

Chapter 10

(Completely revised)

MAIN UNDERCARRIAGE JACK ASSEMBLY**LIST OF CONTENTS**

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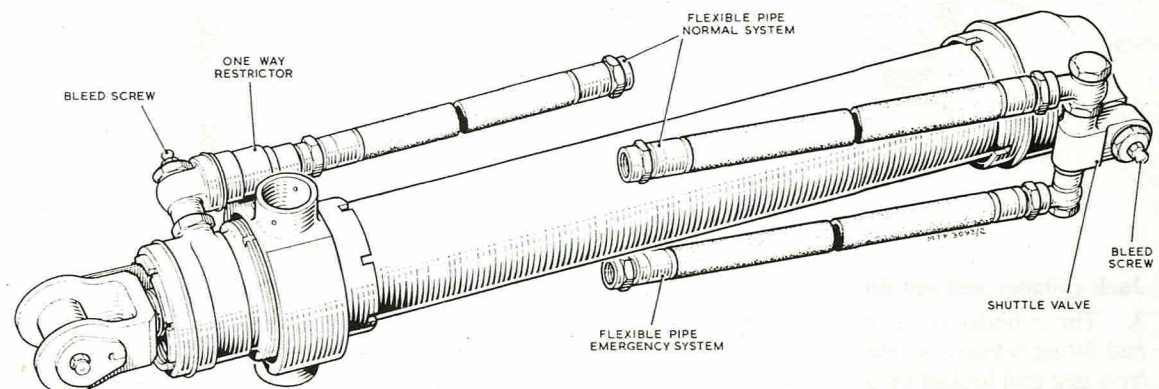
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Introduction

1. The assembly described and illustrated in this chapter is a basic type and its variants are given in appendices. It is employed to raise and lower the main undercarriage, and the jack incorporates damping devices which function at each end of the stroke and ensure that the undercarriage is moved from or brought to rest in the 'up' or 'down' position without shock to the aircraft structure.

DESCRIPTION**Assembling (fig. 1)**

2. The assembly comprises a double-acting jack, a shuttle valve, a one-way restrictor and three flexible pipes. One of the pipes conveys Normal system pressure, through the restrictor, to the closure side of the jack, and the other two convey Normal and Emergency systems pressure, through the shuttle valve, to the extension side of the jack. The jack is described in this chapter, and the descriptions of the shuttle valve and restrictor, and instructions for servicing them, will be found in A.P.1803T.

**Fig. 1. Main undercarriage jack assembly****RESTRICTED**

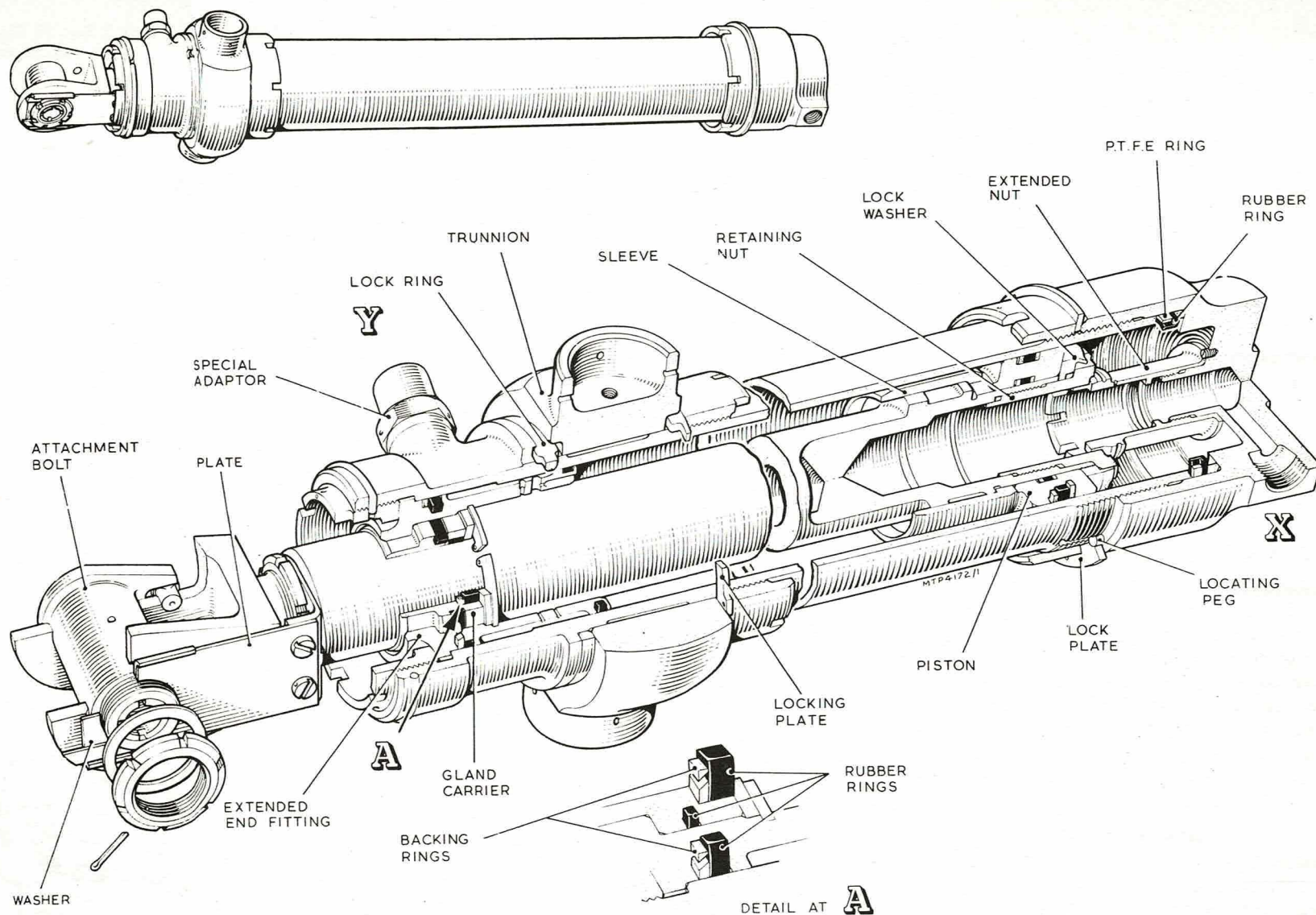


Fig. 2. Main undercarriage jack

Jack cylinder and end fittings (fig. 2)

3. The cylinder is closed at one end by an end fitting which is screwed on and is located by a peg and locked by a lock plate and ring nut. A stepped rubber ring and a backing ring seal the end fitting on the cylinder. The end fitting has a central internal hollow boss on to which an extended nut is screwed

to form part of the "closure" damper; the nut is locked by a grub screw. A passage connects the bore of the boss with one of the two fluid connections. In this connection the shuttle valve is secured, with bonded seals, by a banjo bolt in which a bleed screw is fitted. Flexible pipes from the Normal and Emergency systems are secured to the

shuttle valve by banjo bolts and bonded seals.

4. The other end of the cylinder accommodates an internal end fitting which houses a gland carrier and is secured by a ring nut that is locked by a circlip. A rubber ring and a backing ring seal the end fitting in

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the cylinder. The end fitting has a cylindrical extension that projects into the cylinder to form part of the "extension" damper; the inner end of the extension is sealed in the cylinder by a rubber ring. The gland carrier is sealed in the end fitting by a rubber ring and carries a rubber ring and backing ring, retained by a washer and circlip, for the piston rod. An adapter screwed into a boss at this end of the cylinder provides the second fluid connection. The restrictor is secured to the adapter by a banjo bolt in which a bleed screw is fitted, and a flexible pipe, from the Normal system, is coupled to the restrictor. The banjo bolt and adapter are sealed by bonded seals.

Trunnion

5. The jack is secured to the aircraft by a trunnion that fits over the cylinder and is located adjacent to the "closure" fluid connection. It is secured against a shoulder on the cylinder, with a lock ring interposed, by a ring nut and locking plate. Projections on the lock ring and locking plate engage with slots in the cylinder shoulder and trunnion.

Piston and rod (fig. 2 and 3)

6. The inner end of the piston rod is screwed internally to receive the piston retaining nut which is itself bored to form the outer part of the "closure" damper. A lock-washer locks the piston retaining nut which secures the piston and a sleeve against a shoulder on the rod. The sleeve forms the inner part of the "extension" damper. The piston is sealed on the rod and in the cylinder by triple seals each consisting of a rubber ring between two backing rings. At its outer end the piston rod is screwed internally to receive a fork end fitting that carries an attachment pin. A dowel fitted in the fork end fitting engages with a slot in the flanged head of the attachment pin which is retained in the fitting by a lock nut and split pin. The lock

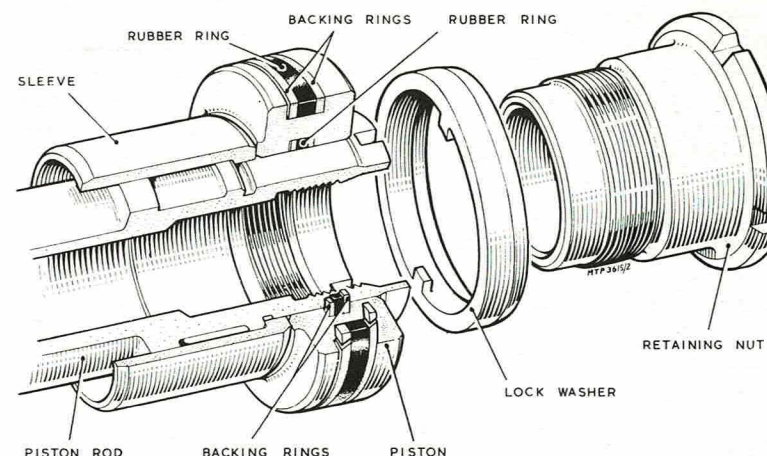


Fig. 3. Piston assembly

nut also retains on the pin two washers and a plate. The end of the plate is fastened by two screws to a locking bracket that fits over the shank of the fork end fitting and is located in a slot in the end of the piston rod where it is secured by a lock nut.

Principle of operation

Extension

7. From the closed position, the jack is extended by admitting hydraulic pressure at X (fig. 2). Initially, because of the relative positions of the extended nut and the piston nut, pressure has unrestricted access only to the bore of the piston rod and restricted access, through one small hole in the wall of the extended nut, to the full piston area. Acceleration is therefore gradual until the piston nut is clear of the extended nut after which the motion is rapid until the sleeve covers a series of holes in the wall of the end fitting extension. This results in a progressive restriction on the venting of fluid and thus damps the final travel of the piston.

Closure

8. The jack is closed by admitting pressure at Y (fig. 2). Initially the pressure has restricted access to only a portion of the annular area of the piston. Acceleration increases as the sleeve uncovers the series of holes in the wall of the end fitting extension; motion becomes rapid until the piston nut covers the extended nut. The venting of fluid from the full area of the piston is then restricted to the small hole in the wall of the extended nut and the final travel of the piston is damped.

TABLE 1
Special tools

Part No.	Description
MT.1025	Bench clamp for use with holding blocks
MT.1026/11	Holding block for cylinder
MT.1026/22	Holding block for piston rod

Table 1—continued.

Part No.	Description
MT.1237	Hand clamp for external end fitting
MT.1303	Spanner for piston nut
RS.181/13	Spanner for extended nut
RS.181/16	Spanner for fork end lock nut
RS.181/17	Spanner for attachment pin lock nut
RS.181/34	Spanner for internal end fitting ring nut
RS.181/40	Spanner for external end fitting ring nut
RS.181/42	Spanner for trunnion ring nut.

SERVICING

Leakage

9. If there is leakage from joints sealed by bonded seals or olives, check that the adapter, banjo bolt or nut is tightened normally. If this is ineffective, the joint faces must be examined and the seal or olive renewed. At the internal end fitting, seepage around the ring nut or from between the fitting and the gland carrier indicates defective external sealing rings in the end fitting or gland carrier respectively. Leakage along the piston rod indicates defective gland carrier internal sealing rings. Defective external sealing rings on the cylinder are indicated by seepage around the end fitting ring nut and lock plate. In all cases the surfaces must be examined and the rings renewed.

Dismantling

10. (1) Disconnect the flexible pipes from the restrictor and shuttle valve; identify the pipes.
- (2) Secure the cylinder in its holding block and remove the banjo bolt and shuttle valve.
- (3) Remove the banjo bolt and restrictor from the adapter and remove the adapter from the cylinder.

(4) Remove the bleed screws from the banjo bolts.

(5) Remove the circlip and unscrew the ring nut that secures the internal end fitting.

(6) Withdraw the piston rod together with the ring nut and internal end fitting from the cylinder.

(7) Unscrew the external end fitting ring nut, slide the lock plate along the cylinder and remove the locating peg.

(8) Using the hand clamp, remove the external end fitting; remove the lock plate and ring nut from the cylinder.

(9) Unscrew the trunnion ring nut and remove it, the locking plate, the trunnion and the lock ring from the cylinder.

(10) Secure the piston rod in its holding block, extract the split pin and remove the attachment pin lock nut.

(11) Detach the plate from the locking bracket, remove the plate and washers from the attachment pin, and the pin from the fork end fitting; do not remove the locating dowel.

(12) Slacken the lock nut to free the locking bracket, and unscrew the fork end fitting.

(13) Remove the ring nut and internal end fitting from the piston rod; extract the circlip, washer and gland carrier from the fitting.

(14) Unlock the lock washer, unscrew the piston retaining nut and remove the lock-washer, piston and sleeve from the piston rod.

(15) Remove the grub screw that locks the flange of the extended nut and remove the nut from the external end fitting.

(16) Remove all sealing rings.

Assembling

11. New sealing rings are to be fitted throughout and are to be lubricated with grease XG-315. Backing rings are to be split at 45 degrees; the gap is not to exceed 0.005 in. when the ring is fitted in the appropriate bore and the gap edges are to be trimmed clean. Backing rings are to be located as shown in fig. 2 and 3. Lubricate bearing surfaces with clean oil OM-15. Charge the attachment bolt with grease XG-275.

(1) Fit the gland carrier into the internal end fitting and secure it with the washer and circlip.

(2) Secure the piston rod in its holding block and pass the internal end fitting (extension leading) and the ring nut on to it.

(3) With the lock nut and locking bracket on the fork-end fitting, screw the fitting into the piston rod, locate the locking bracket in the slot in the piston rod and lightly retain it with the lock nut.

(4) Smear the contact faces of the attachment pin with anti-fretting compound ZX-28, then insert the pin into the fork-end fitting, locating it on the dowel, fit one washer and the plate on the protruding end of the pin and secure the plate to the locking plate with two screws. Wire-lock the two screws together.

(5) Fit the second washer on the pin, secure the pin with the lock nut and lock the nut with the split pin.

(6) Fit the sleeve on the piston rod to abut the shoulder followed by the piston (stepped face leading) and the lock nut washer, secure them with the retaining nut and lock the nut. The existing lock-washer may be used provided that it is not cracked and the locking points are at least 15 degrees apart.

(7) Screw the extended nut on to the external end fitting boss and lock it with the grubscrew which must be flush with the face of the nut flange and is to be locked by centre popping.

(8) Pass the lock ring, trunnion, locking plate and ring nut on to the cylinder in that order and secure the cylinder in its holding block.

(9) Fit the lock ring with its projections engaging the slots in the cylinder shoulder and the trunnion, and the locking plate engaging the slots in the trunnion, then tighten the ring nut against it.

(10) Screw the external end fitting ring nut on to the cylinder until it is clear of the thread and follow it with the lock plate.

(11) Screw the external end fitting on to the cylinder until it just abuts the cylinder end face, then screw the fitting back to the nearest locking position, i.e. a maximum of one turn, and fit the locating peg.

(12) Place the lock plate over the locating peg and tighten the ring nut against it.

(13) Insert the piston and rod and the internal end fitting in the cylinder, secure the end fitting with the ring nut and lock the nut with the circlip.

(14) Screw the adapter, with bonded seal, into the cylinder fluid connection.

(15) Carry out the tests as detailed in para. 12.

(16) With its body inwards and its axis at 90 degrees to the cylinder axis, secure the shuttle valve to the end fitting fluid connection with the banjo bolt and bonded seals; fit the bleed screw in the banjo bolt.

(17) With its axis parallel to the cylinder and body facing inwards, secure the restrictor to the adapter with the banjo bolt and bonded seals; fit the bleed screw in the banjo bolt.

(18) Connect the appropriate flexible pipes to the restrictor and to the shuttle valve with the banjo bolt and bonded seals.

(19) Carry out the tests detailed in para. 13.

TESTING

Jack (fig. 2)

12. Oil OM-15 is to be used for all tests.

(1) With the jack closed and full of oil apply a pressure of 5,400 lb/in² at Y and hold it for two minutes. Leakage is not permissible.

(2) Apply pressure at X to extend the jack, raise the pressure to 5,400 lb/in² and hold it for two minutes. Leakage is not permissible.

(3) Apply pressure alternately at X and Y to extend and close the jack completely 10 times and at each end of each stroke raise the pressure to 4,000 lb/in². The movement of the piston must be smooth and regular throughout the test.

(4) Apply pressure to the fully closed jack at X, the pressure required to extend the jack should not exceed 45 lb/in².

(5) Apply pressure to the fully extended jack at Y; the pressure required to close the jack should not exceed 60 lb/in².

Assembling (fig. 1)

13. (1) Apply a pressure of 4,000 lb/in² at A. Leakage is not permissible.

(2) Apply a pressure of 4,000 lb/in² at B. Leakage is not permissible.

(3) Apply a pressure of 4,000 lb/in² at C. Leakage is not permissible.

(4) The tests must be carried out in the above order.

Installation

14. (1) Prior to installing the unit, remove the temporary rust preventative from both arms of the trunnion and the attachment pin, using an approved solvent, then coat the parts with anti-fretting compound ZX-28.

(2) Adjust the fork-end fitting to suit the airframe pick-up centres, then tighten the lock nut, in which position the inspection hole in the end fitting must not be visible.

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Appendix 1

MAIN UNDERCARRIAGE JACK ASSEMBLY

Type No. 1.00628.006

incorporating— Jack 1.00635.015

Shuttle valve 8507 Mk. 2.

One-way Restrictor
8509/89.

Introduction

1. This assembly is identical to that described and illustrated in the chapter.

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