

FERRET, ALL TYPES

BASE REPAIR

NOTE:- This instruction supersedes previous issues, all copies of which are to be destroyed. It has been amended throughout.

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INTRODUCTION

1. This instruction details the methods of carrying out Base Repair.
2. General information (including engine and electrical data), tests, adjustments and repair sequences within the scope of the Unit, LAD and Field workshops are described in VEH N 403-1 and N 404-1.
3.
 - a. Base repairs dealing with rationalised equipment fitted to 'Ferret' will be found in the following instructions:-
 - Engine - VEHICLE Part, Section X
 - Electrical Equipment - ELECTRICAL Part, Section F
 - b. The Stock Numbers quoted give positive identification of components and assemblies, but it is not intended that this instruction should be used as a Parts List.

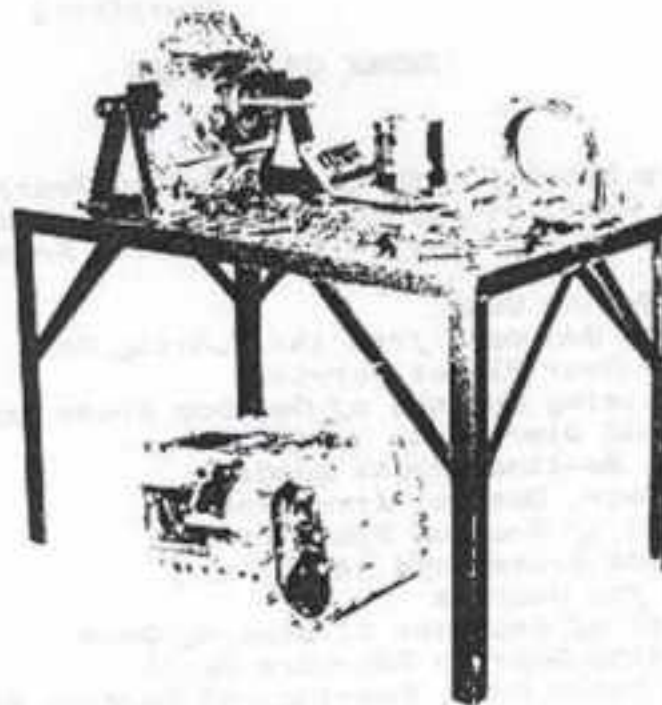


FIG 1 - GEARBOX - SUITABLE ASSEMBLY BENCH MADE FROM ANGLE AND SHEET IRON (LOCAL MANUFACTURE)

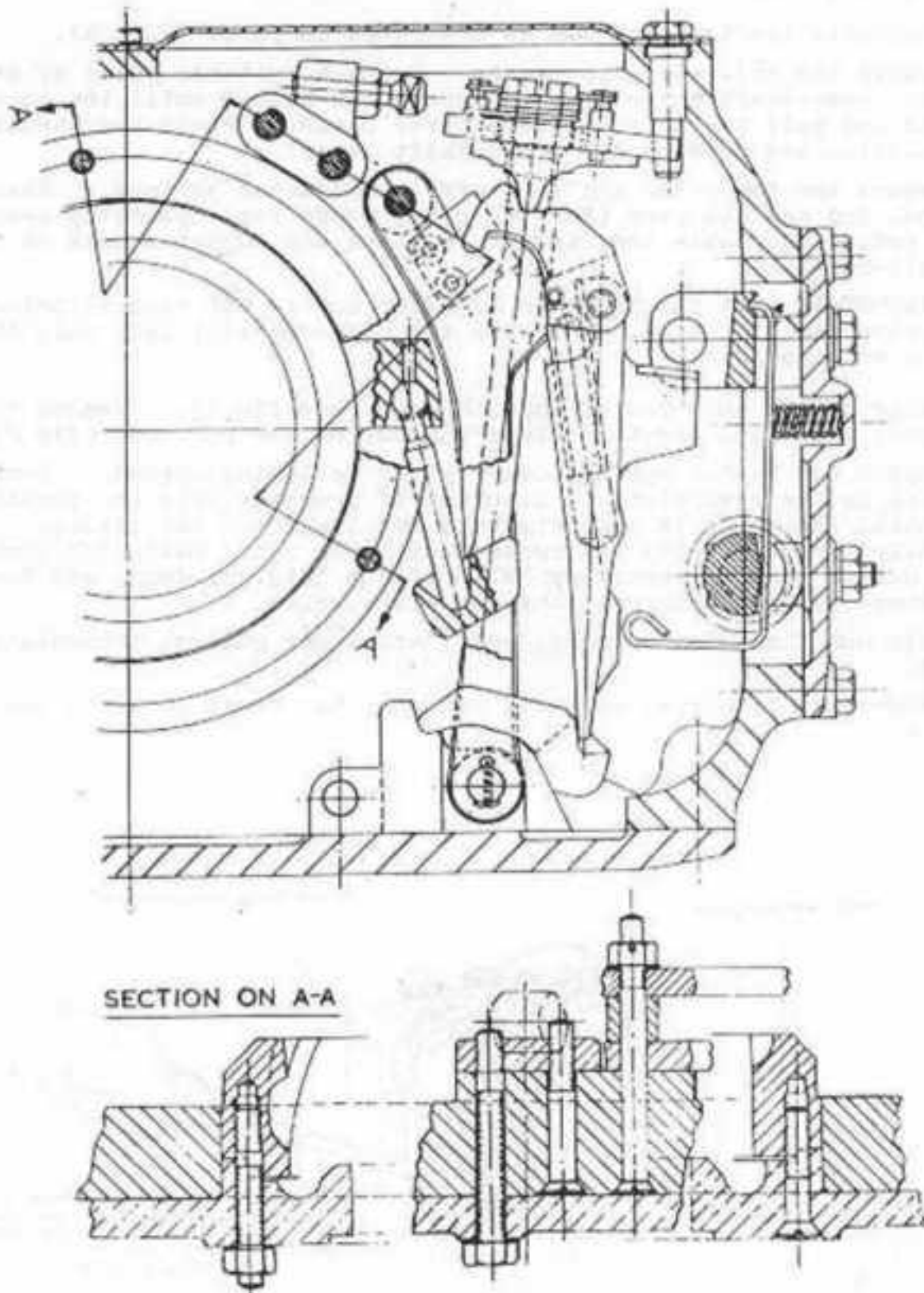


FIG 2 - GEARBOX - GENERAL ARRANGEMENT OF CLUTCH OPERATING GEAR ON THE 5TH SPEED (TOP)

DISMANTLING, REASSEMBLING, REPAIR AND ADJUSTMENTS OF MAJOR ASSEMBLIES AND COMPONENTS
GEARBOX

Dismantling (figs 1 to 16)

4. a. Dismantle the transfer box as described in paras 37 to 41.
- b. Remove the selector gear cover. Using a suitable piece of steel tube over the cross-shaft outer lever, depress the busbar until the engaged strut released and pull the selector gear cover clear. Place the struts in the control position and release the cross-shaft lever.
- c. Remove the top cover and lift off the adjuster springs. Remove from the 1st, 2nd, 3rd and 4th gear (NOT 5th gear) brake band operating gear, the adjuster nut, ring, table and strut. Replace the adjuster nuts on their respective pull-rods.

NOTE: - It is IMPORTANT that the 5th gear adjuster nut is NOT removed before the following precaution is taken, otherwise the pull-rod will fall into the casing and foul the running gear.

5. a. Lever up the pull-rod of the 5th gear (see fig 3). Remove the adjuster nut, ring, table and strut, replace the nut on the pull-rod (fig 2).
- b. Remove the busbar spring cover by the following method. Remove the two top bolts on the coverplate. Slacken off progressively the remaining four bolts until the cover is approximately one inch from the casing. Remove two diagonally opposite bolts and replace with two slave bolts $\frac{3}{8}$ inch x $\frac{3}{4}$ inch UNC. Remove the two remaining bolts of the original four, and finally release the busbar spring pressure by the two slave bolts.
- c. Lift out the busbar spring, outer and inner guides, the collar and bucket (fig 4).
- d. Remove the setscrews and nuts securing the front cover to the gearbox.

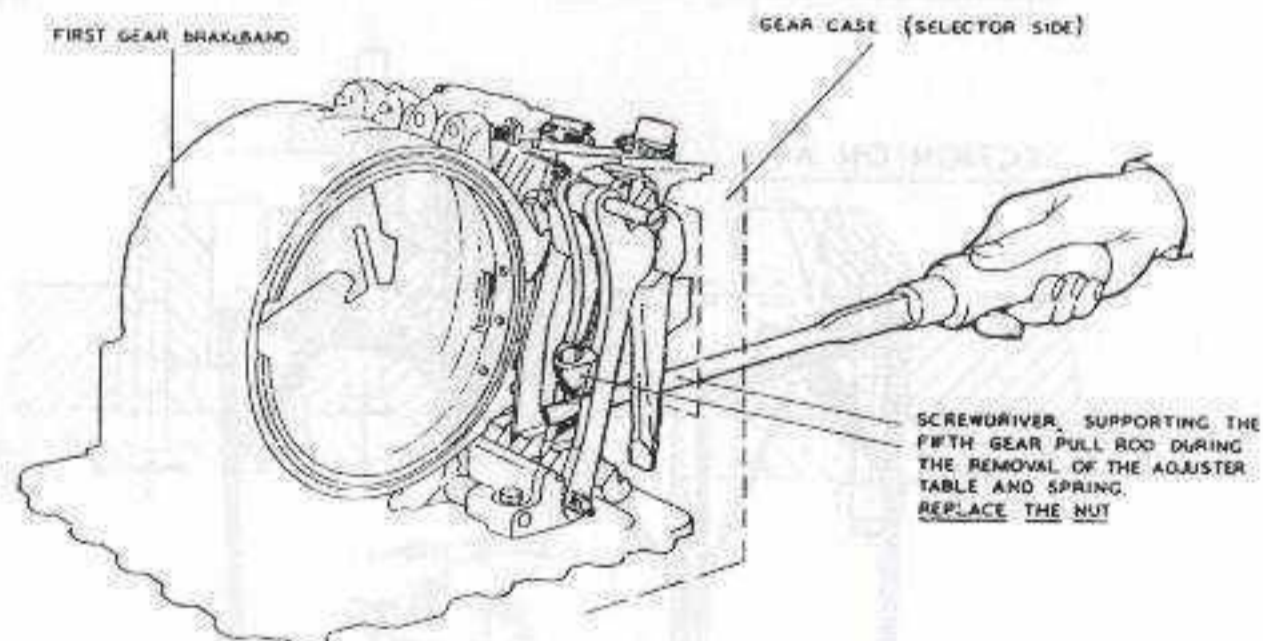
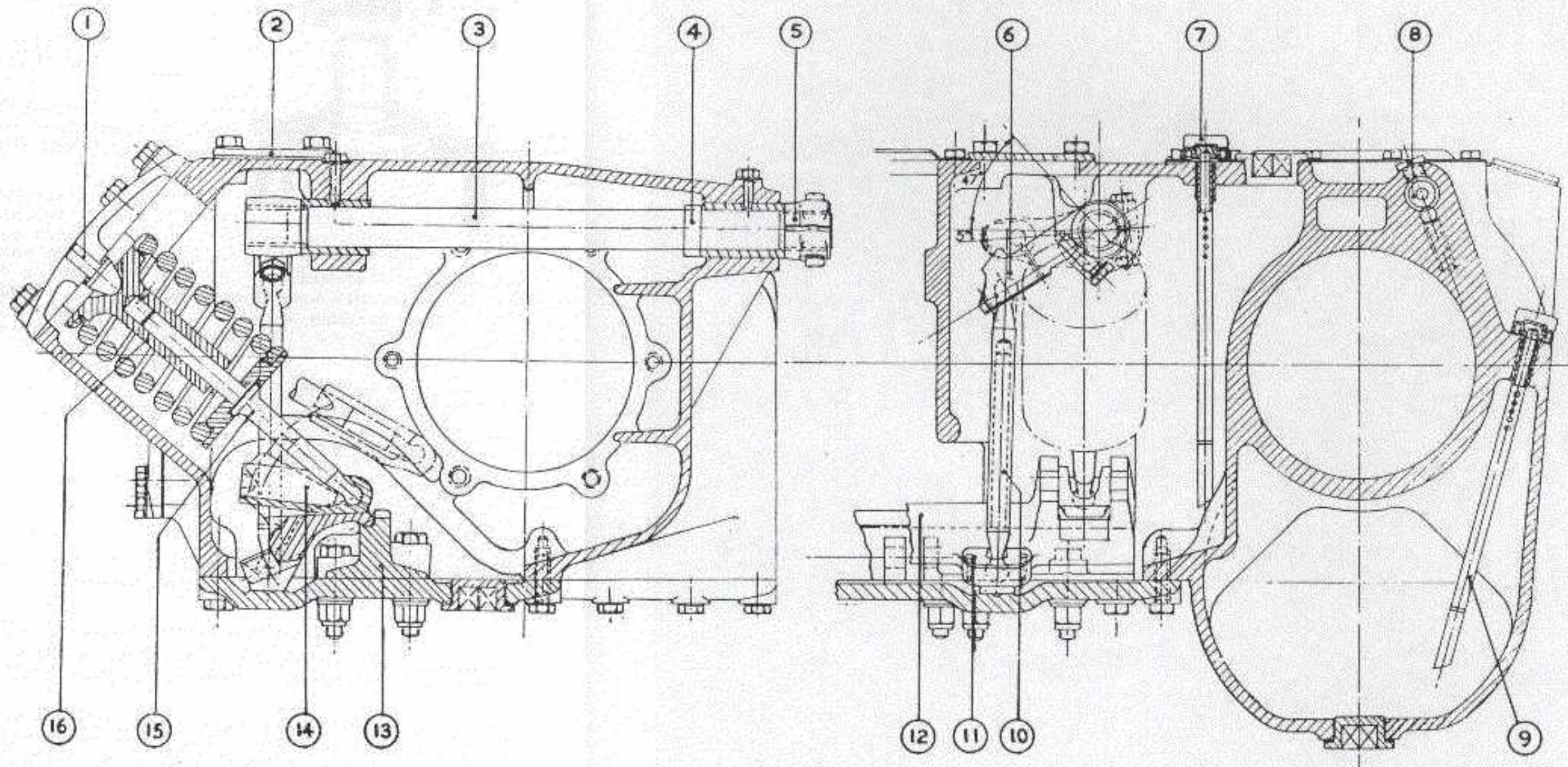


FIG 3 - GEARBOX - METHOD OF SUPPORTING 5TH GEAR PULL-ROD DURING REMOVAL OF OPERATING GEAR



- | | | |
|---------------------------------|--|-----------------------------|
| 1 Pin, ball, busbar spring | 7 Dipstick gearbox | 12 Busbar |
| 2 Plate, stop busbar spring | 8 Selector, shaft, spring and ball forward and reverse | 13 Bracket, fulcrum, busbar |
| 3 Cross-shaft, operating busbar | 9 Dipstick transfer box | 14 Bucket busbar |
| 4 Collar, cross-shaft | 10 Rod, operating, busbar | 15 Guide, inner and collar |
| 5 Lever, operating, outer | 11 Plate, retaining, busbar rod | 16 Guide, outer and spring |
| 6 Lever, operating, inner | | |

FIG 4 - GEARBOX - SPRING GEAR ARRANGEMENT

- 6.
- Up-end the gearbox as shown at fig 5 and lift the gearbox casing off the front cover. Joggle the case to allow the brake bands to clear the serrated drums. The gearcase will come away leaving the driven shaft, 2nd, 3rd, 4th and 5th gear trains on the front cover. The 1st gear planet carrier plate can now be removed from the gearbox, by means of the tools made locally and shown at fig 6. Slip the tools between the planet wheels and under the plate and pull upward. The planet carrier will come away with the 1st speed brake drum and bearing. Remove the running gear adjusting washer, which is between the bearing and the bevel pinion housing.
 - Remove the 5th gear hook split pin, nut, spacer and csk hd screws from the front of the gearbox (fig 2).
 - Remove the bottom cover from the gearbox complete with the brake band assembly. Lift out the busbar and the 5th speed pull-rod.
 - Remove the six screws securing the bevel pinion housing from inside the gearbox. Remove the brass plug which is screwed into the transfer case opposite the bevel pinion; insert a long brass drift and drive out the bevel pinion housing through the gearbox from the transfer case end. Remove the two 'O' packing rings (fig 17).
 - Remove the 5/16 inch UNC screws securing the 'forward' bevel gear housing and tap the housing towards the centre of the casing and out through the opposite side. Retain the shims with the housing.

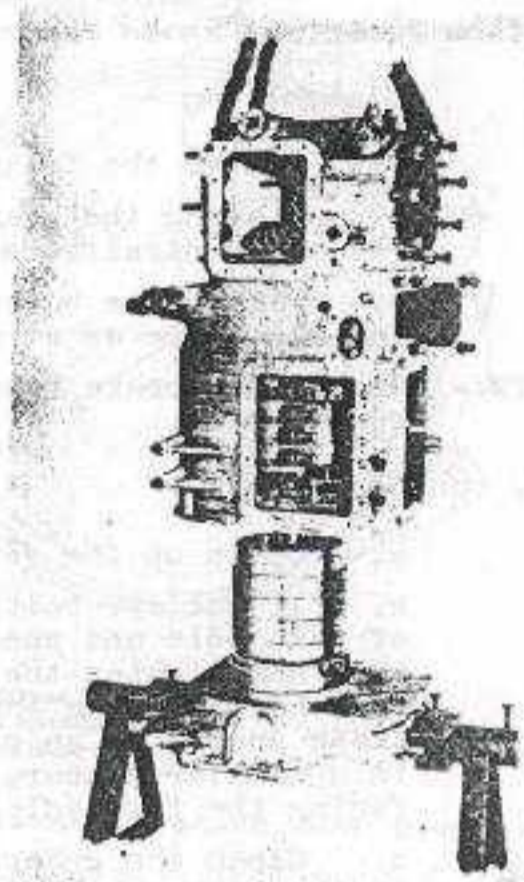


FIG 5 - GEARBOX - DISMANTLING,
METHOD OF REMOVING GEARCASE FROM
THE RUNNING GEAR

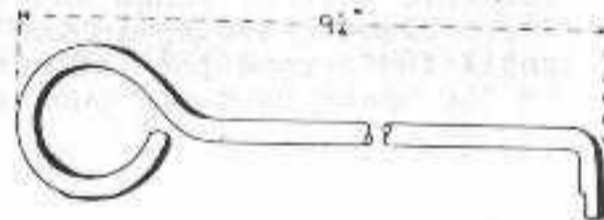


FIG 6 - GEARBOX - TOOL REMOVING 1ST GEAR
PLANET CARRIER 2 OFF (LOCAL MANUFACTURE)

Casing

7. *Dismantling -*
- Remove the inner lever of the busbar operating cross-shaft. Discard the pinch bolt.
 - Remove the locating screw to the outer bush and withdraw the cross-shaft complete with its outer lever, collar and outer bush. Drive out the inner bush, if worn.
 - On the casing, check the 5th gear adjuster bracket. If secure, do not disturb, but renew the adjuster screw if necessary. The bracket is held by one hex hd screw and one csk hd screw, which must be tightened or replaced before the front cover is fitted as the latter covers the csk hd bolt (fig 2).

Cross-Shaft Bushes

8. *Renewal (fig 4) -*
- Press into the web the inner bush (the short one). Fit the outer bush to the casing a good push fit.
 - The bushes should be line reamed to plus 0.002 inch and the collar fitted to allow 0.005 inch endfloat.
 - Renew the lever pinch bolts.

Bottom Cover and Brake Bands

9. Dismantling -

- a. Remove the following: the link rod, spring and distance pieces.
- b. Viewing the gearbox from the selector side, remove the rear centralizer rod and centralizers, retaining the mated parts on the rod.
- c. Remove the busbar fulcrum bracket complete with hooks and centralizers and dismantle as at sub-para b.

NOTE: - Should the brake bands be serviceable, mark each band with its gear for correct replacement.

10. Reassembly -

- a. Clean up the joint face of the cover.
- b. If the eye-bolts have been removed, or are being renewed, clean the base of each bolt and smear with jointing compound, thread the link rod through them and tighten the nuts. Should the link rod be gripped tight, remove the rod and line ream the eye-bolts. Examine the links for slackness in the rod; these should be an easy fit without shake. Fit the rear centralizer eye-bolts in a similar manner, placing the centralizers in position with the boss of each facing the flywheel.
- c. Clean the underside of the busbar fulcrum bracket and assemble the hooks on the bracket, taking care to fit them in pairs. All the hooks should be free to drop under their own weight and without shake. Fit the front centralizers to the fulcrum bracket, the boss of each facing the flywheel end. Coat the base of the fulcrum bracket with jointing compound and tighten the nuts.

11. a. Select the 1st gear brake band and place one centralizer spring in the 1st gear centralizer at the fulcrum bracket side. Compress the spring with a suitable pair of tongs and slide the ears of the band over the centralizer (fig 7). Place a spring in the opposite centralizer and pull the brake band over until the second pair of ears is over the centralizer. Fit the link and pin to the brake band and push the link rod through far enough to secure the 1st

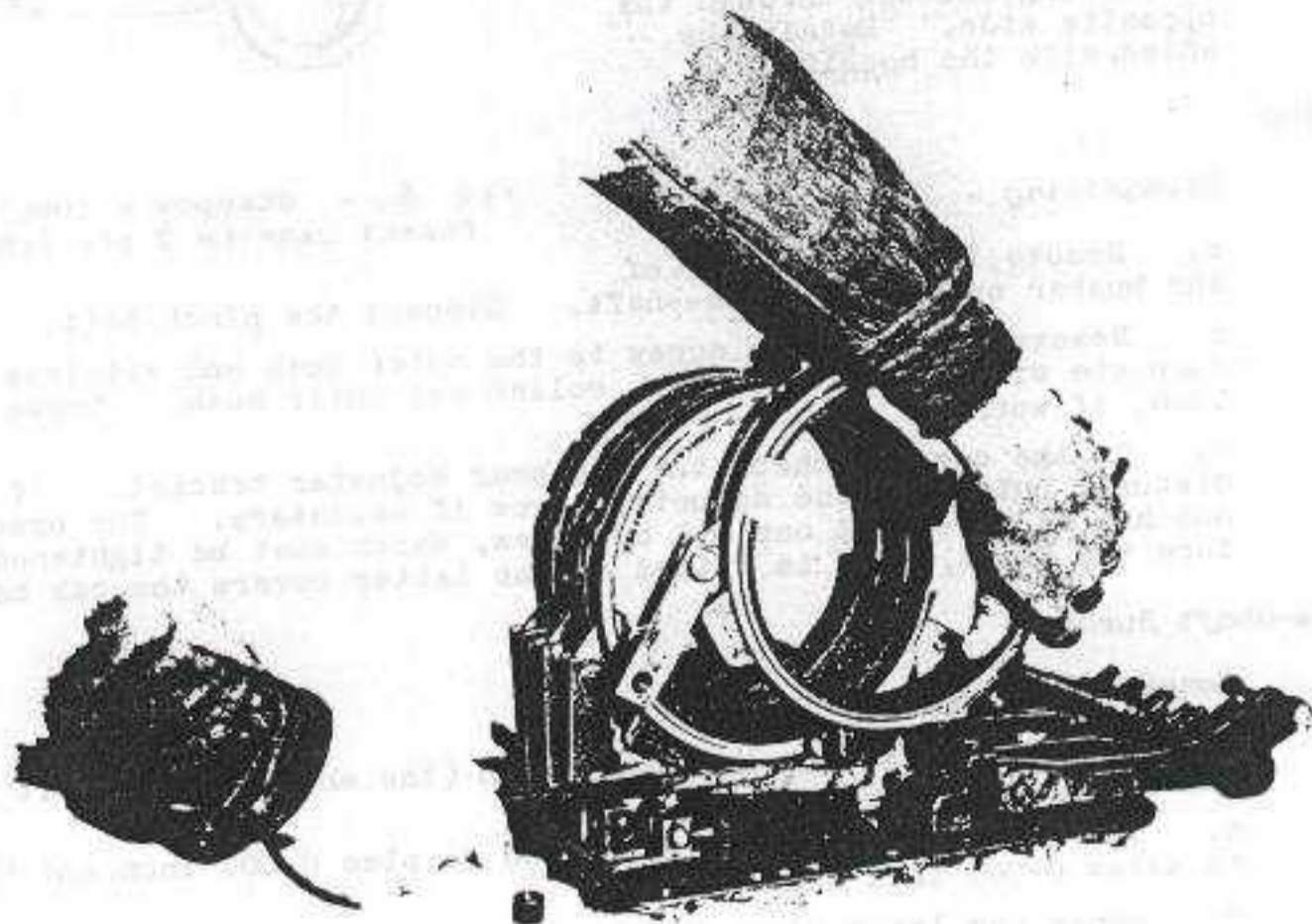


FIG 7 - GEARBOX - METHOD OF REPLACING CENTRALIZING SPRINGS IN THE BRAKE BAND LUGS

gear brake band. Repeat this operation for the other three bands. Check over the assembly and ensure that the hook, centralizers, and link rods are split pinned.

b. Secure the pull-rods to the brake bands with the pins, centralize them and engage the hooks by pressing down on each band in turn.

c. Refit the drain plug with a new gasket washer and tighten.

d. Place the busbar on the fulcrum bracket, making sure that the square headed pin in the bracket locates the busbar correctly. The bottom cover is now ready for final assembly.

Brake Band Linings

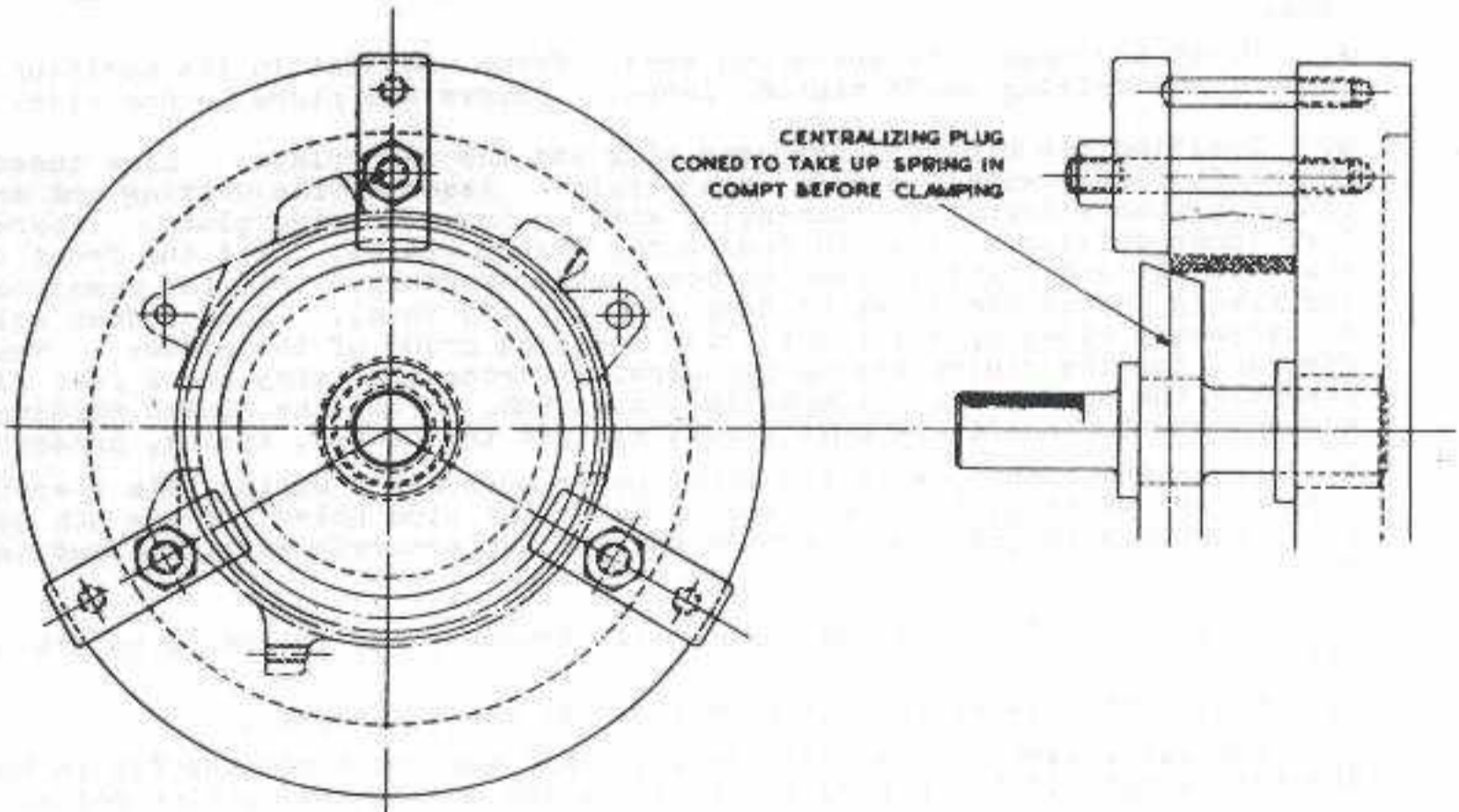
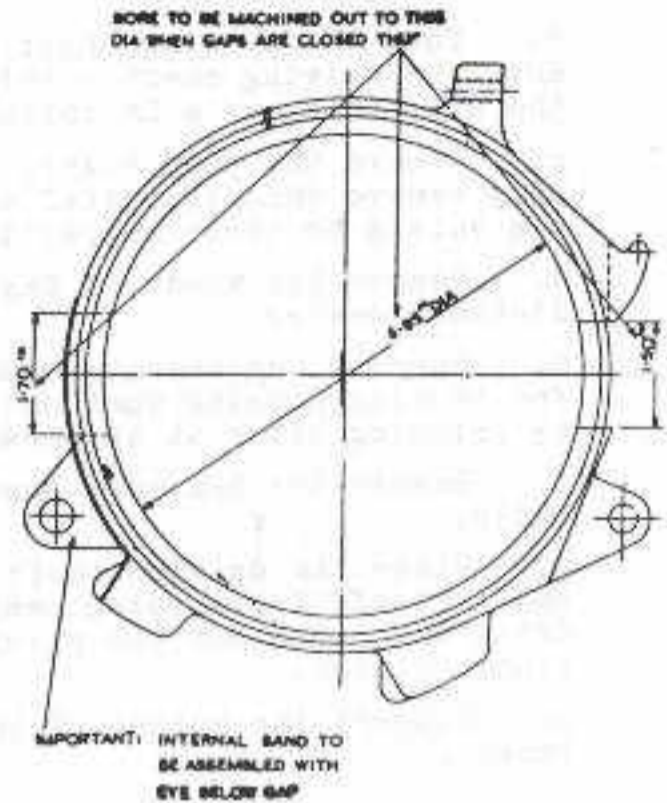
12. *Renewal -*

When removing the linings, remove the rivet heads by drilling and punch out the rivets over a hollow anvil. Under no circumstances will the linings be cut from the brake bands with hammer and chisel as this method will distort the inner bands. Rivet the linings on carefully and machine in accordance with figs 8 and 9.

Front Cover, Oil Pump and Running Gear

13. *Dismantling (fig 10) -*

a. Stand the gearbox front cover and running gear as shown in fig 11 and remove in turn all components of the running gear as far as the 5th gear clutch rear plate.



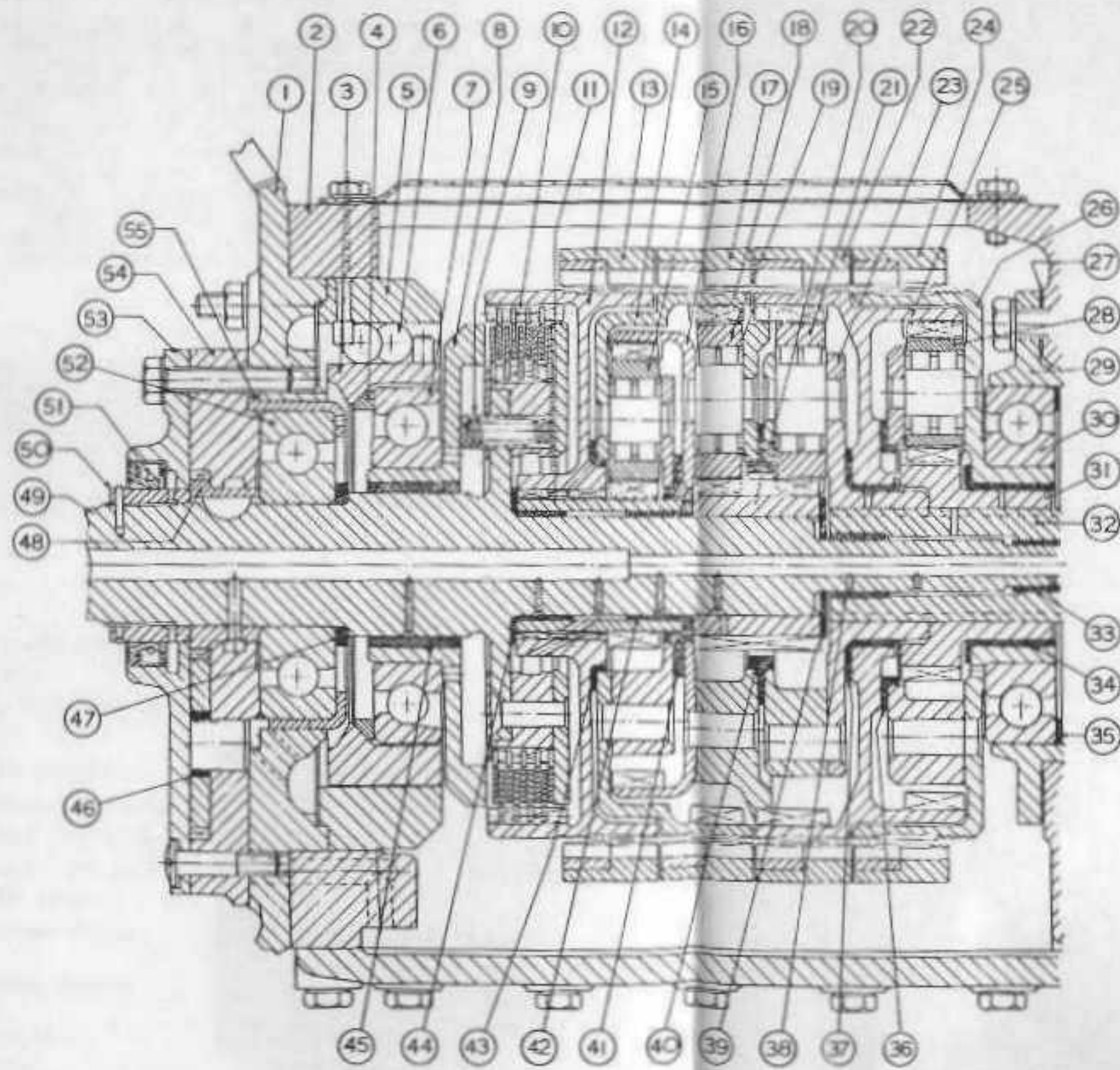
- b. Turn the driving shaft and front cover to the horizontal position and remove the driving shaft locking ring. Using spanner, castle (FV 51448) remove the nut (this has a LH thread).
- c. Remove the pump cover. Lift off the pump body with both gears. From the body remove the oil relief valve cover, the springs and the valve, retaining the valves to their respective seatings.
- d. Remove the Woodruff key, tap the shaft through the bearing, and remove the distance washer.
- e. Support the bearing housing on the front flange and press out the bearing. The bearing housing must not be removed as this component is finished to size by grinding after it is pressed into the housing during manufacture.
- f. Remove the 5th gear inner member and the eight 1/2 inch anti-friction balls.
- g. Place the driving shaft in a vice with the clutch sliding member uppermost and lift off the sliding member. Lift out the clutch plungers and springs, drill and punch out the rivets securing the front clutch plate and remove the clutch plates.
- h. Support the spigot of the clutch sliding member and drive off the thrust bearing.

14. Reassembly (fig 10) -

- a. Check over all bushes and bearings and renew where necessary. Lightly oil all working parts as they are fitted.
- b. Thoroughly clean the driving shaft, paying particular attention to the drilled oil passages. To assist with this cleaning, remove the end plug of the driving shaft and when replacing, use jointing compound and screw well home.
- c. Press the clutch sliding member into the thrust bearing so that the thrust side of the bearing is away from the member. Should the bush sliding member have been renewed check it on the shaft with the new bush. It should be finger tight. Remove the sliding member and place to one side. Hold the shaft in a vice and fit in turn the bearing washer, gear driving oil pump and the driving shaft nut. All should be finger tight. Remove and place to one side.
- d. Check the bush, 4th speed sun wheel, front, for fit in its position to the rear of the driving shaft clutch flange. Remove and place to one side.

- 15.
- a. Position the clutch inner gear ring and the rear plate. Line these up on the shaft flange with two 5/16 inch rivets. Assemble the driving and driven clutch plates alternately commencing with an inner driving plate. There are five inner driving plates and four outer driven plates. Fit the front of the shaft flange and lightly rivet to retain the assembly. Fit the remainder of the rivets (Rivet steel csk hd 5/16 inch x 1 1/4 inch). Hammer down well. If necessary clean up any rivet heads standing proud of the plates. Ream the recesses for the clutch spring plungers, ensuring that they are a free fit. Assemble the springs and plunger in the clutch. Pass the clutch sliding member over the shaft and hold firmly against the clutch, spring, pressure.
 - b. Press the bearing into the front cover housing. During this operation support the housing, not the cover. Smear the stud holes for the 5th gear outer member with jointing compound and pull up securely with nuts and csk hd screws.

- 16.
- a. Very carefully check and correct if necessary the following points on the oil pump.
 - b. The joint between the oil pump body and the coverplate.
 - c. The oil relief valves and springs. All must be a sliding fit in the body. The free length of the spring is one inch, the spring having nine coils.
 - d. Clean up all face joints and entrances to stud holes and oil ports.
 - e. Ensure that the driven gear spindle is 0.005 inch below the outer face of the body.



1. Front cover, gearbox
2. Casing, gearbox
3. Ring actuating, 5th speed
4. Thrust ring, 5th speed
5. Outer member, 5th speed
6. Ball, steel, anti-friction, 1/2 in. dia (K)
7. Thrust bearing, 5th speed
8. Clutch sliding member, 5th speed
9. Clutch return springs and plungers (K)
10. Clutch assembly, 5th speed
11. Sun wheel, 4th speed
12. Brake drum, 4th speed
13. Brake band, 4th speed
14. Brake drum 3rd speed and 4th speed carrier
15. Planets 4th speed
16. Annulus 4th speed
17. Brake band 3rd speed
18. Annulus 3rd speed
19. Planets 3rd speed
20. Sun wheel 2nd and 3rd speed
21. Planets 2nd speed
22. Brake band 2nd speed
23. Carrier planet 2nd speed
24. Brake band 1st speed
25. Brake drum 2nd speed and annulus 1st speed
26. Brake drum 1st speed and planet carrier
27. Shim adjusting mesh out-pur bevel pinion
28. Planets 1st speed
29. Housing, out-pur bevel pinion
30. Brake, drum bearing, 1st speed
31. Sun-wheel 1st speed
32. Driven shaft, gearbox
33. Bush rear, driven shaft
34. Bush, sun-wheel, 1st speed
35. Washer, adjusting, running gear
36. Bush, carrier plate, 1st speed
37. Bush, brake drum, 2nd speed
38. Bush, front, driven shaft
39. Washer, thrust, sun-wheel, 2nd and 3rd speed
40. Washer, carrier support 3rd speed
41. Washer, carrier support 4th speed
42. Bush sun-wheel, rear, 4th speed
43. Bush, brake drum, 3rd speed
44. Bush, sun-wheel, front, 4th speed
45. Bush, clutch sliding member, 5th speed
46. Bush, oil pump driven gear
47. Washer, driving shaft bearing
48. Gear driving, oil pump
49. Shaft, driving
50. Nut and locking, driving shaft
51. Seal, oil
52. Bearing, ball, driving shaft
53. Cover, gearbox oil pump
54. Body, gearbox oil pump
55. Housing, bearing, driving shaft

- 17.
- a. Fit the relief valves and springs and place the pump to one side.
 - b. Grease the grooves in the 5th gear outer member and fit the anti-friction balls (two to a groove). Fit the inner member. Care must be taken to ensure that the balls remain in their grooves.
 - c. Up-end the gearbox front cover and place the 5th gear bevelled thrust ring within the inner gear ring. Place the 5th gear clutch sliding member on the driving shaft, including the thrust bearing (ensure that this bearing is the correct way round) (see fig 10). Place the driving shaft bearing washer in position ensuring that the radii butt up to the shoulder of the shaft. Lightly oil the shaft, press the shaft into position in the front cover complete with 5th gear clutch assembly, sliding member and thrust bearing.
 - d. Place the assembly in a horizontal position. Fit the Woodruff key. Fit the oil pump driving gear. Mark the position of the key on the shaft for reference. Position the pump body, driving gear, driven gear, lightly lubricating the gears. Fit the coverplate without the oil seal, screw the castle nut on to the shaft and pull down firmly. Spin the drive shaft. If any drag is felt, remove the nut and pump cover and examine for high spots. Pack clean rag in the oil seal recess to prevent entry of swarf and drill the hole for the nut locking ring in the shaft. The depth of the hole for the locking ring must NOT exceed $\frac{3}{8}$ inch otherwise there is a danger of breaking into the main oil-way within the driving shaft. Remove the nut and pump coverplate. Refit the pump coverplate with jointing compound. Fit the oil seal to the cover with the skirt of the seal facing the pump, screw in the nut and fit the locking ring.

Running Gear (fig 10)

18. With the driving shaft vertical, assemble the components on the shaft in the following sequence. Lightly oil each component as it is fitted and ensure that all gears mesh correctly. After the running gear has been built up on the driving shaft check with a 0.005 inch feeler gauge between the brake drums to ensure the necessary running clearances (fig 11). Lack of this clearance suggests that one of the bushes or washers has been omitted, or that an unserviceable one has been used. If insufficient clearance exists when new components have been fitted, obtain this clearance by lightly skimming the lip of the drum on a lathe.

Running Gear (Early Vehicles)

19. Assembly -

- a. Bush front 4th speed sun wheel (FV 50077).
- b. 4th speed brake drum (FV 55063).
- c. Bush (FV 50083). Fits inside the rear of 4th speed drum.
- d. 4th speed sun wheel (FV 50075).
- e. Bush rear 4 speed sun wheel (FV 50078).
- f. 4th speed planet carrier assembly (FV 55066).
- g. 4th speed carrier support washer (FV 50084).
- h. 3rd speed planet carrier assembly (FV 55069).
- j. 2nd and 3rd speed sun wheel (FV 50089).
- k. 2nd and 3rd speed sun wheel thrust washer (FV 50090).
- l. 2nd and 3rd speed carrier support washer (FV 50088).
- m. Driven shaft bush front (FV 50101).
- n. Driven shaft bush rear (FV 50102).
- o. 2nd speed planet carrier assembly (FV 55072).
- p. 2nd speed brake drum bush (FV 50093).
- q. 2nd speed brake drum (FV 55073).

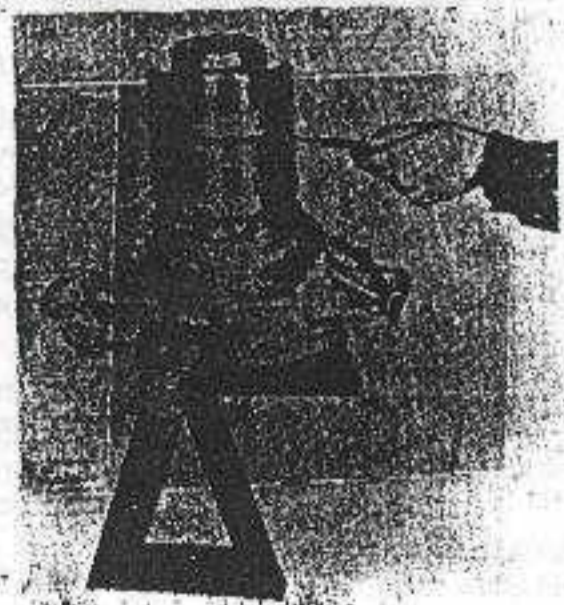


FIG 11 - GEARBOX - CHECKING
THE CLEARANCE BETWEEN THE
BRAKE DRUMS

- r. 1st speed carrier plate bush (FV 50094).
- s. 1st speed sun wheel (FV 50100).
- t. 1st speed sun wheel bush (FV 50099).
- u. 1st speed planet carrier (FV 55076).
- v. Bearing ball LV6/MT7/BG-390-Z.

Running Gear (Late Vehicles)

20. *Assembly -*

The sequence of assembly is identical with the previous paragraph, the only difference between the gearbox fitted to early vehicles being the gear ratios as follows:-

Gear	Early Vehicles	Late Vehicles
1st	5.666 : 1	6.046 : 1
2nd	1.170 : 1	4.381 : 1
3rd	2.375 : 1	2.437 : 1
4th	1.527 : 1	1.569 : 1
5th	1 : 1	1 : 1

21. Therefore, when assembling the later gearbox substitute the following parts and numbers:-

- f. 4th speed planet carrier assembly (FV 55505).
- g. Bush 4th speed planet carrier (FV 51418).
- h. 3rd speed planet carrier assembly (FV 55504).
- j. 2nd and 3rd speed sun wheel (FV 51417).
- k. 2nd and 3rd sun wheel thrust washer (FV 51660).
- o. 2nd speed planet carrier assembly (FV 55503).
- q. 2nd speed brake drum (FV 55498).
- r. 1st speed planet carrier assembly (FV 55502).
- s. 1st speed planet carrier bush (FV 51415).
- t. 1st speed sun wheel (FV 55495).

Forward Bevel Gear Wheel (fig 18) - Assembly -

- 22.
- a. Lightly oil the bevel gear and the bearing housing.
 - b. Press both outer cups into the housing and one inner race to butt up to the gear wheel shoulder. Do not oil or grease the bearings but leave them perfectly dry and clean.
 - c. Place the bearing spacer on the bevel shaft with shims totalling 0.020 inch initially. Pass the pinion through the housing, fit the second bearing and tighten the castle nut.
 - d. Now check the pinion bearings and adjust the shims until they are quite free but without endplay. When this is achieved remove a 0.002 inch shim to pre-load the bearings. Tighten the nut and turn over the tab washer.
 - e. Fit the assembly into the transfer case with a total of 0.020 inch shimming behind the bolting flange (this may have to be increased or decreased later for the purpose of meshing the gear wheels). Ensure that the lubricating hole in the bearing housing is at the top. Replace and tighten the screws.

Input Bevel Pinion (fig 17)

23. Assembly -

- a. Assemble the input bevel pinion with its roller bearings and shims in the same sequence to para 22.a. to d.
- b. Fit the two oil seals into the oil seal housing with the skirt of the seals facing each other and secure with the circlip. Fit the oil seal housing into the input bearing housing securing it with its screwed peg.
- c. Place 0.020 inch shimming behind the bevel pinion housing flange joint initially. Fit the bevel pinion assembly and tighten the screws.
- d. Check the bevel pinion and the forward gear wheel for correct meshing. There should be 0.004 inch to 0.006 inch backlash. Remove or replace the shims behind either of the flanged bolting faces of the two gears until correct meshing has been attained.
- e. When the meshing is correct, remove the input bevel pinion assembly and fit the two packing 'O' rings in their grooves. Replace the input bevel pinion assembly with the lubricating passage to the top.

Reverse Gear Bevel Wheel

24. Fit the reverse gear bevel wheel and bearing housing to the transfer case in the same manner as the forward bevel gear. This will have to be mounted in the LH output casing during the preliminary fitting.

Bottom Plate (fig 12)

- 25.
- a. Thoroughly clean the face joints of the bottom plate assembly and the casing. Place in position the busbar and check for ease of movement through the full range. Remove any high spots from the shoulders on the busbar and/or busbar bracket. Coat the face joint of the casing with jointing compound and assemble the plate to the casing, making sure to engage the operating gear sleeve with the busbar guide. Fit and tighten the securing screws.
 - b. Slacken back the adjuster nuts and secure the 5th gear hooks with the csk hd screw, with the distance piece between the hooks. **PULL THIS CSK HD SCREW AND ITS NUT UP TIGHT OR, DURING USE THE TOP GEAR WILL SLIP.** Split pin the nut (see fig 2).

Running Gear

26. Fitting to the Casing -

- a. Stand the gearbox casing on its rear end and ensure that the input bevel pinion bearing housing is clean. Mount a clock gauge or micrometer head on the stand (manufactured locally, fig 13) and take a reading on the front bolting face of the casing (see fig 14). Set the clock gauge to zero.
- b. Now transfer the clock gauge to the running gear as shown at fig 15. This reading will show the gear case to be 0.040-0.050 inch greater than the running gear. Select a washer or washers which will allow the running gear 0.020-0.022 inch endfloat.

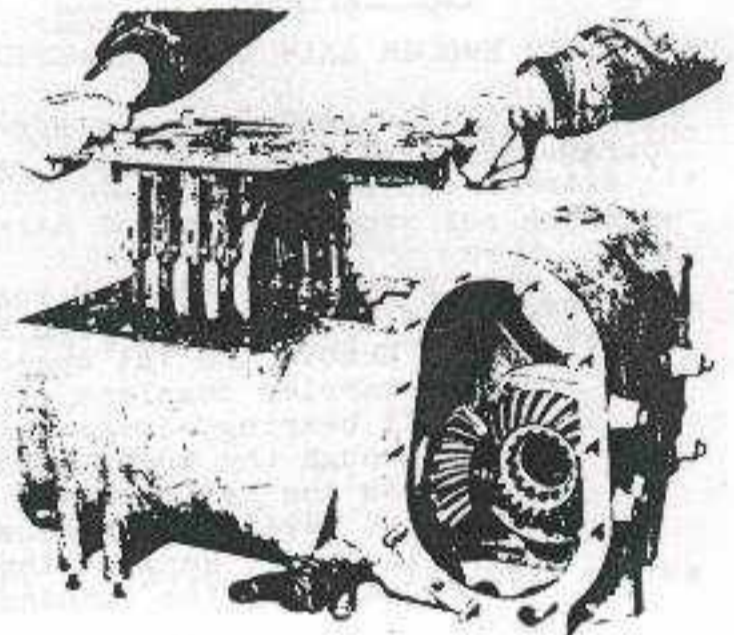


FIG 12 - GEARBOX - FITTING THE BRAKE BAND ASSEMBLY MINUS THE OPERATING GEAR AND STRUTS

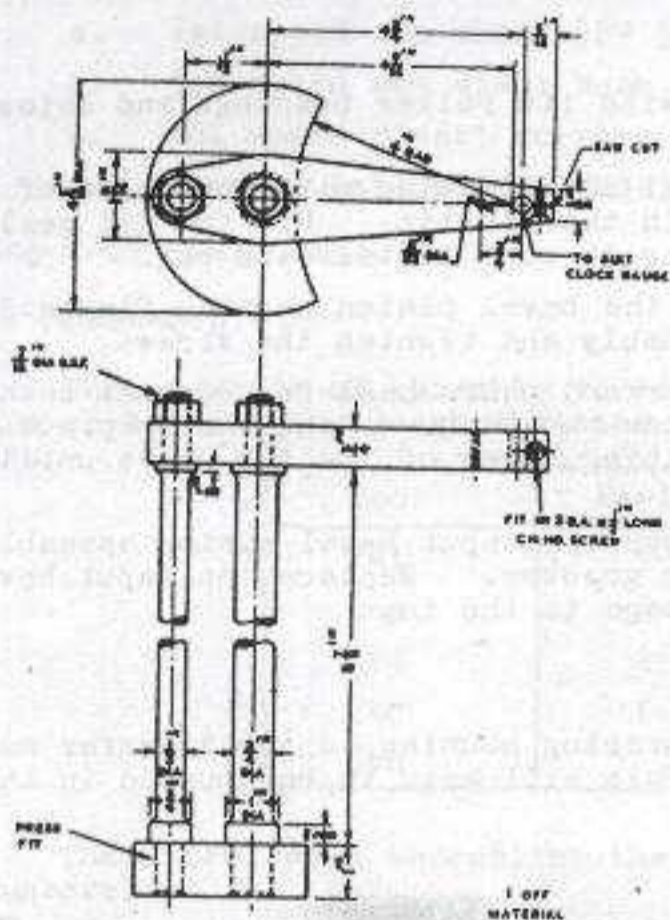


FIG 13 - DIAL GAUGE STAND - FOR CHECKING CLEARANCE BETWEEN RUNNING GEAR AND GEARBOX CASING (LOCAL MANUFACTURE)

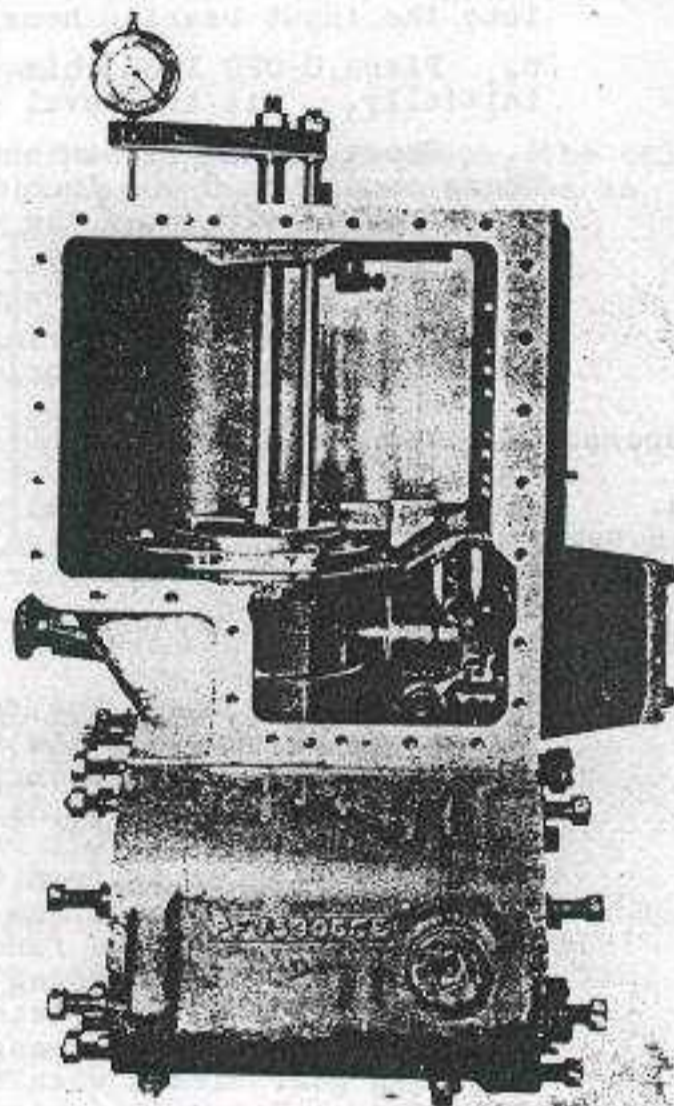


FIG 14 - GEARBOX - CHECKING DEPTH OF GEARCASE TO RUNNING GEAR (SEE FIG 15)

c. Place the selected washer in the input bevel pinion housing. Remove the 1st speed planet carrier complete with its ball bearing, lower this down through the brake bands and press the ball bearing into the input bevel pinion housing (see fig 16). Replace the driven shaft on the running gear.

d. With the driving shaft standing vertical and the 2nd, 3rd, 4th and 5th gears correctly assembled upon it, sling the gear casing by the transfer box end and lower it gently over the running gear. Before the casing meets the front cover apply jointing compound to the face joint, joggle the case gently as it is being lowered to mesh the gearing and engage the splines. Place the gearbox in the horizontal position.

e. Pass the 5th gear pull-rod through its hooks and screw the adjusting nut fully on to the threads. Carefully place the pull-rod between the hooks (figs 2 and 3), and engage the operating pin of the actuating ring (inner member) 5th gear.

f. Ensure that the busbar is correctly seated in its brackets.

Busbar Operating Gear (fig 4)

27. a. Grease the horns of the bucket and position on the busbar. Assemble the inner guide, collar, spring, outer guide, ball pin, washer and cover. Engage the two slave screws diagonally opposite in the casing, pull down evenly until two of the 2 inch screws can be engaged. As soon as the latter are securely

engaged, replace the slave screws. Coat the faces with jointing compound and pull down evenly.

b. Check the movement of the busbar operating gear. The operating lever should reach the stop without any feeling of sponginess. This is caused by slight jamming of the busbar on its bracket which must be eased.

Brake Band Auto-Adjuster Gear

28. Assembly -

Assemble between thumb and finger, a table, ring and adjuster nut. With pressure applied to the table and adjuster nut, the ring should move quite freely. If not, check for burrs. Apply this test to all five adjuster assemblies, particularly if new parts are to be used. New adjuster nuts must always be run down the pull-rod threads to ensure freedom of movement. Assemble the 1st, 2nd, 3rd and 4th gear adjustment mechanisms.

29. a. The 5th gear adjuster mechanism calls for extreme care. **SHOULD THE PULL-ROD BE ALLOWED TO DROP THE 5TH GEAR OPERATING PIN WILL BECOME DISENGAGED.** Proceed as follows.
- b. With a suitable lever placed between the busbar fulcrum bracket and the bottom of the 5th gear pull-rod, lever the pull-rod up slightly (see fig 3).
- c. Holding the lever in the left hand, with the right remove the adjuster nut.
- d. Place the pad and strut into position, replace the table, ring and adjuster nut, screwing the latter down until resistance of the table is felt. Remove the lever.

Selector Gear

30. Dismantling -

- a. Remove the locking bar from the cover. Remove the cam follower plates and the springs.
- b. Remove the camshaft, bearings, the locating plungers and springs.
- c. Remove the selector shaft lever, Woodruff key and quadrant with shaft.

Selector Gear

31. Assembly. Replace in the reverse order to para 30.

- a. If the bushes are to be renewed, press in and line ream.
- b. Where the locking plungers have been renewed, place the back fin of a strut between a pair of plungers; a 0.010 inch feeler gauge should then pass between any two plungers.
- c. When assembled there must be endfloat to the quadrant shaft of 0.005 inch and the quadrant must be correctly meshed to the camshaft.
- d. Check the angular movement of the lever; in each extreme position there must be slight backlash.

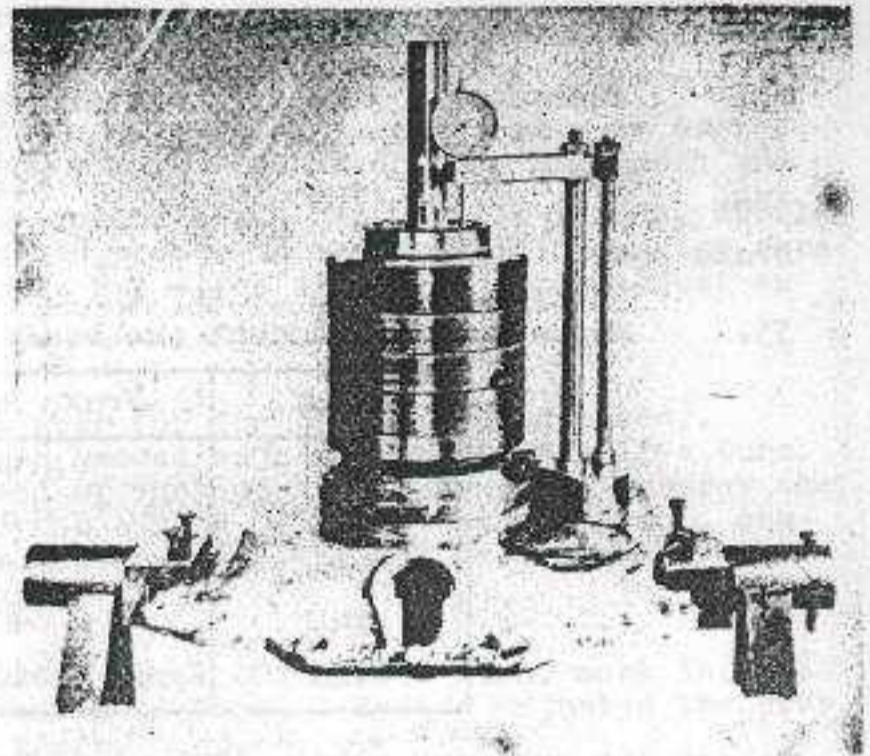


FIG 15 - GEARBOX - CHECKING THE NECESSARY CLEARANCE, RUNNING GEAR TO GEARCASE (SEE FIG 14)

Selector Gear Cover

32. *Assembly to Casing.* Engage the 5th gear strut into position and allow the busbar to rise again. Set the selector shaft lever to the top gear position. Coat the face side with jointing compound and assemble the selector gear cover to the casing.

Brake Band

33. *Adjustments.* Adjust the bands to the following settings:-

Gear	Brake Band Toggle	Adjuster Screw
1st	6.90 inch	0.550 inch
2nd	7.05 inch	0.785 inch
3rd	7.15 inch	0.880 inch
4th	7.2 inch	0.875 inch
Top	7.45 inch	0.385 inch

Select 1st gear and engage it by pulling and releasing the busbar operating lever. If there is a sudden increase in pressure on the return of the busbar operating lever, depress it again and hold it down. Screw down the adjusting nut several times and let

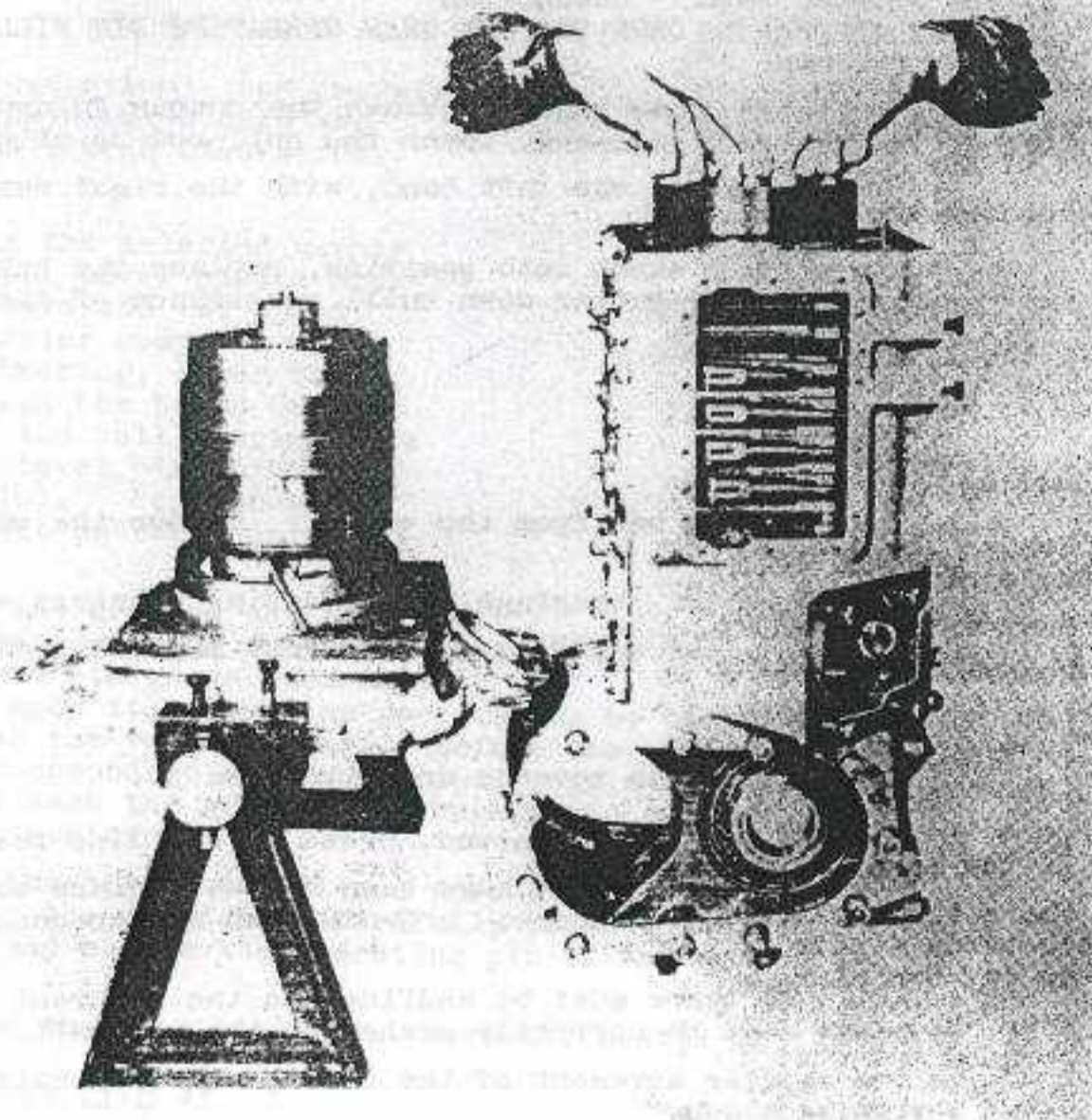


FIG 16 - GEARBOX - ASSEMBLY, FITTING THE 1ST GEAR BRAKE DRUM, BALL BEARING AND PACKING WASHER

- 1 Casing, main gearbox
- 2 Peg, locating, oil seal housing
- 3 Locknut, pinion bearings
- 4 Housing, oil seal
- 5 Cross shaft, operating busbar
- 6 Bearing, taper roller 2 inch x 4.25 inch x 1.094 inch
- 7 Spacer, input bearings
- 8 Bearing, taper roller, 2 inch x 4.25 inch x 1.094 inch
- 9 Gear, bevel pinion, input
- 10 Housing, bearing, mainshaft
- 11 Insert and circlip blanking pinion shaft
- 12 Dog, sliding transfer box
- 13 Fork, selector, forward and reverse
- 14 Shaft, selector
- 15 Mainshaft, transfer box
- 16 Plug, filler
- 17 Plug, hole, removing pinion assembly
- 18 Housing, bearing, differential shaft
- 19 Bush, differential pinion
- 20 Pinion, differential
- 21 Washer, thrust, differential pinion
- 22 Cross-pin, differential
- 23 Housing, differential
- 24 Housing, pinion bearing
- 25 Shims, adjusting spacer
- 26 Packing 'O', 4.750 inch x 0.210 inch
- 27 Bottom cover, gearbox casing
- 28 Plug, draining gearbox
- 29 Packing 'O' 3.850 inch x 0.210 inch
- 30 Washer, locking nut, input bearings
- 31 Circlip, internal, 2.750 inch
- 32 Bush, rear, driven shaft
- 33 Driven shaft, gearbox
- 34 Seals, oil gearbox transfer case

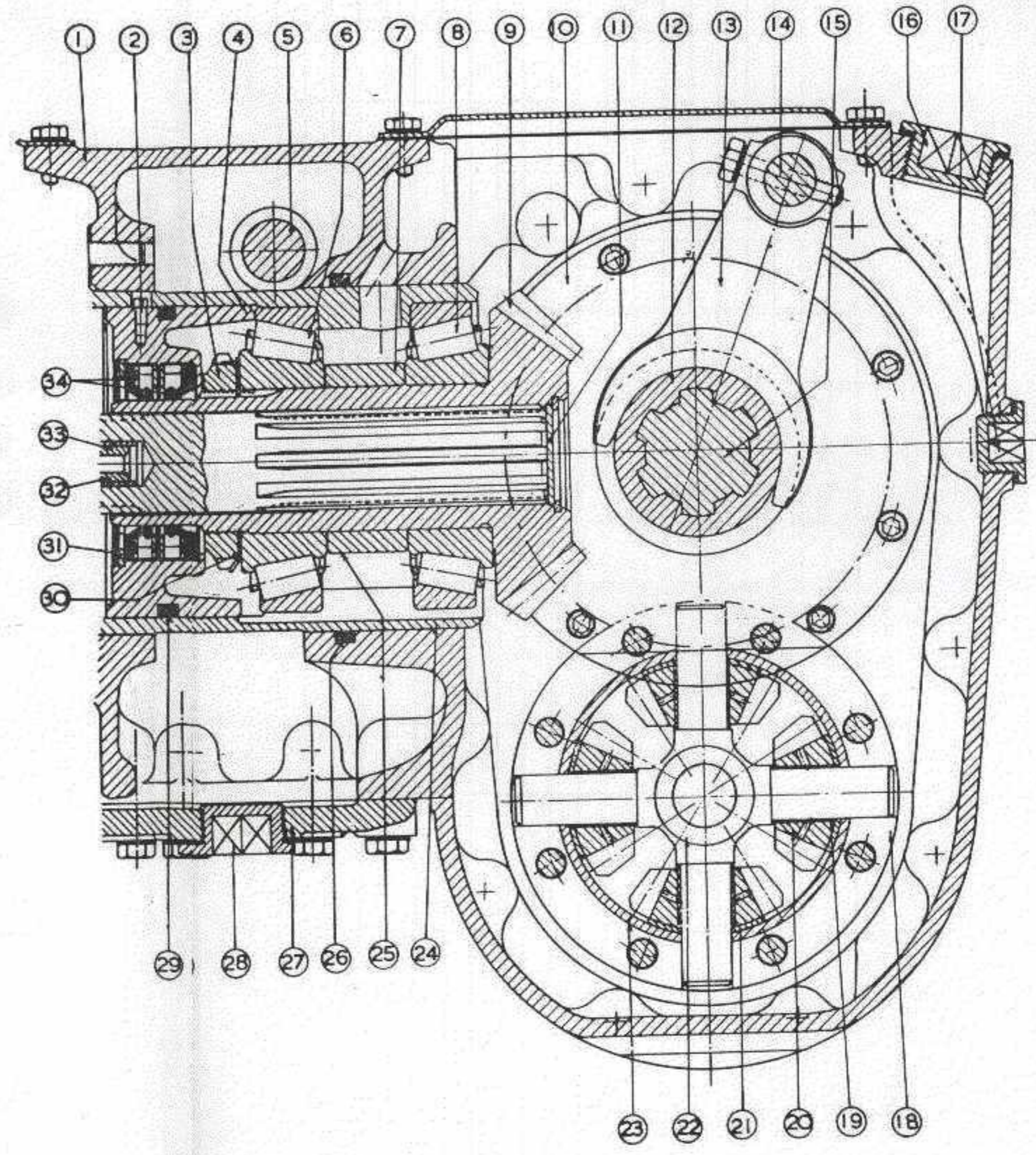


FIG. 17 - ARRANGEMENT OF INPUT PINION AND TRANSFER BOX

the lever come up again. If it continues to exert excessive pressure, hold it down once more and screw the adjuster nut down further. Continue until the excessive return spring pressure just disappears, then slacken the adjuster nut back one full turn. If at the commencement, the adjuster nut has been screwed too far down, unscrew it until the busbar shows signs of excessive pressure, then proceed as before. Fit the auto-adjuster spring, mark the end of the pull-rod and the nut with a pencil so that the movement of the nut can be observed. Operate the extension lever a number of times. The nut will turn slowly and after a time, cease. The toggle setting should now be 6.9 inches measured from the bottom of the groove in the busbar to the top face of the gearbox casing. If the depth gauge does not agree with 6.9 inches adjust as follows.

34. a. To reduce the dimension -
Engage any gear except neutral or 1st gear (or the gear to be adjusted). Slacken the locknut and turn the square headed adjuster screw *IN* half a turn. Retighten the locknut. Remove one end of the adjuster spring and unscrew the adjuster nut one full turn. Replace the spring, mark the adjuster nut, engage 1st gear and operate the lever as before until the nut ceases to turn. Check the toggle setting with the gauge.
- b. To increase the dimension -
Slacken the locknut and turn the adjuster screw *OUT* half a turn, mark the nut and operate the lever until the nut ceases to turn. Having adjusted the gear, repeat the process for the remaining gears.
- c. When the brake band adjustment is complete add 10 pints of lubricant. Fit a new gasket and the top cover.
- d. Running in -
After assembly the brake bands must be bedded to the drums by running the gearbox on a test rig, engaging all gears under load. After bedding-in, re-check the settings and adjust if necessary.

Workshop Special Tools

35. FV 51448 Spanner castle, driving shaft nut
FV 51449 Spanner castle, bevel gear nut
FV 51450 Spanner castle, input bevel pinion nut
FV 51451 Spanner castle, output bevel pinion nut
FV ~~5522~~ Gauge setting, toggle assembly

55522-

TRANSFER BOX

General

36. The transfer case is cast integral with the main gearbox, but the lubrication is separate. All taper roller bearings are pre-loaded to 0.002 inch. The forward and reverse bevel wheels and the six output bevel pinions are meshed by means of shimming. All face joints are sealed with jointing compound.

Dismantling (figs 17, 18 and 19)

37. a. Remove the inspection cover, dipstick and speedo drive.
b. Disconnect the fork end of the forward and reverse selector rod. Remove the top lever from the shaft.
c. Remove the forward and reverse selector, plug spring and ball, the selector rod and fork.
d. Remove the casing output gear RH and withdraw the shaft output.
38. a. Withdraw the roller bearings from the main-shaft and the RH differential casing by means of a puller. Remove both helical gears.
b. Remove the casing output LH. This will come away with the main-shaft, sliding dog, sleeve and differential complete (fig 19).
c. From the LH casing withdraw the differential and the output shaft.

NOTE:- The transfer case has now remaining within it the 'Forward' bevel wheel assembly, this cannot be removed without dismantling the main gearbox and withdrawing the output bevel pinion from within the main gear case (see fig 17).

Output Bevel Gears L and RH

39. *Dismantling (fig 18) -*

- a. Remove the L and RH mounting brackets from the ends of the output bevel cases; with the aid of extractor screws withdraw the bevel pinion housings and bearings; retain the shims to the housings.
- b. Remove the pinion, roller races and distance piece, the cups from the housing and the distance piece shims.
- c. Remove the four bevel gear wheel housings and bearings in a similar manner to sub-para a. Retain all shims to their respective housings.
- d. Withdraw the coupling flange from the splines together with the cap and oil seal. Press the bevel gear shaft out of the bearings and remove the bearings from the housing.

Differential (fig 18)

40. Separate the differential casing and withdraw the following components:-

- a. Gear differential (2).
- b. Cross-pin (1).
- c. Pinions (4).
- d. Bushes pinion (4).
- e. Washer thrust pinion (4).
- f. Gear differential (2).
- g. Washer thrust gear (2).

Main-Shaft, Bevel Gears and Bearings (fig 18)

41. *Dismantling -*

- a. Remove the end cover from the LH main-shaft bearing housing.
- b. Drive the main-shaft out from the opposite end. The shaft will come away with the outer ball thrust bearing and the inner race of the inner roller bearing. The outer race and circlip can be removed later.
- c. Withdraw the reverse bevel gear and bearing housing. The circlip and outer race mentioned in sub-para b. can now be removed from the casing. Retain the shims to the bearing housing.
- d. Press off the ball thrust bearing, the spacer and the roller bearing from the main-shaft.
- e. Remove the forward bevel gear and bearing housing by removing the pre-selector gearbox running gear as described in para 4. Remove the forward bevel gear and housing as at para 6.d. and e.
- f. Withdraw the housing and bevel gear bearings. Retain the shims to their respective assemblies.

42. *Reassembly -*

All taper roller bearings in the transfer box and the output bevel cases must be pre-loaded on assembly to 0.002 inch.

43. *Forward and Reverse Bevel Gear Meshing -*

- a. Assemble the forward (RH) bevel wheel to the transfer case with the original shims. Should these not be available or, if new components are being fitted, commence with a total of 0.020 inch shims. These are available in the following sizes, 0.002, 0.004, 0.010 and 0.025 inch.

NOTE:- Ensure that the lubrication passage in the bearing housing is to the top.

- 1 Cover, including mounting bracket
- 2 Shims, output bearing housing
- 3 Housing bearing, output pinion
- 4 Casing, output gear, RH
- 5 Gear, speedometer, transfer box
- 6 Bearing, roller, 30 mm x 90 mm x 23 mm
- 7 Gear, helical, main-shaft
- 8 Nut, lock, forward gear
- 9 Sleeve, main-shaft
- 10 Spacer and shims, bearing forward gear
- 11 Shims, bearing, housing
- 12 Housing, bearing, forward gear
- 13 Gear, bevel wheel, forward
- 14 Dog, sliding, transfer box
- 15 Gear, bevel wheel, reverse
- 16 Housing, bearing, reverse gear
- 17 Shims, bearing housing
- 18 Spacer and shims, bearing reverse gear
- 19 Nut, lock reverse gear
- 20 Circlip, Seeger, int 90 mm
- 21 Bearing, roller inner, 40 mm x 90 mm x 23 mm
- 22 Spacers, bearing, inner and outer
- 23 Bearing, ball
- 24 Main-shaft, transfer box
- 25 Nut, lock, output pinion (2)
- 26 Bearing, taper, roller (4)
- 27 Shaft, output transfer box
- 28 Casing, output gear, LH
- 29 Bearing, roller, 55 mm x 100 mm x 21 mm
- 30 Casing, differential, short
- 31 Bush, differential gear (2)
- 32 Gear, differential (2)
- 33 Cross-pin, differential
- 34 Transfer box casing
- 35 Casing differential long
- 36 Shaft output transfer box
- 37 Bearing, taper, roller 65 mm x 120 mm x 1.142 inch (4)
- 38 Gear, helical, differential
- 39 Bearing, roller, 2 1/4 inch x 4 1/2 inch x 7/8 inch
- 40 Pinion, bevel (2)
- 41 Shims, pinion bevel

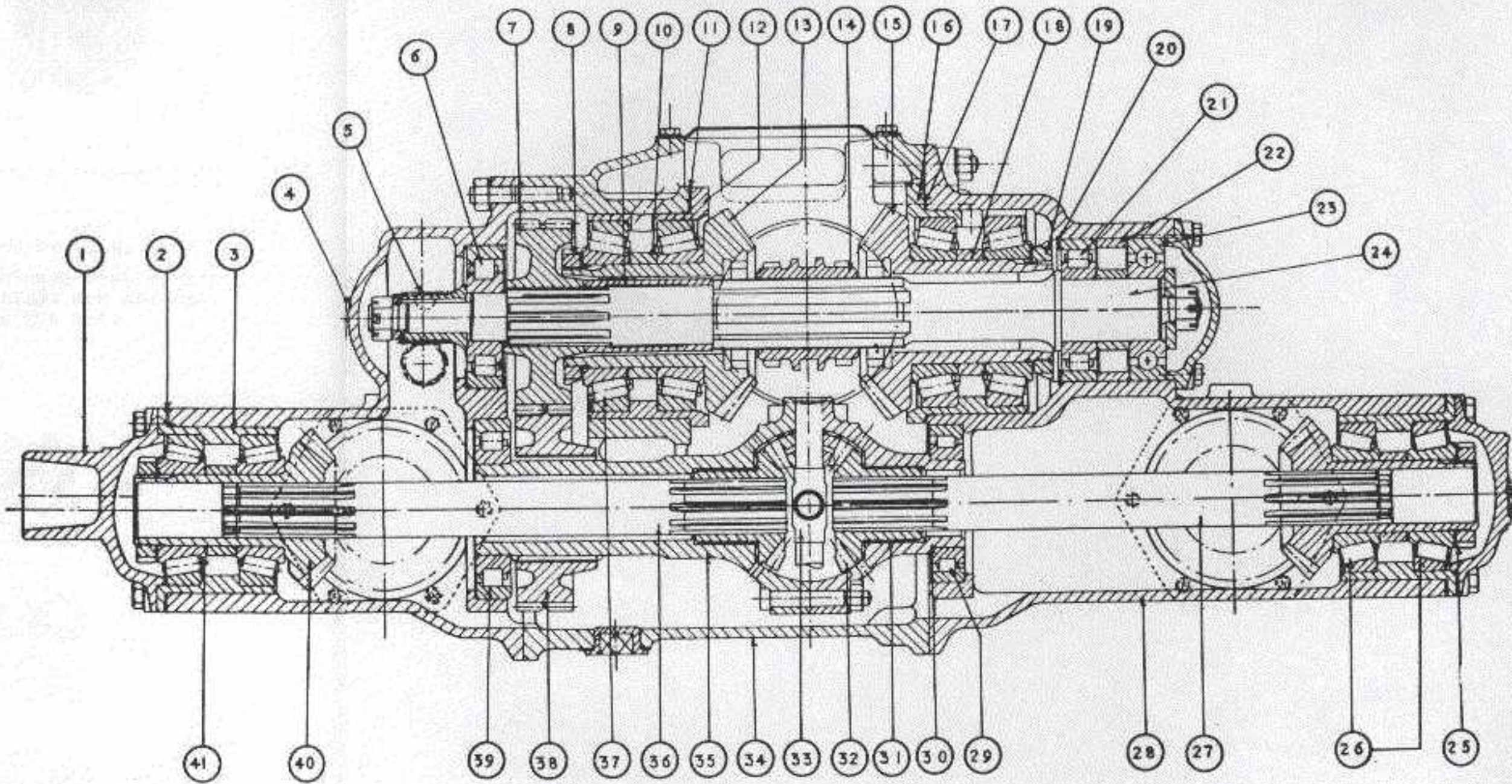


FIG 18 - TRANSFER BOX - GENERAL ARRANGEMENT

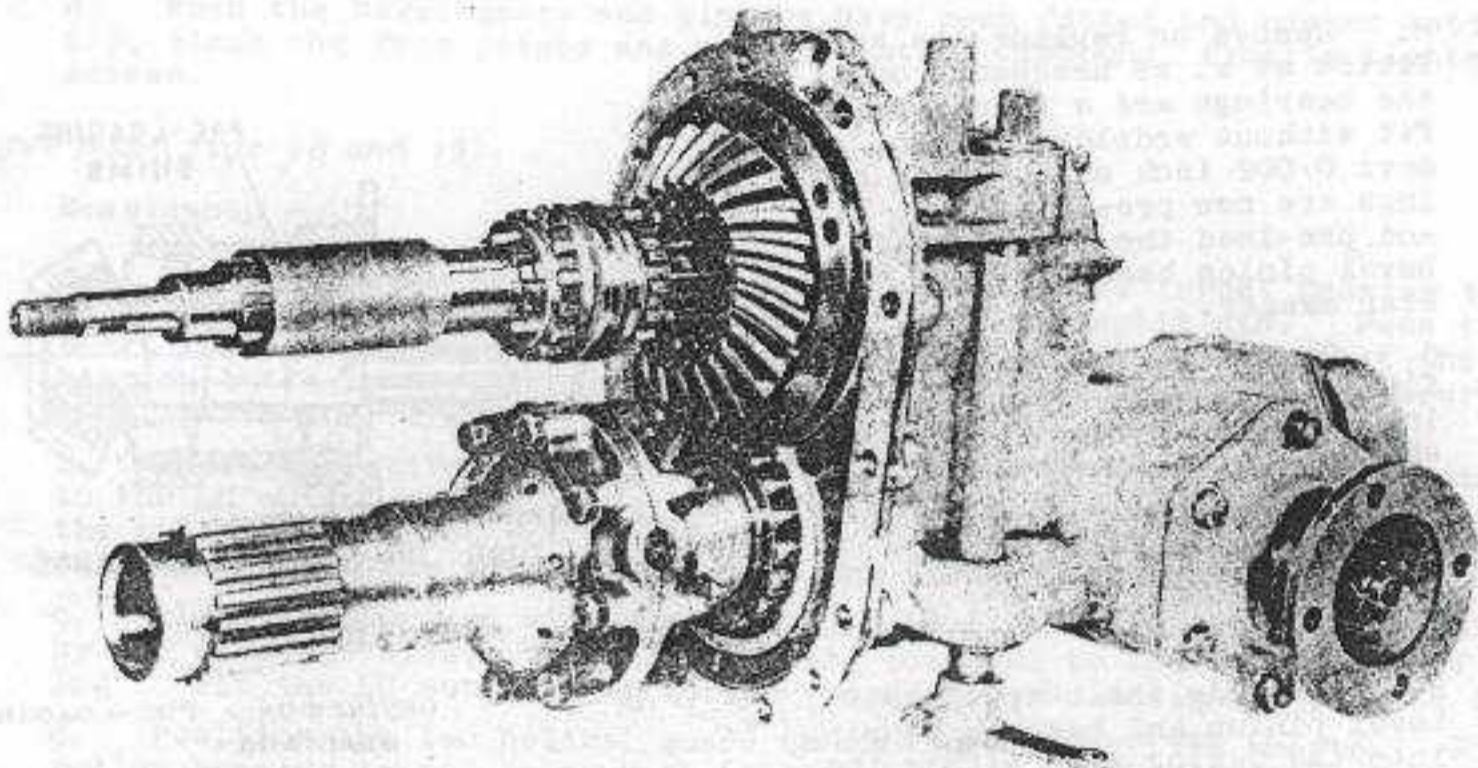


FIG 19 - TRANSFER BOX - LH OUTPUT CASING WITHDRAWN COMPLETE WITH MAIN-SHAFT AND DIFFERENTIAL ASSEMBLY

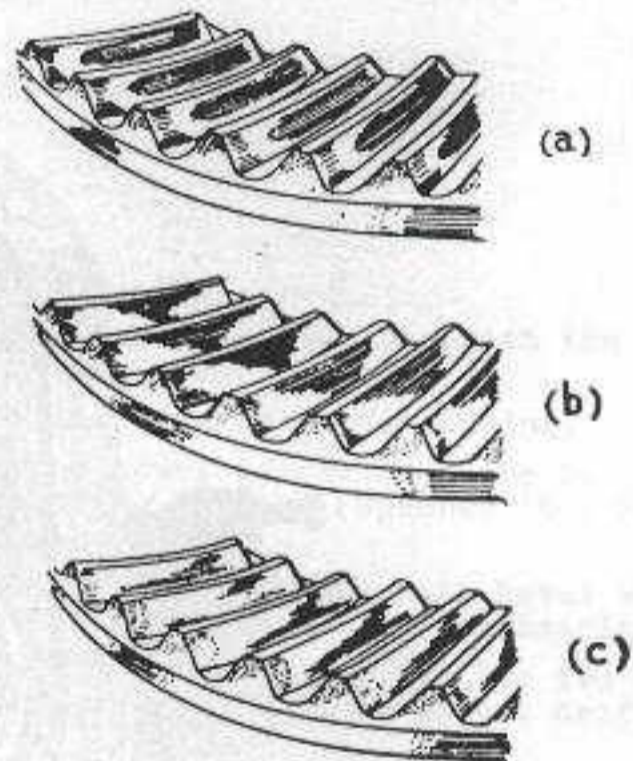
- b. Fit the input pinion through the gearbox casing, sub-para 23.a. to e.
- c. Fit the reverse bevel wheel to the LH output casing shimmed similarly to the other two. Ensure that the face joints of the two casings are dry and clean. Place the LH output casing in position and tighten the nuts.
- d. The three gears must now be meshed by final shimming until all three gears have a backlash of 0.004 to 0.006 inch measured by feeler gauge between the teeth. Finally use a marking agent on the teeth to observe the tooth contact, this should be as at fig 20. Before finally fitting the reverse bevel wheel and housing, insert the circlip into the main-shaft bearing housing.

Output Bevel Gears

44. **Fitting and Pre-loading Bearings (figs 20, 21 and 22) -**

a. Assemble two bearing cups to a housing. Press one bearing cone up to the shoulder of the pinion and pass the pinion shaft through the housing. Place the spacer on the shaft followed by the shims (say 0.020 inch to commence with), then the outer bearing cup.

b. Slip a suitable piece of steel tube over the splined end of the pinion shaft (this is quicker than using the flange coupling). Fit a plain washer and tighten the nut (fig 21).

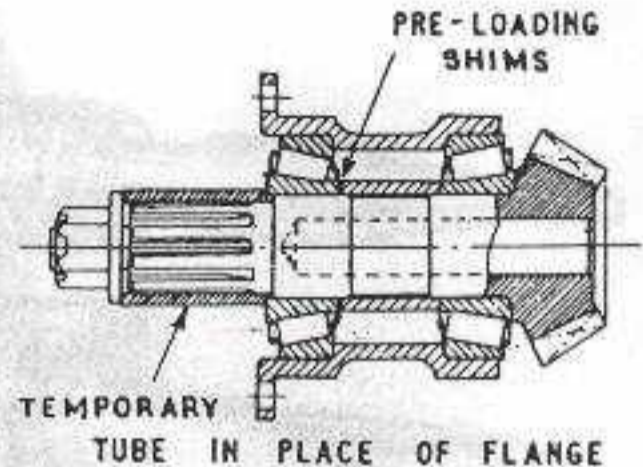


- (a) Correct
- (b) Incorrect - too far out of mesh
- (c) Incorrect - too far in mesh

FIG 20 - GEAR TEETH BEARING MARKS

c. Remove or replace the shims fitted at a. as necessary until the bearings are a free running fit without endplay. Then, remove 0.002 inch shim. The bearings are now pre-loaded. Fit and pre-load the output shaft bevel pinion bearings in a similar manner.

d. Place the oil seal on the flange coupling. Fit the coupling to the splines of the pinion shaft followed by the washer, nut and split pin.



Output Bevel Gears (fig 22)

45. Meshing -

a. Assemble the output shaft bevel pinion and bearing housing into the casing with either the original shimming or a total of 0.020 inch. These go between the bearing housing flange and the casing. Replace the outer cap and tighten the nuts.

FIG 21 - BEVEL BOX - PRE-LOADING BEARINGS

b. Place one of the bevel wheel assemblies into the casing and shim in a similar manner to the pinion in sub-para a; tighten the nuts. It is now possible to observe the two gears and to apply feeler gauges from the opposite side of the casing. Increase or decrease the shims to both assemblies until there is no overlapping of the teeth and they have a backlash of 0.004 to 0.006 inch.

c. Remove the bevel wheel assembly which has been meshed and fit its opposite number to the other side of the output case. Carry out the meshing for this bevel wheel as described in the previous sub-para b.

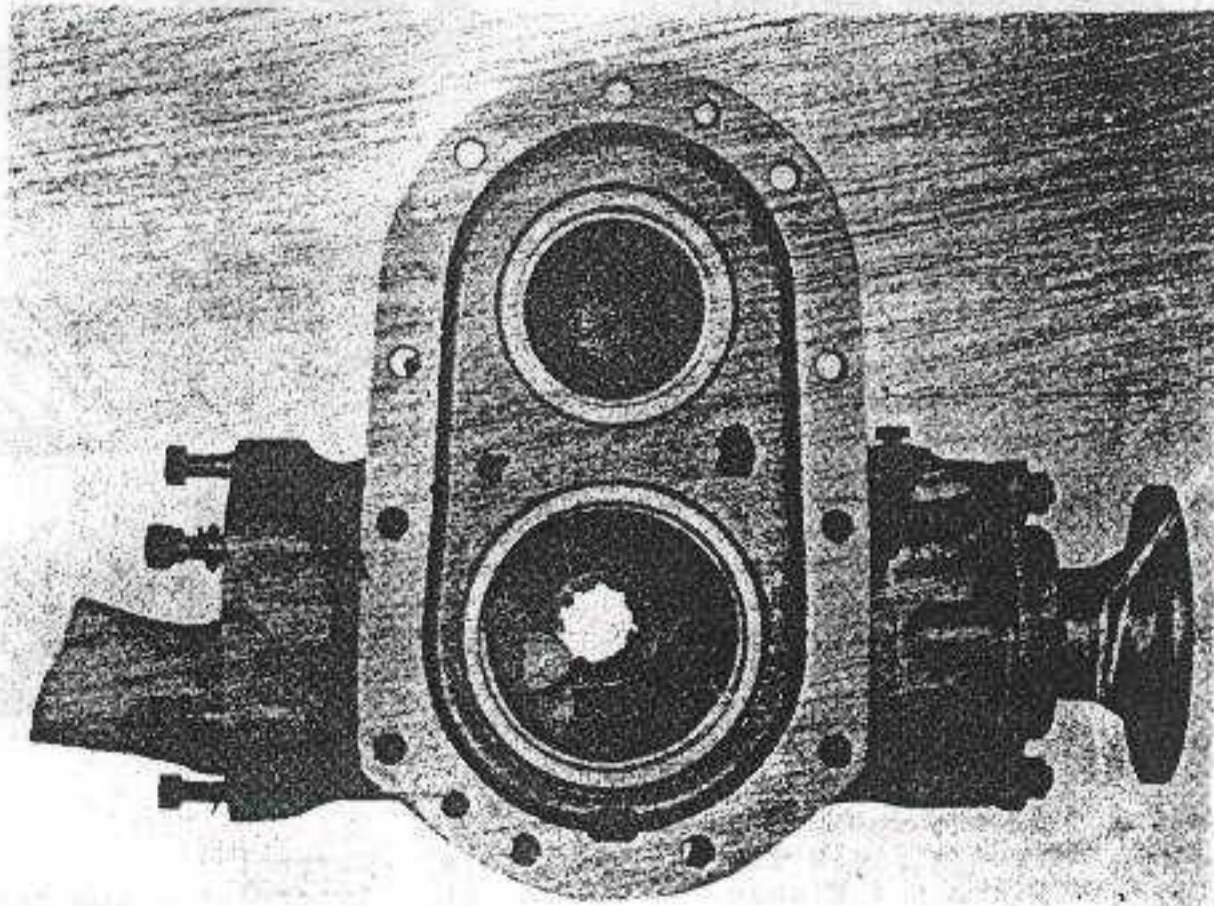


FIG 22 - TRANSFER BOX - METHOD OF MEASURING BACKLASH IN THE BEVEL BOX GEARS

- d. When the bevel gears and pinions have been fitted and meshed satisfactorily, clean the face joints and apply jointing compound, finally tightening the screws.

Transfer Box (figs 18 and 19)

46. *Reassembly -*

- a. Fit the roller bearing, two spacers and the ball thrust bearing to the main-shaft; secure these with the washer, nut and split pin. Pass the main-shaft through the LH output casing from the outside, ensuring that the roller bearing butts up to the circlip. Apply jointing compound to the bearing cover and tighten the screws.
- b. Press the roller bearing carrying the short side of the differential, into the LH output case. Pass the LH output shaft through and engage it with the splines of the output pinion. Fit the differential (short side) to this shaft and press the differential into the roller bearing.
- c. Place the forward and reverse sliding dog on to the main-shaft followed by the distance sleeve. Apply jointing compound to the face joint of the casing. Fit the LH output case to the transfer box and tighten all the nuts.
- d. Position the two helical gears on to their respective shafts. Fit the roller bearing to the main-shaft (this is a drive fit) followed by the Woodruff key, speedometer drive gear, washer, nut and split pin.
- e. Apply jointing compound to the RH face joint of the transfer box, offer up the RH bevel case to engage the two roller bearings on the main and differential shafts and ensure that the case fits squarely on the two bearings.

47. a. Check all nuts and screws on the casing for tightness.
b. Ensure that the drain plug gasket is serviceable.
c. Replace the speedo drive and dipstick.
d. Replace the forward and reverse selector rod, fork and vertical shaft.
e. Place 6 pints of lubricant in the box.
f. Replace the top cover and screws.
g. Replace the selector rod ball, spring and plug.

BEVEL BOX

Dismantling (fig 23)

48. a. Withdraw the pinion assembly from the bevel box.
b. Withdraw the flange from the pinion shaft splines together with the oil seal housing.
c. Remove the two roller bearings, spacer and shim from the housing.
d. Remove the filler and drain plugs and the dowel screws from the box. Unscrew the ring locking, outer bevel wheel bearing housing (Spanner 'C', FV 55521). Remove the shims.
e. Withdraw the housing including the tracta fork complete with bevel wheel, hub and bearings. Collect the shims from behind the inner roller bearing cup.

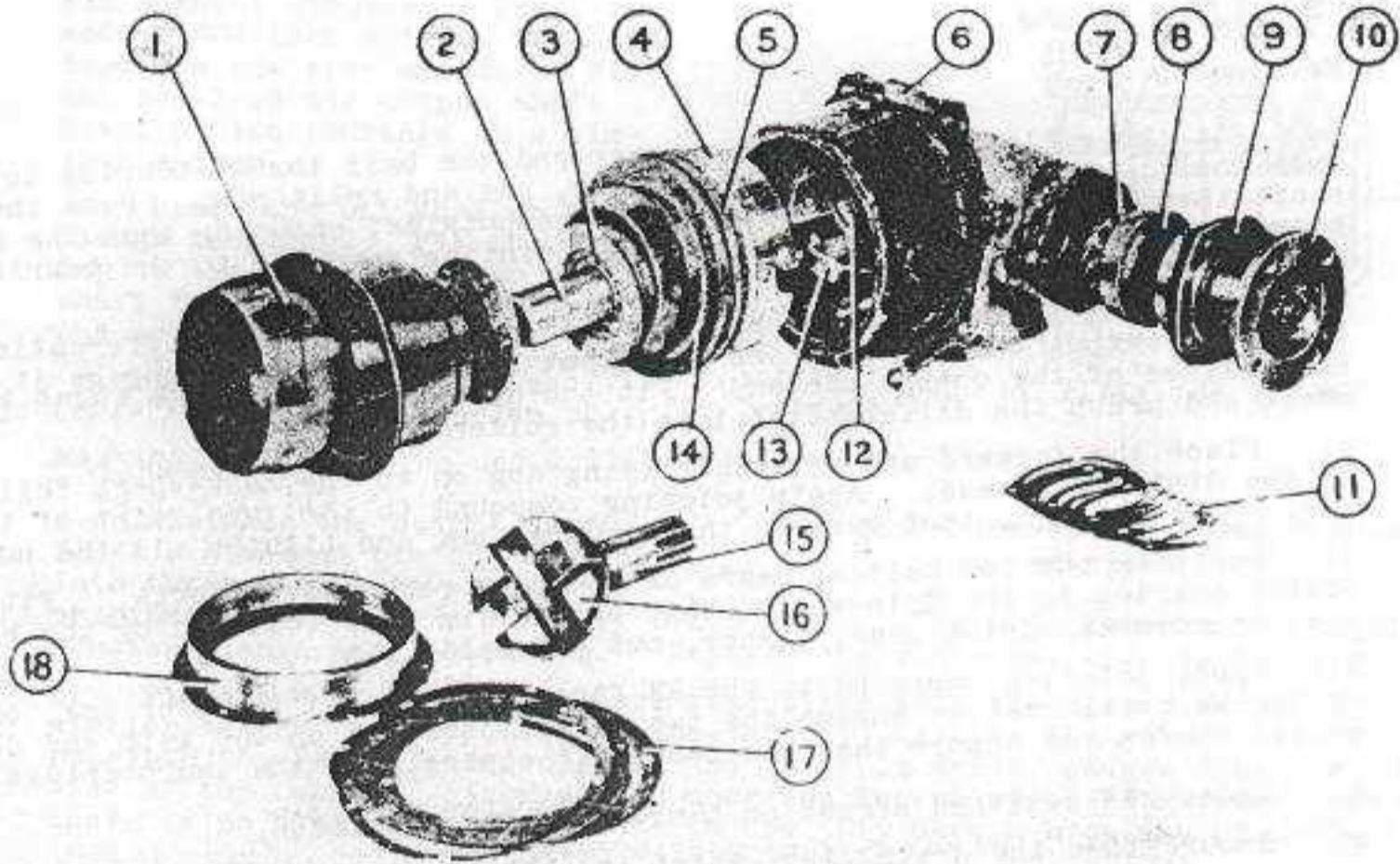
NOTE:- Should it prove difficult to remove the inner bearing cup remove the two screws at the elbow of the bevel box and drive the bearing out with a short drift.

IMPORTANT:- Ensure that all mating gears are kept paired.

Pinion Shaft Bearing

49. *Reassembly -*

- a. Assemble the two bearing cups to the housing. Press one bearing cone up to the shoulder of the pinion and pass the pinion shaft through the housing. Place the spacer on the shaft followed by the shimming (say 0.020 inch to commence with) and the outer bearing and cup.



- | | |
|--|-----------------------------------|
| 1 Housing, outer tracta fork | 10 Flange coupling |
| 2 Sleeve, coupling, tracta fork | 11 Shims, bevel pinion housing |
| 3 Bearing, ball, 1 1/4 inch x 2 3/4 inch
x 11/16 inch | 12 Fork, tracta bevel box |
| 4 Seat, sliding and ring sealing (cork) | 13 Joint, slotted |
| 5 Housing, inner tracta, oil seal | 14 Ring, housing, oil seal |
| 6 Box, bevel | 15 Fork, tracta outer |
| 7 Pinion | 16 Joint, slotted |
| 8 Housing, bevel pinion bearings | 17 Shims, tracta joint housing |
| 9 Housing, bevel pinion oil seal | 18 Housing, outer tracta oil seal |

FIG 23 - BEVEL BOX AND TRACTA JOINT ASSEMBLIES

b. The two bearings must now be fitted and then pre-loaded. A piece of steel tube used in place of the splined flange will give a better 'feel' of the bearings (fig 21). Tighten the nut and note the amount of endplay in the bearings. Remove or replace the shims as necessary until the bearings are a free fit with no endfloat. When this is achieved, remove one 0.002 inch shim.

c. Renew the oil seal in the housing, slip the oil seal housing over the flange, remove the nut, washer and tube and refit the flange to the splined pinion shaft.

Box, Bevel Drive

50. Gauging -

Ensure that the bevel box is scrupulously clean and dry, particularly all internal machined surfaces. Mount the box on the gauge FV 55965 (fig 24).

NOTE:- The purpose of this gauge is to assess the amount of shimming required behind the bearing, inner, bevel wheel. The amount of backlash is controlled at a later stage by means of shimming behind the pinion bearing housing.

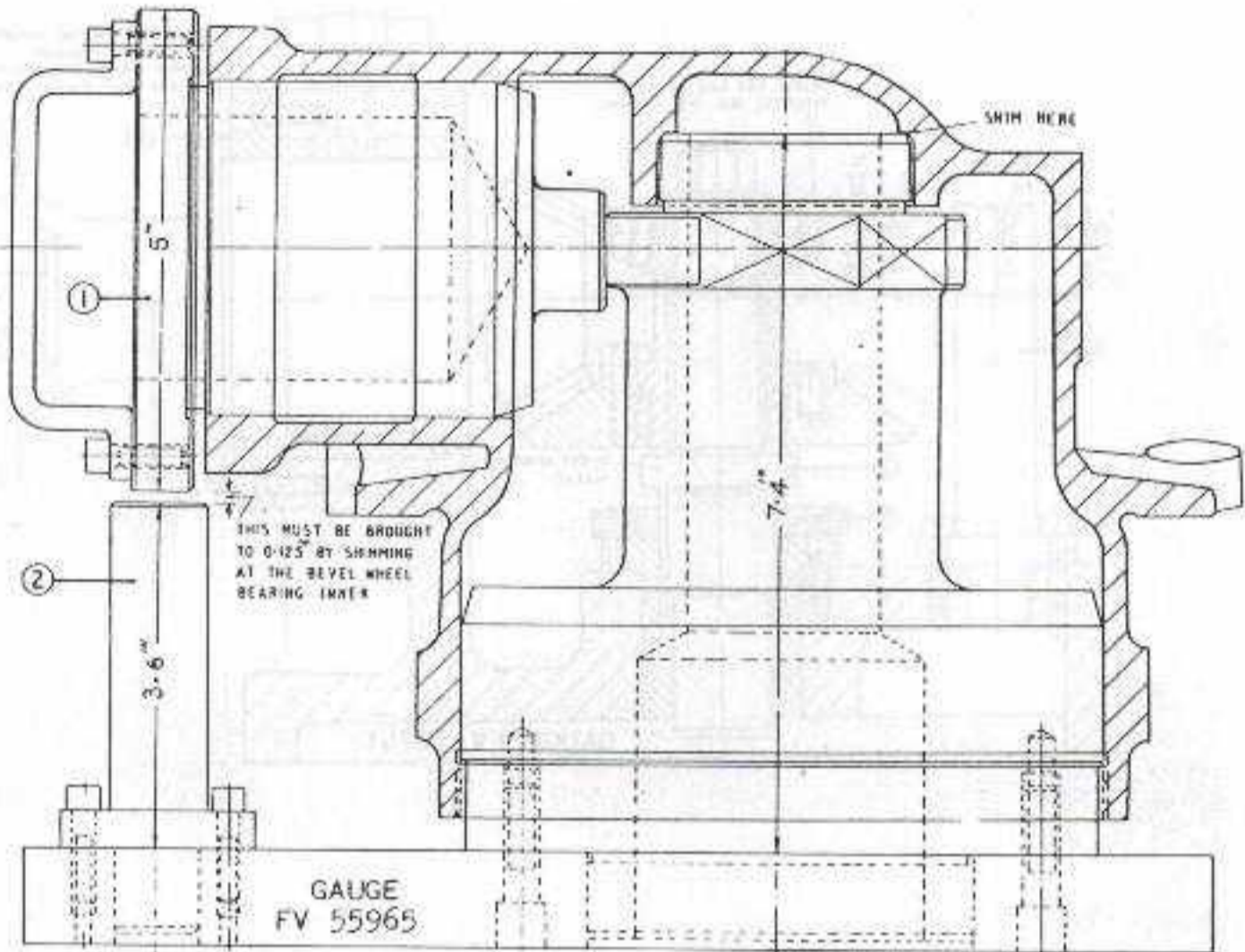


FIG 24 - BEVEL BOX - FIXTURE FOR GAUGING THE AMOUNT OF SHIMMING REQUIRED UNDER THE BEVEL WHEEL HUB INNER, ROLLER BEARING

51. a. Insert the plug (1) into the pinion housing.
 b. Check the gap between the plug collar (1) and the gauge reference (2) with feelers. This will always read below 0.125 inch.

Example:-
 Gap standard..... 0.125 inch
 Gap reading as at sub-para c... 0.112 inch

Shims required... 0.013 inch

- c. Remove the plug gauge (1). Lift the bevel box from the jig and insert the necessary shims behind the bearing, inner, bevel wheel.

Bevel Gears

52. Meshing. The gauge FV 58741 at fig 25 must be used on a large surface plate in conjunction with a vernier height gauge.

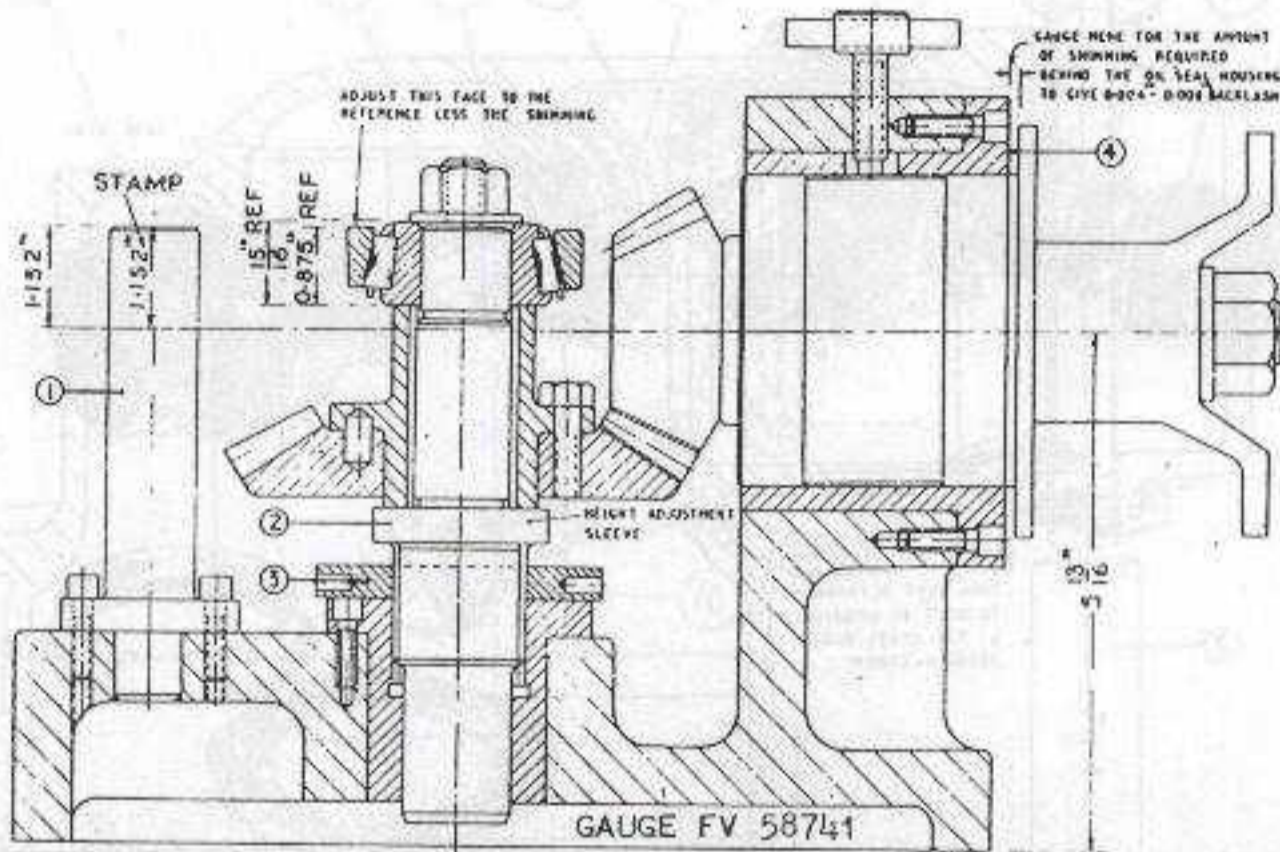
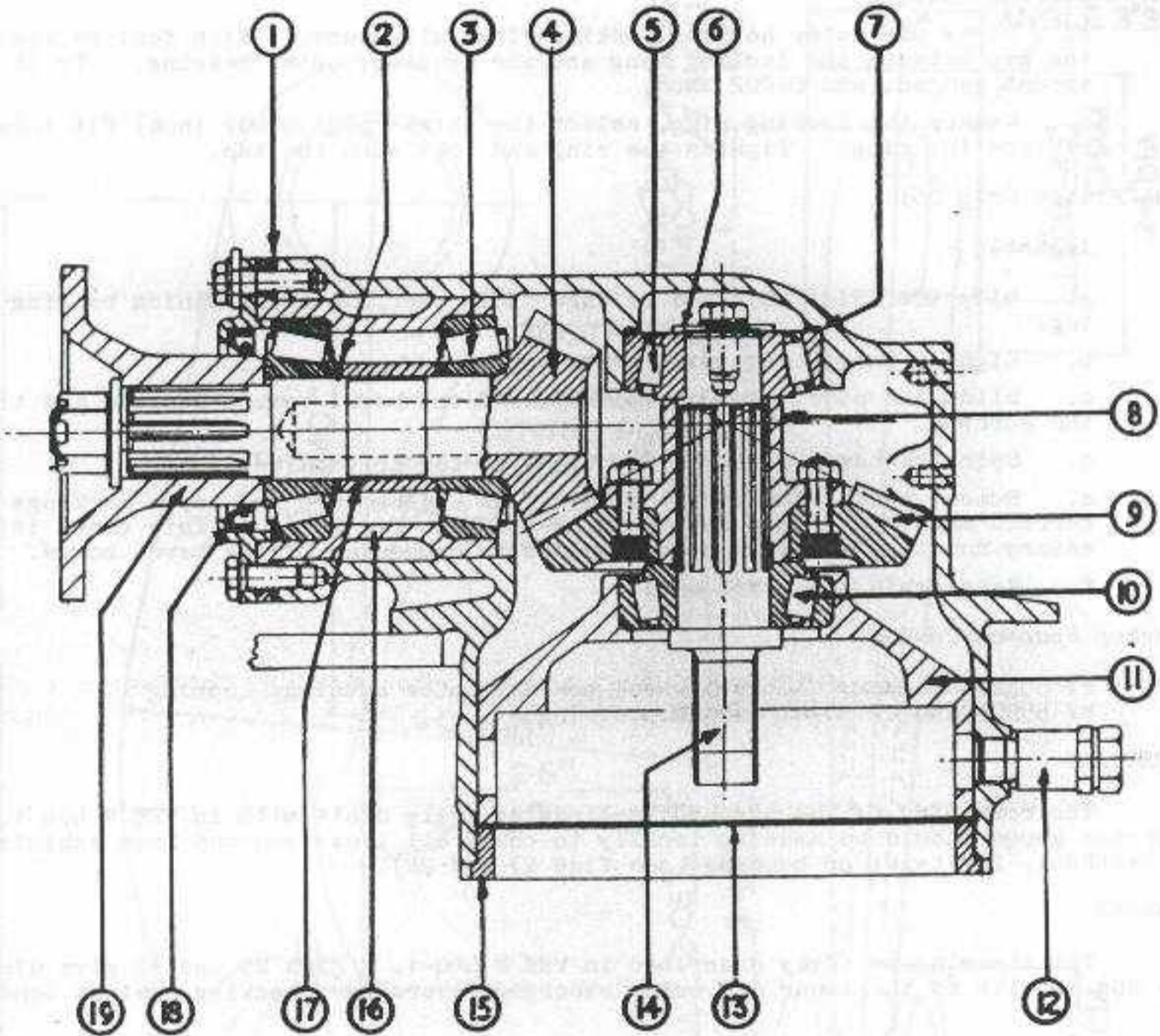


FIG 25 - BEVEL BOX - FIXTURE FOR SETTING UP THE BEVEL WHEEL AND PINION TO THEIR CORRECT CENTRES AND GAUGING THE AMOUNT OF SHIMMING REQUIRED FOR BACKLASH

- 53.
- Mount the bevel wheel, hub and inner bearing on the adjustable pillar (2). Screw down the nut and washer to just 'nip' the bevel wheel and bearing.
 - Set the vernier height to the gauge reference (1).
 - Slacken the locking ring (3) and raise or lower the bevel wheel assembly until the top face of the inner bearing cup coincides with the height gauge exactly.
 - The amount of shimming inserted in the bevel box, sub-para c. must now be accounted for, eg in the example given above, reduce the height gauge by 0.013 inch; this is done by slackening the locking ring (3) and adjusting the bevel wheel assembly by the required amount.
 - Clamp the bevel pinion assembly by means of the 'T' headed screw.
 - Mesh the pinion until there is a backlash of 0.004 to 0.006 inch. Now measure with feeler gauges the gap at (4) between the gauge face and the rear flange of the pinion bearing housing, select the shims and place to one side.

Bevel Wheel Bearings

54. *Pre-loading -*
- Assemble the outer bearing complete with housing, bevel wheel with hub and the inner bearing cone on to the fork, tracta. Fit the plate, washer and tighten the screw.



- | | |
|--|--|
| 1 Shims, bevel pinion housing | 10 Bearing, taper roller, 1.250 inch x 2.875 inch x 0.875 inch |
| 2 Shims, bevel pinion bearing | 11 Housing, bevel wheel bearing, outer |
| 3 Bearing, taper roller, 1.375 inch x 3.00 inch x 0.938 inch (2) | 12 Plug, filler |
| 4 Gear, bevel pinion | 13 Shims, bearing housing (as required) |
| 5 Bearing, taper roller, 1.00 inch x 2.6875 inch x 0.876 inch | 14 Fork, tracta, bevel box |
| 6 Plate, retaining, tracta fork | 15 Ring, locking bevel box |
| 7 Shims, inner bearing (as required) | 16 Housing, bevel pinion bearings |
| 8 Hub | 17 Spacer, bevel pinion bearing |
| 9 Wheel, bevel | 18 Seal, oil, 2 inch x 2 3/4 inch x 3/8 inch |
| | 19 Flange, coupling |

FIG 26 - BEVEL BOX - GENERAL ARRANGEMENT

- b. Place the shims (selected at para 53.b and c) in the bevel box followed by the inner bearing cup and tracta fork complete with bevel wheel and outer bearing housing.
- c. Screw the outer housing locking ring fully home. With feelers measure the gap between the locking ring and the housing, outer bearing. To the amount gauged, add 0.002 inch.
- d. Remove the locking ring, select the shims (plus 0.002 inch) fit them and replace the ring. Tighten the ring and lock with the tab.

Bevel Pinion (fig 26)

55. Assembly -

- a. Slip the shims selected at para 53.f. over the bevel pinion bearing housing.
- b. Lightly smear the pinion teeth with a marking agent.
- c. Slide the bevel pinion assembly into the bevel box. Replace and tighten the screws.
- d. Spin the bevel pinion a few times in the drive direction.
- e. Remove the pinion from the bevel box and observe the tooth markings for correct meshing. This should be as shown in fig 20(a). This check is necessary due to the slight discrepancies in machining of the bevel boxes.
- f. Reassemble the bevel box.

Workshop Special Tools

56. ✓ FV 55521 Spanner 'C' bevel wheel bearing outer housing, locking
/ FV 55965 and FV 58741 Gauges, setting /

SUSPENSION

57. The rebushing of the suspension links is fully dealt with in VEH N 404-1. A reference gauge should be made up locally to check all links removed from vehicles during overhaul, for twist or bending (see figs 27 and 28).

STEERING

58. The steering is fully described in VEH N 404-1. Figs 29 and 30 give dimensions and details of the inner and outer steering levers for checking against bend or twist.

SHOCK ABSORBERS, TYPE 8500

General

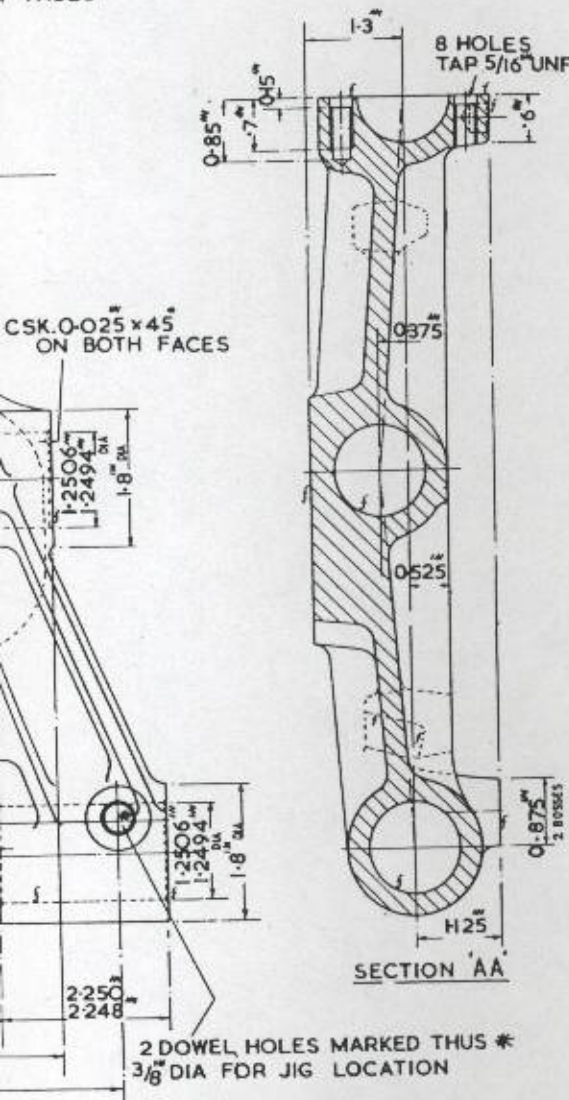
59. The successful working of these shock absorbers depends on the absolute cleanliness of the fluid and all working parts. Therefore, thoroughly clean the unit externally before dismantling. On dismantling place all the smaller parts in a clean tray with sufficient fluid (OM-13) to cover them. Cover the open end of the cylinders with clean rag. Ensure that all tools are clean at all times. It is possible for pressure to build up in this type of shock absorber during service, therefore remove the hex hd plug at the bottom end of the unit to release any pressure (do not attempt to empty the unit by this plug).

60. Dismantling (fig 31) -

- a. Remove the grommet and bump rubbers.
- b. Stand the unit upright, with the bottom eye gripped in a vice (use jaw pads).
- c. Remove the grubscrew from the nut retaining the piston rod bush. Unscrew the nut, fig 33. Remove the seal (dust) and the flat washer.
- d. Pull the piston rod up until the rod gland assembly comes away from the outer tube, slide it off the rod and place in a clean tray. Lift out the reservoir tube.

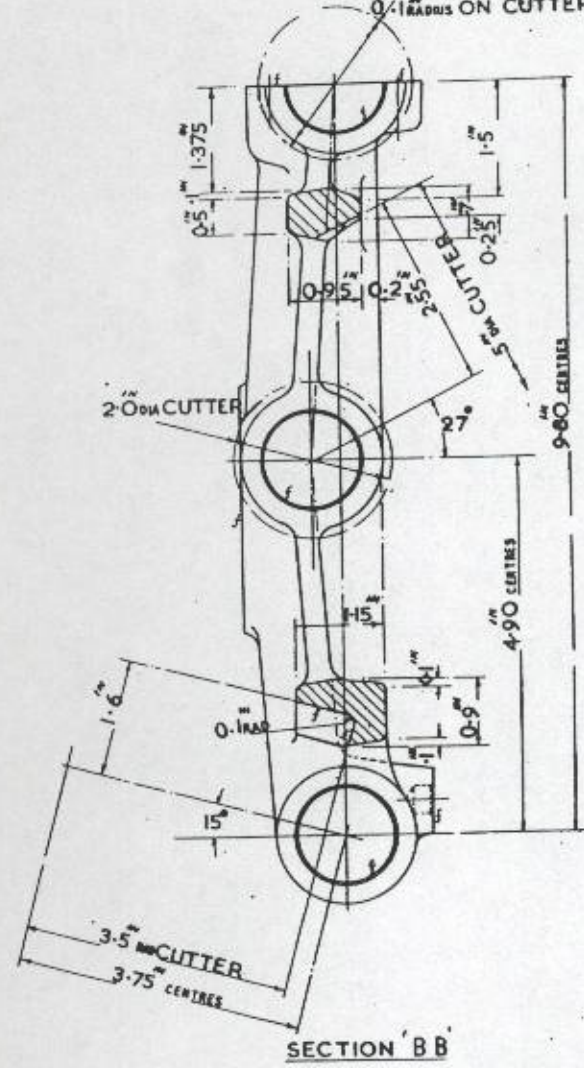
25x45° ON
FACES

CSK.0-025x45°
ON BOTH FACES



SECTION AA

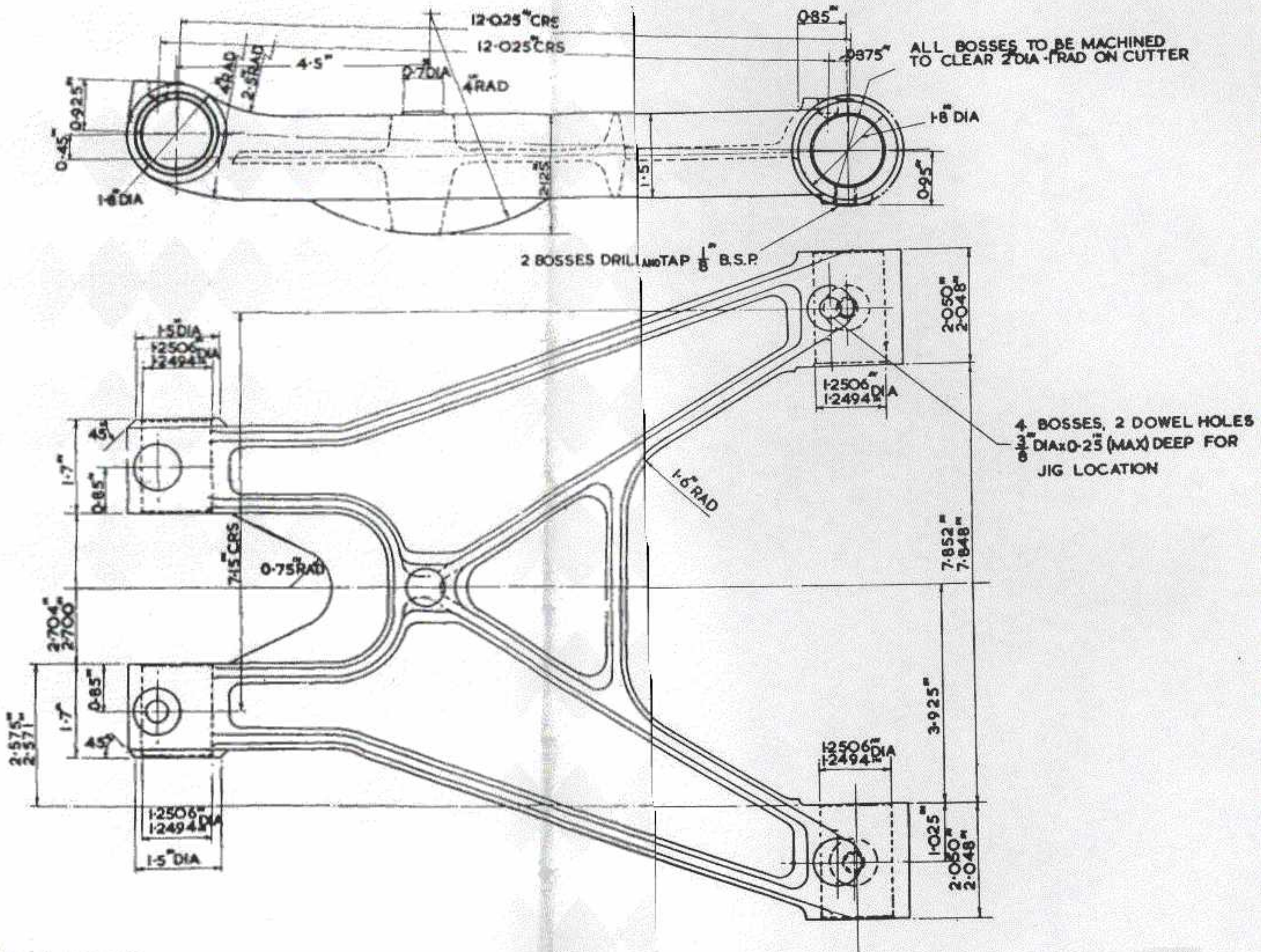
MACHINE TO CLEAR
2" DIA ON BOSS FACES
0.1880 ON CUTTER



SECTION BB

ALL DIMENSIONS TO HOLE CENTRES TO BE
WITHIN 0.005" UNLESS OTHERWISE STATED.

MACHINE AT f



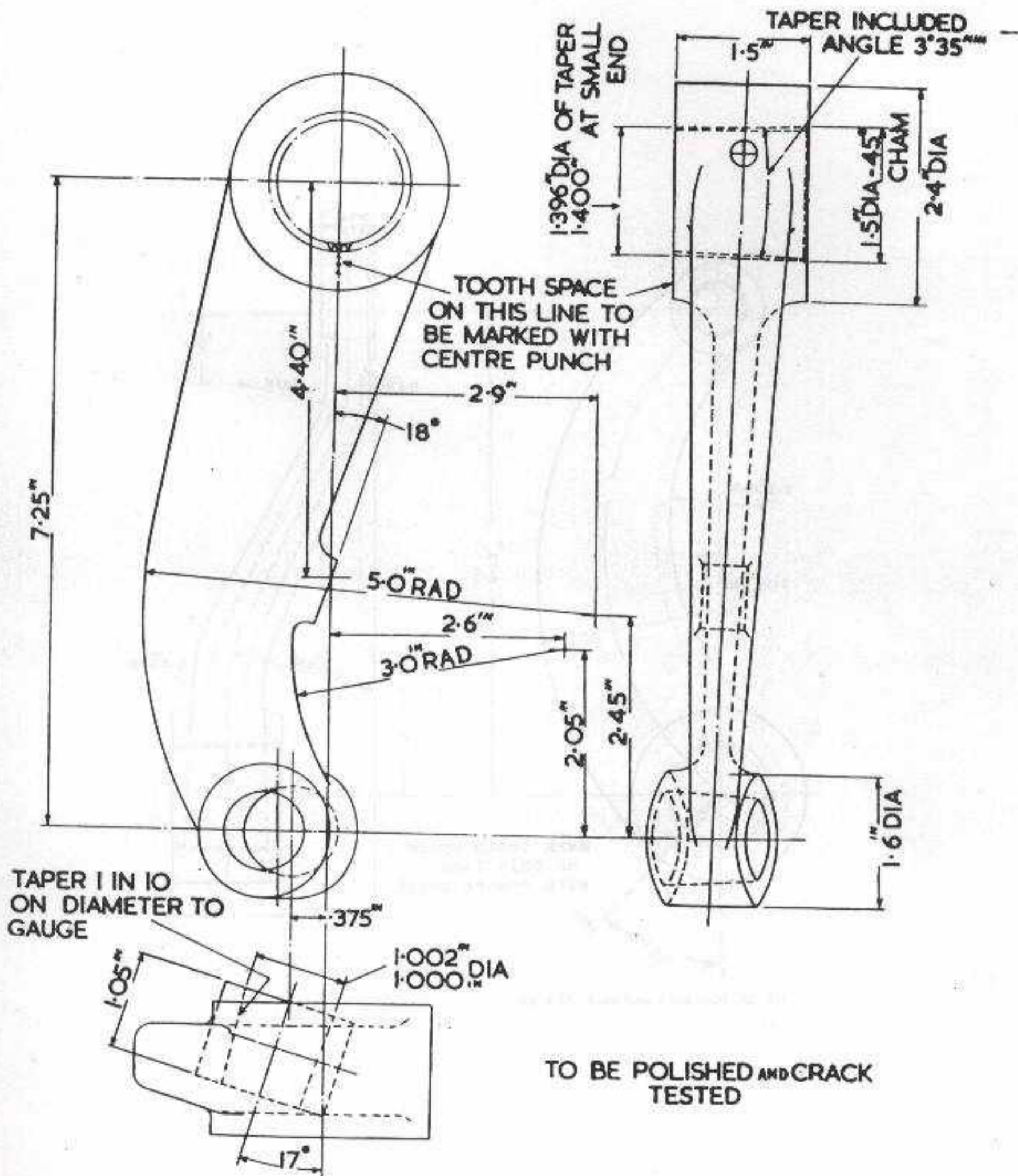


FIG 29 - STEERING - LEVER OUTER

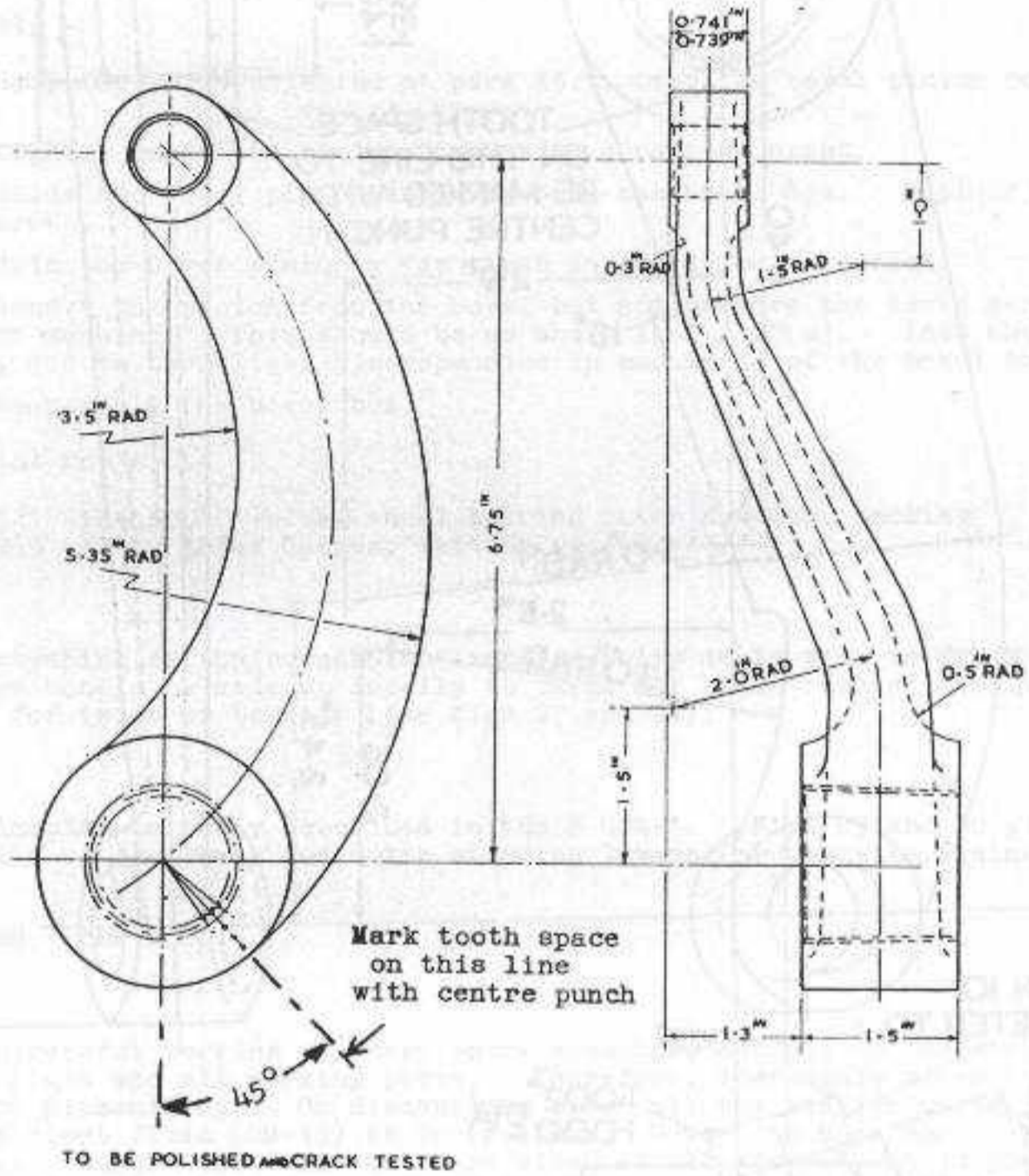
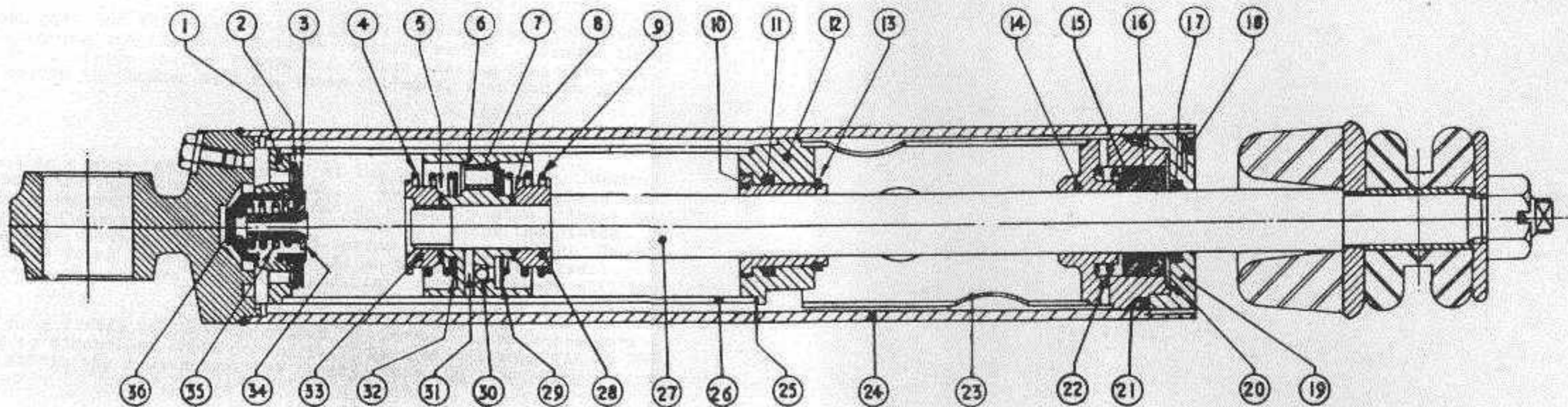
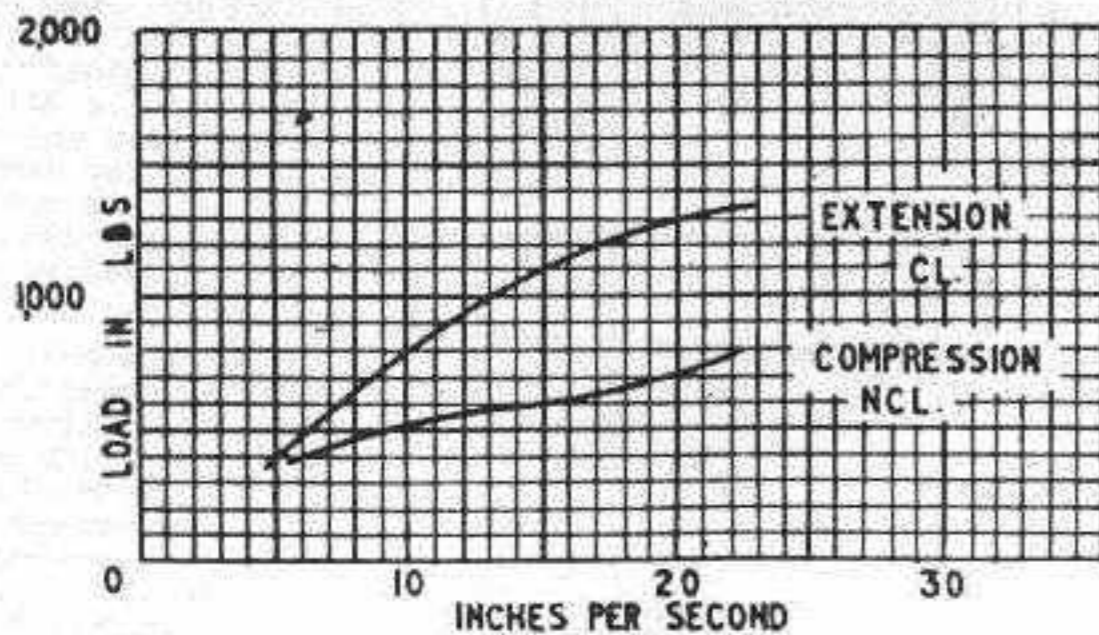


FIG 30 - STEERING - LEVER INNER



MAXIMUM UNIT CRS
FITTED MAXIMUM CRS
FITTED MINIMUM CRS
WORKING STROKE

$21\frac{1}{8}$
 $20\frac{3}{8}$
 $17\frac{1}{4}$
 $3\frac{1}{8}$



RESISTANCE CURVES FOR UNIT 8500
 1100 ± 50 LB EXTENSION
 750 ± 50 LB COMPRESSION

- | | | | |
|----|--------------------------------|----|---------------------------------------|
| 1 | Valve, plate assembly | 19 | Nut, retaining |
| 2 | Spring plate, valve | 20 | Washer, backing gland ring |
| 3 | Plate, retaining valve | 21 | Seal, piston rod bush |
| 4 | Spring, piston valve | 22 | Spring, gland ring |
| 5 | Shim (28 SWG) | 23 | Tube, reservoir |
| 6 | Piston | 24 | Cylinder, outer |
| 7 | Valve, piston | 25 | Washer sealing, inner cylinder |
| 8 | Shim (28 SWG) | 26 | Cylinder, inner |
| 9 | Spring, gland ring | 27 | Piston rod |
| 10 | Sleeve, piston rod | 28 | Collar, locating, piston valve spring |
| 11 | Seal piston rod sleeve | 29 | Plate, piston valve |
| 12 | Bush distance, locating sleeve | 30 | Ball, valve, constant leak |
| 13 | Circlip | 31 | Pin, ball valve |
| 14 | Bush, piston rod | 32 | Plate, piston valve |
| 15 | Header, gland ring (2) | 33 | Nut, piston rod |
| 16 | Seal, chevron | 34 | Nut, relief valve |
| 17 | Seal, piston rod | 35 | Spring, relief valve |
| 18 | Screw, grub | 36 | Relief valve |

These should not show signs of scoring and their bores should be within 0.001 inch of their plan bore size, ie, 0.865 inch diameter. Check the inner cylinder bore for slight dents or scoring.

- c. Replace the hex plug in the case with a new copper washer.
- d. Assemble all components wet. Fit the relief valve, spring and nut to the valve plate assembly, turn the nut with the thumb and forefinger until it meets the spring (this can be felt) then give the nut two complete turns with the key. Press the valve plate assembly into the end of the inner cylinder. Push the inner cylinder down the outer cylinder, valve plate assembly leading, until it comes into contact with the bottom of the outer cylinder.

NOTE:- The inner cylinder will centralize itself during assembly.

- e. Place the piston rod in a vice, with the short shank to the top. Fit the rubber seal into bush, piston rod sleeve, insert the sleeve and secure with the circlip. Slide the sleeve down the rod with the circlip to the bottom. See that the thin washer sealing is still stuck down with jointing compound (sub-para a.).

66. a. Ensure that the constant leak (CL) ball valve and pin are in position in the piston. Holding the piston in the hand insert the two valves on the bottom side, followed by a plate, piston valve and the larger and stiffer of the three springs. Turn the piston over and insert the four valves followed by a plate, piston valve and one of the two remaining springs (these are identical). Place a collar, locating piston valve spring, on the rod followed by

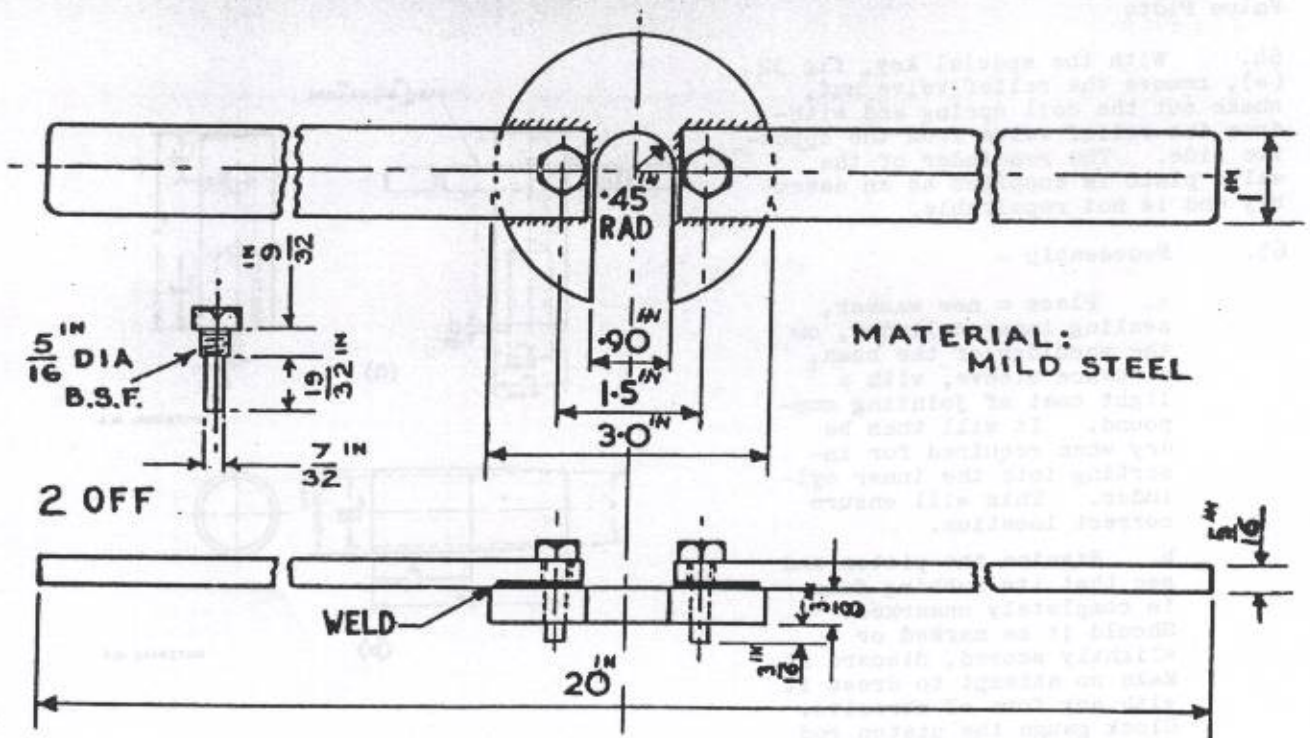


FIG 33 - SHOCK ABSORBER - PEG SPANNER FOR NUT, RETAINING GLAND (LOCAL MANUFACTURE)

the piston assembly, the four valves facing the rod. Screw on the nut piston rod. Should the springs be the originals with shims attached, fit the shims. If the springs are being renewed, both must have a 'fitted' length of $19/32$ inch. Shim up accordingly between either the collar and piston or piston and nut.

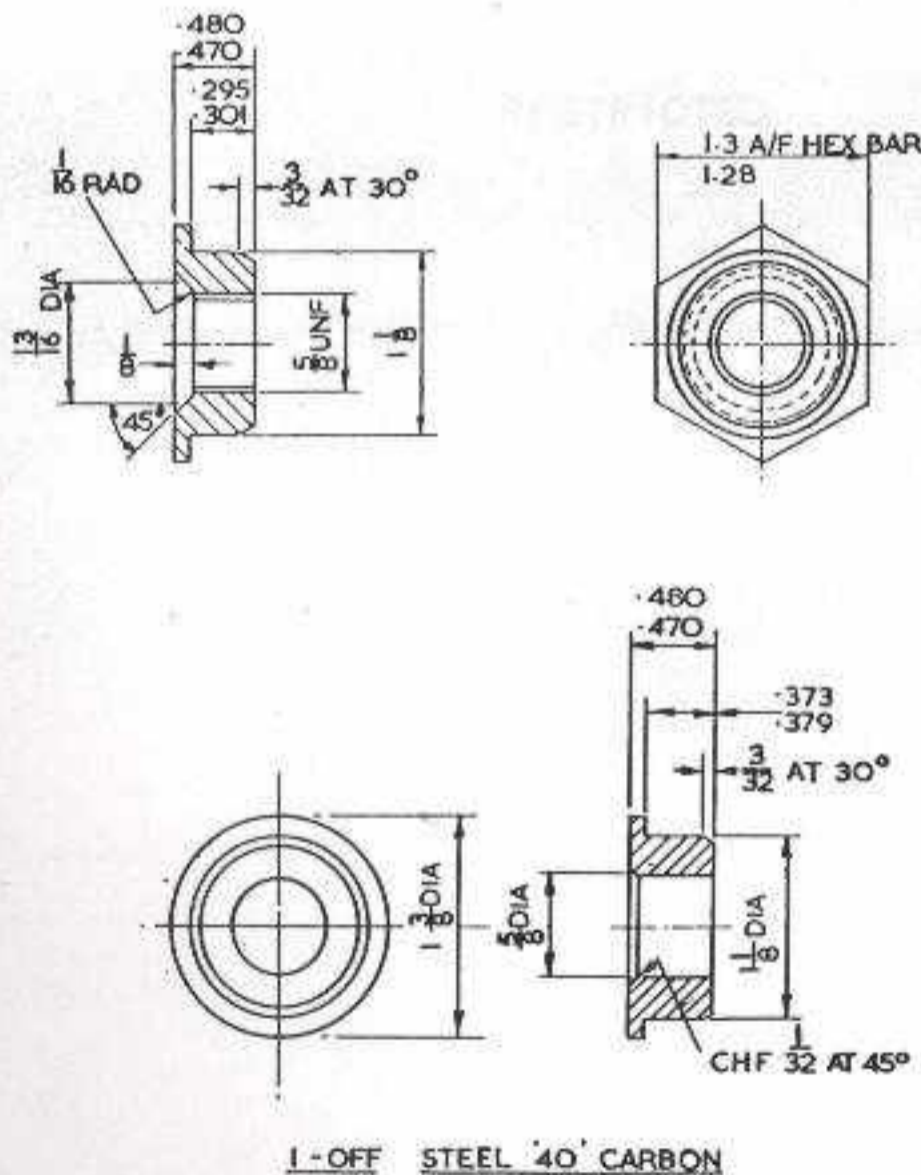
b. Grip the outer cylinder in the vice by its eye end and in a vertical position.

c. Half fill the cylinder with exactly 33 cubic inches of fluid OMD-13 (33 cubic inch = 19 Brit fluid oz, 0.95 pints or 540 cc).

d. Insert the piston and rod into the inner cylinder forcing it down into the fluid. Push the sleeve piston rod down and locate its shoulder into the lip of the inner cylinder. Insert and locate the reservoir tube.

e. Position the seal, piston rod bush, on the gland bush, place the third spring in the recess of the bush followed by the header, gland ring, seal chevron and ring seating gland. Place the thimble (fig 32(b)) over the stepped shank of the piston rod, lubricate the thimble and rod and slide the gland bush on to the rod, seating it within the reservoir tube. Place the washer, backing gland into its recess, the slight chamfered edge leading, press the seal piston rod into the gland nut, screw the nut down tight, replace the grub-screw.

f. Replace the bump rubber, sleeve, washer and grommet.



DIMENSIONS IN INCHES

ALL BURRS AND SHARP EDGES TO BE REMOVED

FIG 34 - SHOCK ABSORBER - PISTON ROD NUT AND COLLAR

E N D