FERRET, ALL TYPES

UNIT REPAIR

NOTE:- This instruction supersedes N 403-1, all copies of which will be destroyed.

INDEX OF TEXT

INDEX OF FIGURES

INDEX OF TABLES

INTRODUCTION

1. This instruction details the methods of carrying out unit repairs.

2. The stripping and assembly sequences detailed in this instruction have been found to be the most satisfactory for unit conditions. It is essential to keep to these sequences.

NOTES:- (1) The abbreviations LH and RH used in this instruction refer respectively to the left-hand and right-hand side of the vehicle as viewed from the driver's seat facing front.

(2) Where this instruction refers to the engine, No 1 cylinder will be that nearest the radiator.

REMOVAL, REPLACEMENT AND ADJUSTMENT OF SUB ASSEMBLIES AND COMPONENTS

GENERAL

3. Whenever access plates are removed, the security of all unions, nuts and bolts within reach will be checked and if necessary tightened, eg, during the removal of the engine top coverplate the starter motor connections and securing nuts must be checked. When the rear skid plate is removed, check the rear engine mounting bolts, security of the fan shroud, and the serviceability of the bottom coolant hoses.

ENGINE B60, MK 6A

Induction Manifold

4. *Removal* -

(a) Disconnect the batteries.

(b) Drain the cooling system.

(c) Remove the engine top coverplate and the hull cross-tube.

(d) Disconnect and remove the oil cooler.

(e) Remove the ignition coil at its bracket.

(f) Remove the generator (see para 84).

(g) Disconnect the distributor ventilator pipes at the carburettor air pipe, remove the pipe and air horn.

(h) Disconnect the controls and fuel pipe at the carburettor, remove the carburettor.

(j) Remove the 4 pin plug from the junction box.

(k) Remove the heater pipe, thermostat to inlet manifold.

(l) Remove the cap of the ignition junction box and disconnect the three leads IGN, OP, SOL, then disconnect the three cable gland nuts beneath the junction box and withdraw the leads.

(m) Slacken the nuts of the induction manifold and remove the large hexagon plug screwed into the rear branch pipe of the manifold and the adjacent Ki-gass connector.

NOTE:- The hexagon plug and connector must be removed due to the limited space available for the removal of the manifold.

(n) Joggle the manifold to break the joints, remove the nuts and the manifold from the engine. Should it be necessary, the ignition junction box may now be removed from the manifold.

5. *Replacement* -

Replace in the reverse order. When fitting the induction manifold, renew all gaskets, and pull down evenly on the manifold nuts, working progressively from the centre.

Cylinder Head

6. *Removal* -

(a) Disconnect the batteries.

(b) Remove or disconnect all the components as detailed in para 4.

(c) Slacken off the coolant hose, thermostat to radiator and the short bypass hose of the thermostat. Remove the wading seal grease nipple and pipe at the water pump.

(d) Disconnect the cable clip on the front of the rocker cover.

(e) Remove the outer and inner cap from the distributor head and remove the HT lead from its contact pin, slacken the union nut of the screening and withdraw the cable. Disconnect all HT leads at the sparking plugs. Slacken off the two hinge bolts and remove the distributor head complete with its harness. Disconnect the LT lead at the contact breaker assembly and remove the assembly from the engine.

(f) Disconnect the coolant temperature bulb at the union situated below Nos 1 and 2 sparking plugs.

(g) Remove the rocker cover, rocker gear and push rods, retaining the latter to their respective rockers. Slacken off the cylinder head nuts (39). Give the crankshaft a few vigorous turns to break the gasket joint, remove the cylinder head nuts, lift the head clear of the engine with the induction manifold, ignition junction box and thermostat attached. These components can now be removed.

7. *Checks to be made whilst the cylinder head is removed* -

Check the following for security:-

(a) Fuel pump and unions.

(b) Cable connections of the low oil pressure switch.

(c) Engine lubrication relief valve securing nuts and plugs.

(d) Condition of the generator driving belts.

(e) Oil tank and oil filter unions.

(f) Rear propeller shaft coupling nuts and bevel box breathers.

8. *Replacement* -

Replace in the reverse order, paying particular attention to the following points:-

(a) During cleaning of the cylinder head ensure that the oil way to the rocker gear is clear.

(b) Should any carbon require removal from the combustion chambers *USE A BLUNT TOOL.*

(c) Renew the cylinder head gasket, lightly coating both faces along the exhaust side with jointing compound approx 1 in wide, to ensure that no leak occurs on this side, the coolant connections being on the outside of the cylinder head studs.

(d) To assist in retiming the ignition, turn the crankshaft to TDC compression stroke No 1 piston and retain it there until the distributor is replaced.

(e) Refit the induction manifold and the ignition junction box to the cylinder head before replacement.

(f) Tighten the cylinder head nuts progressively from the centre as shown in fig 1 to a torque tightness of 35 ft/lb.

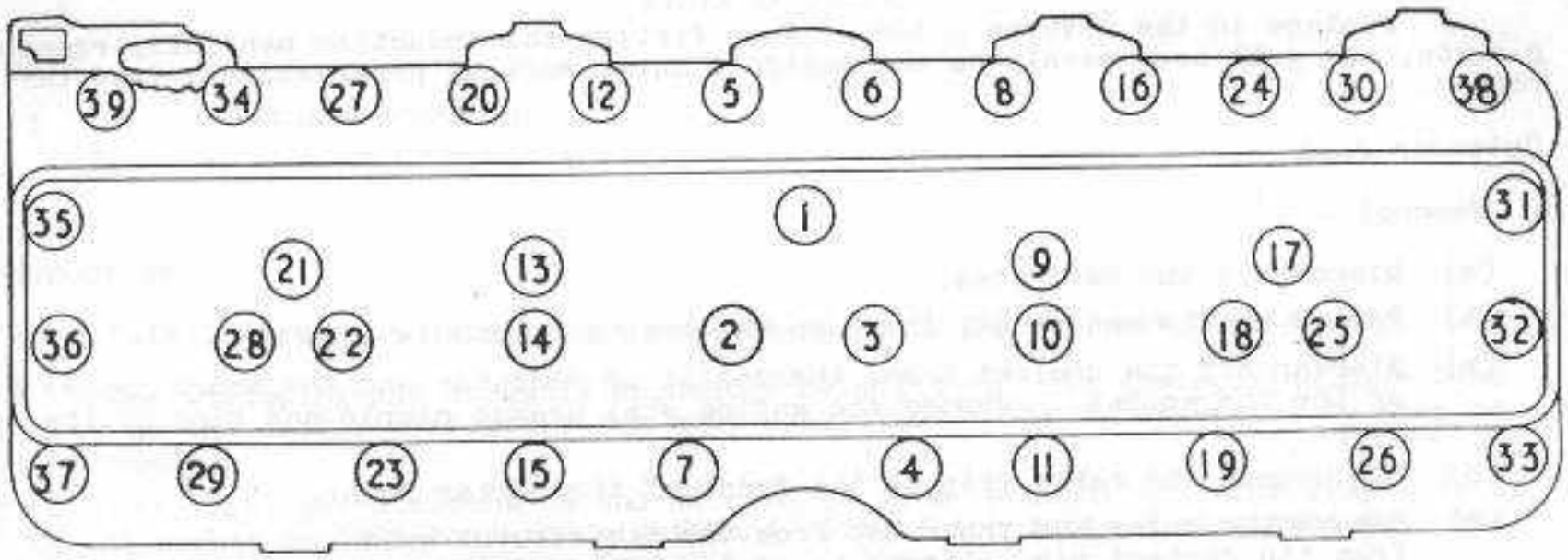


FIG 1 - SEQUENCE FOR TIGHTENING THE CYLINDER HEAD NUTS

(g) Replace the inlet valve rocker gear and push rods.

(h) Replace the distributor, No 1 piston having been positioned as at sub para (d) with the contacts about to open and the distributor rotor opposite No 1 segment; replace the securing nuts; this is the initial setting, the timing will be finalised on road test, (see para 17).

(j) Make all connections and joints on the ignition system with care; all joints must be watertight.

(k) Set the inlet valve clearance to 0·010 in and recheck after the engine has been run and allowed to cool. When cool, tighten the cylinder head nuts.

Inlet Valves

9. *Removal* -

Remove the cylinder head in accordance with para 6, then remove the valves and associated parts; retain for replacement in their original positions.

10. *Conditioning* -

Thoroughly clean the heads and stems. Valves that are pitted or burnt will require refacing on a valve grinding machine. First check the stems and renew all valves worn more than 0·003 in (plan size 0·341 in dia). Where a valve grinding machine is available remove the pitting or burning by grinding (angle of face 45°) and then measure as follows:-

(a) The dia of the lower edge of the seating should be 1·750 in, if less, machine the back of the valve head to restore the dia.

(b) The dia of the head at the upper edge of the seating should not be less than 1·835 in.

(c) The thickness between the upper edge of the seating and the top of the valve should be 1/16 in, retain this by light machining, but within the limit given at (b).

Where a valve grinding machine is not available, fit new valves.

11. *Replacement* -

Replace in their respective guides and fit new packings to the stems. Renew all doubtful valve springs.

Exhaust Valves

12. *Removal* -

(a) Remove the cylinder head as at para 6.

(b) Remove the exhaust manifold and the pipes.

(c) Disconnect the oil filter hoses at their bottom unions and remove the oil filter complete. Plug the unions at the crankcase with clean rag to keep out foreign matter.

(d) Remove the tappet chamber covers, dry out the chambers and plug the oil return holes in the base with clean rag to prevent the possibility of valve wedges entering the sump. Remove the valves and retain for replacement in their original positions.

13. *Reconditioning* -

Treat in accordance with the instructions given at para 10 with the following exceptions:-

(a) The dia of the lower edge of the seating is 1·500 in.

(b) The dia of the head at the upper edge of the seating is 1·610 in.

14. *Replacement* -

Replace in the reverse order and adjust the valve clearances to 0·015 in.

Ignition System

Distributor 6 Cylinder (see fig 2)

15. No 1, Mk 2, FV 141535 (Lucas) - Contact breaker gap 0·010 to 0·012 in
No 1, Mk 2/1, FV 141540 (Delco) - Contact breaker gap 0·019 to 0·021 in
Firing order: 1-4-2-6-3-5

The following para 16 to 19 apply to both distributors either of which may be fitted to the B60 series engine, both are similar in appearance and construction.

16. *Removal* -

Disconnect the HT cables at the sparking plugs, the ventilating pipes and HT cable from the coil at the distributor. Slacken the swivel bolt nuts and lift off the head. ***NOTE THE POSITION OF THE ROTOR,*** and remove it. Disconnect the LT cable at the distributor base, remove the two securing nuts and lift the base from the engine.

17. *Replacement* -

Position the rotor as noted in the previous para, replace the distributor so that the securing studs are central within the slots, replace and tighten the nuts. Replace the remainder of the distributor in the reverse order and test on the road. Finalise the ignition timing by advancing the spark until detonation occurs, then retard slightly. To advance the spark, slacken the securing nuts and turn the distributor body anticlockwise viewed from the top.

18. *Synchronisation of Contact Sets* -

Should the synchronising plate (see fig 3) have been disturbed, proceed as follows:-

(a) Remove the distributor head as at para 16.

(b) Carry out the 3,000 mile servicing to the contacts. Set the gaps to 0·010 in (Lucas) or 0·019 in (Delco-Remy).

(c) Set No 6 piston at TDC compression by the flywheel marking.

(d) Disconnect the LT lead at the terminal pillar, fig 3.

(e) Wire a test lamp in series, LT lead to fixed contact set. Switch on the ignition.

(f) Slacken off the two nuts securing the distributor base to the cylinder block, now turn the distributor clockwise or anticlockwise until the test lamp is just extinguished. Tighten the two securing nuts at the base.

(g) Now wire the test lamp in series, LT lead to the contact breaker mounted on the synchronising plate.

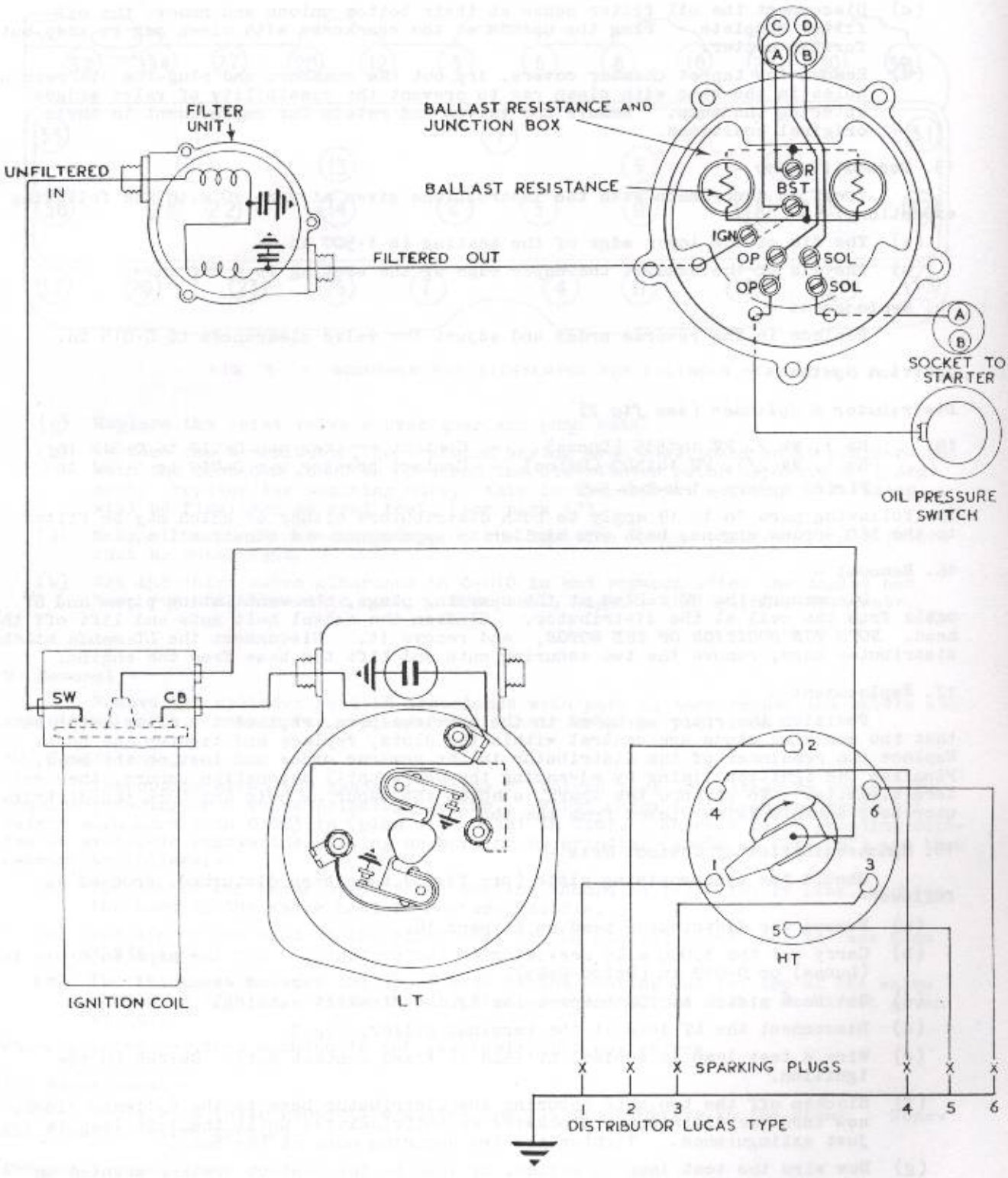
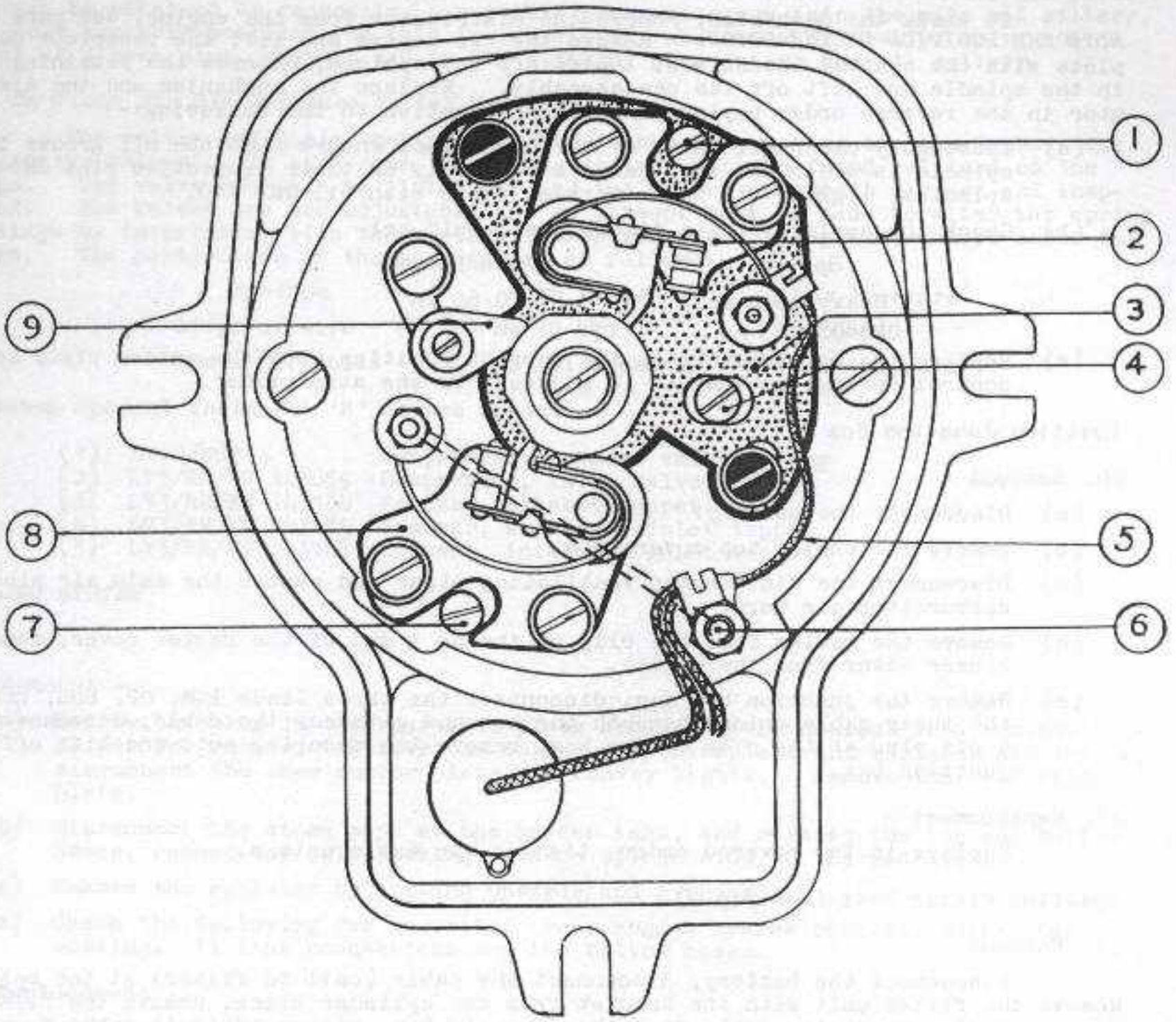


FIG 2 - IGNITION WIRING DIAGRAM, ENGINE B60



1. Points setting eccentric pin
2. Angle plate
3. Synchronising plate
4. Synchronising plate eccentric pin
5. LT lead connecting
6. LT terminal pillar
7. Eccentric pin
8. Angle plate
9. Cam lubricator felt

FIG 3 - CONTACT BREAKER ASSEMBLY

(h) Turn the crankshaft exactly 360°, this will place No 1 piston on TDC compression.

(j) Slacken off the synchronising plate clamping screws and adjust the plate until the lamp is just extinguished. Recheck the gap setting.

NOTE:- Should the timing mark be over-run when coming up to the TDC mark, turn the crankshaft over two complete revolutions and come up to the mark again. Never turn the engine backwards when timing.

19. *Automatic Advance and Retard Mechanism (Lucas)* -

To check the mechanism, remove the distributor from the engine, see para 16. *NOTE THE POSITION OF THE ROTOR.* Remove the two screws and lift the baseplate out complete with the contact assemblies. Lift off the springs, unscrew the retaining screw in the spindle and lift off the cam assembly. Replace the mechanism and the distributor in the reverse order paying particular attention to the following:-

(a) Thoroughly clean all parts of the mechanism, ensure that the oil groove in the spindle is clear and that parts move freely on their respective pins and spindles, lightly oil these working faces with Oil OMD 110.

(b) Check the springs, their dimensions should be:-

Spring	*Free Length*
Heavy (control)	0·80 in
Light	0·767 in

(c) Replace the cam assembly in its correct position with the action plate and the control spring, so that it is adjacent to the stop pillar.

Ignition Junction Box

20. *Removal* -

(a) Disconnect the battery.

(b) Remove the engine top coverplate.

(c) Disconnect the distributor ventilating pipes and remove the main air pipe and carburettor air horn.

(d) Remove the cables from the clip at the No 1 end of the rocker cover, remove the rocker cover from the engine.

(e) Remove the junction box cap, disconnect the three leads IGN, OP, SOL, unscrew the three cable unions beneath the box and withdraw the cable, disconnect the 4-pin plug at the side of the box, remove the securing nuts and lift off the junction box.

21. *Replacement* -

Replace in the reverse order, tighten the cable unions.

Ignition Filter Unit (see fig 2)

22. *Removal* -

Disconnect the battery, disconnect the cable (coil to filter) at the coil. Remove the filter unit with its bracket from the cylinder block, remove the filter cover and disconnect the cable from the junction box, remove the coil cable from the unit.

23. *Replacement* -

Replace in the reverse order making connections as follows. The cable from the ignition coil enters the filter at 'UNFILTERED IN'. The cable from the junction box enters at 'FILTERED OUT'.

Sparking Plugs

24. The correct sparking plug for use with this engine is the No 1, Mk 1 (FV 175878). Should spark plug cleaning and testing equipment not be available, renew all doubtful plugs. When tested under pressure the test pressure must not be less than 100 lb/sq in. The correct gap for this spark plug is 0·015 in.

Engine Lubrication System

25. *Oil Pressure* -

Under normal conditions of engine temperature and speed (3,500 rev/min and 80°C oil temperature), the oil pressure in the main gallery should be 35 lb/sq in. The oil pressure switch which operates the warning light, indicates that the oil pressure

exceeds 7 lb/sq in. Should the warning light come on with the engine running at normal speed and temperature, a dangerous condition is indicated. The actual oil pressure can be obtained by connecting a suitable pressure gauge into the main oil gallery. The most suitable position for this is immediately above the oil relief valve and in front of a core plug, where a 3/8 in UNF blanking plug enters the oil gallery.

26. *To Clean the Oil Pressure Relief Valve* -

The valves and their seatings can be cleaned by removing the plugs above the respective valves. In each case, the valve springs will be found retained on the plugs. The valve can then be lifted out and the valves and seats cleaned and inspected. The valves are non-adjustable and no attempt must be made to alter the spring settings by interfering with the springs themselves, or varying the washers under the plugs. The particulars of the springs are as follows:-

Springs	*High Pressure*	*Low Pressure*
Gauge of wire	No 18 SWG	No 24 SWG
Number of coils	14 + 1 special	14 + 1 special

Workshop Special Tools for 'B' Series Engine

27.

(1)	LV10/W6513	Compressor, exhaust valve spring
(2)	LV3/RR/FV 143889	Compressor, inlet valve spring
(3)	LV3/RR/FV 143184	Spanner, exhaust tappet
(4)	LV3/RR/FV 143185	Spanner, external, inlet tappet
(5)	LV3/RR/FV 143186	Spanner, internal, inlet tappet

COOLING SYSTEM

Radiator

28. *Removal* -

(a) Remove the plug in the rear skid plate and drain the coolant into a clean container for re-use. Remove the engine top coverplate and radiator air louvre, disconnect the rear number plate and convoy lights. Remove the rear skid plate.

(b) Disconnect the steam pipe at the header tank, and release the top and bottom hoses, remove the self-locking nuts on either side of the radiator.

(c) Remove the radiator by lifting upwards and rearward.

(d) Check the following for security; rear engine bearer bracket, bolts, fan cowling, oil tank connections and the bottom hoses.

29. *Replacement* -

Replace in the reverse order to that detailed in para 28. Clean the hull plates and plate joints and smear liberally with Bostik C, ensure that the felt packing is in good condition and correctly positioned.

30. *Renewal of Pressure Valve* -

The pressure valve is set to lift at 9 1/2 to 10 1/2 lb/sq in. In the event of excessive pressure being built up within the cooling system renew the pressure relief valve as follows:-

(a) Remove the engine top coverplate.

(b) Remove the radiator louvre plate.

(c) Remove the pressure valve assembly.

(d) Thoroughly clean the joint area on the header tank.

(e) Fit the new valve and joint washer after applying a liberal coating of jointing compound.

(f) Replace the louvre and top coverplates.

Coolant Pump

31. *Removal* -

(a) Drain the coolant.

(b) Remove the engine top coverplate.

(c) Detach the oil cooler at the centre support stay and at its bottom bracket, gently ease upward.

(d) Detach the ignition coil from its bracket.

(e) Disconnect the carburettor hotspot pipe at the thermostat.

(f) Slacken off the driving belts at the generator.

(g) Remove the fan coupling and driving plate. Lift out the driving belts.

(h) Disconnect the crankshaft fording seal lubricator at the pump, and the coolant hose on the pump.

(j) Remove the four 5/16 in nuts from the lower side of the pump casting, ease the pump slightly to break the joint and remove the pump.

NOTE:- The four nuts holding the sling bracket should not be removed.

32. *Replacement* -

Replace in the reverse order, renewing the backing plate joint and tighten all nuts, ie, the four holding the pump to the cylinder block and the four holding the backplate to the pump. Examine the belts before replacing.

33. *Coolant Pump and Fan Belts* -

Should the belts require removal or replacement, proceed as in para 31(f) and (g). Belts must be replaced in matched pairs and adjusted to give 1/2 in deflection at the centre of their vertical run. Recheck after 50 miles.

Thermostat

34. The thermostat valve should start to open at 174° ± 2°F (79°C) and should be fully open at 203°F (95°C). Observation of the temperature gauge when warming up will show if the thermostat is functioning correctly. The engine should warm up to 174°F quickly, even under light load, and then the temperature should vary between 174°F and 203°F, depending upon the load on the engine and the atmospheric temperature.

35. *Renewal* -

Drain the coolant, disconnect the top water hose, remove the four nuts securing the outlet connections and lift out the thermostat. Fit

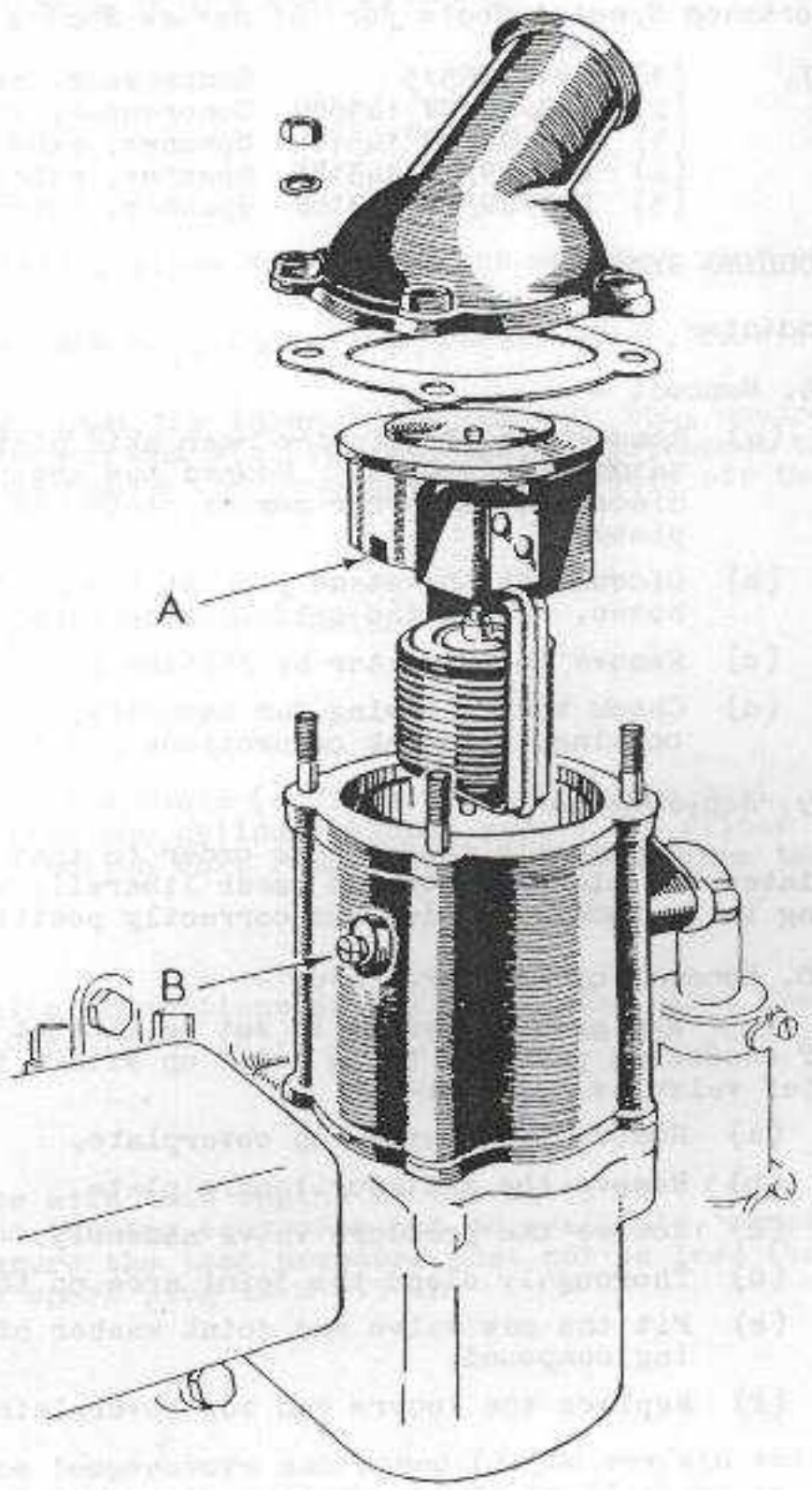


FIG 4 - THERMOSTAT ASSEMBLY

the new thermostat with a new gasket and coat the cleaned joint faces with jointing compound. Engage the recess 'A' with the screw 'B' (see fig 4).

Coolant Hose Connections

36. There are six rubber hose connectors on the coolant system, four of which are accessible, as follows. Two connecting thermostat to header tank, 1 1/4 in ID x 2 3/4 in, one on the pump inlet, 1 1/4 in ID x 2 3/4 in and the thermostat bypass 7/8 in ID x 3 3/4 in long. The two hoses beneath the radiator are inaccessible and can only be reached by removal of the lower skid plate. They are:-

(a) Bottom radiator tank to pump, 1 1/4 in ID x 2 3/4 in long.

(b) Drain hose to hull drain plug, 3/4 in ID x 2 3/4 in long.

These two hoses will be inspected at frequent intervals, or whenever the rear skid plate is removed.

FUEL SYSTEM

Carburettor Solex 40 NNIP/S-1642 (see fig 5 and 6)

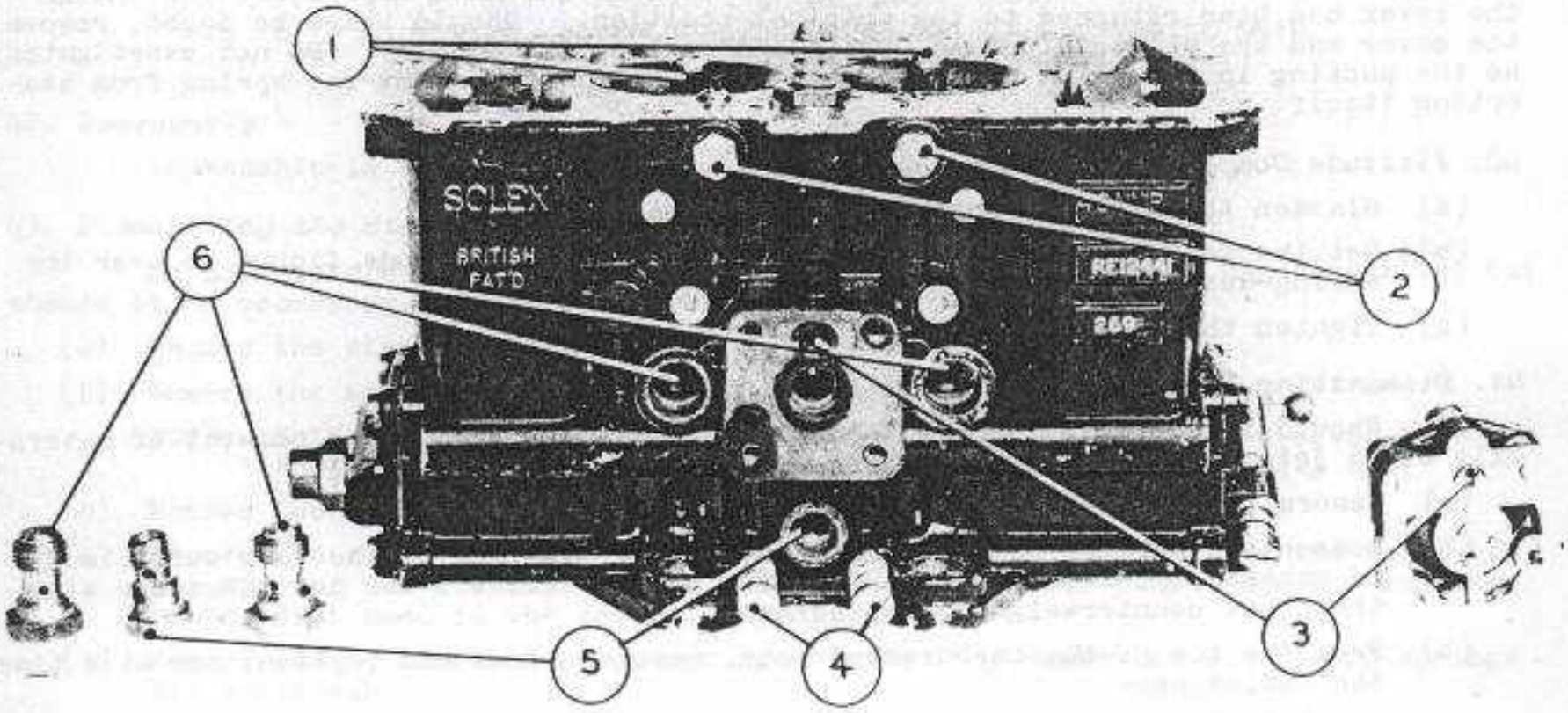
37. *Slow-running Adjustment* -

(a) Run the engine until normal running temperature is reached.

(b) Open the two volume control screws one full turn from the fully closed position.

(c) Adjust the throttle control screw to give required idling speed approx 350 rev/min.

NOTE:- Do not use force when screwing in volume control screws to the fully closed position. Forcing the screws will damage the seat.



1. Bleed, correction jet, main
2. Jets, auxiliary (pilot)
3. Jet, economy
4. Screws, volume control
5. Jet, GS normal (starter)
6. Jets, main

FIG 5 - FRONT VIEW OF SOLEX CARBURETTOR 40 NNIP

38. *Faulty Carburation* -

In the event of faulty running or misfiring being due to incorrect mixture, the following points should be investigated:-

(a) Difficult starting. Check the starter jet which is situated at the lowest point in the drilled passages and is liable to contain water or become clogged with sediment. Ensure that the throttle is not open too wide; it should be in the idling position against the throttle stop screw. To adjust idling speed, see para 37.

(b) Poor slow running. Examine both auxiliary (pilot) jets. Ensure that the starter (carburettor) lever returns fully to the 'off' position stop. Re-adjust idling.

(c) Poor acceleration or flat spot. Check both speed jets. Remove the non-return valves at the bottom of the float chamber, clean the valves and replace.

(d) Lack of power. Check that the throttle opens fully, that the main jets are clear and that the altitude control lever is correctly set.

NOTE:- The altitudes marked on the altitude control lever are the lowest at which the vehicle should operate. With the control lever set at '0000' (zero) the vehicle will run efficiently up to an altitude of 3,000 ft. Set at '3000' for altitudes of 3,000 to 6,000 ft and set at '6000' for altitudes 6,000 ft and above. Should the vehicle be operating below the altitude for which the control is set, the mixture will be too weak, the performance poor and excessive weak mixture will cause damage to the engine valves.

39. *Altitude Control Needle* -

The altitude control needle is pressed down by the altitude control lever eccentric pin against the action of a light spring. It is possible for the needle to have been depressed for a former setting and to have remained depressed even though the lever had been returned to the original position. Should there be doubt, remove the cover and the altitude needle, clean and replace the needle. Do not overtighten, as the packing in the gland nut will grip the needle and prevent the spring from asserting itself.

40. *Altitude Compensating Control Adjustment* -

(a) Slacken the altitude control locking screw.

(b) Set the control so that the hole adjacent to the altitude figure is over the spring-loaded ball.

(c) Tighten the locking screw.

41. *Dismantling (see fig 6)* -

Should it become necessary to carry out cleaning beyond the removal of externally sited jets, remove the carburettor from the engine.

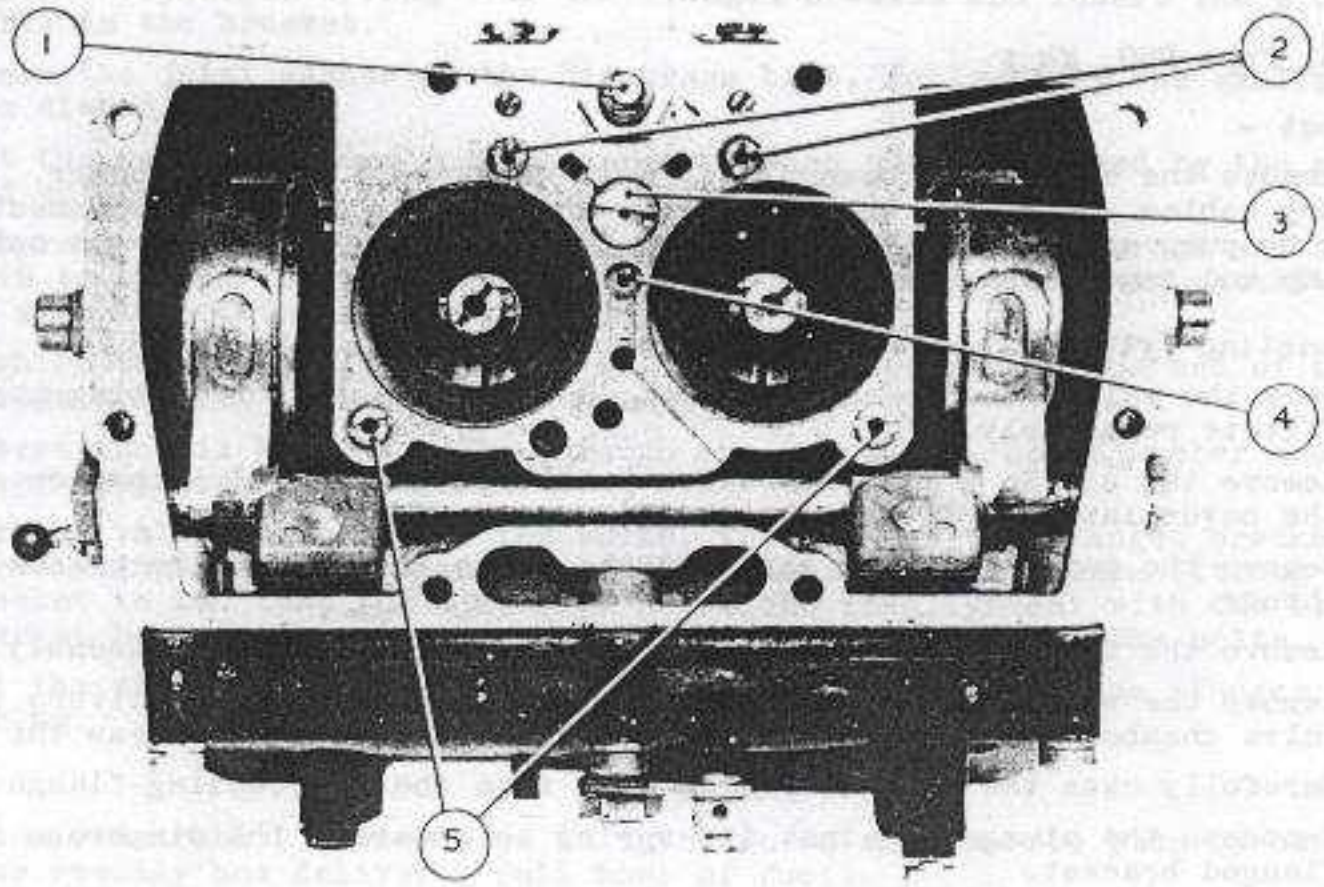
(a) Remove the top cover (together with the gasket).

(b) Loosen the hexagon headed bearing screws at each end of the body sufficiently to release the float spindle and lift out the float. Do not interfere with the float counterweight clamp screws.

(c) From the top of the carburettor body, remove, clean and replace, one at a time, the following:-

(i) Bleed correction main jets.
(ii) Jet GS rich.
(iii) Starter emulsion tube.
(iv) Auxiliary (pilot) jet air bleeds.
(v) Accelerator pump delivery valve retaining screws, which retain the glass ball delivery valves.
NOTE:- When the retaining screws are removed, invert the body and drop the balls into the hand. Replace the balls and retaining screws immediately after cleaning the passages.
(vi) Altitude control needle assembly.
(vii) Idling passage plug screws.

(d) Remove, clean and replace the needle valve and the two speed jets from the top cover.



1. Needle, altitude
2. Bleed, air auxiliary (pilot) jet
3. Tube, emulsion starter
4. Jet GS rich
5. Screws, retaining ball

FIG 6 - TOP VIEW, COVER REMOVED OF SOLEX CARBURETTOR 40 NNIP

42. *Reassembly* -

Reassemble in the reverse order.

43. *Dismantling the Starter Device and Accelerator Pumps* -

Do not disturb the starter device and the accelerator pumps unnecessarily, but should it be necessary, remove the carburettor.

(a) Remove the starter device control lever.

(b) Remove the side cover and lift off the gasket.

NOTE:- Note the position of the flats on the spindle with the starter valve in the closed position, ie, with the control knob pushed fully in.

(c) Remove the locating ball and spring from the body.

(d) Remove the starting device. Check that there is no scoring on the faces of the starter valve and air valve, that the starter air bleed is clear and the rubber dust seal in the cover is serviceable.

(e) Remove the accelerator pumps and ensure that the membranes and return springs are serviceable.

44. *Reassembly* -

Reassemble in the reverse order.

NOTES:- (1) At the time of fitting the accelerator pumps, flex the membrane away from the carburettor body by depressing the pump lever, and pushing the cover back by hand and screwing the cover.

(2) From replacement carburettors remove the transportation piece (fitted to retain the float during storage and transit).

Fuel Pump, Type P50, Mk 1

45. *Removal* -

Remove the engine top coverplate, hull cross-tube and oil cooler. Disconnect the battery cables and remove the LH battery and battery case. Disconnect the fuel pipe cock to pump and remove the LH engine stabilizer. Disconnect the outlet union on the pump and remove the pump from the engine.

46. *Dismantling (fig 7)* -

(a) Mark the valve chamber and the flanged bracket with correlating marks to facilitate reassembly.

(b) Remove the six No 2 BA bolts which pass through the valve chamber and secure the coverplate and flanged bracket.

(c) Remove the coverplate and lift out the joint washer and the pulsometer diaphragm.

(d) Remove the flanged bracket, complete with diaphragm plate assembly.

(e) Remove the valve locking rings retaining the suction and delivery valves in the valve chamber and, noting their respective positions, withdraw the valves.

(f) Carefully ease the main diaphragm away from the surrounding flange.

(g) Compress the plunger against its spring to separate the diaphragm from the flanged bracket.

(h) Hold in this position and insert a thin 3/16 in Whit open-ended spanner between the diaphragm and the flanged bracket, engaging the flats provided on the diaphragm spindle.

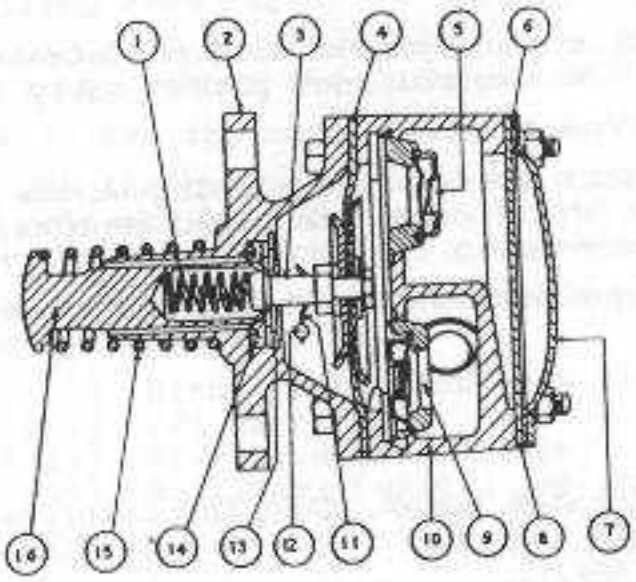
(j) Remove the nut and washer retaining the diaphragm plate assembly and remove the assembly.

(k) Do not remove the oil seal.

47. *Reassembling* -

(a) Insert the suction and delivery valves. The suction valve enters the seating, giving access to the larger of the two chambers in the valve body.

(b) Secure the valves in position with the locking rings.



1. Spring, plunger
2. Bracket, flanged
3. Bolt, special
4. Main diaphragm
5. Valve, suction
6. Gasket, cover
7. Cover
8. Pulsometer diaphragm
9. Valve, delivery
10. Valve chamber
11. Pin, loop
12. Shaft, priming handle
13. Washer retaining and circlip
14. Seal, oil
15. Spring, suction valve
16. Case, plunger

FIG 7 - FUEL PUMP TYPE P50, MK 1

(c) Place the plunger spring over the flanged bracket and insert the plunger assembly in the bracket.

(d) Place the joint washer on the diaphragm bolt, followed by the smaller of the two dished plates.

(e) Fit the main diaphragm and the larger dished plate followed by the plain washer and nut.

(f) Compress the plunger against its spring to raise the diaphragm and insert a 3/16 in spanner between the diaphragm and the flange of the bracket and engage it with the flats on the diaphragm spindle.

(g) Tighten the diaphragm nut and finally lightly peen over the end of the diaphragm spindle.

(h) Insert the six No 2 BA bolts through the end cover, joint washer and the pulsometer diaphragm in that order.

(j) Fit the valve chamber over the bolts, followed by the flanged bracket, with the correlating marks in alignment. Care should be taken when fitting the flanged bracket to see that the diaphragm holes are in alignment with the flanged bracket bolts, otherwise the diaphragm may be damaged by the bolts.

(k) Fit the six No 2 BA nuts and tighten uniformly, holding the plunger against its spring.

48. *Test* -

After reassembly, attach pipe to inlet union and operate pump by hand. It should prime readily and deliver a full bore of fuel.

49. Replace in the reverse order to that detailed in para 44.

Fuel Gauge - Tank Unit

50. *Removal* -

Disconnect the batteries. Remove the insulated cap of the unit, disconnect the five leads. Remove the two BA screws securing the outer flange, break the gasket joint gently, lift out the unit.

51. *Replacement* -

Replace in the reverse order, paying particular attention to the following points:-

(a) The float arm pivots freely.

(b) The float arm is straight.

(c) The protective coating on the float is not pierced.

(d) Check that the arms are in contact with the potentiometer.

(e) The leads are not frayed or corroded.

(f) The gasket is in good condition and smeared lightly with jointing compound.

TRANSMISSION

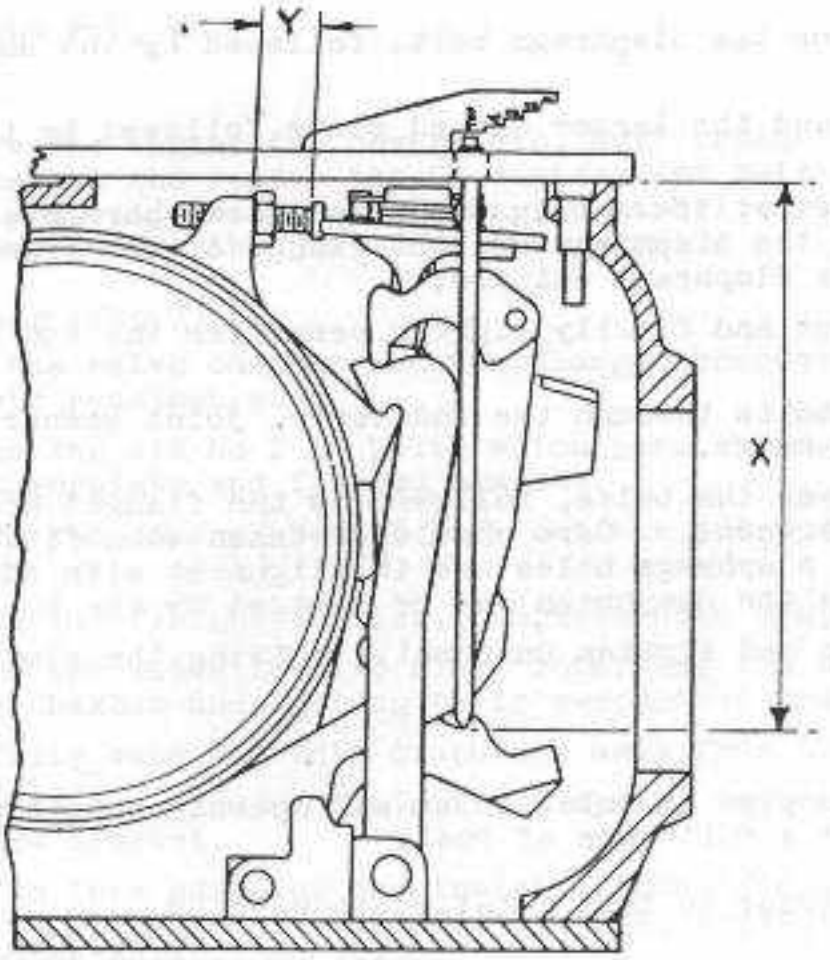
Gearbox

52. This is of conventional pre-selector construction except that the casing is cast integral with the transfer box; it should be noted that the lubrication of these two units is entirely separate.

Brake Band Adjustment

53. *Minor Adjustment* -

Normally the brake band adjusters should not require attention. Abnormal wear of the brake band linings can be taken up by fully depressing the gear change pedal a number of times (20 to 30) with the defective gear selected and the engine stationary. During the operation of "pumping" the gear change pedal it should be noted that the



GAUGE SETTING		
GEAR	DIMENSION IN INCHES	
	DIMENSION 'X'	DIMENSION 'Y'
1ST	6·9	0·550
2nd	7·05	0·785
3rd	7·15	0·880
4th	7·20	0·875
TOP	7·45	0·385

FIG 8 - GAUGE SETTING

pedal has the required 1 in free movement at the pedal pad before resistance is felt. If less than 1 in is obtained with the lowest gear engaged, adjust the actuating rod between the pedal and the lever operating on the gearbox.

54. *Major Adjustment* -

If a gear slips or binds after carrying out the instructions in the preceding para, check the brake band adjustment using Gauge LV9/MGO(M)1274. The steps of this gauge give the dimensions shown against the corresponding gear in fig 8.

NOTE:- Under no circumstances will the adjuster nut of top gear be removed as this will allow the associated pull-rod to drop into the gearbox casing necessitating a heavier repair.

(a) Refer to fig 8 and 9.

(b) Remove the gearbox top coverplate.

(c) Select and engage neutral.

(d) Loosen the adjuster screw lock nut and screw the adjuster screw in well clear of the adjuster ring of the gear to be adjusted.

(e) Select and engage the gear to be adjusted.

(f) Release the adjuster spring.

(g) Using the gauge locate the conical end of the rod in the lip of the busbar and place the baseplate firmly on the machined face of the gearbox and slide the stepped portion over the top of the rod. If the appropriate step does not register with the top of the rod, the toggle action will be adjusted as detailed in the following sub paras (h) to (l).

(h) By alternatively disengaging, adjusting and re-engaging the gear, set the adjuster nut so that the correct busbar height is obtained.

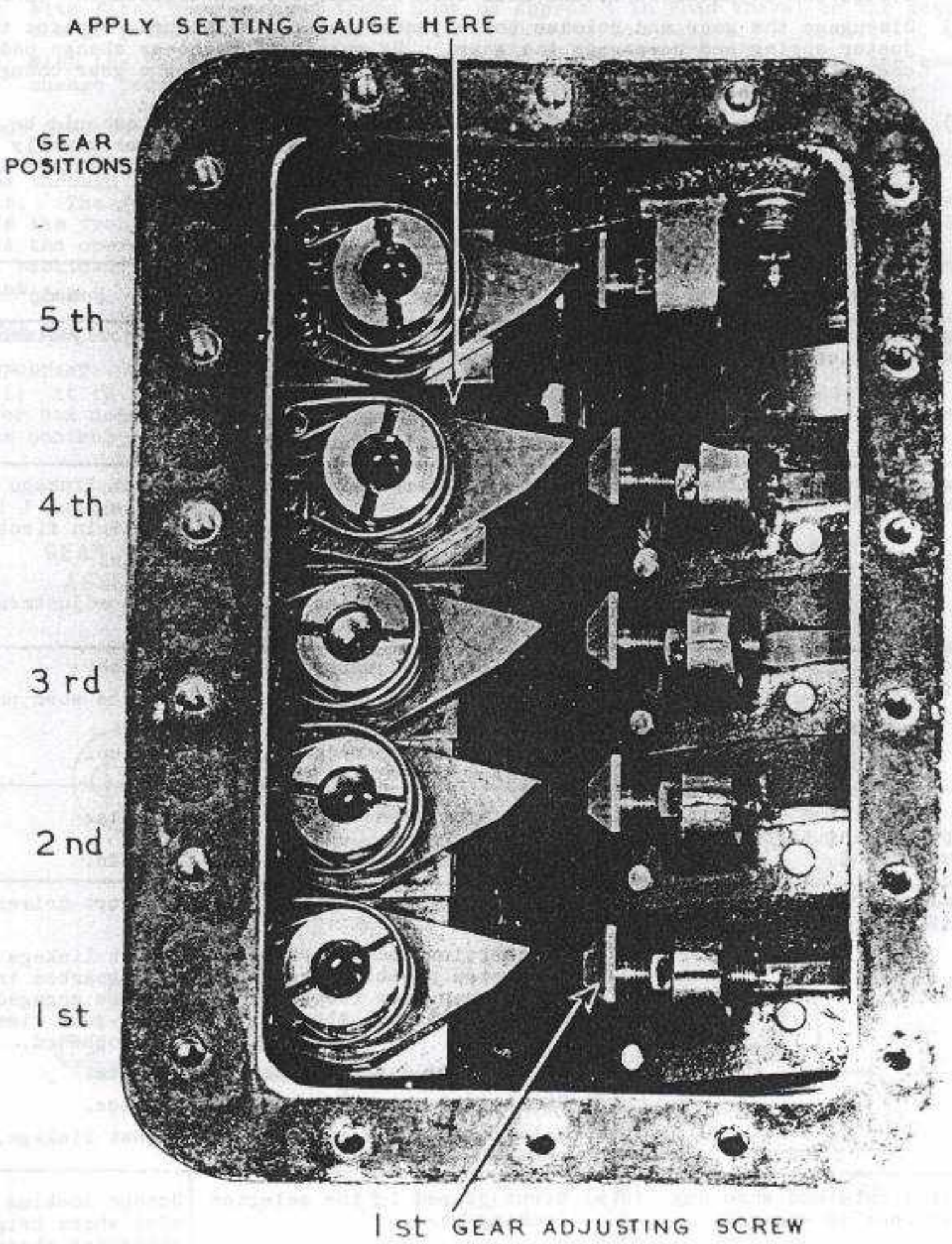


FIG 9 - TOP COVER REMOVED FROM GEARBOX

(j) With the gear engaged screw the adjuster screw out until the flat just touches the face of the adjuster ring with the ring held in its max clockwise position. Rotate the adjuster screw one half turn further out and tighten the locknut.

(k) Disengage the gear and release the adjuster nut one half turn, replace the adjuster spring and re-engage the gear. By operating the gear change pedal check that the adjuster nut rotates. Continue operating the gear change pedal until no further movement of the adjuster nut is observed.

(l) Leave the gear engaged and check the height of the busbar, it should be the same height as originally set. If the busbar is lower than originally set, the adjuster screw has been set too far out. If the busbar is higher than originally set then the adjuster screw is set too far in.

TABLE 1 - TROUBLE SHOOTING

Symptom	*Probable Causes*	*Remedy*
Gauged distance 'X' greater than tabulated figure	(a) Brake drum and brake lining grooves cross threaded (only occurs until bands are fully bedded).	Major adjustment.
	(b) Adjuster screw incorrectly adjusted (too far out).	
Gauged distance 'X' smaller than tabulated figure	(a) Insufficient pedal free travel.	Adjust linkage to give approx 1 in free travel in first gear.
	(b) Automatic adjuster mechanism inoperative.	Repair.
	(c) Adjuster screw incorrectly adjusted (too far in).	Major adjustment.
Automatic adjuster mechanism inoperative	(a) Defective adjuster spring.	Replace.
	(b) Adjuster ring binding on adjuster table.	Replace worn parts.
	(c) Adjuster nut threads tight or nut seized.	Free-up.
End of pull rod level with or protruding through adjuster nut	(a) Brake band worn out.	Replace.
	(b) Brake band broken.	Replace.
Pedal returns with a kick failing to engage a gear	(a) Pedal not depressed to full extent.	Instruct driver.
	(b) Insufficient pedal travel in depressed position preventing busbar from reaching gearbox internal stop.	Adjust linkage so that gearbox internal stop is engaged with pedal just clear of the toeboard.
	(c) Strut guide spring broken.	Replace.
	(d) Strut guide broken.	Replace.
	(e) Maladjustment of external controls to camshaft.	Adjust linkage.
Neutral obtained when any other gear is engaged	(a) Strut jammed in the selector locking bar.	Scrape locking bar slot where bright whiteness shows.
	(b) Strut return spring broken.	Replace.

55. *Gear Change Pedal* -

Adjust the linkage to obtain the following:-

(a) With first gear engaged there must be approx 1 in free travel on the gear change pedal.

(b) With the busbar fully depressed against the gearbox internal stop the gear change pedal must be just clear of the toeboard.

56. *Gear Selector Control (see fig 10) - Adjustment* -

Disconnect the selector rod at the gearbox. Move the operating lever on the gearbox through its full range. At each extremity, a slight amount of backlash will be felt. The gears selected when the lever is placed at the extremities are first towards the front of the gearbox and third towards the rear. Adjust the control rod so that the operating lever on the box is moved to these positions (allowing for the slight backlash) when the gear lever is moved to its relevant position in the gear quadrant.

Transfer Box

57. *IMPORTANT:*- When the vehicle is being towed, the transfer box must be placed in neutral; it is not sufficient to place the gearbox in neutral. To ensure that the transfer box does not jump out of neutral whilst being towed, lash the forward and reverse control lever in the neutral position.

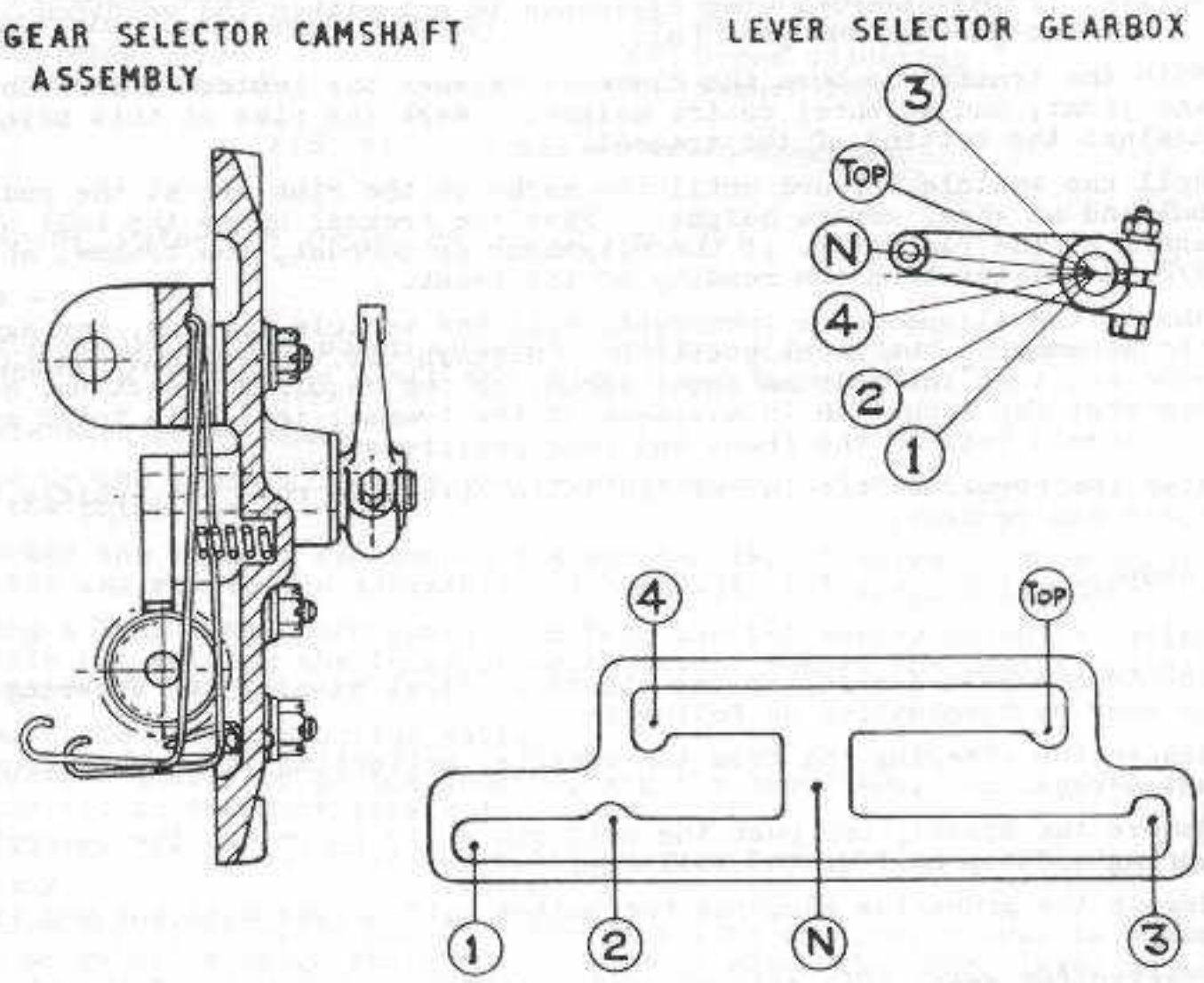


FIG 10 - GEARBOX, SELECTOR CONTROL

58. The internal bushes of the transfer box mainshaft are the bearings for the gearbox driving shaft rear spigot and are pressure lubricated by a pump. This pump is driven by the gearbox driving shaft, so that with the shaft stationary, oil will not be delivered to the bushes. With the engine stationary and the vehicle being towed with the transfer box not set in neutral, the transfer box mainshaft will be rotating around the stationary gearbox driving shaft. Under these conditions, oil will not be fed to the bushes, with a resultant seizure or partial seizure between the bushes and the driving shaft. With the transfer box in neutral there will be no movement of the mainshaft around the gearbox driving shaft and no damage will result.

Workshop Special Tools

59. GAUGE, setting, Wilson preselector gearbox, LV9/MGO(M)1274

STEERING

60. *Road Wheel Alignment (Toe-in 1/8 in)* -

(a) Place the vehicle on level hard standing.

(b) Jack the vehicle up allowing the wheels to clear the ground, rotate the front wheels and ensure that they run true at the inside rim, if there are signs of wobble or buckle, replace with one running true.

(c) Turn the steering wheel full lock to lock, counting the turns, and centre the steering wheel. The front wheels should now be straight ahead and the clearance between the steering stops should be within 1 1/4 in to 1 3/8 in on each side.

NOTE:- If the steering stop clearance is not within the required limits refer to para 64 sub para (n).

(d) With the trammel measure the distance between the inside rims of the wheels at the front, and at wheel centre height. Mark the rims at this point, do not disturb the setting of the trammel.

(e) Roll the vehicle forward until the marks on the rims are at the rear of the hub and at wheel centre height. Pass the trammel under the hull and measure again at the rim marks, if the alignment is correct, the trammel should read 1/8 in greater than the reading of the front.

(f) Should the alignment be incorrect, roll the vehicle forward, and again place the trammel in the front position. Slacken off the locknuts on the steering rods and turn the rods an equal amount in the required direction, not forgetting that for each 1/16 in movement at the trammel is 1/8 in total movement of the wheels between the front and rear positions.

(g) When the required "toe-in" of 1/8 in is obtained, roll the vehicle forward again and recheck.

Steering Rods

61. *Removal* -

Should backlash develop in the steering, first examine the steering rod ball joints for wear by dismantling as follows:-

(a) Remove the steering rod from the vehicle, collecting the rubber grommets and metal caps.

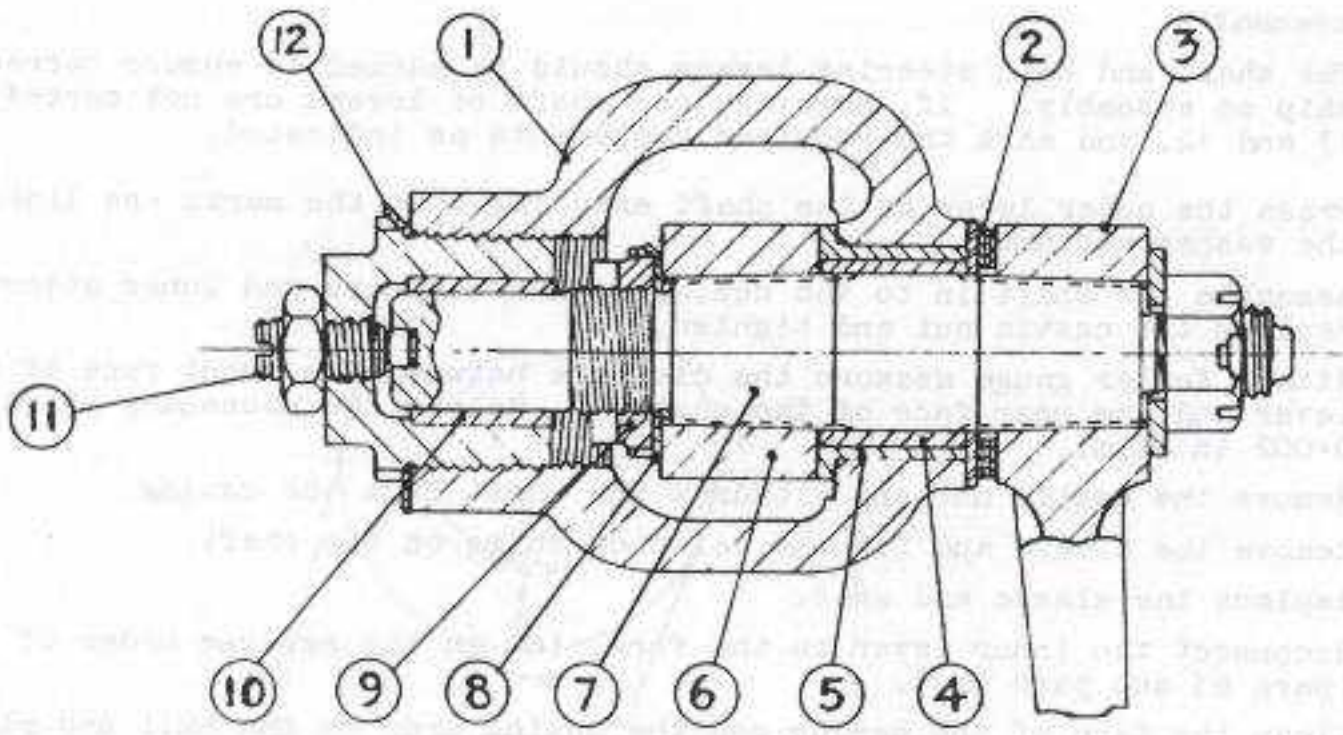
(b) Remove the circlip and push the ball pin up to force out the coverplate, coil spring and top half of the ball cap.

(c) Remove the grubscrew securing the bottom half of the ball cup and withdraw the cup.

(d) Examine for wear, this will be most apparent on the ball of the pin, if there is the slightest sign of ridging, replace both ball pin and cups.

62. *Replacement* -

Replace in the reverse order with a liberal smear of grease (XG 279) in the ball and cups.



1. Casing
2. Shims and ring sealing
3. Lever steering outer
4. Bush steering lever shaft (steel)
5. Bush steering lever
6. Lever steering inner
7. Shaft
8. Washer lock inner
9. Nut steering lever
10. Bush steering lever shaft
11. Screw adjusting
12. Washer lock

FIG 11 - STEERING LEVER ASSEMBLY

Steering Levers, Outer and Inner, RH and LH (fig 11)

63. *Removal* -

The steering levers outer cannot be withdrawn from their shafts on the vehicle. It is necessary to remove the shaft and outer lever together.

(a) Drain both relay boxes.

(b) Jack up the vehicle, remove the front wheels and loosen the inner ball mounting at the outer lever.

(c) Slacken the locknut and loosen the slotted thrust screw. Turn back the tab washer and remove the screwed steel bush with 'C' spanner (FV 51456).

(d) Using a long flat-nosed punch turn back the tab washer which is behind the castle nut holding the inner steering lever, remove the castle nut with spanner (FV 51457).

(e) Remove the casing mounting bolts.

(f) Drive the shaft out of the housing, and the inner arm, leaving the inner arm connected to the fork link end.

(g) Remove the front and rear inspection covers from the inner steering lever casing.

(h) Remove the front split pin from the fork link end pin, access to the split pin can be gained through the aperture through which the inner lever operates.

(j) Remove the fork link pin and inner lever.

(k) Remove the split pin and nut from the shaft and press the shaft out of the outer lever.

64. *Replacement* -

The shaft and both steering levers should be marked to ensure correct angular relationship on assembly. If, however, the shaft or levers are not marked, refer to fig 12, 13 and 14, and mark the required components as indicated.

(a) Press the outer lever on the shaft ensuring that the marks are lined up and fit the washer and nut.

(b) Assemble the shaft in to the casing with its sleeve and inner steering lever. Replace the castle nut and tighten.

(c) With a feeler gauge measure the distance between the front face of the outer lever and the rear face of the casing. Select the necessary shims minus one 0·002 in shim.

(d) Remove the castle nut and withdraw the shaft from the casing.

(e) Remove the sleeve and fit the selected shims on the shaft.

(f) Replace the sleeve and seal.

(g) Reconnect the inner lever to the fork link in the reverse order of removal (para 63 sub para (h)).

(h) Clean the face of the casing and the mating area on the hull and place the shims as required in position.

(j) Assemble the shaft, casing and inner lever ensuring that the marks on the shaft and the inner lever are in line.

(k) Replace the tab washer and castle nut and tighten. Turn over the tab washer.

(l) Position the inner ball in the outer steering lever.

(m) Refit the casing to the hull with the shims, smearing the mating surfaces with Bostik 'C'.

(n) Check that the steering wheel is centralised and ensure that the clearance between the steering stops is between 1 1/4 in to 1 3/8 in on each side. If the clearance is not within the tolerance, check the following:-

(i) The markings are in correct alignment.
(ii) The markings on the shaft and/or levers are correct.
(iii) The shaft is not twisted.
(iv) The levers are not bent.

(o) Replace the drain plug and fill with 1 1/2 pts of OEP 220.

(p) Replace the front and rear inspection covers on the inner steering lever casing.

NOTE:- The alignment of the front wheels must be checked on the replacement of the steering lever assembly in accordance with para 60.

Workshop Special Tools

65. LV9/ASC/FV 51456 SPANNER 'C' steering locknut
LV9/ASC/FV 51457 SPANNER castle steering locknut

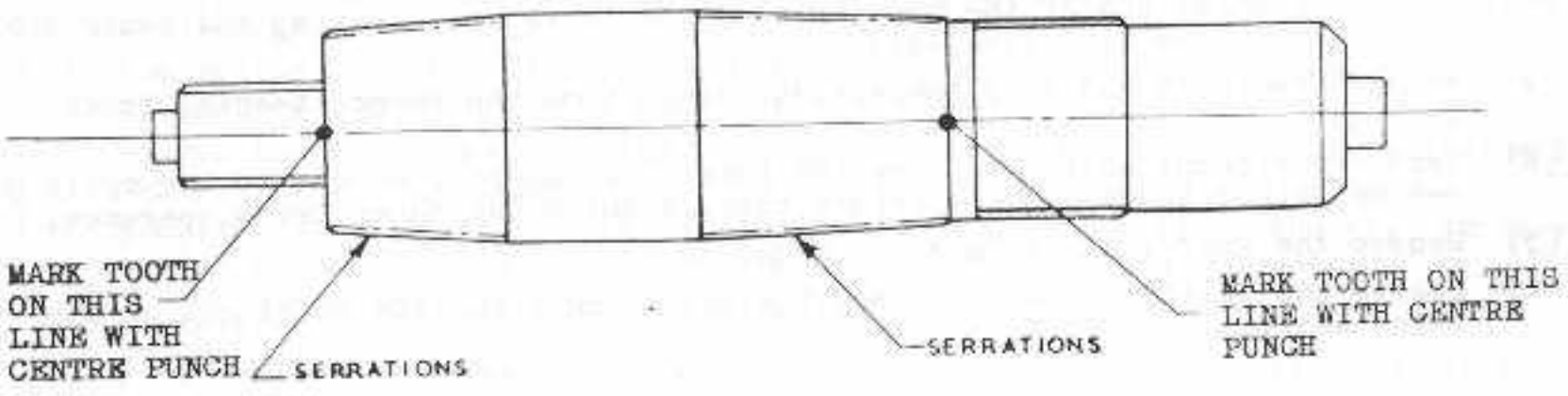


FIG 12 - MARKING OF STEERING RELAY SHAFT

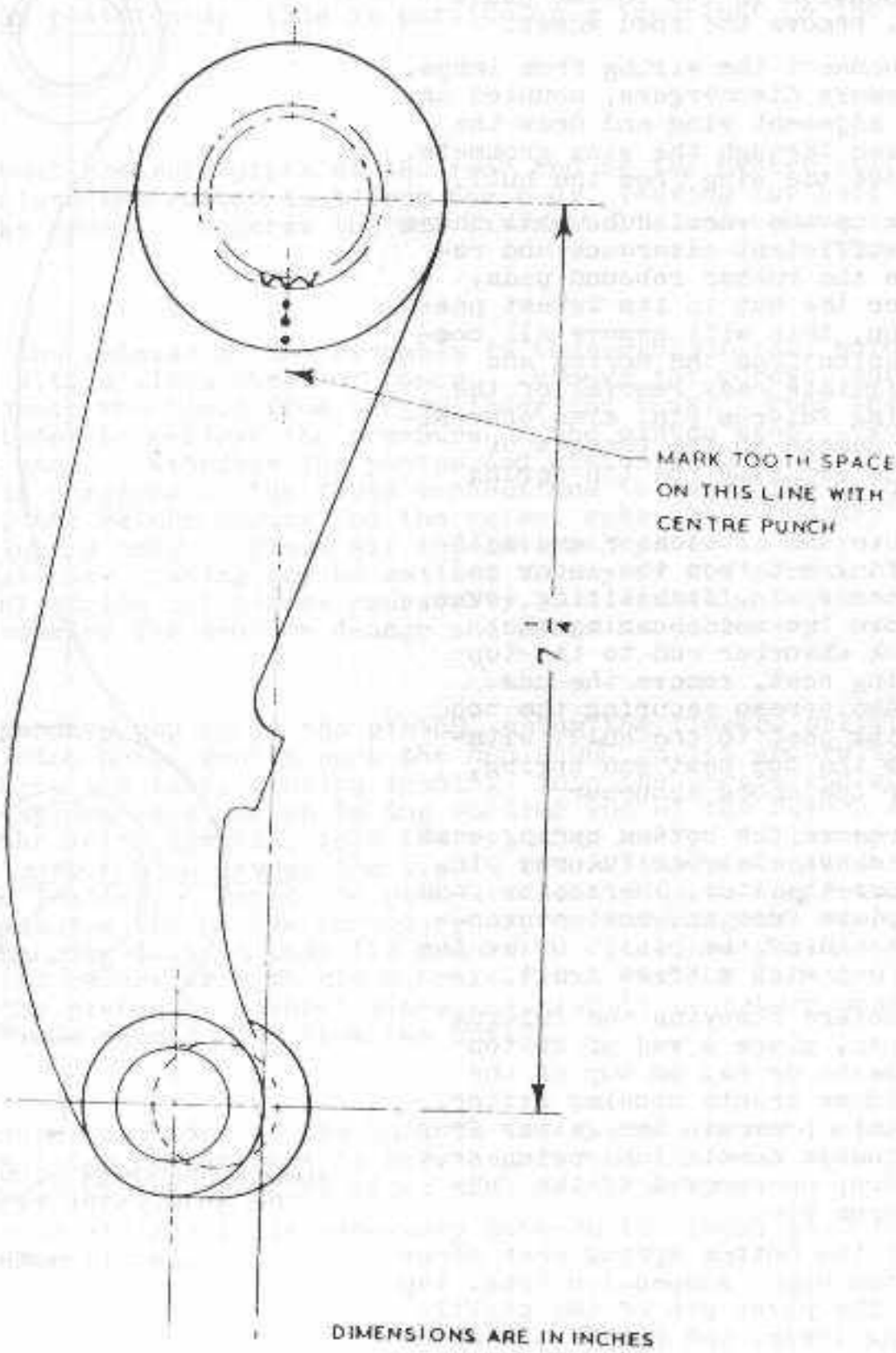


FIG 13 - MARKING OF OUTER STEERING LEVER

SUSPENSION

66.(a) Jack up the vehicle and place skidding under the hull, sufficient to leave the road wheel clear of the ground with the suspension in its lowest position, remove the road wheel.

(b) Disconnect the wiring from lamps, or smoke dischargers, mounted on the adjacent wing and draw the cables through the wing grommets. Remove the wing from the hull.

(c) Jack up the wheel hub until there is sufficient clearance and remove the rubber rebound pads, lower the hub to its lowest position, this will remove all compression from the spring and facilitate easy removal of the spring fulcrum pin, also preventing damage to the threads of studs securing the top spring seat on removal.

(d) Remove the lubricator and self-locking nut from the inner end of the spring stabilizing lever, remove the nut securing the shock absorber rod to the top spring seat, remove the hex headed screws securing the top spring seat to the hull, withdraw the top seat and spring, over the shock absorber.

(e) To remove the bottom spring seat and shock absorber fulcrum pin, remove the stud, lubricator, and endplate from the most convenient end of the pin. Drive the pin out with a brass drift.

NOTE: - Before removing the fulcrum pin, place a wad of cotton waste or rag on top of the inner tracta housing gaiter, this prevents the gaiter from damage should the spring seat drop on removal of the fulcrum pin.

(f) Lift the bottom spring seat clear of the upper suspension link, tap out the pivot pin of the stabilizing lever, and remove the shock absorber complete with the lower spring seat and stabilizing lever.

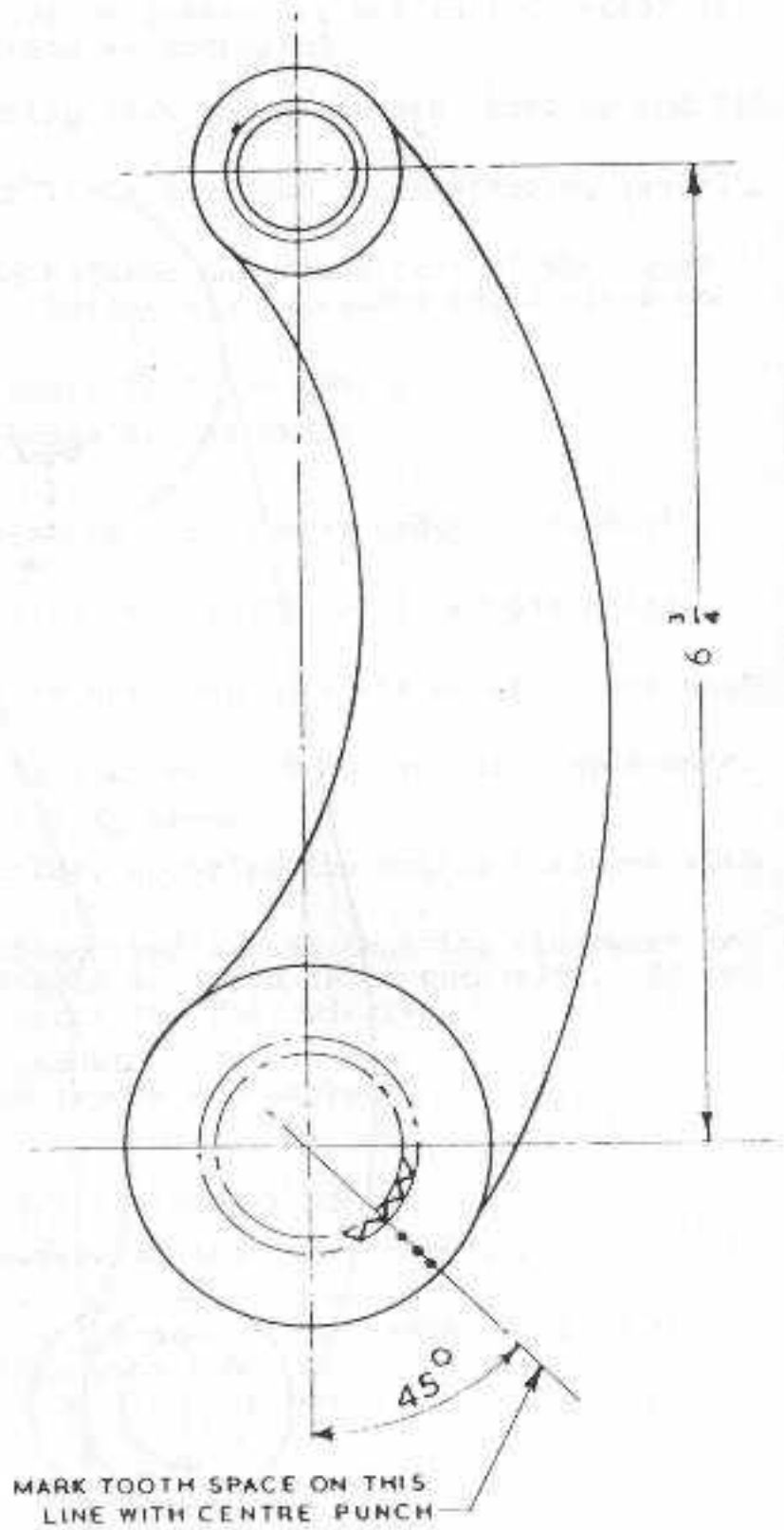


FIG 14 - MARKING OF INNER STEERING LEVER

67. *Replacement* -

Replace in the reverse order, ensuring the replacement of the rubber 'O' sealing rings.

BRAKES

68. The brakes are of the double leading shoe type and are operated hydraulically by the foot pedal and mechanically by the handbrake on all four wheels.

69. *Removal of Brake Shoes* -

Jack up the vehicle and remove the road wheel, remove the brake drum securing screws and withdraw the drum, lever the brake shoe out of the carrier, retrieve the two springs and the pin from the carrier.

70. *Replacement* -

Replace in the reverse order, ensuring that the pin is greased and the retaining springs correctly positioned; this is particularly important on the lower shoe.

Master Cylinder

71. *Removal* -

Disconnect both pressure pipes at the rear end of the master cylinder, remove the boot clip and detach the rubber boot from the body, leaving the boot and push-rod attached to the brake pedal. Unscrew the six fixing bolts and remove the master cylinder from the hull.

72. *Dismantling* -

Ensure that the outside of the assembly is thoroughly clean, before dismantling on a bench, covered with a clean sheet of paper. Remove the screws, spring washers and coverplate and drain the fluid from the cylinder and tank. Push the piston down the bore of the cylinder to relieve the pressure on the piston stop. Remove the circlip and the piston stop. Withdraw the piston and piston washer, seal off the ports, and apply a light air pressure to the fluid connections to expel the main cup, tap out the spring retainer, the return spring and the valve, ease the secondary cup out of the piston, using the fingers only. Place all the internal parts in a tray of clean brake fluid, the master cylinder casting may be swilled in any of the normal cleaning fluids, but must be thoroughly dried out before reassembly. Clean all the internal parts with a fluffless cloth, examine for wear or damage and renew as necessary.

73. *Reassembly* -

Ease the secondary cup on to the piston, using the fingers only, the lip of the cup must face the piston head, gently work the cup round on its groove to ensure its correct seating. Drop the valve (spring leading) into the larger end of the return spring, and fit the spring retainer on to the smaller end of the return spring. Enter the assembly, with the valve upwards, into the cylinder bore; follow up with the cup, lip leading, taking care not to damage the lip. Insert the piston washer and the piston, drilled face leading. Press the piston assembly up to the return spring, taking care not to damage the lip of the secondary cup on entering the bore, fit the piston stop and circlip, ensuring that it beds its groove. Fit a new gasket and secure the coverplate. Fill the reservoir with clean brake fluid (Oil OX (Aust) 9), replace the filler cap. Push the piston in several times allowing it to return unassisted; after a few applications fluid should flow from the outlet.

74. *Replacement* -

Refit the master cylinder to the hull in the reverse order to that detailed in para 71, ensuring that the rubber boot is serviceable and the vent hole in the boot is at the bottom. Couple up the pressure pipes and bleed the system.

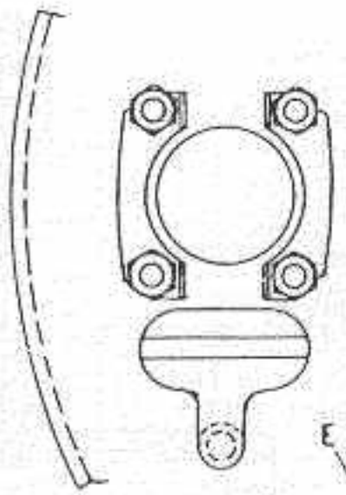
NOTE:- A min clearance of 1/32 in is necessary between the pedal push-rod and the master cylinder piston.

Brake Expanders

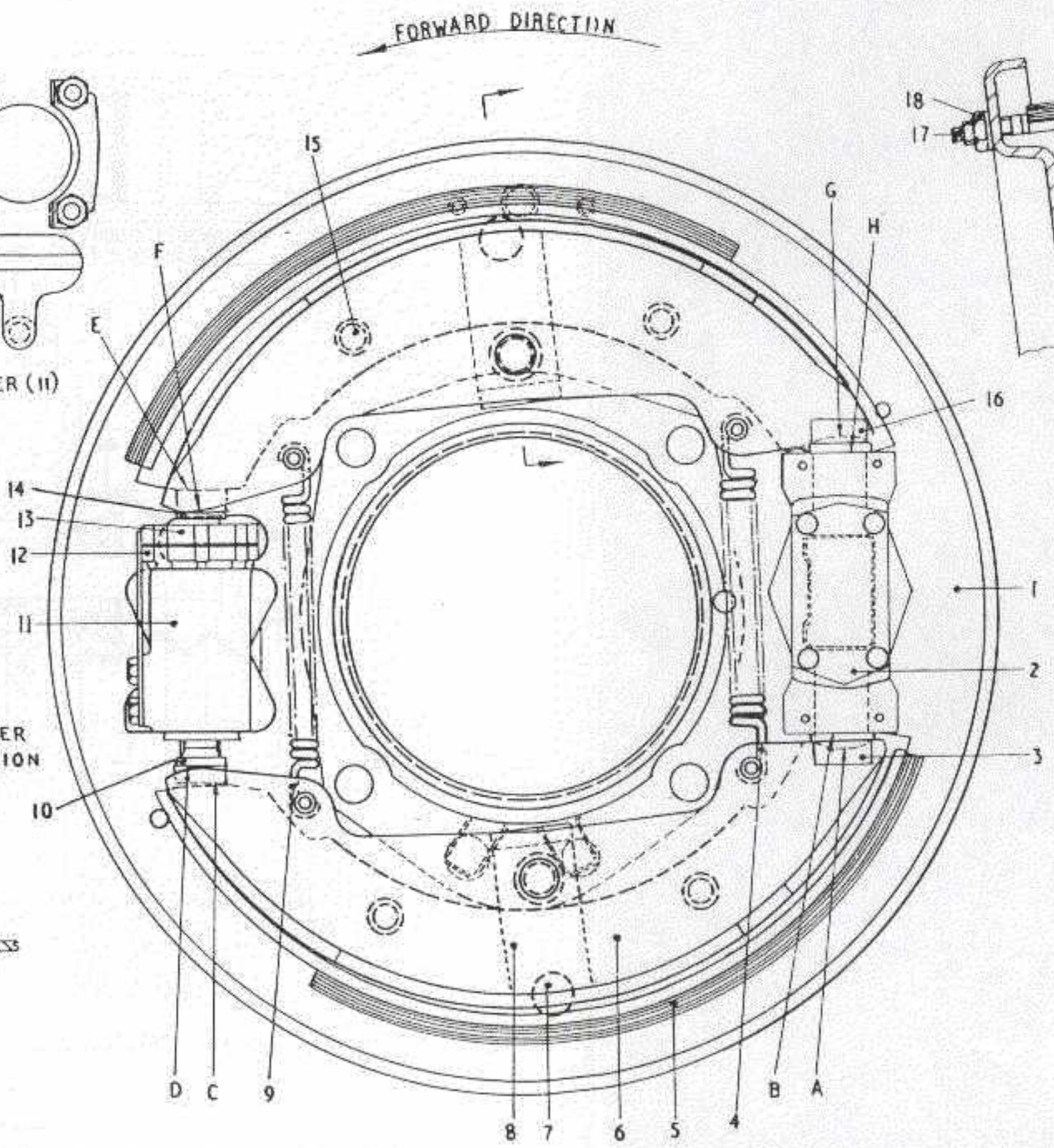
75. *Removal* -

Jack up, and remove the road wheel, slacken off the brake shoe adjusters, remove the brake drum, lever the brake shoes out of their carriers and collect their locating pins and springs. Disconnect the pressure pipe at the union of the expander, disconnect the handbrake cable bracket, remove the bolts securing the expander unit to the brake backplate.

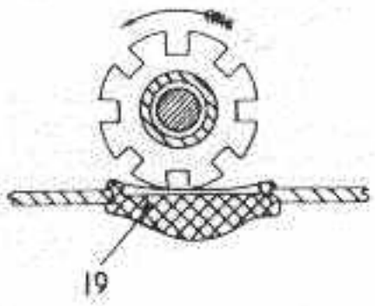
VIEW ON REAR OF ADJUSTER (11) SHOWING LOCK PLATES.

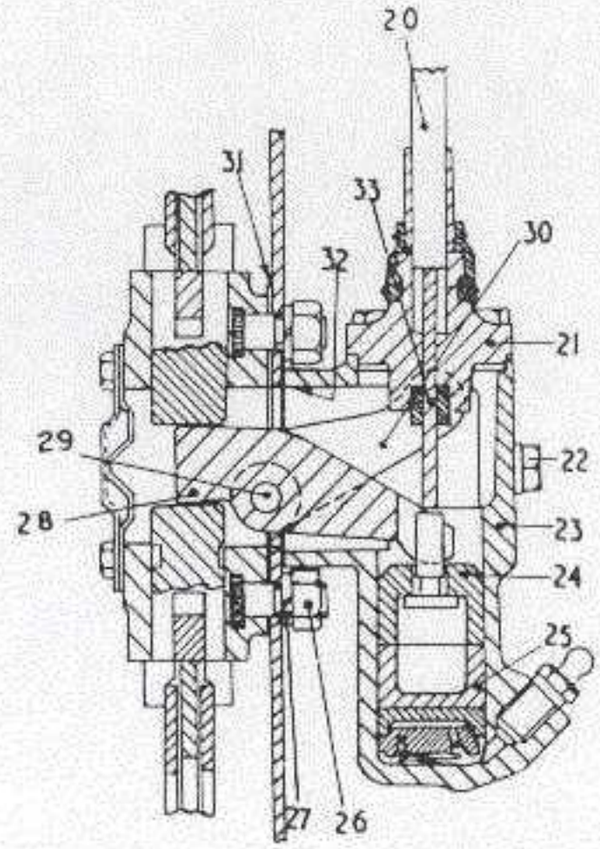


VIEW ON REAR OF ADJUSTER (11) SHOWING LOCK PLATES



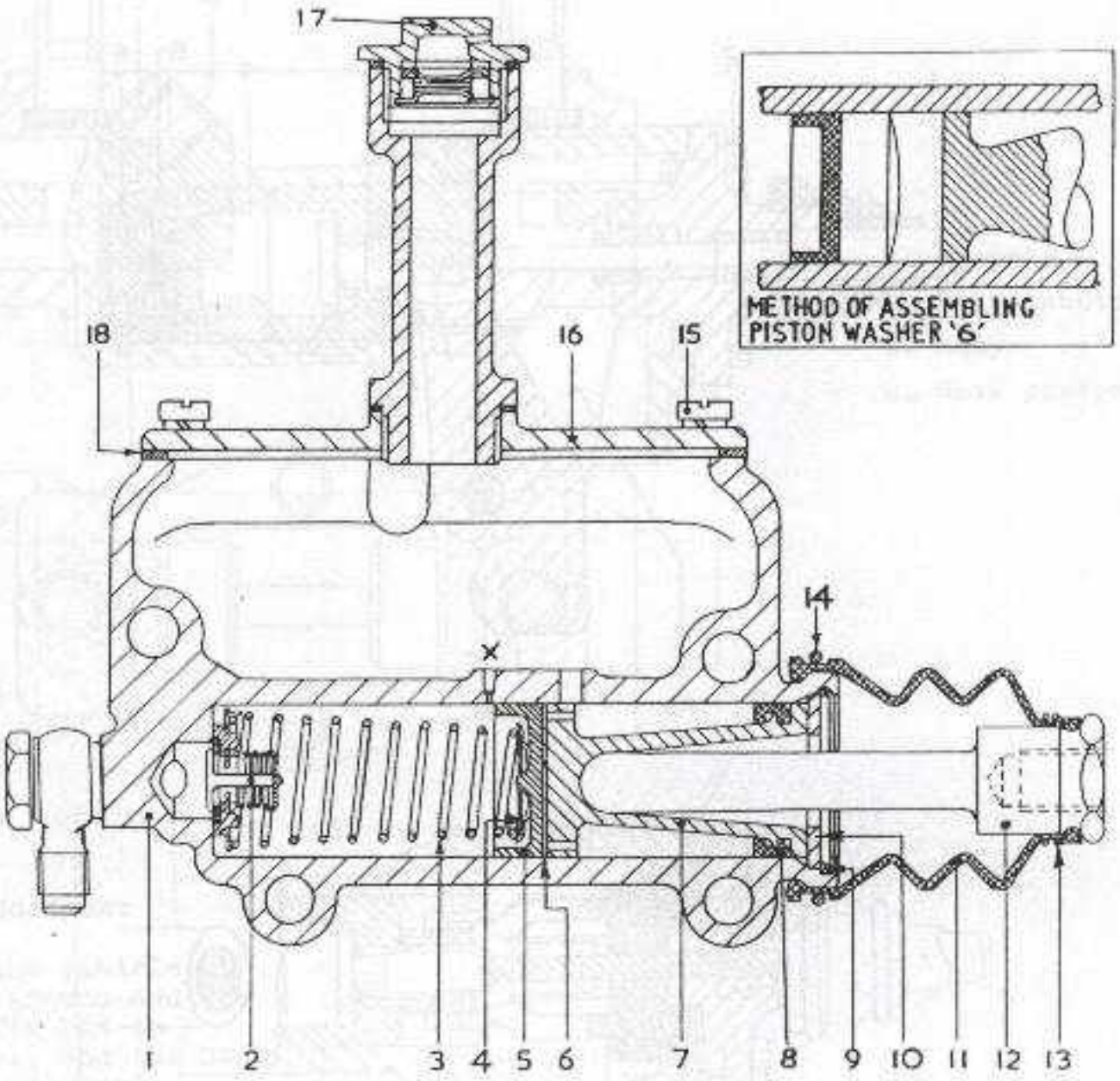
VIEW THROUGH ADJUSTER HOLE SHOWING DIRECTION OF ROTATION





1. **Backplate**
2. Tappet assembly
3. Tappet abutments
4. Spring pull-off (FV 29407)
5. Lining brake shoe
6. Carrier brake shoe
7. Pin rocker
8. Link brake shoe
9. Spring pull-off (FV 29406)
10. **Adjuster screw**
11. Adjuster assembly
12. Clicker
13. Adjuster cap and nut
14. Adjuster screw
15. Spring shoe retainer
16. Tappet abutment plate
17. Steady pins brake shoe
18. **Steady pin** locknut
19. Adjuster dust excluder
20. Handbrake cable
21. Cable assembly cap
22. Bolts securing expander
23. Expander body
24. Handbrake piston
25. Hydraulic piston
26. Nuts tappet assembly
27. Spring washer
28. Lever expander inner
29. Hinge pin levers
30. Lever expander outer
31. Gasket
32. Gasket
33. Lever trunnion block

FIG 15 - BRAKE ASSEMBLY (LH)



1. Cylinder body
2. Valve
3. Spring return
4. Retaining spring
5. Cup main
6. Washer piston
7. Piston
8. Cup secondary
9. Spring retainer
10. Stop piston
11. Boot
12. Push-rod
13. Clip boot small
14. Clip boot large
15. Screws, ch hd BSF (6)
16. Cover tank
17. Cap filler
18. Gasket

FIG 16 - HYDRAULIC BRAKES - MASTER CYLINDER ASSEMBLY

76. *Dismantling (fig 17)* -

(a) Tap out the hinge pin and remove the inner lever.

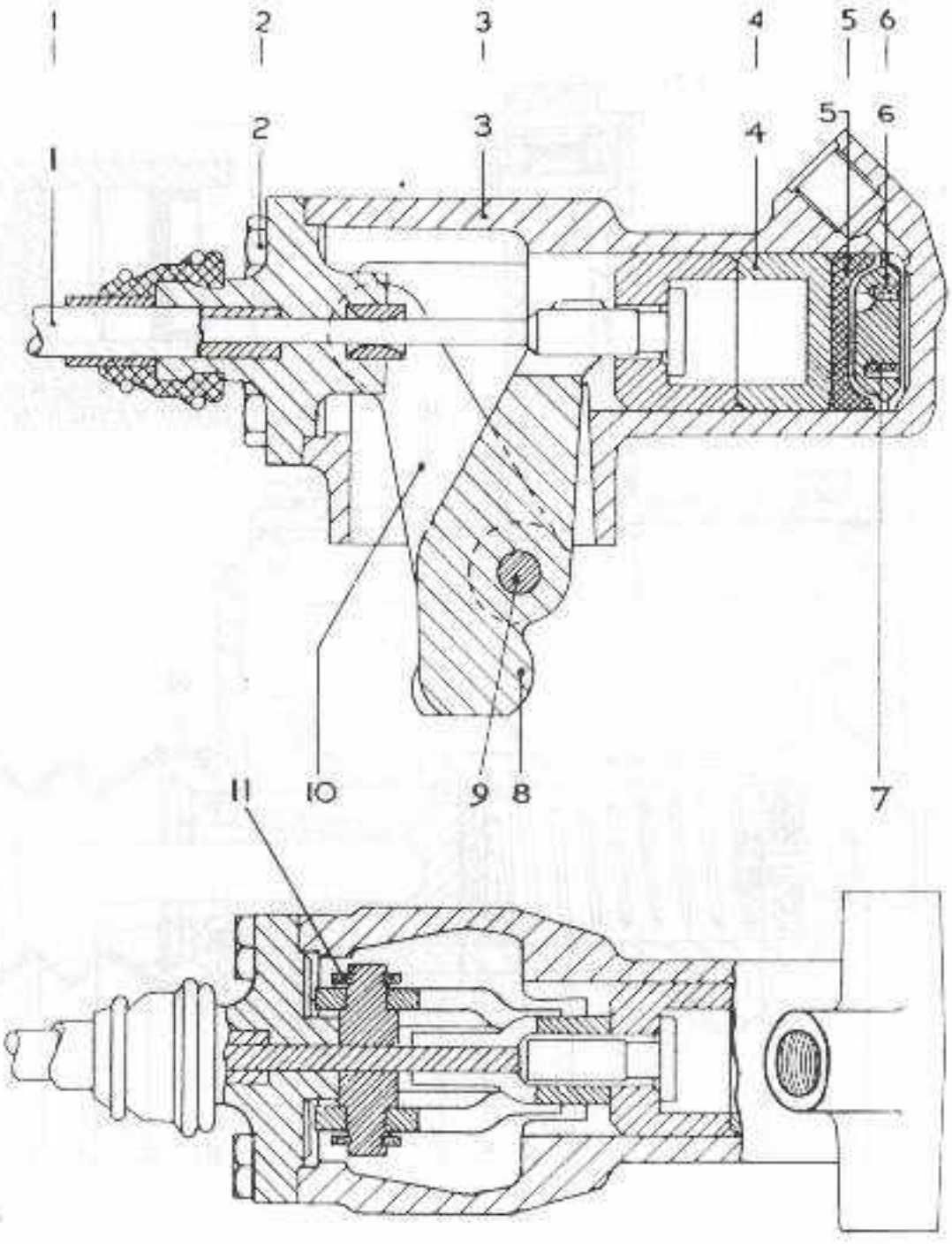
(b) Remove the four setscrews securing the cable and cap, pull the cable assembly out as far as it will go.

(c) Remove the two small circlips and disconnect the outer levers (these may require a little manipulation).

(d) Pull the cable assembly away from the body.

(e) Shake out the hydraulic piston, apply a light air pressure to expel the rubber cup, cup filler and the spring.

(f) Place all the hydraulic components in a clean container of brake fluid.



1. Cable assembly
2. Screws securing end cap
3. Body
4. Hydraulic piston
5. Cup rubber
6. Cup filler
7. Spring cup filler
8. Lever inner
9. Pin hinge
10. Lever outer (2)
11. Circlips (2)

FIG 17 - BRAKE EXPANDER LH

77. *Reassembling* -

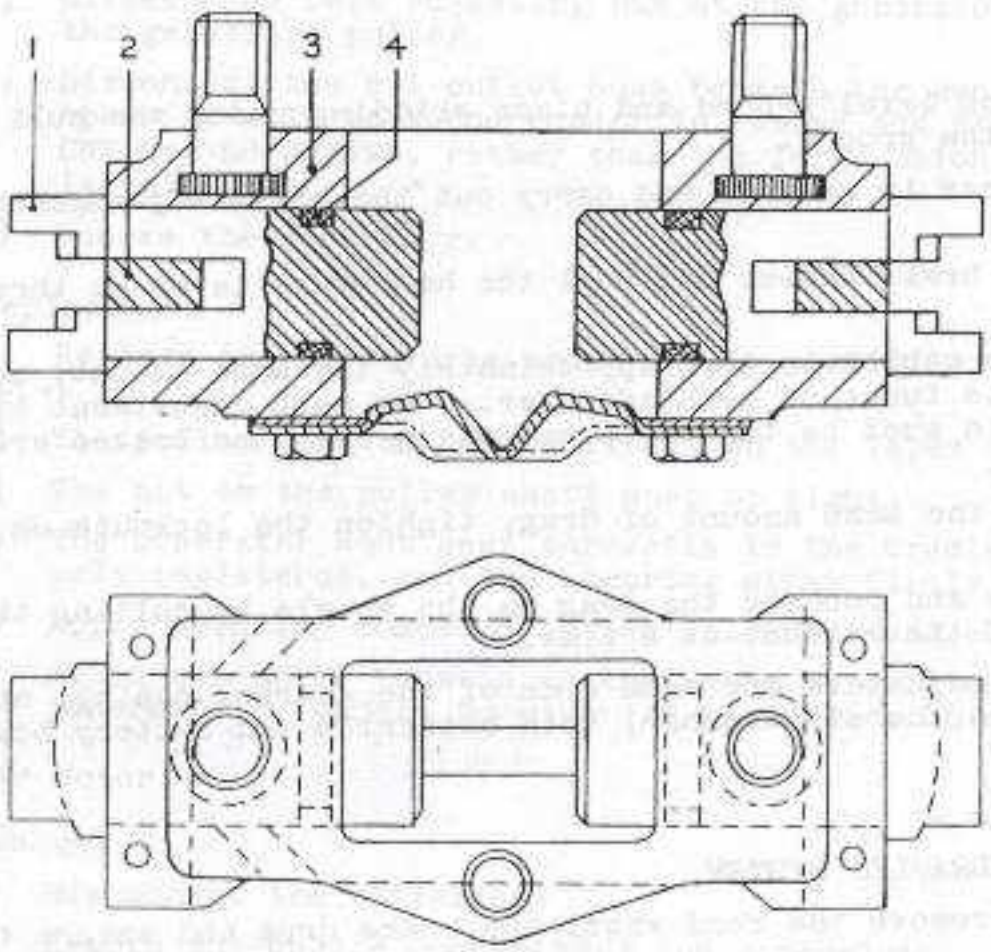
Reassemble in the reverse order.

Brake Tappet Assembly

78. The tappet assembly (fig 18) will require servicing on brake overhaul or every 12 months, the tappet assembly will be stripped and lubricated with Grease XG 279.

Brake Adjusters

79. Brake adjusters (fig 19) will require servicing on brake overhaul or every 12 months. Sleeves and screws will be removed from adjuster nuts, thoroughly cleaned and lubricated with Grease XG 279 before being reassembled.



1. Tappets
2. Plate abutment
3. Body
4. Seal piston

FIG 18 - BRAKE TAPPET ASSEMBLY

Brake Shoe Adjustment

80.(a) With the vehicle on level ground and the transfer box in neutral, and the hand-brake released.

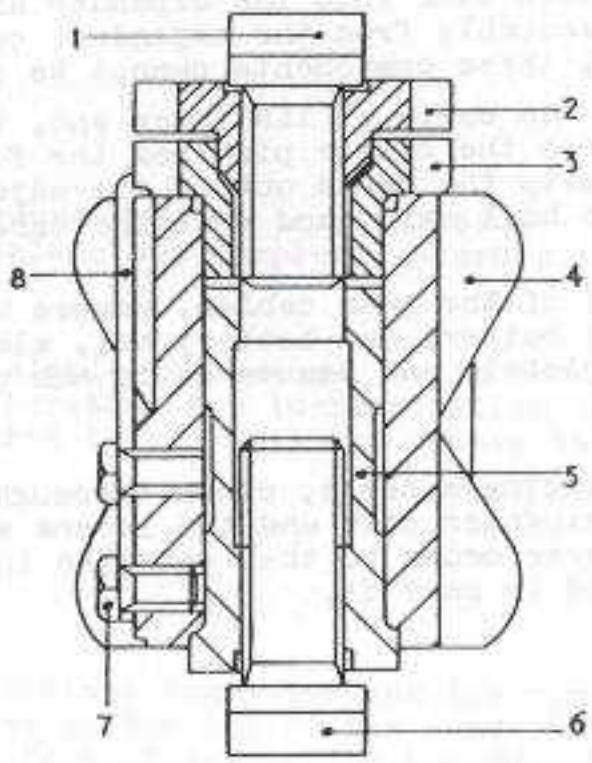
(b) Jack up the vehicle until the tyres are clear of the ground.

(c) Using a spanner, turn the hexagon head adjuster clockwise until the brake shoe contacts the drum.

(d) Now turn the adjuster anticlockwise until the wheel is just free to revolve.

(e) Treat the square head adjuster for the second brake shoe in the same way.

(f) Repeat the operation on the remaining three brakes.



1. Adjuster screws RH thread
2. Adjuster nut
3. Adjuster cap
4. Body
5. Adjuster sleeve
6. Adjuster screw LH thread
7. Clicker screws
8. Clicker

FIG 19 - BRAKE ADJUSTER

Mechanical Handbrake

81. *Adjustment* -

(a) Jack the vehicle up on level ground and place skidding under the hull to get all four wheels off the ground.

(b) Place the transfer gear in neutral and carry out the brake adjustments as detailed in para 80.

(c) Slacken off all four brake cables and pull the handbrake lever on three clicks of its ratchet.

(d) Adjust all four brake cables in turn approximately the same amount, commence with say, two complete turns of each adjuster. On each adjustment of the cables all four wheels must be turned to ascertain when the brakes are just beginning to operate.

(e) When all wheels have the same amount of drag, tighten the locknuts on all the cable adjusters.

(f) Release the handbrake and recheck the drag on the wheels by pulling the handbrake on one click of the ratchet at a time.

NOTE:- The rear brake cable adjusters are each side of the gearbox casing, and it will be necessary to remove the air cleaner, both batteries and battery boxes to gain access to them.

82. *Removal of Handbrake Cable* -

DO NOT DISTURB THE HYDRAULIC SYSTEM.

(a) Jack up the vehicle, remove the road wheel and brake drum and ensure that the handbrake is off.

(b) Detach the expander unit (wheel cylinder) from the rear of the brake backplate, and release the cable support bracket.

(c) Remove the endplate secured by four setscrews where the cable enters the expander unit.

(d) Push out the hinge pin and remove the inner lever, pull the cable assembly out of the expander unit as far as it will come and remove the two small circlips, push the cable back into the expander and remove the two outer levers. Remove the cable assembly from the expander, complete with coverplate, tappet block and piston, these components cannot be removed from the cable assembly.

(e) Disconnect the cable at its inner end, ie, within the hull if it is the front cable, remove the clevis pin from the fork end attached to the brake cross-shaft and slip the cable out of the adjuster plate. Slacken off the pinch bolt at the hull exit, and pull the cable assembly out through the hull side plate.

(f) For removal of the rear cables, remove the air cleaner (in the case of the RH rear cable) battery and battery box, slacken off the locknut, unscrew the turnbuckle completely and remove as in sub para (e).

83. *Replacement* -

Before replacing a cable, clean thoroughly and smear lightly with Grease XG 279, wipe out the expander unit and the levers with a clean rag soaked in gasoline. Replace in the reverse order to that detailed in the previous para and carry out the adjustments detailed in para 81.

ELECTRICAL SYSTEM

Generator (Two Speed)

84. *Removal* -

(a) Remove the engine compartment top coverplate.

(b) Disconnect and remove the oil cooler.

(c) Disconnect the leads within the ignition coil housing and remove the coil complete with its support bracket.

(d) Disconnect the 5 pin plug at the generator.

(e) Slacken the belt adjusting nut at the generator and slip the driving belt off the generator pulley.

(f) Disconnect the oil outlet hose beneath the generator (because of restricted space it will be found easier to remove the elbow which is held by two 5/16 in UNF hex hd screws, rather than the large union nut). Disconnect the top inlet oil pipe.

(g) Remove the generator.

85. *Replacement* -

Replace in the reverse order paying particular attention to the following points:-

(a) The pulley must be seated firmly on the taper of the shaft.

(b) The nut on the pulley shaft must be tight.

(c) The generator must seat correctly in the cradle with the locating dowel properly registered, and the securing strap firmly tightened.

(d) Apply jointing compound to the oil inlet and outlet elbows.

(e) Avoid excessive tension on the belts as this will overload the bearings of the generator. Adjust to give 1/2 in deflection on the vertical run of the belts.

Starter Motor

86. *Removal* -

(a) Disconnect the batteries.

(b) Remove the engine compartment top coverplate.

(c) Remove the exhaust pipes.

(d) Disconnect the breather pipe adjacent to the rear tappet chamber.

(e) Disconnect the tachometer drive.

(f) Pull out the cables at the starter motor.

(g) Remove the screws and lift out the starter assembly.

87. *Replacement* -

Replace in the reverse order.

Panel Switchboard No 1, Mk 1

88. The switchboard is fully waterproofed and tropicalised. If the switchgear should require workshop attention, replace the complete assembly.

89. *Removal* -

Disconnect all cables at the nipple connectors, avoid handling the cables with dirty or greasy hands to prevent obliterating the identification on the sleeves. Take out the bolts securing the panel bracket to the hull and remove the panel complete.

90. *Replacement* -

Replace in the reverse order.

Generator Panel No 2, Mk 1

91. The panel houses the cutout, voltage regulator and the current regulator. The main and auxiliary fuses are positioned in the top of the panel. Spare fuse wire is wound on the insulated portion of the fuse bridge, above the fuse for which it is intended. The fuse wire gauges are:-

Generator circuit: 50 A, 10 SEC fusing rating, strip fuse

Auxiliary circuit: 5 A, No 30 SWG, tinned copper

92. To replace a fuse remove the four nuts holding the generator panel to the hull side plate, pull the panel away from the hull to allow sufficient working space. (It will not be necessary to remove the large serrated cap). Remove the four screws and lift off the top cover. Both fuses are plainly marked and are of the pull-out type. Thread only sufficient fuse wire between the inner and outer tongues to bridge the two contacts. Do not pinch the tongues together with pliers to make contact between the fuse wire and tongues, the pressure required to push the fuse back into position will ensure good contact. Replace the cover and reposition the panel to the hull plate.

Oil Pressure Switch

93. *Removal* -

Remove the generator (see para 84). Unscrew the cable gland nut, disconnect the earth wire and remove the six base securing nuts. Lift the unit off the crankcase and tilt to remove the insulating disc. Disconnect the cable at the terminal screw and pull the cable through the union. Collect the gland washer and replace the insulating disc and cap in the defective unit.

94. *Replacement* -

Thoroughly clean the area of the crankcase covered by the gasket and place a new gasket into position. Remove the cap (with 'O' seal), insulating disc and preservative of the new unit. Place the gland washer into position within the union, insert the cable and secure to the terminal screw. Secure the unit to the crankcase, connect the earth wire and tighten the cable gland nut. Replace the insulating disc, 'O' seal and cap, screwing the latter down firmly. On earlier units, the seal between the cap and the body is effected by a flat rubber ring. When replacing the caps of these units, it is advisable to smear sealing compound on the faces to ensure a waterproofed joint. Replace the generator.

HULL AND TURRET

General

95. The hull and turret are of welded armour plate construction. Repairs and welding of the armour plate will be carried out in accordance with WKSP B 011.

Turret and Turret Ring

96. *Removal* -

(a) Remove the screws securing the turret to the turret ring and lift off the turret. (Weight: 325 lb approx).

(b) Support the turret ring, slacken the bolts securing the bearing housings to the roof plate, tap back the housings and lift off the turret ring.

NOTES: - (1) The roof plate holes are elongated for adjustment at two of the bearing housings, the third having clearance holes only.
(2) Early Mks of turret rings are provided with flats at the lower rims to facilitate removal and replacement.

97. *Replacement* -

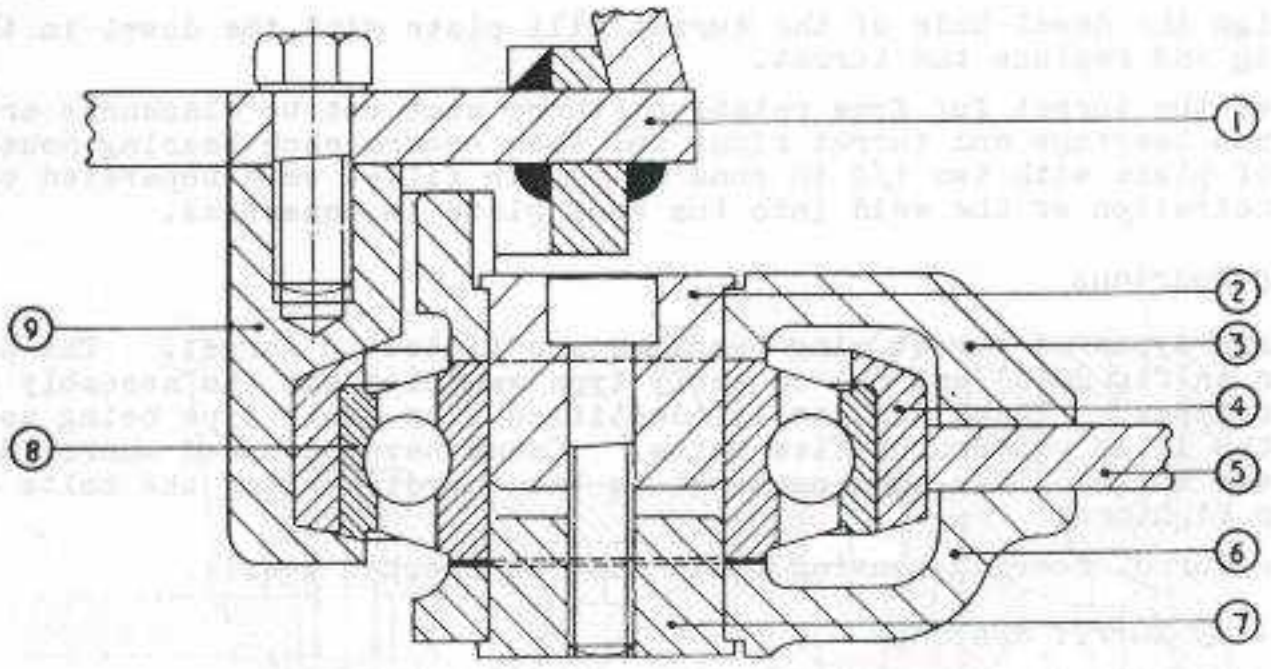
(a) Tighten the bolts securing each bearing housing until the roof plate is just nipped.

(b) Lower the turret ring into position and tap the housing until the bearings are in contact with the bearing track.

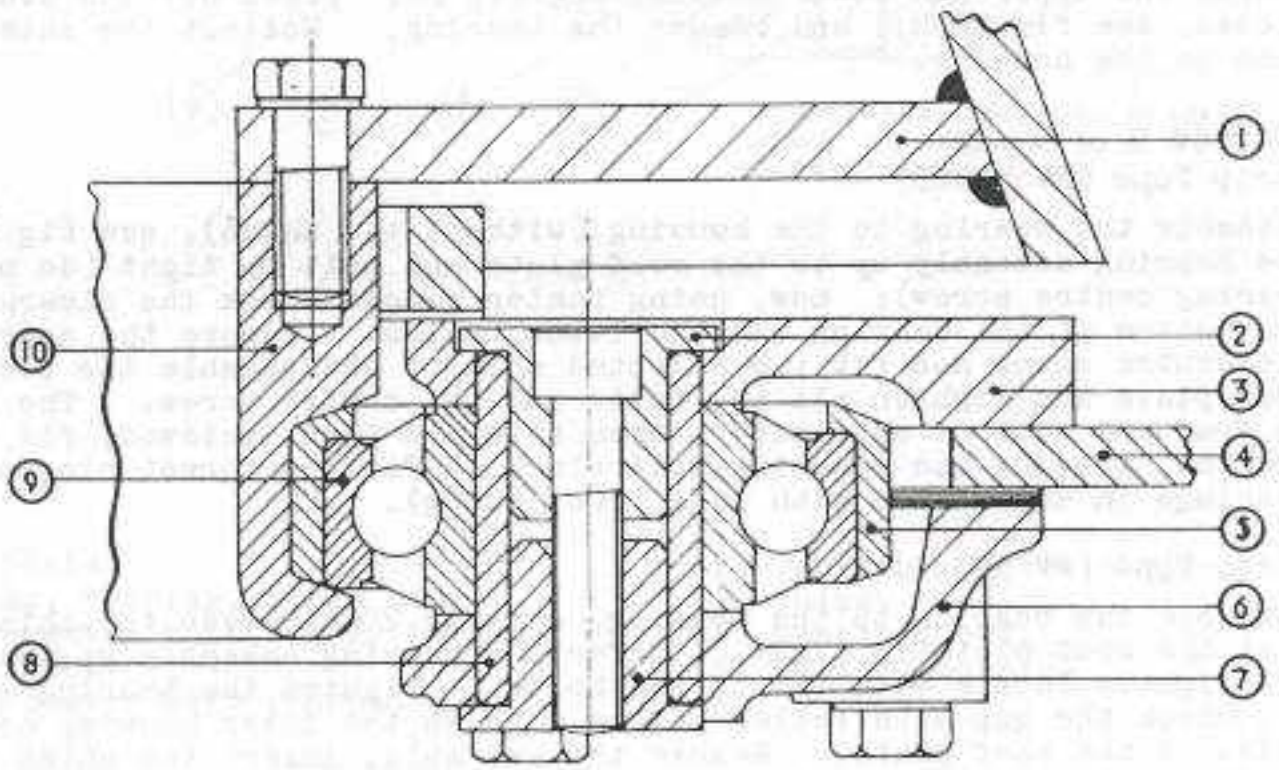
(c) Measure the gap between the turret ring and the splash ring at three or more points around the circumference. Adjust the bearing housings until both rings are concentric.

(d) Tighten the bolts securing the bearing housings and then check the turret ring for sidefloat, endfloat and freedom of rotation. If slight sidefloat is present, slacken the bolts of one housing, take up the float and retighten the bolts.

(e) Lubricate the bearings and track with Grease XG 279.



(a) TURRET ASSEMBLY FV 59125



(b) TURRET ASSEMBLY FV 59335

(a) Assembly, FV 59125

1. Sill plate
2. Spigot bearing, upper
3. Housing, bearing, upper
4. Collar, bearing
5. Roof plate
6. Housing, bearing, lower
7. Spigot bearing, lower
8. Bearing, ball
9. Ring, turret

(b) Assembly, FV 59335

1. Sill plate
2. Boss, centre bolt, upper (plain)
3. Housing, bearing, upper
4. Roof plate and splash ring
5. Collar, bearing
6. Housing, bearing, lower
7. Boss, centre bolt, lower (tapped)
8. Bearing, centre sleeve
9. Bearing, ball
10. Ring, turret

FIG 20 - TURRET BEARING ASSEMBLIES (EARLY TYPES)

(f) Align the dowel hole of the turret sill plate with the dowel in the turret ring and replace the turret.

(g) Test the turret for free rotation (there must not be slackness or 'lift' between bearings and turret ring) and then secure each bearing housing to the roof plate with two 1/2 in runs of 1/4 in fillet weld separated by a 3 in gap. Penetration of the weld into the roof plate is essential.

Turret Ring Bearings

98. Three types of turret ring bearings are fitted to Ferret. The bearing assemblies shown in fig.20(a) and (b) on early type vehicles and the assembly shown at fig 21 on later types. These are easily identified, the early type being secured by four bolts and the later pattern by five bolts. Cases have occurred where turret bearing housings have worked loose, due no doubt to the turret masking the bolts and not being checked for tightness.

NOTE:- The turret bearing housing bolts must be checked weekly.

99. *Removal of Turret Bearings* -

(a) Remove the turret and turret ring, see para 96.

(b) Using an Allen key, remove the centre bolt from the bearing.

(c) Remove the bolts and withdraw the assembly from the roof plate.

(d) Remove the upper and lower bosses, see fig 20; press out the bearing centre sleeve, see fig 20(b), and remove the bearing. Collect the shims and wire them to the housing.

100. *Reassembly* -

(a) *Early Type (FV 59125)* -

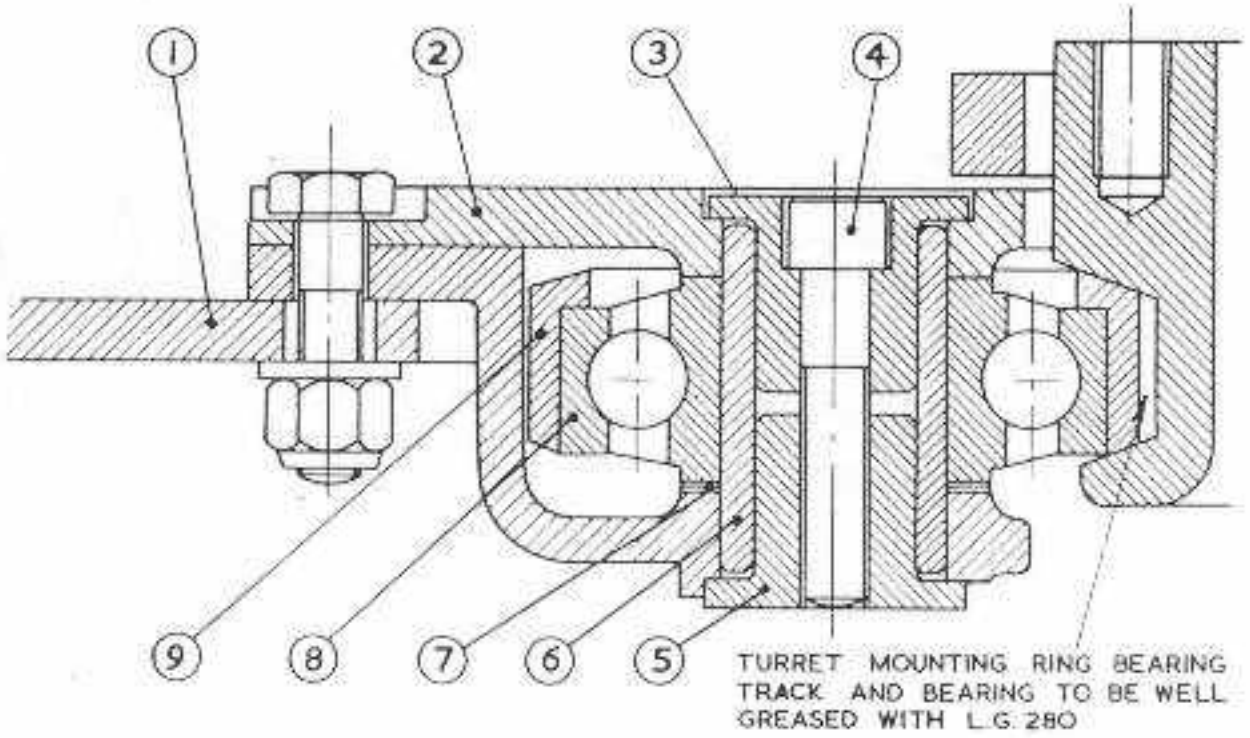
Assemble the bearing to the housing (without the shims), see fig 20(a). Offer the bearing assembly up to the roof plate and bolt up tight (do not tighten the bearing centre screw); now, using feeler gauges check the clearance between the bottom of the bearing and the lower casing. Remove the assembly, take out the centre screw and fit the selected shims. Reassemble the bearing to the roof plate and tighten all the bolts and the centre screw. The bearing must be free and without endfloat. When this has been achieved, fit all three assemblies, leaving the securing bolt slack. Fit the turret ring and adjust the bearings in accordance with para 97(c) to (g).

(b) *Early Type (FV 59335)* -

Assemble the bearing to the housing, see fig 20(b) (less the shims). Ensure that the roof plate is clean. Offer the bearing assembly up to the roof plate and lightly locate with two of the bolts. Tighten the bearing centre screw and check the gap with feeler gauges between the lower housing and the undersides of the roof plate. Remove the assembly, insert the shims and reassemble to the roof plate. The bearing must be free and without endfloat. Fit the turret ring and adjust, as described at para 97. Finally, seal the gaps between the bearing housings and the splash ring with Bostik 'C'. Replace the turret.

(c) *Later Type (FV 55741)* -

Assemble the bearing to the upper and lower housings (less the shims). Bolt the housings together (tight) and measure the clearance between the bearing and the lower housing. Dismantle the bearing, insert the necessary shims and reassemble. Bolt the housings together, fit the centre screw and tighten. The bearing must be free and without endfloat. Fit all three bearing housings to the roof plate with a liberal coat of Bostik sealing compound. Fit the turret ring and adjust, in accordance with para 97. Seal the gap between the housings and splash ring with Bostik 'C'. Replace the turret. Lock the bearing housings to the roof plate, see para 97(g).



1. Roof plate
2. Housing, bearing, upper
3. Boss, centre bolt, upper (plain)
4. Centre bolt
5. Boss, centre bolt (threaded)
6. Bearing, centre sleeve
7. Shims
8. Bearing, ball
9. Collar, bearing

FIG 21 - TURRET BEARING ASSEMBLY (LATER TYPE)

E N D