



Xomox Corporation

4444 Cooper Road

Cincinnati, Ohio 45242

Telephone 513 745-6000

Telex 684-2011

September 30, 1988

Mr. Thomas E. Murley  
Director  
Office of Nuclear Reactor Regulation  
United States Nuclear Regulatory Commission  
Washington, D.C. - 20555

Subject: Potential Valve Failures and Corrective  
Action Relating Thereto

Dear Mr. Murley:

Xomox Corporation ("Xomox") is the manufacturer and supplier of valves to a great number and variety of industrial customers, including, on occasion, nuclear power facilities. The valves which Xomox supplies to nuclear facilities are not unique to those facilities or materially different from the valves which it supplies to other industrial users so that those valves are "commercial grade items" as defined in 10 CFR 21.3(4). Certain of those valves which Xomox has assembled together with Limitorque electric motor actuators have been determined to be subject to the possibility of becoming inoperable under certain conditions and circumstances. Some of those valves and actuators have been supplied to nuclear facilities. Xomox itself is not in a position to evaluate the conditions and circumstances of each of those valves and actuators and is therefore unable to determine whether or not any of those particular valves and actuators could create a "substantial safety hazard." 10 CFR 21.3(d), (g), and (k).

Although Xomox is not obligated by 10 CFR 21 to report formally the potential failure of valves and actuators to the Nuclear Regulatory Commission ("Commission"), and the Commission has already been made aware of this problem by the previous report of Niagara Mohawk Power Corporation, Xomox nevertheless wishes to inform the Commission of such a potential for failure. For the convenience of the Commission, Xomox has utilized the format set forth at 10 CFR 21.21.

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PDR AD0CK 05000220  
S PIC

Tuffline  
Sleeved Plug Valves

Tuffline  
Fully Lined Valves

Matryx  
Vane Actuators

Pliaxseal  
High Performance Butterfly Valves

IE19  
1/1

1. Name and address of the individual informing the Commission:

Mr. Michael Sandling  
Vice President of Manufacturing and Engineering  
Xomox Corporation  
4444 Cooper Road  
Cincinnati, Ohio - 45242

2. Identification of the items supplied:

Xomox-mounted Limitorque electric motor actuators with Models HOBC, H1BC, H2BC, H3BC, H4BC, and H5BC gear boxes on plug and butterfly valves manufactured and supplied by Xomox.

3. Identification of the firm supplying the item:

Xomox Corporation  
4444 Cooper Road  
Cincinnati, Ohio - 45242

4. Nature of the failure and potential safety hazard:

Under certain conditions and circumstances, the components of the drive train or drive adaptor assembly (which include the drive adaptor, spline adaptor and shaft key) may become disengaged and render the valve inoperable. The consequences of such valve inoperability depend entirely upon the particular circumstances of the installation of each valve at any given facility.

5. The location and number of all items supplied for facilities or activities subject to the regulations of the Commission:

XOWOX

<u>COMPANY</u>	<u>QUANTITY</u>
Beaver Valley Nuclear Station Duquesne Light Company S & W Engineering Corporation P.O. Box 186 Shippingport, Pennsylvania - 15077 Attention: Mr. Bob Benjamin	15
Bellefonte Nuclear Station Tennessee Valley Authority Near Scottsboro, Alabama - 35768 Attention: Mr. George Weis	18
Clinton Power Station Illinois Power Company RR3, Rt 54 East Clinton, Illinois - 61727 Attention: Mr. Wayne Hupp	3
Comanche Peak Nuclear Station Texas Utilities Electric Company P O. Box 1002 Glenrose, Texas - 76043-1002 Attention: Mr. Bruce Rudd	4
Ginna Nuclear Station Rochester Gas & Electric Corporation 89 East Avenue Rochester, New York - 14649-0001 Attention: Mr. Charlie Anderson	2
Grand Gulf Nuclear Station - Unit 1 System Energy Resources, Inc. P.O. Box 756 Port Gibson, Mississippi - 39150 Attention: Mr. Charles Quick	6
Grand Gulf Nuclear Station - Unit 2 Bechtel Construction Company Grand Gulf Road Port Gibson, Mississippi - 39150 Attention: Mr. Lloyd Nolan	6

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Knolls Atomic Power Labs. 7  
Building 0-2  
P.O. Box 1072  
Schnectady, New York - 12301  
Attention: Mr. Gary Galica

\* Knolls is a testing laboratory, not a nuclear facility.

Millstone Nuclear Station 2  
N.E. Nuclear Energy Company  
Rope Ferry Road (Rt. 156)  
Waterford, Connecticut - 06385  
Attention: Mr. Barrett Nichols

Nine Mile Point Nuclear Station 6  
Niagara Mohawk Power Corporation  
Lake Road  
Town of Scriba, New York - 13093  
Attention: Mr. Lee Koslawski

Nuclear One Station 3  
Arkansas Power and Light  
Rt. 3, Box 1376  
Russellville, Arkansas - 72801  
Attention: Mr. Wes McDaniel

Richland Nuclear Station 2  
WPPSS  
Mail Drop 280  
3000 George Washington Way  
Richland, Washington - 99352  
Attention: Mr. Loren Oakes

River Bend Nuclear Station 10  
Gulf States Utilities  
P.O. Box 220  
St. Francisville, Louisiana - 70775  
Attention: Ms. Nancy Spillman



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Satsop Nuclear Station 2  
WPPSS  
P.O. Box 968  
Richland, Washington - 99352-0968  
Attention: Mr. Bill Dooley

Sequoyah Nuclear Station 24  
Tennessee Valley Authority  
P.O. Box 2000  
Soddy-Daisy, Tennessee - 37379  
Attention: Mr. Leon Lane

South Texas Nuclear Station 8  
Houston Lighting & Power Company  
Bechtel Energy  
P.O. Box 15  
Bay City, Texas - 77414  
Attention: Mr. Tim Portlock

Susquehanna Nuclear Station 2  
Pennsylvania Power and Light  
P.O. Box 467  
Berwick, Pennsylvania - 18603  
Attention: Mr. Robert Prato

Three Mile Island Nuclear Station 2  
GPU Nuclear Corporation  
P.O. Box 480  
Rt. 441 South  
Middletown, Pennsylvania - 17087  
Attention: Mr. Art Farr

\* These valves are no longer in service.

Trojan Nuclear Station 2  
Portland General Electric Company  
121 Southwest Salmon Street  
Portland, Oregon - 97204  
Attention: Mr. A. M. Roller

Watts Bar Nuclear Station	24
Tennessee Valley Authority	
P.O. Box 800	
Spring City, Tennessee - 37381	
Attention: Mr. Steve Hungate	

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Valves supplied for installation in foreign facilities:

Bechtel Western Power Company	6
12440 E. Imperial Highway	
Norwalk, California - 90650	
Attention: Mr. Mike Canobbio	

Westinghouse Electric Corporation	18
P.O. Box 3700	
Pittsburgh, Pennsylvania - 15280	
Attention: Mr. Greg Olson	

Xomox Canada, Ltd.	48
222 Norfinch Drive	
Downsview, Ontario M3N 1Y5	
Canada	
Attention: Mr. Abdul Tahir	

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Valves originally supplied for nuclear facilities but not used for that purpose:

TVA-Hartsville Nuclear Station	8
NSSS Inc.	
5000 Highway 80 East	
Jackson, Mississippi - 39208	
Attention: Mr. Tom Westbrook	

\* Originally supplied for TVA-Hartsville Nuclear Station, who sold them to NSSS who in turn will resell to some other user.

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General Physics Corporation  
10650 Hickory Ridge Road  
Columbia, Maryland - 21044  
Attention: Mr. Ken Bromenschenkel

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- \* Originally supplied for Shearon-Harris Nuclear Station of Carolina Power and Light Company who sold them to General Physics who in turn will resell to some other user. One (1) of these valves has been disassembled.

Consumers Power Company  
1945 West Parnell Road  
Jackson, Michigan - 49201  
Attention: Mr. Ron Baumen

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- \* Originally supplied for Midland Nuclear Station which was cancelled. Valves are warehoused by Consumers Power.
6. The corrective action which is being taken, the name of the individual or organization responsible for that action and the length of time that will be taken to complete the action:

Xomox Corporation has fully advised each purchaser of the affected valves concerning the potential for valve inoperability. Xomox has fabricated parts as necessary and is providing drive adaptor or drive train replacement kits and instructions to each purchaser of an affected valve for installation by the purchaser. Each of the purchasers of a valve is responsible for implementing the corrective action with respect to each particular valve. Xomox expects that each of those purchasers will be in possession of the necessary kits and instructions on or before September 30, 1988. That the drive adaptor replacement procedure is not complicated in and of itself, but its completion with respect to any particular valve will depend entirely upon the circumstances of that installation.

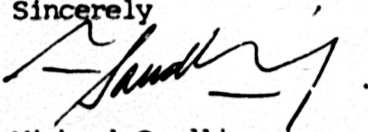
XOMOX

7. Any advice related to the potential failure of the item:

Attached hereto are copies of certain communications and instructions that have been provided to the purchasers of the valves concerning their potential inoperability.

If any additional information is required, or if Xomox can be of any further assistance to the Commission, please do not hesitate to contact me.

Sincerely



Michael Sandling  
Vice President of  
Manufacturing and Engineering  
XOMOX CORPORATION  
/pat





Xomox Corporation

4444 Cooper Road

Cincinnati, Ohio 45242

Telephone 513 745-6000

Telex 684-2011

October 14, 1987

Mr. Charlie Anderson  
Rochester Gas & Electric Corp.  
89 East Avenue  
Rochester, NY 14649-0001

Ref:	<u>Xomox Drawing</u>	<u>Tag Number</u>	<u>Purchase Order No.</u>	<u>Quantity</u>
	18747-01	8685	NEG-51082	1
		8690		1

Dear Mr. Anderson:

In confirmation of our telephone conversation of October 14, 1987, we wish to advise you of a possible problem in the valves as referenced above.

The potential may exist on Xomox (Tuflin) plug or butterfly valves with Limitorque 90° H-BC operators for certain components in the drive train within the operator or between the operator and the valve stem to move out of correct engagement. This may result in loss of operability of the valve and incorrect position feedback.

In that Xomox is not knowledgeable in the design of nuclear power plant systems and the exact nature of system application, we are unable to determine whether this problem could result in a reportable condition under 10CFR Part 21. As such, Xomox is informing you as purchaser/licensee in order that you may evaluate the reporting requirements, if any. The reporting requirements imposed on yourselves may be different from the requirements, if any, applicable to Xomox. Therefore, you must evaluate this matter and act accordingly.

Xomox will be pleased to work with you to resolve the above possible problem in its entirety.

If Xomox can be of further assistance or should any immediate actions be required on our part, please contact us.

Sincerely,

David J. Hobson  
Chief Engineer

# XOMOX

Xomox Corporation

4444 Cooper Road

Cincinnati, Ohio 45242

Telephone 513 745-6000

Telex 684-2011

November 9, 1987

Mr. Charlie Anderson  
Rochester Gas & Electric Corp.  
89 East Avenue  
Rochester, New York - 14649-0001

<u>REFERENCE:</u>	<u>XOMOX DRAWING</u>	<u>TAG NUMBER</u>	<u>PURCHASE ORDER NO.</u>	<u>QUANTITY</u>
	18747-01	8685	NEG-51082	1
		8690		1

Dear Mr. Anderson:

In follow up to our letter of October 14, 1987 and our telephone conversations, we wish to advise you that one of the utilities who received valves of similar design to those identified above has notified the Nuclear Regulatory Commission in accordance with 10CFR Part 21 of the potential for drive disengagement.

We are informing you of this because we wish to keep you advised of all relevant facts regarding the development of this situation.

We wish further to advise you that replacement drive parts for the valves identified above are currently being fabricated and are expected to be available within three (3) weeks.

Please contact the undersigned to discuss shipment and installation of these parts.

Sincerely



David J. Hobson  
Engineering Manager  
/pat



Xomox Corporation 4444 Cooper Road Cincinnati, Ohio 45242 Telephone 513 745-6000 Telex 684-2011  
 Fax: 513-745-6972

June 7, 1988

Rochester Gas & Electric Corporation  
 89 East Avenue  
 Rochester, New York - 14649-0001

Attention: Mr. Charlie Anderson

SUBJECT:	REPLACEMENT PARTS KIT P/NO:	<u>325649</u>
	KIT P.O. NUMBER:	<u>NQ-10443-B-RD</u>
	ORIGINAL P.O. NUMBER:	<u>NEG-51082</u>
	VALVE TAG NUMBERS:	<u>8685 &amp; 8690</u>
	XOMOX DRAWING NUMBER:	<u>18747-01</u>
	XOMOX SALES ORDER NUMBER:	<u>E-69186</u>

Dear Sir:

Enclosed, please find replacement parts and installation instructions for the drive train between motor operator and valve for the items listed above.

These parts should be installed on the valves per the attached instruction. The installation of these parts will prevent any potential loss of operability or incorrect position feedback caused by disengagement of components in the drive train.

Installation of these parts will result in a net increase in mass of 4.5 lbs. This constitutes a 4.5% increase in mass of the operator assembly. On the basis these parts are installed per the enclosed instructions, and having evaluated the impact of this increase in mass, it is hereby concluded that the installation of these parts will have negligible effect and not invalidate any seismic analysis performed by Xomox or its subsidiary, Atwood and Morrill. Furthermore, as indicated on the enclosed Certificate of Compliance, the parts of the kit supplied meet or exceed the specification requirements of the above referenced purchase order(s) and applicable Xomox Sales Order and drawings. Please note: The applicable specification drawings will be revised accordingly and submitted to your company for future reference.

Please contact Charlie Anderson, (716)-546-2700 of Rochester Gas & Electric Corporation on receipt.

Very truly yours

*John F. Gardner/pat*  
 John F. Gardner  
 Director of Engineering  
 /pat

Very truly yours

*David Showalter/pat*  
 David Showalter  
 Quality Control Supervisor

TOPLINE, DIVISION OF XOMOX CORPORATION, 4444 COOPER RD., CINCINNATI, OHIO 45242

VALVE MATERIAL AND PERFORMANCE CERTIFICATE OF CONFORMANCE

We hereby certify that the listed equipment and required documentation for the same meet the requirements of the purchase order and applicable specifications:

CUSTOMER: ROCHESTER GAS & ELEC. CO.      CUSTOMER ORDER NO: NQ-10443-B-RD  
89 EAST AVENUE  
ROCHESTER, NY - 14649-0001      CUSTOMER SPEC NO: N/A

CUSTOMER ITEM NO: N/A

SALES ORDER NO: E-69186

OUR ITEM NO: 1

PRODUCT CODE NO: 325649

DESCRIPTION: RETROFIT DRIVE TRAIN KIT

TAG NUMBER(S): SEE ENCLOSED LETTER

APPROVED EXCEPTION(S):

BODY MATERIAL: N/A

HEAT NO: N/A

PLUG MATERIAL: N/A

HEAT NO: N/A

COVER MATERIAL: N/A

HEAT NO: N/A

STUD MATERIAL: N/A

HEAT NO: N/A

NUT MATERIAL: N/A

HEAT NO: N/A

BOLT MATERIAL: N/A

HEAT NO: N/A

WE HEREBY CERTIFY THAT THE AFOREMENTIONED EQUIPMENT MEETS OR EXCEEDS THE REQUIREMENTS OF THE ORIGINAL PURCHASE ORDER AND SPECIFICATION. FURTHERMORE, THE PARTS ARE OF THE SAME FIT AND FUNCTION AND WILL NOT ALTER OR VIOLATE ANY PREVIOUS SEISMIC QUALIFICATION CALCULATIONS AND TESTING.

SIGNATURE: Dave Showalter/pat      DATE: 6-7-88  
Dave Showalter, Quality Control Supervisor

/pat



XOMOX CORPORATION TUFLINE  
SINGLE LEVEL EXPLOSION

3/02/88 9:20:40

LEVEL-ID-PART NUMBER

DESCRIPTION

0 325649

LIMITORQUE HOBC DRIVE RETROFIT  
10" 801  
ROCHESTER G & E P.O. NEG-510  
TAG 8685, 8690 GINNA STATION

1 911880

ADDL. REQUIREMENTS: LIMITORQUE  
RETROFIT PACKAGES

1 325561

ADAPTOR - LIMITORQUE HOBC ON  
10" 801

1 325534

MATERIAL: ASTM A193 B7 4140 STE  
SPACER - LIMITORQUE HOBC  
MATERIAL 1018 CU STEEL

1 325581

KEY: 3/8" X 1/4" X 3" LONG  
MATERIAL: 1018 STEEL

1 325574

1/2" HI-COLLAR HELICAL SPRING  
LOCKWASHER I.D. = .509 - .523  
O.D. = .737 MAX. MAT'L: STEEL

1 325584

1/2-13 X 2-3/4 SHCS ASTM  
A574 ALLOY STEEL  
C OF C REQUIRED  
REFERENCE P104408-02

XOMOX

INSTRUCTION FP1350

DRIVE ADAPTOR REPLACEMENT INSTRUCTIONS FOR XOMOX-  
MOUNTED LIMITORQUE ELECTRIC MOTOR ACTUATORS MODEL  
H0BC, H1BC, H2BC, H3BC, H4BC, AND H5BC ON TUFLINE PLUG  
VALVES AND PLIAXSEAL HIGH PERFORMANCE BUTTERFLY VALVES

XOMOX CORPORATION  
4444 COOPER ROAD  
CINCINNATI, OHIO - 45242  
(513)745-6000

PREPARED BY:	MIKE BRAUSCH
	OCTOBER 23, 1987
REVISION A:	CARL STEELE
	APRIL 24, 1988
REVISION B:	CARL STEELE
	JUNE 1, 1988

# LIMITORQUE TYPE HBC ELECTRIC MOTOR ACTUATOR DRIVE

## ADAPTOR REPLACEMENT INSTRUCTIONS

XOMOX

This manual contains the step-by-step instructions, in detail, for replacing the Xomox manufactured internal drive adaptors in Limatorque Electric Motor Actuators, sizes H0BC through H5BC, mounted on Xomox Tufline Plug Valves and Xomox Pliaseal High Performance Butterfly Valves. Xomox will be glad to furnish, free of charge, technical assistance relating to this drive train retrofit, if you desire. Call Xomox at (513)-745-6000, Technical Services Manager, if assistance is desired.

### 1.0 SCOPE:

The scope of the instructions herein is limited to the prereplacement isolation, line depressurization and valve closure, the removal of the drive adaptor and/or spline adaptor, the installation of the new drive adaptor and spacer assembly, post replacement procedures, certification of work performed, and return of parts and/or material.

**NOTE:** UPON INSTALLATION OF THE REPLACEMENT DRIVE ADAPTOR KIT, ALL OLD OR NEW PARTS AND/OR MATERIALS THAT WERE NOT INCORPORATED INTO THE REASSEMBLED DRIVE TRAIN MUST BE RETURNED TO XOMOX, (SEE SECTION 8.0).

### 2.0 INTRODUCTION:

The internal drive adaptors in all Xomox-supplied Limatorque HBC Electric Motor Actuators mounted on Xomox valves must be replaced in order to eliminate the potential for certain components of the drive train to become disengaged. The replacement drive adaptor kit must be installed according to the procedures set forth in detail in these instructions.

In the event the actuator must be removed to replace the drive adaptor (see Section 5.2), the actuator's rotational travel limit switches (i.e. trip rotors) must be correctly reset after the Limatorque is remounted to the bracket (see Section 6.2).

**WARNING:** INCORRECT ADJUSTMENT OF THE TRIP ROTORS COULD PREVENT COMPLETE CLOSURE OF A VALVE. A VALVE IN SUCH AN OPEN POSITION MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

**NOTE:** IF YOU ARE UNABLE TO INSTALL THE INTERNAL DRIVE ADAPTOR(S) IMMEDIATELY, PLEASE NOTIFY XOMOX AT (513)-745-6000, TECHNICAL SERVICES MANAGER.

### 3.0 REPLACEMENT DRIVE ADAPTOR KIT:

#### 3.1 Contents of the Replacement Drive Adaptor Kit.

- 3.1.1 Drive Adaptor , 1 Piece
  - 3.1.2 Spacer, 1 Piece
  - 3.1.3 Spacer Bolt (socket head cap screw), 1 Piece
  - 3.1.4 Helical Spring Lockwasher, 1 Piece
  - 3.1.5 Rectangular Key , 1 Piece
  - \* 3.1.6 Compensator
  - \* 3.1.7 Mounting Bracket
- \* Not in all kits, parts list will identify as part of kit assembly if required.

**NOTE:** ALL PARTS HAVE BEEN COATED WITH HOCUT 702, A WATER SOLUBLE RUST PREVENTATIVE. SHOULD YOUR INTERNAL PRACTICES REQUIRE SUBSEQUENT PAINTING (COATING) OF ANY PORTION(S) OF THE DRIVE TRAIN AFTER INSTALLATION, THE RUST PREVENTATIVE MUST BE REMOVED AS AN INITIAL STEP IN PREPARATION FOR SUCH PAINTING.

### 4.0 PREREPLACEMENT PROCEDURE:

**NOTE:** SHOULD THE FOLLOWING PRECAUTIONARY STEPS PREVENT THE IMMEDIATE INSTALLATION OF THE INTERNAL DRIVE ADAPTORS, PLEASE NOTIFY XOMOX IMMEDIATELY AT (513)-745-6000, TECHNICAL SERVICES MANAGER.



#### 4.0 PREREPLACEMENT PROCEDURE (CONTINUED):

4.1 To best insure the safety of the maintenance personnel and the integrity of the valve and actuator assemblies, follow all appropriate plant safety procedures. The following minimum precautionary steps are recommended:

4.1.1 Isolate the valve assembly.

4.1.2 Depressurize the upstream and downstream piping.

**WARNING:** DUE TO THE NATURE OF THE DESIGN OF HIGH PERFORMANCE BUTTERFLY VALVES, VALVE DISCS LEFT OPEN WHILE UNDER PRESSURIZED FLOW CONDITIONS WILL ROTATE ON THEIR OWN DUE TO INHERENT DESIGN FEATURES, ONCE AN ACTUATOR IS REMOVED. PRESSURIZED HIGH PERFORMANCE BUTTERFLY VALVES WITH THE ACTUATORS REMOVED MAY SUDDENLY SWING OPEN OR SLAM CLOSED WITHOUT WARNING. SUCH AN EVENT MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

4.1.3 Remove the limit switch housing cover, exposing the rotation setting trip rotors.

4.1.4 Electrically actuate the valve to its fully closed position, observing which trip rotors disengage at the end of the actuator's closing cycle.

**WARNING:** TO AVOID ELECTRIC SHOCK, BE CAREFUL NOT TO TOUCH THE ELECTRIC CONTACTS OR TRIP ROTORS.

4.1.5 Disconnect and positively isolate the electrical power supply to the Limitorque actuator's motor controls to prevent any possibility of valve actuation during performance of work.

4.1.6 Shift the manual override lever counter-clockwise to engage the gear actuator.

#### 5.0 ADAPTOR REPLACEMENT PROCEDURES:

5.1 Limitorque Models HOBC and HIBC Electric Motor Actuators (see Figure 1) -

5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):

5.1.1 Take off the pointer cap (#9) exposing the bore section of the actuator.

CAUTION: MARK THE POSITION OF THE POINTER CAP. THE POINTER CAP MUST BE REMOUNTED IN THE SAME POSITION.

NOTE: REMOVE ALL PARTS OR MATERIAL FOUND IN THE SPACE BETWEEN THE POINTER CAP AND THE TOP/END OF THE EXISTING DRIVE ADAPTOR.

5.1.2 From the underside of the actuator mounting bracket, push the drive adaptor into the actuator spline adaptor (#7), pushing it completely through and extracting the drive adaptor out the top of the actuator.

CAUTION: MARK OR NOTE POSITION OF DRIVE FLATS ON PRESENT DRIVE ADAPTOR. NEW DRIVE ADAPTOR MUST BE INSTALLED IN THE SAME POSITION.

NOTE: UPON INSTALLATION OF THE REPLACEMENT DRIVE ADAPTOR KIT, ALL OLD OR NEW PARTS AND/OR MATERIALS THAT WERE NOT INCORPORATED INTO THE REASSEMBLED DRIVE TRAIN MUST BE RETURNED TO XOMOX (SEE SECTION 8.0).

5.1.2.1 If the drive adaptor will not disengage from the compensator (or from the valve stem where the compensator is fabricated as an integral part of the drive adaptor), turn the actuator's manual override handwheel slightly in the direction of opening (see the arrow on the face of the handwheel) to remove the pressure exerted on the drive components during valve closing. Do not turn the handwheel with enough force to reengage the rotor contacts or move the valve stem.

## 5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):

**WARNING:** IF TRIP ROTORS ARE REENGAGED, THEIR SETTINGS MUST BE CORRECTLY RESET AFTER INSTALLATION OF THE DRIVE ADAPTOR KIT. (SEE SECTION 6.2). INCORRECT ADJUSTMENT OF THE TRIP ROTORS COULD PREVENT COMPLETE CLOSURE OF A VALVE. A VALVE IN SUCH AN OPEN POSITION MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

MOVING THE VALVE STEM ON HIGH PERFORMANCE BUTTERFLY VALVES WILL MOVE THE VALVE DISC INTO A PARTIALLY OPEN POSITION. VALVE DISCS LEFT OPEN UNDER PRESSURIZED FLOW CONDITIONS WITH ACTUATORS REMOVED MAY SUDDENLY SWING OPEN OR SLAM CLOSED WITHOUT WARNING. SUCH AN EVENT MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

- 5.1.3 From the underside of the actuator mounting bracket, push the spline adaptor (#7) into the hub bore, extracting it out the top of the actuator.
- 5.1.4 Holding the spline adaptor with its relief flange to the right, insert the new drive adaptor with the new key into the spline adaptor from the left with the drive flats to the left, engaging the key in one of the slots in the spline adaptor. See Figure 3.
- 5.1.5 Insert the new drive adaptor to the right until the end of the drive adaptor extends out of the relief flanged end of the spline adaptor approximately 1/8". See Figure 3.
- 5.1.6 Insert the spacer bolt with the lockwasher into the counter-bored end of the spacer.
- 5.1.7 Fasten the spacer and spacer bolt to the right end of the new drive adaptor, tightening the spacer bolt with an Allen wrench to a torque of 40-50 ft.-lbs. See Figure 3 for adaptor assembly cross-section.

## 5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):

- 5.1.8 When a new compensator is supplied in the kit, remove the old compensator from the valve stem and install the new compensator onto the valve stem using the markings on the compensator to identify which end attaches to the valve stem.
- 5.1.9 Install the adaptor assembly through the top of the actuator, drive flats first, orienting the adaptor drive flats with the compensator drive flats (or, where the compensator is fabricated as an integral part of the drive adaptor, orienting the adaptor drive flats with the flats of the valve stem).

**CAUTION:** NOTE POSITION OF DRIVE FLATS ON REMOVED DRIVE ADAPTOR. NEW DRIVE ADAPTOR MUST BE INSTALLED IN THE SAME POSITION. FAILURE TO INSTALL THE NEW ADAPTOR IN THE SAME POSITION AS THE REMOVED DRIVE ADAPTOR MAY RESULT IN VALVE INOPERABILITY.

- 5.1.10 After aligning the adaptor spline teeth, push the adaptor assembly inward until it bottoms out, fully engaged in the compensator (or, where the compensator is fabricated as an integral part of the drive adaptor, fully engaged on the valve stem). See Figure 4.
- 5.1.11 Remount the pointer cap (#9) using the four (4) screws previously removed, tightening them to a torque of 5 ft.-lbs.

**WARNING:** THE POINTER CAP MUST BE REMOUNTED IN THE SAME POSITION AS ORIGINALLY REMOVED. FAILURE TO DO SO MAY RESULT IN VALVE INOPERABILITY AND/OR INCORRECT POSITION INDICATION.

- 5.1.12 Turn the actuator's manual override handwheel slightly in the direction of closing (the opposite direction from the arrow on the face of the handwheel) to reexert pressure on the drive components. Turn the handwheel until the closed position trip rotors reengage their contacts.



## 5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):

5.1.13 Disengage the manual override lever by shifting it clockwise.

5.2 Limitorque Models H2BC, H3BC, H4BC, and H5BC Electric Motor Actuators (see Figures 1 and 2). The existing drive adaptor of these models cannot be removed through the top of the actuator consequently, the actuator must be removed from the valve). This procedure must also be used for any Limitorque Models H0BC and H1BC from which the existing drive train cannot be removed through the top of the actuator.

**WARNING:** IF THE BRACKET IS BOLTED DIRECTLY TO THE VALVE COVER (SEE FIGURE 5), DO NOT UNBOLT THE MOUNTING BRACKET FROM THE VALVE IN ORDER TO REMOVE THE ACTUATOR. IN A PLUG VALVE, THE VALVE COVER AND/OR PLUG MAY BE SUBJECTED TO ENTRAPPED PRESSURE DESPITE ANY DEPRESSURIZATION OF THE LINE SO THAT IMPROPER PROCEDURE IN UNBOLTING THE VALVE COVER COULD ALLOW THE PLUG AND/OR COVER TO EJECT SUDDENLY FROM THE VALVE AND CAUSE PERSONAL INJURY OR PROPERTY DAMAGE. IN SUCH CIRCUMSTANCES, LEAVE THE MOUNTING BRACKET IN PLACE AND REMOVE THE ACTUATOR BY UNBOLTING IT FROM THE BRACKET.

IF THE BRACKET IS NOT BOLTED DIRECTLY TO THE VALVE COVER (I.E., IT IS MOUNTED TO THE VALVE FLANGE OR TO SOME OTHER MOUNTING PAD (SEE FIGURE 5), THEN THE BRACKET MAY BE UNBOLTED FROM THE VALVE IN ORDER TO REMOVE THE ACTUATOR.

**NOTE:** CALL XOMOX AT (513)-745-6000, TECHNICAL SERVICES MANAGER, IF ANY ASSISTANCE IS DESIRED IN REMOVING OR REMOUNTING THE ACTUATOR (SEE SECTION 5.2.13) AND/OR RESETTNG THE TRIP ROTORS (SEE SECTION 6.2).

5.2.1 Remove the actuator, subject to the immediately preceding warning.

**CAUTION:** MARK OR NOTE POSITION OF DRIVE FLATS ON PRESENT DRIVE ADAPTOR. NEW DRIVE ADAPTOR MUST BE INSTALLED IN THE SAME POSITION.

**5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):**

5.2.2 Remove the drive adaptor and spline adaptor (#9) from the actuator bore, dropping them through the bottom of the actuator.

**NOTE:** REMOVE ALL PARTS OR MATERIAL FOUND IN THE SPACE BETWEEN THE POINTER CAP AND THE TOP/END OF THE EXISTING DRIVE ADAPTOR.

**NOTE:** UPON INSTALLATION OF THE REPLACEMENT DRIVE ADAPTOR KIT, ALL OLD OR NEW PARTS AND/OR MATERIALS THAT WERE NOT INCORPORATED INTO THE REASSEMBLED DRIVE TRAIN MUST BE RETURNED TO XOMOX (SEE SECTION 8.0).

5.2.3 Holding the spline adaptor with its relief flange to the right, insert the new drive adaptor with the new key into the spline adaptor from the left with the drive flats to the left, engaging the key in one of the slots in the spline adaptor. See Figure 3.

5.2.4 Insert the new drive adaptor to the right until the end of the drive adaptor extends out of the relief flanged end of the spline adaptor approximately 1/8".

5.2.5 Insert the spacer bolt with the lockwasher into the counter-bored end of the spacer.

5.2.6 Fasten the spacer and spacer bolt to the right end of the new drive adaptor, tightening the spacer bolt down with an Allen wrench to a torque of 40-50 ft.-lbs. See Figure 3.

**5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):**

- 5.2.7 When a new compensator is supplied in the kit, remove the old compensator from the valve stem and install the new compensator onto the valve stem using the markings on the compensator to identify which end attaches to the valve stem.
- 5.2.8 Install the adaptor assembly through the bottom of the actuator, spacer end first, orienting the adaptor drive flats with compensator drive flats (or, where the compensator is fabricated as an integral part of the drive adaptor, orienting the adaptor drive flats with the flats of the valve stem).
- CAUTION: NOTE POSITION OF DRIVE FLATS ON REMOVED DRIVE ADAPTOR. NEW DRIVE ADAPTOR MUST BE INSTALLED IN THE SAME POSITION. FAILURE TO INSTALL THE NEW ADAPTOR IN THE SAME POSITION AS THE REMOVED DRIVE ADAPTOR MAY RESULT IN VALVE INOPERABILITY.**
- 5.2.9 After aligning the adaptor spline teeth, push the adaptor assembly inward until the spline adaptor is flush with the end of its housing bore.
- 5.2.10 Remount the actuator onto the valve, orienting it as it was previously mounted.
- 5.2.11 Engage the drive adaptor assembly flats fully into the compensator (or, where the compensator is fabricated as an integral part of the drive adaptor, fully engaged on the valve stem). See Figure 4.
- 5.2.12 When a new mounting bracket is supplied in the kit, use the new mounting bracket to reassemble the actuator to the valve.

5.0 ADAPTOR REPLACEMENT PROCEDURES (CONTINUED):

**WARNING: FAILURE TO USE NEW MOUNTING BRACKET MAY RESULT IN VALVE INOPERABILITY.**

- 5.2.13 Rebolt the actuator to the mounting bracket (or rebolt the mounting bracket to the valve, whichever is applicable), tightening the bolts according to the following torque chart:

BOLT SIZE	TORQUE FT.-LBS.
1/4-20	3-6
5/16-18	8-113
3/8-16	15-19
7/16-14	25-30
1/2-13	40-50
9/16-12	55-65
5/8-11	60-75
3/4-10	80-100
7/8-9	125-140
1-8	150-165
1-1/8-8	175-200
1-1/4-8	225-250

- 5.2.14 Turn the actuator's manual override handwheel slightly in the direction of closing (the opposite direction from the arrow on the face of the handwheel) to reexert pressure on the drive components. Turn the handwheel until the closed position trip rotors reengage their contacts.
- 5.2.15 Disengage the manual override lever by shifting it clockwise.



## 6.0 POST REPLACEMENT PROCEDURE:

### 6.1 For all valves -

- 6.1.1 Reconnect the electrical power to the Limitorque Actuator's motor controls.
- 6.1.2 Electrically actuate the valve open and closed, observing the rotational trip rotor engagement on the closing cycle. After the rotors have disengaged on valve closing, check the location of the flats on the valve stem to verify full valve closure and proper disc/plug positioning.

**WARNING:** INCORRECT ADJUSTMENT OF THE TRIP ROTORS COULD PREVENT COMPLETE CLOSURE OF A VALVE. A VALVE IN SUCH AN OPEN POSITION MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

**NOTE:** IF TRIP ROTOR SETTING ADJUSTMENTS ARE REQUIRED, GO TO SECTION 6.2.

- 6.1.3 If the trip rotor settings are correct, remount the limit switch housing cover, tightening the bolts or screws to a torque of 5 ft.-lbs.
  - 6.1.4 Actuate the valve once again to check the trip rotor settings.
  - 6.1.5 The valve is now ready for any post replacement testing which may be required by your company's internal procedures.
- 6.2 If trip rotor setting adjustments are required for the closing cycle -
- 6.2.1 Adjust the closed trip rotor settings according to the Limitorque Type HBC Electric Motor Actuator Instruction and Maintenance Manual.

## 6.0 POST REPLACEMENT PROCEDURE (CONTINUED):

- 6.2.1.1 On the Pliaxseal High Performance Butterfly Valve, a disc setting of  $\pm 1^{\circ}$  from the fully closed position is required to guarantee maximum sealing ability. For the Tuflin Plug Valve, the closure variance is  $\pm 4^{\circ}$ .

**WARNING: INCORRECT ADJUSTMENT OF THE TRIP ROTORS COULD PREVENT COMPLETE CLOSURE OF A VALVE. A VALVE IN SUCH AN OPEN POSITION MAY CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.**

- 6.2.2 Actuate the valve to check the adjustment settings of the trip rotors.
- 6.2.3 If the trip rotor settings are correct, remount the limit switch housing cover, tightening the bolts or screws to a torque of 5 ft.-lbs.
- 6.2.4 Actuate the valve once again to check the trip rotor settings.
- 6.2.5 The valve is now ready for any post replacement testing which may be required by your company's own internal procedures.

## 7.0 DOCUMENTATION/CERTIFICATION:

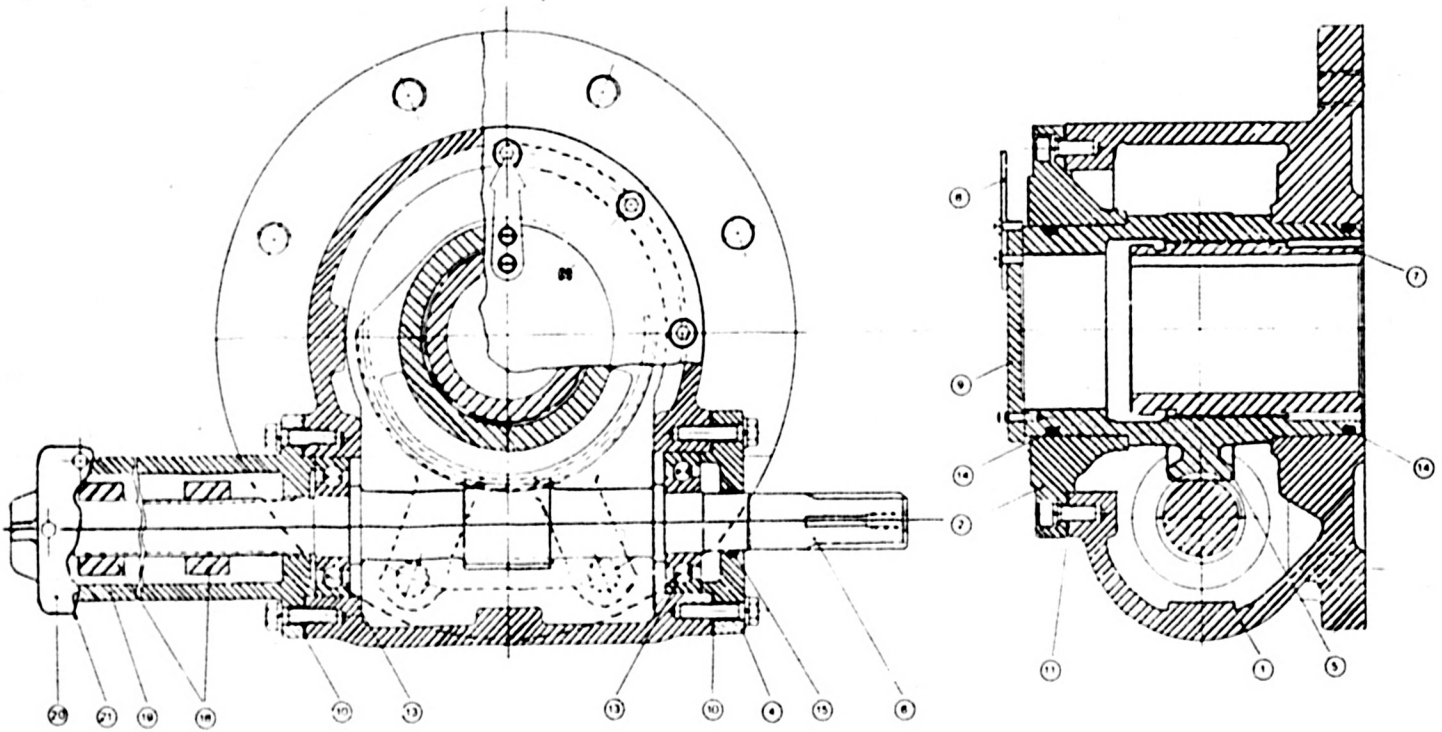
- 7.1 Upon completion of installation of the new drive train retrofit kit parts, please complete the enclosed "Acknowledgement of Completion Certificate", attached hereto as Exhibit "B", and return to Xomox Corporation, 4444 Cooper Road, Cincinnati, Ohio-45242.

8.0 RETURN OF PARTS:

- 8.1 Upon installation of the replacement drive adaptor kit, all old or new parts and/or materials that were not incorporated into the reassembled drive train must be returned to Xomox, including:
- 8.1.1 All old parts and/or material that have been removed from the original assembly, including but not limited to the old drive adaptor, the old key, and any material removed from the space between the pointer cap and the top of the drive adaptor; and
  - 8.1.2 All new parts that were provided to you by Xomox in the replacement drive adaptor kit but were not installed in the reassembled drive train.
- 8.2 Send all such parts and/or material to Xomox together with the "Returned Goods Authorization Notice", attached hereto as Exhibit "A". If necessary, call Xomox Corporation, (513)-745-6000, Technical Services Manager, to arrange for shipment to or pick up by Xomox.

# FIGURE 1

# DISASSEMBLY INSTRUCTIONS FOR HBC-0 THRU HBC-3



PARTS LIST					
PC. NO.	DESCRIPTION	PC. NO.	DESCRIPTION	PC. NO.	DESCRIPTION
1	HOUSING	8	POINTER	15	WORM SHAFT O-RING
2	HOUSING COVER	9	POINTER CAP	16	STOP SCREW COVER
3	END CAP	10	END & THRU CAP GASKET	17	STOP SCREW & LOCKSCREW
4	THRU CAP	11	HSG COVER GASKET	18	HEX STOP NUT
5	DRIVE SLEEVE & WORM GEAR	12	DRIVE SLEEVE BUSHING	19	LIMIT STOP HOUSING
6	WORM SHAFT	13	WORM SHAFT BEARING	20	CAP LIMIT STOP HSG
7	SPLINE ADAPTER	14	DRIVE SLEEVE O-RING	21	LIMIT STOP HSG GASKET

1. Remove limit stop housing cap, pc #20 and gasket, pc #21
2. Rotate worm shaft, pc #6, clockwise until pointer cap, pc #9, stops rotating.
3. Remove pointer cap, pc #9, and housing cover, pc #2.
4. Remove both stop nuts, pc #18, and limit stop housing, pc #19.

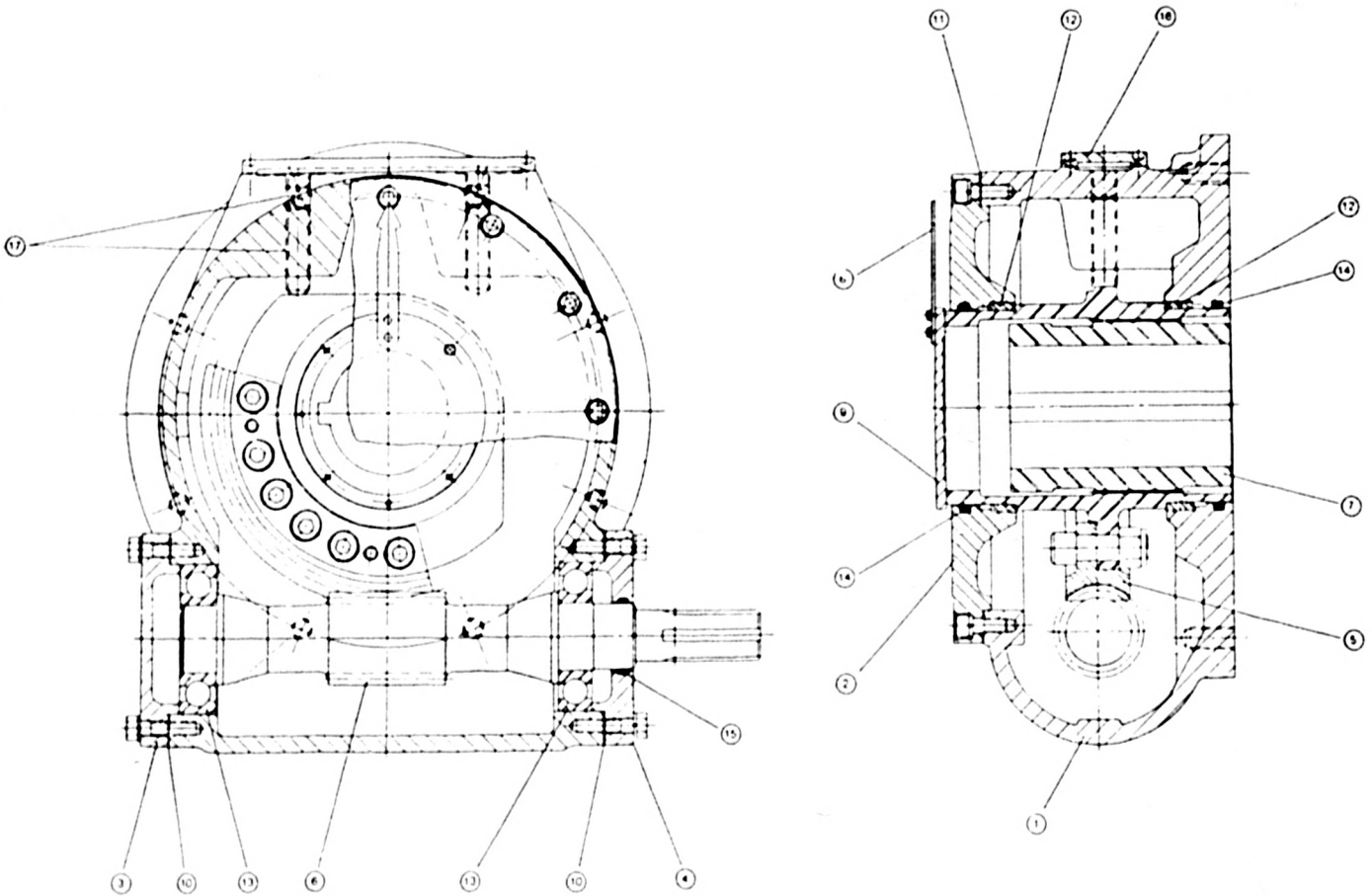
5. Remove thru cap, pc #4.
6. Remove worm shaft, pc #6, by pulling from housing, pc #1. It may be necessary to work bearing, pc #13, around drive sleeve, pc #5, by rotating the drive sleeve slightly in the direction it was turning in Step #2. It is not necessary to remove bearing, pc #13, from worm shaft.

In reassembling the above unit, follow all of the above steps in the reverse order. Be sure you have located the center line of the sector gear before re-installing the housing cover, pc #2.



# FIGURE 2

# DISASSEMBLY INSTRUCTIONS FOR HBC-4 THRU HBC-10



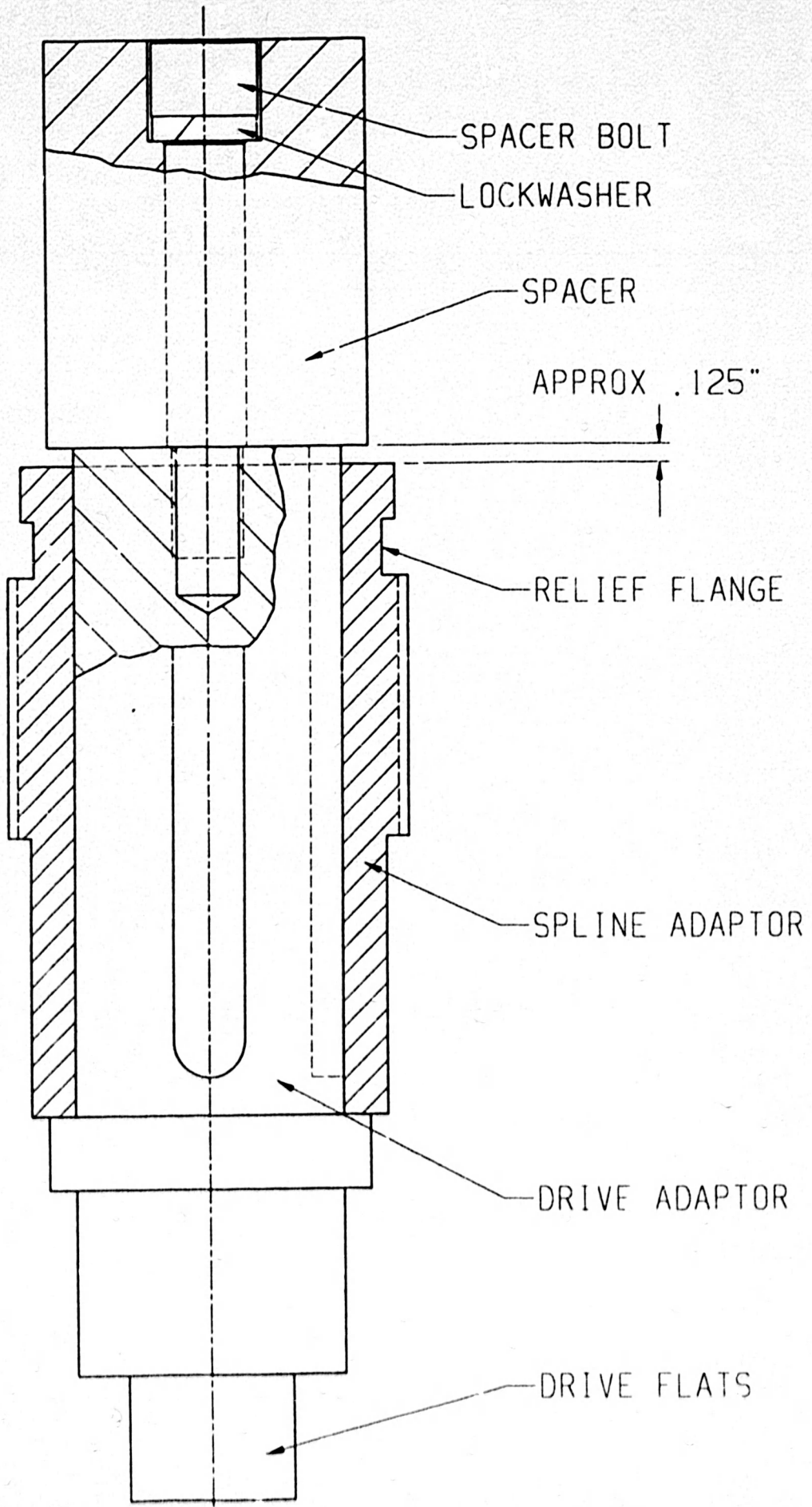
PARTS LIST		
PC. NO.	DESCRIPTION	
1	HOUSING	8 POINTER
2	HOUSING COVER	9 POINTER CAP
3	END CAP	10 END & THRU CAP GASKET
4	THRU CAP	11 HSG. COVER GASKET
5	DRIVE SLEEVE & WORM GEAR	12 DRIVE SLEEVE BUSHING
6	WORM SHAFT	13 WORM SHAFT BEARING
7	SPLINE ADAPTER	14 DRIVE SLEEVE "O" RING
		15 WORM SHAFT "O" RING
		16 STOP SCREW COVER
		17 STOP SCREW & LOCKSCREW

1. Remove stop screw cover piece, pc #16.
2. Remove stop screw and lock screw, (total 2 each), pc #17.
3. Rotate worm shaft full clockwise until pointer cap, pc #9, stops rotating or until the worm shaft can no longer be turned.
4. Remove end cap, pc #3, and thru cap, pc #4.
5. Remove pointer cap, pc #9 and housing cover, pc #2.

6. Remove worm shaft, pc #6, by pulling from housing, pc #1. It will be necessary to slightly rotate or cock the drive sleeve, pc #5, away from the worm in order to allow the bearing, pc #13, to clear. It is not necessary to remove the bearing, pc #13, from the worm shaft.
- To reassemble the actuator, proceed in the reverse order listed above. In order to insure good stop nut engagement at:

the end of travel, it is recommended that the stops be preset for 90° of rotation by establishing 45° rotation on either side of the worm gear center line while installing the stop screws. It will then be necessary to re-adjust the stops once the actuator is on the valve, however, this will minimize the risk of disorienting the worm gear sector.

FIGURE 3



**FIGURE 4**

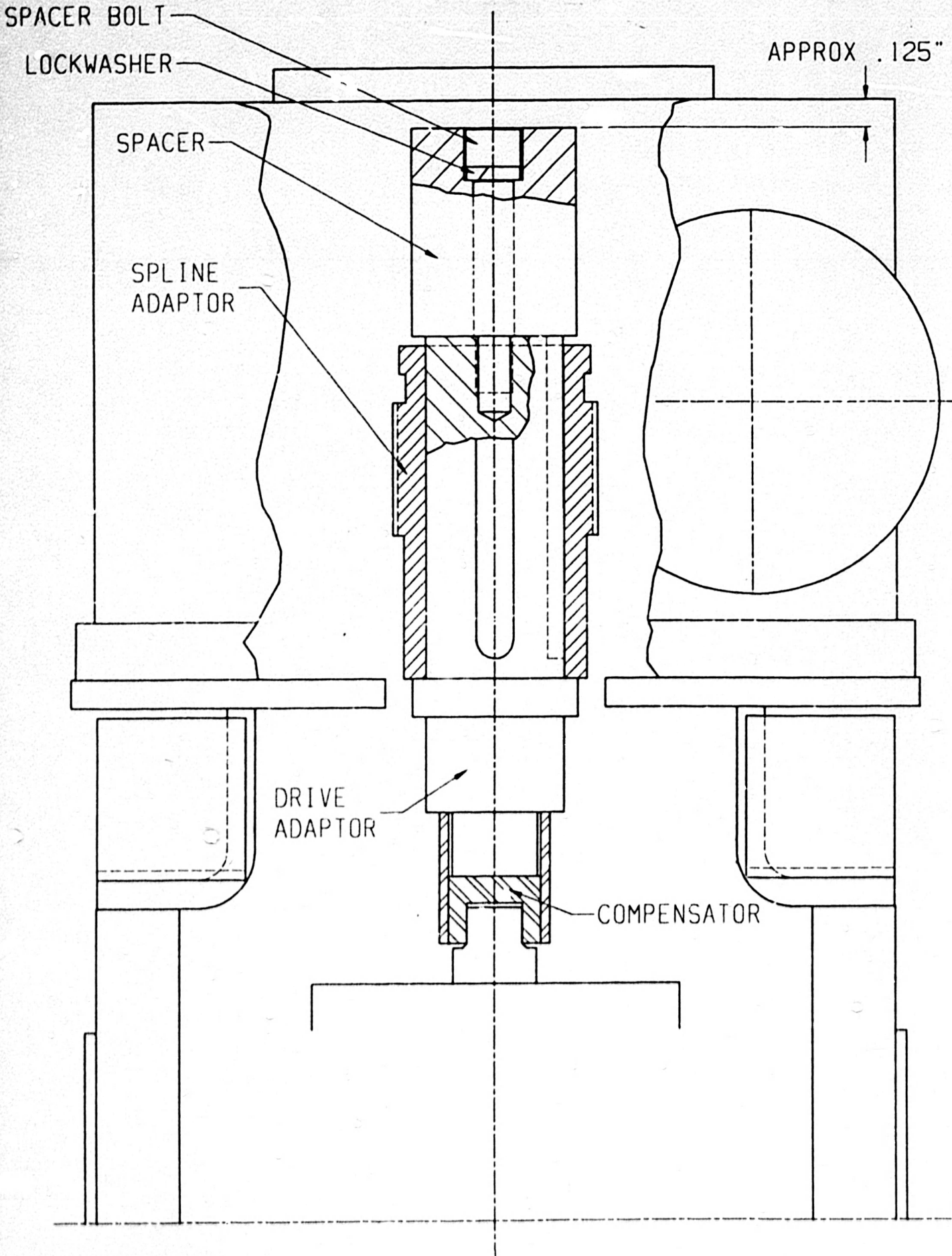
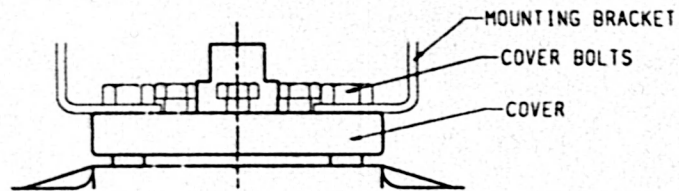
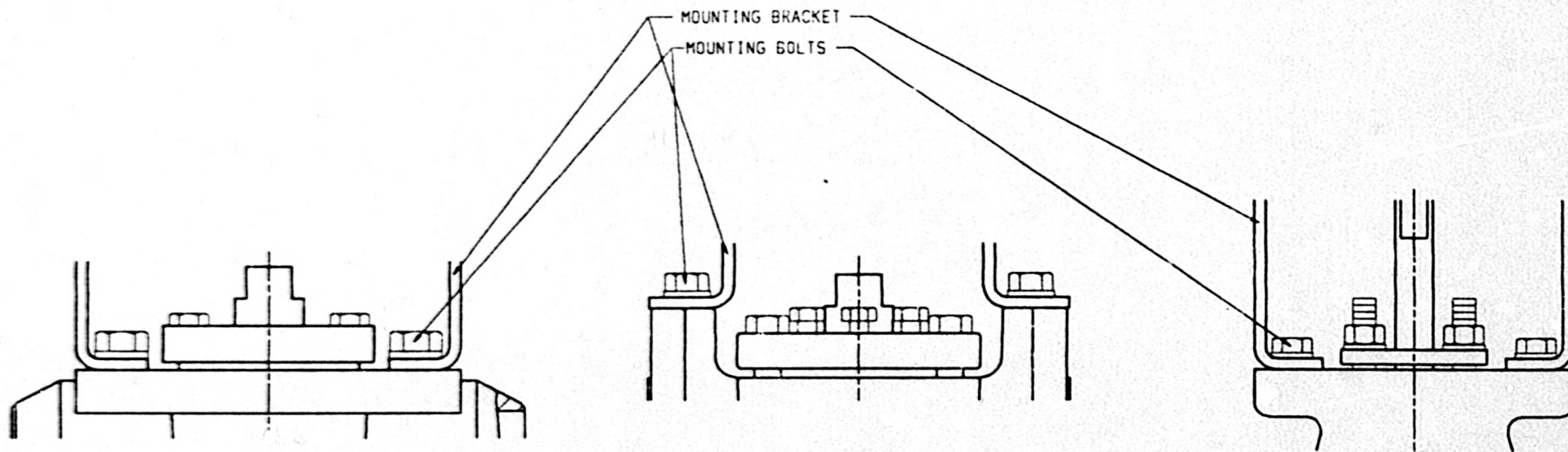


FIGURE 5

BRACKET BOLTED DIRECTLY TO VALVE COVER



BRACKET NOT BOLTED DIRECTLY TO VALVE COVER





XOMOX

EXHIBIT "A"

RETURNED GOODS AUTHORIZATION NOTICE  
AND CERTIFICATE  
FOR LIMITORQUE RETROFIT

MAIL TO: XOMOX CORPORATION  
4444 COOPER ROAD  
CINCINNATI, OHIO - 45242

ATTENTION: MR. DAVID BIETERMAN  
TECHNICAL SERVICES MANAGER  
LIMITORQUE RETROFIT

REFERENCE: ROCHESTER GAS & ELECTRIC CORPORATION  
REPLACEMENT PARTS KIT P/NO: 325649  
KIT P.O. NUMBER: NJ-10443-B-RD  
ORIGINAL P.O. NUMBER: NEG-51082  
VALVE TAG NUMBER: 8685 & 8690  
XOMOX DRAWING NUMBER: 18747-01  
XOMOX SALES ORDER NUMBER: E-69186

It is hereby certified that upon installation of the replacement drive adaptor kit, all old or new parts and/or materials that were not incorporated into the reassembled drive train have been returned with this certificate to Xomox Corporation.

\_\_\_\_\_  
Company Representative                      Title                      Date

Cost of freight shall be borne by Xomox.  
Include copy of this certificate with parts.  
Call Xomox Corporation, (513)-745-6000, Technical Services Manager, if there are any questions.

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XOMOX

EXHIBIT "B"

ACKNOWLEDGEMENT OF COMPLETION CERTIFICATE

MAIL TO: XOMOX CORPORATION  
4444 COOPER ROAD  
CINCINNATI, OHIO - 45242

ATTENTION: Q./C. MANAGER - MR. DAVE SHOWALTER

REFERENCE: ROCHESTER GAS & ELECTRIC CORPORATION  
REPLACEMENT PARTS KIT P/NO: 325649  
KIT P.O. NUMBER: NQ-10443-B-RD  
ORIGINAL P.O. NUMBER: NEG-51082  
VALVE TAG NUMBERS: 8685 & 8690  
XOMOX DRAWING NUMBER: 18747-01  
XOMOX SALES ORDER NUMBER: E-69186

CHECK ONE (1) AND SIGN ACCORDINGLY:

- (1) [ ] the above referenced drive train retrofit kit(s) supplied by Xomox Corporation were installed on the valves whose tag numbers are referenced above; following the Xomox provided instructions for installation FP1350.
- (2) [ ] It has been decided to not install the drive train retrofit kits supplied by Xomox. It is understood that failure to install the drive train retrofit kit is an assumption of the risk by our Company of valve failure due to the absence of these retrofit parts.

\_\_\_\_\_  
Company Representative Title Date