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HUNTER

ARRESTER-HOOK DAMPER DOWTY ROTOL TYPE 11269YA01

GENERAL AND TECHNICAL INFORMATION REPAIR AND RECONDITIONING INSTRUCTIONS

BY COMMAND OF THE DEFENCE COUNCIL

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Ministry of Defence

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Service users should send their comments through the channel prescribed for the purpose in:
Naval Aircraft Maintenance Manual (RN)
AP 100B-01, Order 0504 (RAF)

GENERAL AND TECHNICAL INFORMATION

CONTENTS

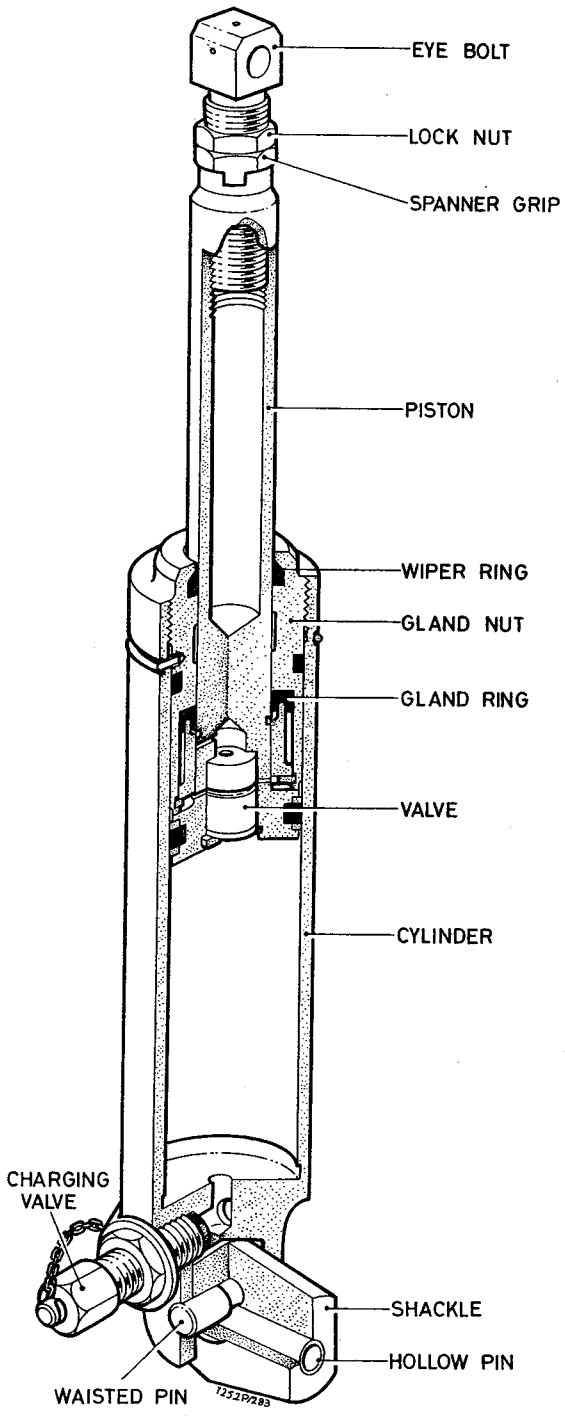
Introduction

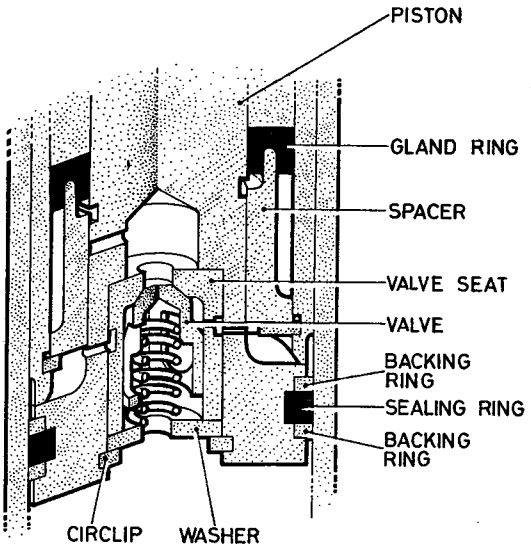
1 The arrester-hook damper is a pneumatic unit fitted between an airframe attachment point and a lever of the arrester-hook. It operates to give rapid lowering of the hook, to maintain the hook in the down position and, after the hook has engaged the arrester cable, to damp out any upward movement caused by the arrester action.

2 Although the unit is essentially a pneumatic one, a small quantity of fluid is introduced, to assist in the lubrication of the piston and improve the damping characteristics.

Description (fig.1)

3 The cylinder, which houses the piston assembly is closed at one end, and twin lugs, integral with this end, receive a shackle connected to the lugs by a waisted pin. This pin is retained by a transverse hollow pin located through the shackle to the waisted portion thus forming a universal joint. A side tapping, adjacent to the lugs, communicates through a hole to the bore of the cylinder and a charging valve, fitted with a sealing ring, is screwed in and locked with a locking plate, a setscrew and a spring washer. A gland nut, fitted with a sealing ring and a wiper ring, and recessed for a gland ring and a spacer secured by a circlip, is screwed into the opposite end of the cylinder to seal and support the piston assembly. A wire locking ring retains the nut.





ENLARGED VIEW OF PISTON HEAD AND VALVE

Fig. 1 Arrester-hook damper

4 The piston head is formed on one end of the piston rod and fitted with a sealing ring and supporting piston rings. A central bore in the head connects with two radial drillings in the piston rod and accommodates a non-return valve assembly. This assembly consists of a valve seat, which is a "drive-fit" in the piston head and contains a spring-loaded and fluted valve retained by a washer and a circlip. A small orifice through the seat aligns with one of the radial drillings of the piston rod and provides a leak hole through the head when the valve is closed. The outer end of the piston rod is slotted for a spanner grip and tapped for an eyebolt fitted with a locknut.

Principle of operation

5 The damper is charged with compressed air and when free from load, the piston is fully extended. When the arrester hook is in the "stowed" position and retained by the hook-up latch, the piston is forced into the cylinder and the pressure in the unit is increased by the entry of the piston rod into the cylinder. Although the pressures on each side of the head are equalized through the leak hole, the forces acting on each side are unequal due to the lesser effective pressure area on the piston rod side. On the release of the hook, the greater force causes the piston to move towards the fully extended position, thus assisting in the lowering of the hook. During this extending stroke, the valve is opened to decrease the resistance to the movement, but before the completion of the stroke, the radial drilling in the piston rod leading to the non-return valve, is blanked off by the spacer of the gland assembly. The non-return valve is then closed by its spring and the small leak hole only provides for the transfer of pressure. The final movement of the piston is therefore "damped out".

6 When the hook engages the arrester cable, any tendency for the hook to be drawn back towards the "stowed" position is resisted by the damper unit as the piston is again forced into the cylinder.

SERVICING

Leakage

7 External leakage will be indicated by loss of pressure and will be due to a faulty gland ring or sealing ring, or to a defective charging valve. Renew the appropriate seal and replace the charging valve.

8 Internal leakage past the piston head or the non-return valve will be shown by inadequate damping out when the arrester hook is lowered and will indicate a faulty sealing ring of the piston head, a badly-seated valve or a weak valve spring. Renew the appropriate part.

TABLE 1 SPECIAL TOOLS

Ref. No.	Part No.	Description
27Q/10183	ST.947 Mk.A	Circlip pliers (Type S.I.S.)
27Q/12317	ST.1652	Drift for valve seat
27Q/13900	ST.1962	Drift for bushes, of shackle and eyebolt
27Q/13483	ST.2025	Extractor for valve seat
27Q/13921	ST.2087	Sleeve for piston

Dismantling

9

WARNING ...

BEFORE ANY ITEMS ARE REMOVED FROM THE DAMPER UNIT, IT IS MOST IMPORTANT THAT ALL PRESSURE IS RELEASED. THIS IS ACHIEVED BY FIRST REMOVING THE CAP OF THE CHARGING VALVE AND THEN GRADUALLY DEPRESSING THE VALVE CORE.

9.1 Remove the locking plate and the charging valve.

9.2 Remove the hollow pin, the waisted pin and the shackle.

9.3 Remove the wire locking ring, unscrew the gland nut from the cylinder and withdraw the piston assembly.

9.4 Slacken the locknut and remove the eyebolt and spanner grip from the piston rod. Remove the locknut from the eyebolt.

9.5 Slide the gland assembly from the piston rod and remove the wiper ring and the sealing ring. Detach the circlip and withdraw the spacer and the gland ring from the gland nut.

9.6 Remove the sealing ring and the piston rings from the piston head.

9.7 Detach the circlip and withdraw the washer, the spring and the valve from the piston head. The valve seat is a "drive-fit" in the head and is not to be removed.

Cleaning

10

WARNING ...

CLEANING AGENT SHOULD BE USED IN A WELL VENTED AREA, AWAY FROM NAKED FLAMES. CARE SHOULD BE TAKEN NOT TO BREATHE THE FUMES OR ALLOW UNDUE CONTACT WITH THE SKIN.

CAUTION ...

Chlorinated solvents can combine with minute amounts of water found in operating hydraulic systems to form hydrochloric acid which will corrode internal metallic surfaces. It is imperative that all internal surfaces are dry and free from any traces of residual solvent prior to assembly and installation. For those applications where it is difficult to remove all traces of solvent, clean unused white spirit is recommended.

To enable all items to be visually inspected for damage and wear, each part must be thoroughly cleaned using the appropriate approved cleaning agents and methods. When cleaning is completed, parts must be dried using compressed air, clean lint-free cloth or tissues and all subsequent handling must be with clean PVC or polythene gloves. If delays occur before assembly, parts must be suitably protected against corrosion.

Assembling

11 All sealing rings are to be lightly coated with Grease XG-315 before being assembled in the unit.

11.1 Fit the sealing ring and the piston rings to the piston head. If a new piston ring is fitted, it is 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 maximum radius of 1/64 in.

11.2 Insert the valve into the piston head, followed by the spring and the washer. Secure the assembly with the circlip.

11.3 Insert the piston assembly into the cylinder.

11.4 Fit the wiper ring and the sealing ring to the gland nut. Locate the gland ring and the spacer in the nut and secure the spacer with the circlip. Pack the cavity of the gland nut with Grease XG-315, slide the nut over the piston rod and screw it into the cylinder. The end faces of the nut and the cylinder, on assembly, must be flush within ±0·010 in. Fit the locking ring.

11.5 Fit the locknut to the eyebolt and the spanner grip to the piston rod. Screw the eyebolt into the piston rod. The eyebolt will be finally adjusted and locked on installation of the damper to the aircraft.

11.6 Pack the cavity in the shackle with Grease XG-315 and smear the waisted portion of the shackle pin with this grease. Secure the shackle to the cylinder lugs with the waisted pin, and fit the hollow pin to locate with the waisted pin.

11.7 Fit a sealing ring to the charging valve and screw the valve tightly into the cylinder. Fit the locking plate and secure it with a setscrew and a spring washer.

11.8 After final assembly and test, wirelock the spanner grip, the locknut and the eyebolt together.

Testing

12 A static hydarulic test rig, a compressed air supply line and a Turner inflation adapter are required.

Duration test

13

13.1 Remove the cap of the charging valve. Ensure that the pressure gauge of the Turner inflation adapter is fully screwed out and then screw the adapter to the charging valve.

13.2 Remove the appropriate cap of the inflation adapter and connect the air supply line to the adapter.

13.3 Screw in the pressure gauge of the adapter to open the charging valve and gradually apply a pressure of 750 lbf/in^2. The piston should be at the fully extended position.

13.4 Screw out the pressure gauge of the inflation adapter to close the charging valve. Remove the air supply line and tightly screw the cap to the adapter.

13.5 Allow the damper unit to remain in the pressurized condition for a period of 24 hours. During this period, the unit is to be compressed 20 times.

13.6 On completion of the test period, gradually screw in the pressure gauge of the inflation adapter to open the charging valve and obtain a reading on the gauge. The loss of pressure during the 24 hour period must not exceed 50 lbf/in^2.

13.7 Gradually open the release screw of the adapter to release all pressure. Remove the inflation adapter.

Hydraulic test

14

14.1 Remove the cap of the charging valve, ensure that the piston is at the fully extended position and connect the supply line of the static hydraulic test rig to the valve.

14.2 Pump in Oil OM-15 to a pressure of 1200 lbf/in^2. Leakage is not permissible.

14.3 Release the pressure, disconnect the supply line and remove the locking plate and the charging valve. With the piston fully extended, drain the oil from the cylinder for a minimum period of 5 minutes.

14.4 Pour 1 cu.in. (16·36 c.c.) of Oil, OM-15 into the cylinder. Replace the charging valve and the locking plate, and secure with the setscrew and spring washer.

14.5 Charge the unit with air to a pressure of 1000 lbf/in^2. Remove the air supply line and the inflation adapter and screw on the charging valve cap.

REPAIR AND RECONDITIONING INSTRUCTIONS

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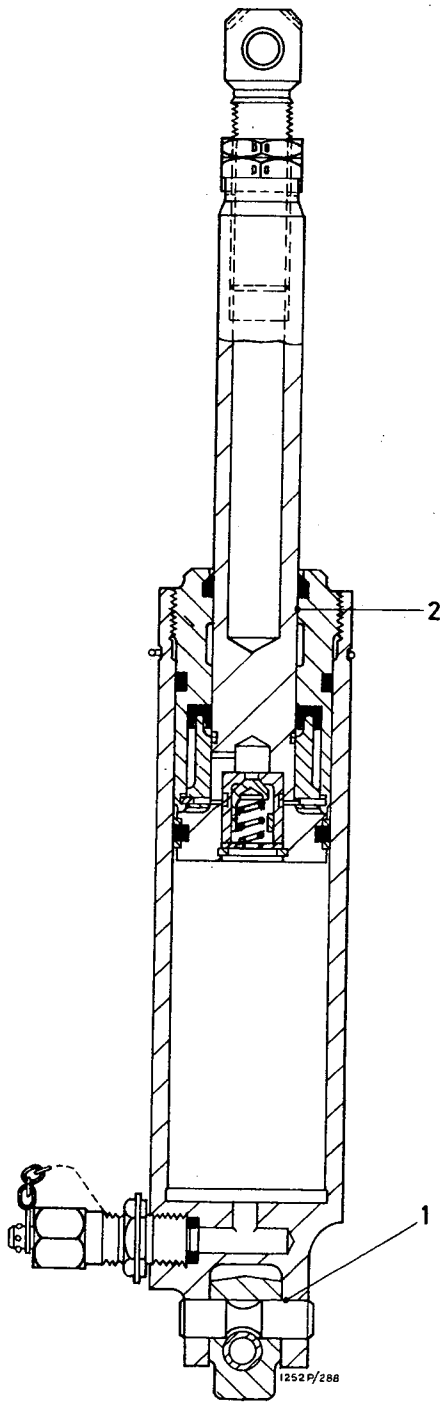

Fig. 1 Fits and clearances - locations

FITS, CLEARANCES AND REPAIR TOLERANCES

Ref. No. on Fig. 1	Parts and Description		Dimension New	Permissible Worn Dimension		Permissible Clearance	
				Interchangeable Assembly	Selective Assembly	New	Worn
1	Cylinder	i/d	0·37550 / 0·37450	0·37600	0·37625	+0·00125 / −0·00025	0·00200
	Pin	o/d	0·37475 / 0·37425	0·37400	0·37350		
2	Gland nut	i/d	0·87575 / 0·87450	0·87700	0·8770	0·00375 / 0·00050	0·00500
	Piston rod	o/d	0·87400 / 0·87200	–	–		

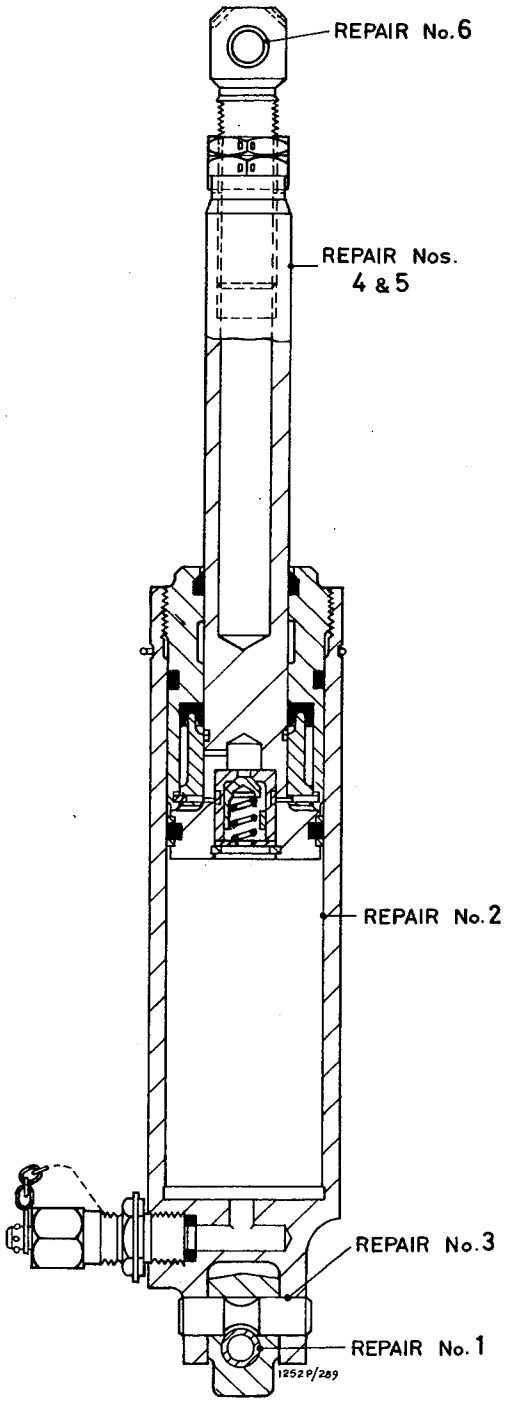

Fig. 2 Repair - locations

REPAIR

General

When carrying out repairs, certain references are made to PS (eg. PS405-3). In these cases, reference is to be made to Dowty Rotol Specification Manual, Publication 872.

REPAIR No.1

Repair to shackle (fig.2)

Repair procedure

Damage or wear to the shackle is to be remedied by opening out existing hole to 0·422375/0·421375 in. and fitting oversize bush 00445R087. Mark repair number R340 diagram 3A1 adjacent existing part no. to PS405-3.

REPAIR No.2

Repair to cylinder (fig.2)

Repair procedure

Scores in the bore are to be polished out providing that after polishing the permissible worn dimension is not exceeded and a surface finish of 8 micro-inches C.L.A. max. is obtained. Mark repair number R340 diagram 3B adjacent existing part no. to PS405-3.

REPAIR No.3

Repair to cylinder (fig.2)

Repair procedure

Damage or wear to the cylinder is to be remedied by opening out the existing holes to 0·391125/0·390125 in. or 0·40675/0·40575 in. in conjunction with mating part and fitting oversize pin 00445R085 or 00445R086 respectively. Mark repair number R340 diagram 3B1 adjacent existing part no. to PS405-3.

REPAIR No.4

Repair to piston rod (fig.2)

Repair procedure

Scores in the chromium plated surface which do not penetrate the base metal are to be remedied by stripping the plating, replating and grinding to the original diameter of 0·874/0·872 in. producing a surface finish of 4 micro-inches C.L.A. max. Mark repair number R340 diagram 3C(a) adjacent existing part no. to PS405-3.

REPAIR No.5

Repair to piston rod (fig.2)

Repair procedure

Scores which penetrate the base metal are to be remedied by grinding as necessary to 0·862 in. minimum and with a surface finish of 8 micro-inches C.L.A. max. Re-build with chromium plate and grind back to the original diameter of 0·874/0·872 in. producing a surface finish of 4 micro-inches C.L.A. max. Mark repair number R340 diagram 3C(b) adjacent existing part no. to PS405-3.

REPAIR No.6

Repair to eyebolt (fig.2)

Repair procedure

Damage or wear to the eyebolt is to be remedied by opening out the existing hole to 0·422375/0·421375 in. or 0·438/0·437 in. and fitting oversize bush 00445R083 or 00445R084 respectively. Mark repair number R340 diagram 3D1 adjacent existing part no. to PS405-3.