

SA 66



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March 1988

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dated November 1971)

# PRESSURE REDUCING VALVES

## HYMATIC TYPES

### PS 48/8 Mk. 2 and PS 48/42

**GENERAL AND TECHNICAL INFORMATION (=1)**  
**GENERAL ORDERS AND MODIFICATIONS (=2)**  
**PARTS CATALOGUE AND RELATED INFORMATION (=3)**

BY COMMAND OF THE DEFENCE COUNCIL

*Mine Whitmore.*

Ministry of Defence

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the channel prescribed for the purpose in:

Naval Aircraft Maintenance Manual (RN)

AP 100B-01 Order 0504 (RAF)

## AMENDMENT RECORD

Amend	Incorporated by	Date
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## RECORD OF ADVANCE INFORMATION LEAFLETS (AIL)

## RECORD OF SERVICE TEMPORARY AMENDMENT LEAFLETS (STAL)

Insert specific identity of STAI

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Modification leaflets

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Preface  
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Index of part numbers  
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### USE OF AMENDMENT INDICATORS

Changes of technical import are identified within this publication by triangle indicators positioned outside the type area thus: ►-----◀

## MODIFICATION RECORD

The following record confirms that the Topic 1 of this publication incorporates all technical changes necessitated by the modifications listed below. Further information on modification titles, classification categories and Mark applicabilities may be found in Topic 2.

Mod No	Brief details	Class
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PRESSURE REDUCING VALVESHYMATIC TYPES PS8/8 Mk.2 and PS 48/42

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LEADING PARTICULARS

Type	PS 48/8 Mk.2	PS 48/42
Part No.	C51886	C52204
Nato Stock No.	6685-99-449-7179	6685-99-449-7269
Inlet pressure	1 to 8.6 bar (15 to 125 lbf/in. <sup>2</sup> )	1.4 to 13.7 bar (20 to 200 lbf/in. <sup>2</sup> )
Outlet pressure	0.7 bar (10.0 lbf/in. <sup>2</sup> nominal)	1.1 to 1.2 bar (16 to 18 lbf/in. <sup>2</sup> )
Dimensions		
Length	193 mm (7.6 in.)	193 mm (7.6 in.)
Diameter	48 mm (1.88 in.)	48 mm (1.88 in.)
Connections		
Inlet	5/8 BSP Internal cone	3/4 BSP Internal thread
Outlet	3/4 BSP Internal cone	3/4 BSP Internal cone
Vent	3/8 BSP Internal cone	3/8 BSP Internal cone
Weight	0.63 kgf (1.4 lbf)	0.54 kgf (1.2 lbf)
Modification state	Issue 3	Issue 2

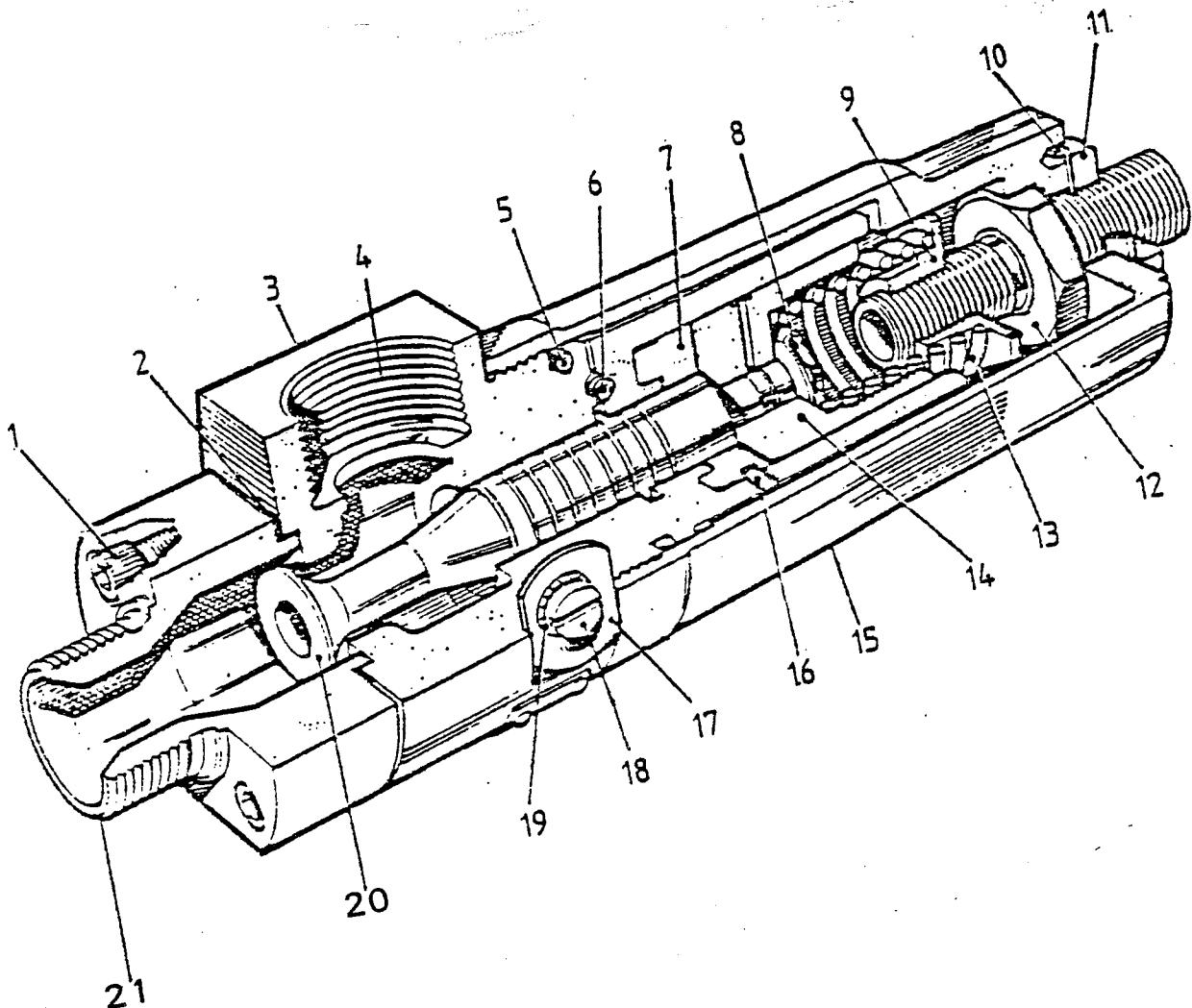
INTRODUCTION

- 1 These valves are used to reduce the pressure and flow of an air supply to the requirements of a particular system.

DESCRIPTION (Fig 1)

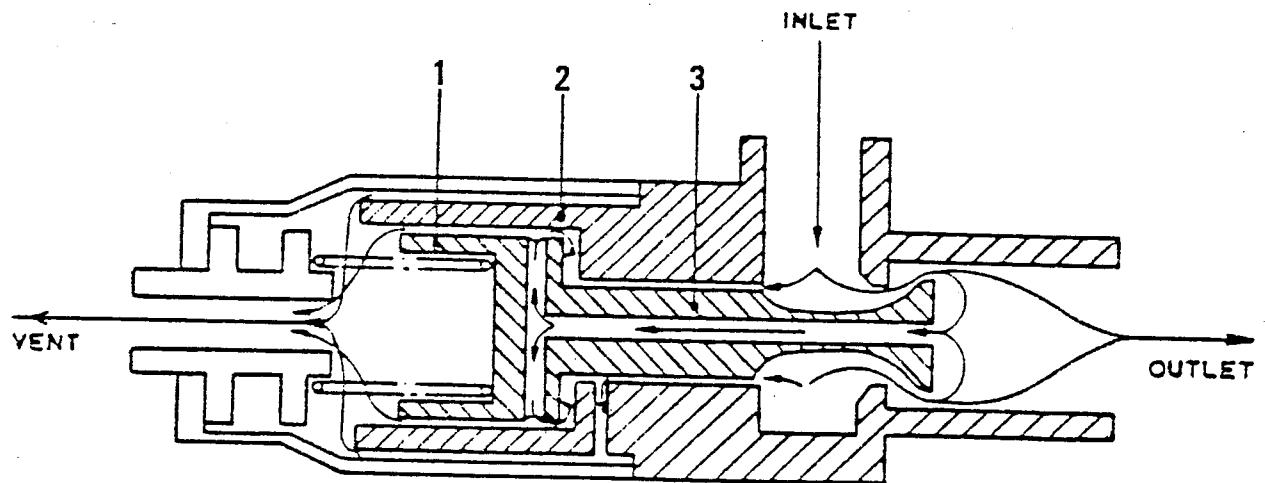
2 The two valves are similar in construction and operation but have the following minor differences:

- 2.1 Each valve has a different working pressure.
- 2.2 PS 48/8 Mk2 has a lower spring setting than PS 48/42.
- 2.3 PS 48/42 has no inlet union fitted.



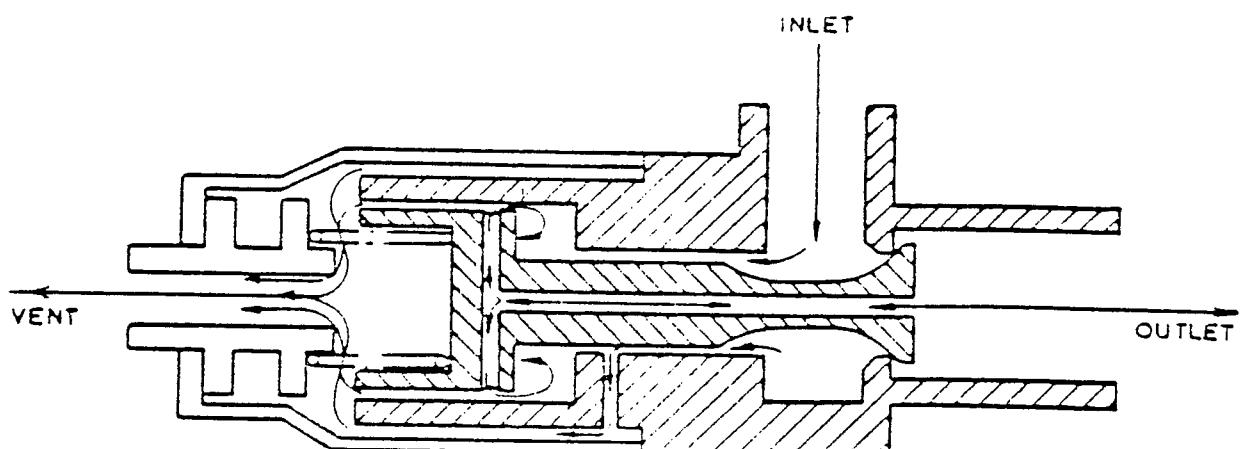
1	Screw, socket head	12	Union, vent
2	Joint washer	13	Spring
3*	Body	14*	Piston
4	Inlet	15	Cover, bottom
5	'o'-ring	16*	Peg
6*	Screw bleed	17	Plate, locking
7*	Insert	18	Lock screw
8	Twicklip	19	Washer, shakereproof
9	Carrier, spring	20*	Poppet
10	Washer, tab	21	Outlet adaptor
11	Locknut		

Fig 1 Reducing Valve Type PS 48/42



- 1 Piston
- 2 Body
- 3 Poppet

Stage 1 pressurising



Stage 2 pressurised

Fig 2 Diagrammatic operation

OPERATION (Fig 2)

3

3.1 The clearances between the poppet and bore and the piston and bore are greatly exaggerated in the illustration so that the air flow path can be readily indicated.

3.2 In the unpressurised condition the poppet is held fully open by the main spring load.

3.3 Air entering the valve through the inlet port, passes to the outlet via the open poppet valve. The outlet air also passes through an axial and radial drilling in the poppet and a radial drilling in the piston to the chamber behind the piston, so exerting a load on the piston in opposition to the spring load as shown in Stage 1.

3.4 As the outlet pressure increases, the air load on the piston increases and compresses the spring until, at the adjusted outlet pressure, the poppet is closed onto its seat as shown in Stage 2.

3.5 Usage of outlet air causes a pressure drop in the chamber behind the piston and the poppet moves from its seat sufficiently to maintain the required outlet pressure and flow.

3.6 Inlet air, which passes through the clearance between the poppet valve stem and the bore of the body, passes round the skirt of the body and exhausts through the vent. Outlet air which passes through the clearance between the piston and the bore of the body to the vent end of the piston, exhausts through the vent.

3.7 The passage of air through the vent union must not be blocked or restricted.

SERVICINGTOOLS, TEST EQUIPMENT AND MATERIALS

4

4.1 Twicklip pliers Hymatic Part No. DMT 993.

4.2 Hexagon wrench key for socket head screws.

4.3 Trichloroethane.

4.4 A nap free cloth.

4.5 Test rig Ref. No. 4G/9413.

DISMANTLING (Fig 1)

5 Note ...

The starred items indicated on the illustration (Fig 1) form a body group of which the body (3), piston (14), poppet (20), insert (7) and pegs (16) are a matched assembly. None of these items can be interchanged with new separate items or with items from another valve. The bleed screw is set by the manufacturer and must not be disturbed.

5.1 Unscrew the inlet union from the PS 48/8 Mk.2 and discard the joint washer.

Note ...

The remaining dismantling instructions refer to both valves.

5.2 Release the tab washer (10) securing the vent union locknut (11), remove the locknut and discard the tab washer.

5.3 To minimise the load of the mainspring (13), push the vent union (12) inwards about 6.3 mm (0.25 in.), to clear the flats of the hexagon from the flats in the bottom cover (15), and turn the union clockwise. The flats must be pushed clear each time the vent union is turned. Turn until the spring carrier (9) is felt to bottom on the thread of the union.

5.4 Remove the lock screw (18), shakeproof washer (19) and locking plate (17) securing the bottom cover. Discard the shakeproof washer and locking plate.

5.5 Unscrew and remove the bottom cover. Remove the spring, remove the vent union from the bottom cover and remove the spring carrier from the vent union.

5.6 Remove and discard the 'O'-ring (5) from the groove in the body (3).

5.7 Remove the four screws (1) securing the outlet adapter (21). Remove the adapter and discard the joint washer (2).

5.8 Remove the Twicklip (8) with the Twicklip pliers, push the poppet (20) clear of the piston (14) and remove the piston and poppet from the body. Discard the Twicklip.

5.9 Do not remove the pegs (16) and insert (7) from the body.

#### EXAMINING (Fig 1)

6

6.1 Clean the parts in trichloroethane and dry off with low pressure clean dry air.

6.2 Examine the sliding surfaces of the piston and poppet and the bores of the body for scoring or fretting. Ensure that there is no evidence of deterioration of surface treatment. Ensure that the pegs securing the insert are secure in the body. Ensure that the valve seats, under the poppet head and in the body, are not damaged. Check that the bleed screw is secure in the body.

6.3 Check that all threads are serviceable and that the cones of the unions are not damaged. The internal thread in the piston is used for machining purposes and does not need checking.

6.4 If the piston (14), poppet (20) or body (3) are found to be unserviceable the body group must be discarded and a new group used for replacement. In this event the nameplate must be transferred to the new group and secured with four drive screws.

6.5 Check the springs to the requirement of Table 1.

TABLE 1 SPRING DATA

Item	Working Length mm (in.)	Load at working length kgf (lbf)
Spring PS 48/8 Mk 2	22.9 (0.9)	5.4 $\pm$ 0.8 (12.0 $\pm$ 1.8)
Spring PS 48/42	22.9 (0.9)	11.4 $\pm$ 0.57 (25.0 $\pm$ 1.25)

REPAIR

7 Repair consists of renewing any parts that do not pass inspection. In situ or special repair schemes do not apply to these valves.

ASSEMBLING (Fig 1)

8

8.1 Polish the sliding surfaces of the poppet (20) and piston (14) and the bores of the body (3) with a nap free cloth. Insert the poppet in the bore of the body. Supporting the head of the poppet with one finger, insert the piston and push it onto the poppet spigot until it is hard against the shoulder. Using the Twicklip pliers, place the new Twicklip (8) in position on the spigot. Use a small screwdriver or similar tool to push each of the four tongues of the Twicklip down until they snap into the groove in the poppet spigot. The correct fitting of the Twicklip is essential.

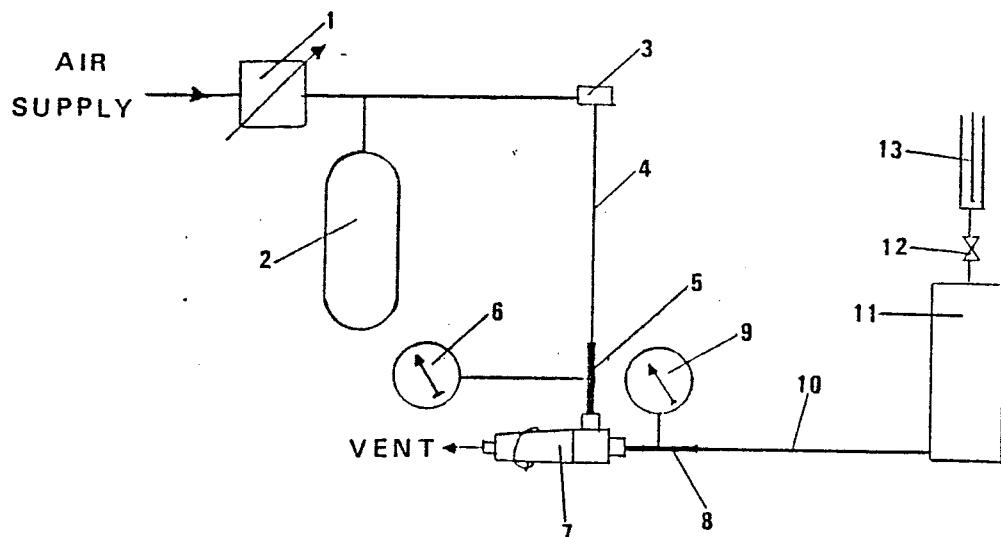
8.2 Check, by moving the assembly axially with fingers, that there is no feeling of friction and that, with the body held in a vertical position the assembly falls slowly to the limit of its travel.

8.3 Position a new joint washer (2) on the outlet adapter (21) and secure the adapter to the body with the four socket head screws (1). Evenly tighten the screws to a torque loading of 2.2-2.8 Nm (20-25 lbf in.). Lock the screws by peening the edge of the recess against the screw head with a rectangular ended punch, at two diametrically opposed positions.

8.4 Screw the spring carrier (9) onto the vent union (12), insert the union in the bottom cover (15) and loosely fit the new tab washer (10) and the locknut (11). Fit a new 'O'-ring (5) in the groove in the body, place the spring (13) in position inside the piston, screw on and tighten the bottom cover.

8.5 Lock the bottom cover (15) with the new locking plate (17), shakeproof washer (19) and lock screw (18).

8.6 PS 48/8 Mk 2. Position a new joint washer on the inlet (4) union and screw in and tighten the union.



1 Control valve	8 Gauge connection DMT/1085/F
2 Receiver	9 Outlet gauge.
3 Filter	10 Tube 12.7 mm (0.5 in. O/D x
4 Flexible pipe	22 SWG x 457.6 mm (18 in.) long
5 Gauge connection DMT/1085/E	11 Receiver
6 Inlet gauge	12 Stop valve
7 Reducing valve	13 Flowmeter

Fig 3 Test layout PS 48/8 Mk 2

TESTING PS 48/8 Mk 2 (Fig 3)

9

9.1 Connect the valve to the test rig as shown in Fig 3, with the long axis horizontal.

9.2 Apply an inlet pressure of 2.1 bar (30 lbf/in.<sup>2</sup>) and adjust the valve on test to control the outlet pressure to 0.7 bar (10.0 lbf/in.<sup>2</sup>) with the flow controlled to 142 litre/min (5.0 ft<sup>3</sup>/min). Turn the vent union clockwise to decrease and anti-clockwise to increase the outlet pressure.

Note ...

Sub-para 9.2 is a nominal setting and the valve may be re-adjusted to meet the requirements of sub-paras 9.3 and 9.4.

9.3 Check that at an inlet pressure of 0.34 bar (5.0 lbf/in.<sup>2</sup>) the outlet pressure does not fall below 0.27 bar (4.0 lbf/in.<sup>2</sup>) when the flow is controlled at 283 litre/min (10.0 ft<sup>3</sup>/min).

9.4 Check that the valve meets the outlet pressure requirements at the flows and inlet pressures specified in table 2.

TABLE 2 PRESSURE AND FLOW DATA PS 48/8 Mk2

Inlet pressure bar (1bf/in. <sup>2</sup> )	Flow litre/min. (ft <sup>3</sup> /min)	Outlet pressure bar (1bf/in. <sup>2</sup> )
1 (15)	14.2-28.3 (0.5-1.0)	0.6-0.7 (9.5-10.5)
4.1 (60)	14.2-28.3 (0.5-1.0)	0.6-0.7 (9.5-10.5)
1.7-8.6 (25-125)	7.1 (0.25)	0.6-0.7 (9.5-10.5)
1.7-8.6 (25-125)	28.3 (1.0)	0.6-0.7 (9.5-10.2)
1.7-8.6 (25-125)	142 (5.0)	0.6-0.7 (9.5-10.2)
1.7-8.6 (25-125)	283 (10.0)	0.6-0.7 (9.3-10.2)

9.5 The vent leakage to atmosphere must not exceed 56.6 litre/min (2.0 ft<sup>3</sup>/min) under any condition.

9.6 After each check lightly tap the pipe line in the vicinity of the valve on test to simulate vibration. Any oscillation set up in the valve by this simulated vibration must not be excessive, must not be of increasing amplitude and there must be no variation in pressures outside the limits specified. Any oscillation must cease when tapping is discontinued.

9.7 Shut off the air supply. Close the stop valve. Blank off the vent connection.

9.8 Apply a pressure of 0.7 bar (10.0 1bf/in.<sup>2</sup>) and check for external leaks. Leakage not exceeding 100 cm<sup>3</sup>/hour (6 in.<sup>3</sup>/hour) is permitted.

9.9 Release the pressure and remove the blank from the vent connection.

9.10 Tighten the vent union locknut and lock it with the tab washer.

9.11 Turning the valve through 360° in 45° stages, as indicated by the arrow in the diagram, check that the valve continues to function within the limits specified and that oscillation does not increase.

9.12 Release all pressure, remove the valve from the test rig and fit protective covers to the inlet, outlet and vent connections.

#### TESTING PS 48/42 (Fig 4)

10

Note ...

Stop valve 'A' is included in the test layout and adjusted as instructed in sub-paras. 10.3 and 10.4 to simulate the pressure drop created in the aircraft system. When this setting has been carried out, stop valve 'A' must not be touched during the setting and testing of the PS 48/42.

10.1 Connect the PS 48/42 to the test rig as shown in Fig 4, with the long axis horizontal.

10.2 Fit a blanking cap to the vent connection.

10.3 Fully open stop valves A and B.

10.4 Adjust the control valve and stop valves A and B until 1.2 bar (17 lbf/in.<sup>2</sup>) is registered on gauge A, 1 bar (15.0 lbf/in.<sup>2</sup>) is registered on gauge B and 1642 litre/min (58.0 ft<sup>3</sup> per min) is registered on the flowmeter.

10.5 Close the control valve. Remove the blanking cap from the vent.

Note ...

Stop valve A must remain in this set position during the whole of the setting and testing of the PS 48/42 and all outlet pressure readings must now be taken on gauge A.

10.6 Apply an inlet pressure of 6.9 bar (100 lbf/in.<sup>2</sup>) and adjust the PS 48/42 to control the outlet pressure to 1.2 bar (17.0 lbf/in.<sup>2</sup>) with the flow controlled to 283 litre/min (10.0 ft<sup>3</sup>/min) by stop valve B. Turn the vent union clockwise to decrease and anti-clockwise to increase the outlet pressure.

Note ...

Sub-para 10.6 is a nominal setting and the PS 48/42 may be re-adjusted to meet the requirements of sub-para 10.7.

10.7 Check that the valve meets the outlet pressure requirements at the flows and inlet pressures specified:

TABLE 3 PRESSURE AND FLOW DATA PS 48/42

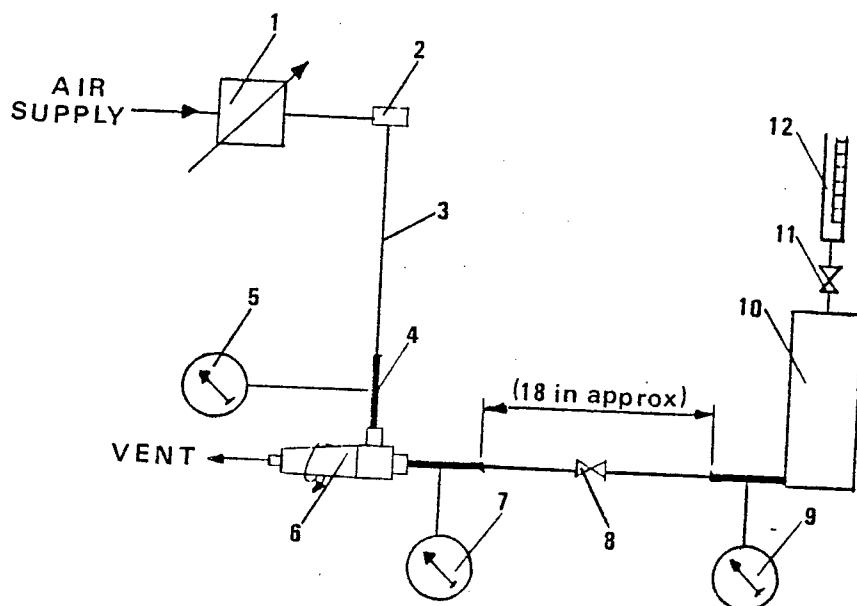
Inlet pressure bar (lbf/in. <sup>2</sup> )	Flow Litre/min (ft <sup>3</sup> /min)	Outlet pressure bar (lbf/in. <sup>2</sup> )
1.4 (20)	5.6- 240 (0.2-8.5)	1.1-1.2 (16-18)
3.4 (50)	14.1- 852 (0.5-30.1)	1.1-1.2 (16-18)
6.9 (100)	28.3-1401 (1.0-49.5)	1.1-1.2 (16-18)
10.3 (150)	42.4-1642 (1.5-58.0)	1.1-1.2 (16-18)
13.8 (200)	56.6-1302 (2.0-46.0)	1.1-1.2 (16-18)

10.8 The vent leakage to atmosphere must not exceed 56.6 litre/min (2.0 ft<sup>3</sup>/min) under any condition.

10.9 After each check lightly tap the pipe line in the vicinity of the valve on test to simulate vibration. Any oscillation set up in the valve by this simulated vibration must not be excessive. must not be of increasing amplitude and cease when tapping is discontinued. If the outlet pressures fluctuate very slowly without exceeding the specified limits the valve may be accepted.

10.10 Turning the valve through 360° in 45° stages, as indicated by the arrow in the diagram, check that the valve continues to function within the specified limits and that oscillation does not increase.

10.11 Release all pressure, remove the valve from the test rig and fit protective caps to the outlet and vent connection, and a protective plug in the inlet connection.



1 Control valve	7 Gauge A
2 Filter	8 Stop valve A
3 Flexible tube	9 Gauge B
4 Hymatic gauge connection DMT/1085/5	10 Receiver
5 Inlet gauge	11 Stop valve B
6 Valve on test	12 Flowmeter

Fig 4 Test layout PS 48/42

GENERAL ORDERS AND MODIFICATIONS

## PREFACE

1 Material issued for inclusion in this Topic 2 should be filed in the following order:

1.1 Preface (this page).

1.2 General orders. These leaflets are identified by the prefix 'GO' to the leaflet numbers and should be filed in numerical order.

1.3 Equipment modification list. This list shows all approved MOD modifications affecting the subject of this Topic 2, including those for which leaflets will not be issued. The list will be reissued periodically. As modification leaflets are inserted, suitable entries should be recorded in the applicable columns of this list.

1.4 Modification leaflets. Leaflets bear numbers allotted in sequence as the leaflets are sent to press and should be filed in numerical order.

2 When a complete leaflet or individual leaf is reissued in amended form the alterations are indicated by triangles thus ►-----◀ to show where text has been changed.

## EQUIPMENT MODIFICATION LIST

MOD Mod. No.	Contractor Mod. No.	Mod. plate strike No.	Modification title	Class	Leaflet No.

PARTS CATALOGUE AND RELATED INFORMATION

## MODIFICATION RECORD

MOD No.	AL No.								

\* INCORPORATED IN INITIAL ISSUE OF CATALOGUE  
NA MOD NOT APPLICABLE TO THIS CATALOGUE  
C MOD CANCELLED  
AS AMENDMENT SHEET

## PARTS CATALOGUE AND RELATED INFORMATION

## PREFACE

## DEMANDS

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 aircraft or equipment. The location of each part within the equipment should be clearly indicated.

(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.

## 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 purchase of the item will be made but the part is to be used until stocks are exhausted.

## MODIFICATION

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	ICY MR	C of S
29C	5310-99-100-6946	AGS 2035/C		-12		C
28N	5340-99-101-1742	AGS 597/C		-27		C
28N	5340-99-913-7397	AGS 597/E		-28		C
27VB	5330-99-102-9777	D9083		-14		C
28F	5310-99-120-0995	AGS 1138/D		- 3		C
27VB	6685-99-449-7179	C51886		1-		P
27VB	6685-99-449-7269	C52204		1-		P
28S	5305-99-913-1779	A31/C8		-11		C
28N	5340-99-101-1788	AGS597/F		-29		C
27VB	5310-99-949-9374	D9619		- 4		C
27VB	5330-99-949-9376	D9592		-19		C
27VB	5310-99-949-9389	D9595		-13		C

## INDEX OF PART NUMBERS

Part Number	Vocab Sect.	NATO Stock No., Ref. No. or LM	Chap. No.	Fig. Index No.
AGS 597/C	28N	5340-99-101-1742		-27
AGS 597/E	28N	5340-99-913-7397		-28
AGS 597/F	28N	5340-99-101-1788		-29
AGS 1138/D	28F	5310-99-120-0995		- 3
AGS 1148/C	28F	5310-99-912-8915		- 5
AGS 2035/C	29C	5310-99-100-6946		-12
A-AA-182040-03				-32
A-FS-631808-01				-16
A 31/C8	28S	5305-99-913-1779		-11
C51610				- 9
C51611				-20
C51613				-26
C51615				-25
C51652				-17
C51886	27VB	6685-99-449-7179	1-	
C52204	27VB	6685-99-449-7269	1-	
D10659				-33
D12167/1				-23
D12167/2				-24
D12168				-22
D12663/6				-15
D13204				- 6
D75120/B2				-31
D9081				-30
D9083	27VB	5330-99-102-9777		-14
D9217				-18
D9266				- 7
D9589				-21
D9590				-10
D9591				- 8
D9592	27VB	5330-99-949-9376		-19
D9594				- 2
D9595	27VB	5310-99-949-9389		-13
D9610				- 1
D9619	27VB	5310-99-949-9374		- 4

DETAILED PARTS LIST

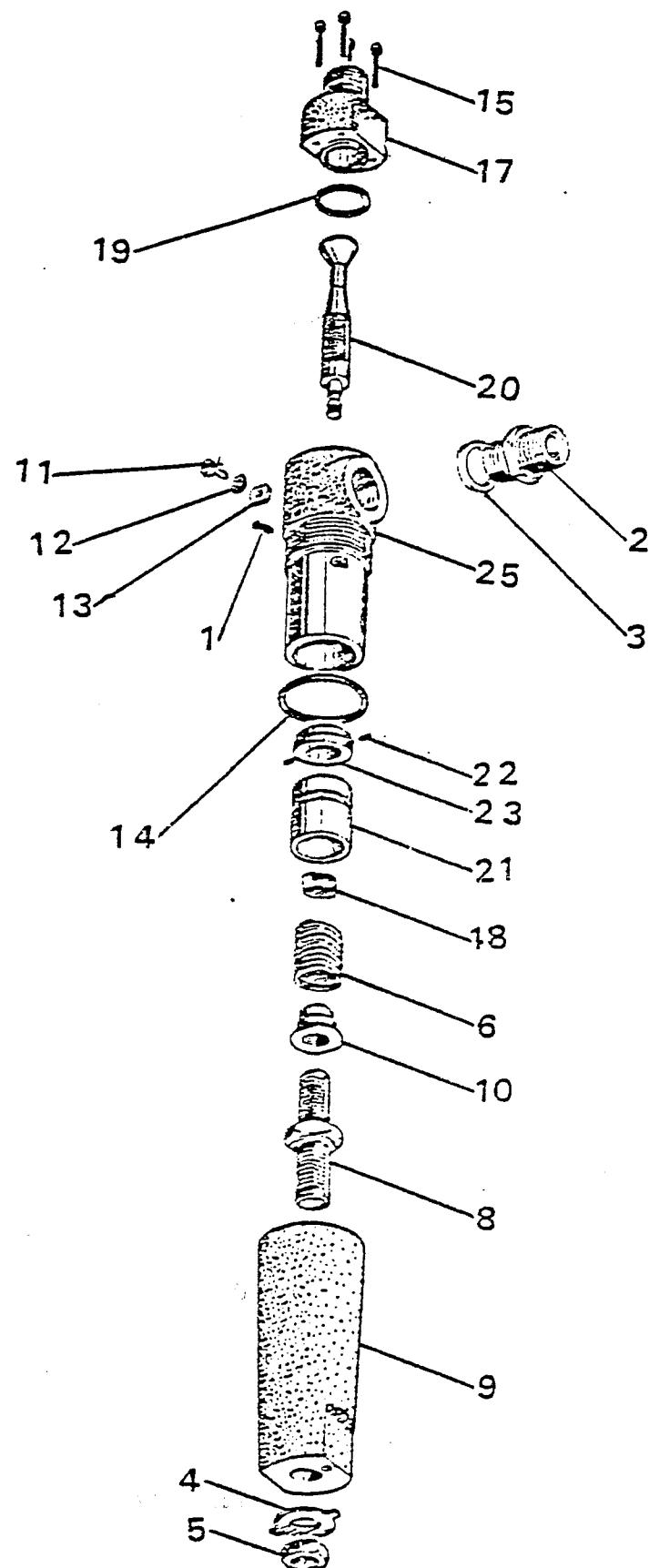


Fig 1 Reducing valve Type No. PS 48/42

2361K  
Mar 88

## DETAILED PARTS LIST

VALVE, REDUCING.

Fig/ Index No.	Part No.	Nomenclature							Usage Code	Units per Assy
			1	2	3	4	5	6		
			.	.	.	.	.	.		
1-	C52204	Valve, reducing (PS48/42)							A	1
1-	C51886	Valve, reducing (PS48/8 Mk2)							B	1
- 1	D9610	.Screw, bleed						*		1
- 2	D9594	.Union, inlet							B	1
- 3	AGS 1138/D	.Washer, sealing							B	1
- 4	D9619	.Washer, tab								1
- 5	AGS 1148/C	.Locknut								1
- 6	D13204	.Spring							A	1
- 7+	D9266	.Spring							B	1
- 8	D9591	.Union, vent								1
- 9	C51610	.Cover, bottom								1
-10	D9590	.Spring, carrier								1
-11	A 31/C8	.Screw								1
-12	AGS 2035/C	.Washer, shakproof								1
-13	D9595	.Plate, locking								1
-14	D9083	.Joint, 'O'-ring								1
-15	D12663/6	.Bolt, socket head 2BA x 7/8"								4
-16+	A-FS-631808	.Bolt, socket head (Alt. to D12663/6)								4
-17	C51652	.Connection outlet								1
-18	D9217	.Twicklip						*		1
-19	D9592	.Joint 'O'-ring								1
-20	C51611	.Poppet						*		1
-21	D9589	.Piston						*		1
-22	D12168	.Peg						*		2
-23	D12167/1	.Insert) Only one insert						*		1
-24+	D12167/2	.Insert) per valve by selection						*		1
-25	C51615	.Body					*	A		1
-26+	C51613	.Body					*	B		1
-27+	AGS 597/C	.Cap, protection 3/8" BSP								1
-28+	AGS 597/E	.Cap, protection 3/8" BSP							B	1
-29+	AGS 597/F	.Cap, protection 3/4" BSP								1
-30+	D9081	.Nameplate								1
-31+	D75120/B2	.Screw, drive PX 0 X 1/8"								4
		* Supplied as matched items as a body group.								
-32+	A-AA-182040-03	*Group body						A		1
-33+	D10659	*Group body						B		1

+ Item not illustrated

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