

Chapter 42

MAIN UNDERCARRIAGE JACK

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Introduction (fig. 1)

1. This jack basically consists of a piston assembly operating within a cylinder to which the hydraulic fluid supply is conducted through swivel pipe units. One

swivel pipe supplies pressure for normal extension of the jack and a second swivel pipe to extend the jack provides for an emergency line. A shuttle valve in the line operates to open either supply line and to

simultaneously close the inoperative line. The swivel pipe unit at the opposite end of the jack incorporates a restrictor valve which limits the speed of jack extension and a snubber fitted in the cylinder reduces the speed of the piston as it approaches the end of its closing stroke. A basic type of jack is described in the chapter and the variants are given in appendices. The swivel pipe units are described in A.P.1803U, Vol. 1, Book 5, Sect. 12.

Description (fig. 2)

2. At one end, the cylinder receives a screwed end-fitting formed with a lug which accommodates a spherical attachment bearing. The end-fitting clamps a flange of the snubber against the end of the cylinder, with adjustment shims interposed. One end of the snubber stem projects into the cylinder and has six radial fluid ports; the opposite end is housed in a central bore of the end-fitting.

3. The end-fitting receives a bleeder screw and the retaining bolts and spigot connection of the combined swivel pipes and shuttle valve unit. Fluid ducts connect the bleeder and the spigot connection with the central bore. A locking plate, located in a slot of the end-fitting, engages with serrations on a shoulder of the cylinder and a clip and bolt assembly retains the plate.

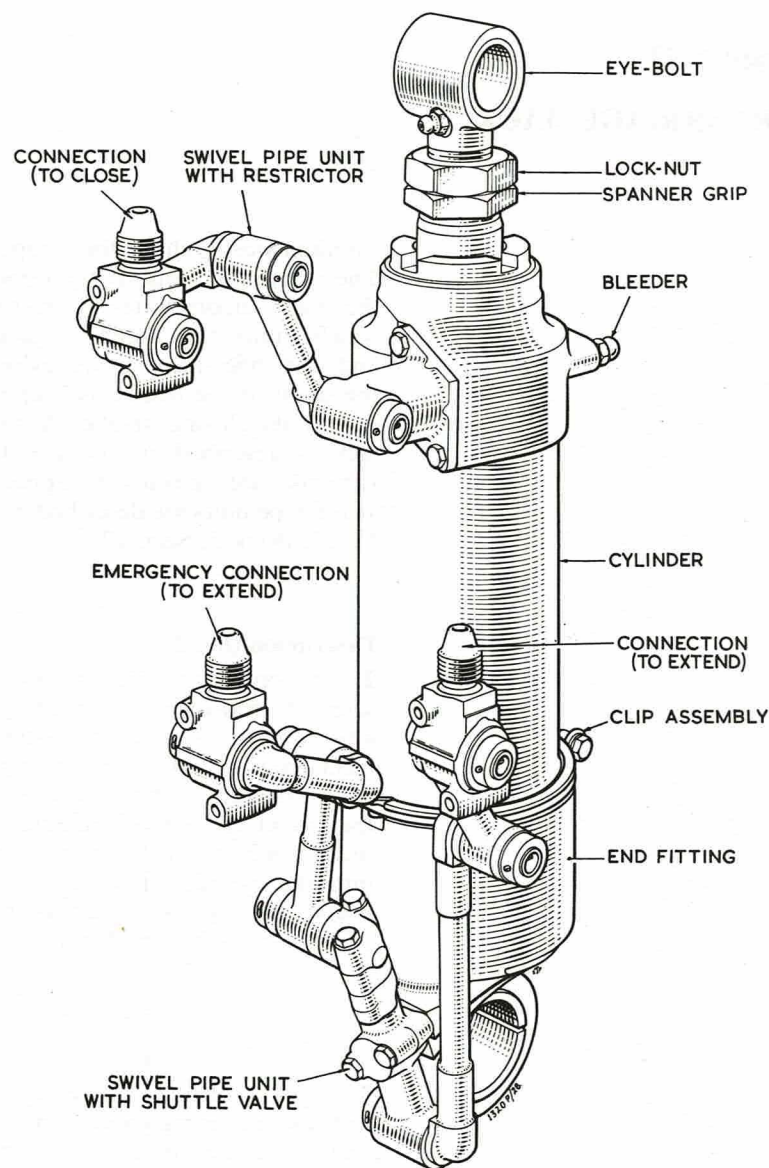


Fig. 1. Main undercarriage jack

4. The inner end of the piston rod is integral with a head which is grooved for a sealing ring and two split backing rings. The rod passes out of the cylinder through a gland assembly, comprising a gland nut fitted with a wiper ring and screwed into the cylinder to retain a gland ring and a spacer. A bleeder screw and the swivel pipe with a restrictor valve is fitted to this end of the cylinder.

5. An eye-bolt fitted with a bush is screwed into the outer end of the piston rod and secured by a lock-nut. This is tightened against a spanner-grip which engages with slots in the end of the rod. The length of the projecting portion of the eye-bolt is thus adjustable to suit the jack mounting points.

Principle of operation

6. Fluid entering the jack by the normal or emergency supply line (*fig. 1*), forces the shuttle valve along the bore of its housing to seal the inoperative pipe line. As the piston extends, the passage of displaced fluid from the cylinder is restricted by the valve in the swivel pipe unit at the opposite end of the cylinder, to govern the speed of extension.

7. Fluid entering by the swivel pipe to close the jack, flows freely past the restrictor valve and constant closure of the piston is maintained until the stem of the snubber enters the bore of the piston. The displacement of fluid is then confined to the radial holes in the snubber stem (*fig. 2*), which progressively reduce the speed of operation as the piston approaches the fully closed position.

SERVICING

TABLE 1

Special tools

Ref. No.	Part No.	Description
27Q/11099	ST.1213	'Apkoway' hub spanner for end-fitting
27Q/13487	ST.1900 Mk. 5	Drift for assembly of bush to eye-bolt
27Q/13488	ST.1903 Mk. 2	Drift bar for use with ST.1900 Mk. 5
27Q/16256	ST.2115	Assembly tool for gland ring
27Q/23683	ST.2459	'C' key spanner for gland nut

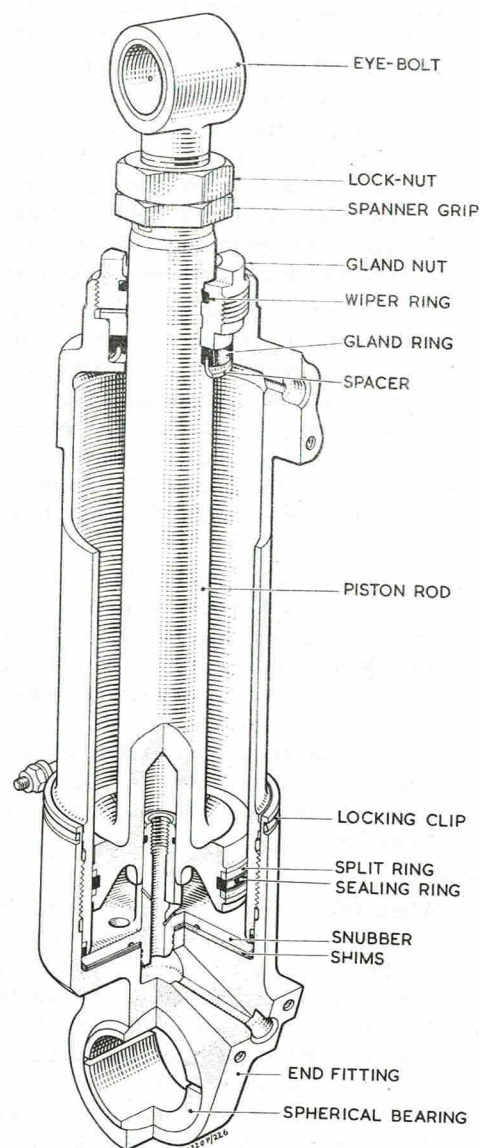


Fig. 2. Jack assembly

Leakage

8. External leakage will indicate a faulty seal which must be renewed. Internal leakage past the piston head sealing ring will be shown by sluggish action of the jack in service or loss of pressure during test. Renew the sealing ring.

Dismantling

9. (1) Unscrew the bolts and remove the swivel pipe and shuttle valve unit from the end-fitting.
- (2) Unscrew the bolts and remove the swivel pipe unit from the cylinder.
- (3) Remove the two halves of the spherical bearing from the end-fitting.
- (4) Slacken the nut and bolt securing the clip assembly. Remove the clip and the locking plate.
- (5) Unscrew the end-fitting from the cylinder. Withdraw the snubber and shims from the end-fitting; the snubber is tapped to facilitate withdrawal. Remove the sealing ring from the stem of the snubber and remove the sealing ring and the backing ring from the end of the cylinder. Remove the bleeder screw from the end-fitting.

(6) Slacken the lock-nut and unscrew the eye-bolt from the piston rod. Remove the spanner-grip from the end of the rod.

(7) Withdraw the piston rod from the cylinder and remove the split rings and the sealing ring from the piston head.

(8) Unscrew the gland nut from the cylinder and remove the wiper ring. Withdraw the gland ring and the spacer from the cylinder.

Assembling

10. All sealing rings are to be lightly coated with Grease XG-315 (34B/9100519) before being assembled in the unit.

(1) Fit the sealing ring and the split rings to the piston head. If new split rings are fitted, they are to be gapped 0.009 to 0.012 in. on assembly and the sharp edges at the gap removed on the flat faces only, up to a maximum radius of $\frac{1}{64}$ in.

(2) Insert the piston into the cylinder, rod-end leading.

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(3) Slide the spacer followed by the gland ring, with the lips of the ring leading, over the end of the piston rod and ensure that they are correctly bedded together against the flange in the cylinder. Fit the wiper ring to the gland nut and screw the nut into the cylinder to retain the gland ring against the spacer.

(4) Ensure that the greaser is fitted to the eye-bolt and screw the lock-nut fully on to the eye-bolt. Locate the spanner-grip against the end of the piston rod and screw the eye-bolt into the rod. The eye-bolt will be finally adjusted and locked on installation of the jack in the aircraft.

(5) Fit the backing ring followed by the sealing ring to the open end of the cylinder, with the rough side of the backing ring adjacent to the sealing ring. Fit the sealing ring to the stem of the snubber.

(6) Locate the shims on the inner face of the end-fitting and insert the spigot of the snubber into the bore of the fitting.

(7) Screw the end-fitting on to the cylinder until the flange of the snubber abuts the end of the cylinder. Support the jack in the horizontal position with the swivel pipe attachment face of the cylinder uppermost. Adjust the end-fitting to align the swivel pipe attachment face of the fitting with that of the cylinder (*fig. 2*), adding or subtracting shims to eliminate any slackness between the end-fitting and the cylinder. Position the locking plate and secure it with the clip and bolt assembly.

(8) Liberally coat the surfaces of the split bearing with Grease XG-275 (34B/9100512) and insert the bearing into the lug of the end-fitting. Fit the

bleeder screws to the end-fitting and the cylinder.

(9) Ensure that the sealing rings are fitted to the spigot connections of the swivel pipe units, and secure the fully tested swivel pipe units to their respective attachment faces on the end-fitting and cylinder with the bolts.

(10) Mount the unit on the surface table, supporting the jack in a fitting-plug gauge passed through the spherical bearing and resting on 'Vee' blocks. Position the three swivel coupling bodies with their mating faces in contact with the table and check the alignment of the faces using feeler gauges. The maximum permissible gap between the surface table and any edge of each mating face is 0.015 in.

(11) After final assembly and testing, the following items must be positively locked with wire.

(a) The bolts securing the swivel pipe units, together.

(b) The gland nut to the cylinder, ensuring that the locking-wire does not interfere with the outer face of the nut.

(c) The bleeder screws to the cylinder and end-fitting respectively.

(d) The lock-nut to the spanner grip.

Testing

11. A combined hand and power pump test rig fitted with a pump capable of delivering 3.45 gal. per minute is required for testing the unit. All pipes between the jack and the rig are to be $\frac{3}{8}$ in. outside diameter for metal pipes or $\frac{3}{8}$ in. nominal for flexible hose. The jack is to be hydraulically-operated at least six times in each direction before testing to expel all air.

(1) Connect the supply line of the static hydraulic test rig to one of the

swivel pipe connections for extending the jack (*fig. 1*). Apply a pressure to fully extend the jack and then gradually increase the pressure to 6000 lbf/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

(2) Connect the supply line to the connection of the swivel pipe unit for closing the jack (*fig. 1*). Apply pressure to fully close the jack and then gradually increase the pressure to 6000 lbf/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

(3) Connect the supply line of the power pump rig to one of the swivel pipe connections for extending the jack. The pressure required to extend the jack must not exceed 600 lbf/in² and the time required to complete the stroke must not exceed 21 seconds. Release the pressure and disconnect the supply line.

(4) Connect the supply line of the power pump rig to the connection of the swivel pipe unit for closing the jack. Operate the rig to fully close the jack. The pressure required to close the jack must not exceed 150 lbf/in² and the time required to complete the stroke must not exceed 12 seconds. Release the pressure and disconnect the supply line.

Installation

12. When installing the jack, the eye-bolt is to be adjusted to suit the airframe pick-up points. The pin centres dimension of the jack in the extended position must not be adjusted outside the limits of 20.65 to 20.89 in. The pin centre of the eye-bolt should not be less than 1.18 in. from the adjacent face of the lock-nut and check that the dimension between the adjacent faces of the spanner-grip and the gland nut is between the limits of 7.155 and 7.305 in. The travel is 7.06 to 7.09 in. After adjustment, tighten the lock-nut against the spanner-grip and wire-lock the eye-bolt, the lock-nut and the spanner-grip together.

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Appendix 1

MAIN UNDERCARRIAGE JACKS

Type No. 1.02268.019 (Port)
1.02269.019 (Starboard)

incorporating:-

Swivel pipe units

Type No. 11861P, A02 } Port
1.00676.003 }

11861S, A02 } Starboard
1.00676.004 }

1. These jacks are identical to the type described and illustrated in the chapter.

Appendix 2

MAIN UNDERCARRIAGE JACKS

Type No. 1.02272.023 (Port)
1.02273.023 (Starboard)

incorporating:-

Swivel pipe units

Type No. 1.00619.003 } Port
1.00621.003 }

1.00619.004 } Starboard
1.00621.004 }

1. These jacks are identical to the type described and illustrated in the chapter except for the fitment of improved type swivel pipe units and a piston sealing ring of different material specification.

◀ (Cancelled:
now issued as
A.P.105B-0987-16) ▶

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