Meggitt Fuelling Products
Avery-Hardoll
Whittaker Controls

4in. API coupler CCMY8500M2 series

Maintenance manual with spare parts list

Publication ref TP0007
Issue 4 November 2003

Avery-Hardoll
Holland Way
Blandford Forum
Dorset DT11 7BJ
UK

Tel: +44 (0) 1258 486600
Fax: +44 (0) 1258 486601

www.meggittfuelling.com

Whittaker Controls
12838 Saticoy St
North Hollywood
California 91605-3505
USA

Tel: +1 818 765 8160
Fax: +1 818 759 2194

www.wkr.com
www.meggitt.com

MEGGiTT
smart engineering for extreme environments

AMENDMENT RECORD

AMENDMENT NO.	PAGE	DESCRIPTION	DATE

Avery-Hardoll

It is the aim of Avery-Hardoll to maintain a policy of continuous progress and for this reason reserve the right to modify specifications without notice. This manual provides the information required to install, service and overhaul the equipment. Although every effort has been made to ensure absolute accuracy, Avery-Hardoll does not hold itself responsible for any inaccuracies that may be found.

HEALTH AND SAFETY AT WORK ACT 1974

REFERENCE: CHAPTER 37, PART 1, SECTION 6

Avery-Hardoll take every care to ensure that, in accordance with the above Act, our products, as far as is reasonably practical in an industrial environment, are when operated and maintained in accordance with the appropriate manual, safe without risk to health.

PRODUCT SAFETY

In the interest of safety it is strongly recommended by Avery-Hardoll that the following details receive strict attention.

For the Purpose of Definition, the word PRODUCT applies to any product sold by Avery-Hardoll.

1 The Product is used only with fluids stated as acceptable by Avery-Hardoll.

2 The Product, whilst in service, must not be subjected to pressures greater than the Maximum Working Pressure or tested to pressures greater than the Test Pressure as specified in the manual.

3 The Product must only be coupled/connected to equipment considered acceptable by Avery-Hardoll.

4 The Product must be handled using the lifting handles where fitted, or in accordance with the manual.

5 The Product must not be misused or handled in any way liable to cause damage.

6 The Product must be inspected for any signs of damage prior to use e.g. cracks, damaged seals, seized or tight operating mechanisms.

7 The Product must be subjected to a regular maintenance programme, either in accordance with the manual or as agreed with Avery-Hardoll.

8 Only technically competent personnel should repair or maintain the Product and only parts supplied by Avery-Hardoll may be used.

9 Products covered by warranty may not be modified in any way without prior written permission of Avery-Hardoll.

10 Products not in service, must be stored in a clean area, and should not be subjected to excessive temperature, humidity, sunlight, or strong artificial light. Products should be protected to prevent damage or the ingress of foreign matter.

11 Where applicable, attention should be drawn to dangers resulting from the generation of static electricity in product flow lines. We strongly recommend account is taken of BS5958 parts 1 and 2.x

12 This equipment is not suitable for use with Liquid Petroleum Gas (L.P.G).

WARNINGS

DO NOT HANDLE O-RING SEALS IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

DO NOT EXCEED PRESSURES AND TEMPERATURES QUOTED OR SERIOUS INJURY AND COMPONENT FAILURE MAY OCCUR.

PRIOR TO OPERATING THE EQUIPMENT, ENSURE THAT ALL AIRPORT/LOCAL PROCEDURES HAVE BEEN COMPLIED WITH.

NEVER USE THE OPERATING LEVER TO START OR STOP FUEL FLOW.

NO SOLVENTS, CLEANING AGENTS, GREASES OR OTHER MATERIALS ARE TO BE USED ON INTERNAL SURFACES IN CONTACT WITH FUEL. CLEANING IS TO BE CARRIED OUT USING CLEAN AVIATION FUEL ONLY.

WORK MUST BE CARRIED OUT ONLY BY SUITABLY QUALIFIED PERSONNEL.

PRIOR TO COMMENCING WORK, ENSURE THAT ALL AIRPORT/COMPANY SAFETY PROCEDURES HAVE BEEN COMPLIED WITH.

TAKE CARE WHEN DISMANTLING AND ASSEMBLING THE PISTON/FUEL CHAMBER/DIAPHRAGM ASSEMBLY. THE UNIT CONTAINS SPRINGS WHICH MAY CAUSE INJURY.

HIGH PRESSURE AIR IS DANGEROUS. HIGH PRESSURE SOURCES MUST NOT BE DIRECTED TOWARDS ANY PART OF THE HUMAN BODY.

CAUTION

IF PRODUCT SELECTIVITY IS EMPLOYED, THE MAXIMUM THREAD ENGAGEMENT OF THE SELECTIVE BOLTS MUST NOT EXCEED 5/16 IN., OR THE COUPLING SLEEVE MAY BE PREVENTED FROM SWIVELLING.

CONTENTS

Preliminary material

Chapters

Chapter 1

INTRODUCTION

1 GENERAL

1.1 The Avery-Hardoll CCMY8500M2 series American Petroleum Institute (API) Pit Coupler is a 4 in. unit designed for use with aviation kerosenes and gasolenes on airport hydrant systems and can be supplied with selectivity if required. Meggitt Fuelling Products, Avery-Hardoll must be consulted for applications with other liquids.

1.2 The coupler is assembled in several configurations. Full details are given in the tables below, but the basic configurations are:

As a basic coupling

With a straight swivel connector

With a 90° elbow swivel connector

With a pressure control valve, deadman and swivel connector

TABLE 1 - 4 INCH API LEVER OPERATED COUPLER - CONFIGURATION

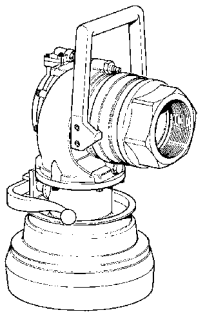
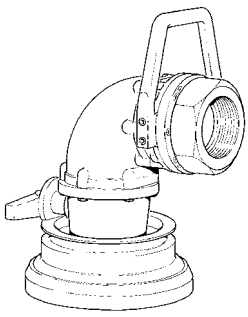
COUPLER CONFIGURATION	CODE NUMBER	
	WITH SHORT HANDLE	WITH WRAP ROUND HANDLE
	CCMY8500M2R2 Coupler and Pressure Controller Swivel Assy CCMY8502M2R2 Coupler and Pressure Controller Swivel Assy with Sampling Point	CCMY8501M2R2 Coupler and Pressure Controller Swivel Assy CCMY8503M2R2 Coupler and Pressure Controller Swivel Assy with Sampling Point
	CCMY8500M2E Coupler and Elbow Swivel Assy CCMY8502M2E Coupler and Elbow Swivel Assy with Sampling Point	CCMY8501M2E Coupler and Elbow Swivel Assy CCMY8503M2E Coupler and Elbow Swivel Assy with Sampling Point.
NOTE: A suffix 'A' in place of 'R2' or 'E' above indicates a straight swivel assembly.		

TABLE 2 - VARIATIONS

THREAD SIZE	SELECTIVITY
B = 4 in. BSP	S1 – Position 1
N = 4 in. NPT	S2 – Position 2
	S3 – Position 3
	S4 – Position 4
	S5 – Position 5
	S6 – Position 6

EXAMPLE: CCMY8502M2R2/B/S4 indicates a Coupler and Pressure Controller Assy with Sampling Point, 4 in. BSP thread and Selectivity Position 4.

1.3 The coupler incorporates a manually operated poppet valve which is interlocked so that the valve cannot be opened if the coupler is not connected. Conversely, the coupler cannot be disconnected if the poppet valve is open. If required, the coupler can be supplied with a sampling point fitted with a 3/8 in. BSP plug.

1.4 The fitting of the pressure control/deadman valve allows a constant delivery pressure to be maintained at varying flow rates. The pressure control valve is of the direct pressure feed back type, sensing fuel pressure downstream of the valve, and works on the balanced diaphragm principle. The fuel pressure on one side of a diaphragm is balanced by air pressure on the other side keeping the valve in the required position. Incorporated within the valve is an emergency “deadman” shut off feature which may be used to start and stop product flow.

Chapter 2

TECHNICAL DESCRIPTION

CONTENTS

1 API COUPLER (Fig 2.1)

1.1 The coupler comprises a body and sleeve. The body houses ten spring loaded catches. The sleeve is fitted over the body and secured with a Spirolox ring. The inner diameter of the sleeve is shaped so that when it is in the “up” or unlatched position the catches are withdrawn into grooves in the body. When the sleeve is pushed downwards the catches are pushed out of the grooves and are locked into engagement with the mating API adaptor. The valve handle is shaped so that the sleeve cannot be moved to the unlatched position until the poppet valve is in the closed position.

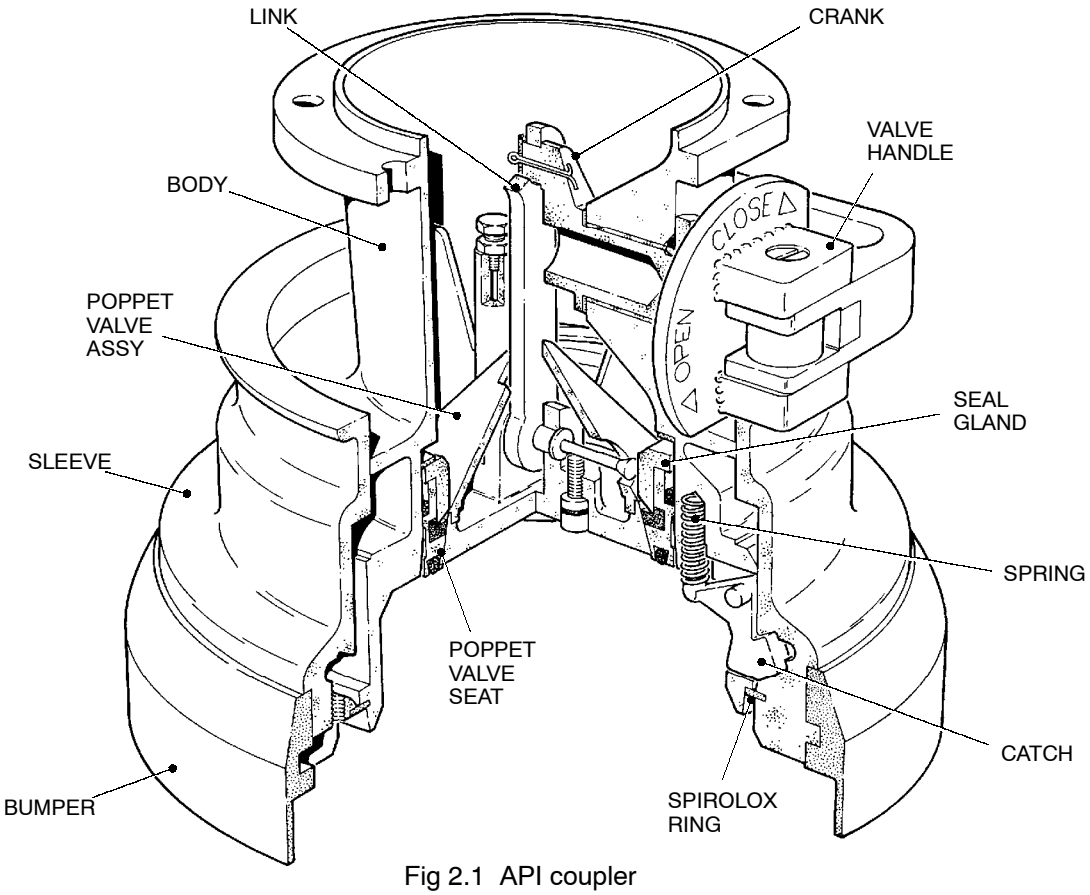


Fig 2.1 API coupler

1.2 The valve handle, either a wraparound or short type, is secured to a crank which fits through a hole in the body, running in nylon bushes and sealed by a gland and O-ring seals. The crank is connected by a link to the poppet valve. A floating poppet seat is spring loaded by means of a wave spring to make the seal between the coupler and the API adaptor, allowing for any wear or misalignment which may occur.

1.3 The crank and link are designed to operate over-centre when the poppet valve is fully open or shut. This prevents fuel pressure accidentally opening or closing the valve.

1.4 To make the coupler selective, bolts can be fitted, in any of six sequences, into numbered holes in the face of the sleeve.

2 SWIVEL CONNECTORS (Fig 2.2)

2.1 The straight or 90° elbow swivel connectors fitted to the coupler are of similar construction. The straight swivel is secured directly to the coupler by nuts, bolts and washers and the elbow has threaded blind securing holes machined in the flange at both ends, to which the coupler and the swivel are secured. The elbow swivel assy is formed to accept a bolt on handle.

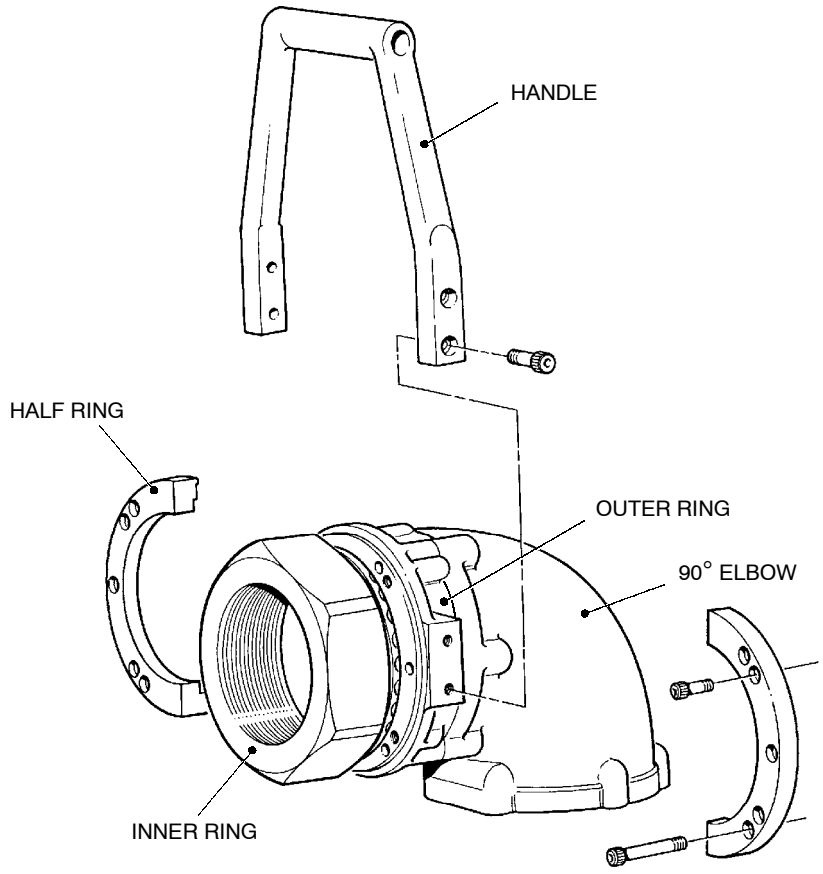


Fig 2.2 Swivel connectors

2.2 The swivel comprises an inner ring, which is formed into a female hose connection, either 4 in. BSP or 4 in. NPT at one end and is grooved on its outer diameter to accept wear strips, O-ring seal, balls and race rings. The inner ring fits into the outer ring and is secured in place by half rings. The half rings are secured to the outer ring by four socket head cap screws.

2.3 The whole assembly is secured to the elbow or the coupler by six socket head cap screws passing through clearance holes in the outer ring. The handle of the elbow is secured by four socket head screws to threaded holes in flats on the outer ring.

3 PRESSURE CONTROL VALVE (Fig 2.3)

3.1 The valve comprises a aluminium alloy body and end plate. The end plate forms an air chamber and the body is divided into an outer chamber, through which fuel passes when the piston is open and an inner fuel chamber, formed by a fuel chamber insert.

3.2 The inner chamber, which is sealed off from the main flow, is divided into two sections by the main diaphragm. These are the air and fuel chambers, which are connected through internal drillings to external fuel sensing and air pressure reference lines.

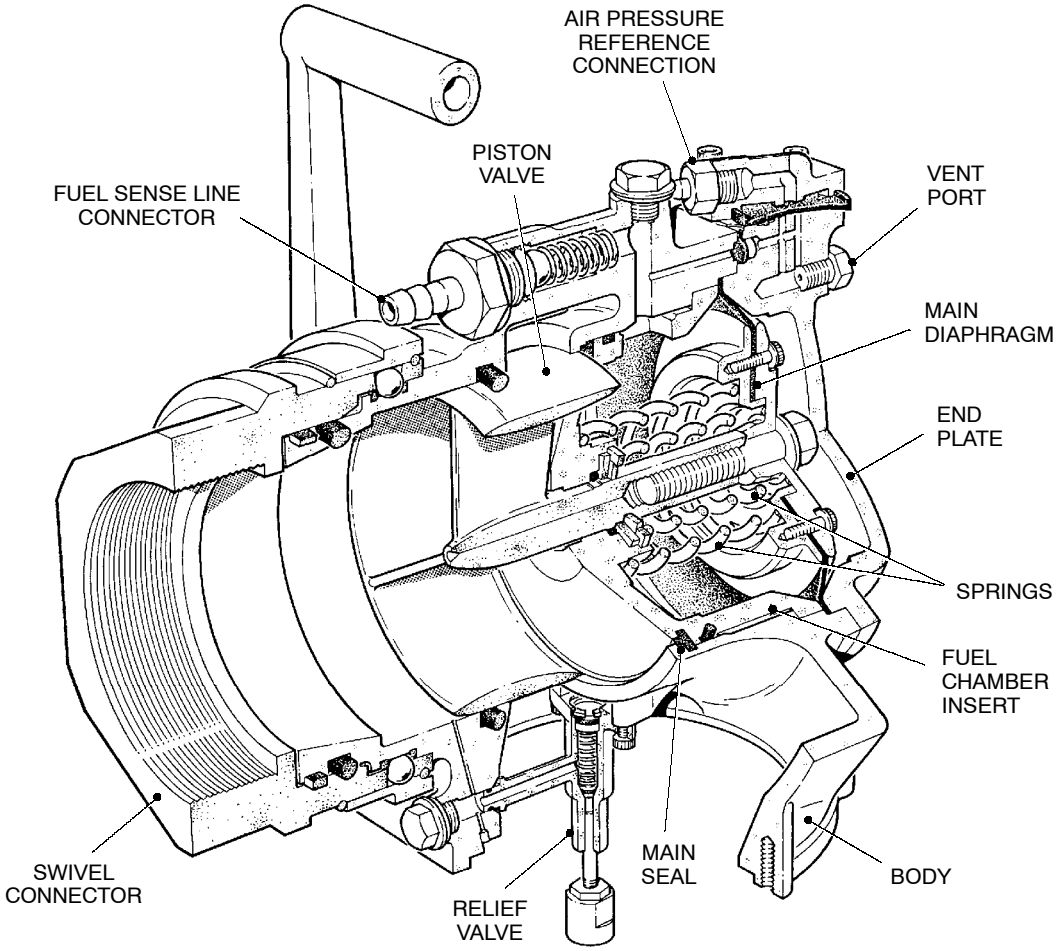


Fig 2.3 Pressure control valve

3.3 The piston is attached by a valve stem to the main diaphragm. The stem passes through a seal in the fuel chamber insert. The whole diaphragm/piston assembly is biased to the closed position by two springs, fitted between the fuel chamber insert and the diaphragm carrier plate. This ensures that in the event of a diaphragm failure, or operation of the deadman valve, the piston will always close, so stopping flow.

3.4 The one way fuel restrictor valve, incorporating a small fixed by-pass orifice, forms the fuel sense line connector. The valve governs the opening time of the piston by allowing a restricted flow from the fuel chamber back through the orifice as downstream pressure falls. The opening time is set at approximately 10 seconds from closed to maximum flow rate (the time may vary slightly depending upon air reference pressure). With a rapid rise in downstream pressure, the ball valve in the fuel restrictor valve is forced open against spring pressure, so allowing rapid pressure build up in the fuel chamber and thus causing rapid closure of the valve.

3.5 When air reference line pressure is released, pressure in the air chamber opens the air vent diaphragm, so discharging pressure through the vent port. The rate of closure of the piston on operation of the deadman valve is controlled by the size of orifice in the vent port. The closing time is set between 3 and 5 seconds. The same action occurs when the valve closes on sensing a downstream pressure surge.

4 OPERATION (Fig 2.4)

4.1 In operation, a preset air reference pressure, at approximately 0.82 bar (12 psi) above the required fuel control pressure, is applied to the air chamber. This pressure, applied to the diaphragm, overcomes spring pressures and causes the piston to open.

4.2 As the piston moves off the main seal, fuel flow commences and downstream pressure increases. This pressure is sensed at the junction of the fuel sense line and the main pipe downstream of the valve (sense point) and fed back into the fuel chamber. The piston continues to open until the fuel pressure and spring force are balanced against the air reference pressure. The spring force and an imbalance of area gives a controlled pressure of 0.82 bar (12 psi) less than the applied air pressure, this being known as the bias of the valve.

4.3 If the downstream pressure increases, the pressure in the fuel chamber increases, overcoming air reference pressure in the air chamber and, closing the piston. The pressure at the control point reduces until the diaphragm is balanced. If the downstream pressure drops, the reverse action takes place, air reference pressure overcomes fuel pressure, opening the piston until the diaphragm is again balanced.

4.4 Fig 2.4 shows the valve in the fully closed and fully open positions. In practice, under normal operating conditions, the valve will open to approximately the mid stroke position and small changes in pressure will be compensated for by small movements of the piston.

4.5 A pressure relief valve, mounted in the body on the inlet side of the diaphragm, prevents an excessive build up in pressure. When the coupler poppet is closed an actuator screw on the top of the poppet pushes the relief valve open so relieving any pressure locked in the coupler. The valve also acts to relieve any excess pressure locked between the pit valve and the pressure control valve caused for example by a temperature rise. The relief valve relieves at approximately 20 bar (300 psi).

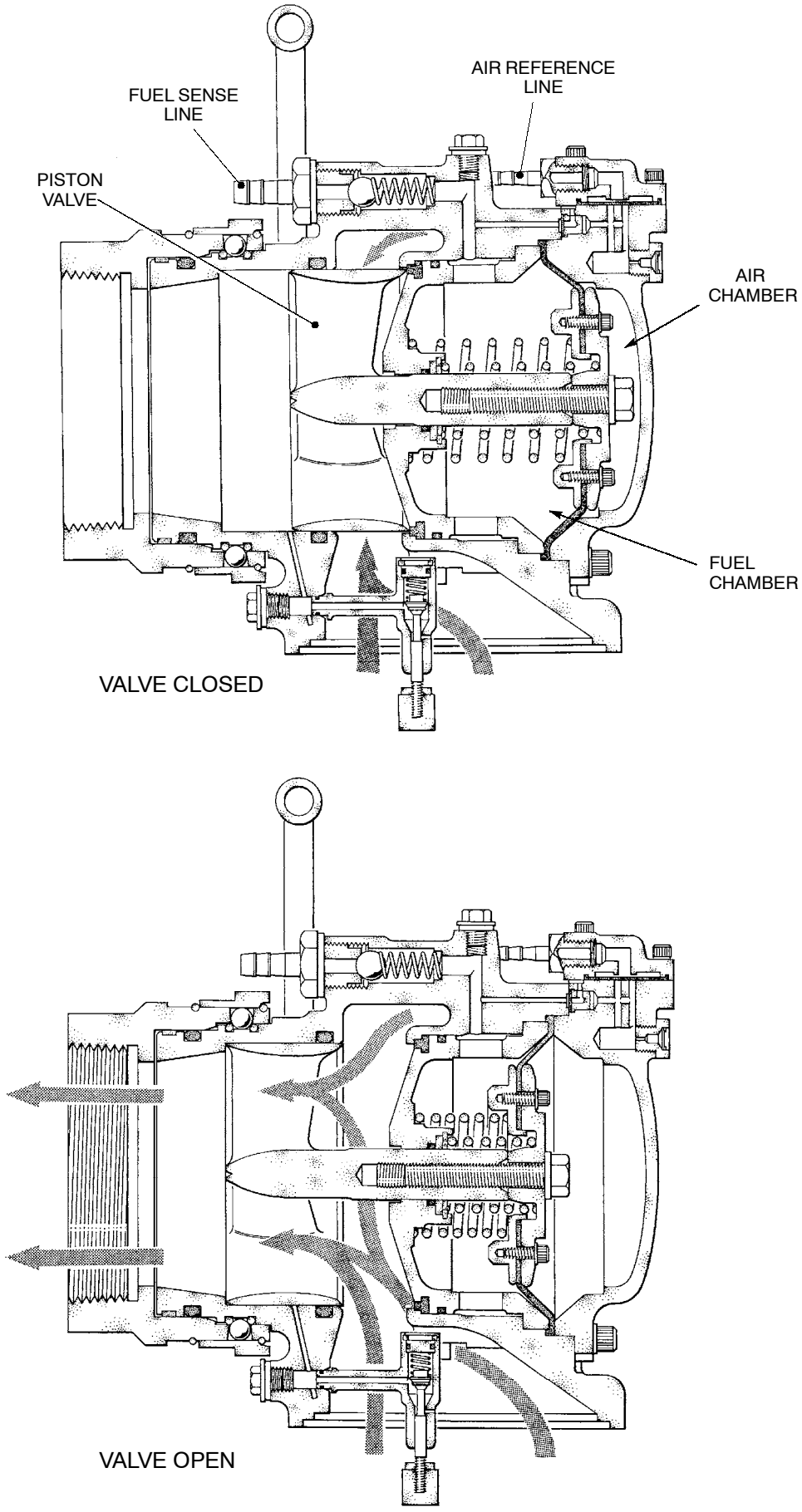


Fig 2.4 Valve operation

Chapter 3

SPECIFICATION

WARNING

DO NOT EXCEED PRESSURES AND TEMPERATURES QUOTED OR SERIOUS INJURY AND COMPONENT FAILURE MAY OCCUR.

1 STANDARDS

1.1 The coupler with its associated ancillaries comply with API 1584 : 4 INCH HYDRANT SYSTEM COMPONENTS AND ARRANGEMENTS.

2 MATERIALS

2.1 Components in contact with fuel are manufactured from the following materials:

Anodised aluminium alloy
Stainless steel
Nickel plated steel
PTFE
High nitrile and fluorocarbon rubbers

3 OPERATING ENVIRONMENT

4.1 The following units and ancillaries are operational under the following conditions:

Test pressure (gauge) . . . . . 23.0 bar (338 psi)
Maximum safe working pressure (gauge) . . . . . 15 bar (225 psi)
Operating temperature . . . . . –20 to + 60 deg C (–4 to + 140 deg F)

4 PERFORMANCE

4.1 Maximum flow rate . . . . . 4500 l/min (1000 imp gal/min)

4.2 Pressure control:

Air reference pressure minus 0.64 to 0.97 bar (10 to 14 psi)

4.3 Deadman control:

Opening time . . . . . 10 seconds (Approx)
Closure time . . . . . 5 seconds (Approx)
Overshoot . . . . . 191 l/min (42 imp gal/min)
(at max flow rate)

5 STORAGE LIFE

5.1 Storage life is three years, limited by deterioration of seals and O-rings only.

6 DIMENSIONS

Height (overall):

Straight swivel (max)	11.76 in. (300 mm)
Elbow swivel (max)	19.29 in. (490 mm)
Pressure controller swivel (max)	19.54 in. (497 mm)

Weight:

Coupler	5.7 kg (12.56 lb)
Coupler with pressure controller swivel	13 kg (28 lb)
Coupler with elbow swivel	9.1 kg (20 lb)

Chapter 4

OPERATION AND MAINTENANCE

CONTENTS

1 COMMISSIONING

1.1 The fuel sense line and air reference line must not exceed 12.2 metres (40 feet) in length. Restrictions in the fuel sense line must be kept to a minimum.

1.2 The air reference pressure must be supplied through a precision, relieving type, pressure regulator. A BOSCH No. 0821-302025, or NORGREN No. 11-818-110, are suitable. The use of any other regulator should be cleared in advance by Meggitt Fuelling Products, Avery-Hardoll.

NOTE

Use of insufficiently sized or non-relieving types of pressure regulator will result in high control/shut off pressures.

1.3 Before a coupler fitted with a pressure control valve can be used for fuelling, its associated fuel sense line and fuel chamber must be purged of air in accordance with the following procedure.

1.4 Connect the coupler to a re-circulating rig capable of producing a minimum flow of 450 l/min (100 imp gal/min) at a pressure not less than the desired flow control pressure.

1.5 Set an air reference pressure 0.83 bar (12 psi) higher than the desired flow control pressure. With the poppet valve open and using the deadman valve, apply air pressure to open the piston.

1.6 With downstream valves open, open an upstream valve to start flow and set flow to approximately 450 l/min (100 imp gal/min).

1.7 Unscrew the bleed screw situated behind the fuel restrictor valve on top of the pressure control valve three complete turns. There is no need to remove fully the bleed screw as it has a cross drilling. Drape a rag over the valve and position a drip tray underneath.

1.8 Using a downstream valve, slowly reduce flow to zero. Increase flow to 450 l/m (100 imp gal/min) and again reduce to zero. Air fuel mixture will be expelled from the bleed valve. Repeat this procedure until clear product flows from the bleed screw.

1.9 Tighten the bleed screw and operate the valve. If all air has been expelled from the system, the opening of the valve from zero flow to approximately 450 l/m (100 imp gal/min) will be smooth and progressive. If opening is too fast ie. less than one second, or if instability (hunting) occurs, repeat the bleeding procedure.

2 OPERATION

2.1 To fit the coupler to the hydrant valve, proceed as follows.

2.2 Remove the pit cover and hydrant valve dust cap. Remove the coupling dust cap.

2.3 Keeping the coupler square, place over the API adaptor of the hydrant valve and ensure that the coupler sleeve drops into position. The coupler is now firmly latched.

2.4 Open the poppet valve by rotating the operating lever counter clockwise to its stop.

NOTE

The poppet valve must not be used to start and stop fuel flow.

2.5 On couplers fitted with and elbow/swivel only, start fuel flow by latching the hydrant valve in its open position.

2.6 On couplers fitted with a pressure control valve, open the hydrant valve as above. Apply an air reference pressure approximately 0.83 bar (12 psi) higher than the required control pressure to the pressure control valve via the deadman control. This will start fuel flow.

2.7 To stop the fuel flow or isolate flow after fuelling, release the deadman handle and/or pull the hydrant valve release cable. Ensure flow has ceased and close the poppet valve. If a pressure control valve is fitted, some resistance to closing will be felt on the operating lever over two or three seconds, as fuel is expelled from below the valve via the pressure relief valve.

2.8 To remove the coupler: Lift the sleeve to release the catches and then lift the complete unit off the hydrant valve. Fit coupler dust cap and stow away. Replace the hydrant valve dust cap and pit cover.

3 ROUTINE MAINTENANCE

3.1 The frequencies recommended below are a minimum, however, local company instructions must be observed.

WARNINGS

DO NOT HANDLE O-RINGS/SEALS IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

NO SOLVENTS, CLEANING AGENTS, GREASES OR OTHER MATERIALS ARE TO BE USED ON INTERNAL SURFACES IN CONTACT WITH FUEL. CLEANING IS TO BE CARRIED OUT USING CLEAN AVIATION FUEL ONLY.

3.2 Daily

Before use, carefully inspect the unit for signs of damage or leaks. Particular attention should be given to the area around the pressure control valve vent port, and the catches on the underside, for signs of wear or breakage. Damaged units must be withdrawn from service for overhaul as detailed in Chapter 5.

3.3 Six monthly

Carry out a complete operational check. Refer to Chapter 6.

3.4 Yearly

Renew all dynamic seals. Refer to Chapter 5.

3.5 Two yearly

Renew all static seals and all ten catches. Refer to Chapter 5.

3.6 Three yearly

Renew all seals of units in storage. Refer to Chapter 5.

Chapter 5

SERVICING

CONTENTS

1 GENERAL

WARNINGS

DO NOT HANDLE O-RINGS/SEALS IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

WORK MUST BE CARRIED OUT ONLY BY SUITABLY QUALIFIED PERSONNEL.

PRIOR TO COMMENCING WORK, ENSURE THAT ALL AIRPORT/COMPANY SAFETY PROCEDURES HAVE BEEN COMPLIED WITH.

1.1 This chapter details the procedures to be followed when dismantling the API coupler and ancillaries for overhaul and repair. These procedures must be carried out by suitably qualified engineers in clean workshop conditions.

1.2 Before commencing dismantling ensure that all the required materials and spare parts are available.

1.3 On completion of overhaul or repair carry out the tests details in Chapter 6.

1.4 In the following text, the Item No. in brackets, e.g. (Item 1), refers to the relevant Item in Table 5.1.

Table 5.1 - SPECIAL TOOLS AND MATERIALS

ITEM	PART NUMBER	DESCRIPTION
1	-	Long nose pliers
2	TAAS6960	Opening tool
3	BDH29442-4B	Paraffin wax, soft

2 COUPLER (Fig 5.1)

WARNING

DO NOT HANDLE O-RINGS/SEALS (9,10,24,27,30,43) IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

2.1 Dismantling

2.1.1 Remove the six screws (39) and washers (40) securing the coupler to its associated ancillary and separate. Remove the O-ring seal (43). Remove the dust cover (29).

2.1.2 With the coupler placed inlet side upwards on the work surface, use the opening tool (Item 2) and latch the coupler. Lift the sleeve (1) and operate the handle (14 or 15) to open the poppet valve (33).

2.1.3 Remove the pin retaining screw (31) and O-ring seal (30) and using long nose pliers (Item 1) partially withdraw the poppet pin (32). Remove the poppet valve (33) from the link (5). The poppet valve can be further dismantled if required by removing the three screws (36) securing the halves together.

2.1.4 Remove the poppet seat (25), poppet seal (24), O-ring (27), gland (23) and wave spring (22).

2.1.5 Remove the split pin (2) and washer (3) from the crank (4) and withdraw the link (5).

2.1.6 Remove the socket head screw (16) and washers (18) and (17) retaining the handle on the crank. Remove the handle.

2.1.7 Remove the key (6) and PTFE washer (12) and withdraw the crank through the centre of the body (19). Remove the O-ring seal (9).

2.1.8 Remove the six socket head screws (13) securing the crank gland (11) to the body. Withdraw the crank gland and remove the O-ring seal (10).

2.1.9 Using a suitable tool remove the liner bushes (7) and (8).

2.1.10 Prise out the spirolox ring (26) securing the sleeve to the body and, keeping a firm downward pressure on the opening tool, gently tap the sleeve all round downwards until it becomes disengaged from the main body.

2.1.11 Prise the bumper (28) from the sleeve if replacement is required.

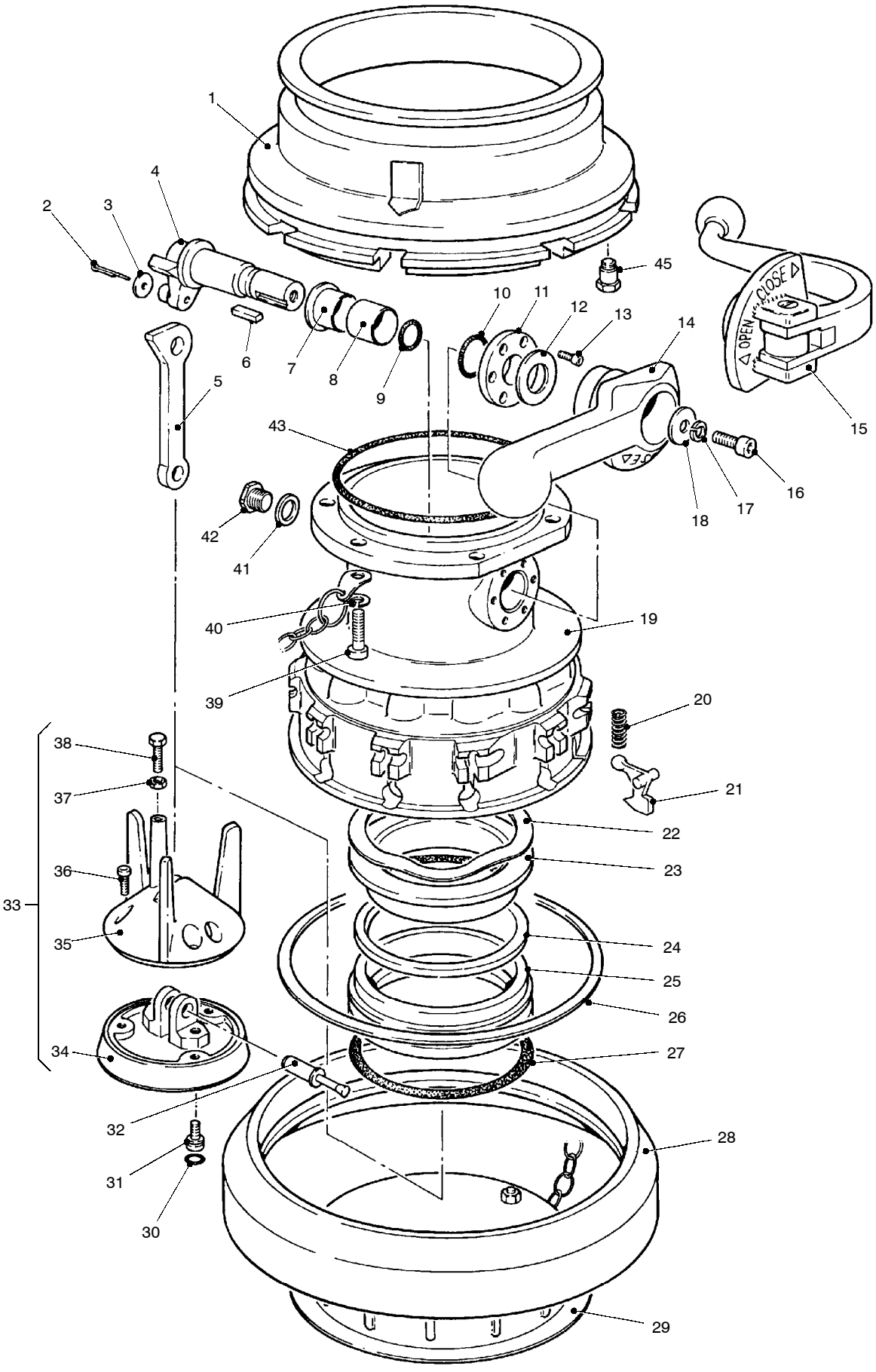


Fig 5.1 API Coupler assembly

2.1.12 Remove the opening tool and withdraw the catches (21) and springs (20) from the body.

2.2 Inspection

2.2.1 Carefully wash all parts in clean aviation fuel and inspect for signs of wear or damage. Defective parts must be renewed immediately.

2.2.2 Check that the free length of the wave spring is 0.34 in. (8.64 mm) minimum.

2.2.3 Check for wear on the three legs of the poppet valve guide (35) and the seal gland (23) internal diameter. Check that no significant distortion has been sustained by the catches (21).

2.3 Assembling (Fig 5.2)

2.3.1 Place the sleeve (1) on the working surface with the selectivity slots uppermost. Locate the body (19) inside the sleeve with the ten slots uppermost.

2.3.2 Insert the ten springs (20) into the body (19) and insert the catches (21) through the slots. Locate the catch pivots in the undercuts on the body.

2.3.3 Rest the opening tool (Item 2) on the balls of the catches and depress the tool. Ensure the catch pivots remain in place.

2.3.4 With the opening tool fully depressed, lift the sleeve squarely over the body to the “fully latched” position. Relax pressure on the tool and locate the spirolox ring (26) into its groove in the body, ensure the ring is correctly located in its groove, lightly tapping into place if necessary. Release the opening tool by pushing back the sleeve.

2.3.5 Refit the bumper (28) to the sleeve. It may be necessary to warm the bumper by soaking in hot water to soften for easier fitting.

2.3.6 Fit new nylon bushes (7) and (8) into the body. Fit a new O-ring seal (9) to the crank (4) and locate the crank through the bushed bore, from the inside of the body.

2.3.7 Fit a new O-ring seal (10) to the crank gland (11), carefully slide the crank gland over the crank, and secure to the body with six socket head cap screws (13).

2.3.8 Fit the PTFE washer (12) and key (6) to the crank and then refit handle (14) or (15) securing with washers (18) and (17) and socket head screw (16).

2.3.9 Locate the link (5) onto the crank ensuring it is positioned as shown in Fig 5.1, fit the washer (3) and secure with split pin (2).

2.3.10 Fit the poppet seal (24) into its housing in the poppet seat (25). Fit O-ring (27) to the seat ensuring the O-ring is flat.

2.3.11 Locate the wave spring (22) into the body (19), lightly smear the poppet seat locating bore with paraffin wax (Item 3) and fit the poppet seat assembly into the body.

2.3.12 If dismantled, reassemble the poppet valve (33) ensuring the holes for the poppet pin (32) are aligned.

2.3.13 Use the opening tool (Item 2) to set the sleeve to the coupled position. Operate the handle and set to the fully open position.

2.3.14 Offer up the poppet assembly, locate the link (5) through the slot and align the holes. Insert the poppet pin (32) to its stop, fit O-ring seal (30) to retaining screw (31) and insert screw into the poppet.

NOTE

Take care to ensure that poppet pin is correctly inserted through the holes in the poppet and link.

2.3.15 Close the poppet valve and remove the opening tool.

2.3.16 If the coupler is fitted with a pressure control valve, adjust the actuator screw to give a measurement of 1.355 to 1.365 in. (34.42 to 34.67 mm) from the flange face to the top of the screw as shown in Fig 5.2 and tighten the lock nut. No adjustment is necessary for couplers fitted with Elbow/Swivel, but ensure lock nut is tight.

2.3.17 Fit O-ring seal (43) and secure the coupler to its associated ancillary with the six screws (39) and washers (40). Test as detailed in Chapter 6.

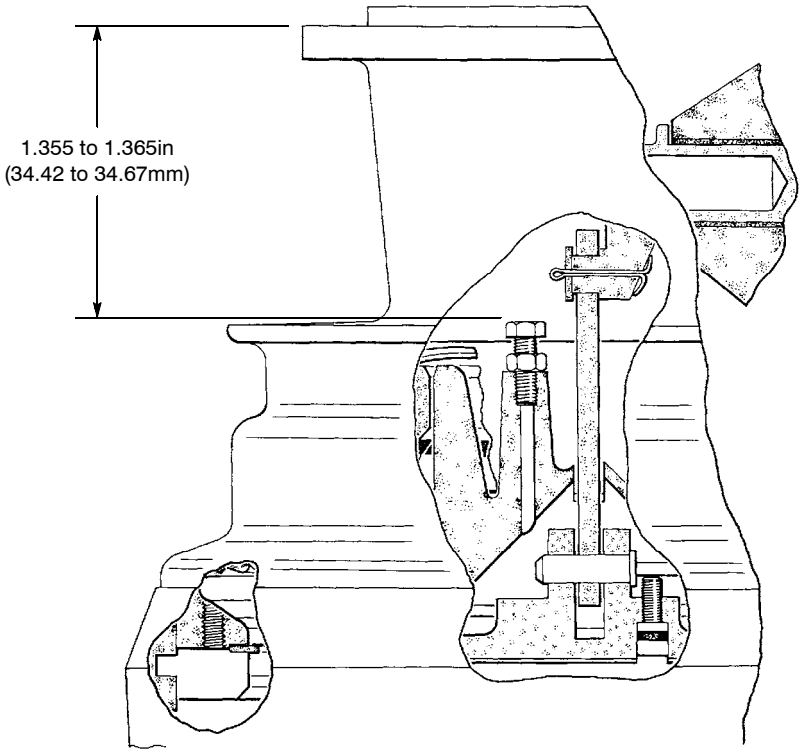


Fig 5.2 Actuator screw adjustment

3 90° ELBOW AND SWIVEL (Fig 5.3)

3.1 Dismantling

WARNING

DO NOT HANDLE O-RINGS/SEALS (4,7,13) IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

3.1.1 Refer to Para 2.1.1. Remove the six screws and washers securing the elbow to the coupler and separate. Remove the O-ring seal.

3.1.2 Support the weight of the swivel and remove the six socket head screws (5) securing the swivel to the elbow (3) and separate the swivel and elbow, remove the O-ring seal (4).

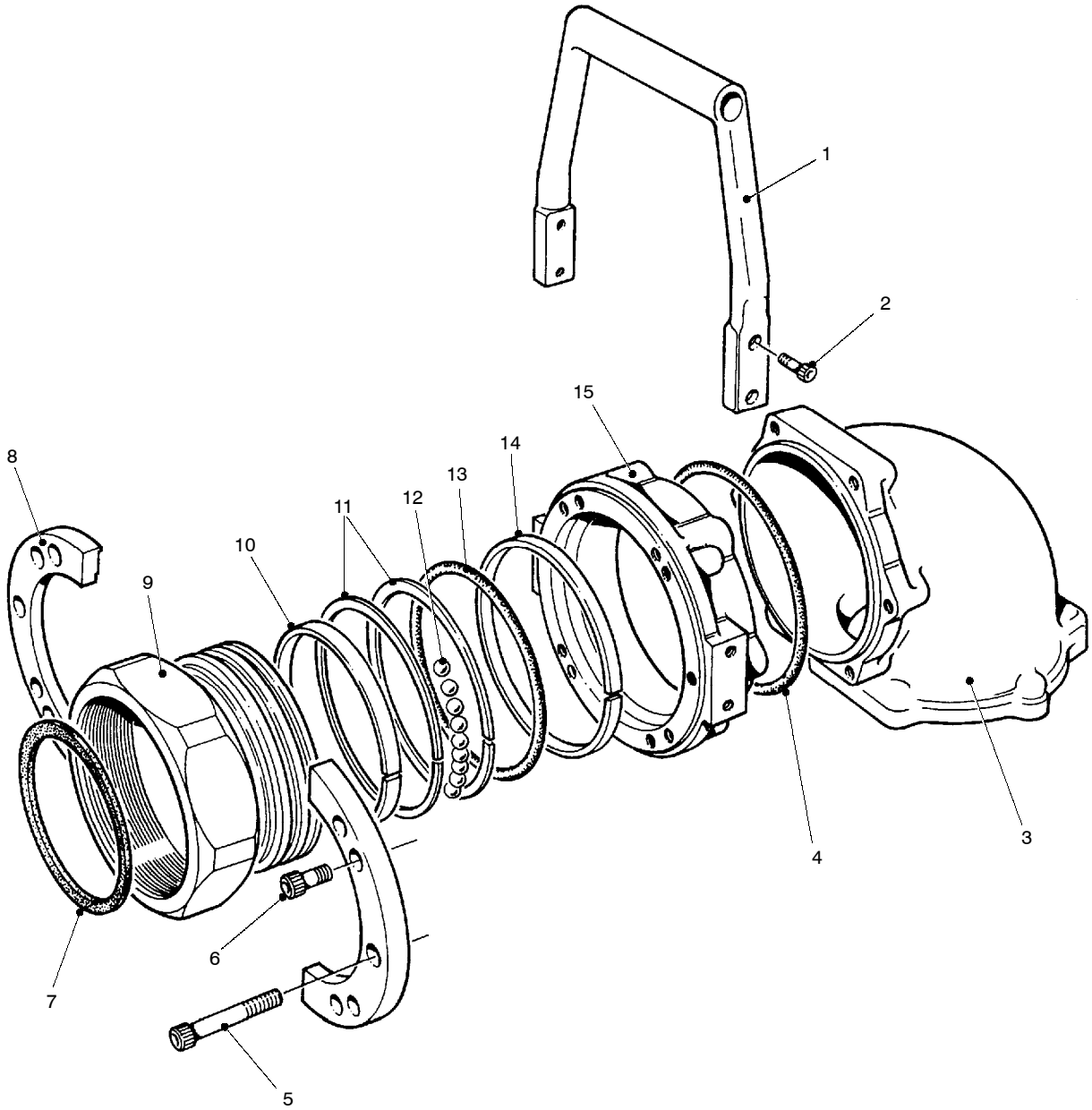


Fig 5.3 Elbow and swivel assembly

3.1.3 Remove the four socket head screws (6) securing the half rings (8) to the outer ring (15). Remove the half rings (8) to give access to the forty five balls (12), which can now be carefully removed into a suitable container.

3.1.4 Holding the inner ring (9) secure by clamping the hexagon in a suitable vice, withdraw the outer ring (15) and remove the O-ring seal (13), Slydring wear strips (10) and (14) and race rings (11).

3.1.5 If the inner ring is the BSP version remove the sealing ring (7). If necessary remove handle (1) from outer ring.

3.2 Inspection

3.2.1 Carefully wash all parts in clean aviation fuel and inspect for signs of wear or damage. Defective parts must be renewed immediately. Ensure that any abrasion to the elbow casting has not significantly affected its wall thickness.

3.3 Assembling

3.3.1 Refit the Slydring wear strips (10) and (14), O-ring seal (13) and race rings (11) to the inner ring (9). Ensure the joins in the race rings are positioned 180° apart. Slightly swage the ends of the wear strips to aid retention. Lubricate the seal and wearstrips with paraffin wax (Item 3).

3.3.2 Lay the outer ring (15), inlet side down on the work surface and partially insert the inner ring (9) into the outer ring (15). With the lower race ring slightly below the outer ring upper face, insert the forty five balls (12) between the two race rings.

3.3.3 Loosely fit the half rings (8) onto the inner ring (9) under the hexagon, gently push down on the inner ring until the lower face of the half rings comes into contact with the upper face of the outer ring. Line up the four fixing holes and secure the half rings to the outer ring with the four socket head screws (6).

3.3.4 Fit a new O-ring seal (4) and secure the swivel to the elbow (3) with six socket head screws (5). Ensure the inner ring is free to rotate.

3.3.5 Fit sealing ring (7) to BSP version of inner ring. Refit handle (1) if it has been removed and secure it with four socket head cap screws (2).

3.3.6 Refer to Para 2.1.1. Fit O-ring seal and secure elbow to the coupler with six screws and washers. Test as detailed in Chapter 6.

4 PRESSURE CONTROL VALVE (Fig 5.4)

4.1 Dismantling

WARNING

DO NOT HANDLE O-RINGS/SEALS DIAPHRAGMS (1,4,6,15,56,63) IF THEIR MATERIAL APPEARS CHARRED, GUMMY OR STICKY. USE TWEEZERS AND WEAR NEOPRENE OR PVC GLOVES. DO NOT TOUCH ADJACENT PARTS WITH UNPROTECTED HANDS. NEUTRALIZE ADJACENT PARTS WITH A SOLUTION OF CALCIUM HYDROXIDE. IF THE DEGRADED MATERIAL OR ADJACENT PARTS TOUCH THE SKIN, DO NOT WASH OFF WITH WATER, SEEK IMMEDIATE MEDICAL AID FOR POSSIBLE CONTAMINATION WITH HYDROFLUORIC ACID. HYDROFLUORIC ACID IN CONTACT WITH SKIN HAS DELAYED SYMPTOMS OF CONTAMINATION. IT IS EXTREMELY TOXIC.

4.1.1 Refer to Para 2.1.1. Support the weight of the valve. Remove the six screws and washers securing the valve to the coupler and separate. Remove the O-ring seal.

4.1.2 Remove the two screws (52) with washers (51) securing the pressure relief valve body (47) to the valve body (38) and remove the pressure relief valve assembly (40).

4.1.3 Remove the four screws (39) securing the handle (35) to the body. Prise the circlip (60) from its groove and withdraw it on to the hexagon on the swivel body (62). Pull back the swivel sleeve (59) to release the balls (61) and remove the swivel body (62) from the valve body (38).

4.1.4 Place a suitable container in position under the swivel body, remove the circlip (58) and withdraw the sleeve (59) taking care to recover the sixteen balls. (61).

4.1.5 Remove the sealing ring (63) from BSP version of the swivel body.

4.1.6 Remove the Slydring wear strip (57), O-ring seal (56) and circlips (55) from the valve body (38).

4.1.7 Remove the fuel restrictor valve (31), bonded seal (32), withdraw the ball (33) and spring (34).

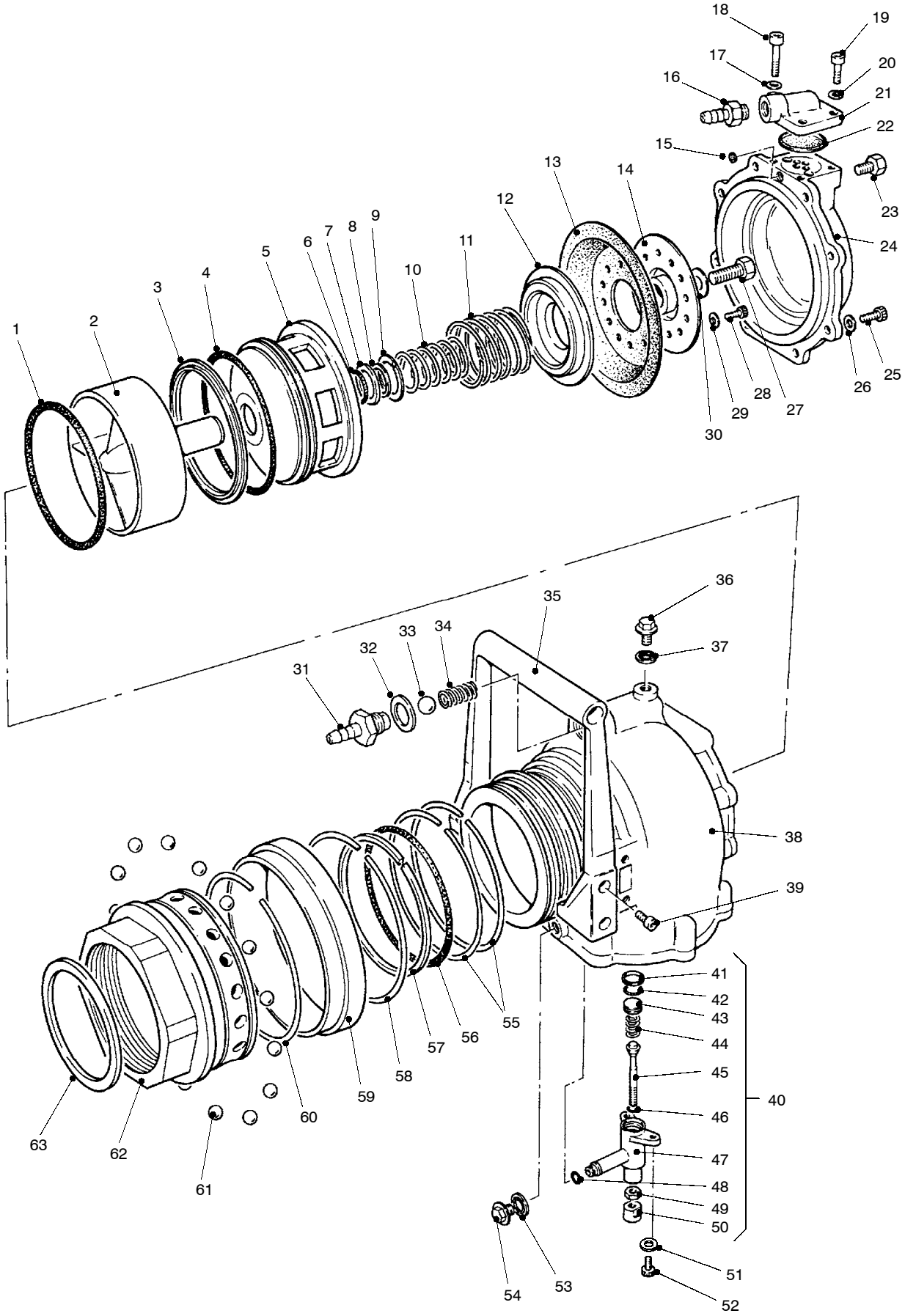


Fig 5.4 Pressure control valve and swivel assembly

4.1.8 Remove the eight cap head screws (25) and washers (26) securing the end plate (24) to the body and, taking care not to lose the diaphragm (15), separate the end plate from the body.

4.1.9 Remove the four socket head screws (18,19) and washers (17,20) securing the exhaust valve cover (21) and lift the cover from the body, gently prise out the diaphragm (22). Remove the vent port (23).

4.1.10 Stand the main body on the end plate flange, and using a wooden or nylon drift against the head of the fuel chamber insert (5), carefully free and remove the piston/fuel chamber/ diaphragm assembly from the body.

NOTE

Do not strike the piston (2) as this will damage the main seal (3).

4.1.11 Taking care not to damage the PTFE inner part, remove both parts of the double delta seal (1) from the body.

WARNING

TAKE CARE WHEN DISMANTLING AND ASSEMBLING THE PISTON/FUEL CHAMBER/ DIAPHRAGM ASSEMBLY. THE UNIT CONTAINS SPRINGS WHICH MAY CAUSE INJURY.

4.1.12 Prevent the piston (2) from rotating and remove the bolt (27) and bonded seal (30) from the piston stem, a sharp tap to a ring spanner should release the bolt. Withdraw the piston from the fuel chamber insert (5).

4.1.13 Carefully remove the twelve cap head screws (28) and washers (29) securing the diaphragm clamp plate (14), remove the clamp plate and peel the diaphragm (13) off the carrier (12).

4.1.14 Remove the springs (10,11) from the fuel chamber insert. Remove the Spirolox ring (9), washers (7,8) and both parts of the small double delta seal (6) taking care not to damage the PTFE part.

4.1.15 Remove the main seal (3) and O-ring seal (4) from the fuel chamber insert.

4.1.16 If considered necessary remove the bleed screw (36) and seal (37), the blank plug (54) and seal (53) and the air connector (16).

4.1.17 To further dismantle the pressure relief valve (40) remove the O-ring seal (48) from the valve body (47). Remove the nuts (50,49) from the valve spindle. Push down on the plug (43) and remove the circlip (41) from the valve body.

4.1.18 Remove the plug and the O-ring seal (42). Withdraw the spring (44) and valve spindle (45) from the valve body. Remove the O-ring seal (46) from the spindle.

4.2 Inspection

4.2.1 Carefully wash all parts in clean aviation fuel and inspect for signs of wear or damage. Defective parts must be renewed immediately. Ensure that any abrasion to the body casting has not significantly affected the wall thickness.

4.2.2 Ensure that the small orifices in the fuel restrictor valve (31), the vent port (23) and exhaust valve diaphragm (22) are clear. The diaphragm may be re-used if in good condition. Check that the relief valve drilling in the main body is clear.

4.2.3 If there are no obvious signs of wear or abrasion the PTFE outer rings of the double delta seals (6) and (1) may be re-used. The O-ring seals must be renewed every two years.

4.2.4 Check that the piston sealing edge and ground outer diameter of the piston are in good condition.

4.2.5 There may be some particles of dust or other foreign matter in the fuel chamber. The design of the valve minimises the likelihood of any such particle impairing valve operation. To ensure optimum performance, flush the fuel sense line through with clean aviation fuel before reconnecting.

4.3 Assembling

4.3.1 Fit the O-ring of the large double delta seal (1) into the groove in the main body (38). Carefully distant the PTFE outer part, as shown in Fig 5.5 and position it over the O-ring.

4.3.2 Fit the main seal (3) and O-ring seal (4) to the outer diameter of the fuel chamber insert (5). Assemble the small double delta seal (6), locate it into the fuel chamber insert and secure with the washers (7,8) and Spirolox ring (9).

4.3.3 Apply a thin smear of paraffin wax (Item 3) to the seal and carefully insert the stem of the piston (2) through the seal.

WARNING

TAKE CARE WHEN DISMANTLING AND ASSEMBLING THE PISTON/FUEL CHAMBER/DIAPHRAGM ASSEMBLY. THE UNIT CONTAINS SPRINGS WHICH MAY CAUSE INJURY.

4.3.4 With the piston sealing edge resting on the main seal (3), locate the springs (10,11) over the piston stem and into position in the fuel chamber insert.

4.3.5 Locate the diaphragm carrier (12) on top of the springs, place the main diaphragm (13) and diaphragm clamp (14) in position on the carrier, ensuring the screw holes are aligned. Fit the twelve socket head cap screws (28) and washers (29), tighten in a diametral sequence to a torque of 4 lbf ft (5.42 Nm). Repeat the tightening sequence three times to ensure even torque on all screws. Fit the bolt (27) and bonded seal (30) and secure the diaphragm assembly to the piston, tighten the bolt to a torque of 20 lbf ft (27 Nm).

4.3.6 Lightly smear the main seal (1) and O-ring seal (4) with paraffin wax (Item 3) and, ensuring the fuel chamber insert is square, press the piston/fuel chamber/diaphragm assembly into the main body.

4.3.7 Lightly smear the air side of the main diaphragm (13) with paraffin wax (Item 3) and ensure that the diaphragm bead is fitted correctly into the counterbore in the main body.

4.3.8 Locate the small diaphragm (15) in the counterbore in the end plate (24). If necessary apply a light smear of paraffin wax (Item 3) to hold it in place. Position the end plate correctly onto the main body and secure with the eight socket head screws (25) and washers (26), tighten in a diametral sequence to 10 lbf ft (13.6 Nm).

4.3.9 Fit the exhaust diaphragm (22) into the exhaust valve cover (21) and secure to the end plate with socket head screws (18,19) and washers (17,20). Note location of long screw (18). Refit air connection (16) if removed. Fit vent port (23).

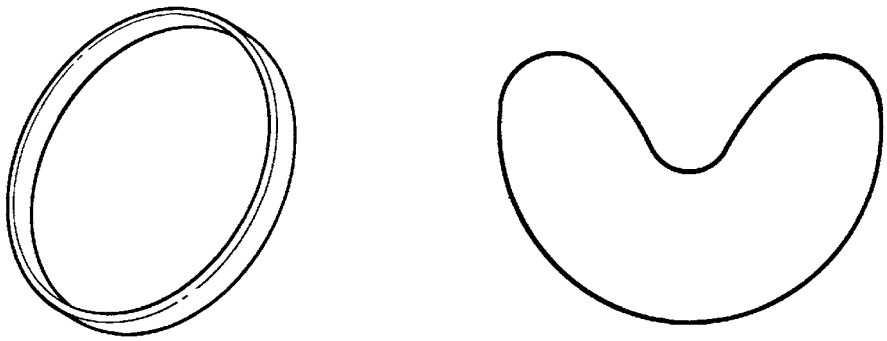


Fig 5.5 PTFE seal installation

4.3.10 Locate the spring (34) and ball (33) into the main body and fit the fuel restrictor valve (31) and bonded seal (32).

4.3.11 Fit the circlips (55), Slydring wear strip (57) and O-ring seal (8) to the swivel end of the main body (15).

4.3.12 Using paraffin wax (Item 3) to hold them in place, fit the balls (61) to the swivel body (62) and fit the sleeve (59) over the balls. With the sleeve pressed back to the stop on the body refit the circlip (58).

4.3.13 Smear the O-ring seal (56) with paraffin wax (Item 3) and fit the swivel body (62) to the main body (38) using a combined pressing and rotating action. When the balls are felt to engage in position between the two circlips (55), slide the sleeve forward to expose the circlip groove and fit the circlip (60). Secure the handle (35) to the body with four socket head screws (39).

4.3.14 Replace the plug (54) and bonded seal (53) and the bleed screw (36) and bonded seal (37).

4.3.15 To re-assemble the pressure relief valve, fit the O-ring seal (46) to the valve spindle (45) and insert into the valve body (47).

4.3.16 Fit the O-ring seal (42) to the plug (43). Locate the spring (44) into the valve body ensure it fits over the valve spigot.

4.3.17 Smear the plug (43) with paraffin wax (Item 3) and fit into the valve body. Maintain a downward force on the plug and fit the circlip (41).

4.3.18 Loosely fit the locknut (49) and adjusting nut (50) to the spindle. Fit O-ring seal to the valve body, locate the complete relief valve assembly into position in the main body and secure with the two socket head screws (52) and washers (51).

4.3.19 Adjust the nut (50) to the dimension shown in Fig 5.6 and tighten locknut (49).

4.3.20 Fit a new O-ring seal and secure the valve to the coupler with six socket head screws. Test as detailed in Chapter 6.

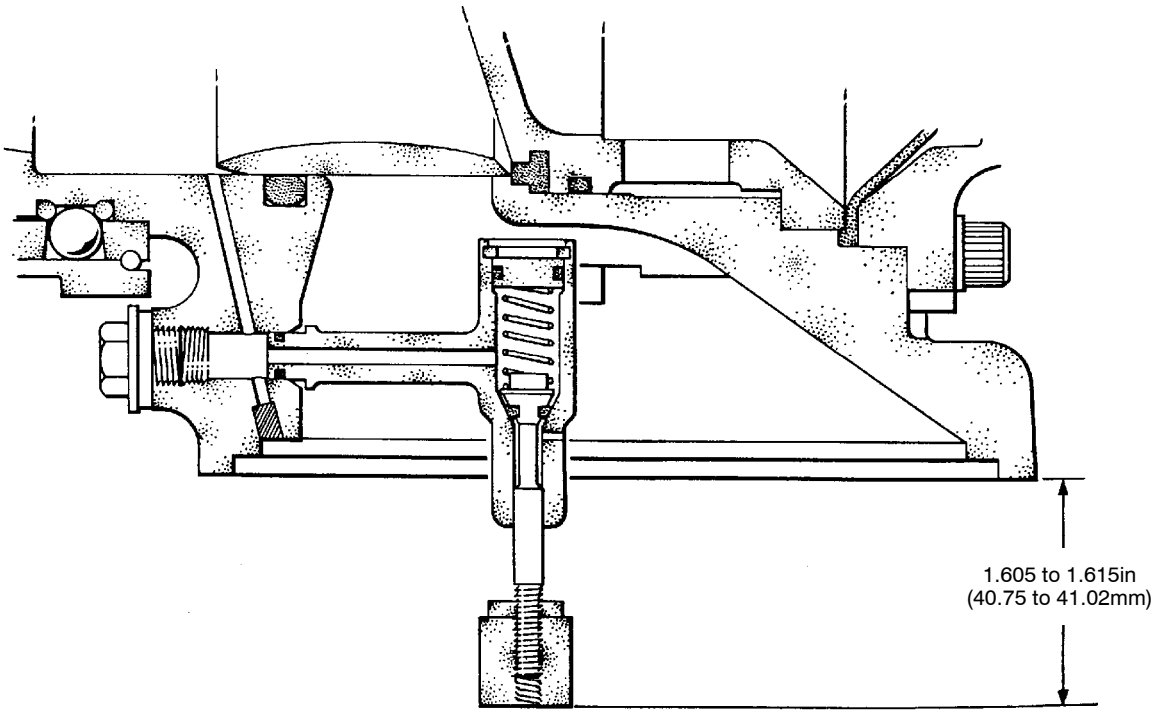


Fig 5.6 Relief valve adjustment

Chapter 6

TESTING

CONTENTS

1 GENERAL

1.1 The following tests are to be carried out on completion of repair or overhaul of any component. These tests are to be carried out only by suitably qualified personnel. Tests 1 and 2 apply to all builds of coupler, tests 3 and 4 apply to couplers fitted with a pressure control valve.

WARNINGS

DO NOT EXCEED PRESSURES AND TEMPERATURES QUOTED OR SERIOUS INJURY AND COMPONENT FAILURE MAY OCCUR.

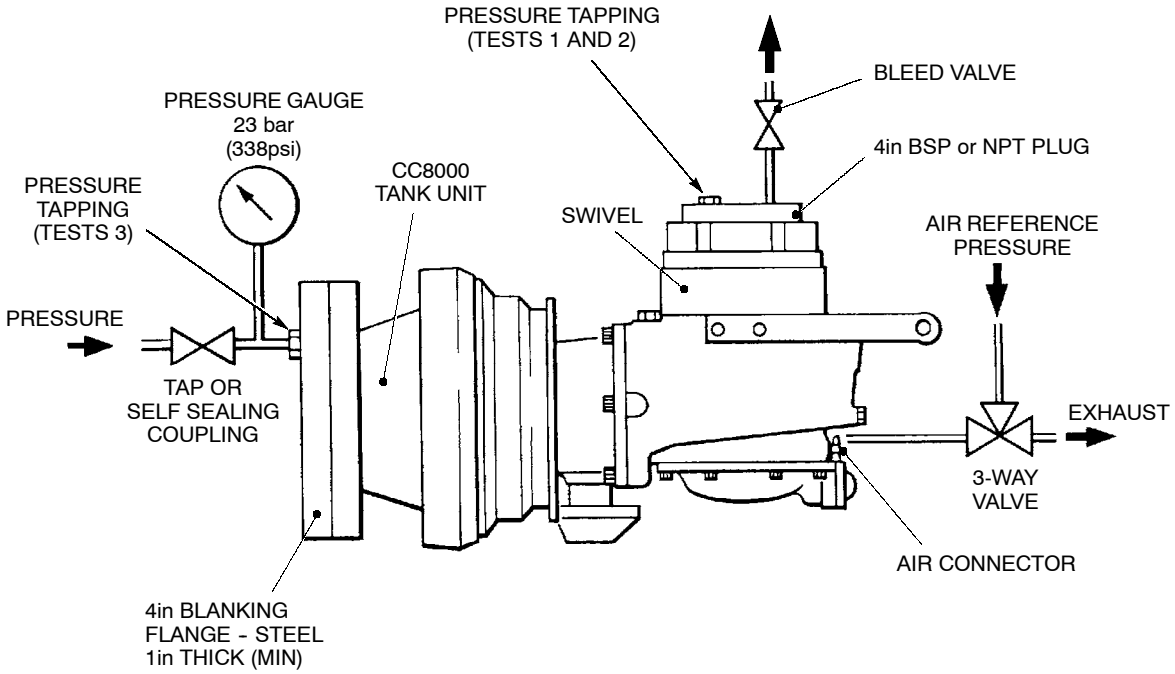
PRIOR TO OPERATING THE EQUIPMENT, ENSURE THAT ALL AIRPORT/LOCAL PROCEDURES HAVE BEEN COMPLIED WITH.

NEVER USE THE NOZZLE OPERATING LEVER TO START OR STOP FUEL FLOW.

WORK MUST BE CARRIED OUT ONLY BY SUITABLY QUALIFIED PERSONNEL.

TABLE 6.1 – TEST EQUIPMENT REQUIRED

ITEM	DESCRIPTION	REMARKS
1	Fuel supply pressure source, with gauge, to provide a minimum 23 bar (338 psi)	Tests 1 to 4
2	Avery–Hardoll CC8000 tank unit or similar, suitably blanked off with a 1 in. steel flange and incorporating a pressure tapping	Tests 1 to 4
3	Suitable 4 in. BSP or NPT threaded plug, incorporating a bleed valve and pressure tapping to blank off swivel connector	Tests 1 to 4
4	Compressed air source, approx. 5.5 bar (80 psi), with 3-way valve	Tests 1 to 4
5	1/8 in. BSP connector, bleed valve and bleed tube	Test 4
6	Fuel container (approx. 10 litre cap)	Test 4



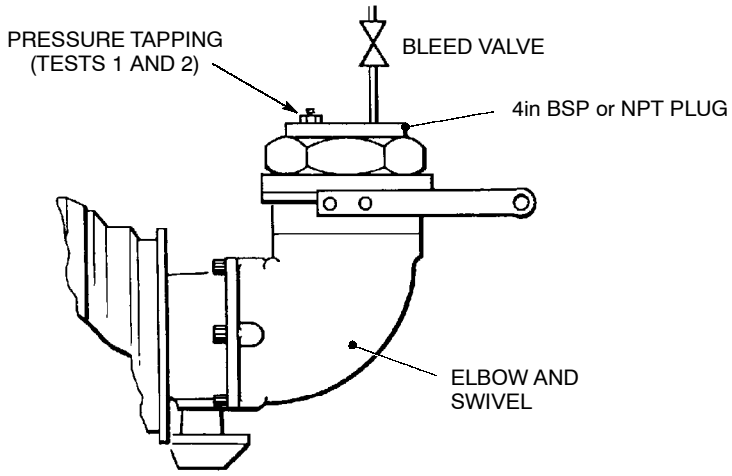


Fig 6.1 Test rig configuration – tests 1, 2 and 3

2 TEST 1 – Static pressure test, coupler poppet closed (Fig 6.1)

2.1 With the unit in the horizontal position as shown and the poppet valve closed fill the unit with fuel through the swivel connector. If a pressure control valve is fitted apply approximately 5.5 bar (80 psi) air reference pressure to open the piston valve. Check that no air pressure builds up in the fuel chamber (block fuel restrictor connector with thumb for approximately 20 seconds when piston is fully open).

2.2 Screw the threaded plug (Item 3) into the swivel connection. Connect the pressure source (Item 1) to the pressure tapping on the plug and open the bleed valve. Expel any air in the unit and close the bleed valve.

2.3 Slowly increase the fuel pressure in the unit to 23 bar (338 psi) and hold for one minute.

2.4 No leaks should be apparent, no more than 0.34 bar (5 psi) decrease in pressure is permissible.

2.5 Decay the pressure through the bleed valve and remove the plug. Proceed to Test 2.

3 TEST 2 – Static pressure test, coupler poppet open (Fig 6.1)

3.1 Connect the CC8000 tank unit and flange (Item 2) with the pressure tapping plugged and open the poppet valve.

3.2 Fill the unit with fuel through the swivel connector. If a pressure control valve is fitted apply approximately 5.5 bar (80 psi) air reference pressure to open the piston.

3.3 Screw the threaded plug (Item 3) into the swivel connection. Connect the pressure source (Item 1) to the pressure tapping on the plug and open the bleed valve. Expel any air in the unit and close the bleed valve.

3.4 Slowly increase the fuel pressure in the unit to 23 bar (338 psi) and hold for one minute.

3.5 No leaks should be apparent, no more than 0.34 bar (5 psi) decrease in pressure is permissible.

3.6 Reduce the test pressure to 5 p.s.i. and hold for two minutes. Inspect the area of the poppet seal looking for signs of constant leakage which is unacceptable. A wetness in the adjacent area is acceptable as long as no constant flow is visible.

3.7 Decay the pressure through the bleed valve. Proceed to Test 3 if a Pressure Control Valve is fitted.

4 TEST 3 – Main seal and relief valve test (Fig 6.1)

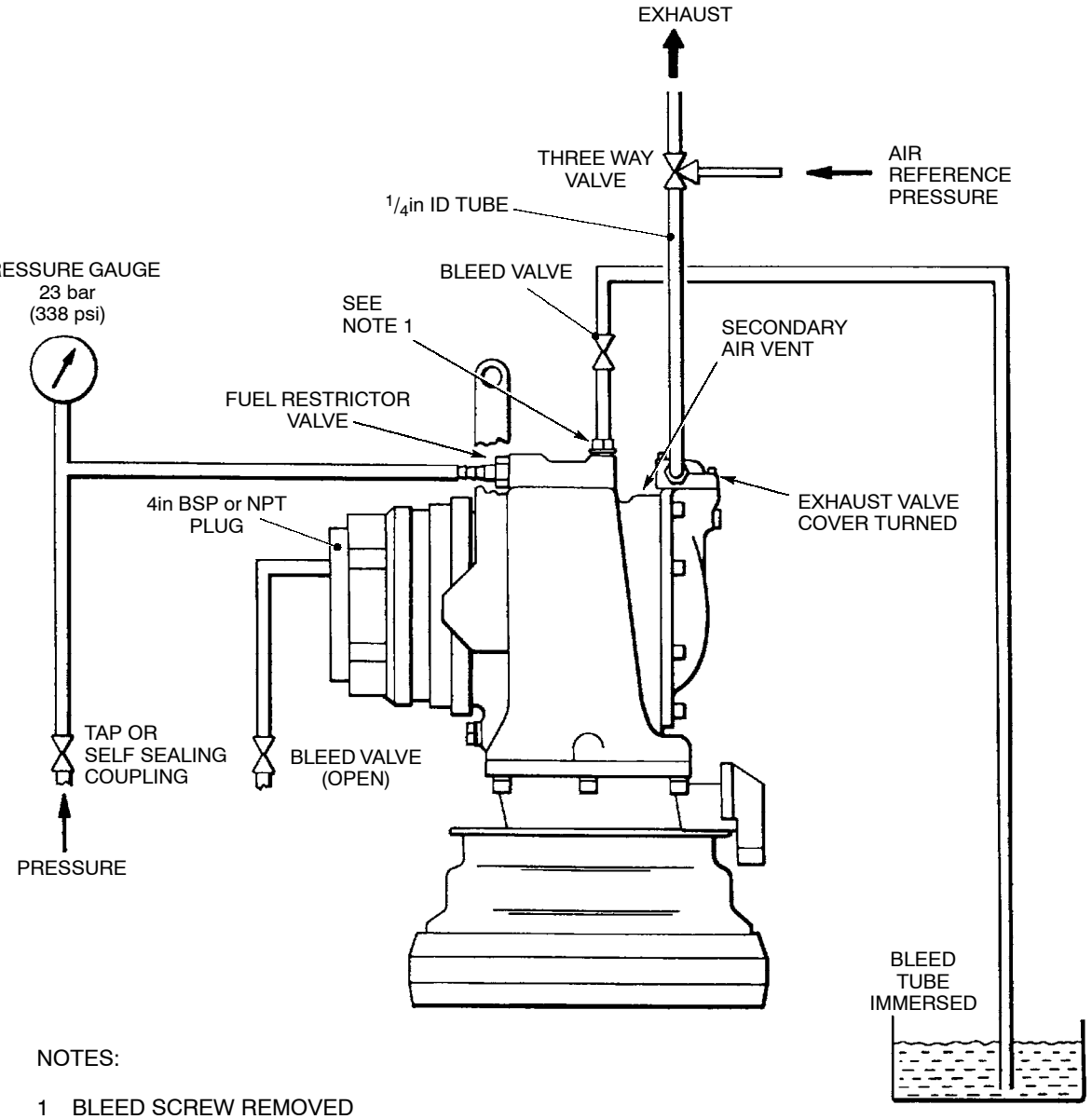
4.1 Connect the pressure source (Item 1) to the CC8000 tank unit flange (Item 2) pressure tapping, fit blanking plug to the pressure tapping on the threaded plug (Item 3). Fill the unit with fuel expelling air through bleed valve.

4.2 Set the bleed valve on the threaded plug open, the main piston closed (no air reference pressure applied) and the poppet valve open.

4.3 Slowly increase the fuel pressure in the unit to 15 bar (225 psi) and hold for one minute.

4.4 No leaks should be apparent, no more than 0.34 bar (5 psi) decrease in pressure is permissible.

4.5 Continue raising the pressure until the pressure suddenly decreases. This should occur at approximately 17.3 bar (250 psi) as indicates that the pressure relief valve has lifted, fuel will be expelled from the bleed valve. If the pressure continues to rise with no signs of valve lifting, suspect the relief valve is jammed. Remove and inspect as described in Chapter 5 re-assemble and retest.



NOTES:

1 BLEED SCREW REMOVED AND REPLACED BY 1/8in BSP CONNECTOR, BLEED TUBE AND BLEED VALVE

2 COUPLER TO BE TESTED IN ATTITUDE SHOWN

Fig 6.2 Test rig configuration – test 4

4.6 Decay any pressure in the unit and close the poppet valve, fuel will be expelled from the bleed valve. If the valve will not close with reasonable force applied to the handle the relief valve may be out of adjustment. Check the adjustment as described in Chapter 5.

4.7 Remove the CC8000 tank unit and proceed to Test 4

5 TEST 4 – Fuel chamber test (Fig 6.2)

5.1 Refer to Fig 6.2. Remove exhaust valve cover, rotate it through 90° and replace it. Ensure that the bleed valve on the threaded plug is open.

5.2 Remove the bleed screw and fit the connector, bleed tube and bleed valve (Item 5) in its place. Ensure the bleed tube end is immersed in fuel in container (Item 6). Fill the fuel chamber with fuel through the fuel restrictor valve until all air is expelled through the bleed tube.

5.3 Apply air pressure to the valve and release two or three times to ensure any remaining air is expelled from the fuel chamber.

5.4 With the bleed valve open apply approximately 4 bar (60 psi) reference air pressure to open the piston.

5.5 Close the bleed valve and through the fuel restrictor slowly apply 6.9 bar (100 psi) pressure to the fuel chamber and hold for one minute.

5.6 No leaks should be apparent, no more than 0.34 bar (5 psi) decrease in pressure is permissible.

5.7 Reduce pressure in the fuel chamber to 4 bar (60 psi).

5.8 Place a finger over the secondary air vent, release the air reference pressure using the three way air valve. Little or no air should be expelled through this vent.

5.9 Release the pressure in the fuel chamber and re-apply air pressure.

5.10 Release the air pressure again, air should be expelled forcibly from the secondary air vent.

5.11 Drain the unit thoroughly, including the fuel chamber. Replace the bleed screw and reposition the exhaust valve cover correctly.

Chapter 7

FAULT FINDING

1 GENERAL

1.1 Faults to the coupler will in many cases be easily identified as mechanical failure due to damage, leakage of seals or jamming of moving parts. On a coupler fitted with a pressure control valve, some faults may be more difficult to diagnose. The following table lists faults that may occur, the possible cause(s) and remedy.

1.2 The following table is a guide only and may not cover all possible faults. Operation and maintenance procedures correctly carried out should keep faults to a minimum. If the fault cannot be traced and rectified, consult Avery-Hardoll for advice.

TABLE 7.1 - FAULT FINDING - PRESSURE CONTROL VALVE

Fault	Cause	Remedy
Valve fails to open or is very slow to open	Restrictor valve orifice blocked	Remove restrictor valve and clean
	Sense line blocked	Remove blockage
	Air supply fault	Check air supply
	Locked in pressure higher than applied air reference pressure	Depressurise the system
	Piston jammed by foreign matter	Remove the valve, clean and inspect for damage
	Diaphragm defective	Refer to Chap 5 and renew the diaphragm
Valve fails to close	Piston jammed open by foreign matter	Remove the valve, clean and inspect for damage
	Piston sealing edge or main seal damage	Check for damage and renew if necessary (refer to Chap 5)
	Air pressure not fully released	Check deadman air valve
	Blockage in sense line causing an hydraulic lock	Remove blockage
	Negative head on valve discharge	This may occur on some dispenser test rigs with underground tanks but will not occur during normal fuelling
Valve unstable ("Hunting")	Air in fuel chamber and/or fuel sense line	Purge system or air (refer to Chap 4)

(continued)

Fault	Cause	Remedy
Valve opens too quickly	Air in fuel chamber and/or fuel sense line	Purge system of air (refer to Chap 4)
	Opening orifice too large	Exchange the restrictor valve for one with a smaller orifice
	Diaphragm perished or ruptured	Inspect diaphragm and renew if necessary
	Restrictor valve ball not seating correctly	Clean and inspect the restrictor valve seat renew if necessary
Valve response too slow to deadman shutdown	Restriction in air supply line	Remove restriction
	Restriction in fuel sense line	Remove restriction
	Vent port orifice too small	Exchange the vent port assembly for one with a larger orifice
	Piston partially jammed by foreign matter	Clean and inspect for damage
	Air passes blocked	Remove blockage
	Small diaphragm distorted	Dismantle and renew the diaphragm (refer to Chap 5)
Valve responds too quickly to deadman shutdown	Small diaphragm distorted	Refer to Chap 5 and dismantle and renew the diaphragm
	Vent port orifice too large	Exchange the vent port assembly for one with a smaller orifice
Valve responds too slowly to pressure surges	Restriction in fuel sense line	Remove restriction
	Sense line too long or too small in diameter	Reduce length of line or increase diameter
	Air in fuel chamber and/or fuel sense line	Refer to Chap 4 and purge system of air
	Air reference pressure set too high	Adjust air pressure to give 6-8 psi bias over required control pressure
Fuel leaking from the vent port assembly NOTE: The design of the valve is such that no fuel should leak from the vent port. If leaks do occur they must be rectified immediately	Main diaphragm ruptured or incorrectly fitted	Dismantle inspect and refit or replace as required (refer to Chap 5)
	Wet air in supply line	Check air supply
	Small diaphragm ruptured	Dismantle and renew (refer to Chap 5)

Chapter 8

SPARE PARTS CATALOGUE

CONTENTS

1 GENERAL

1.1 When ordering spare parts please quote the following information:

(a) Publication number and issue

(b) Fig/Item number

(c) Part number and description

(d) Quantity

2 The following tables of spare parts also contain the relevant attaching parts, i.e. screws, washers, nuts, etc, which may fail as a result of repeated removal and insertion.

NOTES

(1) '+' in the Fig/Item column indicates Item is not illustrated.

(2) 'REF' in the Qty column indicates Item is for reference purposes only and is **not available** as a spare.

(3) '*' in the Fig/Item column indicates Item is a suggested spare part.

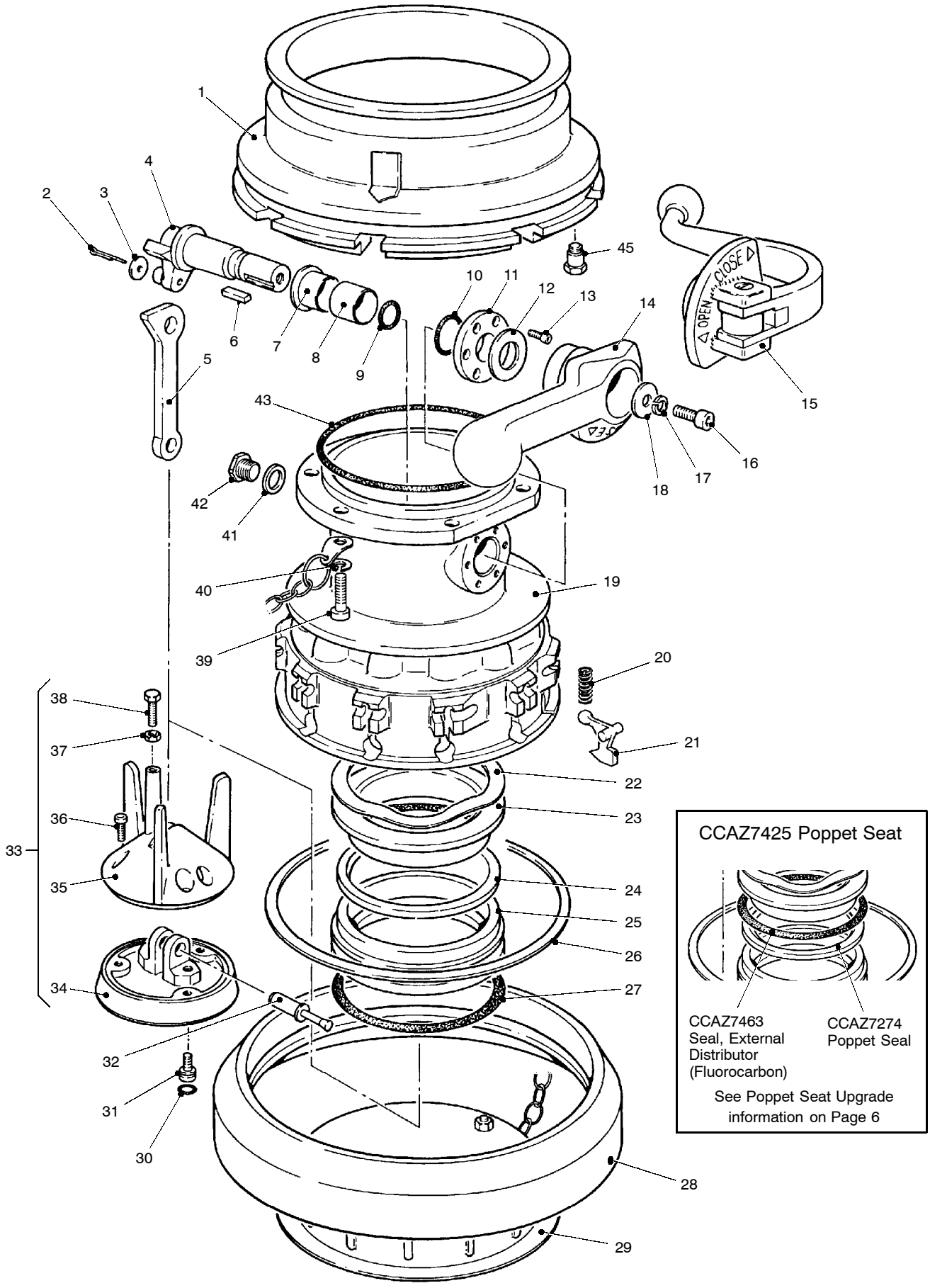


Fig 8.1 API Coupler assembly

API COUPLER ASSEMBLY - CCMY8500M2 SERIES

Fig/ Item No.	Part No.	Description	Qty
8.1–			
1	CCAZ7394	Sleeve	1
*2	ZT4006E0316A	Split pin, 3/32 in. x 1 in. lg	1
3	CCSZ7259	Washer, Crankpin	1
4	CCSZ7253	Crank	1
5	CCSZ7252	Link	1
6	CCSZ7269	Key	1
*7	ZAPZ0080-2	Nyliner, Type 5, No. 14, L7 $^{1}/_{2}$	1
*8	ZAPZ0080-1	Nyliner, Type 4, No. 14, L12-D	1
*9	ZO32M014624A	O-Ring, Fluorocarbon	1
*10	ZO32M022116A	O-Ring, Fluorocarbon	1
11	CCSZ7257	Crank Gland	1
*12	CCPZ7270	Washer, Anti-scuff	1
13	ZS3225D0408A	Screw, 6-32 UNC x 1/2 in, lg, skt cap hd	6
14	CCAZ7472	Lever, Operating	1
15	CCMZ7281	Lever Assembly, Operating, Wrap Round	1
16	ZS3225E0810A	Screw. 1/4-28 UNF x 5/8 in. lg, skt cap hd	1
17	ZW8207G08A	Washer, Spring, 1/4 in. id x 1/2 in. od, S/Coil	1
18	CCSZ7264	Washer, Operating Lever	1
19	NOT SPARED	Body, Drilled Boss (for CCMZ8498-1)	1
	NOT SPARED	Body (for CCMZ8498)	1
+			
20	ZASZ0001-15	Spring	10
21	CCSZ7397	Catch	10
22	ZMSZ0329-02	Spring, Wave	1
23	CCSZ7273	Seal, Gland	1
*24	CCRZ7480	Seal, External Distributor (Fluorocarbon)	1
25	CCAZ7479	Seat, Poppet	1
26	ZASZ0038-9	Ring, Spirolox	1
*27	ZO32E244139A	O-Ring, Fluorocarbon	1
28	CCPZ7450	Bumper	1
29	CCMZ7262	Dust Cover Sub-assembly	1
*30	ZO32M006116A	O-Ring, Fluorocarbon	1

* = Suggested spare part

Continued

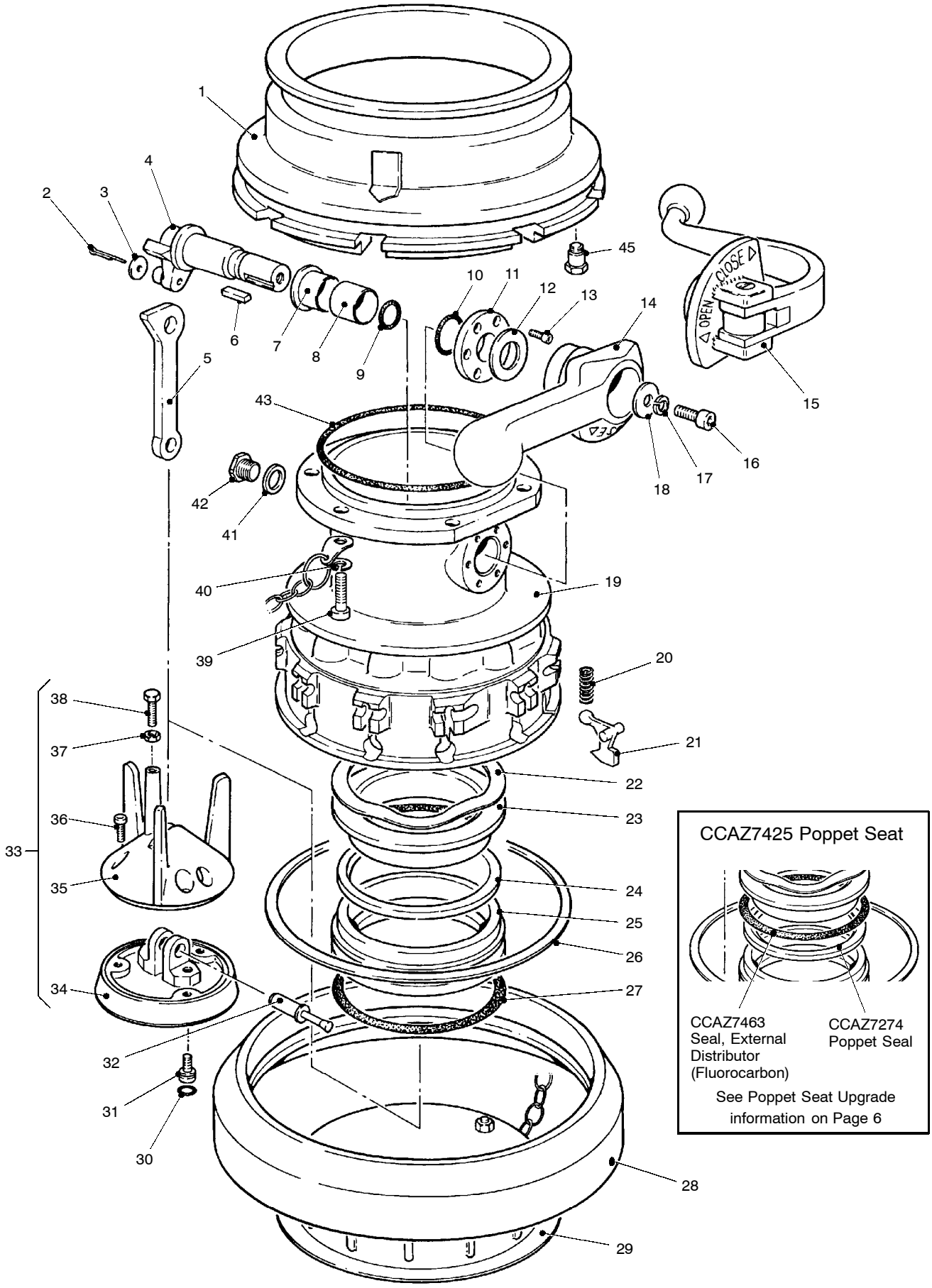


Fig 8.1 API Coupler assembly

API COUPLER ASSEMBLY (continued)

Fig/ Item No.	Part No.	Description	Qty
31	CCSZ7255	Screw, Pin Retaining	1
32	CCSZ7258	Pin, Poppet	1
33	CCMS7398	Poppet Assembly, comprising:	1
34		. Poppet	1
35		. Guide, Poppet	1
36		. Screw, 10-24 UNC x 3/8 in. lg, st.st. skt cap hd, fused patch	3
37	ZN4004E08A	. Locknut, 1/4 in. UNF, st.st	1
38	ZASZ0072-4	. Screw, Special	1
39	ZS3225D1014A	Screw, 5/16 in. UNC x 7/8 in. lg, skt cap hd	6
40	ZW8207G10A	Washer, Spring, 5/16 in. id S/Coil	6
*41	ZMMZ0135-1	Seal Washer, Bonded, 3/8 in. BSP	1
42	FCCZ653	Plug	1
*43	Z032E249139A	O-Ring, Fluorocarbon	1
44	CCSZ7375	Bolt, Selective Coupler	5

API COUPLER ASSEMBLY SPARES KIT

Item No.	Kit Part No.	Description	Qty per Kit
	CCMS7515	**Seal Kit**	
2	ZT4006E0316A	Split pin	1
7	ZAPZ0080-2	Nyliner	1
8	ZAPZ0080-1	Nyliner	1
9	ZO32M014624A	O-Ring	1
10	ZO32M022116A	O-Ring	1
12	CCPZ7270	Washer, anti-scuff	1
24	CCRZ7480	Seal, External Distributor, Fluorocarbon	1
27	ZO32E244139A	O-Ring	1
30	ZO32M006116A	O-Ring	1
41	ZMMZ0135-1	Seal Washer, Bonded, 3/8 in. BSP	1
43	ZO32E249139A	O-Ring, Fluorocarbon	1
	CCMS7522	**Catch Kit**	
21	CCSZ7397	Catch	10

* = Suggested spare part

Earlier standard Poppet Seat Upgrade options:

POPPET SEAT	DIM 'X'	MATCHING SEAL	Part No.
CCAZ7272	11.33 mm	'O' RING	Z032E348210A
CCAZ7425	7.2 mm	SEAL, EXTERNAL DISTRIBUTOR	CCRZ7463
		SEAL REPAIR KIT	CCMS7482

To convert CCAZ7272 Poppet Seat to latest standard the following parts are required:

CCAZ7479	Poppet Seat	1 off
CCRZ7480	Seal, External Distributor, Fluorocarbon	1 off
Z032E244139A	'O' Ring Seal	1 off
CCRZ7274	Seal Poppet	1 off

To convert CCAZ7425 Poppet Seat to latest standard the following parts are required: (See Fig 8.1)

CCMS7482	Seal Repair Kit	1 off

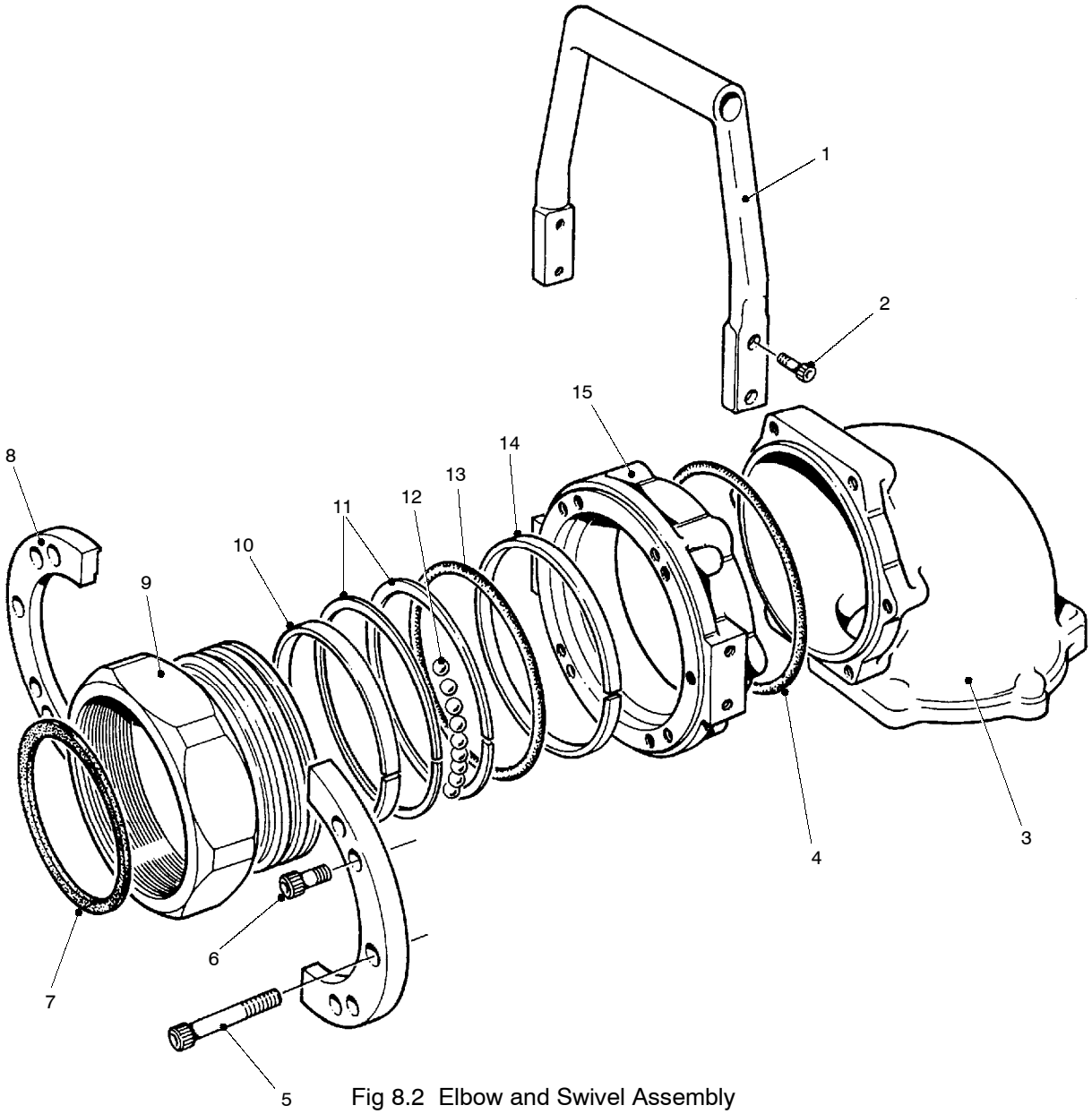


Fig 8.2 Elbow and Swivel Assembly

ELBOW AND SWIVEL ASSEMBLY

Fig/ Item No.	Part No.	Description	Qty
8.2-			
+	CCMS7299	4 in. Elbow and Swivel Assembly (BSP)	1
+	CCMS7304	4 in. Elbow and Swivel Assembly (NPT)	1
1	CCAZ7279	Handle	1
2	ZS3225D0810A	Screw, 1/4 in. UNC x 5/8 in. lg, skt cap hd	4
3	NOT SPARED	Elbow Assembly	1
*	ZO32E249139A	O-Ring, Fluorocarbon	1
4			
5	ZS3225D1040A	Screw, 5/16 -18 UNC x 2 1/2 in. lg, skt cap hd	6
+	CCMZ7280	4 in. Swivel Assembly (BSP version)	1
+	CCMZ7302	4 in. Swivel Assembly (NPT version)	1
6	ZS3225D0810A	. Screw, 1/4 in. UNC x 5/8 in. lg, skt cap hd	4
*	CCRZ7271	. Sealing Ring (Fluorocarbon) (BSP version only)	1
7			
8	CCAZ7277	. Half Ring	2
9	CCMS7276	. Inner Ring (BSP version)	1
	CCMS7308	. Inner Ring (NPT version)	1
*10	CCPZ7266	. Slydring, Small	1
11	CCSZ7278	. Race Ring	2
12	ZASZ0068-6	. Ball, 5/16 in. dia, st.st	45
*13	ZO32M109357A	. O-Ring, Fluorocarbon	1
*14	CCPZ7267	. Slydring, Large	1
15	CCMZ7275	. Outer Ring Assembly	1

* = Suggested spare part

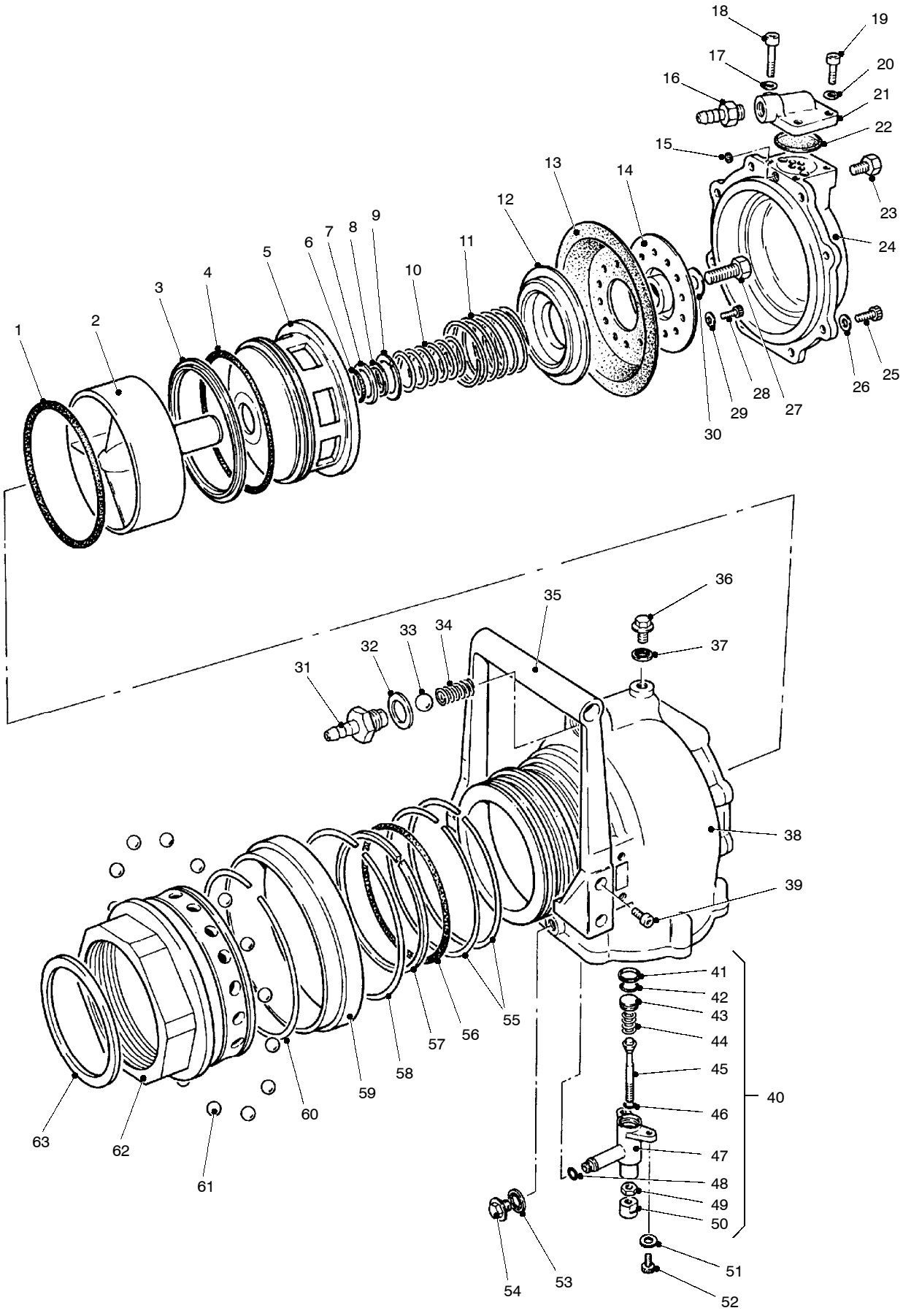


Fig 8.3 Pressure Control Valve and Swivel Assembly

PRESSURE CONTROL VALVE AND SWIVEL ASSEMBLY

Fig/ Item No.	Part No.	Description		Qty
8.3-				
	CCMZ7300M2	4in. Pressure Controller Mk 2 (BSP)		1
+				
	CCMZ7309M2	4in. Pressure Controller Mk 2 (NPT)		1
+				
*1	ZARZ0097-8	Double Delta Seal, Fluorocarbon O-Ring		1
2	CCAZ7369	Piston		1
*3	CCRZ7343	Main Seal		1
*4	ZO32M114530A	O-Ring, Fluorocarbon		1
5	CCAZ7321	Fuel Chamber Insert		1
*6	ZARZ0097-9	Double Delta Seal, Fluorocarbon O-Ring		1
7	CCSZ7339	Washer		1
8	CCSZ7402	Washer		1
9	ZASZ0038-14	Spirolox Ring		1
10	CCSZ7403	Supplementary Spring		1
11	CCSZ7404	Main Spring		1
12	CCAZ7401	Diaphragm Carrier		1
*13	CCRZ7342	Main diaphragm		1
14	CCAZ7400	Diaphragm Clamp		1
*15	CCRZ7377	Small Diaphragm (Fluorocarbon)		1
16	ZACZ0103-2	Tapered Coupling, male, threaded 1/4 in. BSP		1
17	ZW8207G06A	Washer, Spring, 10-24 UNC, S/Coil		1
18	ZS3225D0616A	Screw, 10-24 UNC x 1 in. lg, HTS, Skt Hd Cap		1
19	ZS3225D0610A	Screw, 10-24 UNC x 5/8 in. lg, HTS, Skt Hd Cap		3
20	ZW8207G06A	Washer, Spring, 10-24 UNC, S/Coil		3
21	CCAZ7317	Exhaust Valve Cover		1
*22	CCRZ7344	Exhaust Valve Diaphragm		1
23	CCMS7352A	Vent Port Assy	0.8 mm (standard)	1
	CCMS7352D	Vent Port Assy	0.6 mm	1
	CCMS7352B	Vent Port Assy	0.7 mm	1
	CCMS7352	Vent Port Assy	1.0 mm	1
	CCMS7352C	Vent Port Assy	1.4 mm	1
24	CCMS7315	End Plate		1
25	ZS3225D1012A	Screw, 5/16 in. UNC x 3/4 in. lg, HTS, Skt Hd Cap		8
26	ZW8207G10A	Washer, Spring, 5/16 in. id, S/Coil		8
27	ZS3228D1440A	Screw, 7/16 in. UNC x 2 1/2 in. lg, Hex. Hd		1
28	ZS3225D0610A	Screw, 10-24 UNC x 5/8 in. lg, HTS, Skt Hd Cap		12
29	ZW8207G06A	Washer, Spring, 10-24 UNC, S/Coil		12
*30	ZMMZ0135-8	Bonded Seal, 7/16 in. int dia.		1

* = Suggested spare part

Continued

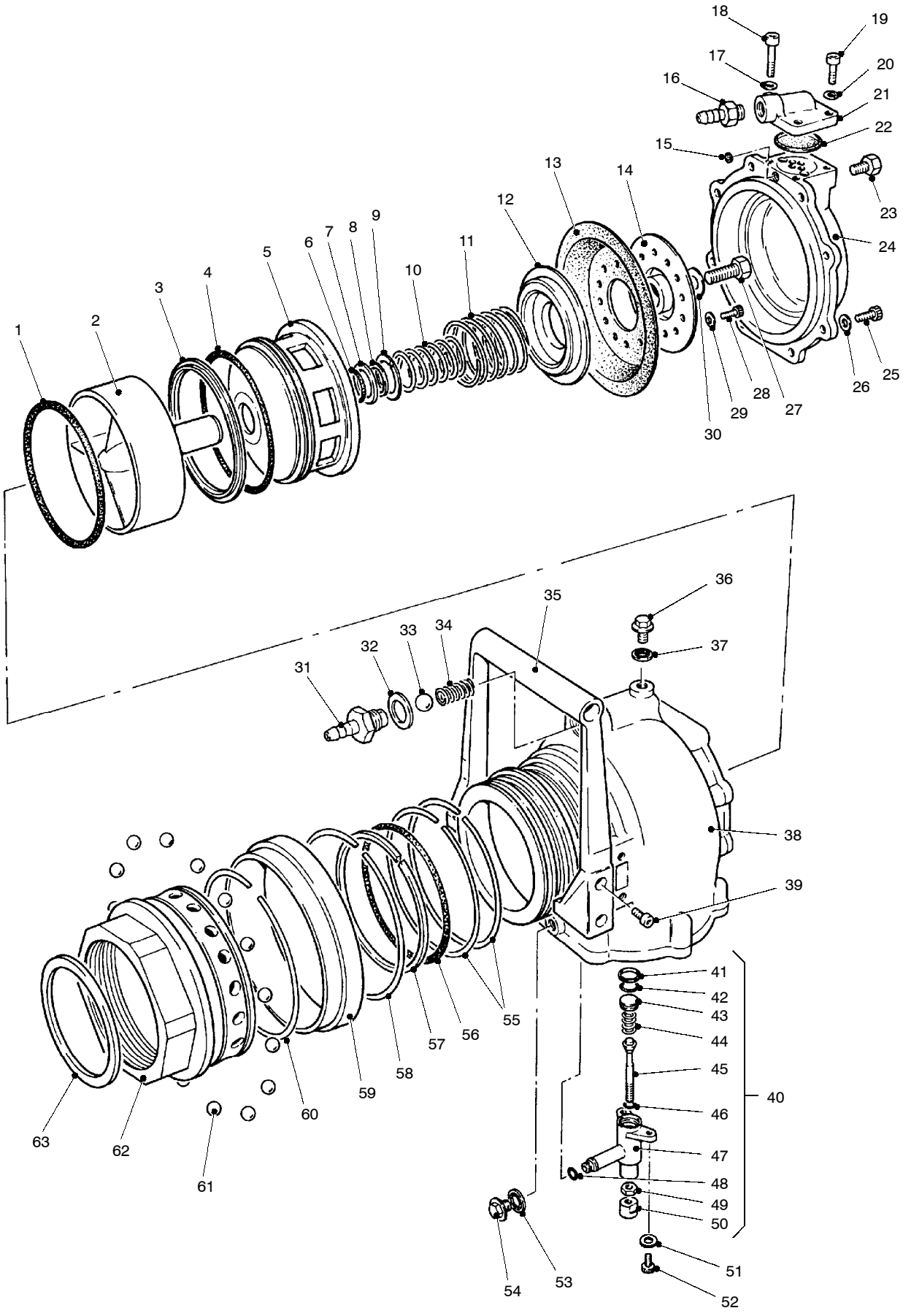


Fig 8.3 Pressure Control Valve and Swivel Assembly

PRESSURE CONTROL VALVE AND SWIVEL ASSEMBLY (continued)

Fig/ Item No.	Part No.	Description	Qty
31	CCCZ7346	Fuel Restricter Valve 1.0 mm (standard)	1
	CCCZ7346A	Fuel Restricter Valve 0.8 mm	
+			
	CCCZ7346B	Fuel Restricter Valve 0.7 mm	
+			
	CCCZ7346C	Fuel Restricter Valve 1.5 mm	
+			
*32	ZMMZ0135-7	Bonded Seal, 1/2 in. BSP	1
33	ZASZ0068-11	Ball, 1/2 in. dia, st.st	1
34	CCSZ7336	Spring (fuel rinse valve)	1
35	CCMZ7411	Handle, st.st	1
36	CCSZ7347	Bleed Screw, 1/8 in. BSP, st.st	1
37	ZMMZ0135-4	Bonded Seal, 1/8 in. BSP	1
38	NOT SPARED	Pressure Control Valve Body sub-assy	1
39	ZS3225D0810A	Screw, 1/4 in. UNC x 5/8 in. lg, HTS, Skt Hd Cap	4
40+	CCMS7328	Pressure Relief Valve assy, comprising:	1
41	ZASZ0058-25	Circlip, internal	1
*42	ZO22M010116A	O-Ring, BS4518-0101-16, high nitrile	1
43	CCAZ7332	Retaining Plug	1
44	CCSZ7334	Spring	1
45	CCSZ7331	Pressure Relief Valve Spindle	1
*46	ZO22E005070A	O-Ring, BS1806-005, high nitrile	1
47	CCAZ7330	Pressure Relief Valve Body	1
*48	ZO22M005116A	O-Ring, BS4518-0051-16, high nitrile	1
49	ZN4004D06A	Nut, thin, 10-24 UNC, st.st	1
50	CCAZ7333	Nut, adjusting	1
51	ZS4025D0608A	Screw, 10-24 UNC x 1/2 in. lg, st.st, Skt Hd Cap	2
52	ZW8207G06A	Washer, Spring, 10-24 UNC, S/Coil	2
*53	ZMMZ0135-4	Bonded Seal, 1/8 in. BSP	1
54	ZACZ0017-1	Plug, 1/8 in. BSP, parallel	1
55	CCSZ7338	Circlip (ball track)	2
*56	ZO32M114357A	O-Ring, Fluorocarbon	1
*57	ZARZ0097-10	Wear Strip, 15 1/4 in. lg.	1
58	CCSZ7337	Circlip (Swivel Sleeve stop)	1
59	CCAZ7325	Swivel Sleeve	1
60	CCSZ7337	Circlip (Swivel Sleeve stop)	1
61	ZASZ0068-10	Ball, 3/8 in. dia, st.st	16

* = Suggested spare part

Continued

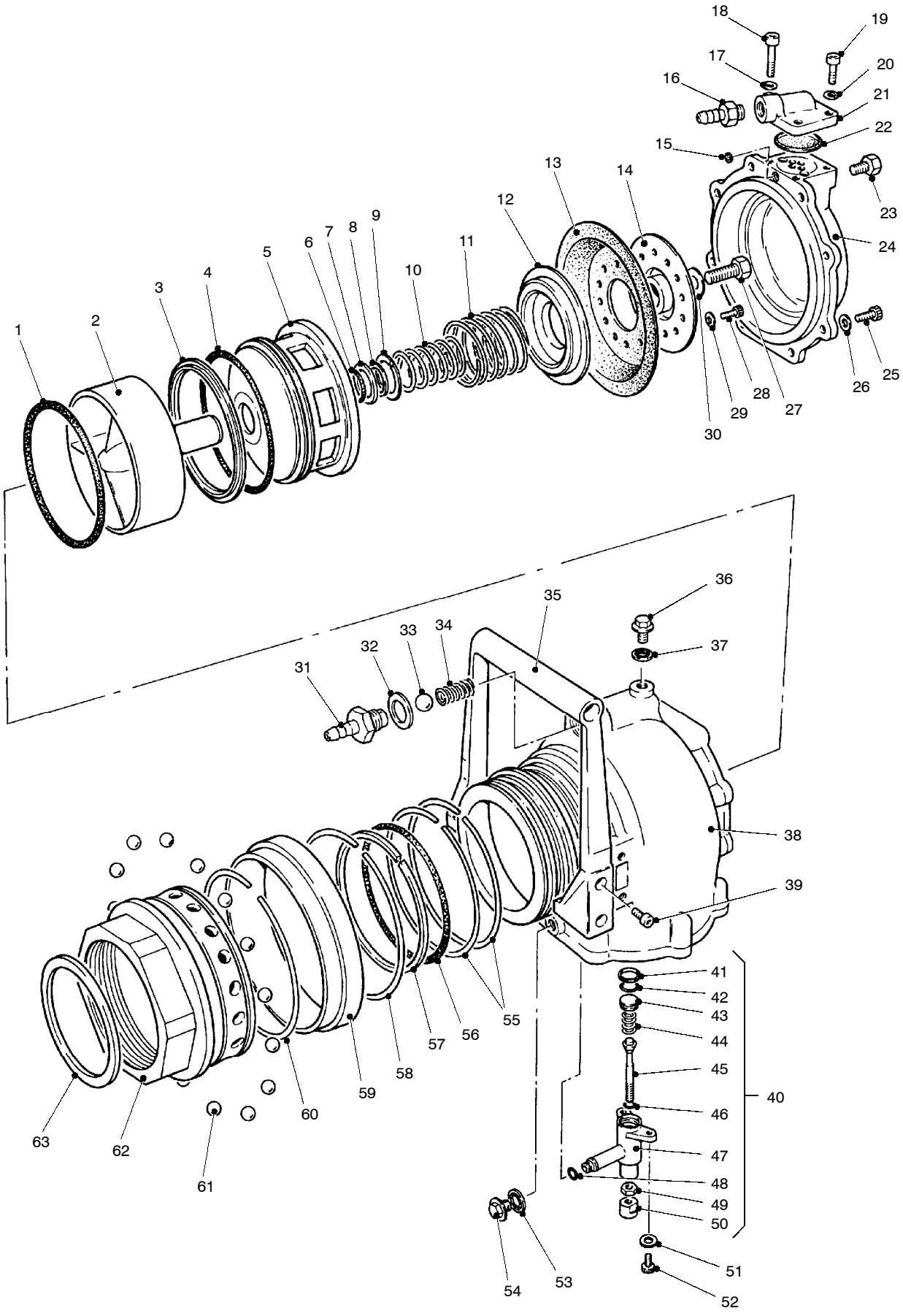


Fig 8.3 Pressure Control Valve and Swivel Assembly

PRESSURE CONTROL VALVE AND SWIVEL ASSEMBLY (continued)

Fig/ Item No.	Part No.	Description	Qty
62	CCAZ7323	Swivel Body (BSP version)	1
	CCAZ7324	Swivel Body (NPT version)	
+			
*63	CCRZ7271	Sealing Ring (Fluorocarbon) (BSP version only)	1
64	ZAPZ0084-20	Taper Plug/Cap (BSP version)	1
	ZAPZ0084-21	Taper Plug/Cap (NPT version)	
+			

* = Suggested spare part

PRESSURE CONTROL VALVE AND SWIVEL ASSEMBLY SPARES KIT

Item No.	Kit Part No.	Description	Qty per Kit
	CCMS7516	**Seal Kit**	
1	ZARZ0097-8	Double Delta Seal, Fluorocarbon O-Ring	1
3	CCRZ7343	Main Seal	1
4	ZO32M114530A	O-Ring, Fluorocarbon	1
6	ZARZ0097-9	Double Delta Seal, Fluorocarbon O-Ring	1
13	CCRZ7342	Main diaphragm	1
15	CCRZ7377	Small diaphragm (Fluorocarbon)	1
22	CCRZ7344	Exhaust Valve Diaphragm	1
30	ZMMZ0135-8	Bonded Seal, 7/16 in. id	1
32	ZMMZ0135-7	Bonded Seal, 1/2 in. BSP	1
42	ZO22M010116A	O-Ring, BS4518-0101-16, high nitrile	1
46	ZO22E005070A	O-Ring, BS1806-005, high nitrile	1
48	ZO22M005116A	O-Ring, BS4518-0051-16, high nitrile	1
53	ZMMZ0135-4	Bonded Seal, 1/8 in. BSP	1
56	ZO32M114357A	O-Ring, Fluorocarbon	1
57	ZARZ0097-10	Wear Strip, 15 1/4 in. lg.	1
63	CCRZ7271	Sealing Ring, Fluorocarbon (BSP version only)	1

* = Suggested spare part