

TITLE:

bled steam check valve with pneumatic actuator and limit switches

**THIS COVERS BLEED STEAM CHECK VALVES
FITTED WITH PNEUMATIC ACTUATOR
AND EXTERNAL LIMIT SWITCHES**

**FOR SPARE PARTS, REFER TO SHEET GIVING DETAILS OF CLASSIFICATION.
WHEN ORDERING SPARE PARTS, QUOTE FULL PRODUCT NUMBER
STAMPED ON NAMEPLATE**

REFER TO APPENDIX 2 FOR SPECIFIC PRODUCT NUMBERS

Q	PRODDUCTS ADDED	P.GRAY	J.CHANDLER	29SEP'04
P	PRODUCTS ADDED	J.CHANDLER	S.ATHERTON	13FEB04
N	B07EV600TFDE, B07EV800TFDA, B11EV500RFDB, B11EV600TFDA, B2RJN350QFDA & B31JV400RFDA ADDED	P.GRAY	S.ATHERTON	11 DEC 02
M	B43EN700SFDA ADDED	J.CHANDLER	S.ATHERTON	14 NOV 02
L	RE-WITTEN. APPENDIX 2 ADDED	R.PORTER	S.ATHERTON	DECEMBER '01
REV.	DETAIL	PREPARED BY	APPROVED BY	DATE

PRODUCT SAFETY SIGN AND LABEL SYSTEM

- 1. DANGER – Immediate hazards which WILL result in personal injury or death.**
- 2. WARNING – Hazards or unsafe practices which COULD result in personal injury or death.**
- 3. CAUTION – Hazards or unsafe practices which COULD result in minor personal injury.**
- 4. ATTENTION – Hazards or unsafe practices, which COULD result in product or property, damage**

If and when required, appropriate safety labels have been included in the rectangular margin blocks throughout this manual. Safety labels are vertically orientated rectangles as shown in the *representative examples* (below), consisting of three panels encircled by a narrow border. The panels contain four messages which communicate:

- The level of hazard seriousness.
- The nature of the hazard.
- The consequences of human or product interaction with the hazard.
- The instructions, if necessary, on how to avoid the hazard.

The top panel contains a pictorial, which communicates the nature of the hazard and the possible consequence of human, or product interaction with the hazard. In some instances of human hazards the pictorial may, instead, depict what preventative measures to take, such as wearing protective equipment.

The bottom panel may contain an instruction message on how to avoid the hazard. In case of human hazard, the message may also contain a more precise definition of the hazard, and the consequences of human interaction with the hazard, than can be communicated solely by the pictorial.

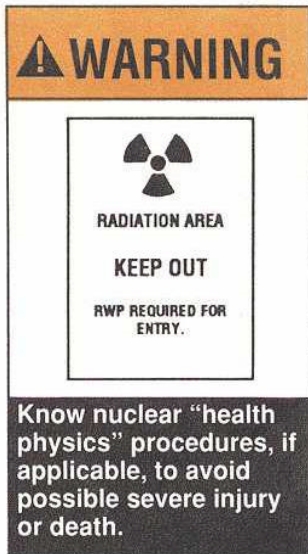


Contents

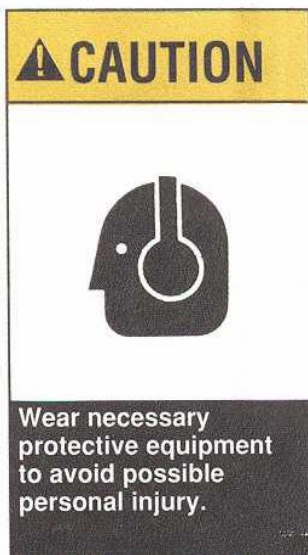
<i>Section</i>	<i>Subject</i>	<i>Page</i>
I.	Safety Notice	4
II.	Safety Precautions	5
III.	Introduction	5
IV.	Design Features & Nomenclature	6
V.	Commissioning	10
	A. Connecting to Electrical Supply	10
	B. Solenoid Valve Check	10
VI.	Storage	11
VII.	Installation & Welding	11
VIII.	Disassembly	13
IX.	Re-assembly	16
	A. Pre-Assembly Checks	17
	B. Assembly Procedure	20
X.	Inventory Philosophy	23
XI.	Valve Repair	23
	A. Factory Refurbishment	23
	B. Service Warranty	23
	C. Dewrance Product Repair by Unauthorised Sources	23
XII.	Troubleshooting	24
Appendix 1	Pneumatic Actuator Maintenance	26
	A. Dismantling Procedure	26
	B. Inspection & Spare Parts	27
	C. Cleaning & Re-assembly	29
	D. Recommended grease & lubricant	31
	E. Wrench Sizes	31
Appendix 2	Torque Wrench Values	32

I. Safety Notice

Proper installation, operation and maintenance are essential to the safe and reliable operation of all valve products. The relevant procedures recommended by Dewrance and described in this manual, are effective methods of performing the required tasks. Some of these procedures require the use of tools specifically designed for an intended purpose. These special tools should be used when, and as, recommended.



It is important to note that this manual contains various 'safety messages' which should be carefully read in order to minimise the risk of personal injury, or the possibility that improper procedures will be followed which may damage the involved Dewrance product, or render it unsafe. It is also important to understand that these 'safety messages' are not exhaustive. Dewrance cannot possibly know, evaluate, and advise any customer of all the conceivable ways in which tasks might be performed, or of the possible hazardous consequences of each way. Consequently, Dewrance has not undertaken any such broad evaluation and, thus, who uses a procedure and/or tool, which is not recommended by Dewrance, or deviates from Dewrance recommendations, must be thoroughly satisfied that neither personal safety, nor valve safety, will be jeopardised by the method and/or tools selected. If not so satisfied, contact Dewrance if there are any questions relative to tools/methods. Some of the products manufactured by Dewrance may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper "health physics" procedures should be consulted and followed, if applicable.



The installation, operation and maintenance of valves and/or valve products may involve proximity to fluids at extremely high pressure and/or temperature. Consequently, every precaution should be taken to prevent injury to personnel during the performance of any procedure. These precautions should consist of, but not limited to, ear drum protection, eye protection and the use of protective clothing (i.e. gloves etc.) when personnel are in or around a valve work area. Due to the various circumstances and conditions in which these operations may be performed on Dewrance products, and the possible hazardous consequences of each way, Dewrance can not possibly evaluate all conditions that might injure personnel or equipment. Nevertheless, Dewrance does offer the safety precautions listed on page 5 for customer information only.

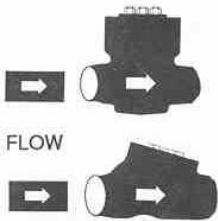
It is the responsibility of the purchaser or user of Dewrance valves/equipment to adequately train all personnel who will be working with the involved valves/equipment. Further, *prior* to working with the involved valves/equipment, personnel who are to perform such work should become thoroughly familiar with the contents of this manual. Accordingly, should any additional copies of this manual be required, they can be purchased by contacting Dewrance.

⚠ DANGER



Do not remove cover nuts or cover if valve is under pressure, as this will result in severe personal injury or death.

⚠ WARNING



Ensure that the arrow on the check valve points in same direction as normal system flow, to avoid possible severe injury or death.

⚠ ATTENTION



Do not install or use a valve if the material and/or pressure class are not known.

II. Safety Precautions

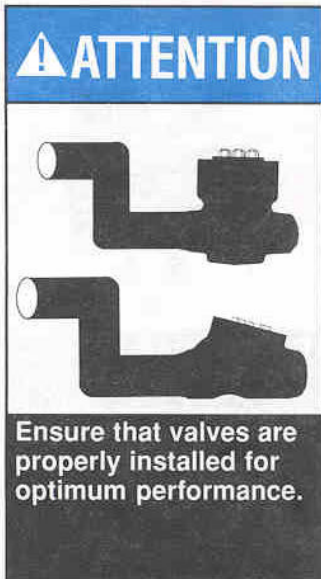
- Do **NOT** attempt to remove the packing gland nuts while valve is under pressure.
- Do **NOT** attempt to eliminate cover seal leakage, by tightening the cover nuts, while the valve is under pressure.
- The cover should **NEVER** be removed while the valve is under pressure.
- Do **NOT** attempt to remove the Actuator while the valve is under pressure.
- No **ALTERATION AND/OR MODIFICATION** should be made to any Dewrance valve, except as sanctioned and/or authorised by Dewrance.
- **NEVER** install, or attempt to use, any valve that is not properly identified as to its material and pressure class.

III. Introduction

Dewrance Bled Steam Check Valves are built to high standards of precision and accuracy, and must pass rigid inspection before leaving the factory. It is imperative that these valves are properly installed, maintained and operated to ensure optimum performance.

The purpose of this service manual is to instruct installation crews maintenance personnel and operators in these fundamentals. This manual should be made available to these personnel at all times, so that they can become, and remain, familiar with the details of these valves.

Dewrance Bled Steam Check Valves are intended for high-pressure service in fluids approved by Dewrance. When shipped from the Dewrance factory, they are guaranteed to be in good condition; however, Dewrance cannot assume responsibility for damage to valves due to faulty installation, improper operation or other conditions beyond its control.



IV. Design Features & Nomenclature

This range of valves has been specifically designed for installation in bled (extraction) steam lines between steam turbines and feed water heaters but are equally applicable to reheater connections and bleed on pass-out lines in process plants.

Their function is to prevent the reverse flow of stored steam and water from the heater or its bled steam pipe to the turbine. Installation would be in a horizontal pipe as near to the turbine as possible.

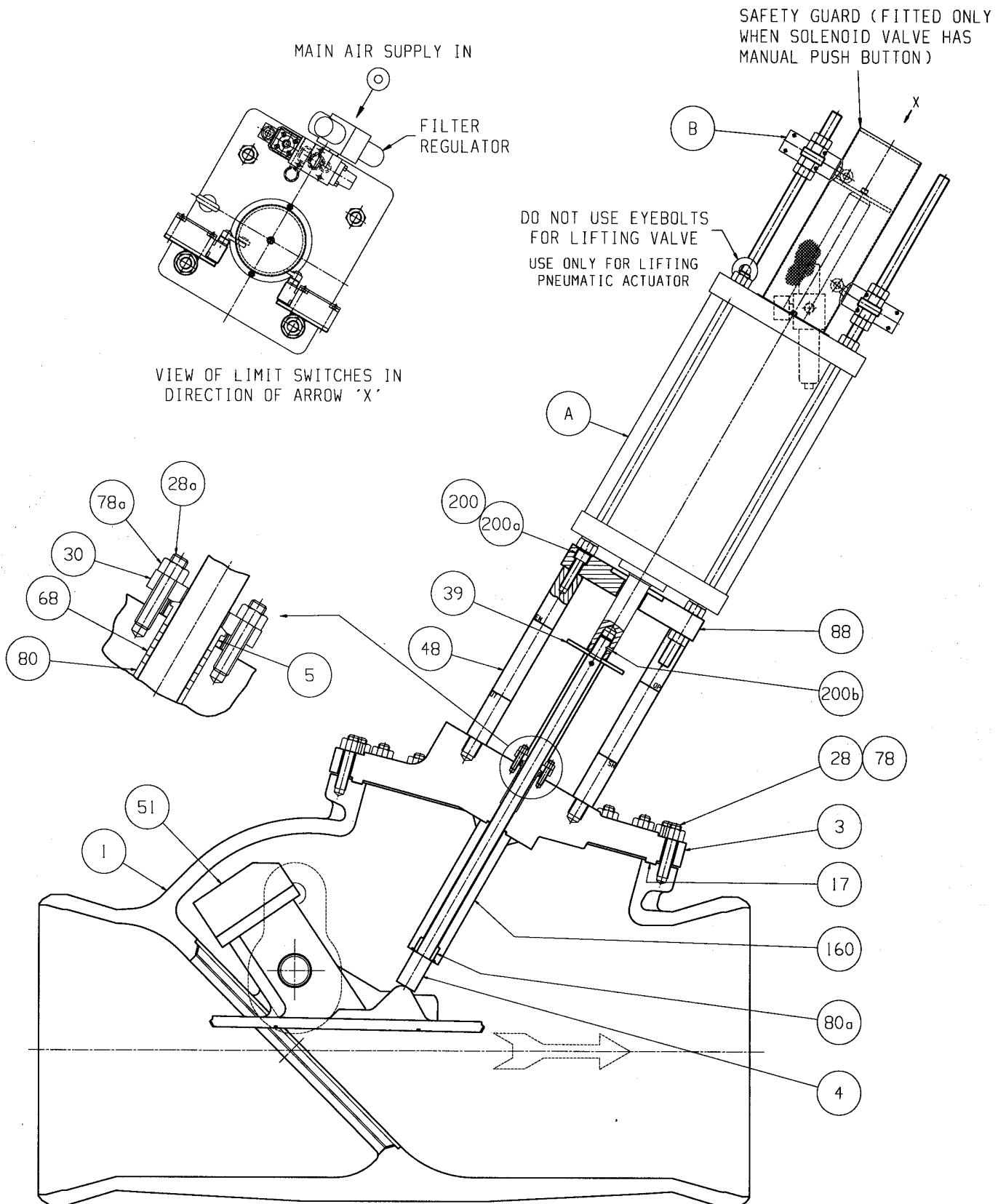
These valves are Free Acting whereby the disc moves to the closed position when flow in the forward direction ceases. Gravity action on the disc provides a closing moment from the fully open to fully closed position. Where power assistance is required, a spring return pneumatic cylinder is accommodated whilst still maintaining the automatic Gravity closing feature.

All Dewrance Bled Steam Check valves are based on the same seat geometry of a conical seated disc in a conical body seat. The seating intensity is high enough to give a good seal and yet low enough not to cause any surface scuffing. The position of the hinge pin ensures that the disc opens and closes without a rubbing action to effect a tight seal over the full range of pressures.

The combination of disc geometry and the body shape produce a seat angle which gives a short disc travel as the flow falls progressively with decreasing flow. This disc will be on the seat when flow ceases and before reversal takes place without slamming. This arrangement gives a low pressure drop and flow under the disc assists in keeping the valve fully open over a wide range of flows.

IV. Design Features & Nomenclature – Continued

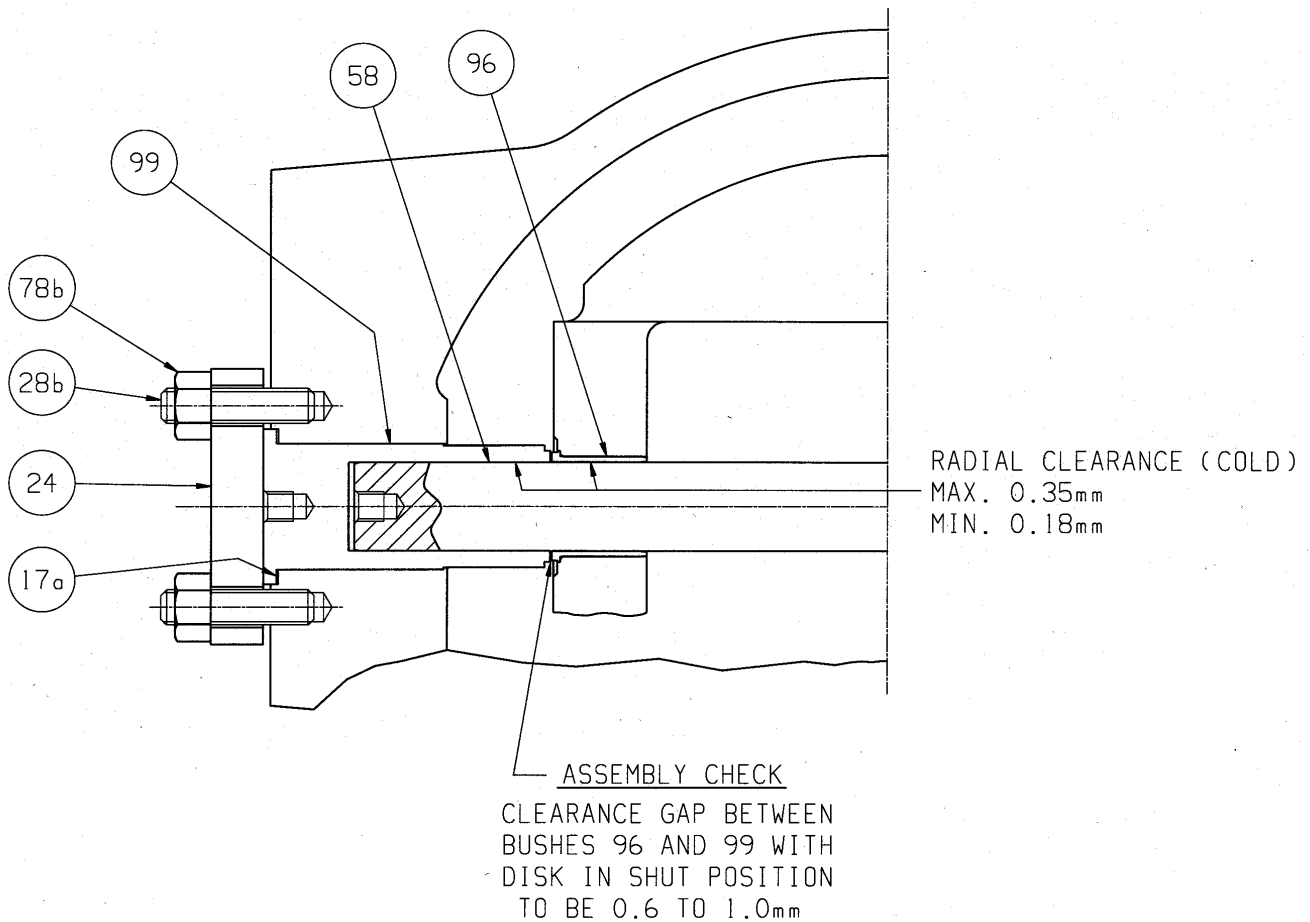
Figure1



IV. Design Features & Nomenclature – Continued

Figure 2

SCRAP VIEW OF HINGE PIN AREA
IN DIRECTION OF ARROW 'A' (FIG.1)



IV. Design Features & Nomenclature – Continued
PARTS LIST (REFERRING TO Fig.1 & Fig.2)

REF. No.	No. OFF	DESCRIPTION
1	1	Body
3	1	Cover
4	1	Stem
5	1	Gland
17	1	Cover Gasket
17a	2	Side Flange Gasket
24	2	Side Flange
28	**	Cover Stud
28a	4	Gland Stud
28b	8	Side Flange Stud
39	1	Stem Indicator
48	4	Pillar
51	1	Disk
58	1	Hinge Pin
68	**	Gland Packing
78	**	Cover Nut
78a	4	Gland Nut
78b	8	Side Flange Nut
80	1	Neck Bush
80a	1	Guide Bush
88	1	Adaptor Plate
96	2	Hinge Pin Bush
99	2	Hinge Pin Housing
160	1	Stem Guide
160a	1	Limit Switch Striker Plate
200	4	Cap Head Screw
200a	4	Safety Washer
200b	1	Set Screw
A	1	Pneumatic Actuator
B	2	Limit Switch

** QUOTE PRODUCT NUMBER FOR QUANTITY

V. Commissioning

A. Connecting to Electrical Supply

FOR SINGLE ACTING PNEUMATIC ACTUATOR WITH SOLENOID VALVE WIRED FOR NORMALLY CLOSED POSITIONS.

1. Ensure that the adjusting nut on the filter regulator is fully out (anti-clockwise) then turn on the air supply to the inlet supply of the filter regulator.
2. Connect the electrical supply to the solenoid valve.
3. Energise the solenoid valve.
4. Screw in the adjusting nut on the filter regulator (clockwise) until the working pressure is obtained (Refer to certified General Arrangement drawing for details of air pressure requirements). The valve stem (4) will go to the fully instroked position.
5. To ensure correct and safe operation, check the outstroke by de-energizing the solenoid valve. As the air pressure is relieved, the stem (4) will move to the fully outstroked position.

WARNING: CARE MUST BE TAKEN WHEN EXHAUSTING THE SOLENOID VALVE THAT THE AREA CLOSE TO THE VALVE IS KEPT CLEAR. DO NOT ATTEMPT TO OBSTRUCT EXHAUSTING ORIFICES BY HAND.

B. Solenoid Valve Check

Next, it is necessary to check the functional operation of the solenoid to ensure that it responds correctly via the control system.

1. With solenoid valve energised, the stem (4) and the indicator plate (39) will move to a fully instroked position. This will indicate the correct operation of the solenoid. Open limit switch operation can also be checked at this stage.
2. Select the 'close valve' position via the Control System (for on-load testing) i.e. solenoid de-energized and check the actuator has moved to the fully outstroked position. Closed limit switch operation can also be checked at this stage.
3. Select the 'open valve' position via the control system (for on-load testing) and check that the actuator has moved to the fully instroked position.
4. With the working air pressure still set, a simulated turbine trip should now be carried out via the control system to ensure the correct solenoid response.

V. *Commissioning - Continued*

5. Local on-load testing can be achieved by operating the push button on the solenoid valve. When the actuator is fully outstroked, release the push button and the pneumatic actuator will return to the fully instroked position.
6. After satisfactory completion of the above steps, fully screw out (anti-clockwise) the adjusting nut on the filter regulator and de-energise the solenoid valve. The stem (4) will move to the fully outstroked position.

When the valve is required to be put into service, screw in (clockwise) the adjusting nut on the filter regulator until the working air pressure is obtained. The stem (4) will move to the fully instroked position when the valve is ready for service.

VI. *Storage*

Indoor storage of valves is recommended. If prolonged storage is anticipated, the valves should be stored in humidity controlled storage areas.

If valves are ordered to a more stringent cleaning and storage procedure, the recommendations in that procedure should be followed.

VII. *Installation & Welding*

When valves are received, an enclosed 'Packing Note' will provide an itemised statement of all valves and parts included in the shipment. The recipient should check and account for each item on the list, and then keep this packing note as a permanent record for these valves/parts.

Unloading the valves should be done with care. Remember that, although the valve is a rugged piece of equipment, it may still be damaged by abusive handling. Skidded or chocked valves should not be unskidded until immediately before installation.

Improper installation of a valve can have very serious consequences, resulting in a possible malfunction, which may result in extensive and costly repairs. Compliance with the following recommendations will do much to assure optimum performance of the valve after installation.

It is essential that precautions be taken to prohibit the entry of foreign debris inside the valve, which could damage the seating surfaces before and/or after installation.

VII. Installation & Welding - Continued



Provisions should be made for supporting the valve and adjacent piping so that the pipeline stresses will not be transmitted to the valve body during site welding of the pipe to the valve.

Welding and stress relieving procedures should conform to the applicable code or standard.

Weld with care and beware of weld splatter damaging internal parts

Cleaning of pipelines in which the valve is installed, and all connecting lines, is essential before the unit is put into operation. Welding beads, scale and foreign debris in the line can cause damage to the valve seats and can result in leakage.

When raising pressure at any time in the pipeline system, the valve gland nuts should be tightened or 'followed up' at regular intervals.

VIII. Disassembly (Refer to Fig.1 & 2)



WARNING: ENSURE THAT THERE IS NO PRESSURE IN THE PIPELINE OR VALVE. THE PIPELINE SHOULD BE DRAINED PRIOR TO DISMANTLING THE VALVE.

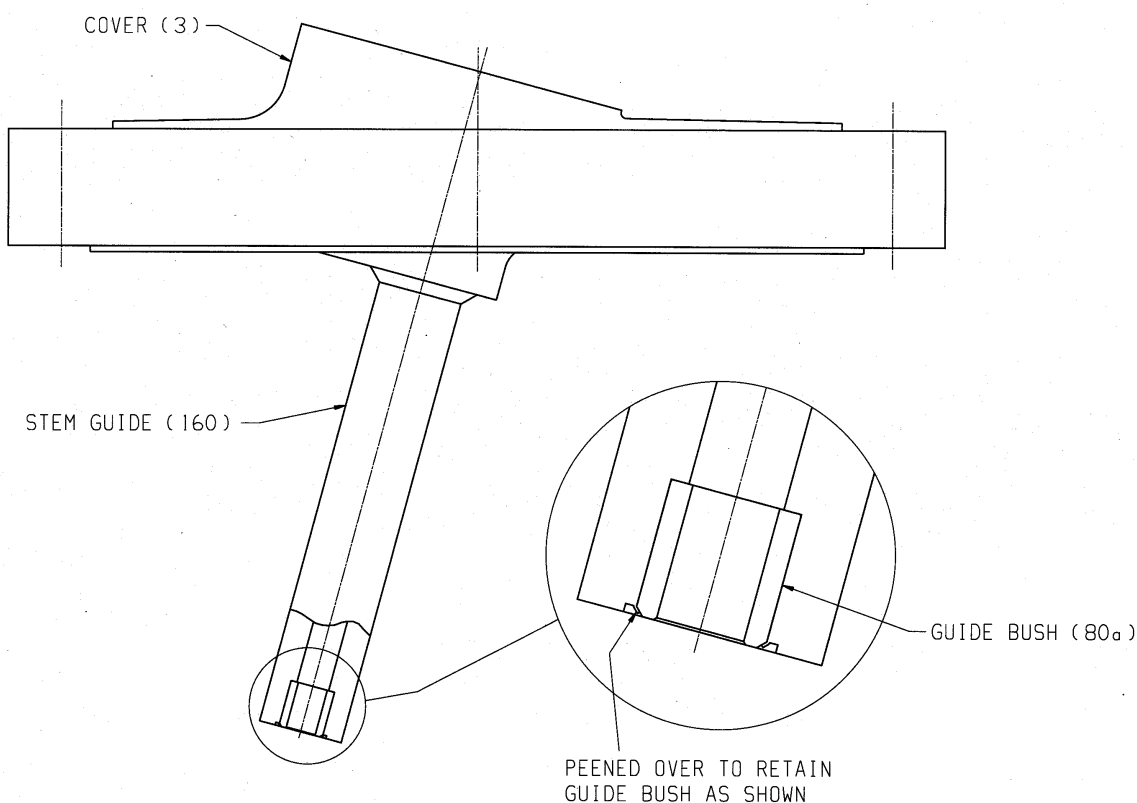
1. Fully retract the regulating nut on the filter regulator to zero pressure.
2. De-energise the solenoid to exhaust the air in the pneumatic cylinder (A).
3. Isolate the compressed air and electrical supplies.
4. Label and record cables before disconnecting electrical connections to solenoid valves and limit switches.
5. Disconnect compressed air connection.
6. Loosen gland nuts (78a) then utilising the eyebolt in the top of the actuator (A) and suitable lifting equipment, support the weight of the actuator. Unscrew and remove the lower actuator nuts that secure the actuator to the adaptor plate (88). Carefully raise the actuator to the half way position. Slacken set screw (200b). Utilising the hole in stem (4) and the flat portion on the piston rod, unscrew stem (4) from the actuator piston rod and remove stem indicator (39). Protect actuator from ingress of foreign matter.



(SEE APPENDIX 1 FOR ACTUATOR MAINTENANCE INSTRUCTION).

VIII. Disassembly - Continued (Refer to Fig.1 & 2)

7. Screw three suitable eyebolts into the threaded holes on the side of the cover (3). Thread size is stamped adjacent to the holes.
8. Unscrew all cover nuts (78).
9. Utilizing the eyebolts and suitable lifting equipment, lift off the cover assembly.
10. Remove gland nuts (78a)
11. Remove gland (5), gland flange (30) and gland packing (68).
12. Refer to the diagram below. Check guide bush (80a) for wear or scoring. Should a new bush be required, then first remove the old bush. Do this by knocking back the places where the stem guide has been peened over the bush and then knocking guide out with suitable punch.



13. Ensure that the disk (51) is in the closed position.
14. Referring to Fig.2 check and record the gap between hinge pin bush (96) and hinge pin housing (99).

VIII. Disassembly - Continued (Refer to Fig.1 & 2)

15. Remove indicator locking nut (78) and indicator bracket (160). Refer to Fig.1 Appendix 1.
16. Unscrew and remove side flange nuts (78b).
17. Remove side flange (24).
18. Remove hinge pin housing (99). A tapped hole is provided in the end of the housing to facilitate the removal.
19. Withdraw the hinge pin (58). A tapped hole is provided in both ends of the hinge pin to facilitate the removal. This tapped hole is the same size as the one in the hinge pin housing (99).
20. To remove the disk (51), place a nylon sling through to hinge pin bush holes (96) in lugs on the disk then, using lifting equipment, hoist out the disk.

CAUTION: WHEN LIFTING OUT THE DISK (51), THE TENDENCY IS FOR THE DISK TO SWING AWAY FROM THE BODY SEAT. CARE MUST BE TAKEN NOT TO DAMAGE THE BODY AND DISK SEATING FACES WHEN LIFTING.

IX. Re-assembly (Refer to Fig.1 & 2)**A. PRE-ASSEMBLY CHECKS**

Ensure the following checks are performed prior to assembling the valve.

BODY (1)

Ensure that the body is cleaned of any other foreign debris, which may have accumulated in the valve body.

STEM (4)

Check the finish of the stem, which operates through the gland. The stem must be smooth and free from scoring.

COVER (3)

1. Inspect the gasket sealing face for damage.
2. Inspect the internal walls of the gland box for steam cuts or pitting.

STUDS (28, 28a & 28b)

Check for wear or damage; replace with new ones as necessary.

HINGE PIN (58)

It is important that the pin is straight within 0.06mm, if greater that this pin must be straightened.

CAUTION: Take care not to damage pin during this operation.

NECK BUSH (80)

Inspect bore of bush for wear or scoring, replace with as necessary.

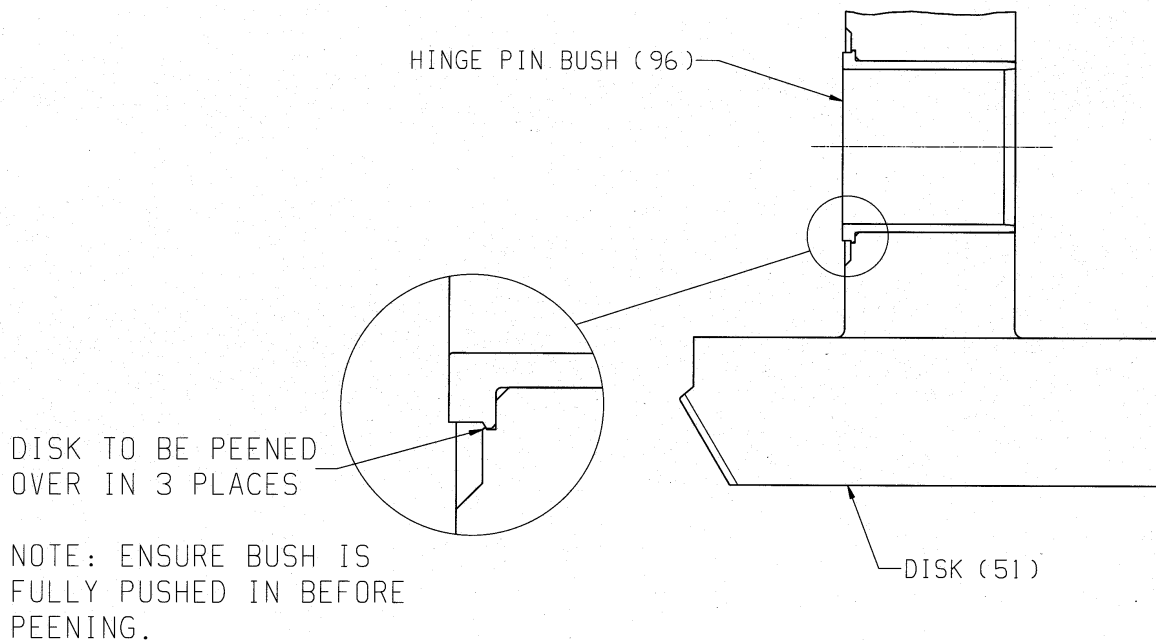
HINGE PIN BUSH (96)

Check Bush for wear, if damaged, bush must be replaced in the following manner:

Using suitable punch, knock back the peened metal and tap out the Bush.
Press in new Bush and secure by peening in three places as shown below.

IX. Re-assembly - Continued (Refer to Fig.1 & 2)

Should it be necessary to replace the Hinge Pin Bushes. Push the Bushes into position and 'peen' over in three places as shown below.



NOTE: IT IS NOT RECOMMENDED TO RE-USE ANY PACKINGS OR GASKETS.

In case of defects considered to be outside the acceptable standards, replacement parts should be fitted.

Dewrance provide in-house factory repair facility and a fast response spare parts service.

IX. Re-assembly - Continued (Refer to Fig.1 & 2)

B. ASSEMBLY PROCEDURE.

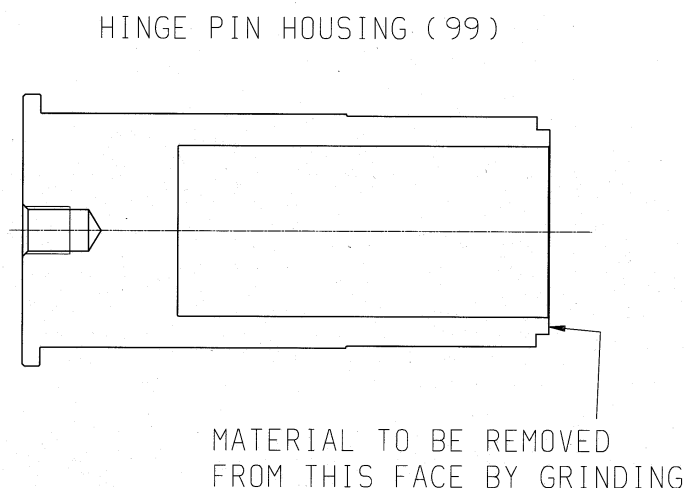
1. Ensure that the disk (51) and body (1) seating faces are clean. Place a nylon sling through hinge pin bushes (96) located in disk and using lifting equipment, lower disk into body (1). As the disk is being lowered, it will have to be pushed over at the same time until the disk comes into contact with the body seat.

CAUTION:

CARE MUST BE TAKEN TO PREVENT DAMAGE TO DISK AND BODY SEATING FACES, THE ANGLE OF THE SEAT TO DISK FACES WILL KEEP THE DISK IN POSITION.

2. Align hinge pin bushes (96) and slide in hinge pin (58).
3. Ensure gasket faces on body (1) and hinge pin housing (99) are clean, fit new side flange gasket (17a), slide in hinge pin housing (99).
4. Fit side flange (24) over side flange studs (28a).
5. Screw on side flange nuts (78b) and tighten in a diametrically opposing sequence to a torque value shown in APPENDIX 2.
6. Using feeler gauges, check that the minimum clearance gap between hinge pin bush (96) and hinge pin housing (99) is 0.6mm to 1mm (0.024" to 0.040"). The valve is designed to these tolerances. In the event of tolerances being outside the above limits, proceed as follows:

Remove the hinge pin housing (99) on the affected side/s Referring to diagram below, remove by grinding sufficient metal from face shown to achieve above tolerances. Ensure that the face is machined square to C/L. Refit hinge pin housing (99).



IX. Re-assembly - Continued (Refer to Fig.1 & 2)

7. Ensure gasket faces on cover (3) to body (1) are clean. Fit new cover gasket (17) into recess in body (1).
8. If guide bush (80a) has been replaced, ensure that the stem guide (160) has been peened over to retain the guide bush (80a), refer to Section VII (page 14).
9. Slide stem (4) through guide bush (80a,) and into stem guide (160) & neck bush (80).
10. Fit new gland packing (68), gland (5), gland flange (30) and gland nuts (78a).
11. Using eyebolts and lifting equipment fit cover assembly over cover studs (28), making sure that the location dowel is lined up correctly.

CAUTION: CARE SHOULD BE TAKEN NOT TO DAMAGE COVER STUDS (28). SUPPORT STEM (4) DURING THIS OPERATION AS IT COULD BECOME DISLODGED

12. Lightly lubricate cover studs (28) with a high temperature anti seize compound and fit cover nuts (78). Gasket compression is an important factor in obtaining a long term tight joint. It is essential that the gasket be pulled down evenly. Use feeler gauges between the cover (3) and body (1) flange to ensure this compression is even.

CAUTION: DO NOT LUBRICATE GASKET OR GASKET SEALING FACES. COVER NUTS (78) MUST BE TIGHTENED IN A DIAMETRICALLY OPPOSING SEQUENCE IN A MINIMUM OF 3 STAGES TO A TORQUE VALUE SHOWN IN APPENDIX 2.

13. Using lifting equipment as previously described, lift up actuator (A) and lower over valve ensuring that actuator screwed tie rods locate into adaptor plate (88). Lower to half way position then fit position indicator (39) over stem (4) and screw stem into actuator piston rod, secure with pin (200b).
Lower actuator all the way down onto adaptor plate face (88), secure with lower actuator nuts.
14. Tighten gland nuts (78a).
15. Reconnect electrical and compressed air connections.
16. Reinstall electrical and compressed air supplies.
17. Screw in adjusting nut on filter regulator until the working air pressure is obtained.
18. Stroke valve fully open and close to check ease of operation.

X. Inventory Philosophy

INVENTORY PHILOSOPHY

The basic objective in formulating a service parts inventory philosophy is to provide prompt valve service capability, thus preventing maintenance outage time extensions. To accomplish this, it is necessary to have immediate availability of the proper inventory of service parts for optimum valve quantities. This can be achieved at a minimum of cost by defining the inventory on a frequency of need basis.

To assist towards this objective, the Field Service and Repair Organisation of Dewrance recommends that the following guidelines be utilised to establish meaningful inventory levels:

1. Identify the total number of valves in service by size, type number, pressure/temperature class, and tag number.
2. Identify the frequency of replacement tendency of specific parts:

Class I	-	Parts most frequently replaced.
Class II	-	Parts less frequently replaced, but critical in the event of an emergency requirement.
Class III	-	Parts seldom replaced.
Class IV	-	Hardware e.g. nuts, bolts, pins etc.
Class V	-	Parts practically never requiring replacement.

3. "Need probability coverage" is defined as the probable percent (%) of total, uninterrupted operational time which can be expected by stocking predetermined valve component classifications.

Determine "need probability coverage" which is computable with a specific company's operational objectives and service parts inventory investment philosophy. Then relate "need probability coverage" to parts classifications, which will satisfy that need.

Guidelines are as follows:

X. Inventory Philosophy - Continued

PARTS CLASSIFICATION

NEED PROBABILITY COVERAGE

Class I	70%
Class I and II	85%
Class I, II and III	95%
Class I, II, III and IV	99%

4. Consult recommended spare parts list by valve type to determine quantity of parts valves to be covered by the inventory plan.
5. Select parts and specify quantities.

IDENTIFICATION AND ORDERING ESSENTIALS

When ordering service parts, please furnish the following information to ensure receiving the correct replacement parts:

Identify valve by:

Specify parts required by:

- | | |
|-------------------------------|---------------------------|
| 1. Full Product No. | 1. Part Name |
| 2. Size. | 2. Part Number (if known) |
| 3. Type | 3. Quantity |
| 4. Pressure/Temperature Class | |
| 5. Tag Number | |

X. Inventory Philosophy - Continued

CLASSIFICATION OF SPARE PARTS

Classification	Item No.	Description
CLASS I Parts most frequently replaced	17	Cover Gasket
	17a	Side Flange Gasket
	68	Gland Packing
CLASS II Parts less frequently replaced but critical in the event of an emergency requirement	4	Stem
	5	Gland
	51	Disk
	80	Neck Bush
	80a	Guide Bush
CLASS III Parts seldom replaced	24	Side Flange
	30	Gland Flange
	39	Stem Indicator
	48	Pillar
	58	Hinge Pin
	88	Adaptor Plate
	96	Hinge Pin Bush
CLASS IV Hardware e.g. Nuts, Studs, Pins etc)	99	Hinge Pin Housing
	28	Cover Stud
	28a	Gland Stud
	28b	Side Flange Stud
	78	Cover Nut
	78a	Gland Nut
CLASS V Parts practically never requiring replacement.	78b	Side Flange Nut
	Balance	

XI. Valve Repair

A. FACTORY REFURBISHMENT

Many customers find it desirable to return their valves to Dewrance for restoration or modernising. Products returned to Dewrance valve repair centre are restored to original specifications and returned with a new valve warranty.

B. SERVICE WARRANTY

Factory repaired valves carry a warranty that covers workmanship and new parts installed during repair, for a period of one year from date of repair completion.

C. DEWRANCE PRODUCT REPAIR BY UNAUTHORISED SOURCES.

Dewrance has not authorised any outside repair companies, contractors, or individuals to perform warranty repair service on new products, or field/factory repaired products of its manufacture. Therefore customers contracting for such repair services from unauthorised sources must do so at their own risk. Likewise, if any Dewrance product falls to perform within the scope of its design, Dewrance must be notified and given the opportunity to inspect and correct the problem. Dewrance will not accept any backcharges for unauthorised repair sources performing corrective repairs on its products.

XII. Troubleshooting

The following table indicates the difficulties, which may be encountered, the most probable cause and the necessary corrective action.

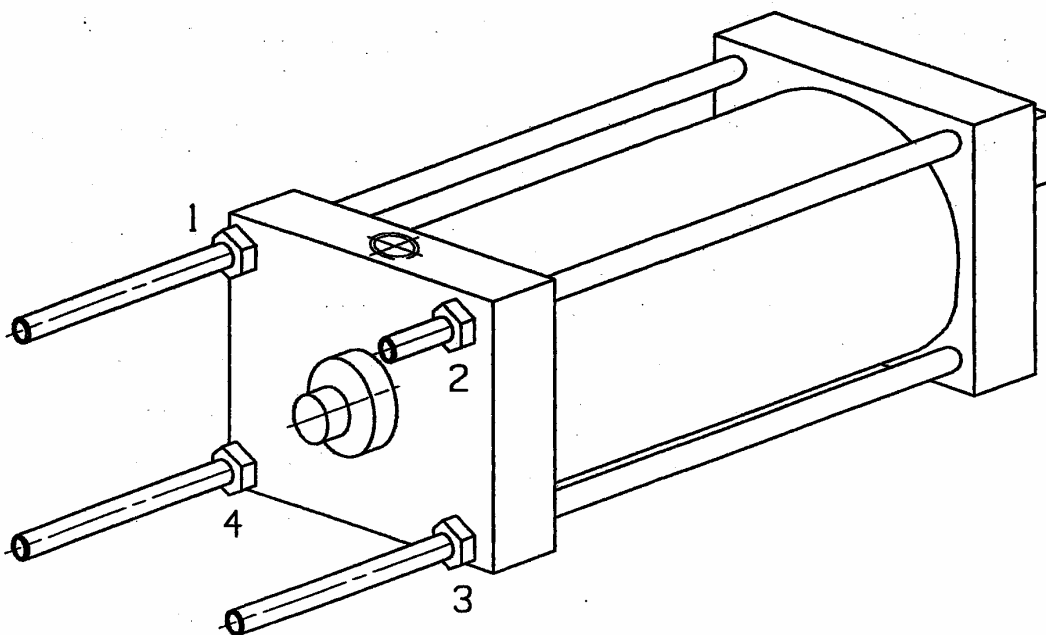
PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Body/Cover Joint Leakage	A. Gasket damaged.	A. Disassemble valve, and fit new gasket as outlined in manual.
	B. Cover nuts loose.	B. Tighten cover nuts as outlined in Manual
Cover Gland Box leaking.	A. Gland Packing damaged.	A. Disassemble valve, and correct discrepant condition as outlined in manual.
	B. Gland nuts loose.	B. Tighten gland nuts as outlined in Manual
Disk will not open and fully close.	A. Foreign material trapped between disk and seat.	A. Disassemble valve, and correct discrepant condition as outlined in manual. Inspect system for cleanliness.
	B. Air supply low to actuator.	B. Check air pressure and filter regulator. Pressure should be as outlined in Manual. Inspect pipework for leaks.
	C. Gland nuts too tight	C. Tighten as outlined in Manual.
	D. Clearance between hinge pin housing/bush incorrect.	D. Check clearance as outlined in Manual.

Appendix 1 - Pneumatic Actuator Maintenance

A. DISMANTLING PROCEDURE

1. Before starting to dismantle cylinder assembly from its installation, it is important to note by an appropriate means, the position of port and pipework in relation to each other and its installation.
2. Remove cylinder assembly from its installation and lift clear using the lifting eye fitted.
3. Place cylinder on a service bench with the front of the cylinder towards you. (Front of cylinder refers to piston rod end of cylinder.)
4. Undo the elbow fitting pipe 'nut' on the air supply to the valve, remove the solenoid cap and undo and remove the F.R.L mounting plate and F.R.L assembly. Remove the junction box plate and preserve. - (Preserve parts means keep for later maintenance operation.)
5. To dismantle the cylinder, the tie rod nuts on the front end of the cylinder must be loosened as indicated in Fig. 1, until the installed -compression springs have reached their free length.

Fig.1



Removal of Tie Rod Nuts.

1. Loosen nuts '1' and '3' 5 to 6 turns.
2. Loosen nuts '2' and '4' 5 to 6 turns.
3. Repeat steps 1 and 2 until compression spring reaches its free length.

Appendix 1 - Pneumatic Actuator Maintenance - Continued

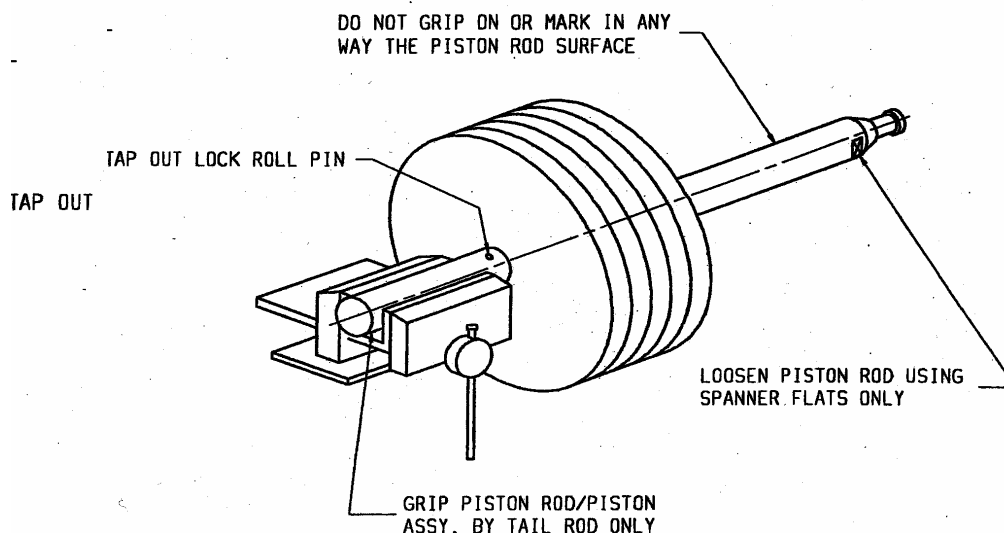
Tightening of Tie Rod Nuts

Tightening of nuts is the reverse procedure of removal.

WARNING: THE TIE ROD FIXINGS ON THE BACK FACE OF THE CYLINDER ARE WELDED SOLID NO ATTEMPT SHOULD BE MADE TO DISMANTLE THE CYLINDER FROM THIS END AS THIS WILL RESULT IN THE UNCONTROLLED RELEASE OF THE COMPRESSION SPRING.

6. Remove the tie rod nuts and lift the back cover and tie rods clear. Remove the compression springs and preserve.
7. Remove tube from front end cover, if necessary by holding tube (do not clamp) and lightly tapping on the four corners of the front cover with a fibre mallet until the tube is clear of the front spigot 'O' ring. Preserve.
8. Wipe the piston rod clean. Remove the piston rod and piston assembly from the front end cover bush. Take particular care not to damage seats or bearings when passing rod end through bush. Preserve.
9. Grip the piston and rod assembly as indicated (Fig. 2), and tap out the locking roll pin with a 5mm diameter punch. Preserve roll pin. Loosen piston rod using spanner flats. Refer to Page 38 for spanner sizes. No marking or gripping should be made on the shaft O.D. Undo the remaining thread engagement by hand supporting both piston rod and piston. Preserve.

Fig. 2



Appendix 1 - Pneumatic Actuator Maintenance - Continued

10. Place front-end cover on bench with bush fixing screws facing uppermost. Remove screws with a 6mm A/F hex. wrench. Turn front-end cover over and support it such that the bush is clear of the bench. Push bush out from back face of front cover. Preserve.

B. INSPECTION & SPARE PARTS

1. Spares for this cylinder are as follows:

- (i) Spigot 'O' Ring (front cover)
- (ii) Bush 'O' Ring
- (iii) Piston Rod 'O' Ring
- (iv) Piston Rod Wiper
- (v) Piston Rod 'U' Ring
- (vi) Piston 'U' Ring
- (vii) Piston Tape

The above parts can be ordered by quoting RK SK (SK No. is stamped on the end cover).

Other spares can be ordered quoting the SK No. and the description of the part required.

2. Tube - Clean tube bore and inspect for scoring and wear. If damaged, order a new tube. If not damaged cover with a clean cloth and preserve.
3. Front cover spigot 'O' ring. Remove 'O' ring and inspect for damage or distortion. If damaged, order spare 'O' ring. If not damaged preserve cover and 'O' ring.
4. Bush - See Fig.3. Remove 'O' ring from bush and inspect for damage or distortion. If damaged, order spare 'O' ring. If not damaged preserve 'O' ring.
Remove wiper seat from front end of bush and 'U' ring from back end of bush with the use of a blunt flat bladed screw driver, taking care not to cause damage to wiper, 'U' ring, seating faces or bearing surfaces. Inspect wiper and 'U' ring for damage or distortion. If either is damaged order a spare to replace the damaged item. If there is no damage preserve.
Bush Bearings - Inspect bearing surfaces. If 75% of the bearing surface appears to be Bronze in colour, the bearings will require replacing. This can be done by carefully pressing the bearings out or machining them out. Either method must result in no damage to the bush itself, as this will cause damage or bad fitting of replacement bearings. Replacement bearings should be ordered to the SK No. and pressed in one from each end of the bush until in position shown in Fig.3.

Appendix 1 - Pneumatic Actuator Maintenance - Continued

FIG. 3

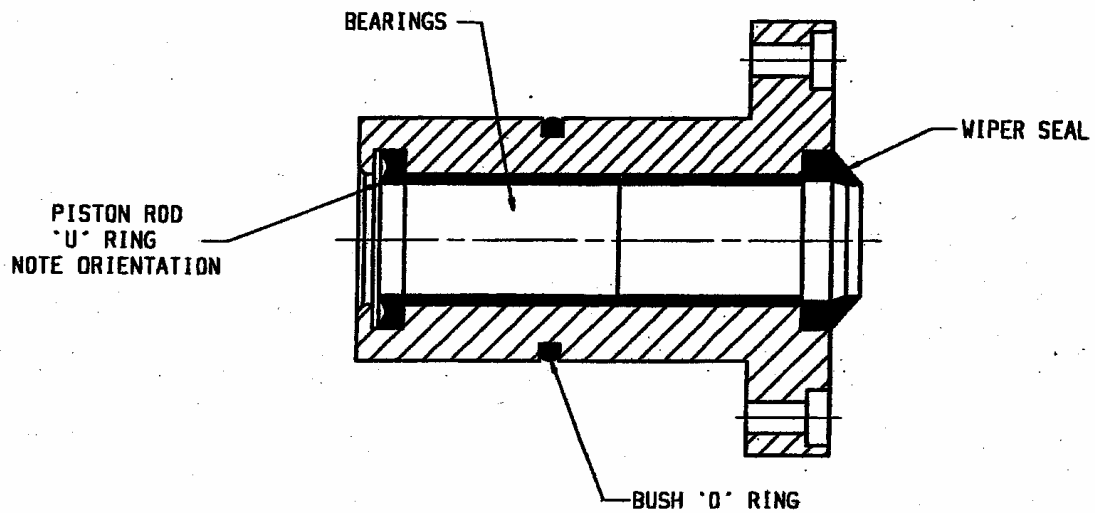
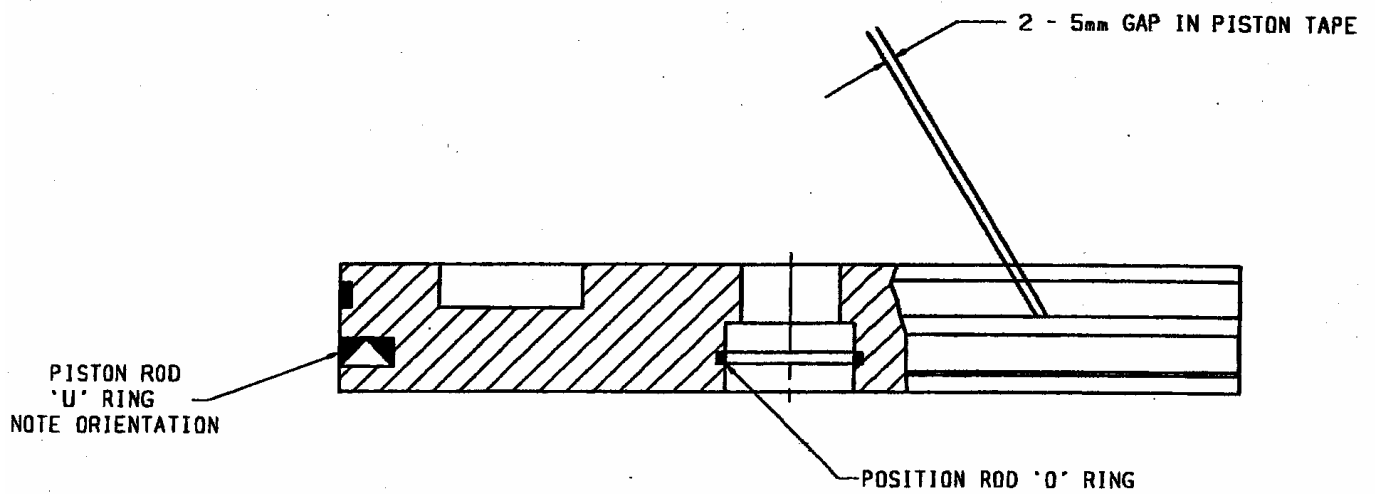


FIG. 4



Appendix 1 - Pneumatic Actuator Maintenance – Continued

5. Piston (Fig. 4) - Remove piston rod 'O' ring from centre bore of piston, inspect for damage or distortion. If damaged order spare, If not damaged, preserve.
Remove piston 'U' ring from piston. Use of a blunt flat bladed screw driver placed in the centre of the 'U' W stretch the 'U' ring over the piston lip is permitted but caution should be taken not to damage the seating faces or 'U' ring itself. Inspect 'U' ring for damage. If damaged order a spare. If not damaged, preserve.
Remove piston tape from piston and inspect for wear. If piston is worn, order spare. If not, then preserve. Note the piston tape is cut at 45° and should have a 2-5mm gap when fitted (See Fig.4)
6. Piston Rod. Inspect for scoring and general wear. If worn order a replacement. If not worn, wrap in a clean cloth and preserve.

C. CLEANING & RE-ASSEMBLY

1. Bush - See Fig. 3. After inspection of bearings and re-fitting if required the wiper seal and 'U' ring grooves should be wiped out and air blasted, the wiper seal and 'O' ring wiped clean and then re-fitted in the positions indicated in Fig. 3. Bung up each end of the bush with clean cloth Wipe clean the 'O' ring groove and outside diameters of the bush and air blast. Wipe clean the bush 'O' ring and refit. Wrap assembly in clean cloth and preserve.
2. Front cover - Wipe out centre bore of front cover and air blast. Place front face of front cover uppermost on bench. Remove outer cloth from bush. Align small O.D. of bush in centre bore of front cover and rotate bush to align fixing screw holes. Press bush into end cover ensuring 'O' ring and wiper are not sheared or otherwise damaged on assembly. Press bush down until flange is seated. Refit fixing screws and tighten using 6mm A/F hex. wrench.
Place front-end cover on edge with port uppermost. (Do not place front cover front face down on the bush head, as this will cause distortion to the lip seal). Wipe clean and air blast the spigot 'O' ring groove, spigot diameter and inside face of the front cover. Wipe 'O' ring clean and refit in spigot groove. Air blast port Cover in clean cloth and preserve.
3. Piston Rod Assembly - Wipe out centre bore of piston and blast clean. Clean piston rod 'O' ring and refit in bore (Fig. 4.) of piston. Wipe the piston rod clean, insert threaded end of piston rod into bore of piston passing it through piston rod 'O' ring until solid. Refit piston tail rod and tighten hand tight. Grip piston rod assembly by 'I' rod in a -vice (Fig. 2.) and tighten rod assembly using spanner flats (Refer to Page 31 for wrench sizes) until the lockpin hole in the tail rod and threaded part of the piston rod are in line. Tap the lock rollpin in such that it is located midway through the tail rod, using 5mm dia punch. Clean cut 'U' ring groove and piston tape groove, air blast. Clean 'U' ring and piston tape, refit. Preserve assembly.

Appendix 1 - Pneumatic Actuator Maintenance - Continued

4. Front Cover and Piston Rod Assembly - Support front-end cover on one edge on a bench. Remove cloth bungs from bush, and air blast bore. Wipe the piston rod clean and lightly grease the full length and diameter (See Page 31 for grease type). Offer the piston rod end up to the back face of the bush, carefully passing the rod end through the 'U' ring, bearings and rod wiper. Push piston up to face of end cover.
5. Tube - Lightly grease the outside diameter of the piston, 'U' ring and piston tape (See Page 31 for grease type)- Wipe out and air blast the tube bore and the tube end about to be fitted. Fit tube over piston tape, 'U' ring and front cover spigot up to spigot 'O' ring. Tip the assembly up onto the tube end and lightly tap the front cover using a fibre mallet onto the tube past the spigot 'O' ring, taking care not to shear or otherwise damage the 'O' ring.
6. Springs and Back Cover - Place the front-end cover and tube assembly on its side, air blast open end of tube. Wipe the springs clean and place them in the open end of the tube, resting on the tube bore. Wipe clean the tube end. Wipe clean and air blast the spigot and inside face of the rear end cover. Position the springs in their spring seat in the back of the piston and offer the back cover spring seat up to the springs checking the orientation of the two end covers, i.e. mounting plate holes in line and rear cover silencer on the opposite side to the inlet port on the front cover.
7. Refit tie rods as indicated in Fig. 1. Fit tie rod front nuts/ferrules to front end of cylinder and do up finger tight. Check that the springs are correctly seated. Then proceed to fully tighten (See Page 31 for wrench sizes) in the reverse order to that described in Fig. 1.
8. Refit F.R.L. and junction box mounting plates. Clean and reconnect the air supply pipe nut to elbow fitting ensuring an airtight joint, refit solenoid cab to solenoid valve.
9. Refit cylinder assembly to rig, making any trimming adjustments as required.

Appendix 1 - Pneumatic Actuator Maintenance – Continued**D. RECOMMENDED GREASE & LUBRICANT**

Grease - Rocol MTS2000, or equivalent.

Air line lubricant - Shell Tellus 37, or equivalent.

E. WRENCH SIZES

Piston Rods - 320mm bore cylinders 42mm A/F
250mm bore cylinders 36mm A/F
200mm bore cylinders 36mm A/F

Tie Rod Nuts - 320mm bore cylinder 36mm A/F
250mm bore cylinders 30mm A/F
200mm bore cylinders 38mm A/F

Appendix 2 – TORQUE WRENCH VALUES SIDE FLANGE NUTS (78b)

150 CLASS BODY – 6 BAR, 12 BAR OR 150 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B21EN200QFDE B21EN250QFDB B21EN250RFDD B21EN300QFDC B21EV300RFDE B21EV300RFDH B21EV350RFDB B21JV350RFDB B21EV375RFDA B21EV375SFDB	11	15
B11EV400RFDA B21EV425SFDA B11EV450SFDE B21JV450RFDA B11EV475RFDB B11EV475SFDB B11EV500SFDD B11EV500RFDB B07EV525RFDB B11EV525SFDA B11EV525TFDA	21	28
B07EV600RFDA B07EV600TFDB B07EV600TFDF B11EV600TFDA B07EV600TFDE B07EV625TFDA B11EV625SFDA B11EV625TFDA B21EV625RFDA B07EV650SFDA B07EV650TFDA B11EV650SFDA B21EV650SFDA B21EV650RFDA B21EV675TFDA	23	31
B07EN700TFDA B07EN700TFDB B11EN700QFDA B11EN700TFDA B21EN700TFDA B07EV750TFDB B11EV750TFDA B21EV750TFDA B07EV800RFDB B07EV800TFDA B11EV800TFDA	33	45
B21EV900SFDA	36	49
400/425/450 CLASS BODY – 200, 250, 300, 350, 400, 425 & 450 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B43EN150QFDC B43EN150QFDD	12	16
B43EN200QFDE B43EN200QFDF B43EN200QFDH B43EN200QFDJ B43JN200QFDA B43JN200QFDB	25	34
B31EN250QFDB B43JN250QFDB B2REV300RFDA B43JN250RFDA B43LN250RFDB B43JN250RFDB B31EV300RFDA	29	39
B2REN300QFDE B2TJN300QFDA B2TLN300QFDB B31EN300QFDB B31JN300QFDB B3TEN300QFDB B31EN325QFDA B31JN325QFDA B2RJN350QFDA B31EV400RFDB B31JV400RFDA	46	62
B2REN400QFDA B2TLN450QFDA B31EV500RFDA B31EV500TFDA B31LV500RFDA B31EV525TFDB	65	88
B31EN500QFDA B3TJN500QFDA B43EV550RFDA B43EV550RFDB B3TEN550QFDA B3TEN550RFDA B3TEN550RFDC B31EV600RFDA B43EV600RFDA B2TEV650TFDA	91	123
B31EV800SFDB B43EN700SFDA B4SEN700SFDA B4SEV800SFDA B4SEV850TFDA	118	160
B4TEV900SFDA	174	236
600 CLASS BODY – 500 OR 600 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B51EN200QFDC B51EN200QFDD B51JN200QFDA B51LN200QFDA	35	47
B45EN250QFDB B45EN250QFDC B45JN250QFDB B51JN250RFDA	36	49
B45LN350QFDA	78	106
1000 CLASS BODY – 900 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B61EN250QFDA	80	108

Appendix 2 – TORQUE WRENCH VALUES COVER NUTS (78)

150 CLASS BODY – 6 BAR, 12 BAR OR 150 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B21EN200QFDE	23	31
B21EN250QFDB B21EN250RFDD B21EV300RFDE B21EV300RFDH	34	46
B21EN300QFDC B21EV350RFDB B21JV350RFDB B21EV375RFDA B21EV375SFDB	55	75
B11EV400RFDA B21EV425SFDA B11EV450SFDE B21JV450RFDA B11EV475RFDB B11EV475SFDB B11EV500SFDD B11EV500RFDB B07EV525RFDB B11EV525SFDA B11EV525TFDA	97	132
B07EV600RFDA B07EV600TFDB B07EV600TFDE B07EV600TFDF B11EV600TFDA B07EV625TFDA B11EV625SFDA B11EV625TFDA B21EV625RFDA	169	229
B07EV650SFDA B07EV650TFDA B11EV650SFDA B21EV650SFDA B21EV650RFDA B21EV675TFDA	219	297
B07EN700TFDA B07EN700TFDB B11EN700QFDA B11EN700TFDA B21EN700TFDA B07EV750TFDB B11EV750TFDA B21EV750TFDA B07EV800RFDB B07EV800TFDA B11EV800TFDA	241	327
B21EV900SFDA	307	416
400/425/450 CLASS BODY – 200, 250, 300, 350, 400, 425 & 450 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B43EN150QFDC B43EN150QFDD	90	122
B43EN200QFDE B43EN200QFDF B43EN200QFDB B43EN200QFDC B43JN200QFDA B43JN200QFDB	219	297
B31EN250QFDB B43JN250QFDB B43JN250RFDA B43LN250RFDB B43JN250RFDB B2REV300RFDA B31EV300RFDA	344	466
B2REN300QFDE B2JN300QFDA B2TLN300QFDB B31EN300QFDB B31JN300QFDB B31EN325QFDA B31JN325QFDA B3TEN300QFDB	378	512
B2RJN350QFDA B31EV400RFDB B31JV400RFDA	424	575
B2REN400QFDA	534	724
B2TLN450QFDA B31EV500RFDA B31EV500TFDA B31LV500RFDA B31EV525TFDB	510	691
B31EN500QFDA B3TJN500QFDA B43EV550RFDA B43EV550RFDB	677	918
B2TEV650TFDA	882	1196
B3TEN550QFDA B3TEN550RFDA B3TEN550RFDC B31EV600RFDA B43EV600RFDA	997	1352
B31EV800SFDB B43EN700SFDA B4SEN700SFDA B4SEV800SFDA B4SEV850TFDA	1155	1566
B4TEV900SFDA	2034	2758
600 CLASS BODY – 500 OR 600 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B51EN200QFDC B51EN200QFDD B51JN200QFDA B51LN200QFDA	394	534
B45EN250QFDB B45EN250QFDC B45JN250QFDB B51JN250RFDA	540	732
B45LN350QFDA	850	1153
1000 CLASS BODY – 900 CLASS DISK		
PRODUCT	TORQUE (LB/FT)	TORQUE (Nm)
B61EN250QFDA	1267	1718