

Chapter 25**NOSE UNDERCARRIAGE JACK****Type No. 1.00673.002****LIST OF CONTENTS**

	<i>Para.</i>		<i>Para.</i>
<i>Introduction</i>	1	<i>Assembly</i>	11
<i>Description</i>	3	Testing	
<i>Principle of operation</i>	7	<i>Testing requirements</i>	12
Servicing		<i>Testing the shuttle valve</i>	14
<i>Leakage</i>	9	<i>Testing the jack</i>	15
<i>Dismantling</i>	10		

Table

<i>Special tools</i>	1
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LIST OF ILLUSTRATIONS

	<i>Fig.</i>
<i>Nose undercarriage jack</i>	1
<i>Jack assembly</i>	2
<i>Test circuit</i>	3

RESTRICTED

Introduction

1. This jack consists essentially of a piston assembly operating in a cylinder assembly. The fluid connections for extending and closing the jack are carried on separate swivel pipe units; the swivel pipe for extending being duplicated to provide for normal and emergency use. A shuttle valve which functions to close the normal supply passage and open the emergency supply is incorporated in the jack. The swivel pipe unit conducting fluid to close the jack is fitted with a restrictor valve which reduces the speed of piston travel and a snubber, located in the cylinder, further reduces the speed as the piston approaches the end of its closing stroke.

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

Description

3. One end of the cylinder is closed by a gland nut fitted with a wiper ring and screwed into the cylinder to retain a gland ring against a spacer. This end of the cylinder is formed with two bosses, one of which receives an adapter screwed in against a sealing ring and fitted with a bleeder screw. The other boss receives the spigot connection of the swivel pipe and restrictor valve unit which is secured to the cylinder by set-screws. An end fitting grooved for a sealing ring and backing ring is screwed on to the opposite end of the cylinder.

4. The end fitting is formed with a shuttle valve housing to which the normal and emergency swivel pipe units are spigoted and bolted. A sleeve is fitted in the shuttle valve housing and the cylindrical shuttle operates in the sleeve. The shuttle is grooved to accommodate a spring ring, encircled by a split sealing ring and has a rubber seat bonded to each end. A fluid passage connects the sleeve bore with the bore of the end fitting and is blanked off at its outer end by a set-screw and a sealing ring. A lug formed on the end fitting houses a split spherical bearing for the airframe attachment and a plug screwed into the end fitting against a bonded seal receives a bleeder screw. A locking plate, located in a

slot of the end fitting engages with serrations round the cylinder and is retained by a wire clip assembly housed in the grooved end of the fitting and tensioned by a bolt and a stiff nut.

5. The snubber, which is retained by the end fitting against the end of the cylinder, has a flanged base and a hollow stem projecting into the cylinder. The flange is grooved for a

sealing ring and a transverse slot intersects the central drilling of the stem to permit the passage of fluid to and from the cylinder. The central drilling is also intersected by three small radial holes and the stem is grooved for a sealing ring and tapped to facilitate withdrawal of the snubber from the end fitting. Shims are fitted under the base of the snubber to eliminate movement after the end fitting is adjusted in relation to the cylinder.

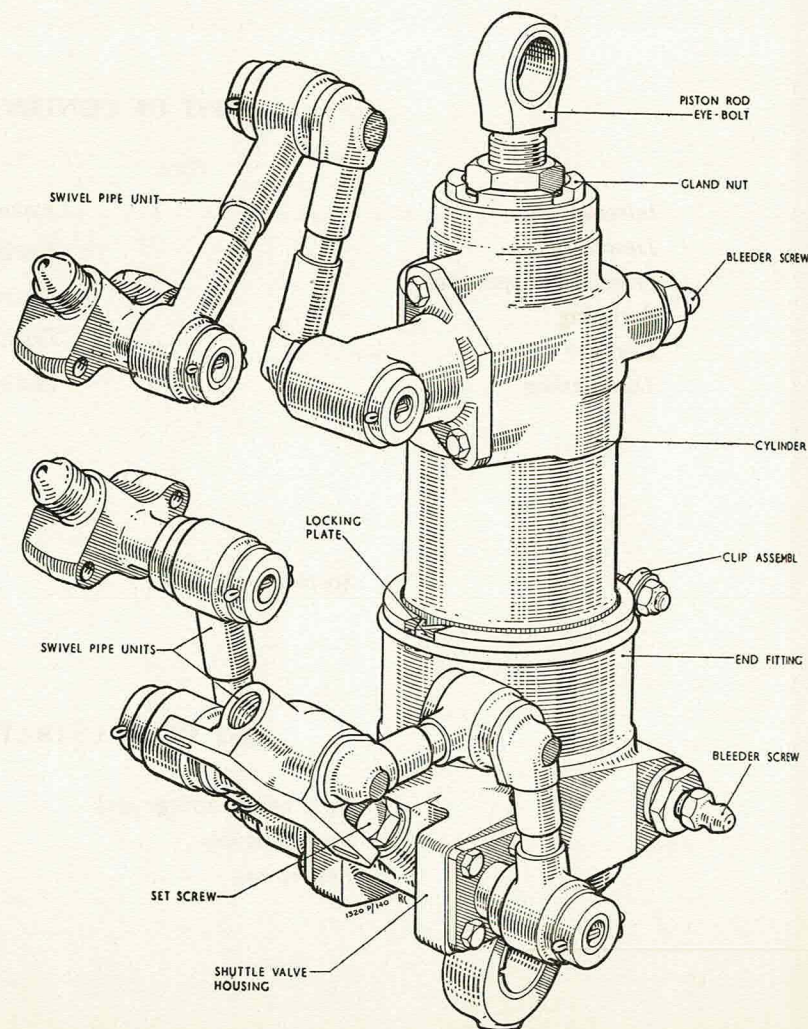


Fig. 1. Nose undercarriage jack

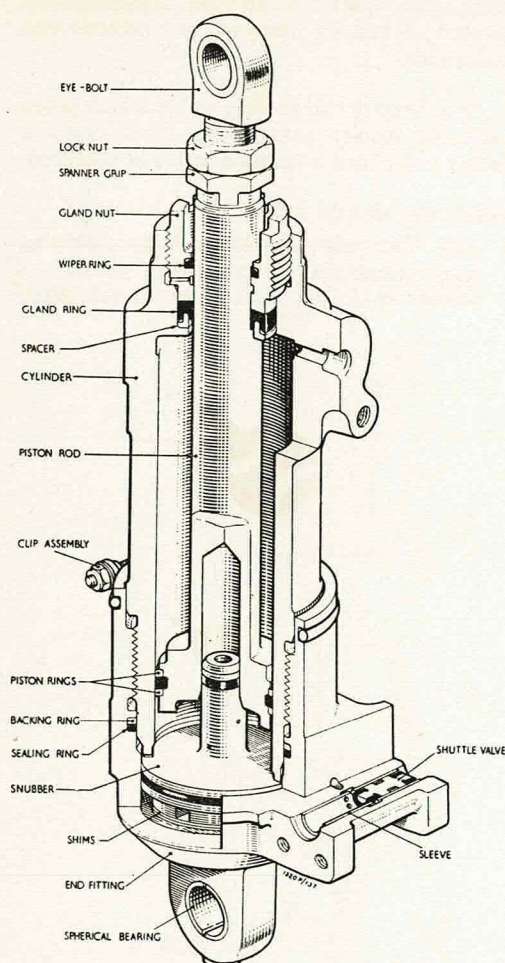


Fig. 2. Jack assembly

6. The outer end of the piston rod is slotted for a tongued spanner grip and threaded for the attachment of a bushed eye-bolt fitted with a lock-nut. At its inner end the piston rod is formed with a piston head, fitted with a sealing ring and two supporting piston rings. The rod is bored at this end to receive the stem of the snubber when the jack is in the closed position.

Principle of operation

7. Fluid entering the jack by the normal or emergency swivel pipe units forces the shuttle along the bore of the sleeve to seal off the inoperative pipe line and enters the cylinder to extend the piston rod. The flow of displaced fluid at the other end of the cylinder is reduced by the restrictor valve and thus limits the speed of extension.

8. The restrictor valve operates similarly in the opposite direction of flow; impeding the passage of fluid entering by the swivel pipe unit to close the jack. Towards the end of the inward stroke the stem of the snubber enters the bore of the piston rod and the flow of displaced fluid, through the central drilling of the snubber, is then confined to the small radial holes which are progressively covered by the moving piston. The increasing restriction thus imposed provides a necessary smoothness of operation required at this stage.

Leakage

9. External leakage will indicate a faulty seal which must be renewed. Internal leakage past the piston seal will be indicated by sluggish action of the jack in service or loss of pressure during testing. Renew the sealing ring. Leakage past the shuttle may be due to foreign matter lodged between the seats, or to scoring. If the bonded seats are damaged or worn, the complete shuttle must be renewed. The central sealing ring of the shuttle can be renewed separately.

Dismantling

10. (1) Remove the swivel pipe units from the end fitting and the cylinder.
- (2) Remove the two halves of the spherical bearing.
- (3) Remove the wire clip and the locking plate, unscrew the end fitting from the cylinder and remove the sealing ring and the backing ring.
- (4) Withdraw the snubber and the shims. The snubber is tapped to facilitate withdrawal. Remove the sealing ring from the snubber.
- (5) Withdraw the shuttle and, if necessary, remove the sealing ring and spring rings. The bonded seats must not be removed.
- (6) Remove the blanking set screw and sealing ring from the shuttle valve housing.
- (7) Remove the bleeder screw from the end fitting.
- (8) Slacken the-lock nut, unscrew the eye-bolt from the piston and remove the spanner grip.
- (9) Withdraw the piston rod from the cylinder, remove the piston rings and the sealing ring from the piston head.
- (10) Unscrew the gland nut and withdraw the gland ring and the spacer from the cylinder. The wiper ring may be removed from the gland nut.

SERVICING

TABLE 1
Special tools

Ref. No.	Part No.	Description
27Q/9106	ST.872	'C' Key spanner for gland nut
27Q/12310	ST.1403	Drift for eye-bolt bush
27Q/13594	ST.1512	'C' key spanner for end fitting
	03026TA01	Assembly tool for gland ring

(11) Remove the bleeder screw, the adapter and the sealing ring from the cylinder.

Assembling

11. 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 piston rings to the piston head. If new piston rings are fitted they are to be gapped 0.009 in. to 0.012 in. on assembly and the sharp edges at the gap removed, on the flat faces only, to a radius of between 0.005 and 0.015 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 and spacer.

(4) Screw the lock-nut fully on to the eye-bolt, locate the tongue of the spanner grip in the slot in the end of the piston rod and screw in the eye-bolt. Temporarily lock the eye-bolt with the lock-nut, final adjustment and locking will be carried out when the unit is installed in the aircraft.

(5) Screw the adapter into the cylinder against a sealing ring and screw the bleeder screw into the adapter.

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

(7) Fit the sealing ring and backing ring to the end fitting. The backing ring should be adjacent to the threads with the rough face towards the sealing ring. Fit the sealing ring to the snubber and insert the shims followed by the snubber into the end fitting.

(8) Locate the sleeve in the bore of the shuttle valve housing.

(9) Fit the spring ring in the groove of the shuttle followed by the split sealing ring. If a new sealing ring is fitted it must be cut through radially before assembly.

(10) Insert the shuttle in the sleeve. Screw the set-screw into the shuttle housing against a bonded seal. Screw the plug into the end fitting and fit the bleeder screw.

(11) Screw the end fitting hard on to the cylinder. Adjust the end fitting until the shuttle valve housing is positioned in line with the swivel pipe attachment boss of the cylinder as shown in fig. 2. If necessary adjust the thickness of shims to eliminate any end movement of the snubber. After adjustment, position the locking plate and lock the end fitting to the cylinder with the wire clip assembly.

(12) Ensure that the sealing rings are fitted to the spigot connections of the swivel pipe units and secure the fully tested units to their respective faces of the end fitting and cylinder with the set-screws.

(13) On installation, the pin centre dimension of the jack in the closed position should be adjusted to the limits of 9.80 to 10.10 in. The length of travel should be 4.53 to 4.63 in. with the piston bottoming at both ends.

(14) After final assembly and testing the following items must be positively wire-locked.

- (a) The bleeder screw to the adapter and the adapter to the cylinder.
- (b) The bleeder screw to the end fitting.
- (c) The heads of the set-screws securing the swivel pipe units together.
- (d) The set-screw to the shuttle valve housing.
- (e) The gland nut to the cylinder.

TESTING

Testing requirements

12. For testing the jack a static hydraulic test rig and a rig fitted with a power pump capable of delivering 3.45 gallons per minute are required. All piping between the jack and

rigs is to be $\frac{3}{8}$ in. outside diameter for metal pipes or $\frac{3}{8}$ in. nominal for flexible hose. Before testing, the jack is to be hydraulically operated at least six times in each direction to expel all air.

13. For testing the shuttle valve a combined hand and power pump rig, fitted with a selector valve and a by-pass valve is required.

Testing the shuttle valve

14. (1) The jack should be fully extended and connected to the test circuit as shown in fig. 3, with a stop cock fitted

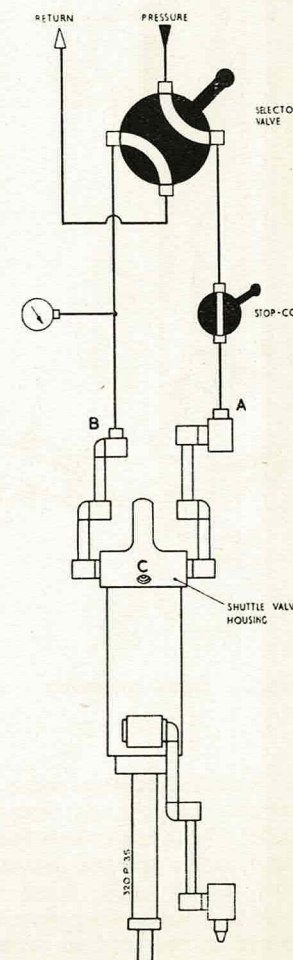


Fig. 3. Test circuit

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between the selector and connection A to the jack. A pressure gauge should be fitted between the selector and connection B.

(2) Remove the set-screw at C (fig. 3) to enable the flow from this point to be conveniently observed.

(3) Operate the power pump and adjust the by-pass valve to control the pressure at 100 lb/in² with the selector valve in the neutral position.

(4) Select pressure to connection A and fluid should flow freely from C. Reverse the selection and fluid should flow from connection B to C.

(5) Repeat operation (4) at least three times to ensure that the shuttle is operating freely. Stop the power pump and screw the set-screw fitted with a bonded seal into the tapping at C.

(6) Disconnect the pipe line from A and select pressure to B. Operate the hand pump, an initial spurt of fluid from A is permissible due to the movement of the shuttle. Raise the pressure to 300 lb/in² and then gradually increase to 6,000 lb/in². Leakage is not permissible. Release the pressure.

(7) Disconnect the supply line from B. Connect the supply line to A and apply a pressure of 100 lb/in². The shuttle should move across, indicated by a spurt of fluid from B. Raise the pressure to 300 lb/in² and then gradually increase to 6,000 lb/in². Leakage is not permissible. Release the pressure.

(8) Disconnect the supply line from A. Connect the supply line to B and apply a pressure of 100 lb/in². The shuttle should move across indicated by a spurt of fluid from A. Raise the pressure to 300 lb/in² and then gradually increase to 6,000 lb/in². Leakage is not permissible. Release the pressure.

(9) Repeat operations (7) and (8) alternately three times.

(10) Close the jack and connect the pipe lines from connections A and B to opposite ports of the selector valve. With the shuttle positioned to allow a flow from A to C, close the stop-cock to trap fluid at zero pressure at A. Operate the power pump applying pressure at B. The jack should extend and a stable pressure should be registered on the pressure gauge. Open the stop-cock to connect A to the return line. Leakage is not permissible except for a possible initial spurt of fluid through connection A. Release the pressure. Repeat this test five times.

Testing the jack

15. (1) Connect the static test rig supply line to one of the swivel pipe units for extending the jack. Apply pressure to fully extend the jack and then gradually increase to 6,000 lb/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

(2) Connect the supply line to the swivel pipe connection for closing the jack. Apply pressure to fully close the jack and then gradually increase to 6,000 lb/in².

Leakage is not permissible. Release the pressure and disconnect the supply line.

(3) For the following tests the restrictor body must be removed from the swivel pipe valve body. Remove the bolts securing the swivel pipe unit to the jack. Unscrew the valve housing from the swivel coupling body and withdraw the restrictor body and the spacer from the housing. Replace the housing ensuring that the sealing ring is in position and secure the swivel pipe unit to the jack.

(4) Connect the jack to the power rig and operate the rig to extend the jack. The pressure required for full extension should not exceed 150 lb/in² and the time taken to complete the stroke should not exceed 16 seconds.

(5) Operate the rig to close the jack. The pressure required should not exceed 150 lb/in² and the time taken to complete the stroke should not exceed 18 seconds.

(6) Remove the jack from the rig and replace the restrictor body and spacer in the swivel pipe valve body. When replacing the valve housing tighten it with a torque loading of 100 to 120 lb. in. referring also to A.P.1803U, Vol. 1, Book 5, Sect. 12, Chap. 3, para. 6 (2).

(7) Connect the unit to the static test rig and with the jack fully extended apply pressure to fully close and then gradually increase the pressure to 6,000 lb/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

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