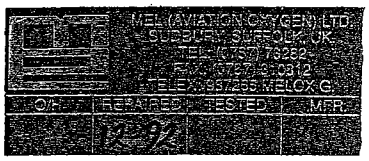
AP 105C-05163-1

(Formerly AP4303Z, Vol.1, Sect.4, Chap.9)

PRESSURE REDUCING VALVE TYPE C58

GENERAL AND TECHNICAL INFORMATION



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AP (N) 140 Chap.1 Annex A (RN)
AP3158 Vol.2 leaflet No. D6 (RAF)

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LEADING PARTICULARS

Stores Ref. 27VC/27 ~~4~~ 75 4607575 OR 4607579.

Maximum supply pressure	124.1 bars (1800 lb.f/in^2)
Reduced pressure	.69 to 1.38 bars (10 to 20 lb.f/in^2)
Relief valve blow-off pressure	2.41 bars (35 lb.f/in^2)

Introduction

1. This valve is capable of reducing pressures of between 150 and 1,800 lb.f/in^2 to static pressures between 10 and 20 lb.f/in^2. After initial adjustment the valve setting should not be altered unless a test rig is available.

DESCRIPTION

2. The valve (fig 1) consists of a body to one end of which an end cap is attached by four 2BA screws and to the other is screwed an inlet connection

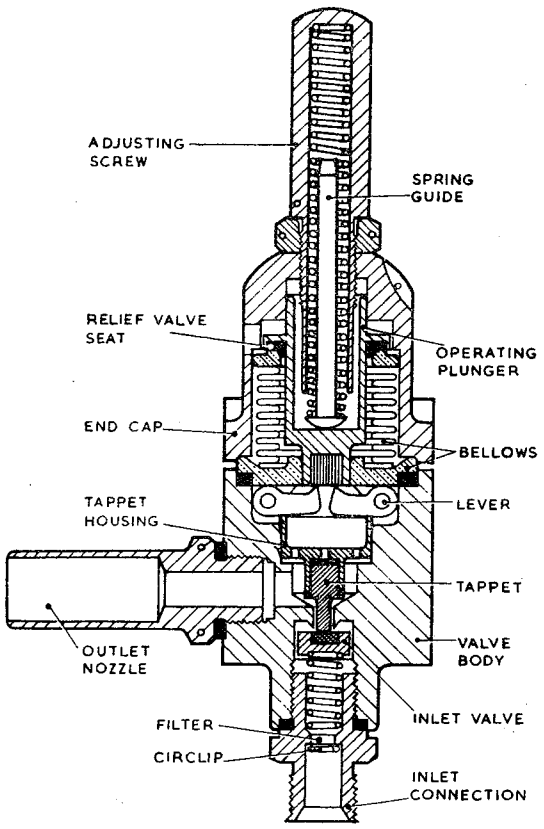


Fig 1 Pressure reducing valve, Type C58

which retains an inlet valve assembly. Between the end cap and the body joint is secured the end plate of a bellows assembly and a rubber joint washer. A rubber washer, cemented to the flange of an operating plunger in the bellows, forms a relief valve seat with the free end of the bellows. The relief valve opens if the outlet pressure becomes excessive and relieves the pressure through a vent in the body.

3. The inlet valve setting can be adjusted by an adjusting screw attached to the end cap. The adjusting screw houses a spring and spring guide which abuts the operating plunger and holds a hardened steel plunger insert against two levers pinned to the fixed end plate of the bellows. As the bellows deflate, movement of the operating plunger is transmitted by a tappet housing and tappet to open the inlet valve.

Note...

Initial setting of the tappet is by shims in the tappet housing; they must always be replaced in their housing after dismantling.

SERVICING

4. Servicing operations involving dismantling should only be undertaken if test rigs are available (fig 3). As the valve operates within very fine limits, dirt or dust on the components will affect efficient operation, cleanliness is essential.

Dismantling

5. (1) Unscrew the inlet connection and remove the joint washer, spring and inlet valve.

(2) Unscrew the outlet nozzle and remove the joint washer.

(3) Unlock and unscrew the adjusting screw and remove the spring and spring guide.

(4) Unlock and remove the four 2BA studs securing the end cap to the body.

(5) Remove the end cap and withdraw the bellows and operating plunger.

(6) Withdraw the operating plunger from the free end of the bellows.

Note...

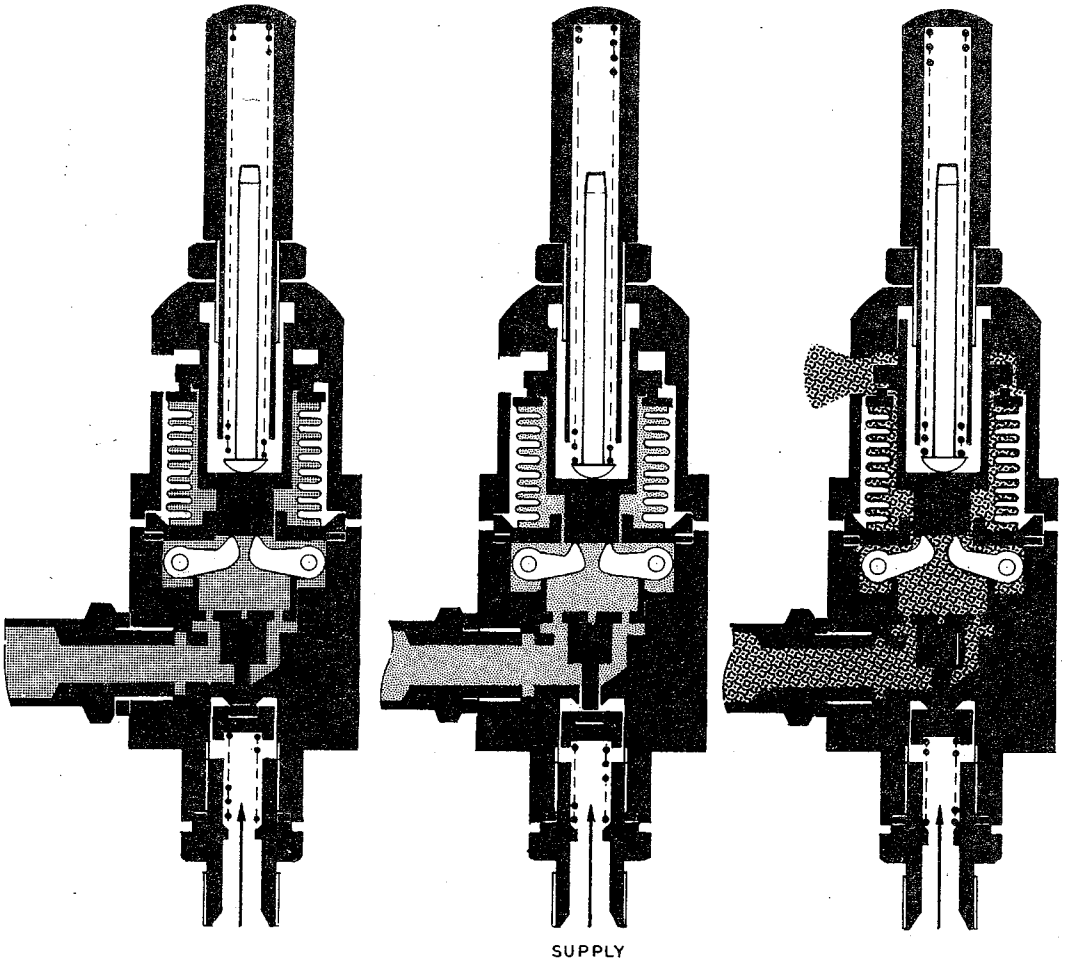
If the rubber washer is defective the operating plunger should be renewed.

(7) Remove the pins securing the levers.

(8) Remove the tappet housing and tappet from the body.

Note...

The shims in the tappet housing below the tappet must be retained and fitted to the same assembly when assembling.



(a) Inlet valve closed. Pressure at outlet and in the bellows at normal reduced pressure. Bellows are expanded (upwards) which allows the inlet valve spring to close the valve.

(b) Inlet valve open. Pressure at outlet and in the bellows below normal reduced pressure. Bellows contract and corresponding movement of the operating plunger, levers, tappet housing and tappet opens the inlet valve. As the pressure increases the bellows expand and when the outlet pressure is normal, the inlet valve seats and conditions are as at (a).

(c) Relief valve open. Pressure at outlet and in the bellows above normal. Bellows expand to their limit. Pressure acting on the operating plunger compresses the adjusting screw spring to force the relief valve seat away from the end of the bellows, and vent the excess pressure to atmosphere. Relief valve closes again and conditions return to those at (a) when excess pressure has been relieved.

Fig 2 Functional diagram

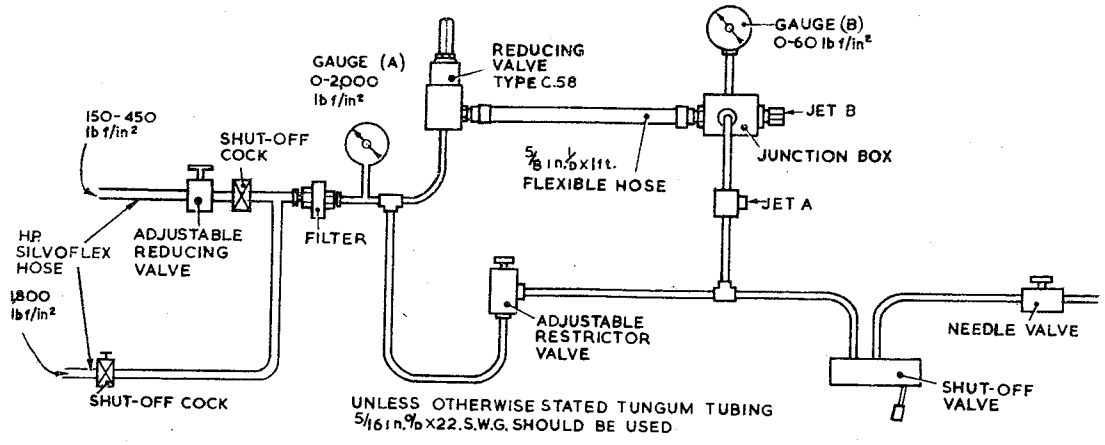


Fig 3 Test rig (for reducing valve)

Examination before assembling

6. Each part of the valve should be cleaned and examined for wear, corrosion and damage before it is assembled. Surfaces of the tappet housing, lever pins, operating plunger and the interior of the end cap should be lubricated with anti-seize compound, ZX-32 (NATO Code S-717) and the adjusting spring should be smeared with graphite grease XG-285 (NATO Code G-355). The springs should be tested for deflection under load as given in Table 1.

TABLE 1 ZX-32 = FOMBLIN

Spring data

Spring	Max. compressed length	Load applied	Length for load applied
Adjusting screw Part No.788/6	2 25/32in	17 ± ½ lb	$3\frac{1}{16}$in
Inlet valve Part No.788/9	33/64in	1 lb 6 oz ±2 oz	39/64in

Assembling

7. (1) Insert the inlet valve in the body and the valve spring in the connection.

(2) Position the joint washer and screw the connection to the body.

(3) Position the outlet nozzle washer and screw the nozzle to the body.

(4) Attach the levers to the bellows and check that they move freely.

(5) Insert the operating plunger in the bellows, check for freedom of movement and ensure that the joint between the rubber washer and the bellows end fitting is sound.

(6) Fit the shims to the tappet housing, insert the tappet and position the assembly in the body.

(7) Fit the rubber washer to the end plate of the bellows, insert the bellows in the end cap and position the end cap and bellows assembly on the body.

(8) Ensure that the bellows end plate fits centrally between the body, fit the four 2BA screws and tighten evenly.

(9) Position the adjusting spring and spring guide in the adjusting screw and fit the adjusting screw to the end cap.

Note...

The measurement between the adjusting screw lock-nut and the end cap must not exceed 9/32in when the lock-nut is screwed back against the adjusting screw shoulder.

(10) After adjustment hold the adjusting screw firmly to prevent rotation and tighten the lock-nut against the end cap.

ADJUSTING AND TESTING

Note...

The testing of the reducing valve as a separate item is described in para 8 to 16; the testing of the valve in conjunction with an anti-g valve, Type AG2, is described in para 17 and 18.

8. Fit the valve to a test rig (fig 3) with one supply capable of providing medium pressures between 150 and 450 lb.f/in^2 and the other a high pressure of 1,800 lb.f/in^2. Two jets are fitted in the low pressure side of the system; jet A is used throughout the tests and jet B is used only during the flow tests. When jet B is not being used the outlet of the junction box should be blanked.

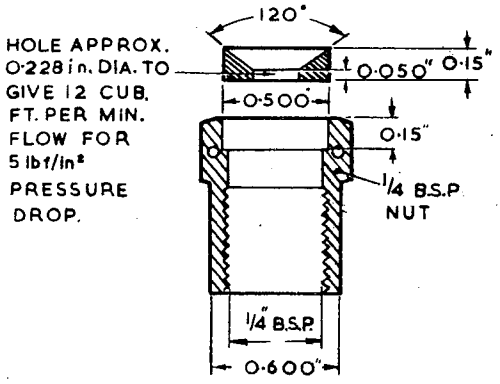


Fig 4 Details of jet B

9. Jet A permits a leakage rate of up to 0.005 cub. ft. of free air per minute at a pressure of 20 lb.f/in^2, thus allowing a slight weep past the inlet valve under all test conditions. This jet can be manufactured from 30 SWG brass sheet soldered to a suitable three-way union, and a 0.004in dia. hole drilled in the centre of the brass sheet.

10. Jet B (fig 4) can be made from brass plate and permits a flow rate of 12 cub. ft. of free air per minute at a pressure of 5 lb.f/in^2. The jet should be soldered into the nut, which should be screwed on to a ¼in steel union (AGS949/B) and sealed with a ¼in light-alloy washer. The union should then be screwed into the junction box and calibrated, the diameter of the hole being adjusted as required.

Static pressure setting

11. (1) Close the high pressure and open the medium pressure shut-off cocks. Set the adjustable pressure valve to give a pressure of 150 lb.f/in^2 on gauge A.

(2) Close the restrictor and shut-off valves and open the needle valve.

(3) Operate the shut-off valve to ensure the valve on test is not sticking.

(4) Set the adjusting screw to give a pressure of 20 $\pm$ $\frac{1}{2}$ lb.f/in^2. Check on gauge B. To increase the pressure turn the adjusting screw clockwise, or vice versa.

Relief valve blow-off test

12. (1) Close the shut-off valve and open the restrictor valve as slowly as possible.

(2) Note the pressure on gauge B immediately an escape of air occurs from the vent hole. The pressure should not exceed 35 lb.f/in^2.

Note...

The restrictor valve must be opened very slowly or it will be impossible to obtain an accurate reading.

(3) Close the restrictor valve and check the static pressure setting to ensure that it has not altered. Reset the adjusting screw if necessary.

(4) Check that the measurement between the lock-nut and the end cap, when the lock-nut is screwed back against the adjusting screw shoulder, does not exceed 9/32in.

(5) Hold the adjusting screw to prevent rotation and screw the lock-nut against the end cap.

Static check test at 1,800 lb.f/in^2

13. (1) Close the medium pressure and open the high pressure shut-off cocks. Check that the pressure of 1,800 lb.f/in^2 registers on gauge A.

(2) Operate the shut-off valve several times and leave in the closed position.

(3) Note the pressure on gauge B which should be not less than 10 lb.f/in^2 or creep above 20 lb.f/in^2.

Leakage test

14. Test for leakage while the valve is being tested at 1.800 lb.f/in^2 by applying soapy water to all joints. Apply the solution so that a film is formed over the relief valve vent in the body. Leakage is not permissible.

Friction test

15. (1) Close the high pressure and open the medium pressure shut-off cocks. Set the adjustable pressure valve to give a pressure of 150 lb.f/in^2 on gauge A.

(2) Open the shut-off and needle valves. Note the pressure on gauge B.

(3) Open the needle valve and check that the pressure on gauge B does not drop more than 2 lb.f/in^2 before the reducing valve operates to compensate for the escape of air from the needle valve.

(4) Set the adjustable pressure valve to give a reading of 450 lb.f/in^2 on gauge A. Repeat operations (2) and (3).

Flow test

16. (1) Close the medium pressure supply shut-off cock and open the shut-off and needle valves to release any pressure in the system.

(2) Remove the blanking cap and fit jet B to the junction box.

(3) Close the shut-off and needle valves and set the adjustable pressure valve to give a pressure of 150 lb.f/in^2 on gauge A.

(4) Check that the flow pressure on gauge B is not less than 5 lb.f/in^2.

(5) Close the medium pressure and open the high pressure shut-off cocks. Check that 1,800 lb.f/in^2 registers on gauge A.

(6) Check that the flow pressure on gauge B is not less than 2.75 lb.f/in^2.

Testing in conjunction with anti-g valve

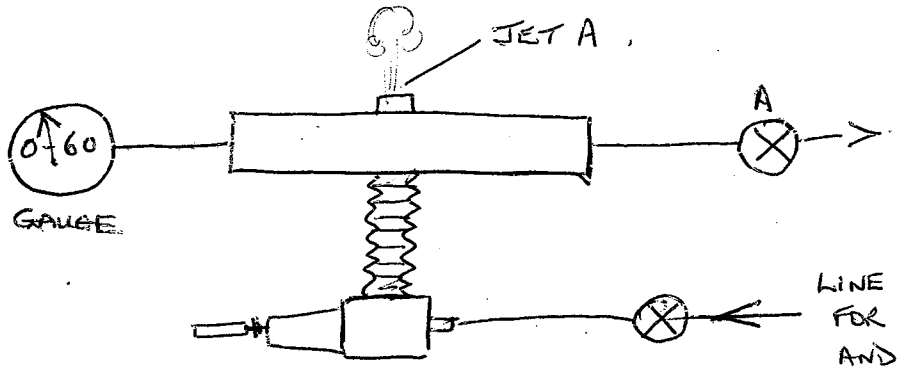
17. The test rig is the same as that used for testing the anti-g valve and reference should be made to AP 105C-05130-1.

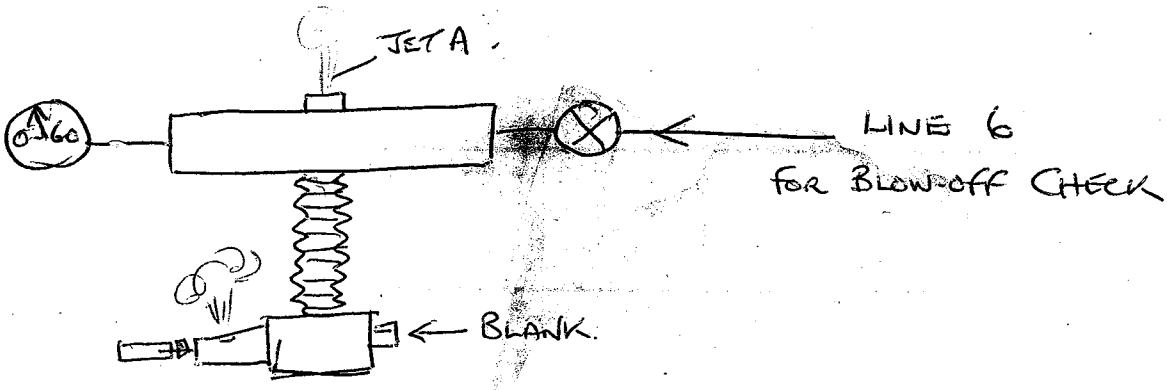
18. With the shut-off valve opened, the following tests should be applied:-

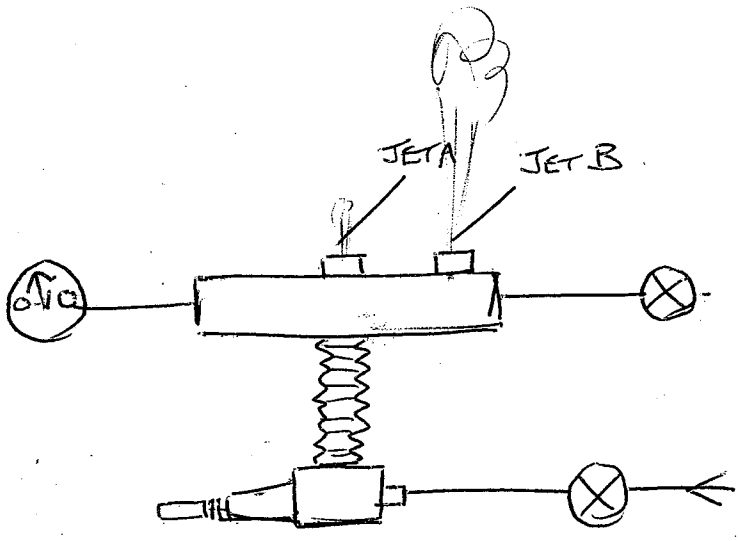
(1) With the supply bottle pressure at 150 lb.f/in^2 the reducing valve outlet pressure should be 20 ± 1 lb.f/in^2 with the anti-g valve closed. With the supply bottle pressure increased to 1,800 lb.f/in^2, the outlet pressure must not fall below 10 lb.f/in^2. There must be no external leakage from the reducing valve.

(2) With a supply bottle pressure of 150-250 lb.f/in^2, depress the anti-g valve push button (do not let the suit pressure increase above 7 lb.f/in^2) and release it sharply two or three times. The reducing valve outlet pressure should recover to 20 ± 1 lb.f/in^2 and must not "creep up".

(3) Remove the top cover from the anti-g valve. Place the 1g carrier and four 1g weights sharply on the control weight. The suit pressure must build up from 0 to 4.5 lb.f/in^2 within one second, with supply bottle pressures of 175 and 1,800 lb.f/in^2. (The suit pressure should stabilise at 5 ± 0.25 lb.f/in^2).







ZX 32 SUPERSEDED BY DTD 900/6080 FLUORINATED GREASE (FOMBLIN)

34B/1585

Gary HARVEY Contact.

PUBLICATION 11701 - 84
ISSUE ONE

OVERHAUL AND TESTING MANUAL FOR C58 AND C58B REDUCING VALVES

MEL (Aviation Oxygen) LTD

AEROSPACE EQUIPMENT MANUFACTURERS

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DESCRIPTION

The C58 and C58B are reducing valves designed to reduce inlet pressures varying from 1800 PSI, to 150 PSI, to outlet pressures between the range of 10 - 20 PSI.

Incorporated in the valve is a relief valve which is set to blow below 35 PSI.

The C58 and C58B reducing valves vary only in their inlet connections the C58B having a banjo connection which provides two connections for twin seat aircraft.

OPERATION

High pressure is applied at the inlet of the valve, the pressure is allowed past the inlet valve by the push rod which holds the inlet valve open. When sufficient pressure has entered the bellows assembly the push rod assembly is pulled away from operating the inlet valve by the expansion of the bellows assembly.

The inlet valve is now against it's seat allowing the outlet pressure to stabilise between 10 - 20 PSI.

In the event of the inlet valve failing to shut off, the bellows will continue to expand until the operating rod is forced away from the bellows assembly by the bellows bottoming in the valve cap. The operating rod is then free to move against the loading spring until the pressure is sufficient to allow escape of gas between operating rod and bellows assembly.

When a flow is drawn from the valve, the bellows contract which allows the push rod to rise and open the inlet valve until sufficient pressure is at the outlet.

DISASSEMBLY (See Fig. 1)

a. Remove all wirelocking wire.

b. Untighten lock nut (19) and remove adjusting screw (18) by turning clockwise. Loading spring (2) and loading spring guide (20) will also be removed at this stage.

c. Remove four screws (24).

d. The bellows assembly (5) can now be removed along with operating rod assembly (3).

e. Located on the top of the bellows assembly are two levers (9) held in place by two lever axis pins (15) these can now be removed from bellows assembly.

f. Situated in the bottom of valve body (16) are the push rod (8) and push rod end (7) in between these components are push rod shims (12), on removal of items (7) and (8) the shims (12) should remain with these parts for setting of valve on re-assembly.

g. The nozzle assembly (1) can now be removed with washer (26).

h. The inlet union (21) can be removed, the filter (13) and circlip (14) are situated in the inlet union and need not be removed at this stage.

i. With C58B valves the C58B banjo (33) can be removed at this stage along with banjo bolt (34), washer (35) and aluminium washer (26).

j. The inlet valve spring (22) can be removed. Caution should be taken when removing inlet valve (23) from body (16) to prevent marking of seating surfaces.

k. The following parts should be destroyed at this stage, as spares are supplied in overhaul kits.

Bellows assembly (5). Pt. No: C32-14
Joint Washer (10). Pt. No: 763-15.
Joint Washer (11). Pt. No: 763-16.
Filter (13). Pt. No: 763-21.
Circlip (14). Pt. No: 763-22.
Washer (26). Pt. No: AGS 1138B.

} PT N° OF KIT M6384

£39.40 + VAT = £102.81

On C58B valves, Washer (35), Pt. No: C58-B and Washer (26) Qty. 2, Pt. No: AGS 1138B along with all above parts, should now be destroyed.

INSPECTION AND CLEANING

All hard parts should be ultrasonically cleaned in Trichloryethelene with the exception of operating rod assembly (3) which has a rubber seat and should be cleaned using Knights Castile soap and water, dried in warm air.

All parts should be inspected for burrs and removal of plating, this can be corrected by cleaning with a needle file and treating with alochrome plating protection.

If there is any serious marking of any components they must be removed and replaced.

RE–ASSEMBLY

a. Fit new filter (13) and circlip (14) into inlet union (21).

b. Carefully place inlet valve (23) into body (16), place spring (22) into recess on inlet valve.

c. Place joint washer (10) into recess of valve body (16).

d. Inlet union (21) can now be screwed into valve body (16).

e. Testing of the inlet valve and body assembly should now take place.

IT IS RECOMMENDED THAT THE FOLLOWING PROCEDURE BE CARRIED OUT.

f. Apply an inlet pressure of 150 PSI to the inlet union (21), place a small amount of leak test solution in the bottom of the body assembly.

THERE MUST BE NO LEAKAGE

g. Operate the inlet valve assembly a minimum of 10 cycles using push rod (8) push rod end assembly (7) to ensure inlet valve is not pushed off-centre.

If there is no leakage, inlet valve assembly can now be tested to 1800 PSI and step (g) repeated with the addition of a leak check around joint washer (10).

h. If inlet valve assembly fails test, inlet valve (23) should be removed and inspected for damage.

If scoring is found on inlet valve seat the valve seat should be replaced.

If no damage is apparent to inlet valve, body (16) should be inspected, if damage is found in body (16) the valve can be re-lapped using a hardwood bob and lapping compound.

Only a small amount of pressure should be applied to the lapping bob as excessive pressure will destroy the seat in valve body (16).

Failure of body (16) and inlet valve (23) to seat correctly after lapping must result in both body and inlet valve being replaced.

If lapping is successful, all traces of lapping compound must be removed.

i. When inlet valve assembly has passed tests (f) and (g), nozzle (1) can be screwed into body (16) ensuring that a new washer (26) is fitted at this stage.

Do not over-crush washer (16) as this will result in a leak between body (16) and nozzle (1).

j. Assemble push rod (8), push rod end (7) and push rod shims (12). Place into valve body (16) after smearing push rod assembly with a small amount of dow corning grease to prevent seizure in valve body.

k. Place new washer (11) into valve body.

l. Fit levers (9) and lever axis pins (15) onto bellows assembly (5) ensuring there is no tendency for levers to stick.

m. Fit bellows assembly into body (16).

n. Locate operating rod assembly (3) into bellows (5) ensuring that operating rod rubber seat is seated evenly in chamfer of bellows assembly.

NB. Lightly grease operating rod rubber seat with dow corning grease to prevent sticking of relief valve.

o. Assemble cap (17) to body (16) using four screws (24) with shakeproof washer, torque screws evenly to prevent damage to bellows assembly.

p. Fit loading spring guide (20) into loading spring (2).

q. Place loading spring assembly into adjusting screw (18) and screw locknut (19) onto adjusting screw.

r. Screw adjuster assembly into cap (17) about ½".

THE VALVE IS NOW READY FOR TEST.

A SUITABLE TEST RIG IS SHOWN IN FIGURE 2.

TESTING See Figure 2.

Static setting 150 PSI supply.

Ensure all valves are closed and regulator fully decreased.

a. Place reducing valve on test rig, ensuring that adjuster is screwed in only about ½".

Open valve 'C', rotate regulator 'A' clockwise until 150 PSI is indicated on pressure gauge 'D'. Outlet pressure will be indicated on pressure gauge 'H'. Reduced pressure must be 20 PSI +/– o.5 PSI. Ensure overall length of valve does not exceed 7". (Rotate adjusting screw clockwise if pressure is too low, anti-clockwise if pressure is too high).

b. **Blow Off Test**

Rotate regulator 'A' anti-clockwise until 50 PSI is indicated on pressure gauge 'D'. Slowly open valve 'E' until a distinct audible hiss occurs from blow off hole, pressure as indicated on pressure gauge 'H' must not exceed 35 PSI independent of storage.

CAUTION!! FAILURE TO OPEN VALVE 'E' SLOWLY WILL RESULT IN SERIOUS DAMAGE TO BELLOWS ASSEMBLY.

c. **Static Check Test 150 PSI.**

Close valve 'E'.

Rotate regulator 'A' clockwise until 150 PSI is obtained on pressure gauge 'D'.
Check that outlet pressure is static at 20 PSI +/— 1/2 PSI as indicated on pressure gauge 'H'.

d. **Static check test 1800 PSI supply.**

ENSURE ALL VALVES ARE CLOSED

Rotate regulator 'A' clockwise until 1800 PSI is indicated on pressure gauge 'B'. Outlet pressure must be between 10 - 20 PSI as indicated on pressure gauge 'H'. Open and close needle valve 'F', ensure pressure remains between 10 - 20 PSI. No creep must be apparent over a period of 5 minutes as indicated on pressure gauge 'H'.

e. **Freedom from Friction test 150 and 450 PSI**

ENSURE ALL VALVES ARE CLOSED AND REGULATOR 'A' FULLY DECREASED.

Open valve 'C' rotate regulator 'A' clockwise until 450 PSI is indicated on pressure gauge 'D'. Ensure outlet pressure on gauge 'H' is static. Crack open needle valve 'F' and check that pressure as indicated on gauge 'H' does not fall more than 2 PSI before valve opens to compensate for flow from needle valve 'F'.

Repeat above test at 150 PSI.

f. **Flow Test 150 and 1800 PSI.**

ENSURE ALL VALVES ARE CLOSED AND REGULATOR FULLY DECREASED

Open valve 'C', rotate regulator 'A' clockwise until 150 PSI is indicated on pressure gauge 'D', open valve 'G', fully open valve 'I', check that pressure indicated on gauge 'I' is a minimum of 5 PSI.

Close valve 'I'. Close valve 'G', rotate regulator 'A' anti-clockwise until all pressure is removed from test rig.

Close valve 'C', rotate regulator 'A' clockwise until 1800 PSI is indicated on gauge 'B'. Open valve 'G', fully open valve 'I', check that pressure as indicated on gauge 'J' does not fall below 2.75 PSI.

Close valve 'I'. Close valve 'G', rotate regulator 'A' fully anti-clockwise until all pressure has disappeared from the test rig.

g. **Leak Test**

Close all valves.

Rotate regulator 'A' until 1800 PSI is indicated on gauge 'B'. Smear all joints with leak test solution, place leak test solution over relief valve aperture.

Ensure a bubble does not inflate.

NO LEAKAGE IS PERMISSIBLE.

TROUBLE SHOOTING GUIDE

1. Fault - Outlet pressure is not static.
   Remedy - Leak past inlet valve.

2. Fault - Overall length of valve exceeds 7".
   Remedy - Incorrect shimming of push rod assembly.

3. Fault - Valve fails blow off test.
   Remedy - Operating rod assembly seat damaged or incorrect shimming.

4. Fault. - Fails flow test.
   Remedy - Inlet filter blocked or inlet valve sticking.

5. Fault - Fails freedom from friction test.
   Remedy - Push rod assembly sticking in bore of valve body or inlet valve sticking or lever assembly sticking.

TEST RIG SPECIAL FITTINGS

1. Orifice drilled 0.010" for needle valve 'F'.

2. Orifice for valve 'G' to pass 12 cubic feet of free air at 5 PSI gauge pressure. Check against rotameter flowmeter.

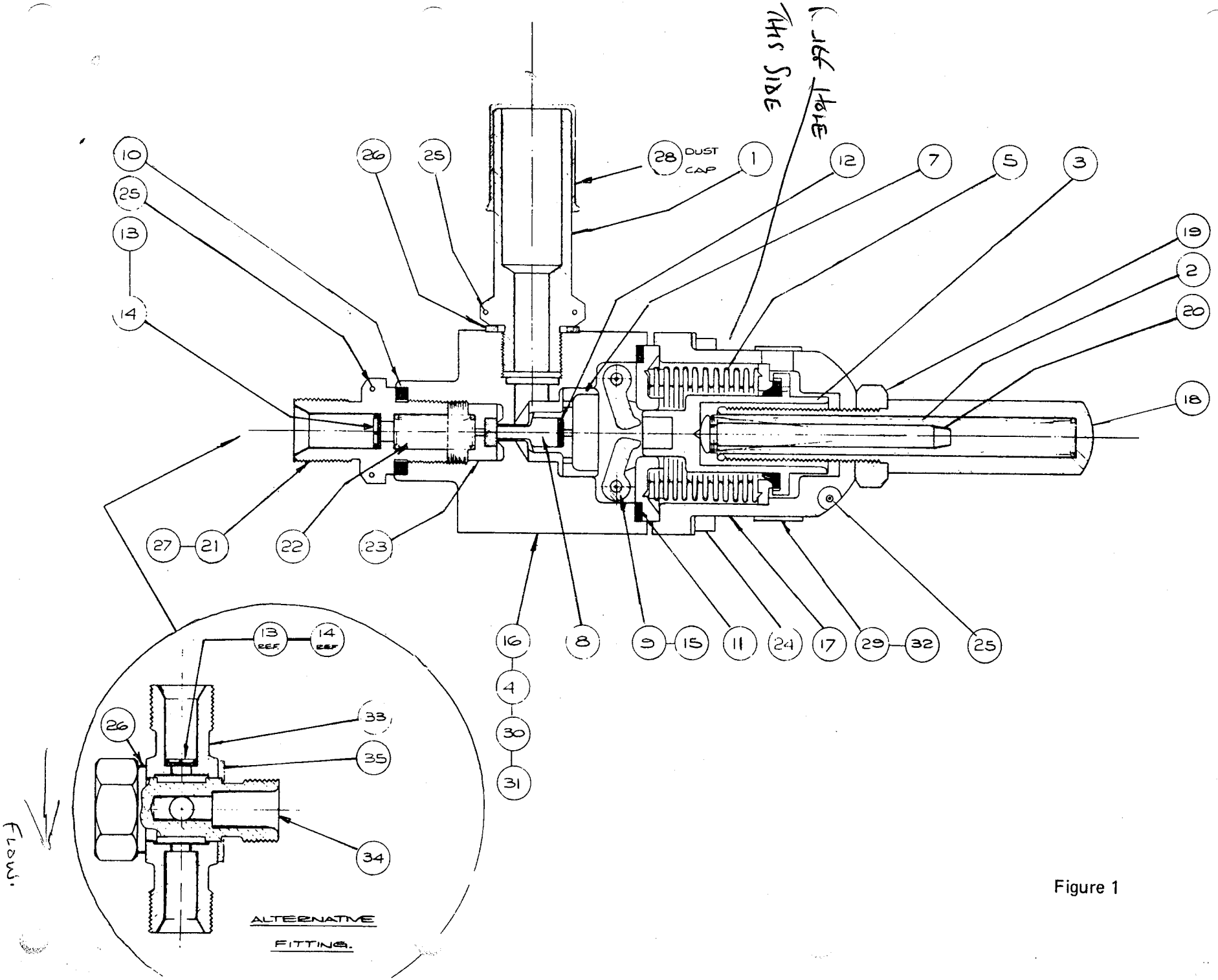
WIRELOCKING

Ensure valve is wirelocked correctly to prevent fitting rotating loose.

Ensure dust caps and rubber band are fitted at all times when valve is not in use.

REF.	DESCRIPTION	QTY.	REMARKS
1	Nozzle	1	C58–1
2	Loading Spring	1	C58–2
3	Sub-Assembly Op. Arm	1	763–6
4	Index Plate	1	C58–4B
5	Bellows Assembly	1	C32–14*
6			
7	Push Rod End	1	763–7
8	Push Rod	1	763–8
9	Lever	1	763–9
10	Joint Washer	1	763–15*
11	Joint Washer	1	763–16*
12	Push Rod Shim	1	763–18
13	Filter	1	763–21*
14	Circlip	1	763–22*
15	Lever Axis Pin	2	763–10
16	Valve Body	1	788–1
17	Cap	1	788–2
18	Adjusting Screw	1	788–4
19	Locknut	1	788–5
20	Loading Spring Guide	1	788–11
21	Inlet Union	1	788–12
22	Inlet Valve Spring	1	788–9
23	Inlet Valve	1	763–5
24	2 BA Cheese Head Screw	4	A31–C28
25	Locking Wire	As reqd.	
26	Washer	2	Ags 1138B*
27	¼"BSP Dust Cap	1	
28	Dust Cap	1	
29	Rubber Band	1	C65–23*
30	Grooved Stud	1	G51
31	Transfer	1	ET 21671/50*
32	Label	1	C65–28*
33	Banjo	1	C58B–2
34	Double Inlet Union Banjo Bolt	1	C58B–1
35	Washer	1	C58–B*

*Items with this mark are supplied with overhaul kit.


10
25
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28 DUST CAP
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13 REF.
14 REF.
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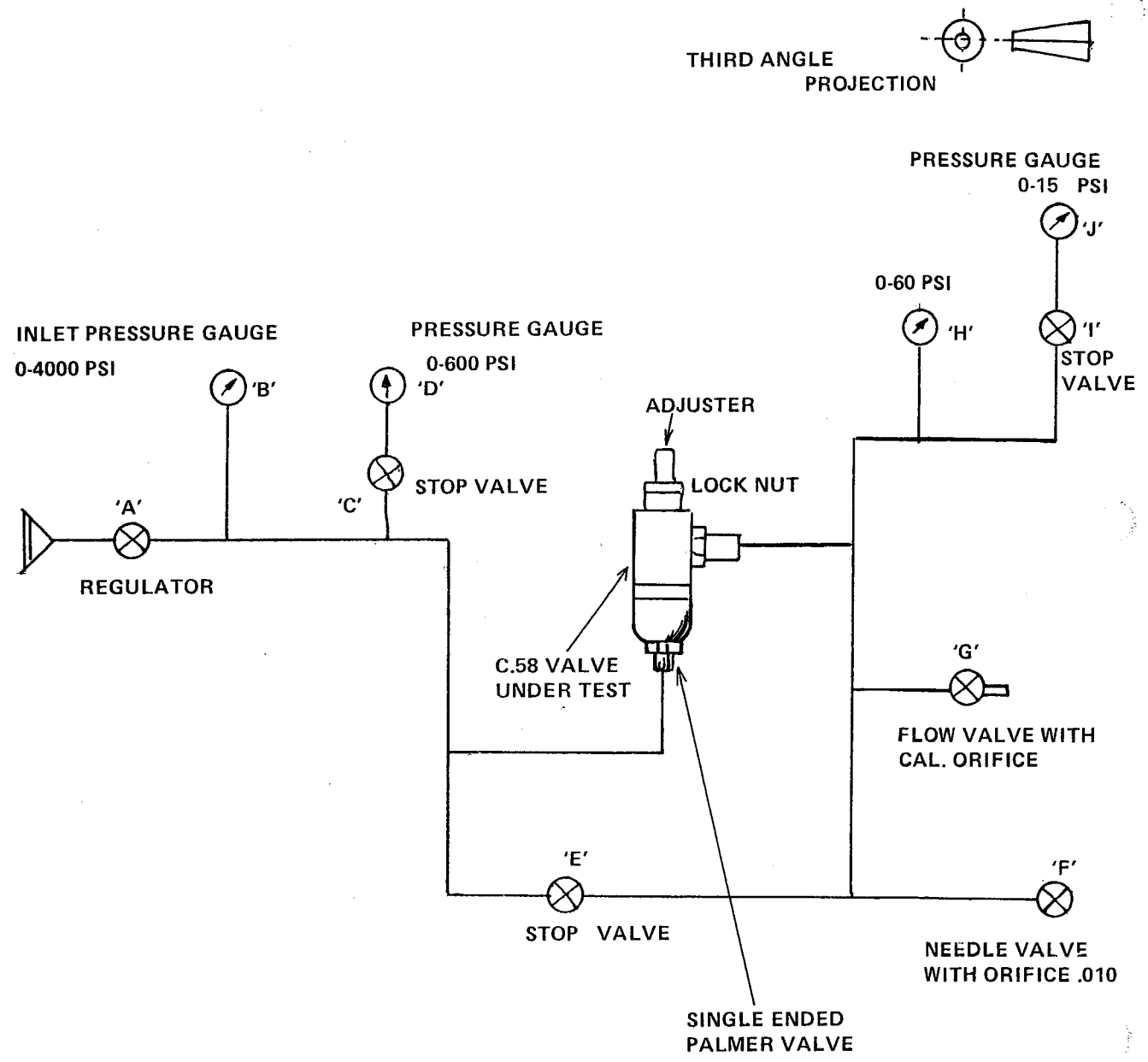
ALTERNATIVE FITTING.
FLOW.

Figure 1

Figure 2



CIRCUIT DIAGRAM FOR
TESTING C58 VALVES

Drg. No: M6336