

Draft Chapter 33E

BOTTOM WHEELCASE, REASSEMBLING

*This draft chapter is issued for advance information
pending the publication of the final chapter.*

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GENERAL

1. The reconditioning described in this chapter is applicable to the 48 Mk. 1 only, and is confined to operations whereby unserviceable parts are replaced by serviceable standard parts. Instructions for major repair and rectification, and the processes essential to such repairs, are contained in Chapter 28D.

2. Consumable stores, required to replace items automatically discarded during dismantling, are listed at the end of the chapter. Tools are referred to in the text as they are used and are also listed at the end of the chapter.

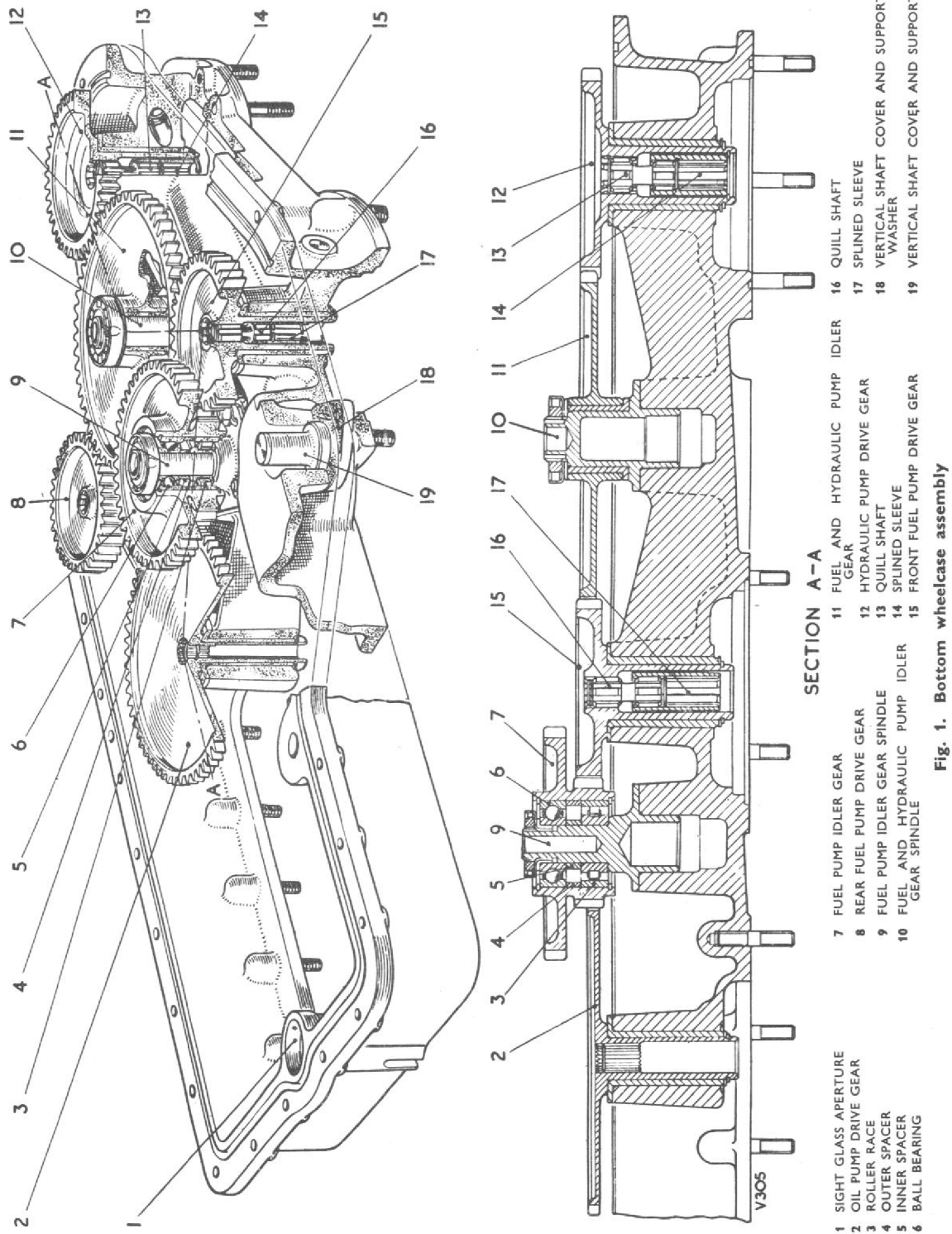
3. Throughout the text, the phrase "within the limits" implies that reference must be made to the Table of Fits and Clearances contained in Chapter 38 of this handbook to ascertain the limits permissible. The term "press" implies the use of a suitable hand or mechanical press.

4. Before making any renewals prior to rebuilding, the inspection sheet must be read carefully

and all work carried out as directed. Minor rectifications, which may not be entered on the inspection report, include renewing damaged or loose studs, cleaning up steel components with fine emery or on a buff, removing burrs and sharp edges, cleaning up any burrs around the stud holes, stoning up gear teeth and splines, and polishing out scratches. Ball bearings, including new ones, must be washed in white spirit. After any work has been carried out, the component in question must be resubmitted for inspection.

RENEWALS

5. With the exception of damaged studs, no additional work, other than that required for normal assembly, is necessary to renew any standard part; the defective parts rejected by inspection being discarded and new, serviceable, or repaired parts substituted. To renew damaged studs, a $\frac{1}{4}$ in. B.S.F. stud box T70809 is required. Damaged studs may be removed, and serviceable replacements fitted, in accordance with standard practice.



REPAINTING

6. As the bottom wheelcase and the fuel and hydraulic pump adapters will have been stripped of paint for the purpose of crack detection, they must be repainted prior to assembly. Before commencing to repaint the castings, ensure that the chromate finish is undamaged. Where the original chromate finish has been removed from small areas only, it may be rectified by the application of selenious acid; where large areas are affected the component must be re-chromated in accordance with D.H. process specification No. 167 contained in Chapter 32.

7. Primer and finishing coats must be applied in accordance with the requirements of D.H. process specification No. 168 (Protection of magnesium-rich alloy against corrosion).

8. (1) Degrease the castings by immersion in a trichlorethylene vapour degreaser; the castings should remain in the degreaser until it attains the temperature of the vapour.
- (2) Secure the fuel pump adapters to the wheelcase with slave washers and nuts.
- (3) Using blanks T74765, blank off the two fuel pump adapters.
- (4) Secure the hydraulic pump adapter to the wheelcase with two 2 B.A. slave cheese-headed set-screws.
- (5) Secure transport blank Part No. 49237 to the hydraulic pump adapter with slave washers and nuts.
- (6) Position the vertical drive cover and support to its aperture, and secure it with slave washers and nuts.
- (7) Using paint mask T76997 or a blank made from local resources to the dimensions detailed in Chapter 21, blank off the oil sump mounting face.
- (8) using adhesive tape and plugs as necessary, blank off the sight glass aperture and the oil gallery plug aperture.
- (9) With the wheelcase face downwards, spray the casing with the approved primer and allow to air dry.
- (10) Spray the casing with the approved finishing coat and allow it to air dry.
- (11) Remove the blanks and the components that were fitted prior to painting.

ASSEMBLY (fig. 1)

Idler gear spindles

9. Before proceeding to assemble the two idler gear spindles blow through all the oil ways in the wheelcase with a compressed air jet.

- (1) Assemble the fuel pump idler gear spindle to the wheelcase and secure it with three new tab-washers (Part No. AGS518E) and nuts; lock the nuts.

- (2) Assemble the fuel and hydraulic pump gear idler spindle to the wheelcase and secure with three new tab-washers (Part No. AGS518E) and nuts; lock the nuts.

Oil, hydraulic, and fuel pump gears

10. (1) Assemble the oil pump drive gear to its bush in the wheelcase.
- (2) Position the retaining washer over the gear shaft and secure it with a new circlip (Part No. 25397).
- (3) Assemble the front fuel pump drive gear to its bush in the wheelcase.
- (4) Position the retaining washer over the gear shaft and secure it with a new Seeger circlip (Part No. 25387).
- (5) Assemble the rear fuel pump drive gear to its bush in the wheelcase.
- (6) Position the retaining washer over the gear shaft and secure it with another new Seeger circlip (Part No. 25387).
- (7) Assemble the hydraulic pump drive gear to its bush in the wheelcase.
- (8) Position the retaining washer over the gear shaft and secure it with a new Seeger circlip (Part No. 25387).
- (9) Clamp a dial test indicator to a convenient position on the wheelcase and check that the end float of the four gears is within the limits.

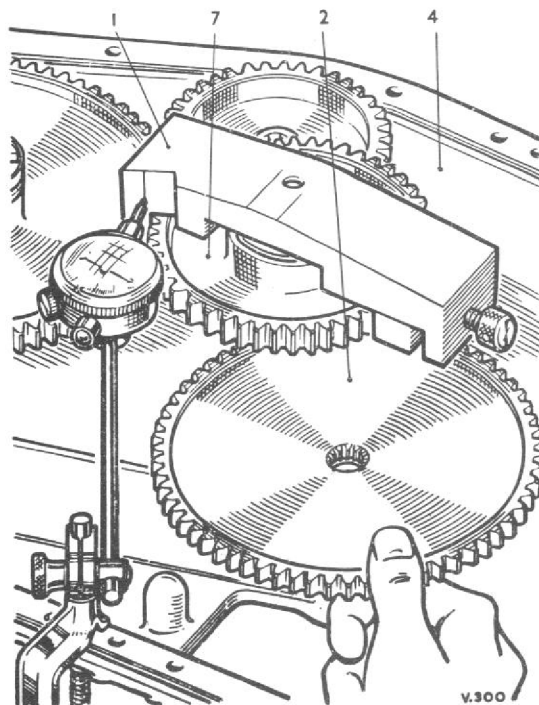
Fuel and hydraulic pump idler gear

11. (1) Smear the fuel and hydraulic pump idler gear spindle with Ragosine LM Paste (Spec. D.T.D.900/4284) and assemble the idler gear and bush over the spindle.
- (2) Position the retaining washer, chamfered side uppermost, to the spindle.
- (3) Position a new cup locking washer (Part No. 25378 Pre-mod. 284 or N3183 when Mod. No. 284 is embodied) and the ring nut on to the spindle.
- (4) Using serrated spanner T74762, tighten but do not lock the nut.

Fuel pump idler gear

Pre-Mod. 383 only

12. (1) Smear the fuel pump idler gear spindle with Ragosine LM Paste (Spec. D.T.D.900/4284) and assemble the fuel pump idler gear assembly over the spindle.
- (2) Position the retaining washer, chamfered side uppermost, over the spindle.
- (3) Position a new cup locking washer (Part No. 25378 Pre-Mod. 284 or N3183 when Mod. No. 284 is embodied) and the ring nut on to the spindle.
- (4) Using serrated spanner T74762, (Pre-Mod. 383) or T77272 (Mod. 383) tighten but do not lock the nut.



- 1 BACKLASH CHECKING TOOL T78446
- 2 FUEL PUMP IDLER GEAR
- 3 OIL PUMP DRIVE GEAR
- 4 BOTTOM WHEELCASE

Fig. 2. Checking the backlash between the oil pump drive gear and the fuel pump idler gear

Mod. No. 383 only

- (1) Position a new retaining ring (Part No. 60537) to the bottom recess in the bore of the gear.
- (2) Press the ball bearing into the housing.
- (3) Assemble the inner and outer bearing spacers into the bore of the gear.
- (4) Press the roller bearing into the housing.
- (5) Secure the roller bearing with a second new retaining ring (Part No. 60537).
- (6) Assemble the gear assembly, small gear downwards, to the fuel pump idler gear spindle.
- (7) Position the retaining washer over the gear spindle.
- (8) Position a new cup locking washer (Part No. N2871), the nut washer and the ring nut on to the gear spindle.
- (9) Using serrated spanner T74762, tighten but do not lock the nut.

End float and backlash checks

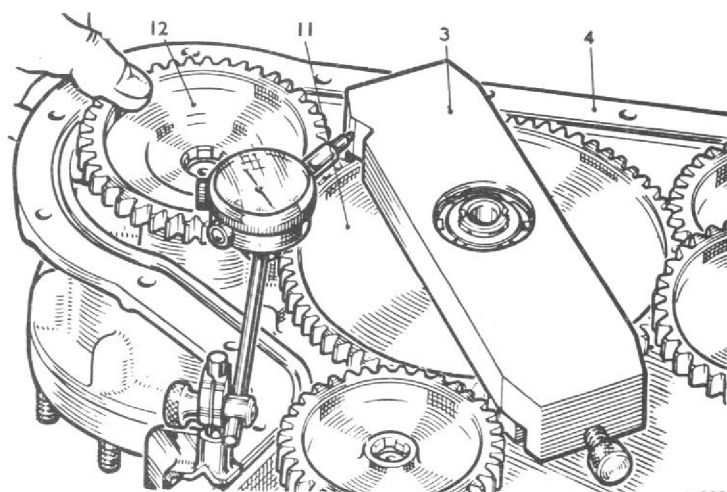
13. The backlash should be checked at three angular positions on each gear. The gear train is shown diagrammatically in fig. 2, page 2, Chapter 24E, and the numbers in parenthesis identify the position of the respective gears in accordance with that illustration.

- (1) Clamp a dial test indicator to a convenient position on the wheelcase and check that the end float of the fuel pump drive gear (7) is within the limits.
- (2) Re-position the dial test indicator and check that the end float of the fuel and hydraulic pump idler gear (11) is within the limits.
- (3) Position backlash checking fixture T78446 over the large gear of the fuel pump idler assembly (7).
- (4) Re-position the dial test indicator and locate the stylus on the scribed line of the backlash checking tool.
- (5) Lock the oil pump drive gear (2), and check that the backlash between this gear and the fuel pump idler gear (7) is within the limits (fig. 2).
- (6) Free the oil pump drive gear (2) and lock the front fuel pump drive gear (15); check that the backlash between the fuel pump idler gear (7) and the front fuel pump drive gear (15) is within the limits.

Note . . .

Due to the geometry of backlash checking tool T78446 a reading equivalent to twice the actual backlash will be obtained.

- (7) Position backlash checking fixture T74764 over the fuel and hydraulic pump idler gear (11).
- (8) Re-position the dial test indicator and locate the stylus on the scribed line of the backlash checking tool.
- (9) Lock the hydraulic pump drive gear (12) and check that the backlash between the fuel and hydraulic pump idler gear (11) and the hydraulic pump drive gear (12) is within the limits (fig. 3).
- (10) Free the hydraulic pump drive gear (12) and lock the front fuel pump drive gear (15), check that the backlash between the fuel and hydraulic pump idler gear (11) and the fuel pump drive gear (15) is within the limits.



- 1 HYDRAULIC PUMP DRIVE GEAR
- 2 FUEL AND HYDRAULIC PUMP IDLER GEAR
- 3 BACKLASH CHECKING TOOL T74764
- 4 BOTTOM WHEELCASE

Fig. 3. Checking the backlash between the fuel and hydraulic pump idler gear and the hydraulic pump drive gear

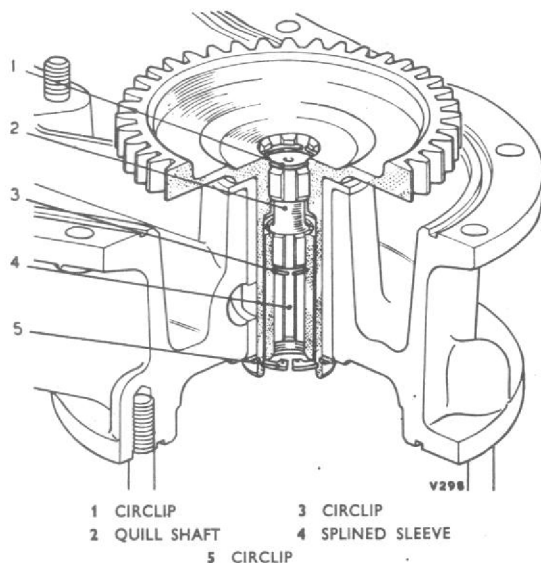


Fig. 4. Hydraulic pump drive quill shaft assembly

- (11) Free the front fuel pump drive gear (15) and lock the rear one (8); check that the backlash between the fuel and hydraulic pump idler gear (11) and the rear fuel pump drive gear (8) is within the limits.
- (12) Lock the cup-washers on the two idler gear spindles by lightly tapping the washer into the serrations of the nut at two opposite positions.

Hydraulic pump drive gear quill shaft (fig. 4)

14. (1) Fit a new circlip (Part No. 2618-7) to the recess in the splined end of the hydraulic pump drive gear.
- (2) Push the quill shaft into the bore of the gear to abut the circlip.
- (3) Fit a new circlip (Part No. 26066) to the recess in the bore of the splined sleeve.
- (4) Assemble the sleeve, with the short splined end first, into the bore of the gear to engage the splines of the quill shaft.
- (5) Secure the sleeve with a new circlip (Part No. 25915 Pre-Mod. 270 or N4249 when Mod. 270 is embodied).

Fuel pump drive gear quill shaft (fig. 5)

15. (1) Fit a new circlip (Part No. 26066) into the splined end of one of the fuel pump drive gears.

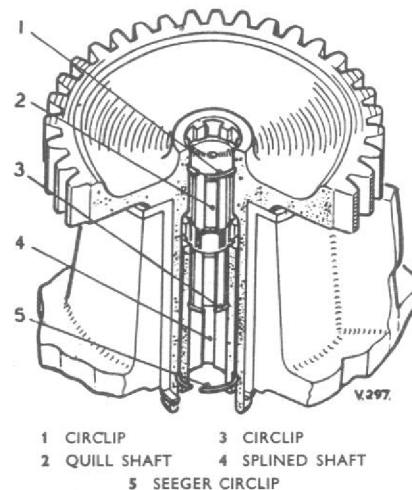


Fig. 5. Fuel pump drive quill shaft assembly

- (2) Push the quill shaft into the bore of the gear to abut the circlip.
- (3) Fit another new circlip (Part No. 26066) to the recess in the bore of the splined sleeve.
- (4) Assemble the sleeve, with the short splined end first, into the bore of the gear to engage the splines of the quill shaft.
- (5) Secure the sleeve with a new circlip (Part No. 26109).
- (6) Repeat the above operations for the other fuel pump drive gear.

Warning—Ensure that the Seeger circlip ((5) in fig. 5) covers the $\frac{1}{8}$ inch extractor hole, as otherwise, oil will leak through into the fuel pump housing once every revolution when the extractor hole coincides with the pressure oil groove.

Vertical shaft cover and support

- (1) Position a new joint washer (Part No. 25370) to the mating face on the wheelcase, adjacent to the front fuel pump drive.
- (2) Position the cover and support into its bore in the wheelcase.
- (3) Using a new tandem tab-washer (Part No. N3745), secure the cover with two nuts; do not lock the nuts.

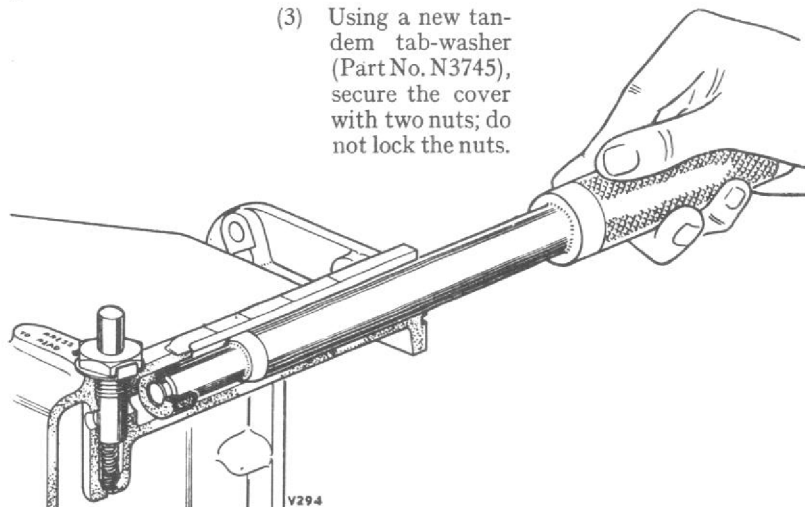


Fig. 6. Inserting the sight glass seating into the sump using tool T74768

Sump to bottom wheelcase

17. The following operations assume that the sump has been previously assembled as described in Chapter 33F.

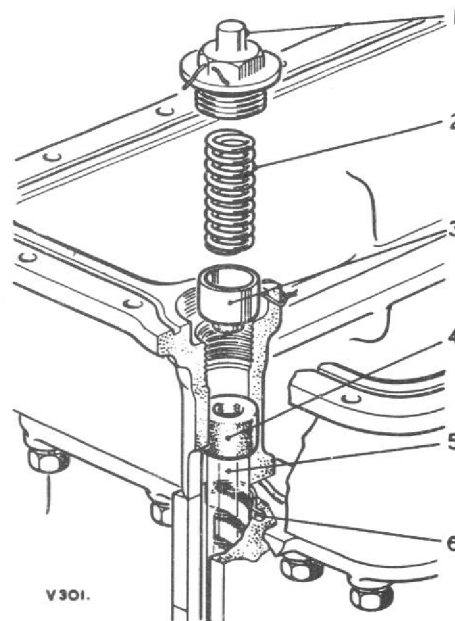
- (1) Remove the blank from the sump.
- (2) Smear a little grease or tallow on a new oil level sight glass seating (Part No. 94041 Pre-mod. 441 or 96618 when Mod. No. 441 is embodied).
- (3) Using inserting tool T74768, insert the seating into the sight glass aperture in the sump (fig. 6), ensuring that the seating bottoms in the bore.
- (4) Position the sight glass screen to the rear of the sight glass aperture.
- (5) Using an approved jointing compound to ensure adhesion at the bends, assemble a new joint strip (Part No. 48346) to the groove in the sump joint face, with the ends cut at an angle to make a scarf joint.
- (6) Position the sleeve and the drive shaft to the oil pump drive in the bottom of the sump.
- (7) Assemble the sump to the wheelcase, and secure it finger-tight with seventeen plain and spring washers and nuts.
- (8) Align the sight glass bore in the sump with the bore in the wheelcase and tighten the securing nuts.
- (9) Using new tab-washers (Part No. AGS518E), assemble a nut to each of the two studs protruding into the bottom wheelcase, shown in fig. 1, Chapter 24E; tighten and lock the nuts.

Fuel pump adapters

18. (1) Position a new sealing ring (Part No. N4604) to the fuel pump adapter face on the wheelcase.
- (2) Position one of the fuel pump adapters over the studs and, using new tab-washers (Part No. AGS195-1), secure it with the six nuts; lock the nuts.
- (3) Repeat the above operations for the other fuel pump adapter.
- (4) Using blanks T74765, blank off the adapter faces, securing each with four slave washers and nuts.

Hydraulic pump adapter

19. (1) Position a new sealing ring (Part No. N4605) to the hydraulic pump face on the wheelcase.
- (2) Position the hydraulic pump adapter over the studs and secure it with the two set-screws.
- (3) Secure transport blank (Part No. 49237) to the adapter face with six spring washers and nuts.
- (4) Using a new washer (Part No. N1099), screw the oil gallery plug into position in the side of the wheelcase adjacent to the hydraulic pump drive.



- | | |
|-----------------|----------------------|
| 1 PLUG | 4 SEAL |
| 2 SPRING | 5 SIGHT GLASS |
| 3 RETAINING CUP | 6 SIGHT GLASS SCREEN |

Fig. 7. Assembly of sight glass components

Sight glass (fig. 7 and 8)

20. (1) Smear each end of the sight glass with a little grease or tallow and assemble it through the wheelcase into the sump.

Smear a little grease or tallow on a new oil level sight glass seating (Part No. 94041 Pre-Mod. 441 or 96618 when Mod. No. 441 is embodied) and, using inserting tool T74769, assemble the seating into the wheelcase bore and over the sight glass (fig. 8).

Note . . .

Ensure that the sight glass and seating locate and bottom correctly.

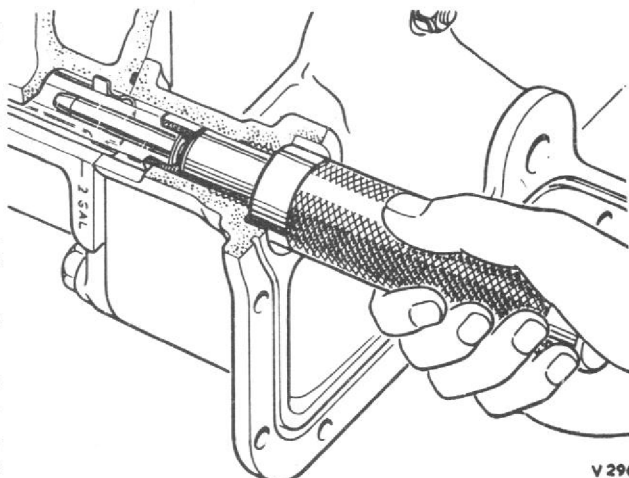


Fig. 8. Inserting the sight glass seating into the wheelcase using tool T74769

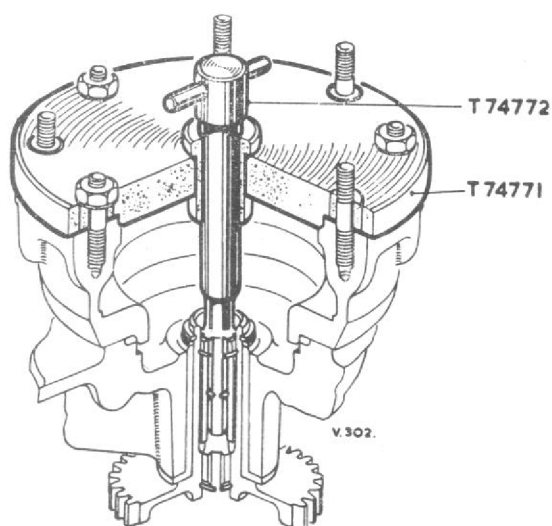


Fig. 9. Checking the alignment of the fuel pump drives

- (3) Assemble the retaining cup and the spring into the wheelcase bore and secure it with the sight glass plug, locked with 22 s.w.g. stainless steel wire, to the drilled hole in the wheelcase (fig. 7).
- (4) Using blank T74770, blank off the wheelcase and secure it with six slave nuts.

Alignment of fuel pump drives

21. The alignment of the fuel pump drives must be checked in the following manner.

- (1) Position adapter gauge T74771 on one of the fuel pump spigots and secure with three equally spaced slave washers and nuts.
- (2) Check the alignment by passing the spline gauge T74772 through the bore of the adapter gauge (fig. 9).

Note . . .

The spline gauge must slide freely through the drive sleeve.

- (3) Repeat the check for the other fuel pump drive.

LIST OF CONSUMABLE PARTS

22. The following is a list of consumable parts which will be required during assembly of the bottom wheelcase.

Part No.	Description	Quantity
AGS518E	Tab-washer, fuel pump spindle	3
AGS518E	Tab-washer, fuel and hydraulic pump spindle	3
25397	Circlip, oil pump drive gear	1
25387	Seeger circlip, fuel pump drive gears	2
25387	Seeger circlip, hydraulic pump drive gear	1
25378	Cup-washer, fuel and hydraulic pump idler gear (Pre-Mod. 284)	1

N3183	Cup-washer, fuel and hydraulic pump drive idler gear (Mod. No. 284)	1
25378	Cup-washer, fuel pump drive gear (Pre-Mod. 284)	1
N3183	Cup-washer, fuel pump drive gear (Mod. No. 284, Pre-Mod. 383)	1
N2871	Cup-washer, fuel pump drive gear (Mod. No. 383)	1
60537	Retaining ring, fuel pump drive gear (Mod. No. 383)	2
2618-7	Circlip, hydraulic pump drive gear	1
26066	Circlip, hydraulic pump quill shaft sleeve	1
25915	Circlip, hydraulic pump drive gear (Pre-Mod. 270)	1
N4249	Circlip, hydraulic pump drive gear (Mod. No. 270)	1
26066	Circlip, fuel pump drive gears	2
26066	Circlip, fuel pump quill shaft sleeve	2
26109	Circlip, fuel pump drive gear	2
25370	Joint washer, vertical shaft cover and support	1
N3745	Tandem tab-washer, vertical shaft cover	1
94041	Seating, oil level sight glass (Pre-Mod. 441)	1
96618	Seating, oil level sight glass (Mod. No. 441)	1
48346	Joint strip, sump	1
AGS518E	Tab-washer, sump studs	2
N4604	Sealing ring, fuel pump adapter	2
AGS195-1	Tab-washer, fuel pump adapters	12
N4605	Sealing ring, hydraulic pump adapter	1
N1099	Washer, oil gallery plug	1
94041	Seating, oil level sight glass (Pre-Mod. 441)	1
96618	Seating, oil level sight glass (Mod. No. 441)	1

LIST OF TOOLS

23. The following tools are required for assembly of the bottom wheelcase.

Tool No.	Description
T70809	Stud box, $\frac{1}{4}$ in. B.S.F.
T74762	Serrated spanner, fuel and hydraulic pump idler gear (Pre-Mod. 383)
T78446	Backlash checking fixture, fuel pump idler gear
T74764	Backlash checking fixture, fuel and hydraulic pump idler gear
T74768	Inserting tool sight glass seating
T74765	Blank, fuel pump adapters (2 off)
T74769	Inserting tool, sight glass seating
T74770	Blank wheelcase
T74771	Adapter gauge, fuel pump drive
T74772	Spline gauge, fuel pump drive
T76997	Paint mask, mounting face
T77272	Serrated spanner, fuel and hydraulic pump idler gear (Mod. 383)

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