Chapter 24A

MAIN SHAFT ASSEMBLY, DISMANTLING

Contents

Illustrations

THIS CHAPTER, which is applicable to both the Ghost 48 Mk. 1 and the Ghost 48 Mk. 2, contains instructions for dismantling the main shaft assembly after it has been removed from the engine in accordance with the instructions given in chapter 23. The general information contained in chapter 22 should be referred to as necessary.

REMOVING THE MAIN SHAFT ASSEMBLY FROM THE TRANSPORT STAND

1. Turn the main shaft assembly in the transport stand T.72419 to a vertical position with the impeller downwards, and attach the lifting fixture T.74809 to the hub shaft.

2. Engage the hook of the lifting tackle with the lifting fixture and just tension the chain.

3. Release the clamps that secure the main shaft assembly to the transport stand ; carefully lift

the main shaft assembly away from the stand, Fig. 1, and lower it on to table T.75876.

REMOVING THE EXTENSION SHAFT ASSEMBLY FROM THE CENTRE SHAFT

1. Unlock the locking washers and remove the sixteen plain nuts and tab washers which secure the extension shaft to the centre shaft.

2. Screw four standard $\frac{5}{16}$ in. B.S.F. slave bolts into the four tapped extractor holes in the extension shaft flange and using a suitable spanner, press off the extension shaft by alternately tightening the four bolts a little at a time until the shaft is released, Fig. 2.

3. Lift the extension shaft clear, lower it on to a bench, and remove the lifting fixture.

REMOVING THE CENTRE SHAFT FROM THE IMPELLER

1. Extract the split-pins and unlock and remove the twelve slotted nuts, plain washers and tab washers which secure the centre shaft to the impeller.

2. Position the three bridge extractors T.73066

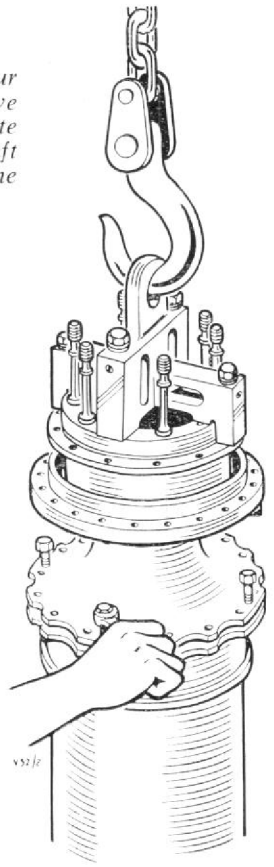

Fig. 2. Using four $\frac{5}{16}$ inch B.S.F. slave bolts to separate the extension shaft assembly from the centre shaft.

Fig. 1. Removing the main shaft assembly from transport stand T.72419.

so that they are evenly spaced on the rear of the centre shaft front flange; tighten each extractor bolt a little at a time and press the centre shaft off the impeller, Fig. 3.

3. Lift the centre shaft clear of the impeller.

4. Place the centre shaft securing nuts and plain washers in a suitable container marked to identify it with the impeller.

EXTRACTING PIVOT, STUDS, AND DOWELS

If the special masks used during vapour blasting and re-anodising (described in chapter 28A) are available, the studs, dowels, and pivot may be left in situ during repair and reconditioning; therefore, all the operations described in the following paragraphs may not be necessary; the operator must, for each instance, select the operations which require to be carried out. The tab washers, nuts, and split pins, which secure the pivot, must in any case be removed to permit efficient inspection of the pivot, in situ, for cracks. Therefore, whenever it is necessary to lift the impeller by means of lifting eye T.72476 which screws on to the threads at the forward end of the pivot, ensure that at least two slave washers and nuts are securely tightened on the pivot studs; to ensure that the impeller cannot possibly fall off the pivot whilst suspended by the lifting eye from a hoist.

If the pivot, or any of the studs, or dowels, are loose or damaged, in order to renew the defective part, or to apply the appropriate repair scheme, the necessary parts should be removed in

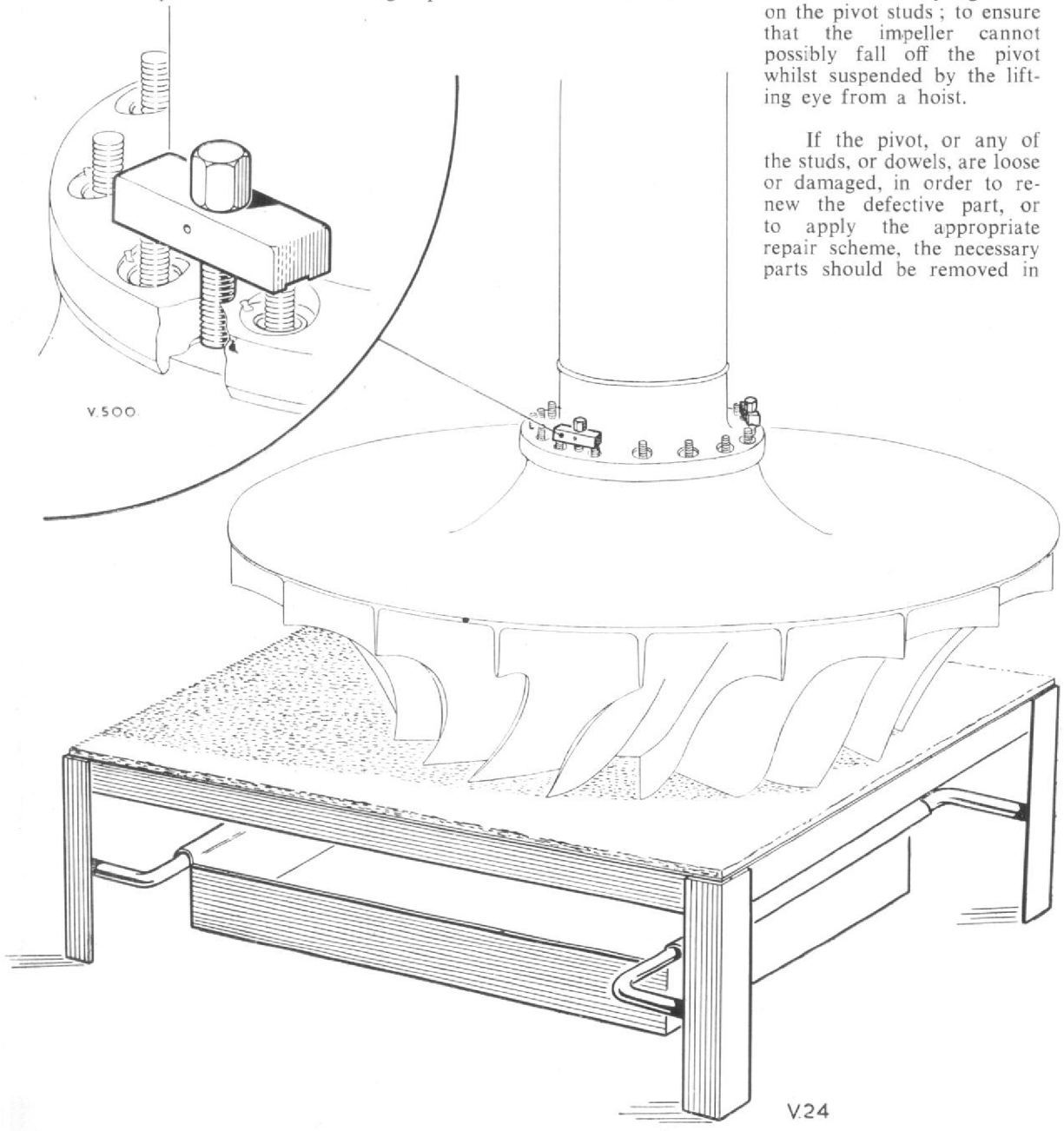

Fig. 3. Impeller and centre shaft on low table T.75876, with three extractors T.73066 positioned for removing the centre shaft.

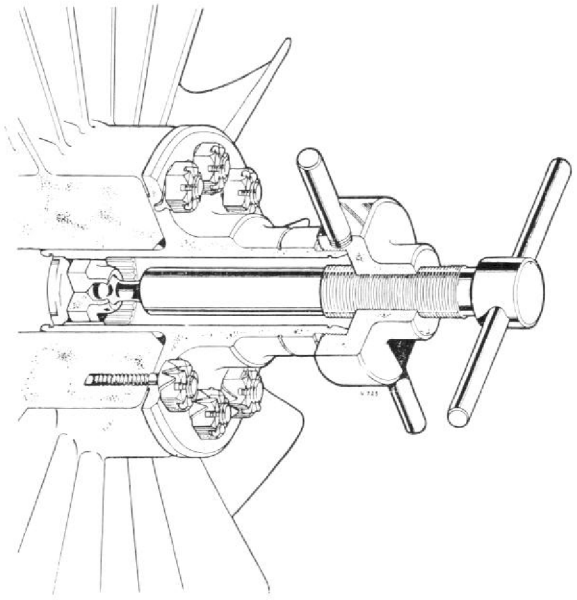

Fig. 4. Assembly of accessory drive shaft plug extractor T.76579 to the impeller.

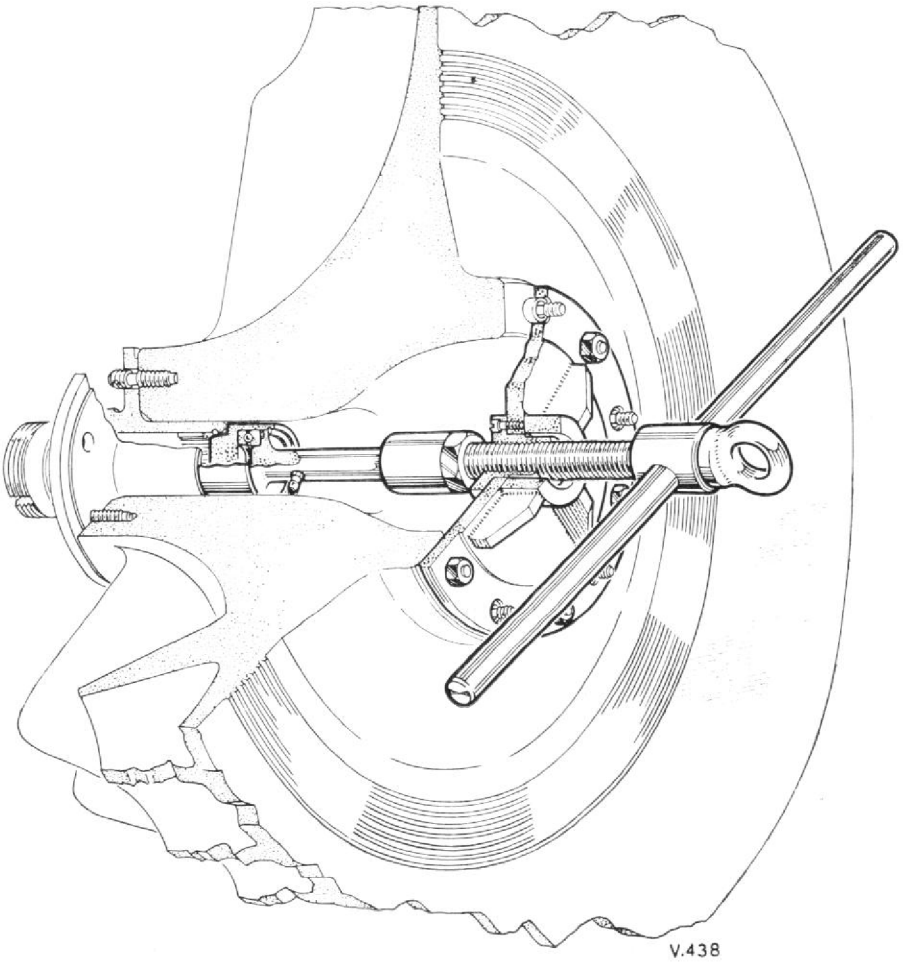

Fig. 6. Assembly of pivot extractor T.78044 to the impeller.

accordance with the relevant operations which follow. When the special masks referred to in the preceding paragraph are not available, all these operations must be applied before the impeller can be vapour blasted and re-anodised.

1. Using at least four slave nuts and washers attach lifting plate T.72420 to the rear face of the impeller, and using a suitable hoist, transfer the impeller from table T.75876 to cradle trolley T.76578. Securely clamp the impeller to the cradle trolley and remove the lifting plate.

2. Swing the cradle through 180 deg. so that the pivot is uppermost and lock in position. Verify the position of the correlation marks on the pivot flange and impeller.

3. Extract the ten split pins, release the ten locking tabs, and remove the nuts which secure the pivot.

4. Swing the cradle through 90 deg. so that the impeller is vertical, and lock the cradle in position.

5. Using Seeger pliers type S.I.S. remove the circlip from the rear of the bore of the pivot.

6. Screw back the centre bolt of accessory drive shaft plug extractor T.76579, Fig. 4. Screw the body of the extractor on to the threads on the front of the pivot and turn the extractor centre bolt in a clockwise direction to press out the plug; unscrew the extractor body and remove it from the pivot.

7. Swing the cradle through 90 deg. so that the back of the impeller is uppermost and lock the cradle in position. Using six slave washers and nuts secure pivot extractor T.78044 to the centre shaft studs in the impeller, Fig. 5.

8. Using a suitable hoist attached to the lifting eye on the pivot extractor, just take the weight of the impeller, release the clamps securing it to the cradle and trasfer it to a hot oil bath.

   The temperature of the hot oil bath should be maintained at approximately 80 deg. C. In practice, it will often be found convenient to use the crack detection hot oil and kerosene bath for this purpose.

9. After about 30 minutes, when the impeller has attained the temperature of the oil, remove the impeller from the oil bath, drain and wipe off the surplus oil, lower the impeller on to the cradle trolley, and ensure that it is securely clamped to the cradle.

   To avoid undue loss of heat, the dismantling operations must be carried out as quickly as possible after the impeller has been removed from the hot oil.

10. Taking care that the pivot will be caught as it drops out, screw in extractor T.78044 and thus press out the pivot.

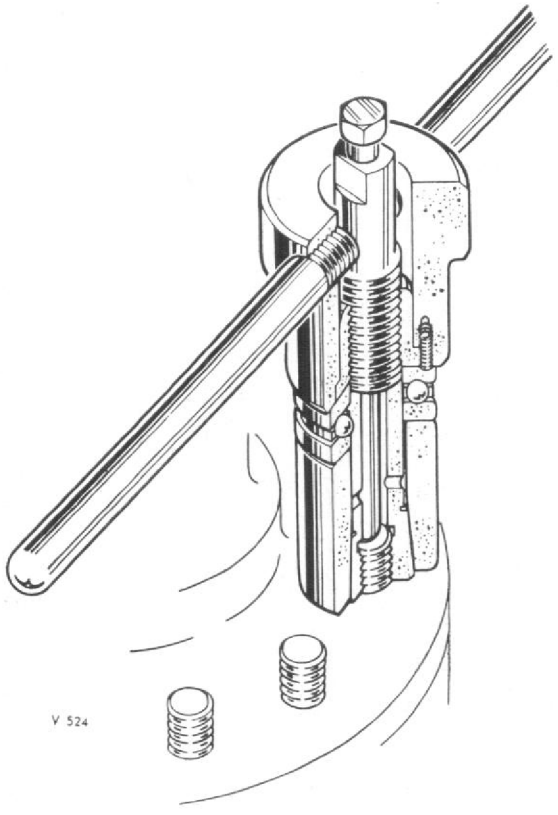

Fig. 6. Sectioned view of stud extractor T.78154 showing method of attachment to a stud in the impeller.

11. Remove the six slave nuts and washers which secure the extractor to the impeller, and remove the extractor.

12. To remove any, or all, of the twelve centre shaft studs, use ½ in. B.S.F. stud extractor T.78154 as follows.

    (a) Screw the adapter of the extractor on to the stud the full length of the thread, Fig. 6. Screw the special bolt through the bore of the adapter until the inner end bears hard on the top of the impeller stud. Screw the spider nut in an anti-clockwise direction thus causing the internally tapered collar to act on the collet which grips the stud. Continue to turn the spider nut until the stud is extracted.

    (b) To disengage the stud from the extractor, unscrew the special bolt until its locking effect on the stud is broken; turn the spider nut in a clockwise direction to release the grip of the collet on the stud and unscrew and remove the stud from the extractor.

13. To remove any, or all, of the twelve centre shaft dowels. Pour sufficient engine oil, to two-thirds fill the dowel, into the relevant stud hole. Insert a close-fitting soft-metal bar into the bore of the dowel. Drape a cloth around the lower end of the bar to prevent the oil splashing, and strike the bar smartly with a

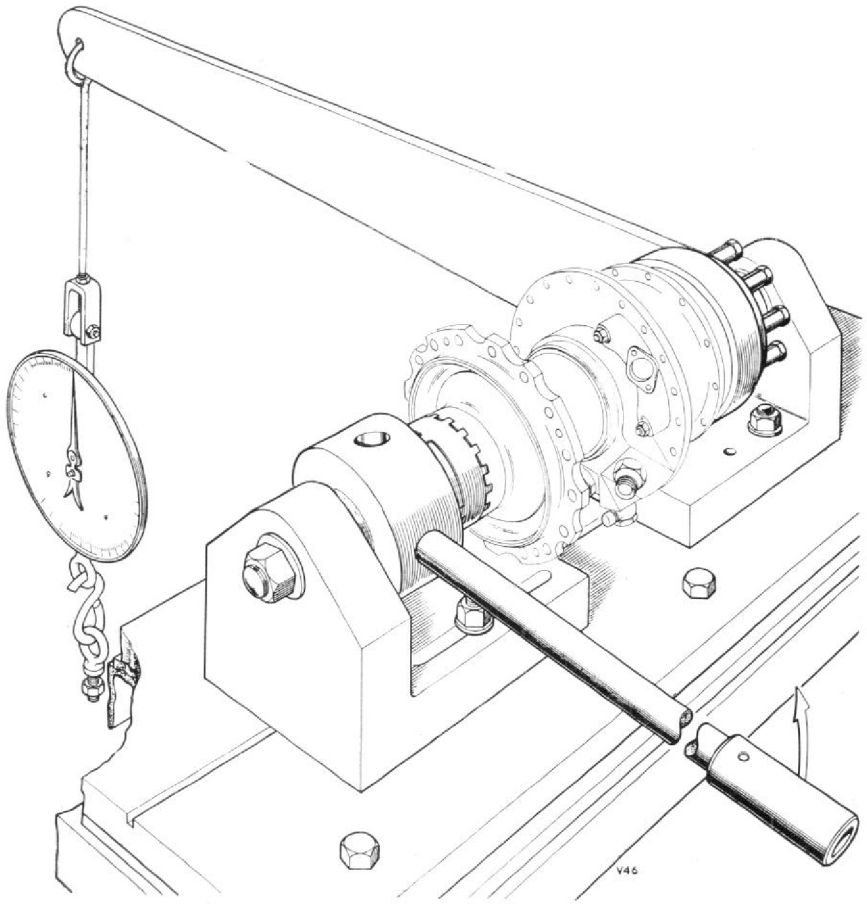

Fig. 7. Torque fixture T.76700, stand T.74466, ring spanner T.72417, tommy bar T.76701 and extension T.76702, for removing hub shaft ring nut.

hammer until the dowel is ejected by hydraulic pressure.

14. Swing the cradle, so that the front of the impeller is uppermost, and lock in position.

15. To remove any, or all, of the ten pivot studs. Use $\frac{1}{2}$ in B.S.F. stud extractor T.78154 as described above.

Whenever the pivot has been removed it is essential to remove the pivot stud from the offset hole and the diametrically opposite hole, as the standard plungers which guide the pivot inserting tool locate in these two holes; but see page 3a, chapter 33A, if T.R.134 has been applied.

16. If it is necessary to remove the impeller from the cradle trolley, use four slave bolts T.75003 to secure lifting plate T.72420 to the pivot face on the impeller.

REMOVING THE HUB SHAFT RING NUT AND PRESSURE PLATE

1. Remove the circlip and tab washer from the hub shaft.

2. Transfer the sub-assembly to torque fixture T.76700, which should be mounted on torque fixture stand T.74466 fastened to the floor.

3. Assemble one of the two location spigots T.72416 to the spring balance end of the fixture.

4. Slacken the two nuts and slide the movable support away from the fixed support to permit the sub-assembly to enter the fixture.

5. Pass the turbine bolts through the holes in the flange at the spring balance end of the fixture; using the eight slave $\frac{17}{32}$ in. distance pieces and $\frac{9}{16}$ in. B.S.F. nuts, secure the assembly to the fixture.

6. Position ring spanner T.72417 and the second location spigot T.72416 to the movable end of the fixture; slide this end inwards until the castellations on the ring spanner are fully engaged with those in the hub shaft nut; tighten the two nuts which secure the movable end.

7. Using tommy bar T.76701 and extension piece T.76702 unscrew the hub shaft nut, Fig. 7.

Remove the nut and the pressure plate, and the remainder of the assembly from the fixture.

REMOVING THE HUB SHAFT FROM THE EXTENSION SHAFT

1. Before attempting to remove the hub shaft, ensure that correlation marks have been placed on both hub shaft and extension shaft to ensure correct re-assembly.

2. Position the hub shaft assembly on bench fixture T.75716—passing the eight turbine bolts through eight of the ten $\frac{5}{8}$ in. holes in the fixture. The bench must be drilled to accommodate these bolts.

3. Fit the reduced diameter of adapter T.73067 in the bore of the hub shaft.

4. Place the rounded end of the screw of extractor T.73068 in the depression provided in the adapter, and engage the three claws under the flange of the extension shaft, Fig. 8 ; draw off the extension shaft.

5. Remove the hub shaft from the bench fixture; remove the eight turbine disc bolts and the turbine disc bolt locking ring.

6. Place the bolts and locking ring in a linen bag and secure it to the hub shaft.

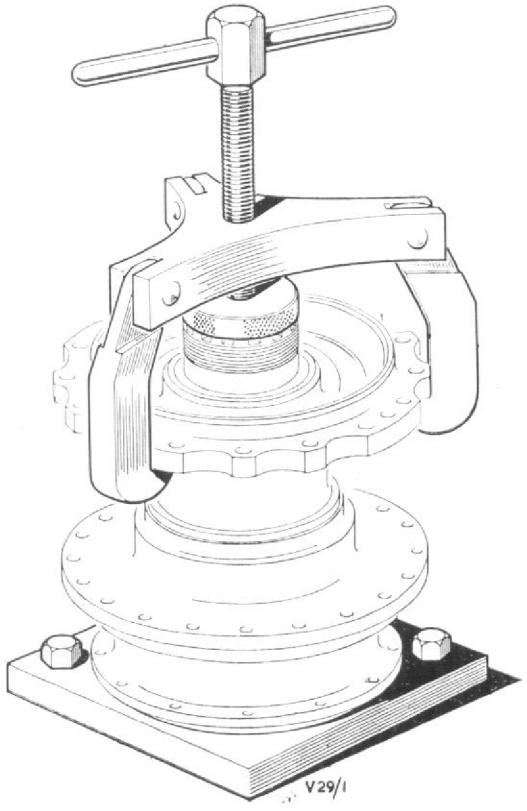

Fig. 8. Using bench fixture T.75716, adapter T.73067, and extractor T.73068 to separate the hub shaft from the extension shaft.

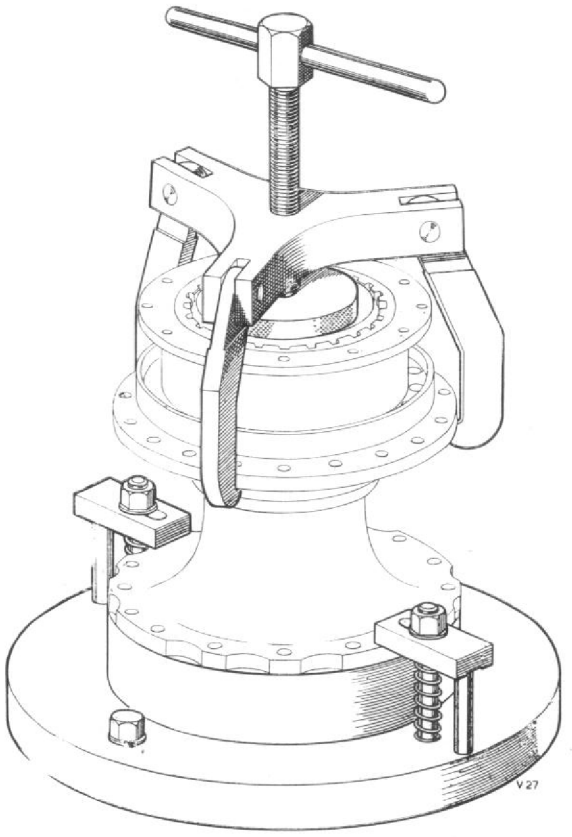

Fig. 9. Bench fixture T.72411, adapter T.73069 and extractor T.73068, for removing rear bearing housing assembly from extension shaft.

REMOVING THE REAR BEARING HOUSING ASSEMBLY FROM THE EXTENSION SHAFT

1. Reverse the assembly ; place it on fixture T.72411 and clamp it securely in position.

2. Position the reduced diameter of adapter T.73069 in the bore of the extension shaft.

3. Place the rounded end of the screw of extractor T.73068 in the depression provided in adapter T.73069, and engage the three claws under the flange of the rear bearing housing, Fig. 9 ; draw off the rear bearing assembly.

DISMANTLING THE REAR BEARING ASSEMBLY

1. Clamp the rear bearing assembly in vice block T.76557.

2. Remove the castellated distance piece.

3. Turn down the tabs of the ring nut locking washer, and use spanner T.76556 to remove

the sealing housing retaining ring nut, Fig. 10, and the locking washer.

4. Unlock the copper tab washer and, using a suitable spanner, remove the sealing housing locking bolt which will be found adjacent to the rear bearing thermocouple location in the side of the bearing housing.

5. Remove the sealing housing, the first of the shielding washers, the complete roller bearing, and the second shielding washer.

6. Wrap the roller bearing in grease-proof paper and place all the loose parts removed in one box; mark the box with the appropriate engine number.

7. Remove the rear bearing housing from the vice block.

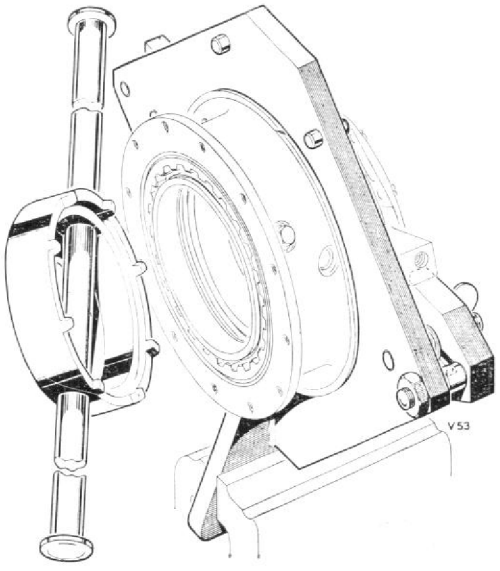

Fig. 10. Using vice block T.76557 and spanner T.76556 to remove the sealing housing retaining ring nut.