AP 105B-03118-13
AUGUST 1986
(Superseding AP 105B-03118-1)

ACCUMULATOR
DUNLOP PART No AC14010

GENERAL AND TECHNICAL INFORMATION (-1)
PARTS CATALOGUE AND RELATED INFORMATION (-3)
BY COMMAND OF THE DEFENCE COUNCIL

Alice Whitmore.

Ministry of Defence
Sponsored for use in the

ROYAL AIR FORCE by D Air Eng (RAF)

Prepared by: Dunlop Limited, Aviation Division
Coventry CV6 4AA
Publications authority: ATP/MOD(PE)

Service users should send their comments through
the channel prescribed for the purpose in:

AP 100B-01 Order 0504 (RAF)

ALI JAN 95

CAUTIONARY NOTICE

Acid Damage

The cleaning fluid for many hydraulic components is trichloroethane or some other form of chlorinated solvent. If traces of solvents are left in components they can combine with minute amounts of water, present in hydraulic systems, to form hydrochloric acid. It is essential that when hydraulic components are cleaned with a chlorinated solvent all traces of the solvent must be removed from internal surfaces and passages, before assembly, using the air blast method or other effective means.

CONTENTS

WARNINGS

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (COSHH)

MAKE SURE YOU KNOW THE SAFETY PRECAUTIONS AND FIRST AID INSTRUCTIONS BEFORE YOU USE A HAZARDOUS SUBSTANCE

REFER TO COSHH ASSESSMENT

READ THE LABEL ON THE CONTAINER IN WHICH THE SUBSTANCE IS SUPPLIED

READ THE DATA SHEET APPLICABLE TO THE SUBSTANCE IN AP 100B-10 AND JSP(F) 395 (AS APPROPRIATE)

MANUAL HANDLING

CONSULT MANUAL HANDLING ASSESSMENTS BEFORE MOVING ANY EQUIPMENT WHERE THERE IS A RISK OF INJURY

OBEY LOCAL INSTRUCTIONS

ACCUMULATOR

DUNLOP PART NO.AC14010

GENERAL AND TECHNICAL INFORMATION (-1)

CONTENTS

LEADING PARTICULARS

System fluid	Oil, OM-15 NATO Code H-515
Maximum working pressure	4000 lbf/in^2
Connections	
Pneumatic	1/4 in. and 1/8 in.B.S.P..
Hydraulic	1/4 in.B.S.P.
Overall dimensions	
AC 14010	10.82 x 2.505 in.

DESCRIPTION

1. This accumulator consists of a cylindrical body containing a floating piston which divides the body into hydraulic and pneumatic chambers (refer to fig.1).

2. When charged, the accumulator provides a volume of pressurized fluid for the operation of associated system units and 'dampens out' any fluid pulsations which may be caused by system operation.

OPERATION

3.

3.1 Application of air pressure to the accumulator through the pneumatic connection pushes the piston towards the end cap. Hydraulic fluid under pressure, introduced via the filter assembly, forces the piston back, compressing the air, until the pressures on both sides of the piston are balanced.

3.2 Immediately a system unit is operated, fluid displacement occurs and the piston moves towards the end cap to maintain the balanced condition and exert pressure on the receding fluid. Fluid replenishment, by a hydraulic supply, forces the piston back to its normal position.

3.3 The capacity of the accumulator ensures that in the event of failure of the hydraulic supply or when the supply is inoperative, sufficient pressurized fluid is available for a number of system operations.

SERVICING

SPECIAL TOOLS

4. The following special tools are required

AM20407	Holding block assembly
A049212	Ring spanner
A10192	Piston loading clamp

DISMANTLING

5. As the component parts are dismantled, place them away from tools and equipment likely to cause damage.

CAUTION . . .

In no circumstances must the cylinder body be clamped directly in a vice.

5.1 With the aid of the holding block assembly, mount the accumulator in a vice.

5.2 Unscrew the filter assembly and remove the sealing washer from the end cap.

5.3 Remove the filter assembly number plate, unscrew the three bolts and lift the inlet connection off the filter body. Extract the filter and rubber seal. Discard the rubber seal.

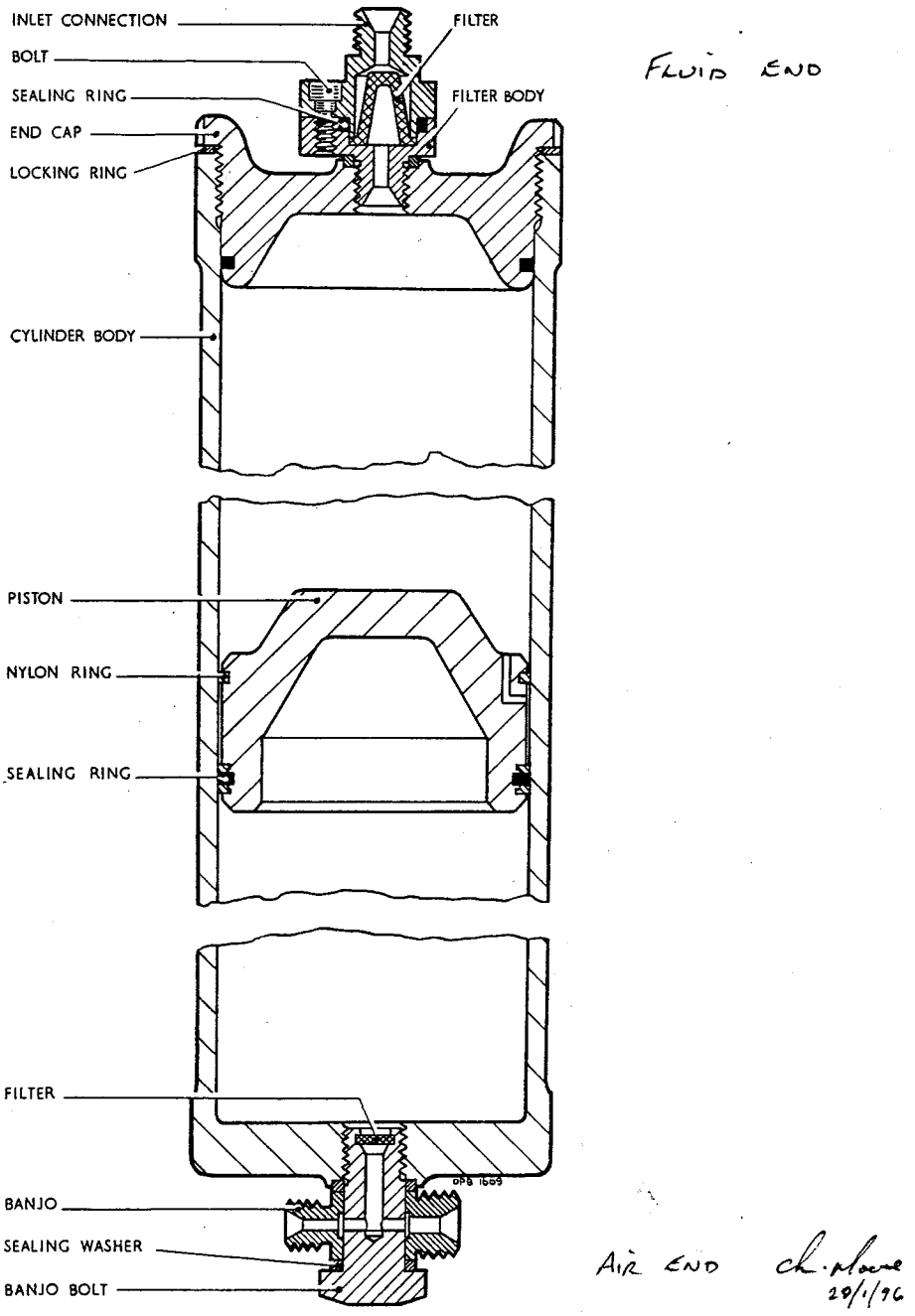

Fig.1 Sectional view of a typical accumulator

5.4 Disengage the lockring from the slots in the end cap and body. Unscrew the end cap using the special ring spanner, remove and discard the lockring and the end cap sealing ring.

5.5 Remove the piston by admitting hydraulic fluid, at low pressure, into the pneumatic chamber. Remove and discard the piston sealing ring. Do not attempt to remove the nylon inserts.

CLEANING

CAUTION . . .

The cleaning fluid for many hydraulic components is trichlorethane or some other form of chlorinated solvent. If traces of solvent are left in components they can combine with minute amounts of water, present in hydraulic systems, to form hydrochloric acid. It is essential that when hydraulic components are cleaned with a chlorinated solvent all traces of the solvent must be removed from internal surfaces and passages, before assembly, using the air blast method or other effective means.

6. If chemical grease solvents are used for cleaning, ensure that they do not come into contact with the rubber components.

6.1 Thoroughly clean and dry all metallic components.

CAUTION . . .

Do not attempt to clean or dry filters with cloth.

6.2 Clean the porous metal filters with a pressurized flow or jet of spirit, mineral industrial (Ref.No.34D/312) in the reverse direction to the normal flow.

EXAMINATION

7.

7.1 Examine the body for damage and corrosion. Slight damage or surface corrosion may be treated as detailed in Repairs.

7.2 Carefully examine the body bore for tooling marks at the internal end radius and in the thread undercut. If such marks are apparent the body must be withdrawn from service and returned to the manufacturer.

7.3 Examine the moulded nylon inserts in the piston skirt for damage and excessive wear. Pistons with damaged or excessively worn nylon inserts must be replaced.

7.4 Examine the filters for damage and freedom from foreign matter. Damaged, blocked or partially blocked filters must be replaced.

7.5 Examine all component threads for condition.

7.6 Examine all other components for damage and corrosion.

REPAIRS

Repair of external damage to accumulator bodies

8. Slight surface scratches, indentations or abrasions may be polished out using a smooth hone or grade 00 carborundum cloth in accordance with the following instructions.

8.1 External damage within the area from the closed end of the body to 2 in.from the open end may be locally polished out to a maximum depth of 0.005 in. The original wall thickness must not be reduced by more than 0.005 in. If damage is more than 0.005 in.deep the body is scrap.

8.2 External damage other than in the areas defined in sub-para.8.1 may be locally polished out to a depth of 0.001 in. If damage is more than 0.001 in.deep the body is scrap.

8.3 Thoroughly clean and degrease the dressed area(s) and treat with Alocrom 1200 as detailed in AP 119A-0601-1C, Chap.4.

Repair of damage to aluminium alloy components

9. Internal and external damage may be treated as follows.

Internal

10.

10.1 Remove slight burrs with a smooth hone or grade 00 carborundum cloth, taking care not to destroy the surface finish.

10.2 Clean off all traces of the abrasive. No further treatment is permitted.

External

11.

11.1 Polish out slight damage or surface corrosion with a smooth hone or grade 00 carborundum cloth.

11.2 Thoroughly clean and degrease the dressed area(s) and treat with Alocrom 1200 as detailed in AP 119A-0601-1C, Chap.4.

CRACK DETECTION

12. Carry out a crack detection examination of the accumulator body using a post emulsified fluorescent type penetrant with a dry powder developer. Any processing materials approved under D.T.D.929 or similar local specification may be used. The following processes, each consisting of a penetrant, washer remover and powder, are suitable.

Process	Supplier
Ardrox 985	Brent Chemical Limited
Britemor 500	Burmah Oil Trading Limited
Zyglo-Pentrex	Magna Flux Limited U.K. Magna Flux Corporation U.S.A.

Crack detection procedure

13.

13.1 Wash the accumulator body in a suitable degreasing fluid.

13.2 Degrease in a hot vapour bath for not less than 10 minutes.

13.3 Degrease in a mild alkaline degreasing agent suitable for aluminium alloys.

13.4 Wash in cold water followed by hot water at 65°C.

13.5 Air dry to remove water.

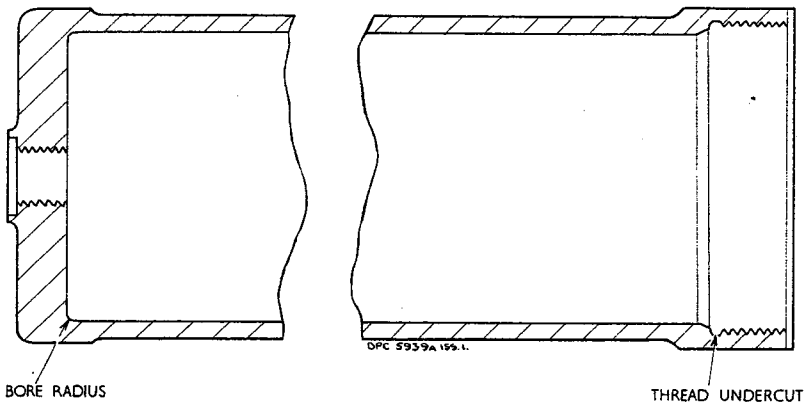

Fig.2 Crack examination areas

13.6 Totally immerse the body in penetrant for 20 minutes, then allow to drain for 10 minutes, thus ensuring a minimum of 30 minutes contact with penetrant.

13.7 Remove surplus penetrant by the method recommended by the penetrant manufacturer.

13.8 Carry out a swift examination of the body under ultra-violet light to ensure effective cleaning.

13.9 Dry in a forced air furnace at a temperature not exceeding 65°C.

13.10 Immerse the body in a dry powder developer or place in a storm cabinet, containing dry powder developer for not less than 15 minutes, then carefully remove the surplus powder from the body surfaces.

13.11 Using a suitable optical boroscope, carefully examine the body under filtered ultra-violet light and in subdued lighting conditions. Pay particular attention to the bore end radius and to the thread undercut (refer to fig.2). Cracks of any kind render the body unserviceable.

13.12 Check for background fluorescence in the hard anodised body bore. Background fluorescence is acceptable if it is of uniformly low intensity, but if it is of sufficient intensity to interfere with examination, the body must be re-cleaned, re-processed and re-examined.

13.13 Check for bright spots in the bore end radius of the body. If spots are apparent the body must be re-cleaned and processed and should the spots persist the body must be rejected and returned to the manufacturer for possible reclaim.

ASSEMBLING

Lubricants and compounds

14. Assembly lubricants must be smeared sparingly on the relevant components and the residue wiped off to leave only a fine surface film. The amount of lubricant used must be such that during assembly there is no surplus to exude into the unit. The following lubricants and compounds are required.

System fluid OM-15 NATO H-515 Ref.No.34B/9100572	Assembly lubricant for rubber sealing rings
Lanolin Ref.No.33C/511 or Grease XG-315 NATO G-394 Ref.No.34B/2204466	For screw threads and metal sealing rings. (Do not use lanolin where it may contaminate adjacent rubber components)

Assembly procedure

15. Exercise care when fitting rubber sealing rings. Avoid harmful stretching and ensure that when fitted, the rings are not trapped or twisted. Absolute cleanliness must be observed during assembly of the unit.

15.1 Fit the sealing ring to the piston.

15.2 Smear the leading edge of the piston skirt with oil OM-15. Using the piston loading clamp, fit the piston into the body, open end first.

15.3 Fit the sealing ring to the end cap and position the lockring on to the body. Using the special ring spanner, screw the end cap into the body.

15.4 Position the filter and seal in the filter body, assemble the inlet connection to the filter body and secure with the three bolts. Fit the number plate.

15.5 Position the sealing washer in the end cap, screw the filter assembly into the end cap and tighten to a torque load of 15 to 17 lbf.ft. (greased).

15.6 Position the sealing washer into the pneumatic connection. Screw the connection into the body and tighten to a torque of 15 to 17 lbf.ft. (greased).

15.7 Test the unit as detailed in Testing.

15.8 After satisfactory completion of testing, wirelock the pneumatic connection to the body and the filter assembly to the end cap. Lock the end cap by peening the lockring into the slots of the end cap and body. Lock the inlet connection to the filter body by lightly peening the inlet connection counterbores to lock the three attachment bolts.

CHARGING THE INSTALLED UNIT

16. To avoid undue pressure on the piston seal by excessive pressure on the one side only, the accumulator must be charged in the following sequence.

16.1 Release any existing hydraulic pressure from the unit.

16.2 Apply air at low pressure to the pneumatic connection to move the piston to the far end of its stroke, then charge the accumulator to the required air pressure (refer to the relevant Air Publication).

16.3 Charge the hydraulic end of the accumulator via the aircraft hydraulic system to the maximum working pressure.

16.4 Check that the hydraulic and pneumatic pressures are balanced.

TESTING

17. After any servicing operations which involve dismantling and assembling the unit must be tested as follows.

Stroke test

18.

18.1 Remove the pneumatic connection. Gradually apply a hydraulic pressure of 100 lbf/in^2 maximum to the hydraulic connection and check for complete piston travel. Ensure that the piston does not strike the end of the body with undue force.

18.2 Re-fit and torque load the pneumatic connection as detailed in Assembly, para.15.6.

18.3 Remove the filter assembly. Gradually apply air pressure of 100 lbf/in^2 maximum to the pneumatic connection and check for complete piston travel. Ensure that the piston does not strike the end cap with undue force.

18.4 Re-fit and torque load the pneumatic connection as detailed in Assembly, para.15.5.

Cycling test

19. The following test need only be carried out if a new piston or body has been incorporated into the unit.

19.1 Charge the pneumatic side of the unit with air to 1000 lbf/in^2. Apply hydraulic pressure to the hydraulic connection to raise the air pressure to 4000 lbf/in^2. Release all the hydraulic pressure. Raise and lower the hydraulic pressure 25 times.

19.2 Release all hydraulic and pneumatic pressures. Dismantle the unit and examine the body bore, the piston nylon inserts and the sealing ring for score marks. Re-assemble the unit and complete the tests detailed below.

Leakage test

20.

20.1 Charge the pneumatic side of the unit with air to 50 lbf/in^2 and check for leakage. No leakage permitted. Increase the air pressure to 3000 lbf/in^2 and check for leakage. No leakage permitted.

20.2 Apply air pressure at 50 lbf/in^2 only, to the hydraulic connection and check for leakage. No leakage permitted.

Operation test

21. Release all pressure in the hydraulic side of the unit, then charge the pneumatic side with air to 2500 lbf/in^2. Apply hydraulic pressure to the hydraulic connection to raise the air pressure to 4000 lbf/in^2. Check that the hydraulic and pneumatic pressures are balanced, after the initial differential pressure is overcome. During this test, check for leakage. No leakage permitted.

22. After satisfactory completion of testing, complete the assembly of the unit as detailed in Assembling, para.15.8.

TABLE 1

FAULTS, CAUSES AND RECTIFICATION
(TROUBLE SHOOTING)

Note . . .

After partial or complete dismantling for rectification, test the unit.

Fault	Cause	Rectification
Loss of fluid or air pressure other than through external leakage	Faulty piston sealing ring	Dismantle and replace sealing ring
Fluid leakage from cylinder/end cap joint	Faulty end cap sealing ring	Dismantle and replace sealing ring
Fluid leakage from end cap/filter assembly joint	Loose filter housing, or faulty sealing washer	Torque load the filter assembly. If leakage persists, release all fluid and air pressure and replace sealing washer
Air leakage from cylinder/pneumatic connection joint	Loose connection nut and/or faulty sealing ring	Torque load the connection nut. If leakage persists, release all fluid and air pressure and replace sealing ring

PARTS CATALOGUE AND RELATED INFORMATION (-3)

MODIFICATION RECORD

Mod No	AL No	Mod No	AL No	Mod No	AL No	Mod No	AL No	Mod No	AL No	Mod No	AL No
2322	*										
Amdt. 22482	*										

* Incorporated in initial issue of catalogue
NA Mod not applicable to this catalogue
C Mod cancelled
AS Amendment Sheet

PREFACE

Demands

1 Requirements for demands are:

1.1 The demand must quote the appropriate Vocabulary Section and Reference/Stock Number for each item. Unreferenced parts are not normally provisioned as spares and demands for such items must quote the Vocabulary Section, Maker's Part Number, and the name and type of the equipment. The location of each part within the equipment should be clearly indicated.

1.2 Demands are to be prepared in accordance with the procedure laid down in AP 830 Volume 1 or BR4.

Local manufacture

2 Parts annotated 'LM' are to be manufactured from local resources. If the manufacture of such items is beyond the capacity of the Unit, the demand is to be endorsed 'Unable to manufacture locally'.

Major repair

3 'MR' indicates that an item is required for major repair purposes only and will not normally be held in store by Units other than those authorised to undertake major repair of the equipment.

Units per assembly

4 The number quoted is the quantity required per next higher assembly in the position shown except 'attaching parts' which quote the quantity required to attach one item. The letters 'AR' in the 'Units per Assy' column indicate that the quantity is 'as required'. Where applicable the quantity normally fitted is shown as a nominal figure, e.g. (Nom 3). Where an item is listed only for reference purposes the letters 'RF' are quoted.

Classification of equipment

5 The Class of Store is indicated by a single letter as laid down in AP 830 Volume 1 or BR4.

Condition of Supply (Interchangeability Code)

6 Condition of Supply is indicated by one of the following letters and is only quoted against parts which are not directly interchangeable:

V Open up holes on assembly
W Partially assembled
X Ream or machine on assembly
Y Drill or drill and tap on assembly
Z Trim on assembly

Obsolescent stock

7 An asterisk in the 'Part No.' column indicates that no further purchases of the item will be made but the part is to be used until stocks are exhausted.

Modifications

8 When items are affected by a modification the 'Mod No.' is quoted in the Nomenclature. Modifications incorporated in the catalogue are listed in the Modification Record.

INDEX OF NATO STOCK NUMBERS

Vocab Sect.	NATO Stock No.	Part Number	Chap. No.	Fig/ Index No.	ICY MR	C of S
27G	5310-99-101-3864	AHO 4727		1/2		C
27VA	4730-99-123-7740	ACO 21000		1/1		C
27G	5305-99-123-9473	ACO 4670/4		1/6		C
27J	5305-99-128-7636	ACO 4118		1/5		C
				1/11		C
27A	4730-99-461-9876	AHO 19778		1/3		C
27VA	1630-99-461-9878	ACO 1490		1/12		C
27VA	1630-99-462-5445	ACM 17883		1/5		C
27VA	5310-99-462-5785	ACO 20839		1/14		C
27A	1630-99-462-5863	ACO 21781		1/8		C
27VA	1630-99-462-5908	ACM 18312		1/4		L
27VA	1650-99-462-5911	AC 14010		1/-		P
27A	1630-99-462-5932	ACO 21776		1/7		C
27VA	5330-99-462-5933	ACO 22095		1/13		C
27VA	1630-99-462-5935	ACO 22174		1/9		C

INDEX OF PART NUMBERS

Part Number	Vocab Sect.	NATO Stock No., Ref. No. or LM	Chap. No.	Fig./ Index No.
ACM 17883	27VA	1630-99-462-5445		1/15
ACM 18312	27VA	1630-99-462-5908		1/4
ACO 1490	27VA	1630-99-461-9878		1/12
ACO 20839	27VA	5310-99-462-5785		1/14
ACO 21000	27VA	4730-99-123-7740		1/1
ACO 21772				1/10
ACO 21776	27A	1630-99-462-5932		1/7
ACO 21781	27A	1630-99-462-5863		1/8
ACO 22095	27VA	5330-99-462-5933		1/13
ACO 22174	27VA	1630-99-462-5935		1/9
ACO 4118	27J	5305-99-128-7636		1/5
				1/11
ACO 4670/4	27G	5305-99-123-9473		1/6
AC 14010	27VA	1650-99-462-5911		1/-
AHO 19778	27A	4730-99-461-9876		1/3
AHO 4727	27G	5310-99-101-3864		1/2

DETAILED PARTS LIST

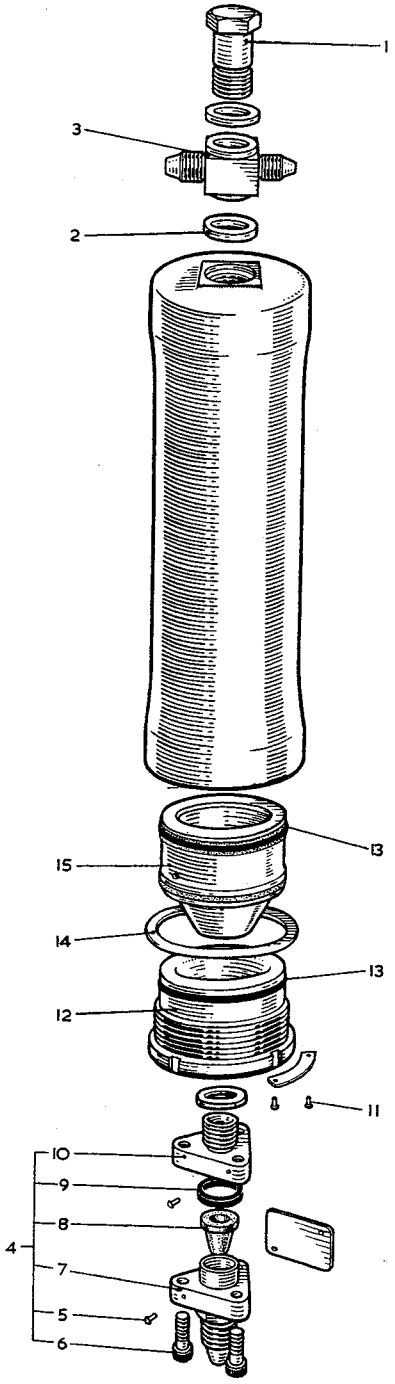

Fig. 1 Hydraulic accumulator assembly

DETAILED PARTS LIST

HYDRAULIC ACCUMULATOR ASSEMBLY

Fig./ Index No.	Part No.	Nomenclature 1 2 3 4 5 6	Usage Code	Units per Assy.
1-	AC 14010	Accumulator, hydraulic, assembly (Dunlop Mod.2322)		
-1	ACO 21000	. Bolt, banjo, assembly		1
-2	AHO 4727	. Washer, sealing		2
-3	AHO 19778	. Connection, banjo		1
-4	ACM 18312	. Connection, inlet and filter, assembly		1
-5	ACO 4118	. . Screw, round head		2
-6	ACO 4670/4	. . Screw, round head, "Unbrako"		3
-7	ACO 21776	. . Connection, inlet		1
-8	ACO 21781	. . Filter		1
-9	ACO 22174	. . Ring, sealing (Amdt. 22482)		1
-10	ACO 21772	. . Body, filter		1
-11	ACO 4118	. Screw, round head		2
-12	ACO 1490	. Cap, end		1
-13	ACO 22095	. Ring, sealing		2
-14	ACO 20839	. Ring, lock		1
-15	ACM 17883	. Piston, assembly		1

+ Item not illustrated