Chapter 2

(*Completely revised*)

MAIN UNDERCARRIAGE JACK UNIT

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LIST OF ILLUSTRATIONS

Introduction

1. This jack consists essentially of a cylinder assembly housing a piston assembly. The fluid connections for extending and closing the jack are carried on separate swivel pipe units; the swivel pipe unit carrying fluid to extend the jack is duplicated to provide for emergency use in the event of normal supply failure, and embodies a shuttle valve which functions to close the normal supply passage. The swivel pipe unit carrying fluid to close the jack incorporates a restrictor valve which reduces the speed of jack extension, and a snubber located in the cylinder reduces the speed of the piston as it approaches the end of the closing stroke.◀A basic type is described in the chapter and the variants are given in appendices.▶

Description

2. One end of the cylinder is fitted with a sealing ring supported by a backing ring and receives a screwed end fitting formed with a lug, which houses a split-spherical-bearing for an airframe attachment point. Tappings in the end fitting receive a bleeder screw and the retaining bolts of the swivel pipe and shuttle valve unit, and a counterbore in the fitting accommodates a spigot connection of the swivel pipes. Both the counterbore and the bleeder screw tapping terminate in holes which communicate with a central bore in the fitting; this bore is recessed for a sealing ring and receives the spigoted end of the snubber. The snubber is flanged and is retained against the end of the cylinder by the end fitting. Shims are interposed between the flange and the end fitting to provide for adjustment purposes when aligning the end fitting relative to the cylinder. A locking plate, located in a slot of the end fitting, engages with serrations on a shoulder of the cylinder and is retained by a wire clip and bolt assembly.

3. The stem of the hollow snubber protrudes into the cylinder and a tapping at the inner end facilitates withdrawal. The stem is grooved for a sealing ring at the inner end and six small radial holes intersect the central

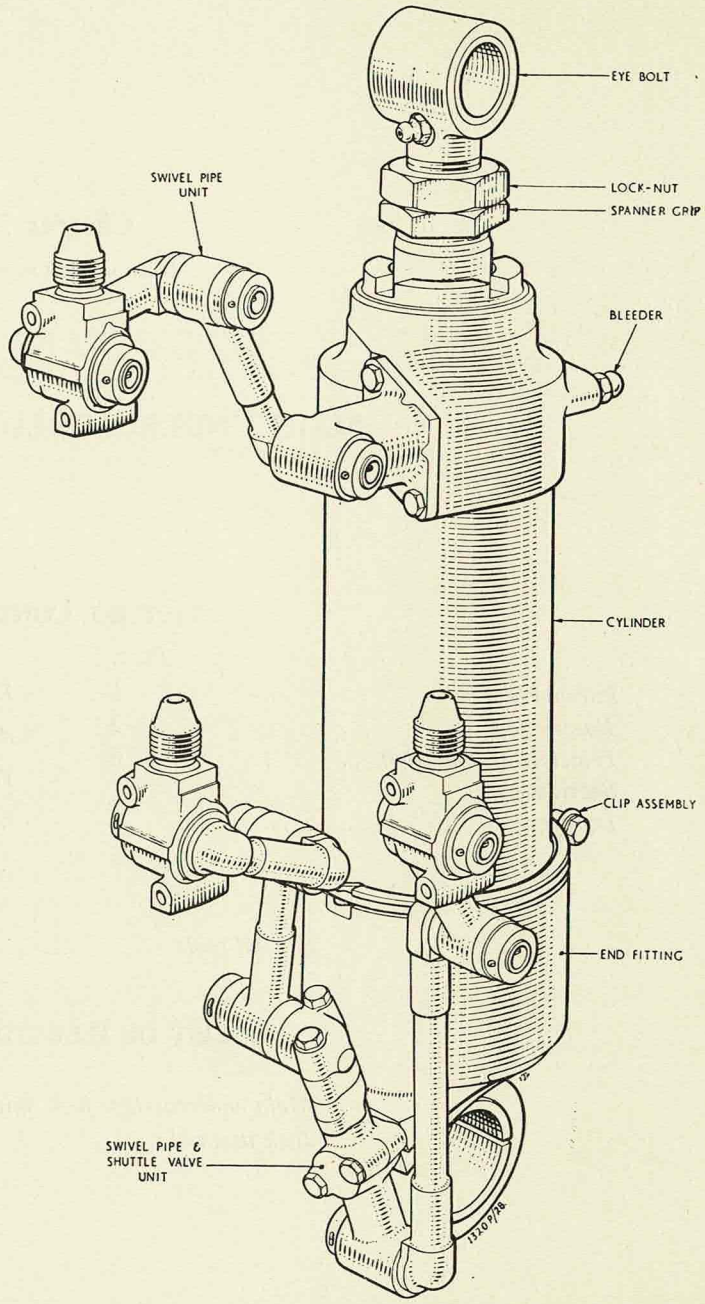

Fig. 1. Main undercarriage jack unit

bore, and provide progressive damping when the piston approaches the end of the closing stroke.

4. The opposite end of the cylinder houses a gland assembly, comprising a gland nut fitted with a wiper ring and screwed into the cylinder to retain a gland ring and spacer against an internal flange. A counterbore in this end of the cylinder accommodates a spigot connection of the swivel pipe and restrictor valve unit, and provision is made to receive a bleeder screw and the swivel pipe retaining bolts.

5. The inner end of the piston rod is formed integral with a piston head grooved for a sealing ring and supporting split rings. The hollow rod at this end receives the stem of the snubber when the piston is in the closing position. The outer end of the rod is slotted to engage the tongues of a spanner grip and internally threaded for the attachment of a bushed eye-bolt fitted with a lock-nut. A greaser is screwed into the eye-bolt and provides for the lubrication of the bush.

Principle of operation

6. Fluid entering the jack by the normal or emergency swivel pipe forces the shuttle along the bore of the shuttle housing to seal off the inoperative pipe line. The piston rod extends, but fluid displaced by the extension of the rod is restricted by the valve in the swivel pipe at the rod end of the cylinder. The speed of extension is thus reduced.

7. Fluid entering by the swivel pipe to close the jack flows freely past the restrictor valve and normal 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, which progressively reduce the speed of operation as the piston approaches the fully closed position.

SERVICING

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 pipes and shuttle valve unit from the end fitting.

(2) Unscrew the bolts and remove the swivel pipes from the cylinder.

(3) Remove the two halves of the spherical bearing from the end fitting.

(4) Slacken the nut and bolt securing the wire clip assembly. Remove the clip and the locking plate.

(5) Unscrew the end fitting from the cylinder. Withdraw the snubber from

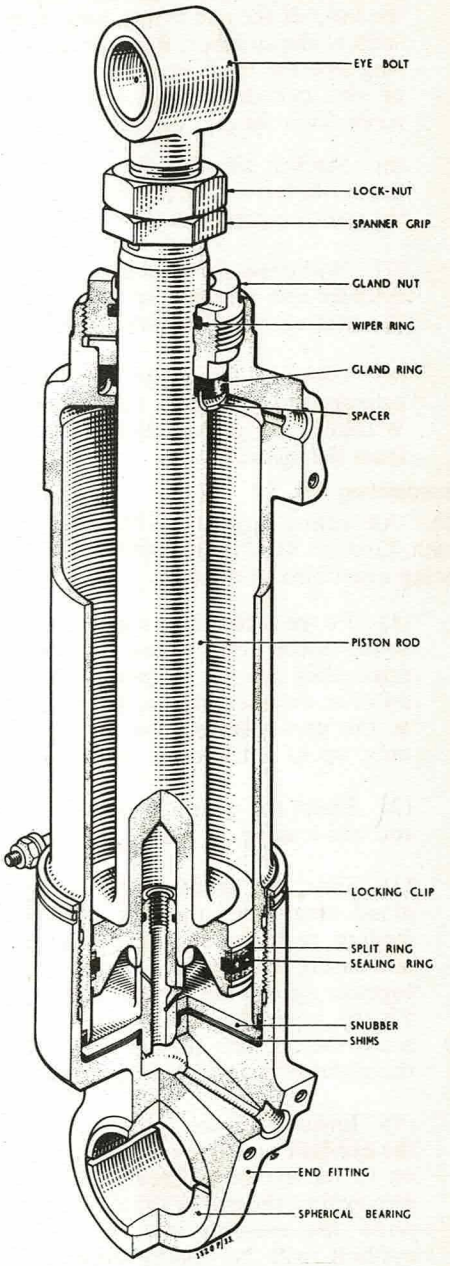

Fig. 2 Jack assembly

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

the end fitting, together with the shims. The snubber is tapped to facilitate withdrawal. Remove the sealing rings from the bore of the end fitting, and from the stem of the snubber. 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.

(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 rings to the stem of the snubber and to the bore of the end fitting.

(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 the requisite number of shims to eliminate any slackness between the end fitting and the cylinder. Position the locking plate and secure it with the wire 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 on a fitting plug gauge, passed through the spherical bearing and resting on 'Vee' blocks. Position the three swivel coupling units 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 screw to the cylinder and end fitting respectively.

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

Testing

11. A static hydraulic test rig and a power pump rig fitted with a pump capable of delivering 3·45 gal. per minute are required. All pipes between the jack and the rigs 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 the connection of one of the swivel pipe units for extending the jack. Apply a pressure to fully extend the jack and then gradually increase the pressure to 6000 lb/in^2. 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. Apply pressure to fully close the jack and then gradually increase the pressure to 6000 lb/in^2. Leakage is not permissible. Release the pressure and disconnect the supply line.

(3) Connect the supply line of the power pump rig to the connection of one of the swivel pipe units for extending the jack. Operate the rig to fully extend the jack. The pressure required to extend the jack must not exceed 600 lb/in^2 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 lb/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 centre 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.

Appendix 1

MAIN UNDERCARRIAGE JACK UNIT

Type No. 1.00674.003
1.00674.004

incorporating—

SWIVEL PIPE UNITS

Type No. 11861PA02
11861SA02
1.00676.003
1.00676.004

Introduction

1. These jack units are identical to the type described in the chapter. Type No. 1.00674003 is the port side unit and Type No. 1.00674.004 is for the starboard side.

Appendix 2

MAIN UNDERCARRIAGE JACK UNIT

Type No. 1.00583.001
1.00583.002

incorporating—

Swivel pipe units 1.00619.001
1.00619.002
1.00621.001
1.00621.002

with Shuttle valve and Restrictor

Introduction

1. These jack units are identical to the type described in the chapter, but differ by the fitment of improved swivel pipe units. Type No. 1.00583.001 is the port side unit and Type No. 1.00583.002 is for the starboard side.

Appendix 3

MAIN UNDERCARRIAGE JACK UNIT

Type No. 1.00583.003
1.00583.004

incorporating—

SWIVEL PIPE UNITS

Type No. 1.00619.003
1.00619.004
1.00621.003
1.00621.004

Introduction

1. These units are identical to the type described in the chapter except for the fitment of sealing and backing rings which are of different material specification. Type No. 1.00583.003 is the port side unit and Type No. 1.00583.004 is for the starboard side.

2. The description and servicing of the swivel pipe units are given in AP.1803U, Vol. 1, Book 5, Sect. 12.