

Chapter 26 STEERING JACK

Type No. 1.01016.001

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Introduction

1. This unit (fig. 1) consists essentially of a hydraulic jack with a built in centring device. Attached by its trunnions to the nose undercarriage and connected to the steering mechanism it steers the nose wheel as required through an arc extending to $25\frac{1}{2}$ deg. on either side of the aircraft centre line.

2. The centring device built into the main piston rod operates only when undercarriage up is selected, centring the nose wheel before the undercarriage is fully retracted.

DESCRIPTION

General

3. The main piston operates in a cylinder formed with trunnions and swivel post which pivot in lugs fitted to the nose undercarriage. The swivel post formed as an extension to one of the trunnions is fitted with a split pin and spacer and drilled for fluid ducts, which interconnect with ducts in the cylinder. The extreme points of the ducts are sealed by steel plugs.

4. The cylinder is closed at one end by a bell shaped end fitting, drilled and formed at the small diameter end to provide an attachment point for the static piston rod and a stop for the sliding gland carrier. The end fitting, screwed into the cylinder secures a sealed gland carrier through which the main piston rod passes. At the opposite end a small sealed gland carrier secured in position by a circlip supports the other end of the main piston rod. Both gland carriers are sealed in the cylinder by a single rubber ring and on the piston rod by a double seal consisting of a rubber ring and a backing ring.

5. The hollow double ended main piston rod with its integral seal carrying piston, houses a built in centring device, which consists of two piston rods and a gland carrier. An internal shoulder is formed in the enclosed end of the main piston rod and a screw thread and slot, in the other. In the central position the shoulder of the sealed gland carrier abuts the shoulder in the enclosed end of the main piston rod bore, but protrudes due to a

stepped diameter, through the end of the rod. Through this gland carrier passes the stepped end of the double ended static piston rod, which is secured to the cylinder end fitting by a screwed plug, locked by a cup washer. This piston rod has a seal carrying integral piston, and a blind bore with a stepped

diameter. A hole drilled in the piston rod adjacent to the reduced internal diameter, forms a fluid passage to the chamber between the piston and the gland carrier. A stepped hollow piston rod, secured in the end fitting by a spacer and circlip is sealed in the bore of the static piston by its seal carrying integral

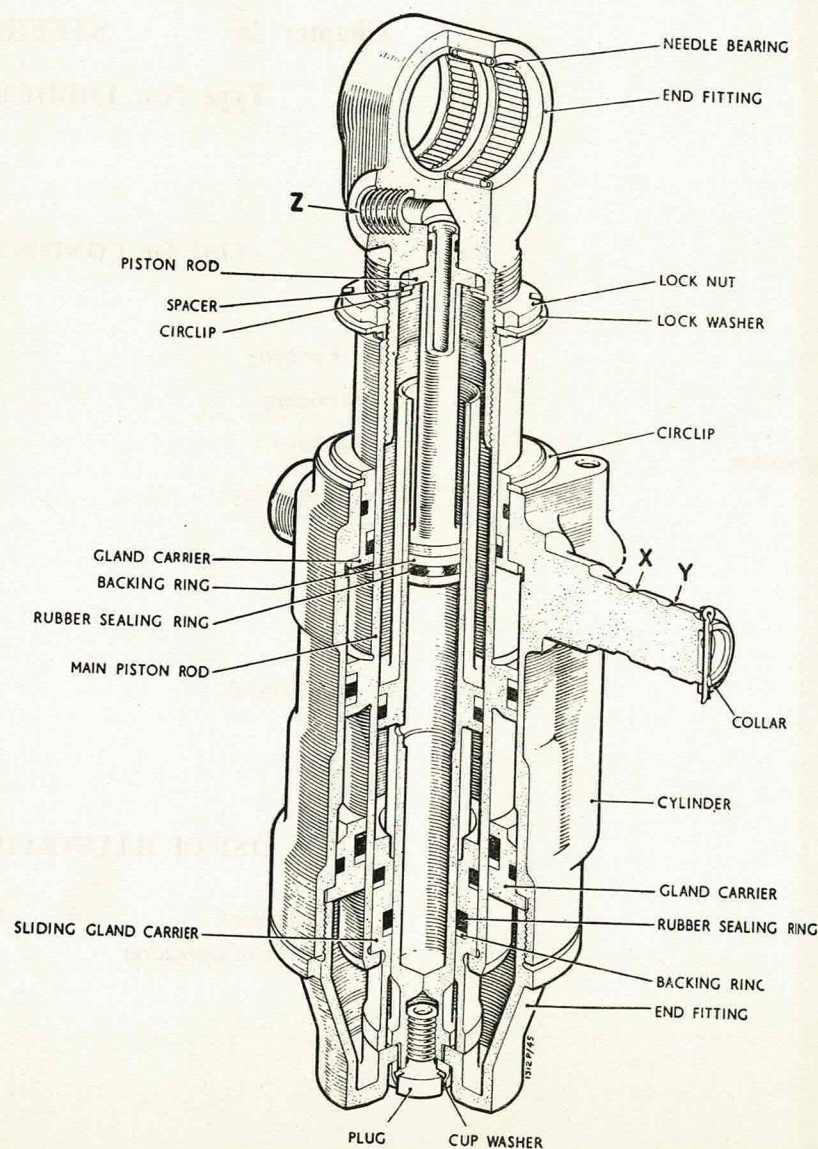


Fig. 1. Steering jack

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piston; a single rubber sealing ring seals the end of the piston rod in the end fitting. The sliding gland carrier is sealed in the main piston rod and on the static piston rod, by a double seal consisting of a rubber sealing ring and a backing ring; the static piston and the small piston rod head is also sealed in this way. The main piston is sealed in the cylinder by a rubber sealing ring positioned between two backing rings.

6. The end fitting, fitted with two needle bearings is drilled and tapped to form a connection point and a fluid duct. Screwed into the exposed end of the main piston rod it is secured in position by a locking nut and lock washer which has location in a slot in the piston rod.

Principle of operation (fig. 2)

Steering

7. The admission of hydraulic pressure to one end of the jack cylinder and its simultaneous release of fluid from the other displaces the main piston rod, thus steering

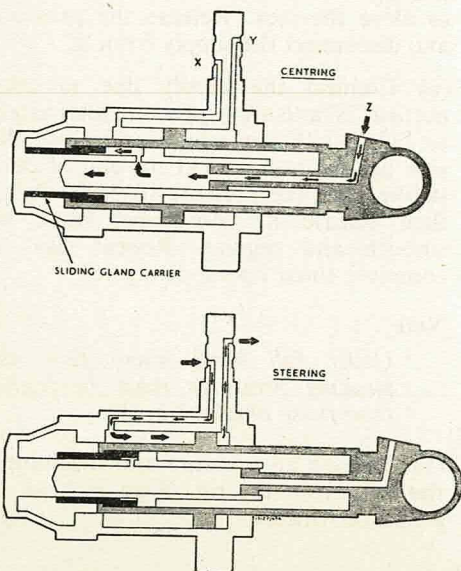


Fig. 2. Principle of operation

the nose wheel (when the jack is attached to the undercarriage) through the steering mechanism; this action is reversible according to the required direction of travel.

Centring

8. Hydraulic pressure entering the centring connection in the end fitting, passes through the hollow piston rod into the centring piston chambers. The sliding gland carrier, due to its larger area moves on to its stop, and pressure acting on the smaller piston inside the static piston rod, locks the main piston rod against it, thus maintaining it in the centre position. When the pressure is released the main piston is unlocked and the jack reverts to its normal steering condition.

Leakage

9. External leakage may be due to a faulty sealing ring which must be renewed. Internal leakage will be indicated by sluggish operation and may be due to a faulty piston sealing ring or a scored cylinder. Renew whichever is appropriate.

Dismantling

10. (1) With the main piston rod fully extended and the unit suitably supported, secure the rod in its holding blocks in the bench clamp. Remove the locking wire from the piston rod lock-nut and washer.

(2) Slacken the locking nut, unscrew the end fitting and withdraw it from the main piston rod, ensuring that the small piston secured by its rod in the end fitting is not damaged. Remove the lock washer.

(3) Remove the circlip and spacer securing the small piston rod, and withdraw it from the end fitting.

(4) Remove the unit and piston rod holding blocks from the bench clamp, then secure the unit cylinder in its holding blocks in the clamp.

(5) Unlock the cup washer, then unscrew and remove the plug securing the static piston rod in the end fitting. Remove the cup washer.

(6) Remove the locking wire and unscrew the cylinder end fitting from the cylinder.

(7) Using the main piston rod, by placing a fibre block or other suitable material against the threaded end and tapping with a mallet, release the gland carrier from the cylinder, then withdraw the piston rod and gland carrier from the cylinder.

(8) Remove the circlip securing it and withdraw the gland carrier from the cylinder. Remove the cylinder and its blocks from the bench clamp.

SERVICING

TABLE 1

Special tools

Part No.	Description
RS.181/23	Hook spanner to fit/remove piston rod lock nut
RS.181/35	Hook spanner to fit/remove end fitting
MT.1556	Piston rod holding blocks
MT.1555	Cylinder holding blocks
MT.1557	Tube spanner to fit/remove retaining plug
MT.1563	Circlip pliers to fit/remove internal circlip
MT.1652	Test adapter

(9) Withdraw the piston and sliding gland carrier from the bore of the main piston.

(10) Remove all sealing and backing rings noting their position.

Assembling

11. Apply a thin film of Grease XG-315 to all sealing rings prior to assembling into the unit.

(1) Fit all sealing and backing rings in their correct locations.

(2) Locate the sliding gland carrier on the stepped end of the static piston rod, with its larger diameter abutting the piston.

(3) Insert the piston and gland carrier into the main piston bore until the shoulders of the gland carrier and main piston rod are in contact.

(4) Fit the small gland carrier into the cylinder end and secure it with its circlip.

(5) Secure the cylinder in its holding blocks in the bench clamp. Insert the main piston into the cylinder bore until the piston abuts the gland carrier.

(6) Locate the cylinder gland carrier over the main piston rod and in the bore of the cylinder, screw the end fitting into the cylinder and tighten, securing the gland carrier in position.

(7) Push the main piston rod towards the cylinder end fitting until the shoulder on the static piston rod abuts the end fitting, screw in the retaining plug with cup washers fitted and tighten. Lock the plug by dimpling the lock washer into the slot after completion of satisfactory tests.

(8) Insert the centring piston rod into the end fitting and secure it with its spacer and circlip.

(9) Fully extend the jack and fill the cavity in the main piston rod with silicone grease DTD.900/4601. Excess grease will emerge from the breather hole when the jack is operated.

(10) Screw the end fitting with nut and lock washer fitted into the main piston rod, ensuring that the centring piston seals are not damaged on entering the bore of the static piston.

(11) Tighten the locking nut securing the lock washer in position on the main piston rod.

Testing

12. A static hydraulic test rig and Test Adapter MT.1652 will be required to carry out the following tests.

Note . . .

Before applying pressure in any test ensure that the unit is hydraulically full i.e. bled free of 'AIR'.

Proof tests

13. (1) Fit the test adapter to the cylinder swivel post and secure it with its spacer and split pin.

(2) Connect the test rig supply line to connection 'X' on the adapter, apply and maintain a pressure of 4,050 lb/in² for two minutes without leakage. Release the pressure.

(3) Repeat (2) with the exception that pressure is applied at 'Y'.

(4) Disconnect the supply line from the adapter and connect it to the jack end fitting connection. Apply a pressure of 4,050 lb/in² and hold for two minutes without leakage. Release the pressure and disconnect the supply line.

Leakage and functioning tests

14. (1) Connect the supply line to connection 'X' and a branch line to connection 'Y'. Apply pressure alternately at 'X' and 'Y' to extend and close the jack against no load. The movement must be smooth and regular and the maximum stroking pressure 110 lb/in².

(2) At the end of each stroke adjust the pressure to 100 lb/in² and maintain

without leakage for one minute, then increase the pressure to 3,000 lb/in² and hold without leakage for a further minute.

(3) Repeat test (2) to complete 5 operations. Check by moving the bleed screws from the adapter and pumping at 'X' and 'Y' that through flow is possible. Release the pressure and disconnect the branch supply line from connection 'Y'.

(4) Connect the branch supply line to connection 'Z' in the end fitting. Apply pressure to connection 'X' to fully extend the jack, raising the pressure at the end of the stroke to 3,000 lb/in². Release the pressure from 'X' and apply pressure at 'Z' to fully centre the unit. Movement must be smooth and regular and the maximum pressure required to centre the unit 600 lb/in². When centred, adjust the pressure at 'Z' to 100 lb/in² and maintain without leakage for one minute, then increase the pressure to 3,000 lb/in² and hold for a further minute without leakage. Repeat to complete five operation cycles.

(5) Repeat test (4) with the exception that pressure is applied to connection 'Y' to close the jack. Release the pressure and disconnect the supply from 'Z'.

(6) Connect the supply line to connection 'X' and apply pressure alternately to 'X' and 'Y' to extend and close the jack against no load. At the end of each stroke raise the pressure to 3,000 lb/in² then release it. Movement must be smooth and regular. Repeat this to complete three operation cycles.

Note . . .

Under full hand pump flow the stroking pressures must be higher than those obtained in (1).

(7) Release all pressure and disconnect the unit from the rig. Wire lock at all points provided.

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