

Chapter 29

FLAP JACK

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Introduction

1. The unit consists of a piston assembly which operates within a cylinder and is locked in the extended position by an internal mechanism. The locking operation is mechanical, but the application of hydraulic pressure is necessary to release the lock before the piston can be moved to the closed position. A basic type is described in the chapter and appendices cover the variants.

Description

2. The cylinder is closed at one end and formed with a lug which houses a spherical bearing providing the airframe attachment point. The opposite end of the cylinder receives a gland assembly to seal and support the piston rod. This assembly comprises a gland housing grooved for a sealing ring supported by a backing ring, and recessed for a square-section ring and a backing ring. The gland housing is secured in the cylinder by

a screwed collar and clamps a claw locking ring against a shoulder in the cylinder bore. Shims are interposed between the claw ring and the housing to provide adjustment of the backlash when the lock is engaged. Bosses formed on the cylinder receive screwed connections, and provide ports for fluid for extending and closing the jack.

3. The hollow piston rod is flanged and formed with a collar coned to engage with the claws of the locking ring when the jack is in the extended position. The rod is blanked at the inner end by a screwed plug fitted with a sealing ring and, at the outer end, is slotted to engage the tongues of a spanner grip and threaded for a fork-end secured by a lock-nut. A collar stop is retained on the inner end of the piston rod by a locking ring which also serves to secure the screwed plug. The collar stop is grooved for a rubber ring fitted with a P.T.F.E. ring, and is recessed for a sealing ring supported by a backing ring. A locking

sleeve, grooved for a sealing ring supported by split rings, and recessed for a rubber ring fitted with a P.T.F.E. ring, slides on the piston rod and over the collar stop. A spring loads the sleeve away from the collar stop and against the rod flange.

Principle of operation

4. When the jack is operated to extend, fluid is applied at connection 2 (fig. 1) and

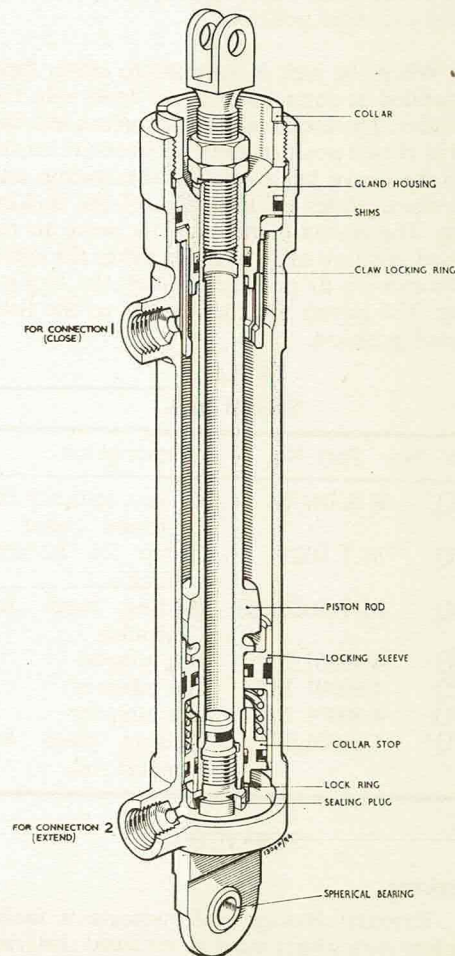


Fig. 1. Flap jack

flows into the cylinder, moving the piston towards the extended position. On approaching this position, the claws of the locking ring are spread outwards by the collar formed on the piston rod. This results in the claws contacting the locking sleeve and arresting it while the piston continues its closing movement, sliding through the sleeve to compress the spring. This condition prevails until the claws override the collar and spring inwards behind it. The claws no longer retard the locking sleeve, and the pressure forces the sleeve over the claws to hold them behind the collar, thus locking the piston rod in the extended position.

5. When the jack is operated to close, fluid is applied at connection 1 and flows into the cylinder. The lock prevents the piston moving to the closed position until the pressure on the locking sleeve has overcome the spring, and the sleeve slides off the claws of the locking ring. The piston commences to move to the closed position and the collar flexes the claws outwards on its passage through the locking ring. The piston rod then moves to the fully closed position.

TABLE 1
Special tools

Ref. No.	Part No.	Description
27Q/	R.S.181/18	'C' key spanner for screwed collar
27Q/	M.T.1025	Clamp for holding blocks.
27Q/	M.T.1026/35	Holding block for cylinder
27Q/	4.60001.259	Test adapter
27Q/	4.60001.262	Test adapter
27Q/	4.60001.263	Test adapter
27Q/	4.60001.272	Holding block for piston rod.

SERVICING

Leakage

6. External leakage will indicate a faulty sealing ring which must be renewed. Internal leakage will be shown by loss of pressure or sluggish action of the jack and will be due to a faulty sealing ring of the collar stop or

locking sleeve. Renew the appropriate seal. A weak or damaged spring will result in inefficient locking and must be renewed.

Dismantling

Note . . .

It is important to ensure that the internal lock is disengaged before the dismantling procedure is commenced. If necessary, the jack must be hydraulically operated to the closed position to achieve this condition

7. (1) Unscrew the collar from the cylinder.

(2) Exert a pull on the piston rod to withdraw the piston and gland assemblies together with the claw locking ring from the cylinder.

(3) Slacken the lock-nut, unscrew the fork-end and remove the spanner grip from the piston rod.

(4) Slide the gland housing and the claw locking ring off the piston rod.

(5) Remove the sealing rings and the backing rings from the gland housing. Remove the shims from the claw locking ring.

(6) Bend the tab of the locking ring to unlock the plug. Unscrew the plug and remove the sealing ring.

Note . . .

The used locking ring must be discarded at the dismantling stage and a new one fitted on assembly.

(7) Withdraw the collar stop, the spring and the locking sleeve.

(8) Remove the sealing and backing rings from the collar stop, and the sealing rings and split rings from the locking sleeve.

Note . . .

The spherical bearing is secured in the cylinder lug by roller peening and must not be removed.

Assembling

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

Adjustment of lock

(1) Initial assembly of the unit, omitting all sealing and backing rings, is to be carried out in order to determine the thickness of the shims required to obtain the correct amount of backlash, with the lock in the engaged condition.

(2) Slide the locking sleeve over the piston rod and locate it against the rod flange, follow with the spring and the collar stop, locating the tongues on the rod through the slots in the stop.

(3) Fit the locking ring to the piston rod, with the tongues of the rod engaged in the slots of the ring. Screw the sealing plug tightly into the end of the piston rod and secure the assembly by punching the skirt of the locking ring into one of the plug slots.

Note . . .

A new locking ring will be required on final assembly.

(4) Insert the piston assembly into the cylinder, followed by the claw locking ring, the shims and the gland housing. Screw the collar tightly into the cylinder to clamp the claw locking ring against the shoulder in the bore.

Note . . .

With the locking sleeve rings temporarily omitted at this stage of assembly, care must be taken to avoid scoring the cylinder bore.

(5) Hold the complete assembly in a vice and pull the piston rod to the fully extended and locked position.

(6) Check the backlash (end-play) between the claw locking ring and the piston rod collar. A dial test indicator reading off the end of the rod is re-

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commended. The permissible backlash is within the limits of 0.003 and 0.007 inches.

(7) If it is necessary to adjust the backlash, unscrew the collar and withdraw the piston and gland assemblies from the cylinder. Slide the locking sleeve back and disengage the claw locking ring. Adjust the thickness of the shims as necessary to obtain the correct backlash. For reference, the laminated shim consists of 0.003 in. laminations.

(8) Insert the piston and gland assemblies into the cylinder and screw in the collar. Engage the lock and re-check the backlash as in operation (6).

(9) When the backlash has been adjusted satisfactorily, unscrew the collar and withdraw the piston and gland assemblies from the cylinder. Separate the components, noting the requisite thickness of the shims and proceed with the complete assembly.

Complete assembly

(10) Fit the sealing ring and the split rings to the locking sleeve. 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, on the flat faces only, removed by a radius of 0.005 to 0.015 in. Insert the rubber ring into the recess of the locking sleeve and fit the P.T.F.E. ring to the rubber ring. Slide the locking sleeve on to the piston rod, locating it against the rod flange and follow with the spring.

(11) Fit the rubber ring to the groove of the collar stop and fit the P.T.F.E. ring to the rubber ring. Insert the sealing ring and the backing ring in the recess of the collar stop, with the rough face of the backing ring adjacent to the sealing ring. Slide the collar stop onto the piston rod, locating the tongues on the rod through the slots in the stop.

(12) Fit the new locking ring to the piston rod, with the tongues on the rod engaged in the slots in the ring. Fit the sealing ring to the plug and screw the plug tightly into the piston rod. Secure the assembly by punching the skirt of the locking ring into one of the plug slots.

(13) Insert the piston assembly into the cylinder, followed by the claw locking ring and the shims.

(14) Fit the square-section sealing ring and the backing ring to the recess in the gland housing. If a new backing ring is fitted, it is to be diagonally cut through to facilitate assembly to the housing, with the gap not exceeding 0.005 in. when the ring is assembled. Fit the sealing ring and the backing ring to the groove of the gland housing, with the rough face of the backing ring adjacent to the sealing ring. Insert the gland housing into the cylinder to abut the shims.

(15) Screw the collar tightly into the cylinder to clamp the claw locking ring firmly against the shoulder in the bore.

(16) Screw the lock-nut on to the fork-end and locate the tongues of the spanner grip to the slots in the end of the piston rod. Screw the fork-end into the piston rod. The fork-end will be finally adjusted and locked on installation of the jack in the aircraft.

(17) Pack the spherical bearing with Grease XG-275 (34B/9100512).

(18) After final assembly and test wire-lock the collar to the cylinder.

Testing

9. A lock loading rig Type No. 03260TAO1 and a test circuit as described and illustrated in A.P.1803D, Vol. 1, Book 1, Sect. 1, are required, together with the special test adapters detailed in Table 1. The test circuit is to incorporate a power pump capable of

delivering 3.45 gal/min. All pipes of the test circuit to the jack are to be $\frac{3}{8}$ in. outside diameter for metal pipes or $\frac{3}{8}$ in. nominal for flexible hose. In addition, two pipe adapters Part No. A.G.S. 1104B and two bonded seals Part No. A.G.S. 1186B are also required for testing. The jack is to be hydraulically operated at least six times in each direction, before testing to expel all air.

Static test

10. (1) Fit a bonded seal to each pipe adapter and screw the adapters tightly into their respective connection bosses. Connect the supply line of the hand pump to connection 2 and gradually apply pressure to fully extend the jack. Release the pressure. Gradually apply a pressure of 300 lb/in², checking for leakage between 0 and 100 lb/in², and then slowly increase the pressure to 2,550 lb/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

(2) Connect the supply line to connection 1 and gradually apply pressure to fully close the jack. Release the pressure. Gradually apply a pressure of 300 lb/in², checking for leakage between 0 and 100 lb/in² and then slowly increase the pressure to 2,550 lb/in². Leakage is not permissible. Release the pressure and disconnect the supply line.

No load friction test and lock proving test

11. (1) Connect the supply lines of the power pump to the jack and apply pressure at connection 2 to extend the jack. The pressure required to fully extend the jack must not exceed 180 lb/in² and the time required to effect the extension must not exceed 6 seconds.

(2) Apply pressure at connection 1 to close the jack. The pressure required to fully close the jack must not exceed 180 lb/in² and the time required to effect the closure must not exceed 8 seconds.

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(3) Apply pressure alternately at the connections for extending and closing the jack to engage and disengage the lock. The pressure required to engage and disengage the lock under "no load" conditions must not exceed 180 lb/in². Release the pressure.

(4) Connect the test adapter, Part No. 4.60001.263 to the lock loading rig 03260TA01 (refer to A.P.1803D Vol. 1, Book 1, Sect. 1).

(5) Remove the fork-end from the piston rod of the jack and screw in the piston rod adapter, Part No. 4.60001.259. Remove the spring box assembly from the rig, and screw the threaded end of the spring box shaft into the piston rod adapter.

(6) Mount the jack on the rig and connect the jack to the test adapter Part No. 4.60001.263.

(7) Connect the supply lines of the power pump to the jack connections and apply pressure to extend the jack and engage the internal lock.

(8) Adjust the position of the spring box on the rig to compress the springs in the box to an end load of 90 to 110 lb.

(9) Apply pressure at connection 1 to disengage the lock and then apply pressure at connection 2 to extend the jack and engage the lock against the 90 to 110 lb. end load. Note the pressure required to engage the lock, and then apply pressure at connection 1 to disengage the lock.

(10) Set the by-pass valve of the power pump to the pressure as noted +100 lb/in².

(11) Engage the lock, close the supply valve of the power pump and reverse the position of the control valve. The lock must not disengage until the power supply valve is opened. Repeat this operation twice.

(12) Operate the lock for 240 cycles.

(13) Repeat the test in (11).

(14) Remove the spring box and the piston rod adapter from the piston rod. Assemble the spanner grip to the piston rod, screw the fork-end into the rod and secure it with the lock-nut.

(15) Screw the adapter Part No. 4.60001.262 to the piston rod of the lock loading rig slave jack, and connect the adapter to the fork-end of the test jack.

(16) Referring to fig. 2 of the chapter for the lock loading rig, A.P.1803D, Vol. 1, Book 1, Sect. 1, adjust the two jacks until dimension 'X' is within the limits of 0.5 to 2.5 in. and dimension 'Y' does not exceed 15.38 in. with the test jack fully extended.

(17) Select the control valve of the power pump to close the test jack. Open the bleeder cock. Operate the hand pump to extend the slave jack and close the test jack by 2.5 to 3.0 in. Discontinue the operation of the pump and close the bleeder cock of the hand pump supply line. Select the hand pump control valve to close the slave jack.

(18) Select the power pump control valve to extend the test jack and apply a pressure of 1,600 to 1,650 lb/in². Gradually open the bleeder cock to allow the test jack to slowly extend. When the lock commences to engage, the travel of the test jack will be momentarily arrested, and the bleeder cock must be opened still further to allow the jack to fully extend and engage the lock.

(19) Release the pressure at the test jack. Operate the hand pump to a pressure not exceeding 82 lb/in² to extend the slave jack and attempt to close the test jack. If the check indicates that the test jack is not locked, the jack is to be rejected.

(20) Repeat operations (17) to (19) three times. The lock must engage satisfactorily each time.

(21) Remove the jack from the lock loading rig.

Installation

12. When the jack is installed, the fork-end is to be adjusted to suit the airframe pick-up points. The dimension between the pin centres must be within the limits of 11.00 to 11.30 in., with the jack in the fully closed position. The piston travel is 3.92 to 4.08 in. After adjustment, tighten the lock-nut against the spanner grip and wire-lock the lock-nut and spanner grip together.

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Appendix 1
FLAP JACK
Type No. 1.00657.001

- 1** This jack is identical to the type described in the chapter.

Appendix 2
FLAP JACK
Type No. 1.00657.002

- 1** This jack is identical to the type described in the chapter, except for the fitment of a spherical bearing drilled to facilitate lubrication.



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