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HUNTER

**PRESSURE REDUCING VALVES  
HYMATIC  
TYPES PS 29/4, PS 29/8, Mk. 2 and PS 29/70**

**GENERAL AND TECHNICAL INFORMATION  
ILLUSTRATED PARTS CATALOGUE (PS 29/4)**

BY COMMAND OF THE DEFENCE COUNCIL **DERA**

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Ministry of Defence

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## REDUCING VALVES

HYMATIC TYPES PS 29/4, PS 29/8, Mk. 2 and PS 29/70

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## LEADING PARTICULARS

Type	PS 29/4	PS 29/8, Mk. 2	PS 29/70
Ref. No.	27VB/3454	27VB/5283	27VB/5297
Inlet pressure	15 to 80 lbf/in <sup>2</sup>	50 lbf/in <sup>2</sup>	30 to 80 lbf/in <sup>2</sup>
Outlet pressure	8.0±0.5 lbf/in <sup>2</sup>	5.75 to 6.0 lbf/in <sup>2</sup>	20±2 lbf/in <sup>2</sup>
Relief valve	10±0.5 lbf/in <sup>2</sup>	8.0 lbf/in <sup>2</sup>	26-27 lbf/in <sup>2</sup>
Overall dimensions			
Height (approx)	3.95 in	3.95 in	3.95 in
Width (square)	2.0 in	2.0 in	2.0 in
Connections			
Inlet	1/4 BSP internal	1/4 BSP internal	1/4 BSP internal
Outlet	1/4 BSP internal	1/4 BSP internal	1/4 BSP internal
Working temperature	- 40°C to +70°C	- 40°C to +70°C	- 40°C to +70°C
Weight (approx)	0.39 lb	0.39 lb	0.39 lb
Modification state	Issue 7	Issue 1	Issue 1

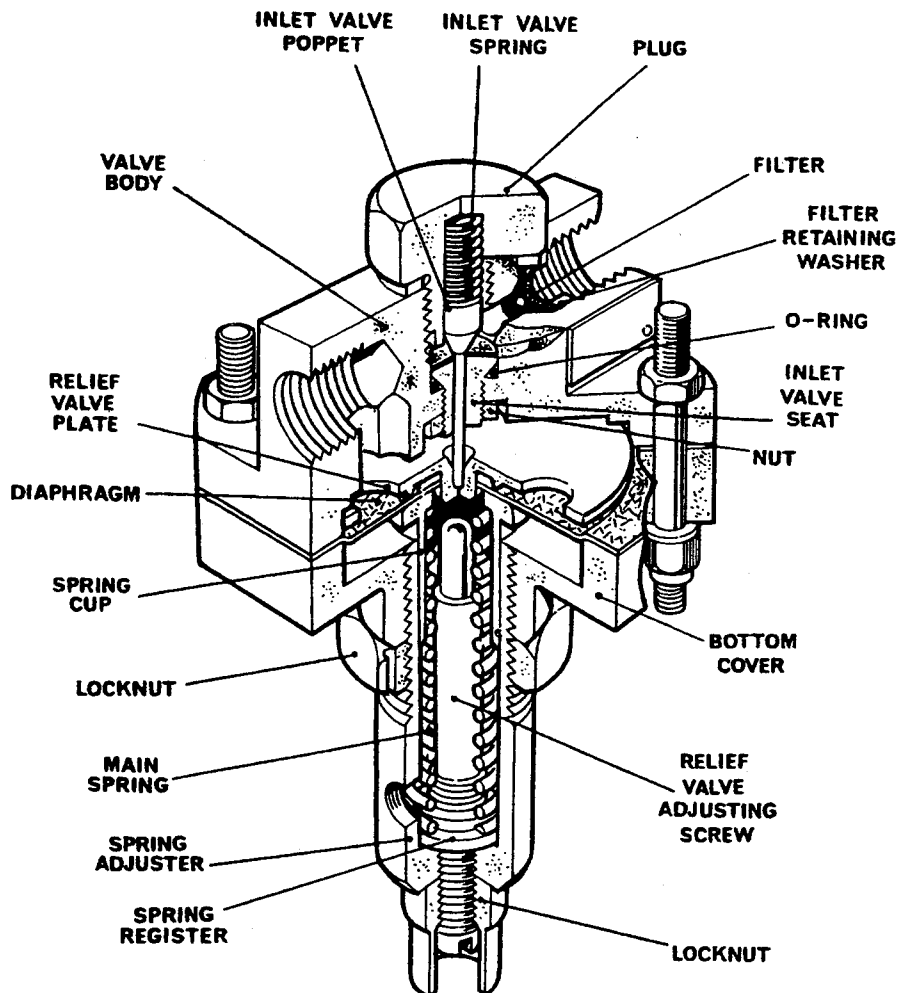


Fig. 1. Reducing valve PS 29/70

### Introduction

1. The valves, are used to reduce the pressure and flow of an air supply, to the requirements of a particular service or system. A relief valve is incorporated in each to safeguard the system.

### Operation (fig. 1 and 2)

2. (1) High pressure inlet air passes through the clearance between the inlet valve stem and valve seat orifice into the chamber above the diaphragm and out through the outlet port (Stage 1).

(2) As the outlet pressure builds up to the adjusted requirement, the diaphragm is deflected, against the load of the main spring, and the inlet valve spring closes the inlet valve (Stage 2).

(3) Any excess pressure on the outlet side of the valve causes the diaphragm to deflect further, but the movement of the valve plate is arrested by the adjusting screw, so breaking the seal between the valve plate and the diaphragm. The excess air passes through the space between the valve plate seat and diaphragm and out to atmosphere through the hole in the spring adjuster (Stage 3).

### SERVICING

#### Tools, test equipment and materials

3. (1) A piece of rubber approximately 2.0 in long and 0.4 in diameter to support the valve seat when removing or securing the nut.
- (2) Pneumatic test rig (Ref. No. 4G/9413).
- (3) Grease XG-315 (Ref. No. 34B/9100519).
- > (4) Trichloroethylene (N.S.N. 6810-00-678-4418). <

#### Dismantling (fig. 1)

Note ...

Each valve has a different main spring and the PS 29/4 and PS 29/8, Mk. 2 have a damper ring fitted in the groove in the spring cup; PS 29/70 has no damper ring.

4. (1) Remove all locking wire.
- (2) Straighten the tab washer securing the plug, unscrew and remove the plug, the inlet valve spring and inlet valve poppet. Discard the tab washer.

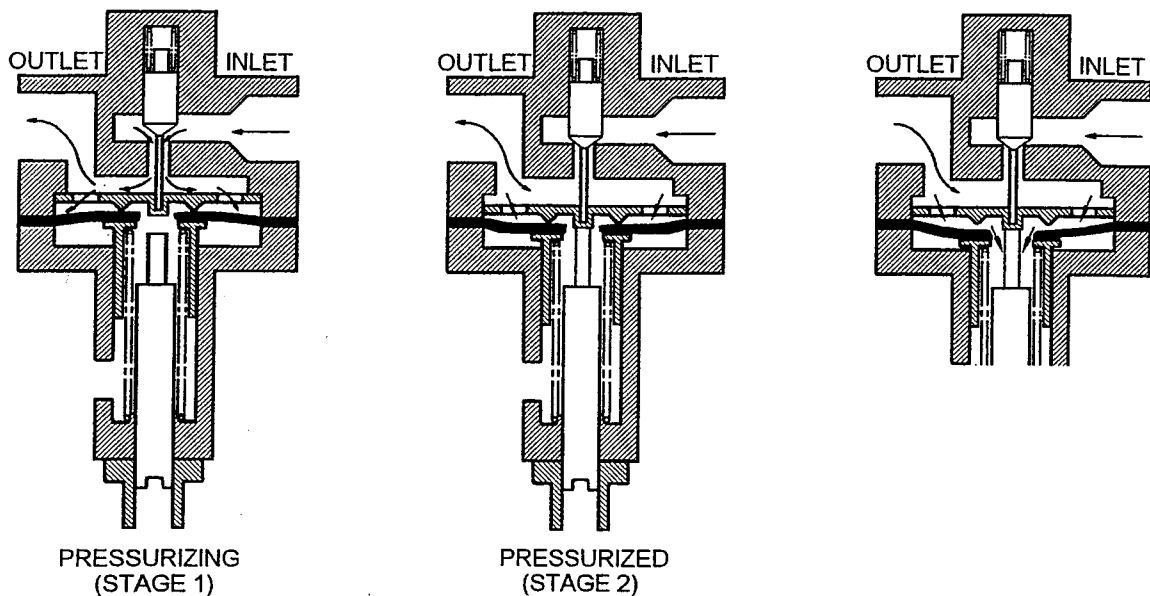


Fig. 2. Operation

(3) Remove the locknut and relief valve adjusting screw from the spring adjuster.

(4) Release the locknut securing the spring adjuster and unscrew and remove the spring adjuster, main spring and spring register.

(5) Remove the four stiffnuts, three plain washers, one wiring tabwasher and four studs.

(6) Separate the body from the bottom cover (if necessary, lightly tap the cover and body with a wooden mallet) and remove the diaphragm, relief valve plate and spring cup. If a damper ring is fitted in the groove of the spring cup do not remove it at this stage.

(7) Remove the nut securing the valve seat. If the seat turns, support it with the piece of rubber (para. 3(1)). Discard the O-ring.

(8) Remove the retaining washer and filter from the inlet port and discard the washer.

#### Examining and cleaning

5. (1) Examine the diaphragm for scratches and cuts (indentation of the diaphragm by the relief valve seat does not render it unserviceable, providing it is not cut) and wipe it clean.
- (2) Examine the inlet valve seat for scratches or damage to the rubber surface and see that the rubber is firmly bonded to the metal.
- (3) Clean metal parts, other than the valve seat, in Trichloroethylene and dry them with < low pressure, clean dry air.
- (4) Check (a) the condition of all threads (b) that the outside diameter of the spring cup and the bore of the spring adjuster are free from

scoring or fretting and (c) that the spring cup moves freely in the bore. If the damper ring is to be removed from the spring cup, ensure that it is removed with the minimum of distortion.

(5) See that all parts are free from corrosion and that the pin of the inlet valve is secure in the poppet.

#### Note . . .

The pin is secured with Loctite, grade C.

(6) Springs are to be checked against the data in Table 1.

TABLE 1

#### Spring data

Spring	Working length (in)	Load at working length (lbf)
Inlet valve	7/16	$0.05 \pm 5\%$
Main PS 29/4	1.5	$8.0 \pm 5\%$
Main PS 29/8 Mk. 2	1.5	$5.68 \pm 5\%$
Main PS 29/70	1.5	$22 \pm 5\%$

#### Assembling

7. (1) Insert the filter and a new retaining washer in the inlet port of the body and push them to the end of the bore.
- (2) Place a new O-ring and the valve seat in position in the recess in the central bore of the body and secure them with the nut. If the seat turns, support it with the piece of rubber (para. 3(1)). Do not over-tighten the nut. Lock the nut by lightly staking into the slot in the valve seat.

(3) Smear a new tab washer with grease XG-315, mount it on the plug then insert the inlet valve spring and inlet valve into the plug. Invert the valve body and screw the plug home, ensuring that the inlet valve stem is centred in the valve seat orifice. Tighten the plug so that the tabwasher is in the correct position for locking, but do not lock until testing is completed.

(4) Connect the inlet port to a workshop air supply and confirm that the inlet valve opens when the stem is depressed. Release the stem, raise the pressure to 80 lbf/in<sup>2</sup> and check that there are no leaks through and/or around the valve seat. Also check that there is no leak at the plug and tabwasher joint face with the body. Shut off and disconnect the air supply.

(5) Invert the valve body and place the relief valve in position on the inlet valve stem. Position the diaphragm over the plate, with the dished centre furthest from the plate as shown in fig. 1.

(6) Position the spring cup (complete with damper ring if the valve is PS 29/4 or PS 29/8, Mk. 2) on the diaphragm. Position the bottom cover, hold the assembly together and insert the four studs through the body flange, mount the three plain washers and one wiring tabwasher and secure with the four stiffnuts. Ensure that the wiring tab points in line with one of the edges of the bottom cover.

(7) Screw the locknut onto the spring adjuster, insert the spring register and lightly smear the bore of the adjuster with grease XG-315. Insert the main spring.

(8) Position the main spring in the spring cup, push the spring adjuster over the cup so that the damper ring (if fitted) enters the bore, and screw the adjuster three or four full turns into the bottom cover. Do not lock.

(9) Screw the relief valve adjusting screw three or four turns into the spring adjuster, screw on the locknut but do not lock.

#### Testing PS 29/4 (fig. 3)

8. (1) Connect the valve to the test rig as shown in fig. 3, with the air supply line connected to the inlet port of the valve.

(2) With reducing valve V and stop valve B closed, adjust the valve on test to control the outlet pressure to  $8.0 \pm 0.5$  lbf/in<sup>2</sup> at an inlet pressure of 80 lbf/in<sup>2</sup>. Lock the spring adjuster with the locknut.

(3) Open and close stop valve A several times to create a flow through the valve and check that the outlet returns to the set pressure each time stop valve A is closed. Lock the plug with the tabwasher.

(4) Leave the valve pressurised for two minutes and check that there is no creep on the outlet gauge and no external leaks.

(5) Reduce the inlet pressure to 15 lbf/in<sup>2</sup>, open and close stop valve A and check that the outlet pressure returns to  $8.0 \pm 0.5$  lbf/in<sup>2</sup> when stop valve A is closed.

(6) Close stop valve A, control the inlet pressure to 80 lbf/in<sup>2</sup>, adjust reducing valve V to control the pressure indicated on the reducing valve gauge to 15 lbf/in<sup>2</sup>. Using stop valve B to control the pressure registered on the outlet gauge, adjust the relief valve to leak at 9.5 to 10.5 lbf/in<sup>2</sup> and lock the adjusting screw.

(7) Close reducing valve V. Close stop valve B and repeat the tests detailed in operations (2), (4) and (5).

(8) Shut off the air supply, remove the valve on test from the test rig, and carry out the requirements of para. 11.

#### Testing PS 29/8, Mk. 2 (fig. 3)

9. (1) Connect the valve to the test rig as shown in fig. 3, with the air supply connected to the inlet port.

(2) With reducing valve V and stop valve B closed, adjust the valve on test to control the outlet pressure to 5.75 to 6.0 lbf/in<sup>2</sup> at an inlet pressure of 50 lbf/in<sup>2</sup>. Lock the spring adjuster with the locknut.

(3) Open and close stop valve A several times to create a flow through the valve and check that the outlet pressure returns to the set pressure each time stop valve A is closed. Lock the plug with the tabwasher.

(4) Leave the valve pressurised for two minutes and check that there is no creep on the outlet gauge, and no external leaks.

(5) With the inlet pressure controlled to 50 lbf/in<sup>2</sup>, open valve A to control the flow to 1.0 ft<sup>3</sup>/min. Leave stop valve A at this position, cut off the inlet supply and wait until the inlet gauge registers zero.

(6) Slowly open the control valve until 50 lbf/in<sup>2</sup> is registered on the inlet gauge and

check that the flowmeter reading is maintained at 1.0 ft<sup>3</sup>/min and that the outlet pressure is not less than 5.25 lbf/in<sup>2</sup>.

(7) Close stop valve A. Control the inlet pressure to 50 lbf/in<sup>2</sup> and adjust reducing valve V to control the pressure registered on the reducing valve gauge to 15 lbf/in<sup>2</sup>. Using stop valve B to control the pressure

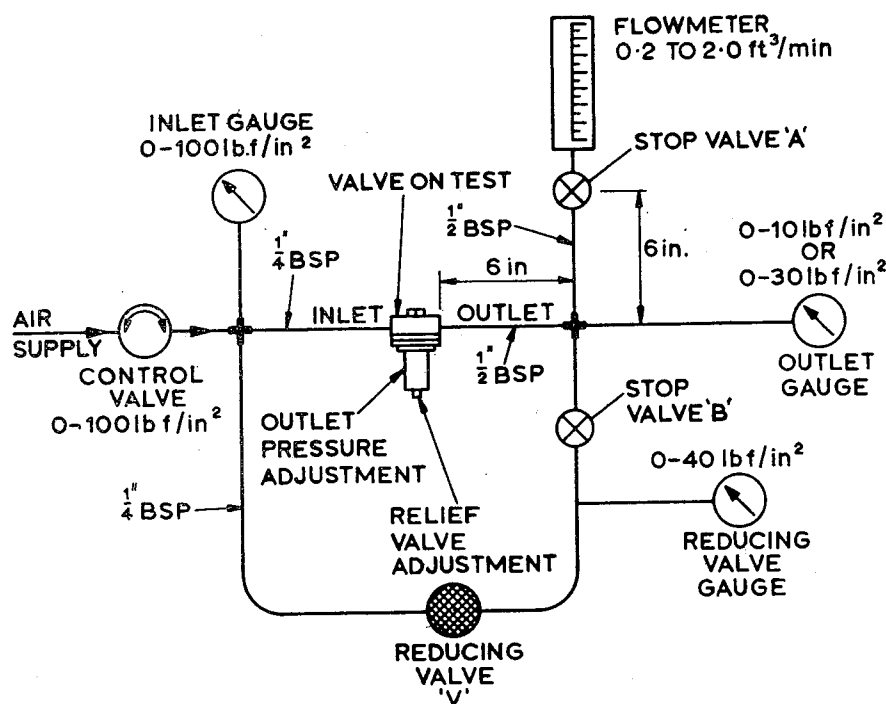


Fig. 3. Test rig

registered on the outlet gauge, adjust the relief valve to leak at  $8.0 \text{ lbf/in}^2$ . Lock the relief valve setting.

(8) Close reducing valve V, close stop valve B and repeat the tests detailed in operations (2), (4) and (6).

(9) Shut off the air supply, remove the valve on test from the test rig and carry out the requirements of para. 11.

#### Testing PS 29/70 (fig. 3)

10. (1) Connect the valve to the test rig as shown in fig. 3, with the air supply connected to the inlet port.

(2) With reducing valve V and stop valve B closed, adjust the valve on test to control the outlet pressure to  $20 \pm 2.0 \text{ lbf/in}^2$  at an inlet pressure of  $80 \text{ lbf/in}^2$ . Lock the spring adjuster with the locknut.

(3) Open and close stop valve A several times to create a flow through the valve and check that the outlet pressure returns to the set pressure each time stop valve A is closed. Lock the plug with the tabwasher.

(4) Leave the valve pressurised for two minutes and check that there is no creep on the outlet gauge and no external leaks.

(5) Check that with the inlet pressure controlled to  $30 \text{ lbf/in}^2$  and no flow through the valve, the outlet pressure is maintained at  $20 \pm 2 \text{ lbf/in}^2$ . Check for creep as in operation (4).

(6) Check that with the inlet pressure controlled to  $30 \text{ lbf/in}^2$  the outlet pressure is maintained at  $18.5 \text{ lbf/in}^2$  minimum at a minimum flow of  $1.0 \text{ ft}^3/\text{min}$ .

(7) Close stop valve A, control the inlet pressure to  $80 \text{ lbf/in}^2$  and adjust reducing valve V to control the pressure registered on the reducing valve gauge to  $30 \text{ lbf/in}^2$ . Using stop valve B to control the pressure registered on the outlet gauge, adjust the relief valve to leak at  $26$  to  $27 \text{ lbf/in}^2$ . Lock the relief valve setting.

(8) Close reducing valve V, close stop valve B and repeat the tests detailed in operations (2), (3), (4), (5) and (6).

(9) Shut off the air supply, remove the valve on test from the test rig and carry out the requirements of para. 11.

#### After-test procedure

11. (1) Ensure that the plug, spring adjuster and relief valve adjusting screw have been locked.

(2) Wire-lock the spring adjuster locknut to the wiring tab under one of the stiffnuts.

(3) Wire-lock the relief valve adjusting screw locknut to the spring adjuster locknut.

(4) Seal the valve in a polythene bag.

ILLUSTRATED PARTS CATALOGUE ( -3A )PREFACEDEMANDS:

1. Parts are to be demanded under Vocabulary Section 27VB except where the list shows that the part is held under a different Vocabulary Section.

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 Equipment is indicated by a single letter as laid down in AP 830 Volume 1 or BR 4.

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.

USAGE CODE

8. The letters A, B and C, allocated to the three valves listed in the Parts List, are used to indicate the applicability of the itemised components to each valve.



GROUP ASSEMBLY PARTS LIST

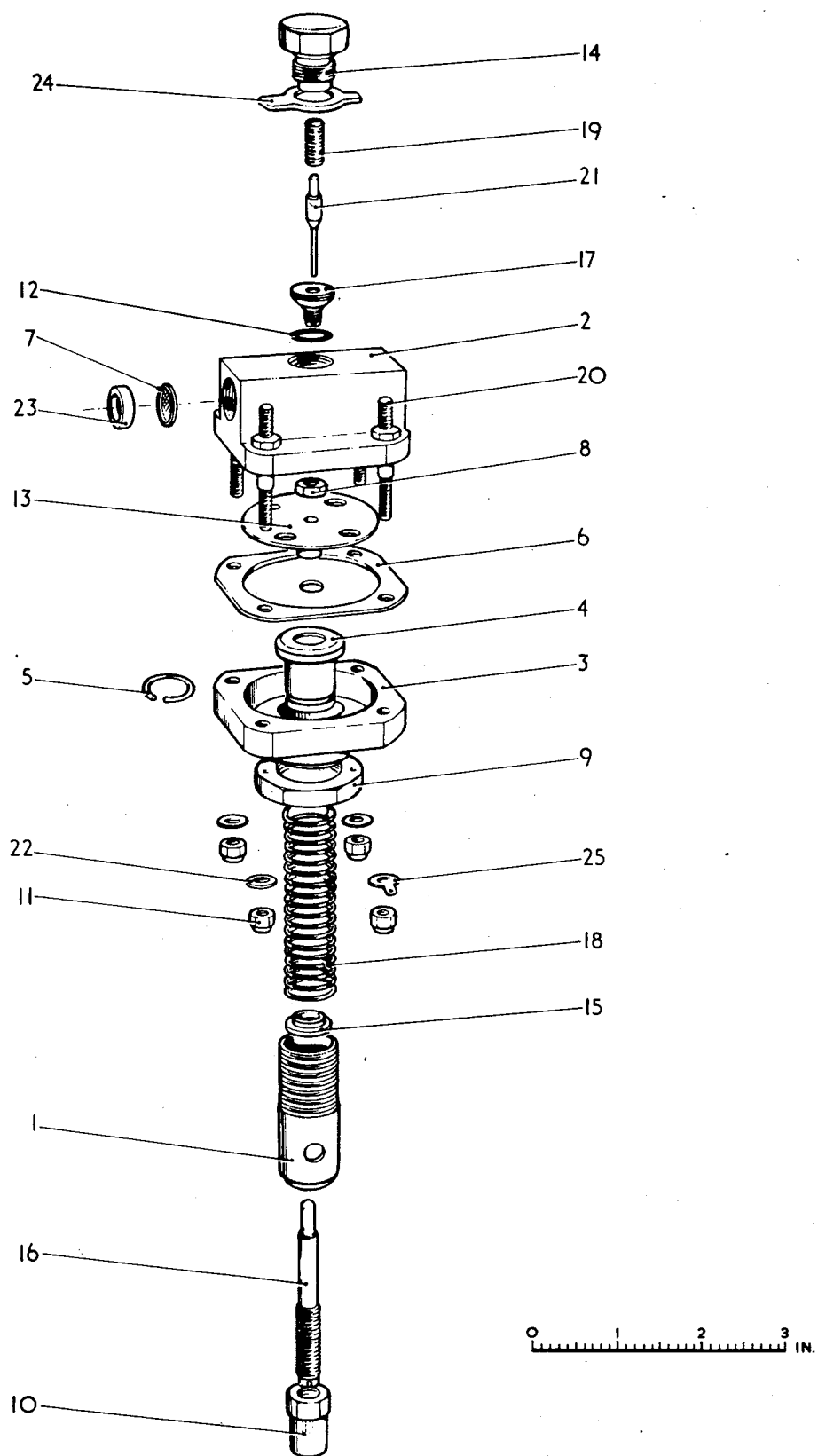


Fig.1 Reducing valves PS 29/4, PS 29/8MK2 and PS 29/70

## GROUP ASSEMBLY PARTS LIST

AP 105C-0554-3A

Fig. and Index	Part Number	Nomenclature	Usage Code	Units per Assy.
		1 2 3 4 5 6 7		
1-	D9206	Reducing valve PS29/4	A	RF
1-	D9488	Reducing valve PS29/8 Mk.2	B	RF
1-	C52097	Reducing valve PS29/70	C	RF
1-1	D9053	. Adjuster, spring	ABC	1
1-2	C51495	. Body, valve	ABC	1
1-3	D9052	. Cover, bottom	ABC	1
1-4	D9207	. Cup, spring	ABC	1
1-5	A-FS-006200-02	. Damper, spring cup	AB	1
1-6	D9585	. Diaphragm	ABC	1
1-7	A-AC-040400-01	. Filter	ABC	1
1-8	A27/CT	. Nut	ABC	1
1-9	D9054	. Nut, lock	ABC	1
1-10	D9212	. Nut, lock	ABC	1
1-11	AGS/2001/B/1	. Nut, stiff	ABC	4
1-12	D6529	. O-ring	ABC	1
1-13	D9402	. Plate, valve	ABC	1
1-14	D9021	. Plug, valve inlet	ABC	1
1-15	D9091	. Register, spring	ABC	1
1-16	D9476	. Screw, adjusting	ABC	1
1-17	D9027	. Seat, valve	ABC	1
1-18	D9477	. Spring, main	A	1
1-18	D9481	. Spring, main	B	1
1-18	A-SH-031515-01	. Spring, main	C	1
1-19	D9061	. Spring, valve inlet	ABC	1
1-20	D9219	. Stud	ABC	4
1-21	D12629	. Valve, inlet	ABC	1
1-22	SP10/B	. Washer	ABC	3
1-23	D9030	. Washer, filter retaining	ABC	1
1-24	D4513	. Washer, tab	ABC	1
1-25	D8995	. Washer, tab	ABC	1

## INDEX OF NATO STOCK NUMBERS

SECT.	NSN-NC- IIN	PART NO.	FIG INDEX	C of S
28M	5330-99-100-6473	A27/CT	1-8	C
27VB	5340-99-101-9460	D9207	1-4	C
27VB	5340-99-102-8319	D9053	1-1	C
27VB	5310-99-102-8383	D9212	1-10	C
27VB	4370-99-102-8585	D9021	1-14	C
27VB	5307-99-102-8586	D9219	1-20	C
27VB	4030-99-102-8775	D8995	1-25	C
27VB	1650-99-102-9735	D9027	1-17	C
28M	5310-99-127-8189	AGS/2001/B/1	1-11	C
27VB	5305-99-128-7546	D9476	1-16	C
27VB	1680-99-145-1437	A-SH-031515-01	1-18	
27VB	1650-99-449-7105	D9206	1-	A
27VB	1650-99-449-7109	C51495	1-2	B
27VB	1650-99-449-7111	D9052	1-3	C
27VB	5310-99-449-7113	D9054	1-9	C
27VB	1650-99-449-7114	D9402	1-13	C
27VB	5310-99-449-7115	D9091	1-15	C
27VB	1650-99-449-7118	D9481	1-18	C
27VB	4820-99-449-7120	D12629	1-21	C
27VB	1650-99-449-7244	D9488	1-	A
27VB	1650-99-449-7248	C52097	1-	A
27VB	1650-99-449-7256	D9585	1-6	C
27VB	5365-99-449-7266	A-FS-006200-02	1-5	C
28W	5310-99-941-9401	SP10/B	1-22	C
27QA	5330-99-943-3706	D6529	1-12	C
27VB	4730-99-949-8674	A-AC-040400-01	1-7	C
27VB	5340-99-949-8676	D9061	1-19	C
27VB	5330-99-949-8758	D9030	1-23	C
27VB	5340-99-949-9373	D9477	1-18	C
27VB	5310-99-949-9475	D4513	1-24	C

## Index of Part Numbers

Part No.	Sect.	NATO STOCK No.	Fig. Index
A-AC-040400-01	27VB	4730-99-949-8674	1-7
A-FS-006200-02	27VB	5360-99-449-7266	1-5
A-SH-031515-01	27VB	1680-99-145-1437	1-18
AGS/2001/B/1	28M	5310-99-127-8189	1-11
A27/CT	28M	5330-99-100-6473	1-8
D4513	27VB	5310-99-949-9475	1-24
D6529	27QA	5330-99-943-3706	1-12
D8995	27VB	4030-99-102-8775	1-25
D9021	27VB	4370-99-102-8585	1-14
D9027	27VB	1650-99-102-9735	1-17
D9030	27VB	5330-99-949-8758	1-23
D9052	27VB	1650-99-449-7111	1-3
D9053	27VB	5340-99-102-8319	1-1
D9054	27VB	5310-99-449-7113	1-9
D9061	27VB	5340-99-949-8676	1-19
D9091	27VB	5310-99-449-7115	1-15
D9206	27VB	1650-99-449-7105	1-
D9207	27VB	5340-99-101-9460	1-4
D9212	27VB	5310-99-102-8383	1-10
D9219	27VB	5307-99-102-8586	1-20
D9402	27VB	1650-99-449-7114	1-13
D9476	27VB	5305-99-128-7546	1-16
D9477	27VB	5340-99-949-9373	1-18
D9481	27VB	1650-99-449-7118	1-18
D9488	27VB	1650-99-449-7244	1-
D9585	27VB	1650-99-449-7256	1-6
D12629	27VB	4820-99-449-7120	1-21
C51495	27VB	1650-99-449-7109	1-2
C52097	27VB	1650-99-449-7248	1-
SP10/B	28W	5310-99-941-9401	1-22

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