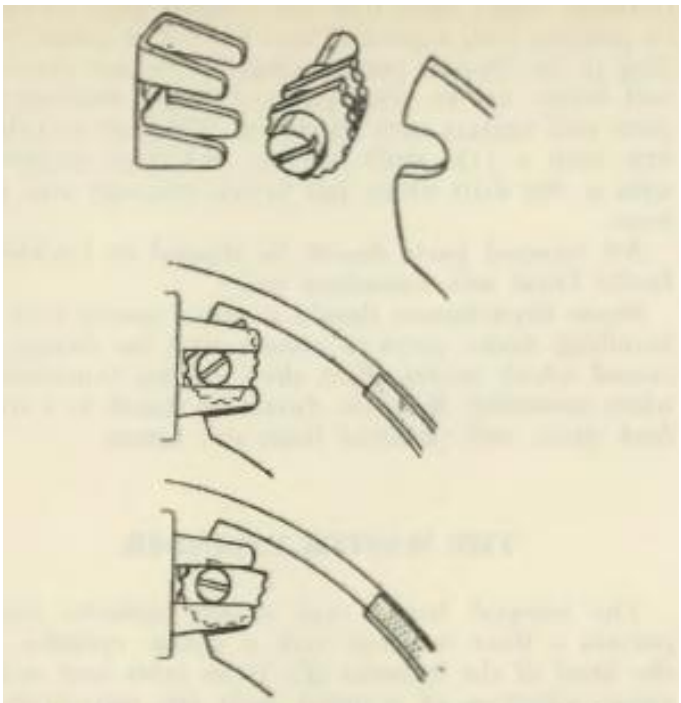


Fig. 9. The component parts of the "Micram" adjuster. —(By courtesy, "The Autocar," London.)

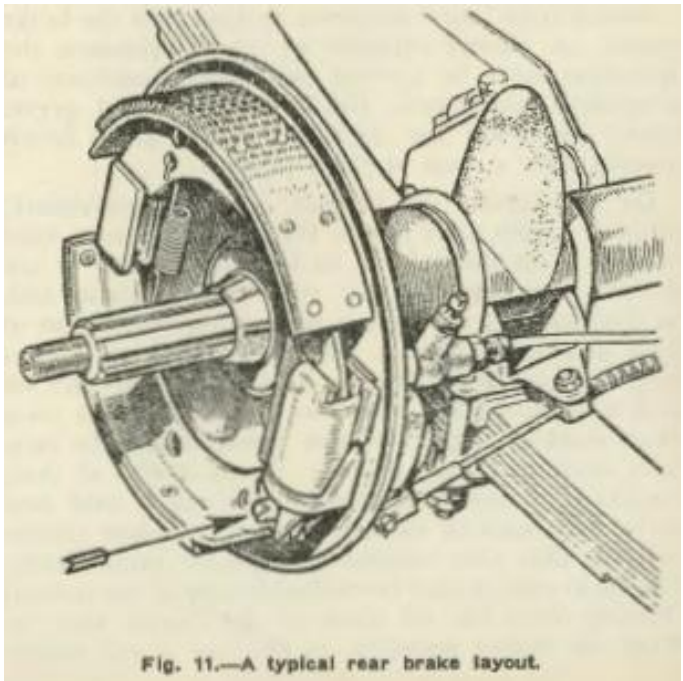


Fig. 11.—A typical rear brake layout.

wheel hub and brake drum are opposite the slotted head of one "Micram" adjuster.

Using a screwdriver turn the adjuster in a clockwise direction until the brake shoe is in contact with the brake drum, then turn the adjuster back one notch; this should provide the correct clearance between the shoe and the drum. If closer adjustment is required spin the drum and apply the brakes hard; this will correctly position the shoe, after which a further adjustment check should be carried out. Repeat these operations on the second adjuster. Adjust the other wheel cylinders in a similar manner.

Rear Wheels ("Micram" Adjuster).

Place chocks under one of the front wheels and release the hand brake. Proceed as for the front brake adjustment but noting that there is only one wheel adjuster to adjust for each rear wheel and that it may be necessary to back off the adjustment by two notches to provide adequate clearance for the two shoes.

Relining the Brakes.

When relining brake shoes, the same make and quality of lining specified for each axle by the vehicle manufacturer must be used throughout, otherwise uneven braking will result despite equal pressure being exerted on all shoes. To enable this to be accomplished in the easiest possible manner, advantage should be taken of the Lockheed exchange shoe scheme, particulars of which will be forwarded by the manufacturers.

Removing the Front Wheel Cylinders and Brake Shoes.

Jack up the vehicle, remove the wheel, back off all the available adjustment and remove the brake drum. Pull one of the brake shoes against the load of the pull of the springs, away from the abutment on the closed end of the adjacent cylinder and slide the "Micram" mask off the piston cover of the operating cylinder; on releasing the tension of the pull off springs, the opposite brake shoe will fall away. Remove the flexible hose, unscrew the banjo bolts on both wheel cylinders and remove the banjo adaptors complete with the bridge pipe. Unscrew the nuts and withdraw the wheel cylinders from the back plate.

Re-fitting the Front Wheel Cylinders and Brake Shoes.

Mount the wheel cylinders on the back plate and secure by means of the spring washers and nuts. Assemble the bridge pipe and banjo connections on the wheel cylinders and fit the banjo bolts using new copper gaskets to ensure pressure tight joints. Screw the flexible hose, with a new copper gasket, into the banjo connection and tighten securely. Mount the opposite end of the hose in the frame or bracket, secure by means of the shakeproof washer and nut and screw and tube nut, which is attached to the pipe, on to the hose end. Assemble the brake shoes taking care to locate the "Micram'' adjusters in the slots in the leading tip of each shoe, with the masks in position.

Removing the Rear Wheel Cylinder and Brake Shoes.

Jack up the vehicle, remove the wheel, back off all the available adjustment, disconnect the rod from the handbrake lever then remove the brake drum. Pull the trailing shoe against the load of the pull off springs away from its abutment at either end; on releasing the tension of the pull off springs the leading shoe will fall away. Collect the "Micram" adjuster and mask. Unscrew the banjo bolt securing the banjo adaptor to the wheel cylinder and remove the rubber boot. Swing the handbrake lever until the shoulder is clear of the backplate and slide the cylinder casting forward. Pivot the cylinder about its forward end and withdraw the rear end from the slot in the backplate; a rearward movement of the cylinder will now bring the forward end clear of the backplate.

Re-Fitting the Rear Wheel Cylinder and Brake Shoes.

Offer up the wheel cylinder to the backplate with the handbrake lever through the slot. Engage the forward end of the cylinder in the slot and slide it well forward, taking care to position the lever so that its shoulder clears the backplate. Engage the rear end of the cylinder in the slot and slide it back to hold it in position. Fit the rubber boot. Mount the banjo connection on the cylinder and, using a new copper gasket, fit the banjo bolt. Assemble the brake shoes, ensuring that the "Micram" adjuster is in the slot in the leading shoe with the mask in position.

DISMANTLING

Routine Instructions.

Should it be found necessary to dismantle the brake system, i.e. master cylinder or wheel cylinders, the operation must be carried out under condition of scrupulous cleanliness. Clean off mud and grease before removing the unit. Dismantle on a bench covered with a sheet of clean paper.

Do not handle the internal parts – particularly rubbers - with dirty hands. Do not swill a unit, after removal from the vehicle, in kerosene, petrol or trichloroethylene as this will ruin rubber parts and, on dismantling, will give a misleading impression of their original condition. Place all metal parts in a tray of clean brake fluid to soak, afterwards dry off with a clean, fluffless cloth and lay out in order on a clean sheet of paper. Rubber items should be carefully examined, and, if there is any doubt of their condition, a comparison should be made with new parts.

Any signs of swollen cups or perished rubber indicate that they should be renewed immediately. The main casings may be swilled in any of the normal cleaning fluids but all traces of the cleaner must be dried out before assembly. In the case of the master cylinder, make sure that the by-pass port is clear by probing with a piece of fine wire. The brakes will drag if the by-pass port is clogged because pressure will build up in the system, thereby forcing the shoes into contact with the drums. The port is drilled first with a 1/16 drill halfway and then completely with a .028 drill which just breaks through into the bore.

All internal parts should be dipped in Lockheed Brake Fluid and assembled wet.

Stores departments should exercise special care in handling brake parts to ensure that no damage is caused which would affect their correct functioning when assembled. Rubbers should be stored in a cold, dark place well removed from any fumes.

THE MASTER CYLINDER

The integral barrel type master cylinder incorporates a fluid reservoir and a master cylinder. In the head of the cylinder (E) is an inlet and outlet valve consisting of a metal body (B) containing a rubber cup (C), and a rubber washer (A) on which the metal body is urged by a return spring (D). The function of the valve is to prevent the return, to the master cylinder, of fluid pumped into the line during the bleeding operation, thereby ensuring a charge of fresh fluid being delivered at each stroke of the brake pedal and a complete purge of air from the system. During normal operation, fluid returning · under pressure and assisted by the effort of the brake shoe pull-off springs, lifts the valve off its seat thereby permitting fluid to return to the master cylinder and the brake shoes to the off position.

Directly in front of the main rubber cup (F), when the system is at rest, is a by-pass (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 (H), through the small holes in the piston, after each brake application. If this additional fluid is not released to the reservoir through the by-pass port due to the hole being covered by the main cup as a result of incorrect pedal adjustment, or to the hole being choked by foreign matter, pressure will build up in the system and all brakes will drag.

Removing the Master Cylinder.

Disconnect the pressure pipe from the cylinder barrel, remove the fixing bolts and detach the rubber boot (N) from the cylinder (E), leaving the boot and push-rod attached to the brake pedal. Unscrew the filler cap (0) and drain the fluid into a clean container.

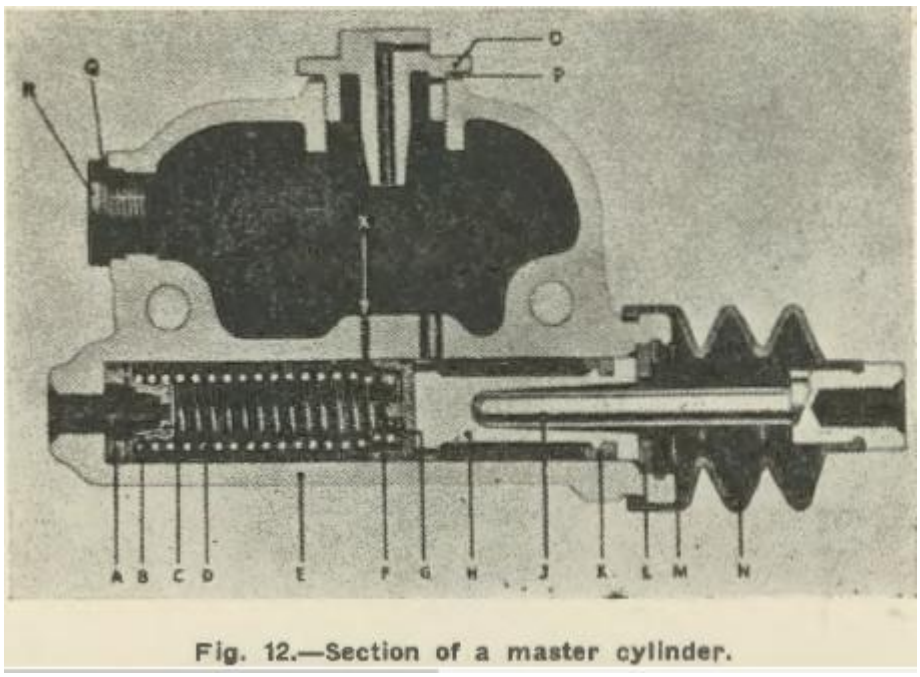


Fig. 12.—Section of a master cylinder.

Dismantling (Master Cylinder).

Push the piston (H) down the bore of the cylinder to release the pressure on the piston stop (L), remove the circlip (M) and the piston stop. Withdraw the piston, rubber cup (F), return spring (D), valve body (B) complete with rubber cup (C) and the rubber washer (A). Using only the fingers in order to prevent damage, remove the secondary cup (K) by stretching it over the end flange of the piston.

Assembling (Master Cylinder).

Fit the secondary cup (K) on the piston (H), 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. Place the rubber washer (A) in position in the bottom of the cylinder bore. Fit the rubber cup (C) in the metal body (B) and assemble the body on the, larger end of the return spring (D). Assemble the retainer (G) on

the smaller end of the return spring and insert the assembly into the cylinder so that the valve body is in contact with the rubber washer. Insert the main cup (F) into the cylinder, lip foremost, taking care not to damage or turn back the lip of the secondary cup (K). Insert the piston stop (L) and fit the circlip (M) ensuring that it beds evenly in its groove.

Fill the reservoir with clean Lockheed brake 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.

Re-Fitting the Master Cylinder.

Insert the push-rod (J) in the piston (H) and fit the boot (N) on the cylinder (E) 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 bracket. Check the brake pedal adjustment, fill with fluid, bleed the system and check for leakage by applying a firm pressure to the brake pedal and inspecting the line and connections.

Front Wheel Cylinders.

The front wheel cylinders are rigidly mounted on the backplate inside the brake drum and between the ends of the brake shoes. Each cylinder operates one shoe only. A single piston in each cylinder acts on the leading tip of its respective shoe, while the trailing tip of the shoe finds a floating anchor by utilising the closed end of the actuating cylinder of the other shoe as its abutment. Between the piston and the leading tip of each shoe is a "Micram" adjuster which is located in a slot in the shoe.

Each wheel cylinder consists of a casting (E) containing a piston (B) fitted with a cover (A) and backed by a rubber cup (C). The space in front of the rubber cup is partially occupied by a cup filler (D).

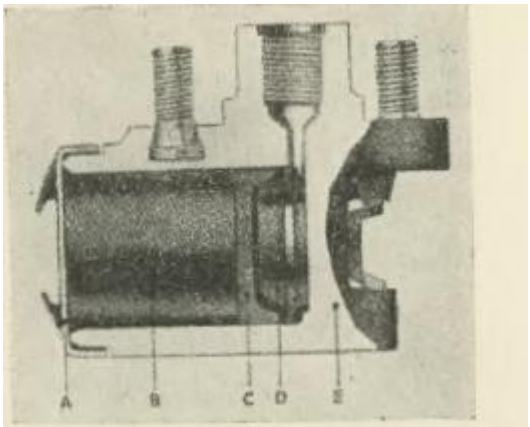


Fig. 13.—Section of a front wheel cylinder.

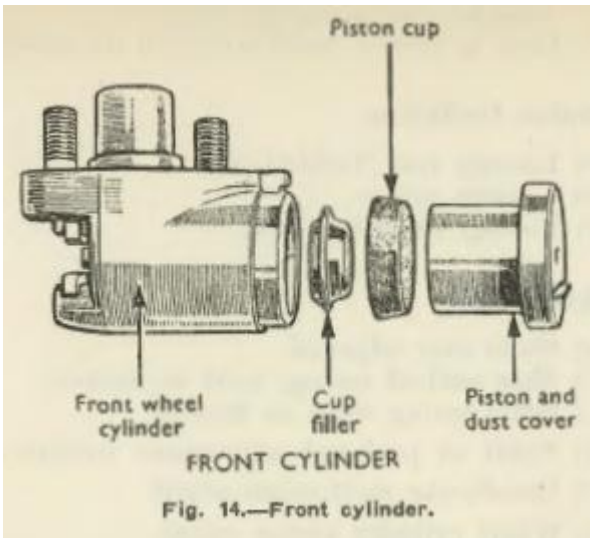


Fig. 14.—Front cylinder.

Dismantling Front Wheel Cylinders.

Withdraw the piston (B) complete with the piston cover from the cylinder (E) and apply a gentle air pressure to the fluid connection to blow out the rubber cup (C) and the cup filler (D).

Assembling Front Wheel Cylinders.

Insert the cup filler (D), recessed face foremost, in the cylinder (E) followed by the rubber cup (C) lip foremost, taking care not to damage or turn back the lip. Insert the piston (B) complete with the piston cover.

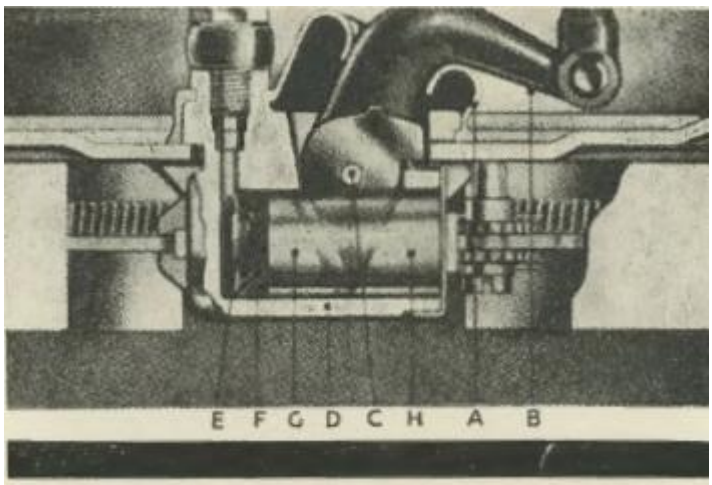


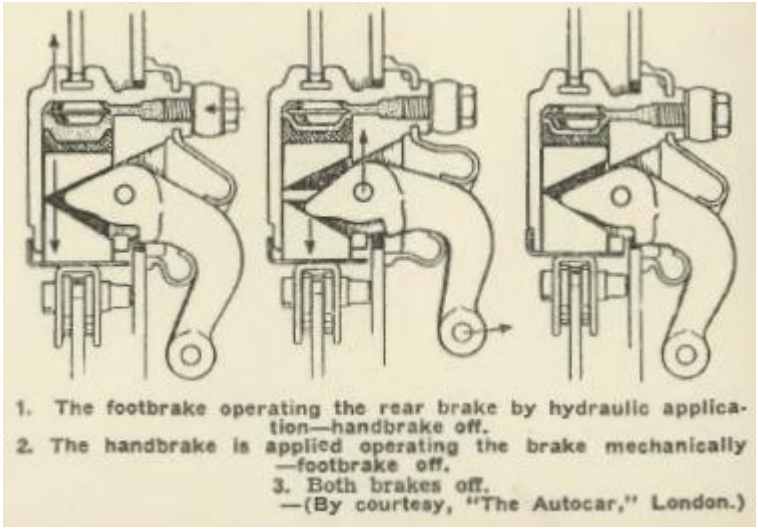
Illustration of the rear wheel cylinder.

For re-fitting the front wheel cylinders to the backplates see previous information.

Rear Wheel Cylinders.

The rear wheel cylinder, which is fitted in an elongated slot in the rear backplate, is free to slide in the slot between the tips of the brake shoes which are of the leading and trailing shoe type.

The cylinder has a single piston operating on the tip of the leading shoes and this shoe butts against a fixed anchor block on the backplate, the web of the shoe being free to slide in a slot in the block. The trailing shoe is located in a similar manner between the anchor block and the closed end of the cylinder, and is free to slide and therefore self-centring. The trailing shoe is operated by movement of the cylinder assembly as a result of the reaction of the leading shoe against the brake drum. A "Micram'' adjuster is located in a slot in the tip of the leading shoe.



1. The footbrake operating the rear brake by hydraulic application—handbrake off.
2. The handbrake is applied operating the brake mechanically —footbrake off.
3. Both brakes off.
—(By courtesy, "The Autocar," London.)

The wheel cylinder (D) (see Figures 16 and 17) contains a single piston split in two, the inner piston (G) being hydraulically operated while the outer piston (H) is manually operated by the handbrake lever (B). The inner piston is backed by a rubber cup (F) and the space in front of the cup is partially occupied by a cup filler (E). When operated hydraulically, the inner piston butts against the outer piston, leaving the handbrake lever (B) undisturbed, and applies a thrust to the tip of the leading shoe through dust cover, "Micram" adjuster and mask. When operated manually, an inwards movement of the handbrake lever brings the heel of the lever into contact with the outer piston (H), thrusting it outwards against the leading shoe without disturbing the inner piston. A rubber boot (A) is fitted to exclude foreign matter.

Dismantling Rear Wheel Cylinders.

Withdraw the piston (H) complete with cover from the cylinder (D). Remove the handbrake pivot pin (C) and the lever (B). Apply a gentle air pressure to the fluid connection and blow out the hydraulic piston (G), rubber cup (F) and the cup filler (E).

Assembling Rear Wheel Cylinders.

Insert the cup filler (E), recessed face foremost in the cylinder (D) followed by the rubber cup (F), lip foremost, taking care not to damage or turn back the lip of the cup. Insert the hydraulic piston (G) ensuring that the slot in the piston coincides with the lever slot in the cylinder casing. Place the handbrake lever (B) in position and fit the pivot pin. Insert the handbrake piston (H) complete with dust cover, ensuring that the lever is engaged in the slot in the piston.

FAULT FINDING ON HYDRAULIC BRAKES

1. Pedal Travel Excessive.
(Requires pumping)
(a) Brake shoes require adjusting.
(b) Master cylinder push-rod requires adjusting. (Excessive push-rod clearance.)

2. Pedal Feels Springy.
(a) Linings not "bedded-in".
(b) Brake drums weak or cracked.
(c) Master cylinder fixing loose.

3. Pedal Feels Spongy (Does not hold pressure).
(a) Master cylinder main cup worn.
(b) Master cylinder secondary cup worn. (Air bubbles rise in supply tank).
(c) Leak at one or more points in the system.

4. Brakes Inefficient.
(a) Linings not "bedded-in".
(b) Linings greasy.
(c) Linings incorrect type.

5. Brakes Drag.
(a) Shoes over adjusted.
(b) Shoe pull-off springs weak or broken.
(c) Pedal spring weak or broken.
(d) Pedal to push-rod adjustment incorrect.
(e) Handbrake mechanism seized.
(f) Wheel cylinder piston seized.
(g) Supply tank overfilled.
(h) Master cylinder by-pass port choked.
(i) Filler cap air vent choked.

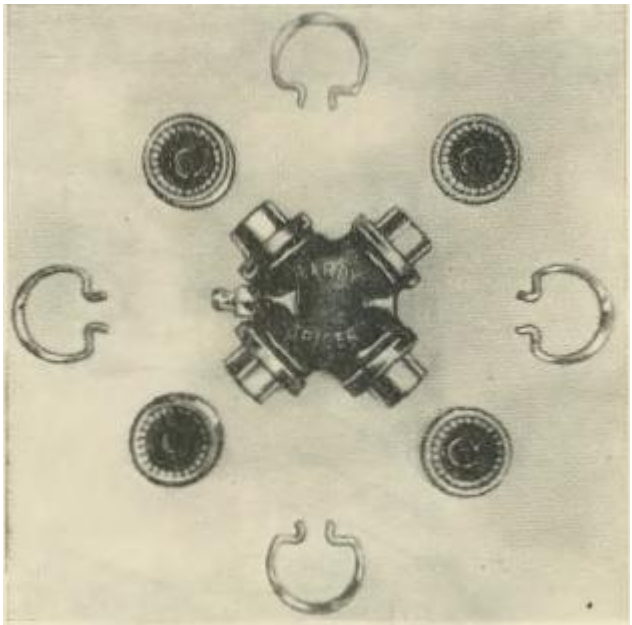
6. Brakes Remain On.
(a) Shoes over adjusted.
(b) Handbrake over adjusted.
(c) Pedal to push-rod adjustment incorrect.
(d) Master cylinder and/or wheel cylinder cups swollen, due to contamination with mineral oil or spurious fluid.

7. Unbalanced Braking.
(a) Greasy linings.
(b) Distorted drums.
(c) Front spring broken or loose at anchorage.
(d) Tyres unevenly inflated.
(e) Brake backplate loose on axle.
(f) Worn steering connections.
(g) Worn spring shackles.
(h) Different types or grades of linings fitted.

HARDY SPICER COUPLINGS

Tests for wear.

Wear on the thrust faces is located by testing the lift in the joint, either by hand, or by using a length of wood suitably supported. Any circumferential movement of the shaft relative to the flange yokes indicates wear in the needle roller bearings, or the sliding spline.



The snap ring type.

Removal of the complete assembly.

Support the propeller shaft near the sliding joint by wood blocks or by a sling from the chassis. Remove all the nuts and bolts from the companion flange at the sliding spline joint end. Unscrew by hand the dust cap at the rear of the sliding joint. Slide the splined sleeve yoke about half an inch towards the propeller shaft. This disengages the pilot flanges and allows the front end of the shaft to be lowered carefully on to the support.

Remove the nuts and bolts from the companion flange at the fixed joint end and lower it carefully to the ground. Remove the front end support and lower the shaft to the ground.

To dismantle the series KR1110, 1300, 1350 and 1410 (Snap ring type).

Having unscrewed the dust cap, pull the sliding joint off the shaft. Clean all enamel from the snap rings and the tops of the bearing races. Remove all the snap rings by pinching their ears together with a pair of pliers, and prising them out with a screw driver. If a ring does not snap out of its groove readily, tap the end of the bearing race lightly to relieve the pressure against the ring. Hold the joint in the left hand with the splined sleeve yoke lug on top and tap the radius of the yoke lightly with a copper hammer {see Fig. 1). The top bearing should begin to emerge. Now turn the joint over and finally remove it with the fingers (see Fig. 2).

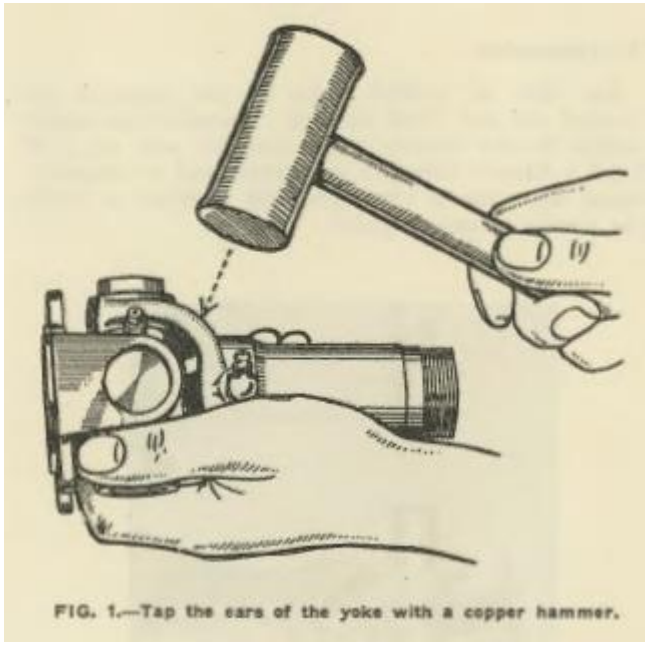


FIG. 1.—Tap the ears of the yoke with a copper hammer.

If necessary, tap the bearing race from the inside with a small diameter bar, taking care not to damage the bearing race. Keep the joint in this position so as to avoid dropping the needle rollers. Repeat this operation for the opposite bearing. The splined sleeve yoke can now be removed (see Fig. 3).

Rest the exposed trunnions on wood or lead blocks and remove the two remaining bearing races.

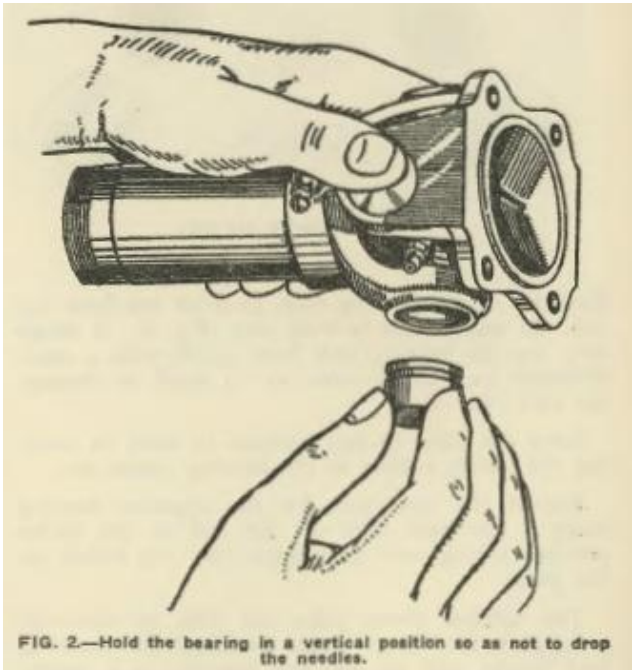


FIG. 2.—Hold the bearing in a vertical position so as not to drop the needles.

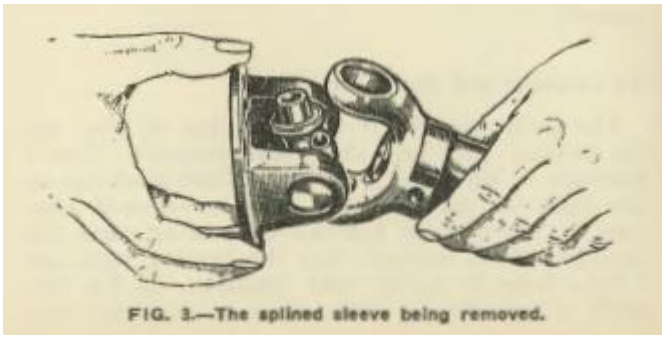


FIG. 3.—The splined sleeve being removed.

To examine and check for wear.

The parts most likely to show signs of wear are the bearing races and the spider journals. Should looseness in the fit of these parts, load markings or distortion be observed, they must be renewed complete, as no oversize journals or bearing races are provided. It is essential that the bearing races are a light drive fit in the yoke trunnion. In the rare event of wear having taken place in the yoke cross hole, the holes will most certainly be oval, the yoke must be removed.

When wear of the cross holes in a fixed yoke, which is part of the tubular shaft assembly, takes place the part should be replaced by a complete tubular shaft assembly. The other parts likely to show signs of wear are the splined sleeve yoke, or splined stub shaft. A total of .004 circumferential movement, measured on the outside diameter of the spline should not be exceeded. Should the splined stub shaft require renewing, this must be dealt with in the same way as the fixed yoke, i.e., a replacement tubular shaft assembly fitted.

To re-assemble.

See that all drilled holes in the journals are cleaned out and filled with oil. Assemble the needle rollers in the bearing races and fill with oil (140 S.A.E.). Should difficulty be experienced in assembly, smear the walls of the races with vaseline to retain the needle rollers in place.

Insert the spider in the flange yoke. Using a soft nosed drift about 1/32 smaller in diameter than the hole in the yoke, tap the hearing into position. It is essential that the bearing races are a light drive fit in the yoke trunnions and that they are replaced with the slot in the top of the race in line with the bearing cap screws holes. They will then be prevented from rotating by the key in the bearing cap. Repeat this operation for the other three bearings.

Replace the bearing caps, bearing cap screws locking plate and split pins, if fitted. If the joint appears to bind, tap it lightly with a wooden mallet, which will relieve any pressure of the bearings on the ends of the journals. When replacing the sliding joint on the shaft, be sure that the trunnions in the sliding and fixed yoke are in line. This can be checked by observing that the arrows marked on the splined sleeve yoke and splined stub shaft are in line. It is advisable to replace the cork gaskets and gasket retainers on the spider journals with a tubular drift. The spider journal shoulders should be shellaced prior to fitting the retainers.

To replace the shaft assembly.

Wipe the companion flange and flange yoke faces clean. This ensures that the pilot flange will register properly and the joint faces bed evenly all round. Insert the bolt, and see that all the nuts are evenly tightened and securely locked. The dust cap must be screwed up by hand as far as possible. The sliding joint is almost always placed towards t the front of the vehicle.

BISHOP STEERING GEAR

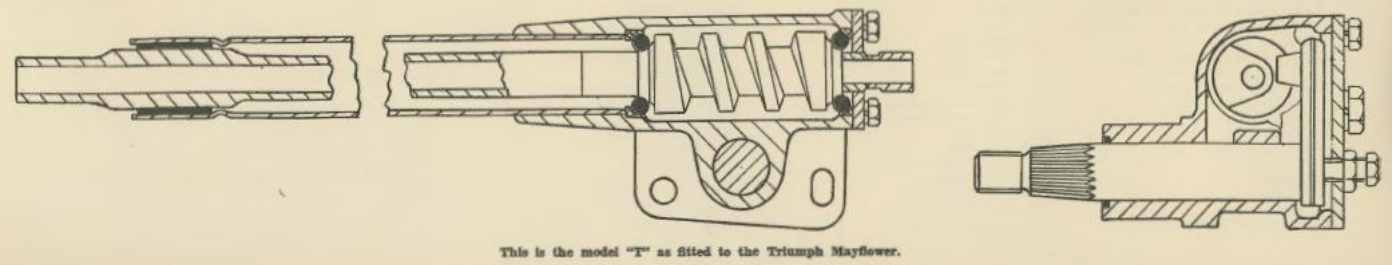
There are several different types of Bishop steering Gear. Fundamentally all the types are the same and the cam is adjusted and set for position by shims under one or both end caps. There is a ball bearing at each end of the cam while in the majority of cases there is a felt bush at the top end of the steering column. If there is no felt bush then a ball race is provided. Positioning of the rocker shaft is either by shims under the cap or by means of a hardened thrust screw. The main differences between the various arrangements lie in the rocker shaft and its pegs.

Five types have been produced as follows:-

(a) A plain peg.
(b) Two plain pegs.
(c) One ball race mounted peg.
(d) Two ball race mounted pegs.
(e) Three ball race mounted pegs.

The single peg type, which is adjusted by means of shims and a thrust screw is fitted to:-

- Austin A40, A125, and A135.
- Morris Series "E"
- Standard Vanguard
- Triumph Mayflower.



This is the model "T" as fitted to the Triumph Mayflower.

Adjustment on the Car.

Means for adjustment to take up wear are provided and the following points should be noted as important:-

1. There should be no end play on the steering tube and cam in any position.
2. Correct rocker shaft adjustment is only practicable when there is no end play in the column and cam. There should be no end play of the rocker shaft in the straight ahead position.
3. Lost movement in either of these two points mentioned above will result in unsteady steering, knocks and backlash on the steering wheel.
4. The cam is designed to allow a little play in the rocker shaft at all positions of its travel except the straight ahead position, the amount of play reaching its maximum at either full lock. The geometry of the steering mechanism should always cause the pressure on the cam to be towards the centre of the box and therefore this play cannot be felt at the wheel, and the pressure on the cam in either direction tends to return the steering to the straight ahead position.

The notes given below apply to the steering unit alone and separate provisions must be made to deal with any looseness in the ball pin joints and other connections, which may in themselves cause 'wandering' or a knock which will be felt on the steering wheel.

To adjust the steering gear, deal with it alone by disconnecting the drop arm lever. It should be carefully noted that under no circumstances must the lever be removed from the rocker shaft by hammer blows. A proper extractor tool must be used to remove this lever, as hammer blows may cause the taper peg to dent the cam track and cause serious damage. If no extractor tool is available, remove the top cover and the nut on the end of the rocker shaft which will then allow the drop arm to be removed by hammering the end of the threaded portion of the rocker shaft with a lead hammer, so pushing the drop arm off with the side of the steering box casting. The fixed pin on the rocker shaft must always be knocked OUT of the cam not into the cam. Look for markings on the drop arm and rocker shaft that will assist when reassembling the unit prior to fitting it in the cam.

If the steering is stiff in the centre position only, the adjusting screw is probably tightened up too much. Screw up 'finger tight' only, but lock up the lock nut really tight. This adjustment must be made with the gear in the centre position only.

Knock or Backlash in the Straight Ahead Position.

It is quite possible for even a stiffly operating gear to have a knock or backlash in the straight ahead position. This is due to play of the taper pin in the cam groove, and is eliminated by resetting the adjusting screw until a slight binding can be felt when turning the steering wheel to and fro with the gear in the straight ahead position. Lost motion can be easily detected by lightly shaking the drop arm and moving the steering wheel to and fro near the straight ahead position until the least amount of play is found (this fixing the deepest point of engagement between the rocker shaft lever and cam). Keep the gear in this position and then adjust the setting of the adjuster screw. Be careful not to adjust this screw too far in so that the feel in the straight ahead position is too heavy; just a slight touch is all that is required, otherwise the top cover plate will be damaged and oil lost, quite apart from the fact that the steering will be rendered stiff in the straight ahead position.

OVERHAUL OF THE GEAR

Stiff Steering Gear

If the steering gear is stiff in all positions it is most probable that the steering column is pulled out of line with the frame bracket. Loosen the top support clip for the outer column (generally under the instrument board) and let the column find its own unrestricted position. If it is out of line horizontally, the box bracket bolts must be readjusted, but if it is out of line vertically, the bracket must be 'packed out' to correct the fault. If it is still stiff in all positions, the explanation may be one or more of the following, and the unit should be removed from the car for examination.

(a) Tight felt bush at the top of the steering column.
(b) Rocker shaft too tight on its bearing.
(c) The cam is too tight in its bearing.
(d) Bent steering tube.
(e) Stator fouling the inside of the steering column.
(f) Trafficator head binding.

If the steering assembly is properly fitted and there is no question therefore of the steering column being pulled out of line, one of the other points enumerated must be to blame.

To investigate the possibility of point (e) and (f) being responsible, loosen off the brass gland nut holding the trafficator tube at the bottom end of the steering and the grub screw or screws in the steering wheel, and partly withdraw the tube.

If the steering is still stiff when the stator tube is free, investigate the possibility of point (c) being responsible by slightly loosening the four setscrews (about half to three-quarter of a turn is sufficient) which holds the bottom end plate in position. This eases the ball bearings.

If the procedure indicated in the previous paragraph fails to ease the steering, retighten the four set screws and remove the steering wheel and trafficator and ascertain whether the felt bush at the top of column is tight and if it is it must be eased.

If the felt bush is not responsible for the trouble and the gear is still found to be stiff, the next step is to check for a bent steering tube. To explore this possibility, withdraw the felt bush to see if the inner column pulls heavily to one side of the outer column.

REMEDIES

Easy Gears with Backlash or Knock.

Disconnect the drop arm and set the steering partly towards right- or left-hand lock. (Full lock position should not be used). Grip the lever firmly and try to move it forwards and backwards (holding the wheel from turning) and see if the steering wheel shows any lift. If such play exists, this is due to end play of the cam in the ball bearings. The remedy for this lift is to remove one or more shims adopting a similar procedure to that described further on for the addition of shims when dealing with a tight bearing. *A* very slight pre-loading of the bearings is permissible.

Bent Steering Inner Column

The inner column is fairly flexible and slightly pulled to one side has little or no effect on the feel of the gear, but a badly bent column which is causing stiffness should either be rectified or replaced.

Tight Cam Bearings

Remove the top cover plate and the rocker shaft. If by turning the steering the ball bearing can be felt grinding, the cam bearings are too tight.

Remove the four setscrews which secure the base plate and insert an additional shim or shims of sufficient thickness to give an easy fit for the bearings. End play must not exceed .0015. Be careful if, when removing the base plate, the ball cup and the ball cage come away, that they are properly replaced when refitting the end cover. Take care also to renew the paper washer if it is damaged and to keep the shims clean, otherwise oil leakage may develop.

Replacement of the Cork Gland, at the Rocker Shaft.

Gear to be taken out of the car.

Drain the oil out of the steering box. Obtain a small tube slightly larger than the diameter of the rocker shaft. Place the tube over the splined end of the rocker shaft and tap the steel washer holding the cork washer, with the end of the tube. This will make the washer cup-shaped and so enable it to be taken out. With a sharp point remove the cork washer. Fit the new cork washer. Place the steel washer in back to front and tap gently with the small tube mentioned above. This will have the effect of springing the washer into position. Peen over round the edge of the washer to hold it in place. Refill the box with oil.

BORG AND BECK CLUTCH

GENERAL INSTRUCTIONS

To ensure satisfactory results, when overhauling Borg and Beck clutches, the following instructions should be carefully noted and carried out:

Clutch Cover Assembly.

Before dismantling the clutch, suitably mark the following parts so that they can be reassembled in the same relative positions to each other to preserve the balance and adjustment:-Clutch cover, lugs on the pressure plate and the release levers.

When reassembling, make sure that the markings coincide and, if new parts have been, fitted which would affect the adjustment, carefully set the release levers by means of the lever adjustment gauge (see chart).

If a new pressure plate has been fitted, it is essential that the complete cover assembly should be statically balanced. Unless special equipment is available this is not a practical proposition.

Before assembly, clean all parts and renew those which show appreciable wear. A very slight smear of grease such as Duckham's H.P.2295 or Keenol should be applied to the release lever pins, contact faces of the struts, eyebolt seats in the clutch cover, drive lug sides on the pressure plate and the plain end of the eye bolts.

Release Bearing.

If the graphite release bearing ring is badly worn it should be replaced by a complete bearing assembly and the old assembly returned to the vehicle manufacturer concerned for salvage of the metal cup.

Driven Plate.

When removing worn facings, the rivets should be drilled out, not punched. After removing the facings, examine the disc or segments for cracks; if damaged, a new driven plate assembly should be used.

After re-facing, mount the driven plate on a mandrel between centres and check for run-out by means of a clock indicator, set as near to the edge as possible. Where the run-out exceeds .015, true the plate by prizing in the requisite direction after finding the high spots. When assembling the driven plate in the flywheel, ensure that the larger chamfered spline end of the hub is towards the gearbox or rear of the vehicle.

Line up the pilot bearing and the driven plate by means of a dummy shaft before tightening the clutch cover securing screws; do not remove the shaft until the screws are fully tightened.

Alignment.

Faulty alignment will cause excessive wear of the splines in the hub of the driven plate, and eventually fracture the steel disc around the hub centre as a result of swash action produced by axial movement of the splined shaft. The notes headed "Misalignment" should be carefully followed.

Pedal Adjustment.

This adjustment is most important and the instructions given should be carefully followed. Faulty adjustment falls under two headings:-

(a) Insufficient free (or unloaded) pedal travel may cause a partly slipping clutch which becomes aggravated as additional wear takes place on the facings, and this can result in burning out unless corrected. Over-travel of effective pedal movement imposes undue internal strain and causes excessive bearing wear.

(b) Too much free pedal movement results in inadequate release movement of the bearing and may produce a spinning plate condition, i.e. dragging clutch, rendering clean gear changes impossible.

Removing the Clutch from the Engine.

Loosen each holding screw a turn at a time by diagonal selection until the pressure of the thrust springs is relieved. Then remove the screws and the complete clutch from the flywheel.

Misalignment.

In almost every case of rapid wear on the splines of the clutch driven plate, misalignment is responsible. The consequent looseness of the driven plate on the shaft results in noticeable backlash in the clutch.

Misalignment also puts undue stress on the driven member and may result in the hub breaking loose from the plate with consequent total failure of the clutch. It is also responsible for worn retractor collars and levers.

Misalignment may also be responsible for a fierce chattering or dragging clutch which makes gear changing difficult. This not only affects the operation and life of the clutch but is also very detrimental to the transmission bearings and gears. Prompt attention may prevent needless expensive replacement of parts.

If considerable backlash is evident or if the clutch drags from an undetermined cause it is advisable to remove both gearbox and clutch and to check the flywheel and housing with a clock indicator to determine possible misalignment. Figures I, 2, 3, and 4 indicate the method of mounting the indicator for various checks required.

Mounting A as shown by Figure 1 for flat flywheels and mounting B as shown in Figure 2 for recessed type of flywheel are used to determine run-out on the friction face of the flywheel and should not exceed .003. Proper grinding of this face is a necessity to satisfactory operation of the clutch.

Mounting C as shown in Figure 2 shows the correct method of checking the rear face of the flywheel. Run-out should not exceed .003 as the clutch cover is mounted on this surface.

When the gearbox bell housing is centred by the inside diameter of the engine housing it is essential that this be concentric with the flywheel and run-out should not exceed .005. Figure 3 shows the mounting of the indicator for this check. (Refer to mounting D).

It is also important that the rear face of the engine housing be parallel with the flywheel face, and this run-out as indicated by mounting E, Figure 3 should not exceed .005.

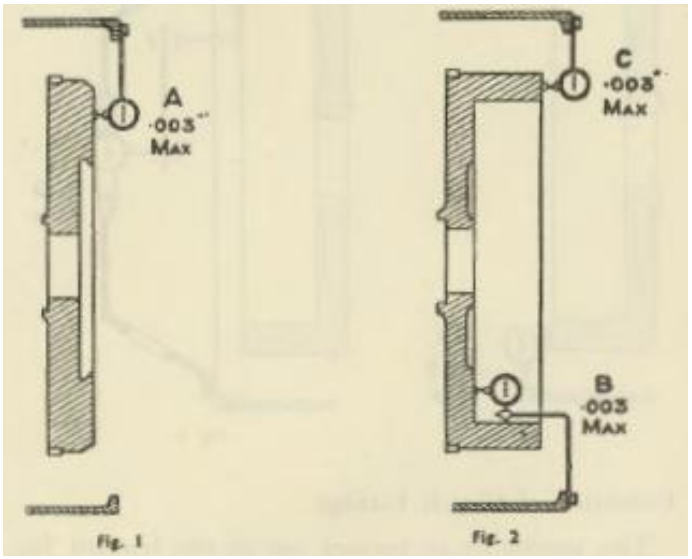


Fig. 1 Fig. 2

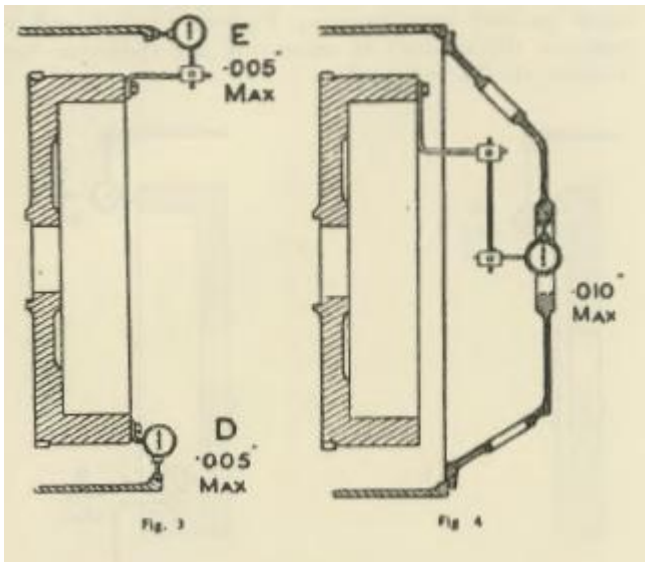


Fig. 3 Fig. 4

If the run-out of either of these faces exceeds .005 correction should be effected.

The engine should be turned over slowly by hand to obtain readings. When the gearbox bell housing is located by dowel pins instead of a pilot flange as shown in Figure 1, it is advisable to remove the clutch shaft and bearings and with the gearbox case mounted on the engine and the indicator mounted on the flywheel as shown in Figure 4, check the hole in which the bearing is mounted. Total variation should not exceed .010.

Condition of Clutch Facings.

The possibility of further use of the friction facings of the Borg and Beck clutches is sometimes raised, because they have a polished appearance after considerable service. It is natural to assume that a rough surface will give a higher frictional value against slipping, but this is not correct.

Since the introduction of non-metallic facings of the moulded asbestos type, in service, a polished surface is a common experience, but it must not be confused with a glazed surface which is sometimes encountered due to conditions discussed below.

The ideal smooth or polished condition will provide a normal contact, but a glazed surface may be due to a film or a condition introduced, which entirely alters the frictional value of the facings. These two conditions might be simply illustrated by the comparison between a polished wood, and a varnished surface. In the former the contact is still made by the original material, whereas in the latter instance, a film of dried varnish is interposed between the contact surfaces.

The following notes are issued with a view to giving useful information on this subject:-

(a) After the clutch has been in use for some little time, under perfect conditions (i.e. with the clutch facings working on true and polished or ground surfaces of correct material, without the presence of oil, and with only that amount of slip which the clutch provides for under normal conditions) then the surface of the facings assume a high polish, through which the grain of the material can be clearly seen. This polished facing is of a mid-brown colour and is then in a perfect condition.
Note- The appearance of wound or woven type facings is slightly different but similar in character.

(b) Should oil in small quantities gain access to the clutch in such a manner as to come in contact with the facings it will burn off, due to the heat generated by slip which occurs under normal starting conditions. The burning of this small amount of lubricant, has the effect of gradually darkening the facings, but, provided the polish on the facings remains such that the grain of the material can be clearly distinguished, it has very little effect on clutch performance. .

(c) Should increased quantities of oil or grease obtain access to the facings, one or two conditions, or a combination of the two, may arise, depending upon the nature of the oil, etc.
    1. The oil may burn and leave on the surface facings a carbon deposit which assumes a high glaze and causes slip. This is a very definite, though very thin deposit, and in general it hides the grain of the material.
    2. The oil may partially burn and leave a resinous deposit on the facings, which frequently produces a fierce clutch, and may also cause a spinning clutch due to a tendency of the facings to adhere to the flywheel or pressure plate face.
    3. There may be a combination of (1) and (2) conditions, which is likely to produce a judder during clutch engagement.

(d) Still greater quantities of oil produce a black soaked appearance of the facings, and the effect may be slip, fierceness, or judder in engagement, etc., according to the conditions.

If the conditions under (c) or (d) are experienced, the clutch driven plate should be replaced by one fitted with new facings, the cause of the presence of the oil removed and the clutch and flywheel face cleaned.

Clutch Pedal Adjustment.

The only adjustment necessary throughout the life of the driven plate facings is to restore periodically the free movement of the pedal before the release bearing comes in contact with the lever tips or release lever plate and commences to release the clutch. To ensure this free movement, a clearance of .10 is advised. As the driven plate facings wear, the pressure plate moves closer to the flywheel and the outer ends of the release levers follow. This causes the inner ends of the release levers to travel further towards the gearbox and decreases the release bearing clearance or free pedal movement previously referred to.

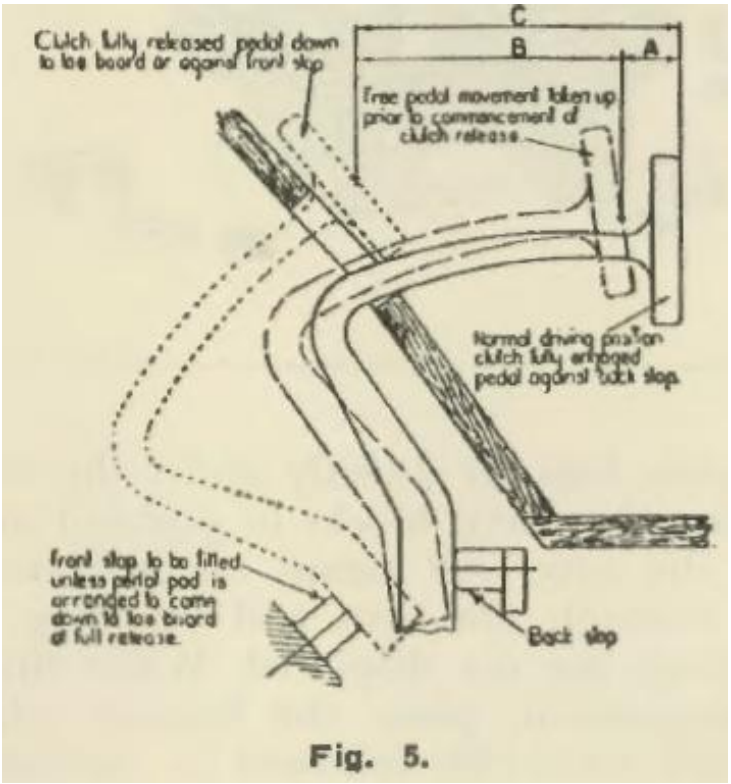


Fig. 5.

Adjust the pedal gear by the method described in the Mayflower section until there is approximately 1.00 free or unloaded movement at the pedal pad. To obtain a clean release, the inner ends of the release levers should be pushed towards the flywheel the distance set out in the clutch pedal travel chart. When the inner ends of the release levers have travelled this amount and no more, the clutch pedal should be in contact with the pedal stop if one is provided. In some cases the toe board is the limiting feature, but this is obviously not so positive. Where an adjustable stop is provided attention to this setting is indicated if the adjustment is incorrect. Should excessive pedal movement be allowed to release the

clutch, it will lead to close coiling of the thrust springs, after which any pedal pressure exerted tends only to overstress the release gear and internal mechanism of the clutch.

Clutch Size	Effective travel at clutch		Free A Movement
6¼	.27	.24	1.00
7¼	.37	.32	1.00
8	.42	.37	1.00
9	.47	.42	1.00
10 and 11	.55	.50	1.00

Effective B travel	Total C travel	Pedal Ratio
1.78	2.78	7:1
2.76	3.76	8:1
3.55	4.55	9:1
4.45	5.45	10:1
5.25	6.25	10:1

Clutch Pedal Travel.

The function of the clutch pedal is to enable the release bearing to be moved sufficiently to free the clutch. Movement of the pedal beyond the point at which the clutch is freed obviously serves no useful purpose and may lead to serious damage if carried to excess.

Excessive pedal movement leads to close coiling of the thrust springs after which any pedal pressure exerted by the driver (and this may be considerable) only tends to overstress the release gear and internal parts of the clutch. This overstress causes excessive wear and may cause failure of one or other of the internal parts.

The required pedal travel is the sum of two movements:-

A. The one inch of free movement to take up the release bearing clearance which is provided to ensure that the clutch is fully engaged when the foot is removed from the pedal.
B. The effective movement necessary to release the clutch.

The amount of effective pedal movement to be provided is that necessary to move the release lever plate or release lever sleeve the distance to free the clutch completely.

The distance which the release lever plate or sleeve must be moved to free the driven plate in the various sizes of clutch is indicated below and a column has been added to show the corresponding amount of pedal movement which should be provided with the larger of the two recommended ratios. It will be appreciated that by pedal ratio is meant the ratio between the movement of the actual pedal pad and the corresponding movement of the release bearing itself, i.e., if for a pedal pad movement of 3.00 the release bearing moves 3/8, the pedal ratio is 8:1.

The pedal travel should be limited by front and back stops, or by toe board and back stop, as the case may be, to the correct amount ascertained on the above basis. This will allow the clutch to be completely freed and at the same time prevent the possibility of damage due to over-travel.

Setting the Release Levers

Having roughly set the levers to the height depicted on the chart for the respective model it is necessary to adjust the levers in plane with one another. If the special gauge plate is not available the levers can be adjusted satisfactorily by clamping the cover assembly, with the driven plate in position, to a flat surface and the adjustment checked by means of a clock gauge recording on the release lever plate. The clutch should be released and the driven plate turned through 90 degrees, during this operation, to counteract for any lack of parallelism in the plate and to ensure that the release levers are in plane with each other.

When there is no release lever plate, as in the case of clutches with ball bearing release, a truly parallel ring of suitable thickness can be fitted on the release lever tips; in this case the thickness of this ring must be added to the figures quoted in the chart.

CHART FOR CLUTCH LEVER TIP SETTING

Clutch Model	Driven Plate	Gauge Plate Part No.	Lever Tip Height from Flywheel Face Dimension A Face	Gauge Plate Land Thickness Dimension C	Gauge Plate Diameter	Remarks
6½	Arcuate and L Crimp	CG323	1.60	.305	6.375	Dimension "A" 1.78 if taken with release lever plate in position.
7¼	Borglite	CG12916	1.665	.285	7.375	Dimension "A" 2.10 if taken with release lever plate in position, when plate is .44 or 2.28 when plate is .62. Vauxhall only.
7¼	Borglite	CG14546	1.560	.285	7.375	See remarks for 7¼ Borglite Model.
7¼	Arcuate	CG191	1.56	.330	7.375	Dimension "A" 2.19 if taken with Release Lever Plate in position when plate is .37 or 2.25 when plate is .37 or 2.25 when plate is .44.
8	Borglite	CG10516	1.812	.285	8.375	See remarks for 8 Borglite Model.
8	Arcuate	CG10515	1.812	.310	8.375	Dimension 'A" 2.40 if taken with Release Lever Plate in position.
9	Borglite Arcuate	CG192	1.895	.330	8.375	Dimension "A" 2.45 if taken with Release Lever Plate in position.
10 and 11	Borglite Arcuate 10 X Cushion (.062) 11 X Cushion (.048)	CG14322	1.945	.330	8.375	
10CF	—	CG456	2.060	.330	8.375	
11	X Cushion (.062)	CG13485	1.945	.345	8.375	See remarks for 10 model.

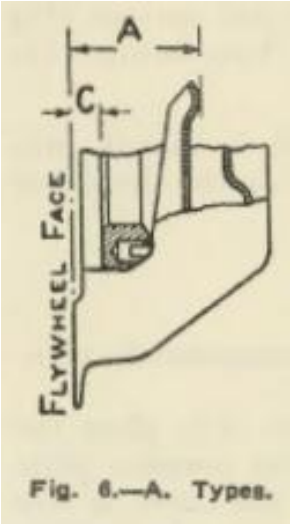


Fig. 6.—A. Types.


Gauge Plate.
Fig. 7.— Gauge Plate.

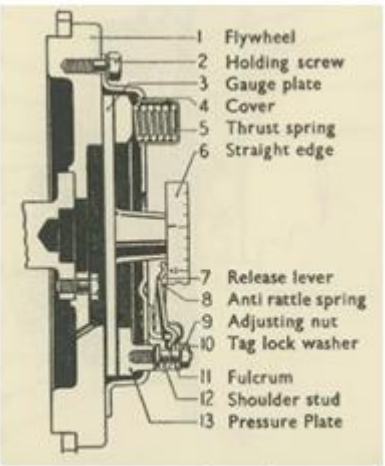


Fig 8 – Setting release levers with gauge plate in position

THE 6½ A-G CLUTCH

Description.

The clutch is of the single dry plate type and consists of a driven plate assembly, a cover assembly and a graphite release bearing. The cover assembly consists of a pressed steel cover (1) and a cast iron pressure plate (2) loaded by six thrust springs (3) housed in flanged cups (4) assembled in holes in the cover. Release levers (8) are pivoted on knife edge fulcrums riveted to the cover, and shoulder studs (10) carried in bosses on the pressure plate, extend through holes in the cover and in the release levers, the outer ends of which engage bearing plates. Adjustment nuts (11) are screwed on to the studs and locked by tab washers (12) against the bearing plates.

The driven plate is usually of the flexible centre type in which the splined hub (13) is indirectly attached to a disc (16) and transmits the power and over-run through a number of coil springs (15) held in position by retaining wires. Two facings (17) are riveted to the disc.

The graphite release bearing (6) is shrunk into a bearing cup (7) which is mounted on the throw-out fork and held by retainer springs.

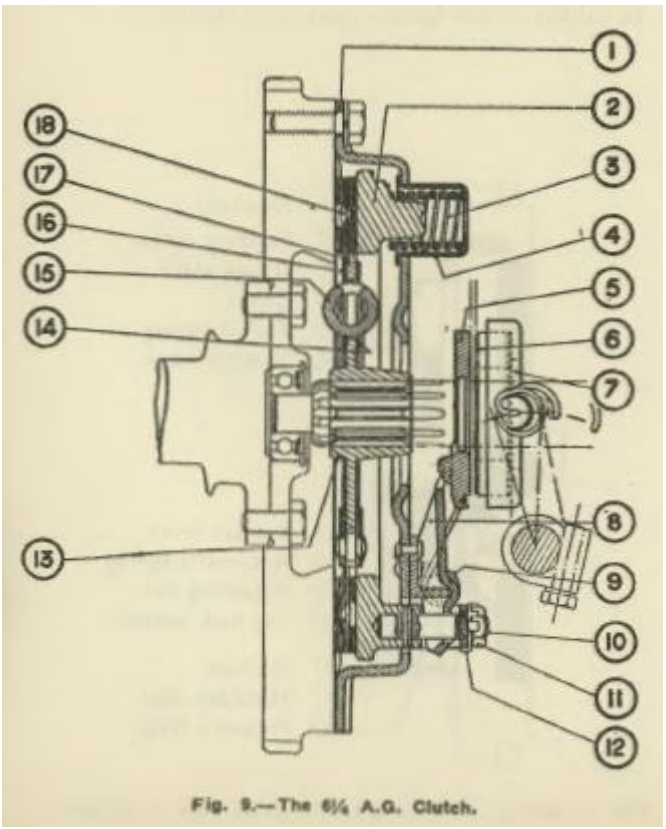


Fig. 9.—The 6½ A.G. Clutch.

Dismantling (See Figures 6 and 9).

Before dismantling mark the components mentioned in "General Instructions''.

Bend back the tabs of the washers (12), place the cover on the bed of a press with the pressure plate resting on blocks so arranged that the cover is free to move downwards when pressure is applied. Place blocks to form a bridge, the uprights resting on the outer rim of the cover, and compress the cover by means of the ram. While under compression, unscrew the adjusting nuts (11) and slowly release the pressure to prevent the thrust springs from flying out. Remove the cover and collect the component parts.

Assembling (See Figures 6 and 9).

Before assembling note the positions of the marked components.

Place the pressure plate on the blocks on the bed of the press and assemble the thrust springs (3) with their cups (4) on the bosses formed on the pressure plate. Mount the release levers (8) on the fulcrums on the cover (1) with their inner ends under the anti-rattle springs (9), taking care that the levers are properly seated. Lay the

cover over the assembled parts ensuring that the machined portions of the pressure plate lugs are directly under the slots in the cover. Place the three blocks in position and slowly compress the cover, by means of the ram,

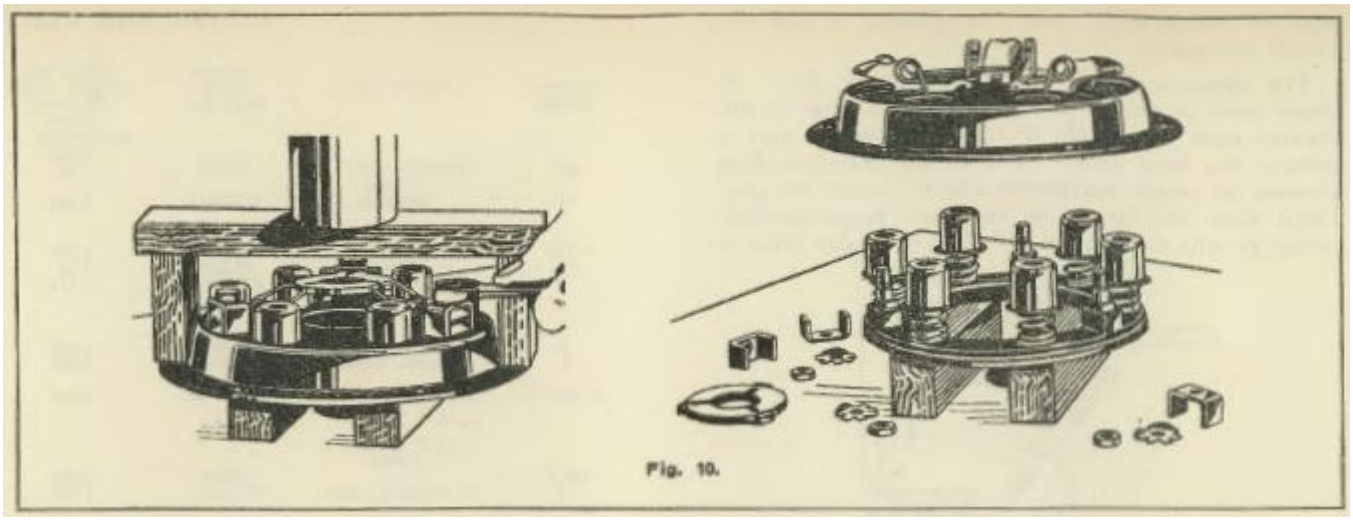


Fig. 10.

guiding the lugs through the slots and ensuring that the thrust springs are not displaced. While the cover is under compression, place the bearing plates over the shoulder studs (10) followed by the tab washers (12) and screw the adjusting nuts (11) down on the latter. Remove the clutch from the press and adjust the release levers (8) using the special gauge plate (see chart) for this purpose. Before setting the tabs of the washers, actuate the clutch several times to settle the components down and then recheck the lever tips for height and their being in plane with one another. Finally secure ·the tabs firmly against the nut sides; use pliers for this operation.

Connect the release lever plate (5) to the anti-rattle springs (9) so that the projecting portions on the plate engage in the slots formed in the release levers.

Release Lever Adjustment

Assemble the gauge plate (Fig. 7, and 3 in Fig. 8) in the flywheel (1) in the position normally occupied by the driven plate and mount the cover assembly on the flywheel, tightening the holding screws (2) a turn at a time by diagonal selection and ensuring that the gauge plate is correctly centred with the three machined lugs directly under the release levers (7).

Place a short straight edge (6) across the centre boss and the bearing surface of one lever. Turn the adjusting nut (9) until the lever is exactly the same height as the gauge plate bore. Repeat for the other levers. If this adjustment is carefully carried out the setting will be within .005.

FAULTS AND THEIR REMEDY

SYMPTOM	CAUSE	REMEDY
1. Drag or spin	(a) Oil or grease on the driven plate facings.	Fit new facings.
	(b) Misalignment between the engine and splined clutch shaft.	Check over and correct the alignment.
	(c) Improper pedal adjustment not allowing full movement to release bearing.	Correct pedal adjustment.
	(d) Warped or damaged pressure plate or clutch cover.	Renew defective part.
	(e) Driven plate hub binding on splined shaft.	Clean up splines and lubricate with small quantity of high melting point grease such as Duckham's Keenol.
	(f) Pilot bearing or bushing of clutch shaft binding.	Renew or lubricate pilot bearing.
	(g) Distorted driven plate due to the weight of the gear box being allowed to hang in clutch plate during erection.	Fit new driven plate assembly using a jack to take the overhanging weight of the gearbox.
	(h) Broken facings of driven plate.	Fit new facings.
	(j) Dirt or foreign matter in the clutch.	Diamantle the clutch from the flywheel and clean the unit, see that all working parts are free. Caution: Never use petrol or kerosene for cleaning out clutch.
2. Fierceness or Snatch	(a) Oil or grease on driven plate facings	Fit new facings and ensure isolation of clutch from possible ingress of oil or grease.
	(b) Misalignment	Check over and correct the alignment.
	(c) Binding of clutch pedal mechanism.	Free and lubricate journals.
	(d) Worn out driven plate facings.	New facings required.
3. Slip	(a) Oil or grease on the driven plate facings.	Fit new facings and eliminate cause of foreign presence.
	(b) Binding of clutch pedal mechanism.	Free and lubricate journals.
	(c) Improper pedal adjustment indicated by lack of the requisite 1.0 free or unloaded foot pedal movement.	Correct pedal adjustment and/or clearances.
	Incorrectly replaced floorboards preventing complete rearward movement of the pedal.	
4. Judder	(a) Oil, grease or foreign matter on the driven plate facings.	Fit new facings and eliminate cause of oil.
	(b) Misalignment.	Check over and correct alignment.
	(c) Pressure plate out of parallel with flywheel face in excess of the permissible tolerance.	Re-adjust levers in plate and, if necessary fit new eyebolts.
	(d) Contact area of friction facings not evenly distributed. Note: The friction facing surface will not show 100% contact until the clutch has been in use for some time, but the contact area actually showing should be evenly distributed round the friction facings.	This may be due to distortion, if so fit new driven plate assembly.
	(e) Bent splined shaft or buckled driven plate.	Fit new shaft or driven plate assembly.
	(f) Unstable or ineffective rubber engine mountings.	Replace and ensure elimination of endwise movement of power unit. Correct to ensure that power unit is held against endwise travel.
	(g) Chassis to engine tie bar out of adjustment.	
5. Rattle	(a) Damaged driven plate, i.e. broken springs, etc.	Fit new parts as necessary.
	(b) Worn parts in release mechanism.	
	(c) Excessive backlash in transmission.	
	(d) Wear in transmission bearings.	
	(e) Bent or worn splined shaft.	
	(f) Graphite release bearing loose on throw-out fork.	
6. Tick or knock	(a) Hub splines badly worn due to misalignment.	Check and correct alignment, then fit new driven plate. Pilot bearing should be renewed.
	(b) Worn pilot bearing.	
7. Fracture of driven plate	(a) Misalignment distorts the plate and causes it to break or tear round the hub or at segment necks in the case of Borglite type.	Check and correct alignment and fit a new driven plate.
	(b) If the gearbox during assembly be allowed to hang with the shaft in the hub, the driven plate may be distorted, leading to drag, metal fatigue and breakage.	Fit new driven plate assembly and ensure satisfactory reassembly.
8. Abnormal facing wear	Usually produced by overloading and by the excessive slip starting associated with overloading.	In the hands of the operator.