

INSTRUCTION MANUAL

FOR

TYPE 1711 VALVES

[Includes 1709,1710 and 1711]

Includes:

Tech Brief: TB-1711

Body/Bonnet Assembly Drawings:

CD-951709, CD-951710, CD-951711

Actuator Drawings:

CD-952305 and CD-952306

BE SAFE

ALWAYS FOLLOW SAFETY RULES

**BE SURE PRESSURE IS OFF BEFORE REMOVING
VALVES FROM PIPELINE**

Badger Meter, Inc.



RESEARCH CONTROL® Valve

6116 East 15th Street

Tulsa, Oklahoma 74112

Tel: 918.836.8411

Fax: 918.832.9962

Doc. 941504-2/23/1999/V0.1

General

If you have questions concerning your valve, you can contact our Valve Sales Department by fax or phone during normal work hours, Monday through Friday.

When you call, be sure to have the Serial Number [from the nameplate] handy as we will need it in order to know the precise nature of your valve.

It may also be helpful to know the process conditions.

Actuator

This series of valves is supplied with a 35 sq.in. actuator, which can be either Air to Open or Air to Close.

If the unit is ATO [Air to Open], the instrument signal [3-15 psi, 6-30 psi, etc] should be piped into the lower pressure case using a 1/4" NPT fitting. To seal the connection, use pipe dope or PTFE paste on the fitting threads. The upper case will have a black plastic vent plug installed. It is best to leave it in place.

Although spring loading is normally factory adjusted, should spring force need to be increased:

- calculate the required amount of preload by multiplying the innervalue's orifice area [from the tech brief] x the shut-off pressure and ÷ by 34. This indicates what we term "air preload setting".

Example: 1000 psi shut-off x 0.197 sq.in. = 5.8 [rounded up to 6.0]

To adjust, simply apply 6 psi to the lower pressure case. The stem will rise [be sure it is safe for the valve to open by shutting off upstream pressure]. Using a backup wrench on the flats on the actuator stem, loosen the adjuster lock nut. Rotate the Adjustor [counterclockwise] until the innervalue seats. Then, tighten the stem lock nut. The preload is now set.

If the unit is ATC[Air to Close], the instrument signal should be piped into the upper case. The lower case will have the vent fitting. If the valve is not closing against incoming pressure [and the valve is equipped with a positioner, simply increase the supply pressure to the positioner until shut-off is achieved.

In the ATC configuration, the springs simply open the valve and do not assist in valve closure.

Although the actuator can provide long service life without maintenance, occasionally repairs are necessary. In that case, contact the factory and we will supply you with actuator dis-assembly instructions.

The size 35 actuator is field reversible. If you need to reverse the action of your actuator, contact the factory for instructions.

If the unit is factory equipped with a positioner or other accessories, it is normal procedure to include any instructions that come with the accessories in the plastic bag with the valve.

DOS AND DON'TS

- DO NOT rotate the actuator on the bonnet if the innervalue is seated. The innervalue will be damaged.
- DO brace the actuator if using in a vibration or shock situation.
- DO NOT expect the valve [with throttling innervalue] to shut-off completely. Normal innervalue leakage class is ANSI Class IV.

Step 1:

In order to service the valve, first make sure all pressure [both upstream and downstream of the valve] is relieved.

Step 2: [applicable if Air to Open]

Using a manually operated regulator applied to the actuator or positioner, stroke the valve upward to approximately 75% travel. This lifts the innervalue off the seat, to prevent damage to the innervalue seating surfaces. [If the actuator is Air to Close, the innervalue is off the seat without air.]

Step 3:

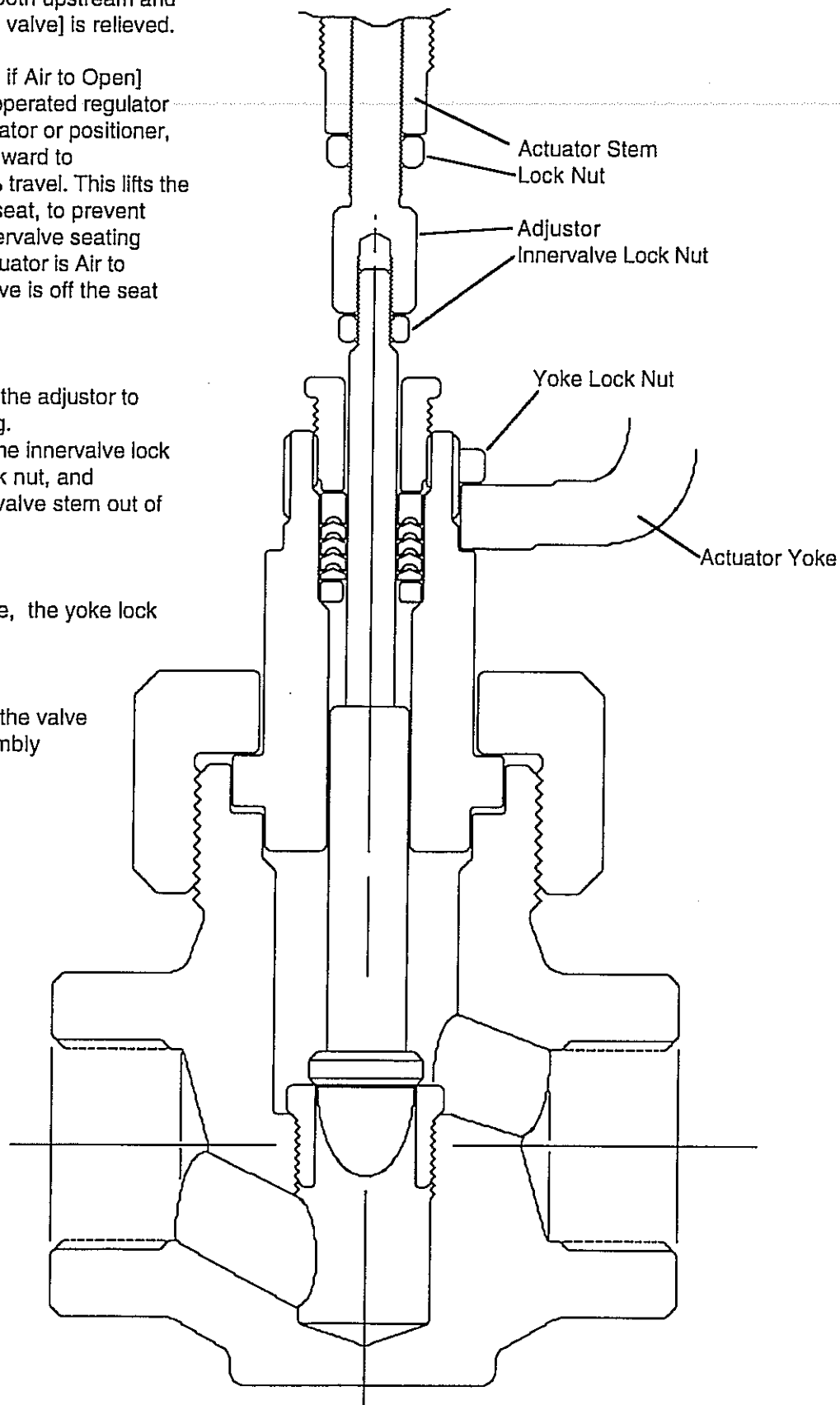
Place a wrench on the adjuster to keep it from turning. With a wrench on the innervalue lock nut, loosen the lock nut, and unthread the innervalue stem out of the adjuster.

Step 4:

Loosen and remove, the yoke lock nut.

Step 5:

Lift the actuator off the valve body/bonnet assembly

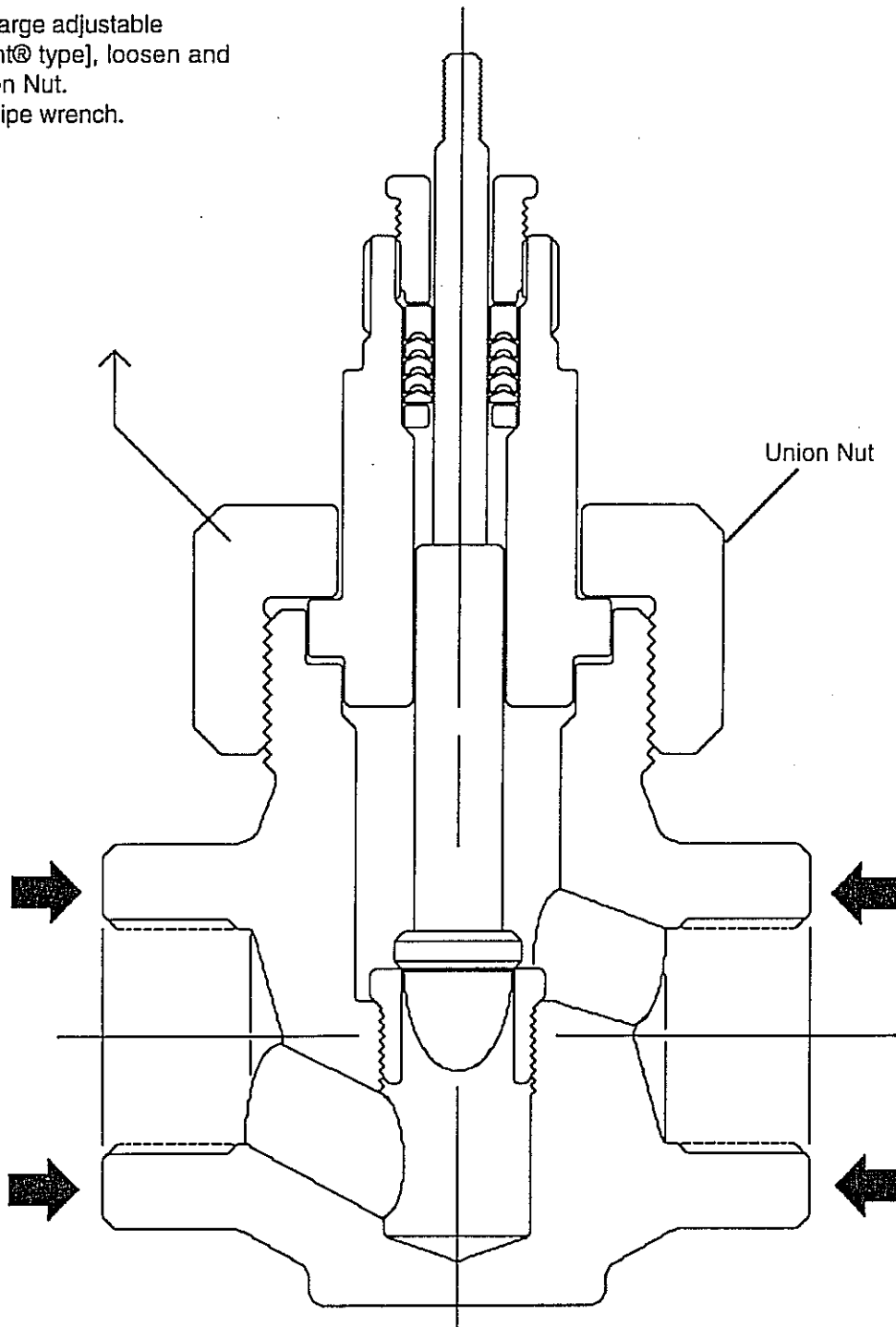


Step 6: Clamp the valve body in a heavy duty vise [NOTE: POSITION THE VALVE BODY IN THE VISE WITH THE ENDS OF THE BODY TOUCHING THE VISE JAWS, AS INDICATED BY THE BLACK ARROWS ON THE SKETCH]

Page 3

DO NOT CLAMP ON THE SIDES OF THE BODY OR THE HEX ENDS OF THE BODY, UNLESS THE BODY HAS WELDED-IN FITTINGS OR PIPE. IN THAT CASE, IT IS OK TO CLAMP ON THE HEX ENDS]

Step 7: Using a large adjustable wrench [Crescent® type], loosen and remove the Union Nut.
DO NOT use a pipe wrench.



Step 8: Before loosening the packing gland, pull the innervalve up to full travel.

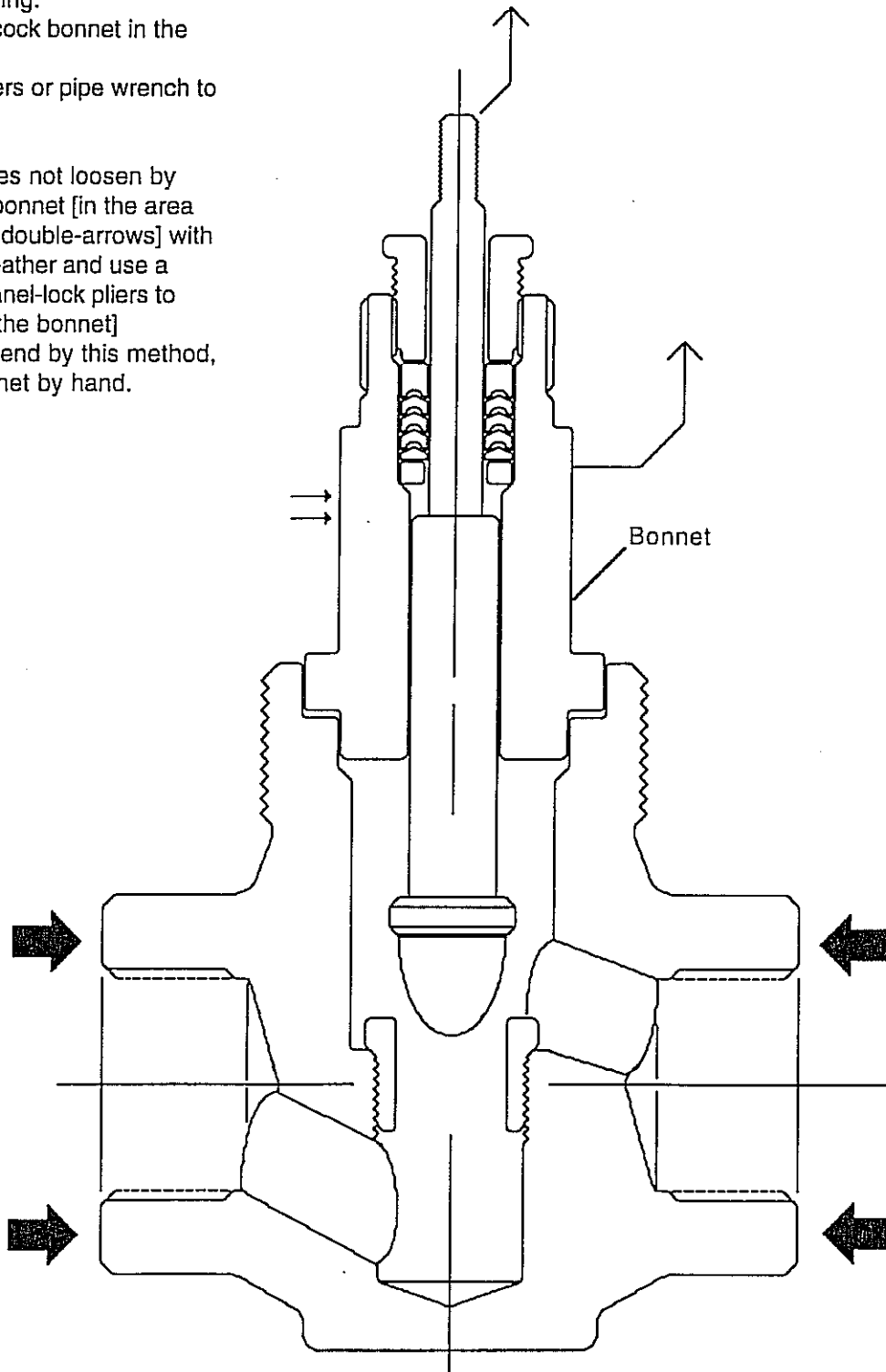
Step 9: Carefully [with leather or rubber gloved hand] carefully pull the bonnet straight up. Note: Slight rotation of the bonnet might be required to break loose the gasket as it may be slightly stuck to the graphite gasket.

To preclude galling:

- Do Not pry or cock bonnet in the body guide.
- Do Not use pliers or pipe wrench to loosen.

If the bonnet does not loosen by hand, wrap the bonnet [in the area indicated by the double-arrows] with thick rubber or leather and use a pair of large channel-lock pliers to grasp and twist the bonnet]

Note: Once loosened by this method, remove the bonnet by hand.



Step 10:

NOTE: The 1711 series of valves uses 2 gaskets per valve. If only one gasket is used, proper compression and seal will not be made.

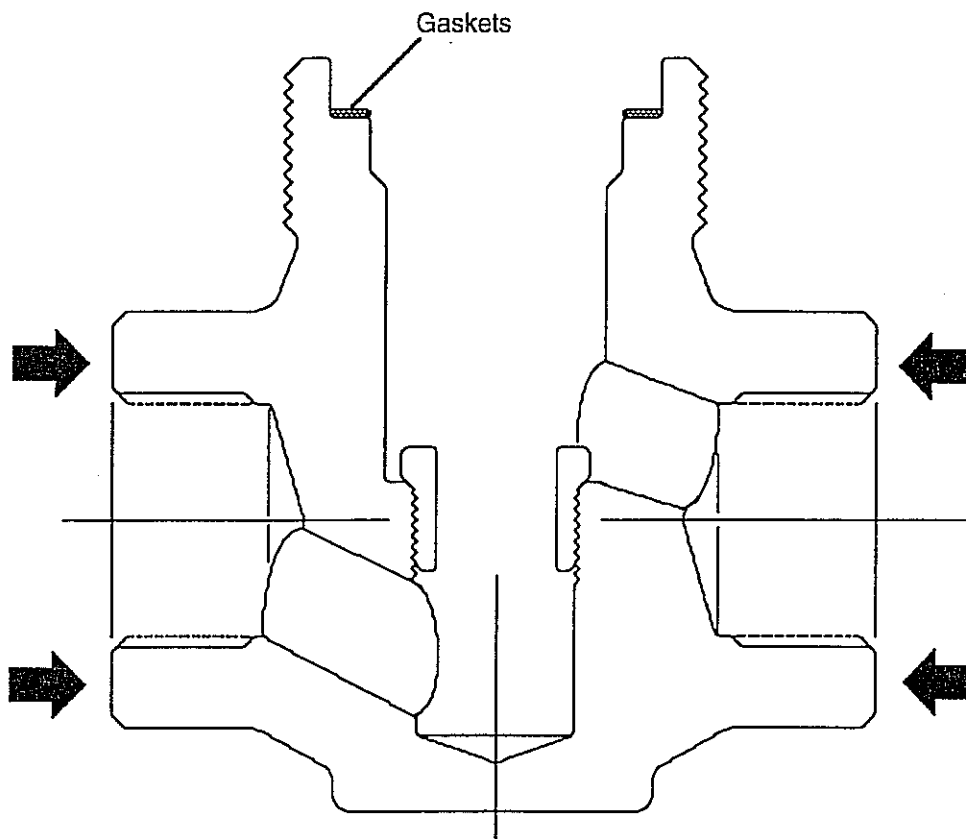
Although new gaskets are recommended, under some conditions, the old gasket might serve well (if you don't have new gaskets).

Check to see if the graphite gasket surface is damaged.

If the gasket material is stuck to the bonnet, or if torn, replace with new gaskets.

If replacing gaskets, use a soft metal or plastic tool to remove all the graphite from the bonnet and body cavity.

Then, using a brass or SST brush, with solvent, remove remaining pieces of the gasket and dry.



Step 11: To remove the seat, you will need a deep thin-wall socket.

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Sizes:

1/2" Valve: 5/8" hex

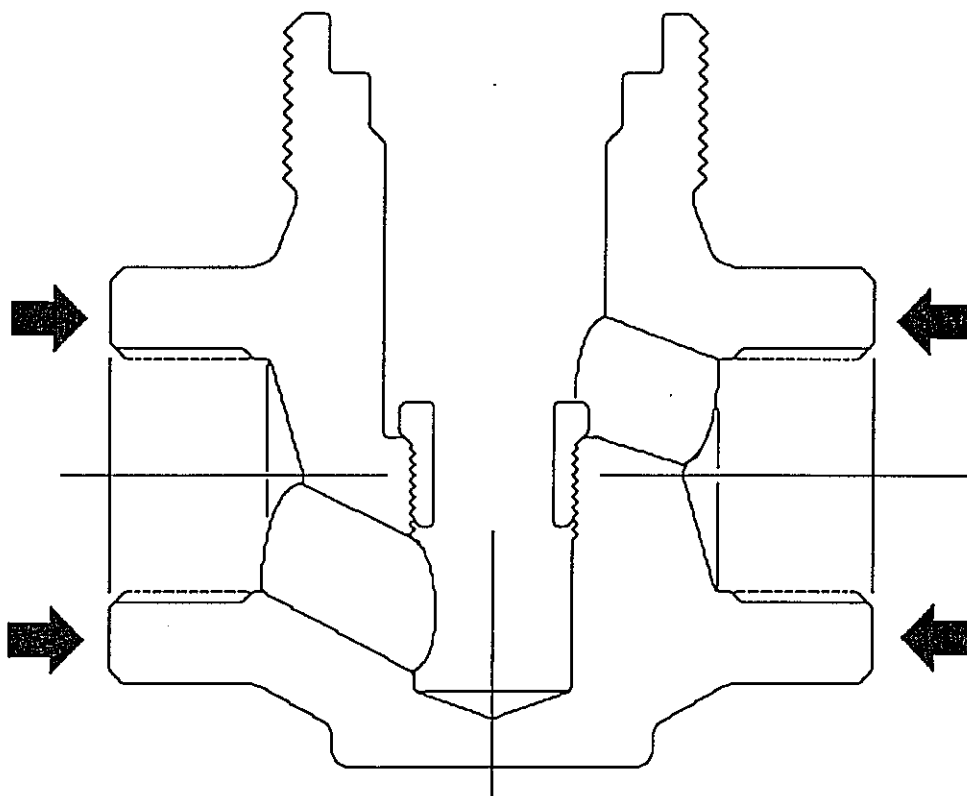
3/4" Valve: 3/4" hex

1" Valve: 15/16" hex.

Remove the seat from the body and clean the body of debris.

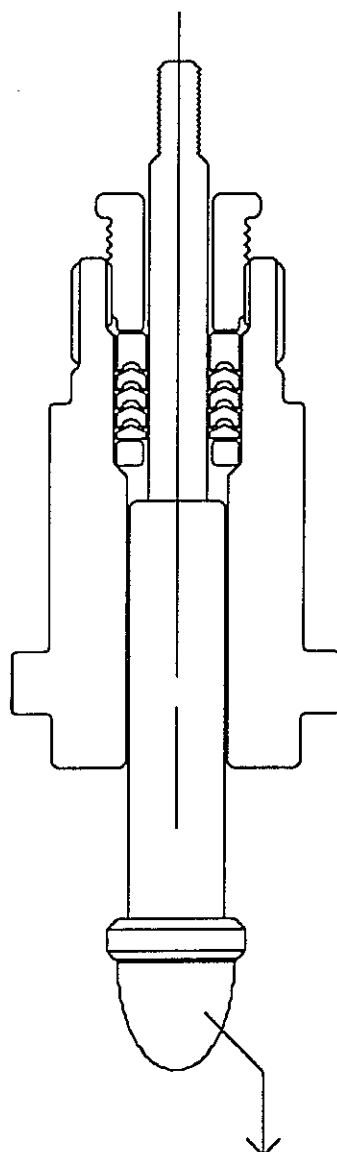
If you already have new components, it is normally best to leave the body in the vise.

If replacing the innervalue, and the old innervalue is still useable, place the old innervalue set in the tube and re-mark the proper information on the tube.



Step 12: Loosen the packing gland and pull the innervalue out the bottom of the bonnet.

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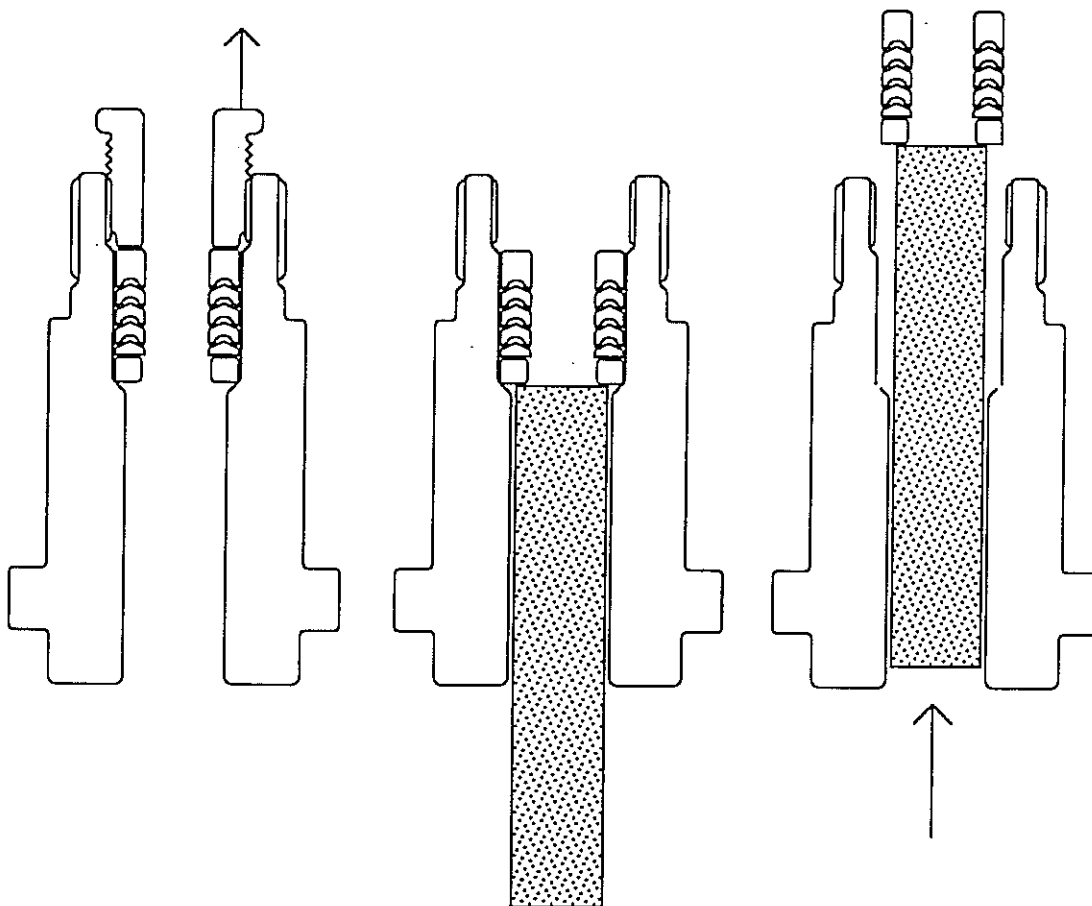
Step 13: Remove the packing gland.

Page 8

Step 14: Using a wooden or plastic dowel slightly smaller than 1/2", insert it into the bottom of the bonnet as shown.

Step 15: Holding the bonnet in one hand, place the dowel on a hard surface and push the packing and SST ring out the top of the bonnet.

Step 16: Inspect bonnet for damage and clean in solvent.



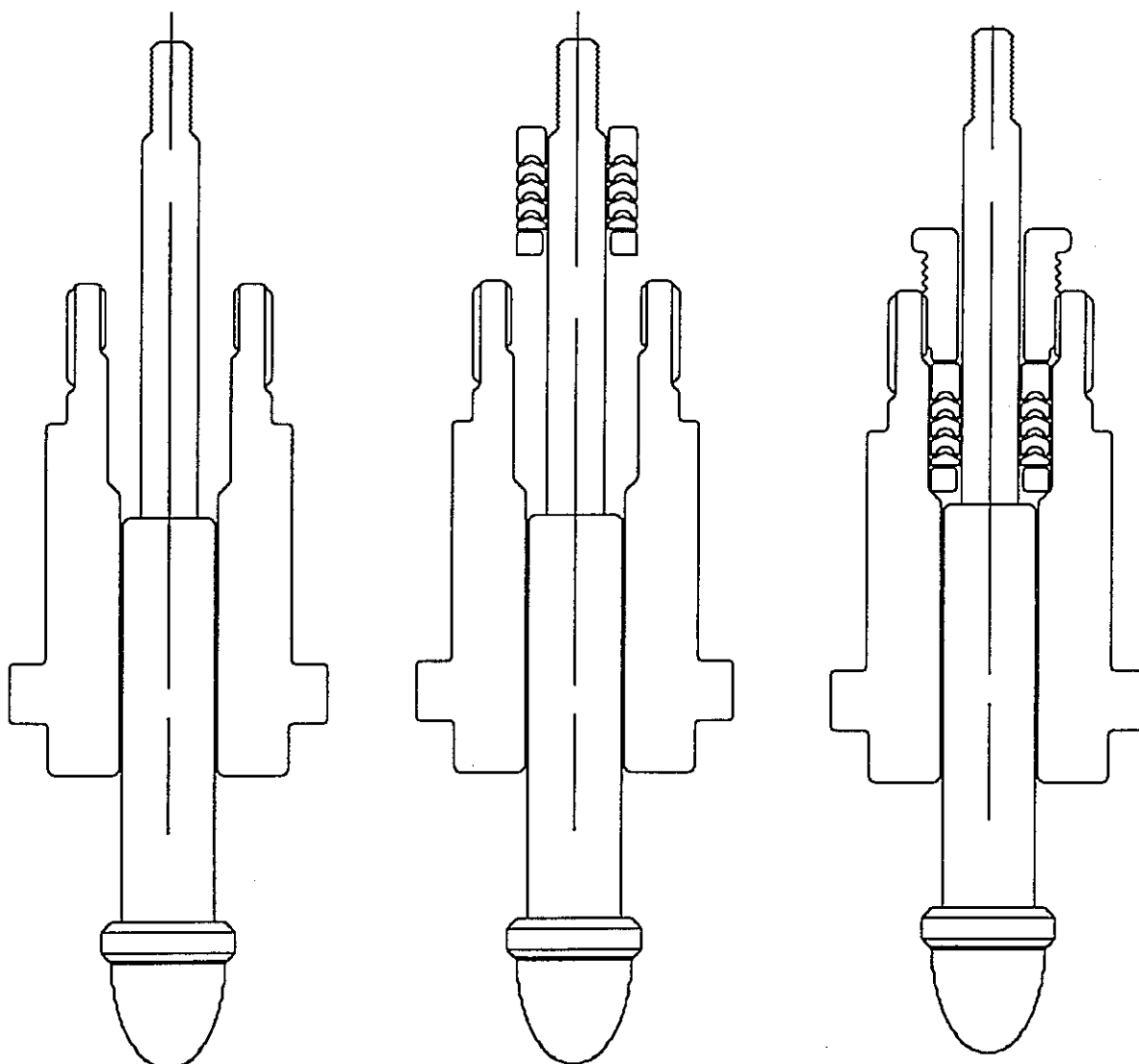
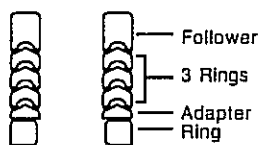
Step 17: Using an acceptable grease, lightly coat the stem and the guide area of the NEW innervalue and insert it up through the bonnet.

Step 18: Place [in this order]

- the SST bottom ring [it is uni-directional]
 - the bottom TFE adapter [cone up]
 - 3 V rings [cup down/cone up]
 - the top TFE follower [cup down/flat end up]
- onto the stem.

Step 19: Lubricate the threads of the gland. Using the packing gland as a pusher, push the packing down into the bonnet until the threads of the gland make contact with the threads in the bonnet. Then thread the gland into the bonnet until hand tight.

Step 20: Tighten the gland [a little at a time] until you feel packing friction [light dragging] on the innervalue stem as you stroke it up and down by hand, then stop. Further tightening or adjustment should be made after the valve is assembled.



Step 21:

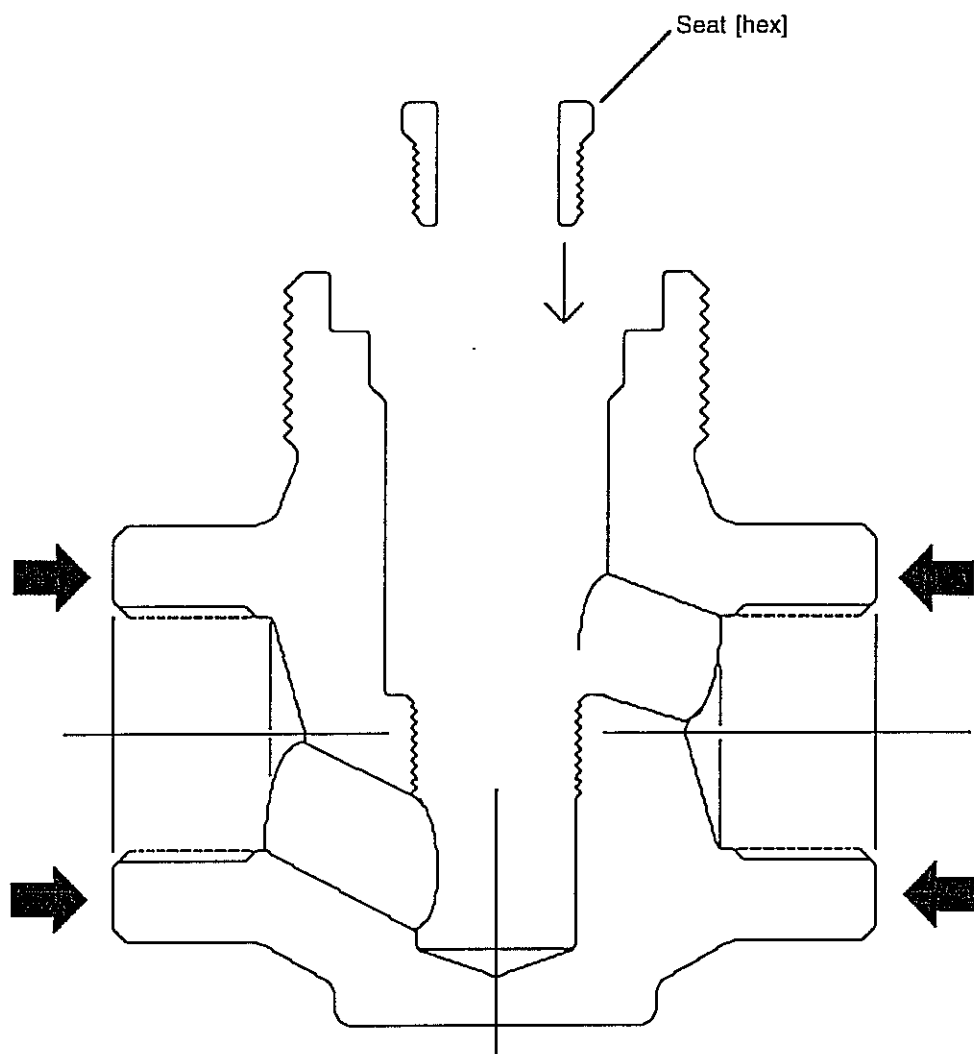
Remove the new seat from the shipping tube and carefully start it into the body. Once started, use the socket to tighten the seat in the body to the following torque values:

- 1/2" Valve > 30-35 lbs•ft

- 3/4" Valve > 35-40 lbs•ft

- 1" Valve > 40-45 lbs•ft

Although new seats come with graphite lubricant painted on the threads, a light amount of pipe dope can be used on the threads and seating angle if desired.

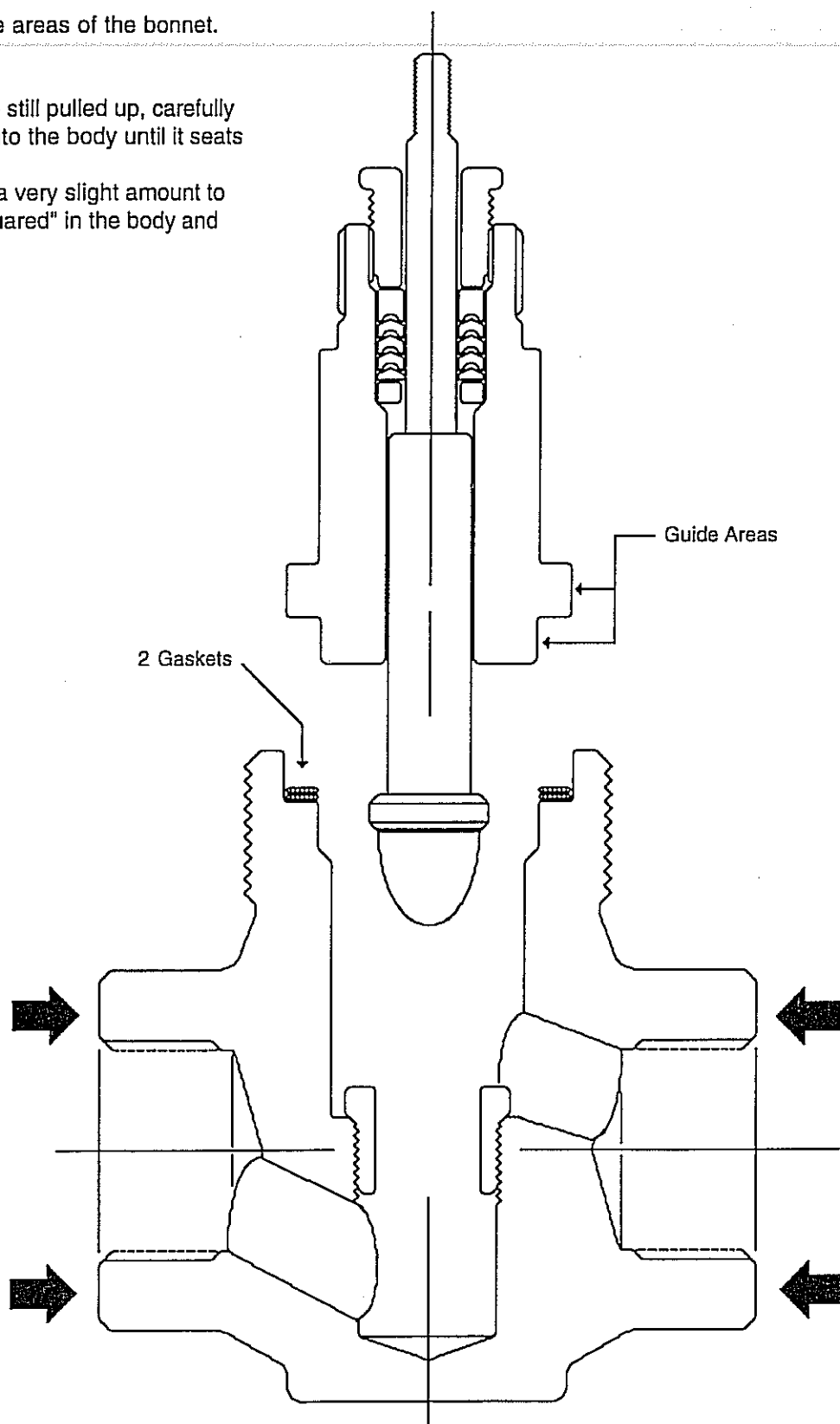


Step 22: Place 2 new graphite gaskets into the gasket cavity of the body. Be Careful, they are brittle.

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Step 23:
Lubricate the guide areas of the bonnet.

Step 24:
With the innervalue still pulled up, carefully lower the bonnet into the body until it seats against the gasket.
Rotate the bonnet a very slight amount to make sure it is "squared" in the body and onto the gasket.



Step 25: Lubricate the threads of the Union Nut and thread it onto the body.

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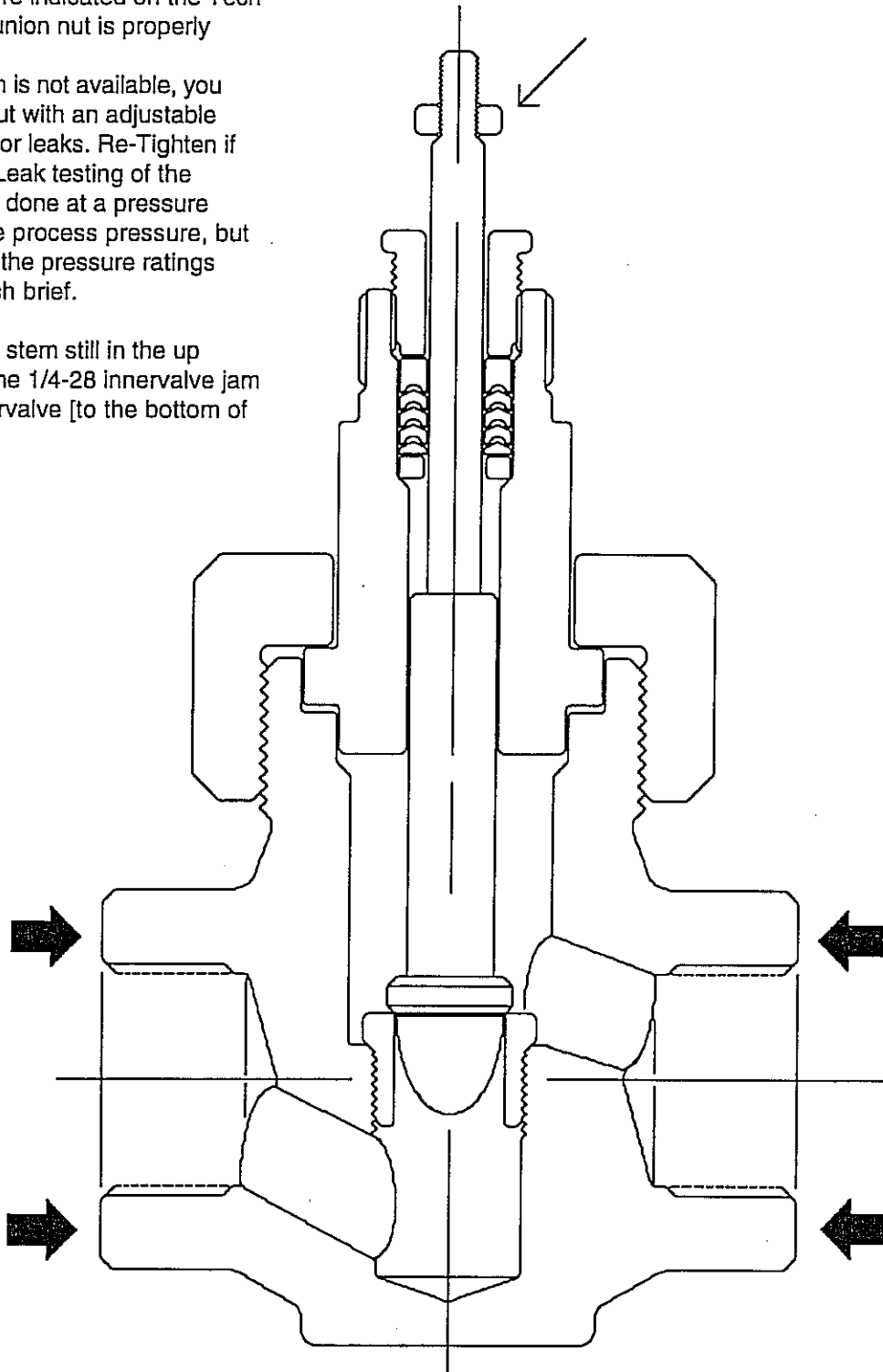
Torque to the following:

- 1/2" Valves > 300 lbs•ft
- 3/4" Valves > 300 lbs•ft
- 1" Valves > 500 lbs•ft

Note: The valve is design rated for maximum pressure indicated on the Tech Brief, only if the union nut is properly installed.

If a torque wrench is not available, you can tighten the nut with an adjustable wrench and test for leaks. Re-Tighten if leakage occurs. Leak testing of the gasket should be done at a pressure slightly above the process pressure, but DO NOT exceed the pressure ratings shown on the tech brief.

Step 26: With the stem still in the up position, thread the 1/4-28 innervalue jam nut onto the innervalue [to the bottom of the threads].



Step 27:

With air still on the ATO actuator, carefully set the actuator onto the bonnet [be sure to slip the yoke lock nut over the stem].

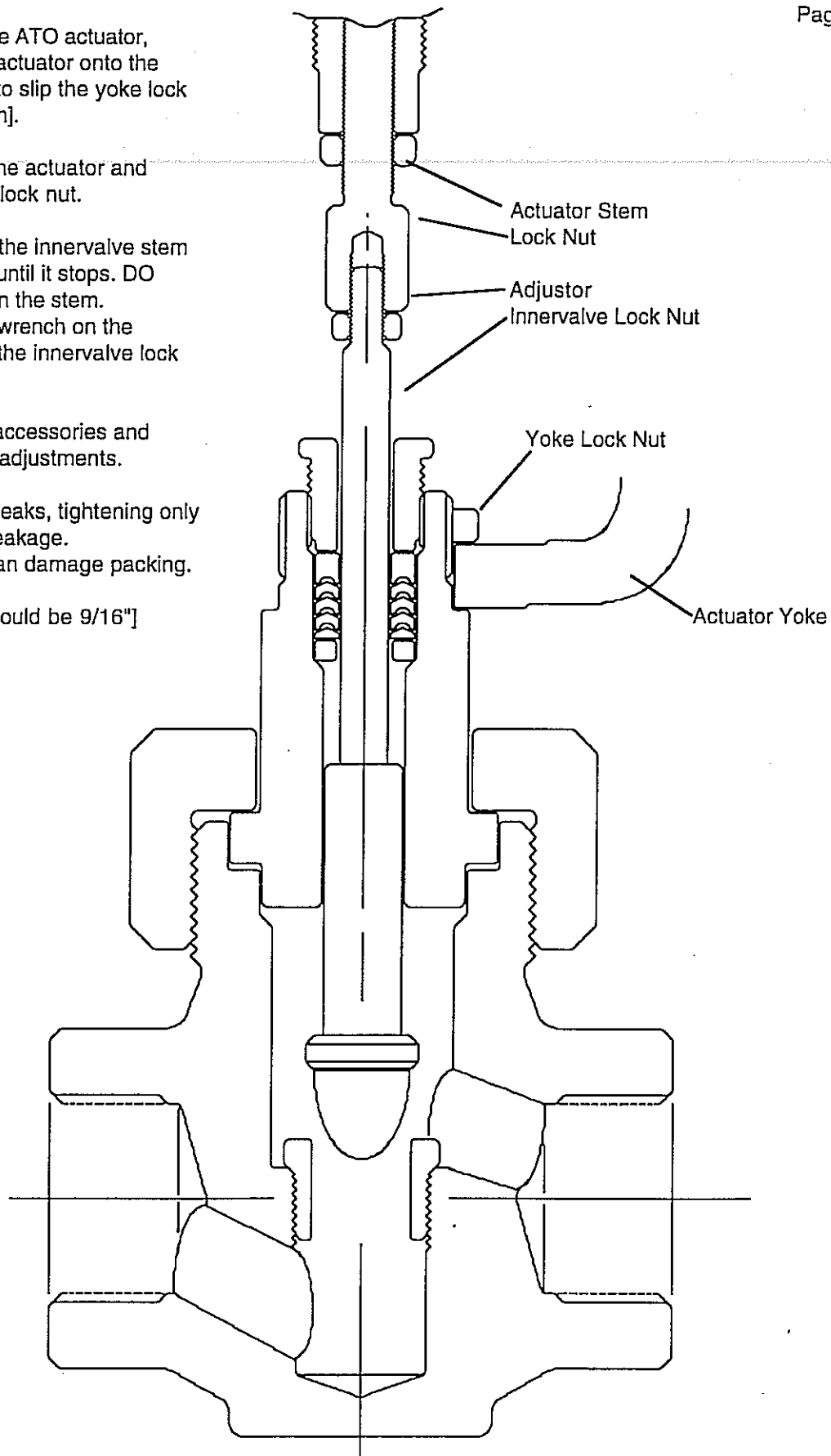
Step 28: Orient the actuator and tighten the yoke lock nut.

Step 29: Thread the innervalue stem into the adjustor until it stops. DO NOT use pliers on the stem. Using a back-up wrench on the adjustor, tighten the innervalue lock nut [jam nut].

Re-connect any accessories and make necessary adjustments.

Test packing for leaks, tightening only enough to stop leakage. Overtightening can damage packing.

Check stroke [should be 9/16"]



DWG NO.	ISSUE	ISS	CHANGE	BY	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
CD-951709	01.03	01.02	REDRAW, RCV #120	GAP	01-27-99		
		01.03	CL BL ADD TYPE 1711. ITEM 7 526896 WAS 526901	GAP	05-11-99		

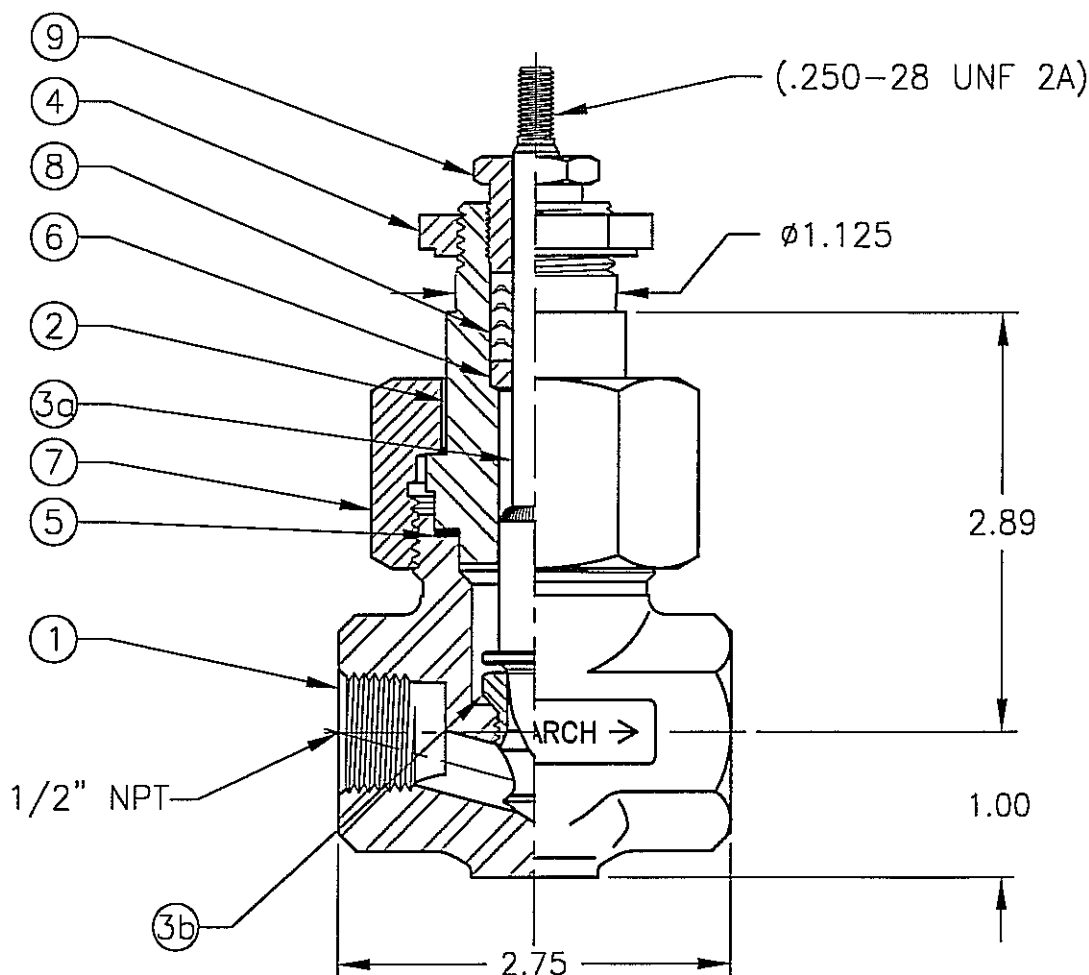
NOTES:

- 1.) TRIM ASSEMBLY P/N _____
SIZE: _____ CV: _____ CHAR: _____
- 2.) NOMINAL STROKE: .562
- 3.) RECOMMENDED SPARE PARTS ARE:
ITEMS 8 (PACKING SET) & 5 (GASKETS)
OPTIONAL SPARE PARTS ARE:
ITEMS 3 (TRIM SET)
- 4.) WHEN ORDERING SPARE OR REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE ASSEMBLY SERIAL NUMBER FROM THE NAMEPLATE ON THE ACTUATOR.

PARTS & MATERIAL LIST

QUANTITIES ARE FOR ONE (1) UNIT ONLY

ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	526897-00	1	BODY	
2	525949-00	1	BONNET	
3a	SEE NOTE 1	1	INNERVALVE	
3b	SEE NOTE 1	1	SEAT	
4	525944-0001	1	LOCKNUT	300 SERIES SST
5	512711-0001	2	GASKET	GRAFOIL
6	525951-00	1	ADAPTOR	
7	526896-00	1	UNION NUT	
8	543242-00	1	PACKING SET	
9	525950-00	1	GLAND	



CERTIFIED FOR: _____		APPROVALS		DATE		 BADGER METER RESEARCH CONTROL VALVES			
P.O. : _____		DRAWN: W. HALL		10-7-93		1/2" GLOBE BODY/BONNET ASS'Y			
LOCATION: _____		CHECKED: W. HALL		5-11-99		UNION GASKET JOINT, .312 GUIDED TRIM-			
SERIAL NO.: _____		ENGINEER: M.A. LOBO		5-11-99		TYPE 1711			
TAG NUMBER: _____		SIZE A		SCALE 3/4		DWG. NO. CD-951709		ISSUE 01.03	
PREPARED BY: _____		DATE: _____							

DWG NO.	ISSUE	ISS	CHANGE	BY	DATE	UNLESS OTHERWISE SPECIFIED DIMENSIONS FOR REFERENCE ONLY LENGTH UNITS ARE INCHES	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ON THIS DRAWING ARE THE EXCLUSIVE PROPERTY OF BADGER METER INCORPORATED.
CD-951710	01.03	01.02	REDRAW, RCV #120	CAP	01-27-99		
		01.03	CL. XL ADD TYPE 1711, ITEM 7 526995 WAS 526901	CAP	05-11-99		

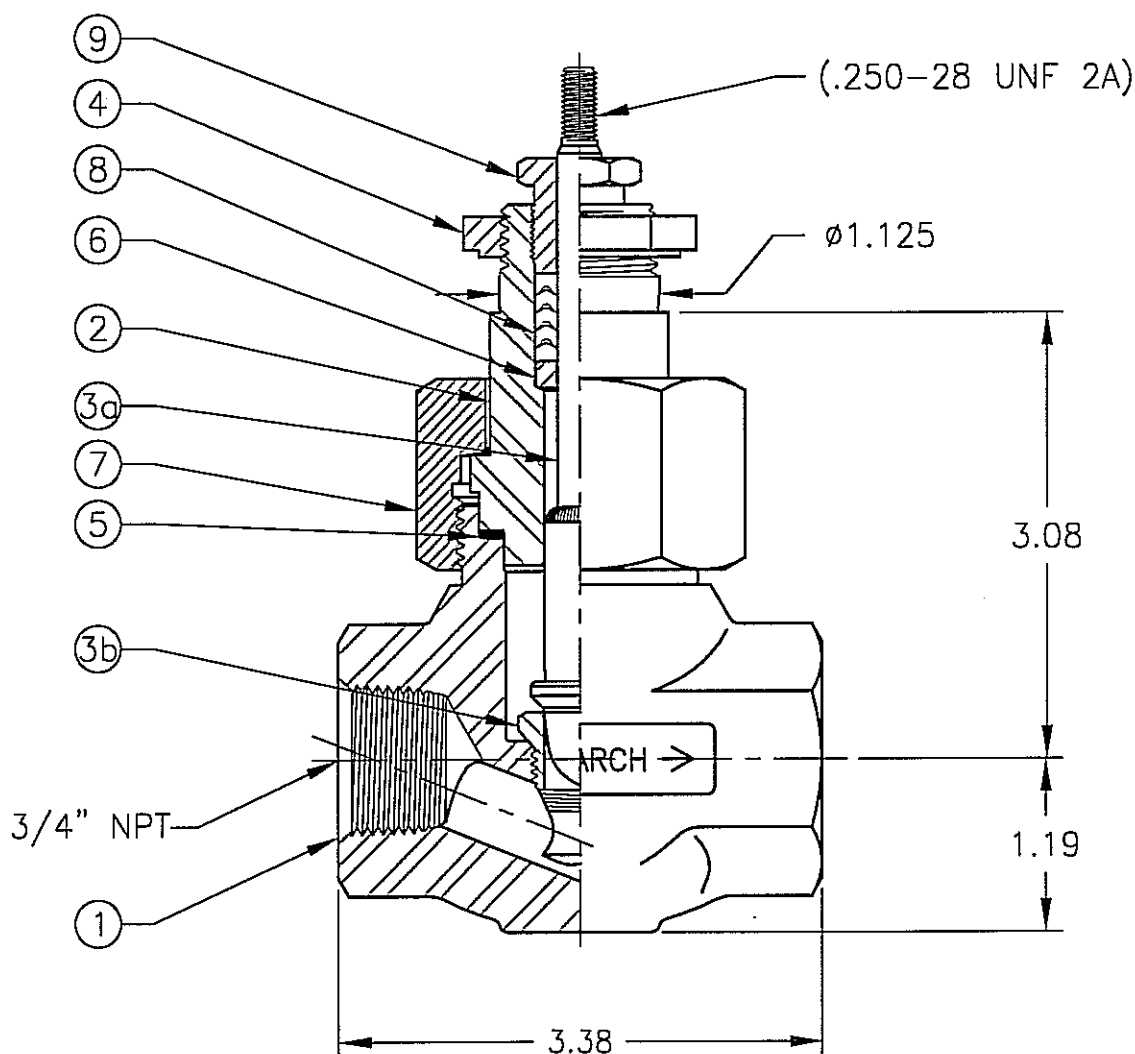
NOTES:

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ITEM NO.	PART NO.	QTY	DESCRIPTION	MATERIAL
1	526907-00	1	BODY	
2	525949-00	1	BONNET	
3a	SEE NOTE 1	1	INNERVALVE	
3b	SEE NOTE 1	1	SEAT	
4	525944-0001	1	LOCKNUT	300 SERIES SST
5	512711-0001	2	GASKET	GRAFOIL
6	525951-00	1	ADAPTOR	
7	526896-00	1	UNION NUT	
8	543242-0001	1	PACKING SET	
9	525950-00	1	GLAND	



CERTIFIED FOR: _____ P.O. : _____ LOCATION: _____ SERIAL NO.: _____ TAG NUMBER: _____ PREPARED BY: _____ DATE: _____	APPROVALS DRAWN: W. HALL CHECKED: W. HALL ENGINEER: M.A. LOBO	DATE 10-7-93 5-11-99 5-11-99	BADGER METER RESEARCH CONTROL® VALVES				
			3/4" GLOBE BODY/BONNET ASS'Y UNION GASKET JOINT, .312 GUIDED TRIM- TYPE 1711				
			SIZE A	SCALE 3/4	DWG. NO. CD-951710	ISSUE 01.03	

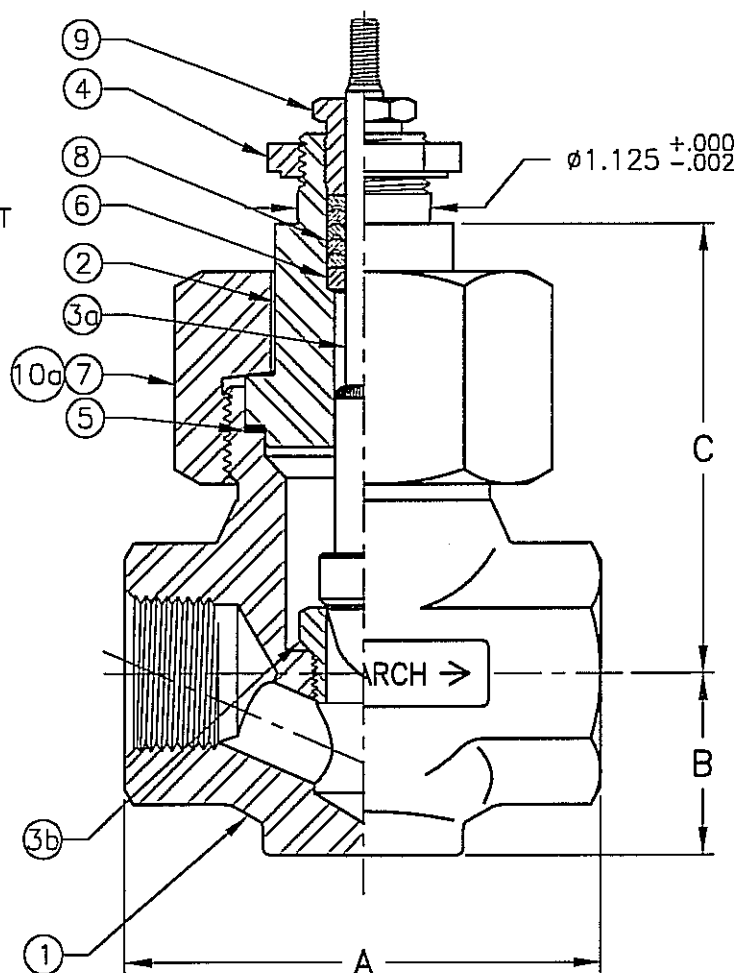
DWG NO.	ISSUE	ISS	CHANGE	BY	DATE	UNLESS OTHERWISE SPECIFIED	ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER
CD-951711	01.03	01.02	REDRAW, RCV #120	GAP	01-27-99	DIMENSIONS FOR REFERENCE ONLY	SHOWN ON THIS DRAWING ARE THE EXCLUSIVE
		01.03	CL III, ADD 1/2", 3/4"	GAP	04-14-99	LENGTH UNITS ARE INCHES	PROPERTY OF BADGER METER INCORPORATED.

DIMENSIONS			
Ps	A	B	C
1/2"	2.75	1.00	2.89
3/4"	3.38	1.19	3.08
1"	4.00	1.50	3.72

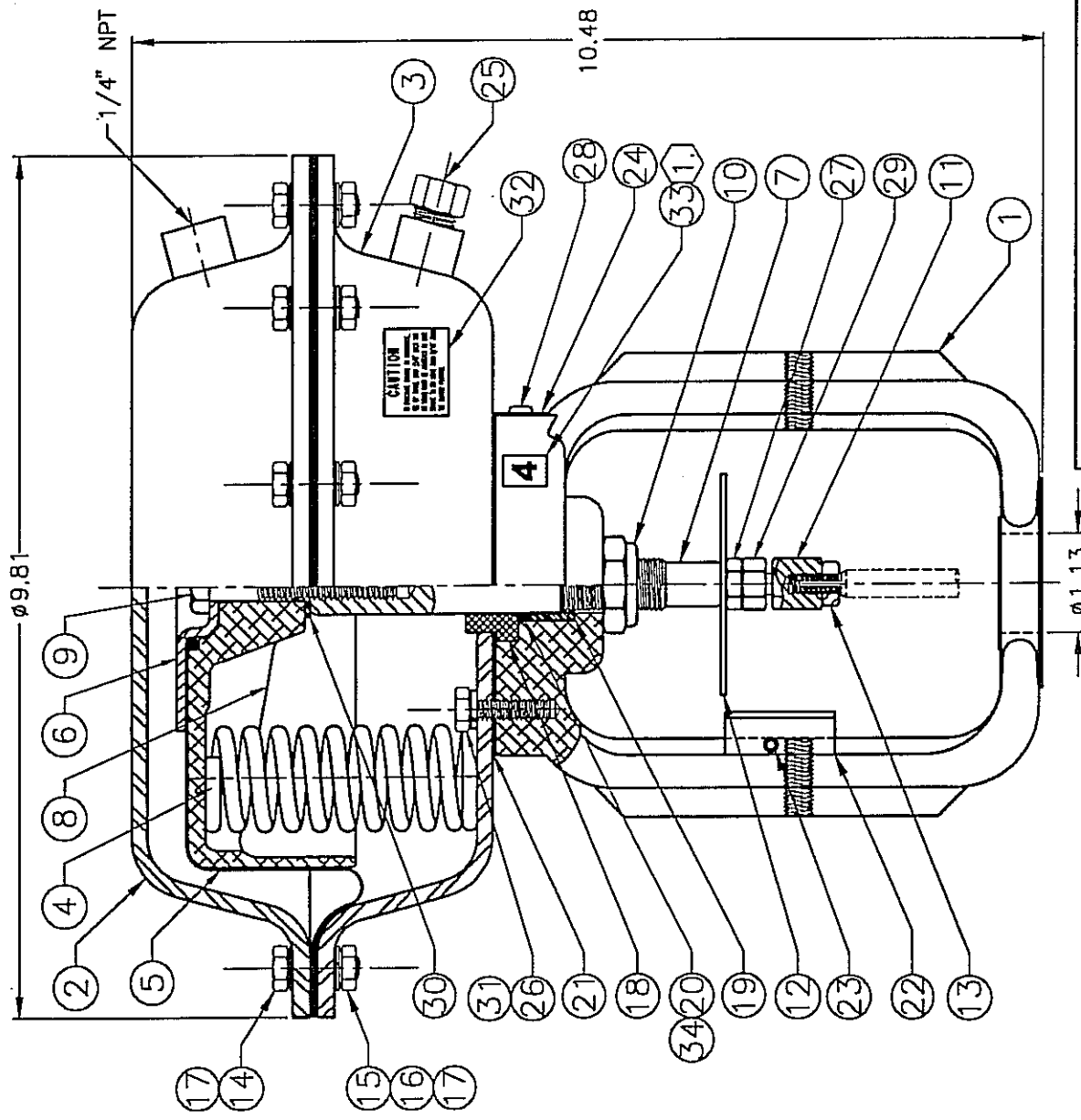
PARTS & MATERIAL LIST						
QUANTITIES ARE FOR ONE (1) UNIT ONLY						
ITEM NO.	1/2" PART NO	3/4" PART NO	1" PART NO	QTY	DESCRIPTION	MATERIAL
1	526897-00	526907-00	526904-00	1	BODY	
2	525949-00	525949-00	526152-00	1	BONNET	
3a	SEE NOTE 1	SEE NOTE 1	SEE NOTE 1	1	INNERVALVE	
3b	SEE NOTE 1	SEE NOTE 1	SEE NOTE 1	1	STEAM	
4	525944-00	525944-00	525944-00	1	LOCKNUT	
5	512711-0001	512711-0001	512702-0001	2	GASKET	GRAFOIL
6	525951-00	525951-00	525951-00	1	ADAPTOR PKG	
7	526896-00	526896-00	526903-00	1	UNION NUT	
8	543242-00	543242-00	543242-00	1	PACKING SET	
9	525950-00	525950-00	525950-00	1	GLAND	
10a	500458-0024	500458-0024	500458-0024	1	LUBRICANT	N/A

NOTES:

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SIZE: _____ CV: _____ CHAR: _____
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OPTIONAL SPARE PARTS ARE:
ITEMS 3 (TRIM SET)
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CERTIFIED FOR: _____ P.O. : _____ LOCATION: _____ SERIAL NO.: _____ TAG NUMBER: _____ PREPARED BY: _____ DATE: _____	APPROVALS		DATE		 BADGER METER RESEARCH CONTROL VALVES 	
	DRAWN:		10-4-93		1/2", 3/4', 1" HP CAST GLOBE BODY UNION GASKET JOINT, STANDARD BONNET, .312 GUIDED TRIM, CV PACKING	
	W. HALL					
	CHECKED:		4-16-99			
	W. HALL					
	ENGINEER:		4-16-99		SIZE	
M.A. LOBO		SCALE				
				DWG. NO.		
				CD-951711		
				ISSUE		
				01.03		



PARTS & MATERIAL LIST		
ITEM NO.	PART NUMBER	DESCRIPTION
1	527247-	1 YOKE
2	526041-	1 SPRING CASE
3	526042-	1 PRESSURE CASE
4	510031-0149	4 SPRING
5	512698-0002	1 DIAPHRAGM
6	512883-0001	1 RETAINER
7	527448-0001	1 STEM
8	512882-0001	1 PISTON
9	400013-0085	1 5/16 GR.8 SCR. STL, ZN PL
10	526147-0001	1 TRAVEL STOP NUT 300 SER SST
11	525992-0001	1 CONNECTOR 316 SST
12	512879-0003	1 TRAVEL POINTER NYLON
13	410001-0062	1 STEM NUT 316 SST
14	400013-0002	12 RIM SCREW SST
15	430004-0021	12 LK WASHER SST
16	410001-0060	12 RIM NUT SST
17	430002-0107	24 WASHER SST
18	512880-0001	1 UPR BUSHING POLYMER
19	460019-0001	1 LWR BUSHING POLYMER
20	490018-0003	1 O-RING ELF NITRILE
21	512712-0001	1 YOKE GASKET CARBON FIBER / NITRILE
22	527233-0003	1 TRAVEL SCALE ALUMINUM
23	400006-0056	1 SET SCREW SST
24	512923-0001	1 NAMEPLATE 300 SER SS
25	526037-0001	1 VENT PLUG PLASTIC
26	526119-0002	6 SCREW STL, XYLAN COATED SST
27	410001-0058	1 LOCKNUT SST
28	400001-0013	2 SCREW SST
29	410001-0056	1 NUT 300 SER SST
30	527432-0001	1 THRUST WASHER STEEL
31	430004-0014	6 LOCK WASHER SST
32	512717-0001	1 CAUTION DECAL MYLAR
33	512914-0003	1 DECAL MYLAR
34	500458-0025	- GREASE

NOTES:

1. DENOTES QUANTITY OF SPRINGS IN UNIT AT TIME OF ORIGINAL FACTORY SHIPMENT. DOES NOT INDICATE RANGE OR TRAVEL.

2. RECOMMENDED SPARE PARTS ARE ITEMS 5, 18, 19 & 20.

3. WHEN ORDERING REPLACEMENT PARTS, PROVIDE FACTORY THE VALVE SERIAL NUMBER FROM THE NAMEPLATE ON THE THE ACTUATOR.

THIS PRINT CERTIFIED FOR:		BADGER METER	
P.O.:		ACTUATOR, 35 SQ IN. ATC, .56" STROKE, 12 PSI SIGNAL RANGE	
LOCATION:		C 29	
SERIAL NUMBER:		CD-952306	
BADGER BY:		JOHN MADLOCK 09-04-98	

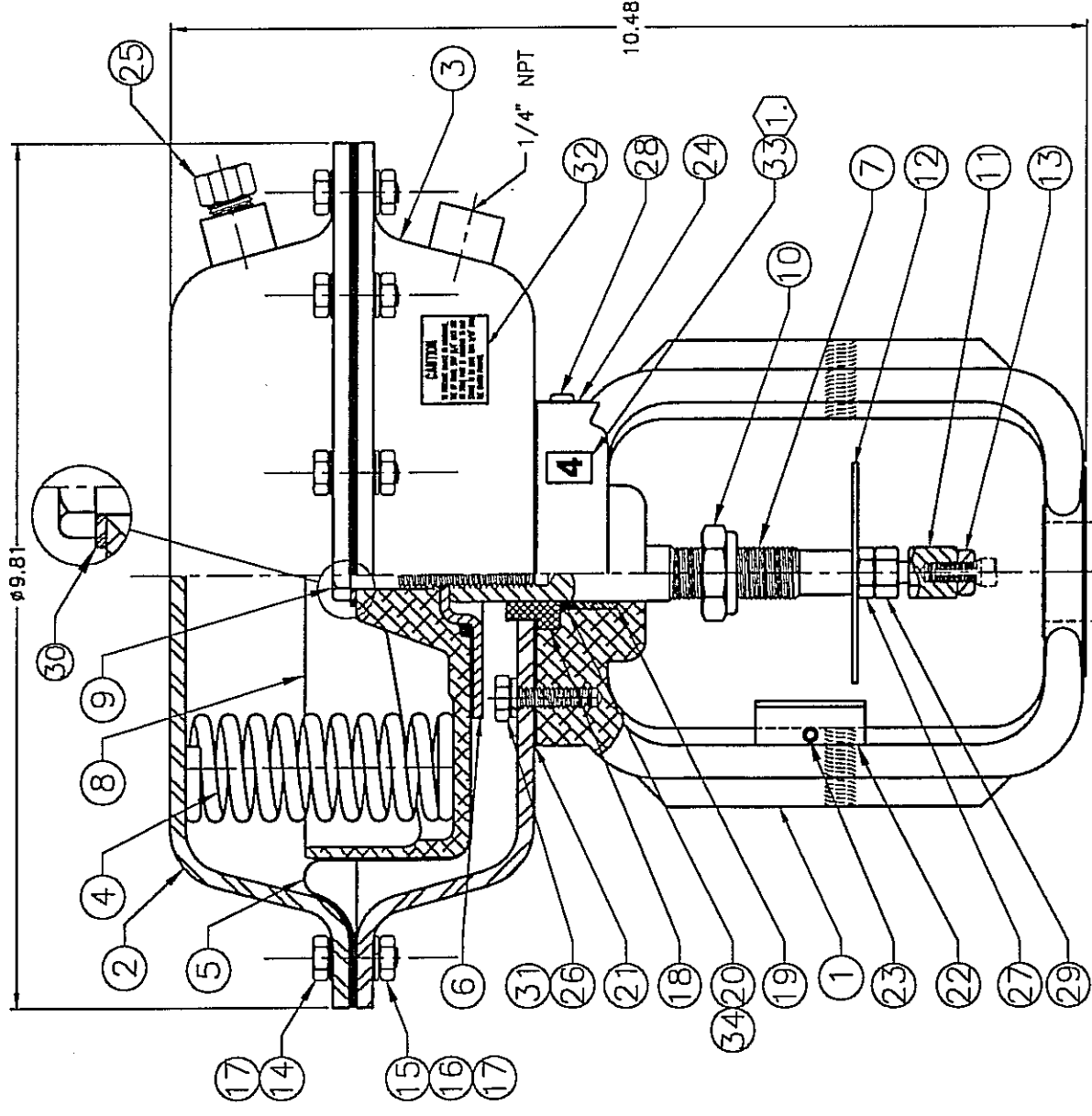
PARTS & MATERIAL LIST			
QUANTITIES ARE FOR ONE (1) UNIT ONLY			
ITEM NO.	PART NUMBER	QTY	DESCRIPTION MATERIAL
1	527247-	1	YOKE
2	526041-	1	SPRING CASE
3	526042-	1	PRESSURE CASE
4	510031-0149	4	SPRING
5	512698-0002	1	DIAPHRAGM
6	512883-0001	1	RETAINER
7	527448-0001	1	STEM
8	512882-0001	1	PISTON
9	400013-0085	1	5/16 GR.8 SCR.
10	526147-0001	1	TRAVEL STOP NUT
11	525992-0001	1	CONNECTOR
12	512879-0003	1	TRAVEL POINTER
13	410001-0062	1	STEM NUT
14	400013-0002	12	RIM SCREW
15	430004-0021	12	LK WASHER
16	410001-0060	12	RIM NUT
17	430002-0107	24	WASHER
18	512880-0001	1	UPR BUSHING
19	460019-0001	1	LWR BUSHING
20	490018-0003	1	O-RING
21	512712-0001	1	YOKE GASKET
22	527233-0003	1	TRAVEL SCALE
23	400006-0056	1	SET SCREW
24	512923-0001	1	NAMEPLATE
25	526037-0001	1	VENT PLUG
26	526119-0002	6	SCREW
27	410001-0058	1	LOCKNUT
28	400001-0013	2	SCREW
29	410001-0056	1	NUT
30	527432-0001	1	THRUST WASHER
31	430004-0014	6	LOCK WASHER
32	512717-0001	1	CAUTION DECAL
33	512914-0003	1	DECAL
34	500458-0025	-	GREASE

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THIS PRINT CERTIFIED FOR: _____

P.O. #: _____

LOCATION: _____

SERIAL NUMBER: _____

BACOR BY: _____

TAG NO.: _____

DATE: _____

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS OF 1/16 INCHES AND SMALLER
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SHALL BE DECIMAL INCHES

BACOR METER
ACTUATOR 35 50 IN. ATO, .56" STROKE,
12 PSI SIGNAL RANGE

SIZE PRODUCT NO. 29 CD-952305
C 29 CD-952305
PAGE 1 OF 1