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PRESSURE RELIEF VALVE DOWTY AEROSPACE HYDRAULICS Part No C5853YMKB

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

BY COMMAND OF THE DEFENCE COUNCIL

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GENERAL

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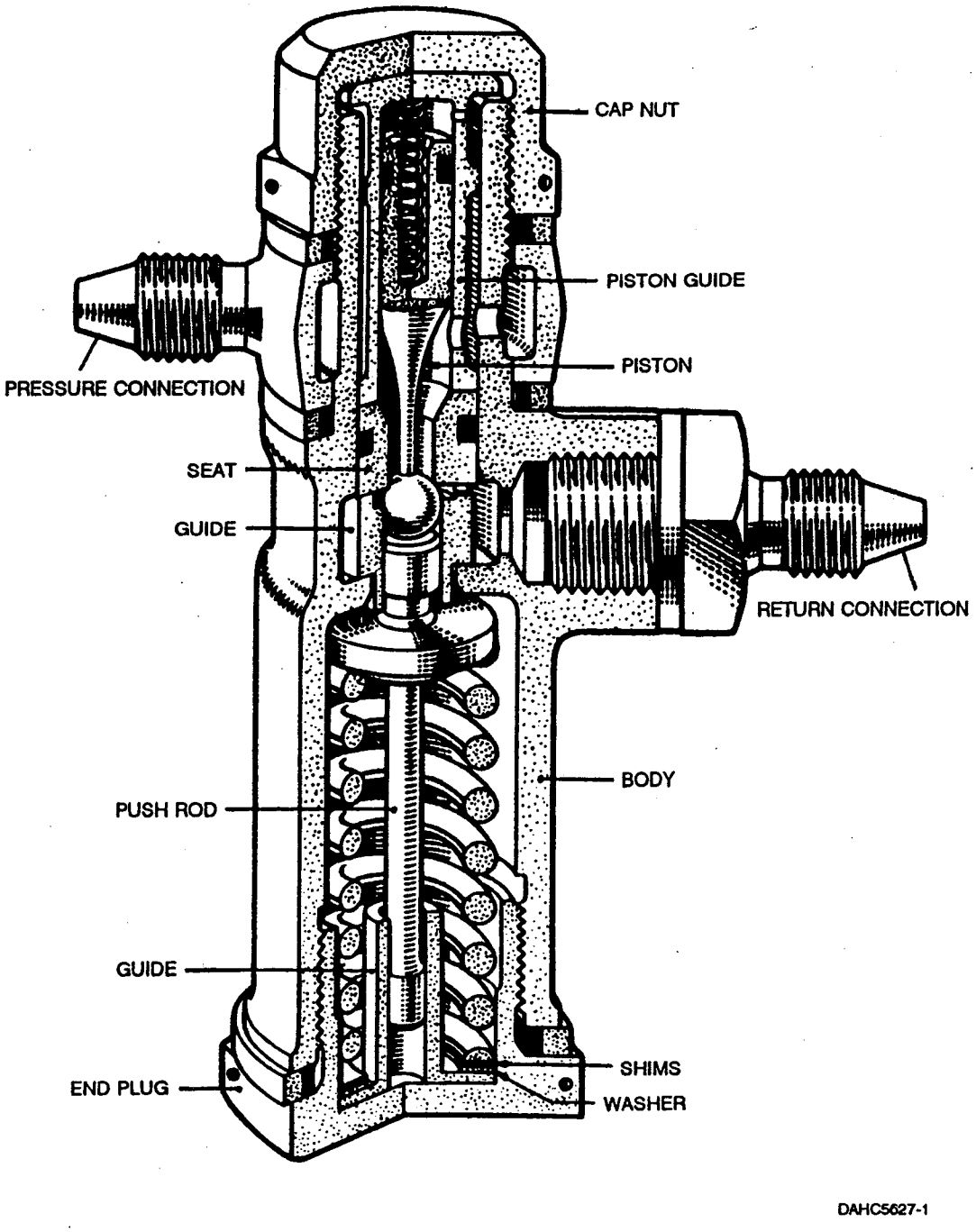

Fig 1 Pressure relief valve

Leading particulars

1 Leading particulars for the unit are as follows:

1.1	System fluid	Oil OM15 (DTD585)
1.2	Relief pressure	2300 to 2400 lbf/in^2
1.3	Reseat pressure	2200 lbf/in^2
1.4	Connections	0.125 in BSP

Modification state

2 The information in this publication includes all appropriate modification up to and including issue 7.

Introduction

3 The pressure relief valve allows fluid pressure in excess of a predetermined value to be relieved from the supply line to the return line.

Constructional description (Fig 1)

4 The pressure relief valve consists of a body which houses a push rod assembly below a ball and a piston assembly above it. The ball is housed in the upper of two guides and bears on a seat held against the guide by the piston guide. The piston assembly is secured in the body by a cap nut which also retains a banjo union pressure connection. The return connection is a standard adapter screwed into the body. The ball is held against the seat by a spring-loaded push rod, the lower end of which is mounted in the lower guide. The spring force on the ball can be adjusted by the number of shims fitted between the spring and a washer on the guide.

Functional description (Fig 1)

5 Inlet fluid passes through the holes in the body and piston guide to load the ball, and also passes into the top of the piston guide above the piston. When the fluid pressure exceeds a predetermined value, the ball lifts from its seat against the spring-loaded push rod and the excess pressure is relieved by the fluid passing through the open valve to the return connection.

6 When the ball lifts, the piston, which is spring-loaded in contact with the ball, follows the movement and has a steadying effect to eliminate chatter.

MAINTENANCE

Special tools and equipment

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

Part No	Description	Application
ST2426	Assembly post	Assembling
-	Trichloroethane (TS367D)	Cleaning
-	White spirit (BS245)	Cleaning
-	Oil OM15 (DTD585)	Assembling
-	Corrosion preventative PX1	Preservation
-	Locking wire (DTD189A)	Locking parts

Safety and maintenance notes

8 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

Dismantling (Fig 1)

WARNING

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

9 Discard the bonded seals and O-rings on removal from the unit.

9.1 Remove the union and bonded seal.

9.2 Remove the cap nut, bonded seals and banjo.

9.3 Withdraw the piston guide, extract the piston and remove the O-ring. Remove the spring.

9.4 Extract the seat, ball and guide: remove the O-ring from the seat.

NOTE

If difficulty is encountered in extracting the above details, remove the remaining details and push the assembly through.

9.5 Remove the end plug and bonded seal. Withdraw the guide and remove the shims and the washer.

9.6 Remove the spring and the push rod.

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.

10 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

11 Visually examine all parts for damage and corrosion. Check parts for permissible wear in accordance with fits and clearances paragraph 15.

Superficial damage

12 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:

12.1 Not exceeding 0.500 in long.

12.2 Not exceeding 0.010 in deep.

12.3 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

13 Spring 500Y32

13.1 Number of working coils: 28

13.2 Wire size: 0.0148 in (28 SWG)

13.3 Free length: 0.83 to 0.86 in

13.4 Check length: 0.475 to 0.505 in

13.5 Load at check length: 1.15 to 1.25 lbf.

14 Spring SP489-204

14.1 Number of working coils: N/A

14.2 Wire size: 0.127 in (approx)

14.3 Free length: 1.73 to 1.78 in

14.4 Check length: 1.205 to 1.280 in

14.5 Load at check length: 93.1 to 102.9 lbf.

Fits and clearances

15 Check that the dimensions are within the specified limits.

FITS, CLEARANCES AND REPAIR TOLERANCES

Ref No on Fig 2	Parts and Description	Dimension New	Permissible Worn Dimension		Permissible Clearance		Remarks
			Interchangeable Assembly	Selective Assembly	New	Worn	
1	PUSH ROD IN GUIDE						
	Guide i/d	0.252 / 0.251	0.253	0.253	0.008 / 0.004	0.010	
	Push rod o/d	0.247 / 0.244	0.243	0.242			
2	BALL IN GUIDE						
	Guide i/d	0.252 / 0.251	0.253	0.253	0.002025 / 0.000975	0.003025	
	Ball o/d	0.250025 / 0.249975	-	-			
3	PISTON IN PISTON GUIDE						
	Piston guide i/d	0.3130 / 0.3120	0.3150	0.3180	0.0020 / 0.0005	0.0070	
	Piston o/d	0.3115 / 0.3110	0.3080	0.3060			
4	SEAT IN BODY						
	Body i/d	0.5005 / 0.4995	0.5030	0.5040	0.0025 / 0.0005	0.0050	
	Seat o/d	0.4990 / 0.4980	0.4995	0.4945			

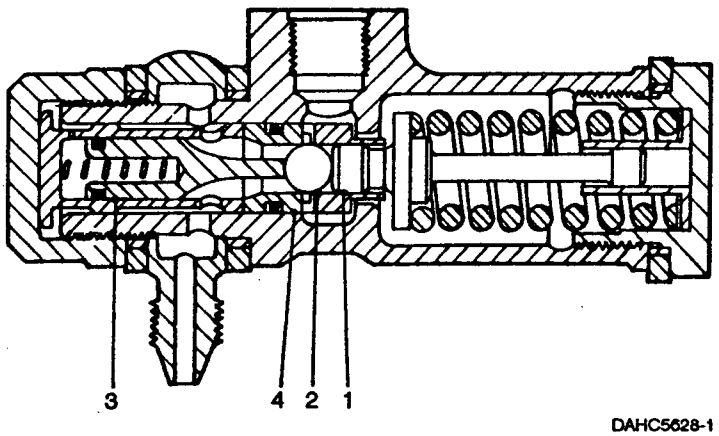

Fig 2 Fits and clearances

Assembling (Fig 1)

16 Lightly lubricate the bonded seals, O-rings and threaded details with clean oil OM15 before assembling the unit.

16.1 Position the guide for the ball against the shoulder in the body.

16.2 Locate the head of the push rod in the guide and position the spring over the push rod.

16.3 Assemble the washer to the guide followed by nine shims.

16.4 Fit the guide over the push rod and screw in the end plug to retain the assembly. The bonded seal is not to be fitted to the end plug at this stage of assembly, but will be fitted during the adjustment of the relief and reseating pressures.

16.5 Position the ball in the guide.

16.6 Assemble the O-ring to the valve seat using the assembly post ST2426. Insert the valve seat in the body against the ball.

16.7 Fit the spring to the piston and insert the piston in the piston guide. Insert the assembly in the body with the stem of the piston against the ball.

16.8 Fit a bonded seal on each side of the union and slide the union over the body. Screw on the cap nut to retain the union and the piston assembly.

16.9 Fit a bonded seal to the adapter for the outlet connection and screw it into the body.

16.10 After satisfactory testing, wirelock the end plug to the cap nut and the cap nut to the adapter.

TESTING

Special tools and test equipment

17 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 capable of delivering 0.5 gal/min at 2500 lbf/in^2)	Apply hydraulic pressure
-	Separate hand pump supply (with pressure gauge)	Additional pressure source

Testing the unit (Fig 1)

18 The unit under test and the test circuit must be hydraulically full before commencing the test. During the test, the fluid temperature must not exceed 45°C.

18.1 Connect the test rig hand pump delivery line to the inlet connection, operate the pump and adjust the end plug to obtain a relief pressure within the limits of 2300 to 2400 lbf/in^2.

18.2 Operate the power pump and adjust the by-pass control valve to limit the pump pressure between 2450 and 2550 lbf/in^2. Using the rig selector valve, operate the relief valve for 20 cycles (ie. to relieve the valve and then allow it to reseat is one cycle).

18.3 With the power pump operated to a pressure of 2300 to 2400 lbf/in^2, check that the valve is relieved and that the flow of fluid from the outlet connection is at a rate between fast drops and a continuous trickle. Adjust the end plug to obtain this condition and check the relief pressure at least three times.

18.4 Operate the pump to pass a full flow of fluid through the valve but ensure that the pressure applied does not exceed 2550 lbf/in^2. Reduce the pressure slowly until fluid ceases to flow from the outlet connection and leakage does not exceed 10 drops per minute. The pressure at the inlet connection should not be less than 2200 lbf/in^2. Repeat this operation at least three times. Discontinue the operation of the pump and release the pressure.

18.5 Insert the bonded seal for the end plug in the gap between the end plug and body of the valve. Measure the residual gap between the bonded seal and the end plug. The dimension will denote the thickness of shims that must be removed from the pack of nine shims to give the correct assembly.

18.6 Remove the end plug and the surplus shims. Each shim is 1/64 in thick with laminated thicknesses of 0.002 to 0.003 in. Fit the bonded seal to the end plug and screw the end plug into the body.

18.7 Operate the power pump and check that the valve is relieved and re-seated at 2300 to 2400 lbf/in^2 and 2200 lbf/in^2 respectively. Re-adjust the shim pack if necessary. For adjustment purposes, 0.010 in shim thickness will alter the pressure by approximately 35 lbf/in^2. Discontinue the operation of the power pump.

18.8 With the test rig hand pump delivery line connected to the inlet connection, slowly apply a pressure of 300 lbf/in^2 and then gradually increase it to 2000 lbf/in^2. Leakage must not occur. Increase the pressure to 2200 lbf/in^2. Leakage from the outlet connection should not exceed 6 drops per minute. Release the pressure.

18.9 Connect the separate hand pump with a pressure gauge to the outlet connection slowly operate the pump to a pressure of 100 lbf/in^2 and then gradually increase it to 500 lbf/in^2. Leakage must not occur.

18.10 Operate the hand pump at the inlet connection to 2000 lbf/in^2 and then increase the pressure at the outlet connection to between 2300 and 2400 lbf/in^2. Maintain the pressure at the outlet connection and increase the pressure at the inlet connection to 4000 lbf/in^2. Leakage must not occur. Any internal leakage will be indicated by a noticeable increase in the pressure shown on the gauge at the outlet connection. This pressure must not be allowed to increase above 2500 lbf/in^2. Slowly release the pressure at the outlet connection first, and then release the pressure at the inlet connection.

18.11 Operate the power pump and check that the relief and reseating pressures are correct. Remove the valve from the test rig.

PARTS CATALOGUE AND RELATED INFORMATION

FOR

PRESSURE RELIEF VALVE

DOWTY AEROSPACE HYDRAULICS - CHELTENHAM

Part No C5853YMKB

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
AC3503	*										
AC5959	*										

* 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
BALL, 1/4 IN DIA			1-15		
AGS1186B	28F	5330-99-9428453	1-2	C	
AGS1186CC	28F	5330-99-9428454	1-7	C	
AGS1186E	4F	5330-99-6396100	1-18	C	
AGS596A	28N	5340-99-9128964	1-25	C	
C5853YMKB	27QM	4820-99-4117568	1	P	
C5853Y2			1-24	MR	
D5653Y14			1-5		
SP489-204	27Q	5340-99-4117553	1-22	C	
SP758B	27Q	4730-99-4117585	1-1	C	
SP900B3	27QA	5330-99-2000872	1-11	C	
SP900-7	27QA	5330-99-9431638	1-14	C	
100002060			1-4A	MR	
2000Y15		5340-99-4170071	1-3	C	
2000Y177	27Q	9905-99-4117577	1-4	MR	
500Y32	27Q	5360-99-4117584	1-12	C	
5853Y10	27Q	4820-99-4117579	1-23	C	
5853Y11			1-17		
5853Y12	27Q	5365-99-4679161	1-21	C	
5853Y15	27Q	5310-99-4117586	1-20	C	
5853Y3	27Q	4820-99-4117572	1-16	C	
5853Y4			1-13		
5853Y5	27Q	4820-99-4117573	1-9	C	
5853Y6			1-10		
5853Y7			1-8		
5853Y8			1-6		
5853Y9	27Q	4820-99-4117574	1-19	C	
750010103			1-11A		
750060107			1-14A		

DETAILED PARTS LIST

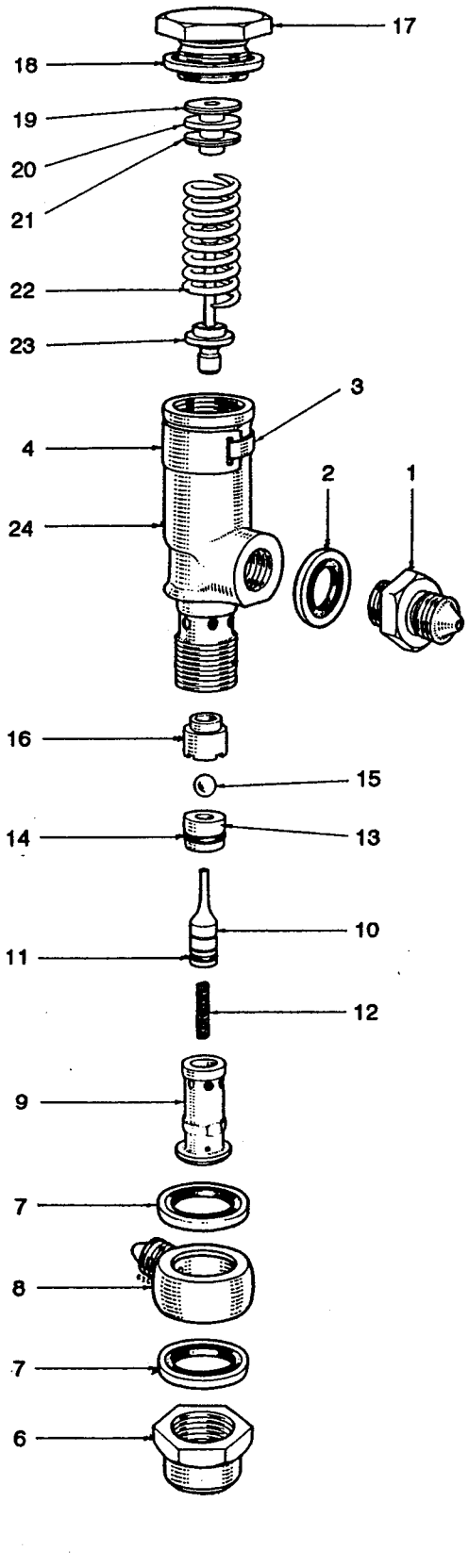

Fig 1 Pressure relief valve

PRESSURE RELIEF VALVE

Fig/ Index No	Part No	1 2 3 4 5 6 Nomenclature	Mnfrs NATO Code	Usage Code	Units per Assy
1	C5853YMKB	Valve, pressure relief (Mod AC3503)			RF
-1	SP758B	. Union			1
-2	AGS1186B	. Seal, bonded			1
-3	2000Y15	. Strap			1
-4	2000Y177	. Nameplate (Mod AC3503)			1
-4A+	or 100002060	. Nameplate (Mod AC5959)			1
-5+	D5653Y14	. Valve sub-assembly, pressure relief			1
-6	5853Y8	. . Nut, cap			1
-7	AGS1186CC	. . Seal, bonded			2
-8	5853Y7	. . Banjo			1
-9	5853Y5	. . Guide, piston			1
-10	5853Y6	. . Piston			1
-11	SP900B3	. . O-ring			1
-11A+	or 750010103	(Alternative) . . O-ring			1
-12	500Y32	. . Spring			1
-13	5853Y4	. . Seat			1
-14	SP900-7	. . O-ring			1
-14A+	or 750060107	(Alternative) . . O-ring			1
-15	ND	. . Ball, 1/4 in dia			1
-16	5853Y3	. . Guide			1
-17	5853Y11	. . Plug, end			1
-18	AGS1186E	. . Seal, bonded			1
-19	5853Y9	. . Guide			1

+ Item not illustrated

PRESSURE RELIEF VALVE

Fig/ Index No	Part No	1 2 3 4 5 6 Nomenclature	Mnfrs NATO Code	Usage Code	Units per Assy
1-20	5853Y15	. . Washer			1
-21	5853Y12	. . Shim			5 (max)
-22	SP489-204	. . Spring			1
-23	5853Y10	. . Rod, push			1
-24	C5853Y2	. . Body			1
-25+	AGS596A	. Cap, dust (Storage and transit)			2

+ Item not illustrated