MWS

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OBSOLETE

PRESSURE REDUCING VALVE DOWTY AEROSPACE HYDRAULICS Part Nos C4973YMKA and 100073004

GENERAL AND TECHNICAL INFORMATION (-1) PARTS CATALOGUE AND RELATED INFORMATION (-3)

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

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GENERAL

CONTENTS

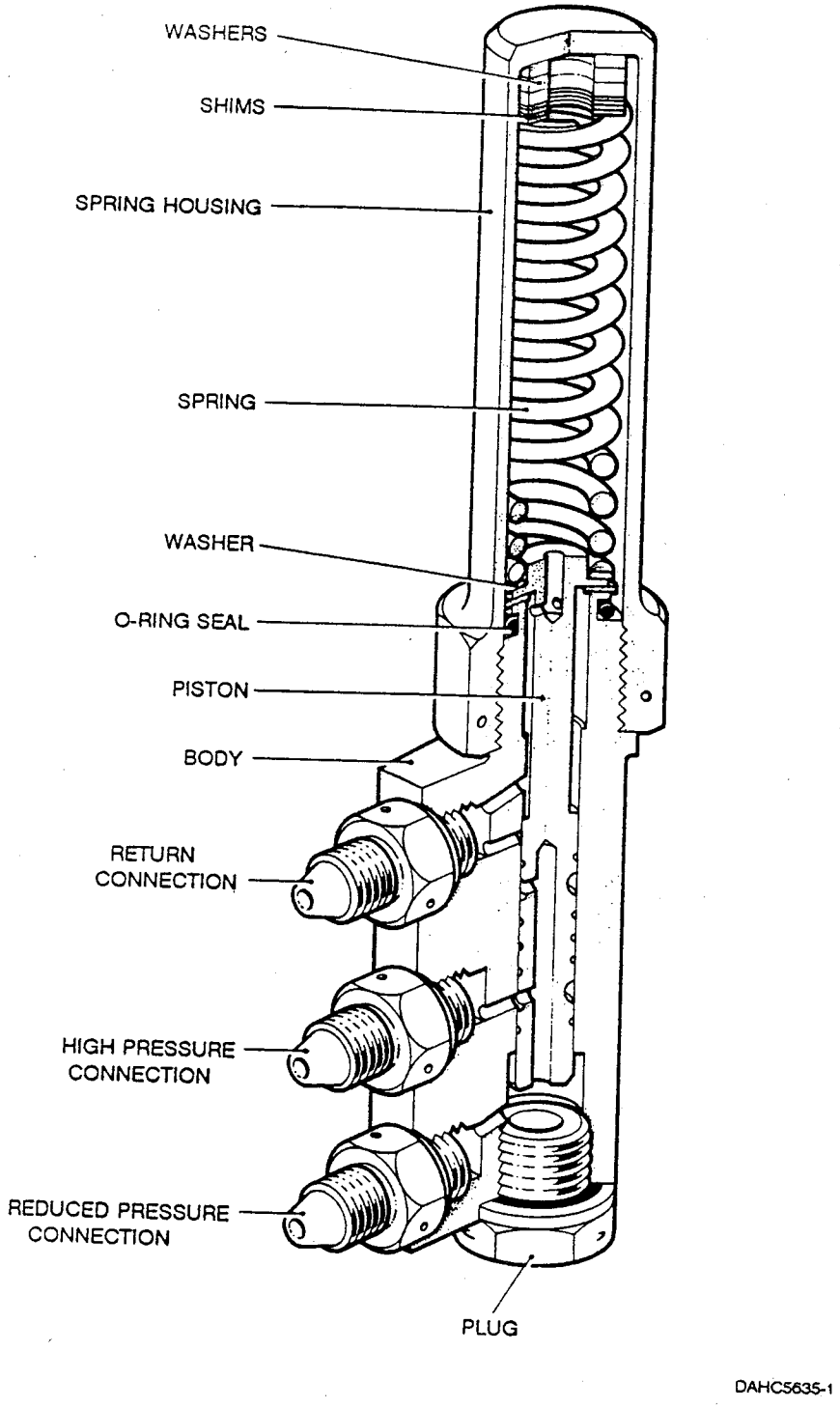

Fig 1 Pressure reducing valve

Leading particulars

1 Refer to the relevant annex for the leading particulars.

Modification state

2 Refer to the appropriate annex for the relevant modification state.

Introduction

3 The pressure reducing valve obtains the pressure reduction by the action of the high fluid pressure upon a piston sliding in a body, against a coil spring. A basic type is described in the general text and variants are detailed in annexes.

Constructional description (Fig 1)

4 The pressure reducing valve comprises a body and piston sub-assembly and a spring housing accommodating a spring and a series of shims and washers.

5 The body and piston sub-assembly has four drilled and tapped holes accommodating three adapters and a plug each sealed by a bonded seal. The bore of the body and the piston are lapped together at manufacture, to achieve a fine diametral tolerance, and must be kept together as a matched pair. A threaded extension on the body has a groove for an O-ring seal.

6 The spring housing together with the spring, shims and washers, screws onto the threaded extension of the body where the spring acts on the piston. The shims and washers provide for pressure adjustment during testing.

Functional description (Fig 1)

7 When the valve is static, the spring is extended and the piston at the end of its travel in the body; a port in the piston is opposite the high pressure connection and the reduced pressure connection is unrestricted. High pressure fluid can enter, flow through and out of the valve.

8 The high fluid pressure, however, immediately acts upon the piston and when the pressure is in excess of a certain value, the spring is overpowered and the piston forced along the bore. The piston stem closes the high pressure connection and, if the movement continues, opens the return connection to relieve the pressure. A reduction in hydraulic pressure within the valve permits the spring to return the piston, thereby closing the return port if it had been uncovered and, continuing the movement, open the high pressure port again.

9 A flange on the piston limits the travel into the body and the spring bears on a washer assembled on this flange. A second washer may also be fitted under the flange to facilitate adjustment of the relief pressure in addition to shims and washers which are fitted at the other end of the spring inside the spring housing. Hunting of the piston is damped out, as the piston moves against the spring, by the gradual closing of a second passage which leads from above the piston to the return connection, thus restricting the flow of the fluid displaced.

MAINTENANCE

Special tools and equipment

10 The following special tools, equipment and materials are required to carry out the maintenance procedures detailed.

Part No	Description	Application
-	Trichloroethane (TS367D)	Cleaning
-	White spirit (BS245)	Cleaning
-	Oil OM15 (DTD585)	Assembling
-	Corrosion preventative PX1	Preservation
-	Locking wire (DTD189A)	Locking parts

Safety and maintenance notes

11 Safety and maintenance notes or other general safety/maintenance requirements appropriate to the equipment, or to the main equipment, must be complied with where relevant throughout the work detailed in this publication.

BAY MAINTENANCE

WARNING

SPECIFIC DETAILS OF THIS UNIT ARE SUBJECT TO SPRING PRESSURE AND CARE MUST BE EXERCISED WHEN DISMANTLING.

Dismantling (Fig 1)

12 Discard the bonded seals and the O-ring seal on removal from the unit.

12.1 Remove the adapters and the plug together with the bonded seals.

12.2 Remove the spring housing and withdraw the spring, the shims and the washers.

12.3 Remove the washer and, if fitted, the adjusting washer from the piston.

CAUTION

The piston and the body are a matched pair and must be kept together as a set.

12.4 Withdraw the piston and remove the O-ring seal from the body.

Cleaning

WARNING

CLEANING AGENT SHOULD BE USED IN A WELL VENTILATED 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.

13 To enable all items to be visually examined for damage and wear, each part must be thoroughly cleaned using the appropriate 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 using temporary corrosion preventative PX1.

Examination and checking

14 Visually examine all parts for damage and corrosion.

Superficial damage

15 Superficial damage in the form of external isolated scores, smooth dents and abrasions free from cracks are to be regarded as negligible provided that internal dimensions are not affected and the damage is within the following limits:

15.1 Not exceeding 0.500 in long.

15.2 Not exceeding 0.010 in deep.

15.3 Not less than 0.250 in from any hole or bearing surface.

NOTE

Burrs must be removed and sharp edges blended out. Minor scores and abrasions in non-sealing bores may be ignored provided that proud portions of the abrasion are removed.

Checking data

16 Spring data

16.1 Refer to the appropriate annex for the relevant spring data.

Assembling (Fig 1)

17 Lightly lubricate the bonded seals, O-ring seal and threaded parts with clean oil OM15 before assembly into the unit.

17.1 Assemble the O-ring seal to the end of the body. Fit the adjusting washer, if required, and the washer to the flange of the piston. Insert the piston in the body.

17.2 Assemble the washers and the shims to the spring housing and insert the spring. Screw the spring housing over the end of the body.

17.3 Assemble the bonded seals to the plug and the adapters and screw them into the body.

17.4 After satisfactory testing, wirelock the spring housing to the plug and adapters to each other.

TESTING

Special tools and test equipment

18 The following special tools and test equipment are required to carry out the test procedures detailed.

Part No	Description	Application
-	Static hydraulic test rig (with power pump and separate hand pump)	Apply hydraulic pressure
-	Pressure gauge 0-1000 lbf/in^2 (with restrictor)	Indicate test pressure

Testing the unit (Fig 1)

19 Using the equipment specified in paragraph 18, carry out the following tests.

19.1 Blank off the reduced pressure connection with the pressure gauge. Connect the power pump supply line of the test rig to the high pressure connection.

19.2 Gradually apply a pressure of 4950 lbf/in^2. The pressure registered on the gauge at the reduced pressure connection should not exceed 725 lbf/in^2. Reduce the pressure at the high pressure connection to 3000 lbf/in^2. Leakage from the return connection at this pressure must not exceed 4 cm^3/min. Release the pressure at both connections.

19.3 Apply a pressure of 3000 lbf/in^2 at the high pressure connection. The pressure registered on the gauge at the reduced pressure connection should be between 450 and 550 lbf/in^2. If necessary, vary the number of shims and washers at the outer end of the spring to obtain this requirement. Leakage from the return connection must not exceed 4 cm^3/min. Operate the valve at least 20 times to allow the spring to settle, then finally check the pressure setting. Release the pressure at both connections and remove the pressure gauge from the reduced pressure connection.

19.4 Connect the hand pump supply line to the reduced pressure connection. Operate the power rig and apply a pressure of 3000 lbf/in^2 at the high pressure connection. Apply pressure at the reduced pressure connection until fluid flows from the return connection. The pressure at which this occurs must not exceed 700 lbf/in^2.

19.5 Gradually reduce the pressure at the hand pump. The flow from the return connection should cease when the pressure is between 450 and 550 lbf/in^2. The leakage from the return connection must not exceed 4 cm^3/min. Release the pressure and disconnect the supply lines.

19.6 Connect the hand pump supply line to the return connection and apply a pressure of 250 lbf/in^2. Leakage must not occur. Release the pressure and disconnect the supply line.

Annex A

DOWTY AEROSPACE HYDRAULICS - CHELTENHAM

PRESSURE REDUCING VALVE

PART NUMBER C4973YMKA

Leading particulars

1 The leading particulars of this unit are as follows:

1.1	System fluid	Oil OM15 (DTD585)
1.2	Reduced pressure range	450 to 550 lbf/in^2
1.3	Connections	0.125 in BSP
1.4	Length	6.610 in

Modification state

2 The information in this annex includes all appropriate modifications up to and including issue 10.

Introduction

3 This unit is identical to the type described and illustrated in the general text.

Checking data

4 Spring 500Y456

4.1 Number of working coils: 13.5

4.2 Wire size: 0.1562 in

4.3 Free length: 2.72 to 2.75 in

4.4 Check length: 2.50 in

4.5 Load at check length: 114 to 126 lbf.

Annex B

DOWTY AEROSPACE HYDRAULICS - CHELTENHAM

PRESSURE REDUCING VALVE

PART NUMBER 100073004

Leading particulars

1 The leading particulars of this unit are as follows:

1.1	System fluid	Oil OM15 (DTD585)
1.2	Reduced pressure range	1350 to 1650 lbf/in^2
1.3	Connections	0.125 in BSP
1.4	Length	7.14 in

Modification state

2 The information in this annex includes all appropriate modifications up to and including issue 10.

Introduction

3 This valve is similar to the type described in the general text but differs in the test and operating pressures, the provision of an improved spring, dimensional differences in the spring housing and the omission of washers from the ends of the spring.

Checking data

4 Spring 04809Y019

4.1 Number of working coils: 20

4.2 Wire size: 0.144 in (9 SWG)

4.3 Free length: 3.68 to 3.74 in

4.4 Check length: 3.17 in

4.5 Load at check length: 129 to 149 lbf.

Special tools and test equipment

5 The following special tools and test equipment are required to carry out the test procedures detailed.

Part No	Description	Application
-	Static hydraulic test rig (with power pump and separate hand pump)	Apply hydraulic pressure
-	Pressure gauge 0-2000 lbf/in^2 (with restrictor)	Indicate test pressure

Testing the unit

6 Using the equipment specified in paragraph 5, carry out the following tests.

6.1 Blank off the reduced pressure connection with the pressure gauge. Connect the power pump supply line of the test rig to the high pressure connection.

6.2 Gradually apply a pressure of 6000 lbf/in^2. The pressure registered on the gauge at the reduced pressure connection should not exceed 1750 lbf/in^2. Reduce the pressure at the high pressure connection to 4000 lbf/in^2. Leakage from the return connection at this pressure must not exceed 4 cm^3/min. Release the pressure at both connections.

6.3 Apply a pressure of 4000 lbf/in^2 at the high pressure connection. The pressure registered on the gauge at the reduced pressure connection should be between 1350 and 1650 lbf/in^2. If necessary, vary the number of shims at the outer end of the spring to obtain this requirement. Leakage from the return connection must not exceed 4 cm^3/min. Operate the valve at least 20 times to allow the spring to settle, then finally check the pressure setting. Release the pressure at both connections and remove the pressure gauge from the reduced pressure connection.

6.4 Connect the hand pump supply line to the reduced pressure connection. Operate the power rig and apply a pressure of 4000 lbf/in^2 at the high pressure connection. Apply pressure at the reduced pressure connection until fluid flows from the return connection. The pressure at which this occurs must not exceed 1700 lbf/in^2.

6.5 Gradually reduce the pressure at the hand pump. The flow from the return connection should cease when the pressure is between 1650 and 1350 lbf/in^2. The leakage from the return connection must not exceed 4 cm^3/min. Release the pressure and disconnect the supply lines.

6.6 Connect the hand pump supply line to the return connection and apply a pressure of 250 lbf/in^2. Leakage must not occur. Release the pressure and disconnect the supply line.

PARTS CATALOGUE AND RELATED INFORMATION

FOR

PRESSURE REDUCING VALVE

DOWTY AEROSPACE HYDRAULICS - CHELTENHAM

Part Nos C4973YMKA and 100073004

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
AC3612	*										
AC4107	*										
AC4211	*										

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

PARTS CATALOGUE AND RELATED INFORMATION (TOPIC 3)

MEMORANDUM OF INSTRUCTIONS

Demands

1 Requirements for demands are:

1.1 The demand must quote the appropriate Reference Number for each item. Unreferenced parts are not normally provisioned as spares and demands for such items must quote the 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, eg (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.

Fitting code (FC)

6 The FC 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 description. Modifications incorporated in the catalogue are listed in the Modification Record.

Manufacturers NATO code

9 The NATO supply code for manufacturers is an alpha-numeric code for non-US based approved manufacturers and a numeric code for US based approved manufacturers. Manufacturers details related to a specific code are contained in the following publications available from DCA, Kentigern House, 65 Brown Street, Glasgow G2 8EX.

99-H4-1 Name to Code
99-H4-2 Code to Name

Usage code

10 The usage code column is normally left blank indicating full applicability of all items. Where a code letter is shown, it indicates that all items with that letter form part of the same assembly or sub-assembly.

INDEX OF PART NUMBERS

Part Number	DMC	Reference Number	Fig/Index	C of S or LM	FC
SCREW, DRIVE PARKER KALON 0 x 1/8 IN DIA			1-15		
AGS1104A	28F	4730-99-1014970	1-1	C	
AGS1186A	28F	5330-99-9428452	1-2	C	
AGS1186B	28F	5330-99-9428453	1-4	C	
AGS566B	28R	4730-99-9719126	1-3	C	
AGS596A	28R	5340-99-9128964	1-19	C	
C4809Y2			1-17B		
C4809Y3			1-13		
C4973YMKA	27QM	4820-99-4117587	1	P	
C4973Y1			1-5		
C4973Y11			1-17C		
C4973Y4			1-17		
C4973Y7			1-17A		
D4809Y14			1-6A		
D4809Y6			1-14A		
D4809Y7			1-12A		
D4973Y12			1-14B		
D4973Y14	27Q	4820-99-4117588	1-12B	L	
D4973Y15	27Q	5310-99-7128076	1-7	C	
D4973Y2			1-12		
D4973Y3			1-14		
SP16G	28W	5310-99-9419488	1-10	C	
SP880A			1-20		
SP900-10	27QA	5330-99-5802282	1-11	C	
04809Y019			1-8A		
100073004	27QM	4820-99-4117594	1	P	
100073104			1-5A		
2000Y41			1-16		
4973Y5	27Q	5310-99-4117589	1-6	C	
4973Y6	27Q	5310-99-4117592	1-18	C	
500Y456	27Q	5360-99-4117591	1-8	C	
718Y17	27Q	5340-99-4117590	1-9	C	
750060110			1-11A		

DETAILED PARTS LIST

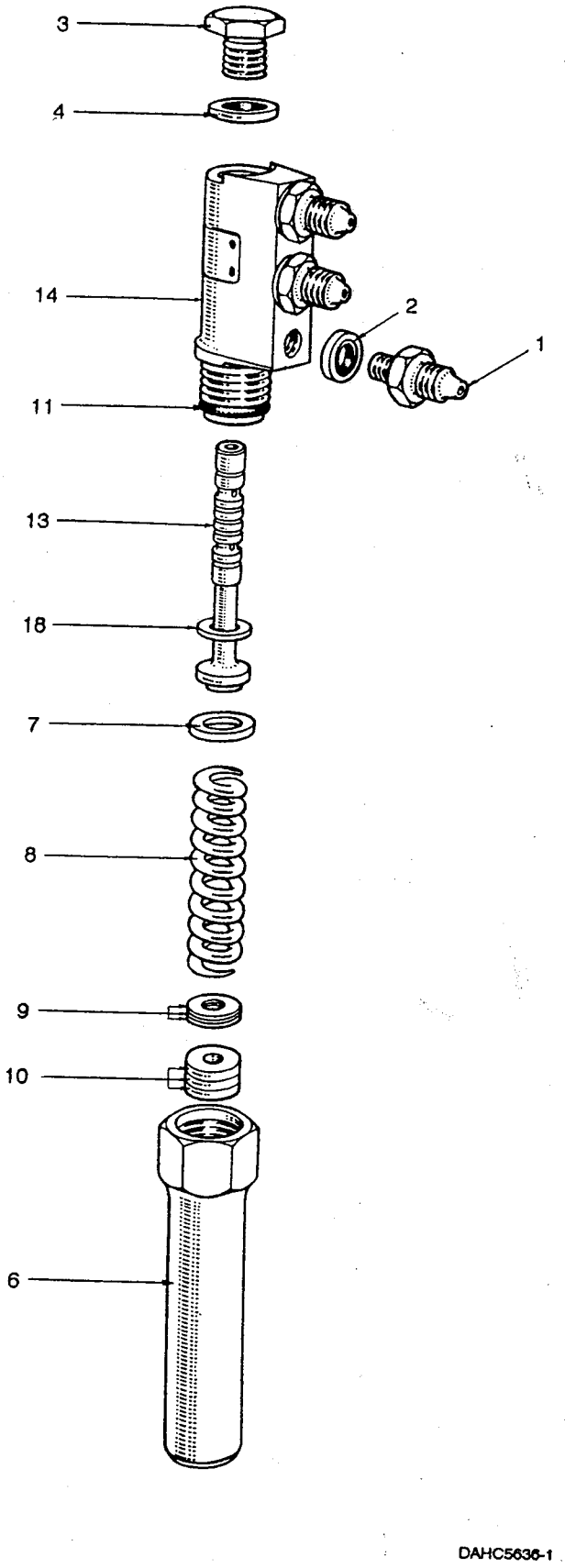

Fig 1 Pressure reducing valve

PRESSURE REDUCING VALVE

Fig/ Index No	Part No	1 2 3 4 5 6 Nomenclature	Mnfrs NATO Code	Usage Code	Units per Assy
1	C4973YMKA	Valve, pressure reducing (Mod AC4107)		A	RF
1+	100073004	Valve, pressure reducing (Mod AC4211)		B	RF
-1	AGS1104A	. Adapter			3
-2	AGS1186A	. Seal, bonded			3
-3	AGS566B	. Plug			1
-4	AGS1186B	. Seal, bonded			1
-5+	C4973Y1	. Valve assembly, reducing		A	1
-5A+	100073104	. Valve assembly, reducing		B	1
-6	4973Y5	. . Housing, spring		A	1
-6A+	D4809Y14	. . Housing, spring		B	1
-7	D4973Y15	. . Washer (Mod AC3612)		A	1
-8	500Y456	. . Spring		A	1
-8A+	04809Y019	. . Spring		B	1
-9	718Y17	. . Shim			AR
-10	SP16G	. . Washer		A	AR
-11	SP900-10 or 750060110	. . Seal, O-ring (Alternative)			1
-11A+		. . Seal, O-ring			1
-12+	D4973Y2	. . Body and piston sub-assembly, valve		A	1
-12A+	D4809Y7	. . Body and piston sub-assembly, valve		B	1
-12B+	D4973Y14	. . Body and piston sub-assembly, valve (Alternative to index 12 and 12A)			1

+ Item not illustrated

PRESSURE REDUCING VALVE

Fig/ Index No	Part No	1 2 3 4 5 6 Nomenclature	Mnfrs NATO Code	Usage Code	Units per Assy
1-13	C4809Y3	. . . Piston			1
-14	D4973Y3	. . . Body sub-assembly		A	1
-14A+	D4809Y6	. . . Body sub-assembly		B	1
-14B+	D4973Y12	. . . Body sub-assembly (Use with index 12B)			1
-15+	ND	. . . . Screw, drive (Parker Kalon 0 x 1/8 in dia)			4
-16+	2000Y41	. . . . Nameplate			1
-17+	C4973Y4	. . . . Body		A	1
-17A+	C4973Y7	. . . . Body (Alternative to index 17)		A	1
-17B+	C4809Y2	. . . . Body		B	1
-17C+	C4973Y11	. . . . Body (Use with index 14B)			1
-18	4973Y6	. . Washer		A	1
-19+	AGS596A	. Cap, dust (Storage and transit)			3
-20+	SP880A	. Washer, sealing (Storage and transit)			3

+ Item not illustrated