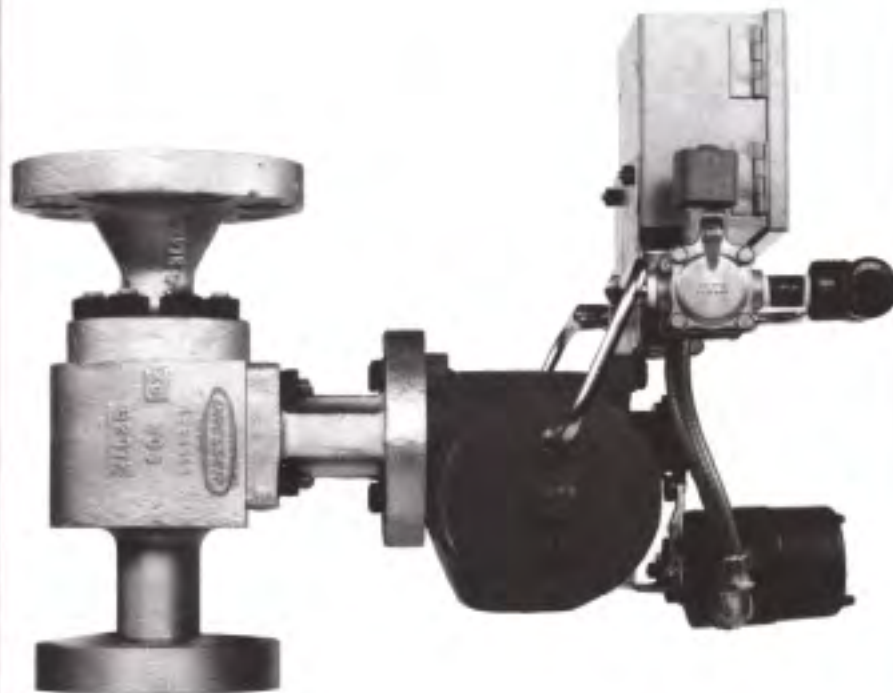


Consolidated®

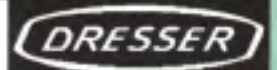
INSTALLATION, OPERATION AND MAINTENANCE MANUAL

CON-15
Initial Issue 8/98



Consolidated® Electromatic Ball Valve System
With 2537 Control Station and 3539 Controller

**DRESSER
INDUSTRIES**



Industrial Valve Operation
Dresser Valve and Controls Division
Alexandria, Louisiana 71309-1430 USA

Contents

Section	Subject	Page
I.	Safety Notice	2
II.	Safety Precautions	3
III.	Product Safety Sign & Label System	4
IV.	Safety Alerts	4
V.	Warranty Information	7
VI.	Introduction	8
VII.	System Design Features	8
VIII.	Operating Principles - Electrical System	9
IX.	Storage and Handling Prior to Installation	12
X.	Recommended Installaton Practices	13
	A. Main Valve	13
	Welding Cautions	14
	B. Type 3539 Controller	14
	C. Required Wire Gauge	14
XI	Hydrostatic Testing	14
XII	Start-Up of the System	15
	A. Prior to Start Up Checks	15
	B. System Start Up	15
	C. Adjusting the Set Pressure and Blowdown	15
	D. Minimum Blowdown Setting	17
XIII	Disassembly	17
	A. Ball Seat and Loader Assembly Removal	17
	B. Actuator Assembly Removal	19
	C. Stem Removal	21
XIV	Cleaning	22
XV	Inspection	22
XVI	Maintenance	22
	A. Seat Leakage	22
	B. Actuation System Trouble Shooting	23
	C. Packing Leakage	25
	D. Electrical System	26
XVII	Reassembly	29
	A. Lubrication	29
	B. Tools Required	29
	C. Valve Assembly	29
	D. Actuator and Accessory Assembly for Bettis T-300 and T-400 Series Actuators	31
	E. Actuator and Accessory Assembly for Bettis Models CB525 and CBL725 Actuators	36
XVIII	Inventory Philosophy	39
	A. General Information	39
	B. Inventory Planning - Replacement Parts List	39
	C. Recommended Spare Parts	40
	D. Identification and Ordering Essentials	40
XIX	Maintenance Tools	41
XX	Manufacturer's Field Service and Repair Program	44
	A. Factory Setting vs. Field Setting	44
	B. Field Service	44
	C. Factory Repair Facilities	44

I. Safety Notice

Proper installation, operation and maintenance is essential to the safe and reliable operation of all valve products. The relevant procedures recommended by Dresser Valve and Controls Division (DVCD), and described in the 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.

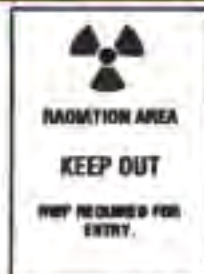
It is important to note that this manual contains various "safety messages" which should be carefully read in order to minimize the risk of personal injury, or the possibility that improper procedures will be followed which may damage the involved DVCD product, or render it unsafe. It is also important to understand that these "safety messages" are not exhaustive. DVCD can not possibly know, evaluate, and advise any customer of all of the conceivable ways in which tasks might be performed, or of the possible hazardous consequences of each way. Consequently, DVCD has not undertaken any such broad evaluation and, thus, anyone who uses a procedure and/or tool, which is not recommended by DVCD, or deviates from DVCD recommendations, must be thoroughly satisfied that neither personal safety, nor valve safety, will be jeopardized by the method and/or tools selected. If not so satisfied, contact DVCD (at 318/640-2250) if there are any questions relative to tools/methods. Some of the products manufactured by DVCD 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 are 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 DVCD products, and the possible hazardous consequences of each way, DVCD can not possibly evaluate all conditions that might injure personnel or equipment. However, DVCD does offer safety precautions listed on page 3 for customer information only.

If the valves and related electrical equipment are used in a manner not specified by Dresser Industries, the protection provided by the valves may be impaired.

It is the responsibility of the purchaser or user of DVCD 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 additional copies of this manual be required, they can be purchased, at a minimal cost, by contacting DVCD (in writing) at P.O. Box 1430, Alexandria, LA 71309-1430, or (telephonically) at 318/640-2250.

WARNING



Know nuclear "health physics" procedures, if applicable, to avoid possible severe personal injury or death.

CAUTION



Wear necessary protective equipment to avoid possible personal injury.

⚠ DANGER

Eliminate pressure and stand clear of discharge when working on valve to avoid severe personal injury or death.

⚠ CAUTION

Wear necessary protective equipment to avoid possible personal injury.

⚠ WARNING

Know valve exhaust/possible leakage points to avoid possible severe personal injury or death.

II. Safety Precautions

Follow all plant safety regulations, but be sure to observe the following:

- **Always** eliminate the working pressure before making any valve adjustments or repairs. This will preclude severe personal injury or death.
- Do **not** stand in front of the discharge of a valve when testing or operating.
- Hearing protection should **always** be used when testing or operating a valve.
- Wear protective clothing. Hot water can burn and super-heated steam is **not visible**.
- When removing a power operated safety relief valve from a system, stand clear and/or wear protective clothing to prevent exposure to spatter, or any corrosive process medium, which may have been trapped inside the valve. Ensure valve is isolated from system pressure **before** valve is removed.
- **Exercise care** when examining a power operated safety relief valve for audible or visible leakage to avoid possible personal injury.
- Prior to each actuation, ensure that no personnel are near the valve exhaust point. Media escaping from the valve during actuation can possibly cause personal injury.
- **Never** tamper with the valve when system pressure is near the valve set pressure.
- Before performing any machining on valve parts, consult DVCD or its authorized representative.
- All valves require periodic inspection and tests by qualified persons to insure that the valves are in proper working condition, and will function as designed by DVCD.
- The owner/operator of the valves must be aware of usage condition, and must bear the responsibility for determining the appropriate frequency of examination of the valves.
- Do not attempt to repack a power actuated relief valve while it is pressurized.
- Use care when making wiring connections on electrical components and when making valve setting adjustments to avoid electrical shock.

⚠ DANGER

AVOID ELECTRIC SHOCK

III. Product Safety Sign and Label System

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

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

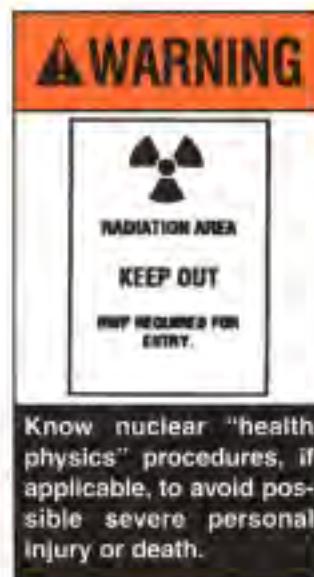
The top panel of the format contains a signal word (DANGER, WARNING, or CAUTION) which communicates the level of hazard seriousness.

The center 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 preventive measures to take, such as wearing protective equipment.

The bottom panel may contain an instruction message on how to avoid the hazard. In the case of human hazard, this 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.

IV. SAFETY ALERTS! READ • UNDERSTAND • PRACTICE

1. DANGER: High temperature/pressure can cause injury. Be sure all system pressure is absent before repairing or removing valves.
2. DANGER: Don't stand in front of valve outlet when discharging. STAND CLEAR OF VALVE to prevent exposure to trapped, corrosive media.
3. DANGER: When inspecting a pressure relief valve for leakage, BE VERY CAREFUL!



⚠ WARNING

Improper use or repair of pressurized device may result in severe personal injury or death.

⚠ WARNING

Heed all container label warnings.

⚠ WARNING

Provide and use guarding to prevent contact with heated and/or pressurized parts.

⚠ WARNING

Do not work with valves while under the influence of intoxicants or narcotics.

⚠ WARNING

All potential hazards may not be covered in this manual.

⚠ WARNING

Improper tools or improper use of right tools could result in personal injury or product damage.

IV. (Continued) READ - UNDERSTAND - PRACTICE

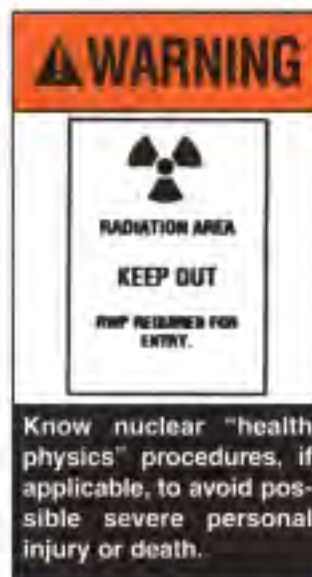
1. **WARNING:** Allow the system to cool to room temperature before cleaning, servicing or repairing the system. Hot components or fluids can cause severe personal injury or death.
2. **WARNING:** Always read and comply with safety labels on all containers. Do not remove or deface the container labels. Improper handling or misuse could result in severe personal injury or death.
3. **WARNING:** Never use pressurized fluids/gas/air to clean clothing or body parts. Never use body parts to check for leaks or flow rates or areas. Pressurized fluids/gas/air injected into or near the body can cause severe personal injury or death.
4. **WARNING:** It is the responsibility of the owner to specify and provide guarding to protect persons from pressurized or heated parts. Contact with pressurized or heated parts can result in severe personal injury or death.
5. **WARNING:** Do not allow anyone under the influence of intoxicants or narcotics to work on or around pressurized systems. Workers under the influence of intoxicants or narcotics are a hazard both to themselves and other employees and can cause severe personal injury or death to themselves or others.
6. **WARNING:** Incorrect service and repair could result in product or property damage or severe personal injury or death. See page 16.
7. **WARNING:** These WARNINGS are as complete as possible but not all-inclusive. Dresser cannot know all conceivable service methods nor evaluate all potential hazards.
8. **WARNING:** Use of improper tools or improper use of right tools could result in personal injury or product or property damage.

IV. (Continued) **READ - UNDERSTAND - PRACTICE**

9. **WARNING:** This valve product line is not intended for radioactive nuclear applications. Some valve products manufactured by DVCD may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper "health physics" procedures should be followed, if applicable.
1. **CAUTION:** Heed all service manual warnings. Read installation instructions before installing valve(s).
2. **CAUTION:** Wear hearing protection when testing or operating valves.
3. **CAUTION:** Wear appropriate eye and clothing protection.
4. **CAUTION:** Wear protective breathing apparatus to protect against toxic media.

NOTE:

Any service questions not covered in this manual should be referred to Dresser's Service Department. Phone: (318) 640-6055.



V. Warranty Information

***Warranty Statement** - Dresser warrants that its products and work will meet all applicable specifications and other specific product and work requirements (including those of performance), if any, and will be free from defects in material and workmanship.

Warranty Claims - Warranty claims must be made immediately upon discovery and in any event, within thirty (30) months of shipment of the applicable product, (at fob shipping point), or within twenty four (24) months from the date of installation, whichever is earlier. For all other details on warranty, limitation of remedy and liability of remedy and liability, Please refer to Dresser's Standard Terms of sale.

CAUTION: Defective and nonconforming items must be held for Dresser's inspection and returned to the original F.O.B. point upon request.

Incorrect Selection or Misapplication of Products - DVCD cannot be responsible for customer's incorrect selection or misapplication of our products.

Unauthorized Repair Work - DVCD has not authorized any non-Dresser affiliated repair companies, contractors or individuals to perform warranty repair service on new products or field repaired products of its manufacture. Therefore, customers contracting such repair services from unauthorized sources must do so at their own risk.

**Refer to Dresser's Standard Terms of Sale for complete details on warranty and limitation of remedy and liability.*

VI. Introduction

The CONSOLIDATED® Ball Valve is an electrically controlled pneumatically actuated pressure relief device. It may be manually operated by closing a switch, or automatically operated at specified opening and closing pressure. The application provides the plant operator with a means of instantaneously opening and closing a relief valve at a remote location.

When the pressure element is set to open the Electronic Ball Valve at a pressure slightly below the lowest set spring loaded safety valves, it will prevent the safety valves from opening except during major overpressure excursions.

This valve meets requirements of ISO standards 4126-1, 1991 edition.

VII. System Design Features

Figure 1 illustrates the relationship of the various elements of the Power Actuated Relief Valve System. The Type 3539 Controller consists of a pressure sensing element (i.e., a bourdon tube), an electrical relay and control box which houses the electrical relay and sensing element. The Type 2537 Control Station is a 3 position selector which allows selection of Manual actuation, Off or Automatic actuation. It consists of a box, selector switch and two indicator lights (red and amber). The Pneumatic Actuator Assembly consists of a double acting pneumatic actuator, two three way solenoid valves (one normally open and one normally closed), one DPST rotary switch and an actuator mounted junction box.

The electrical supply system consists of a control circuit and a solenoid circuit. The control circuit voltage is normally 120 volts AC, with a current requirement of 5 amperes.

The solenoid circuit provides the voltage needed for the solenoid. The standard solenoid voltage is 120 VAC but can be AC or DC at different voltages. The solenoid power supply wiring must be sized so that the voltage drop, due to the solenoid inrush current, does not exceed 5%.

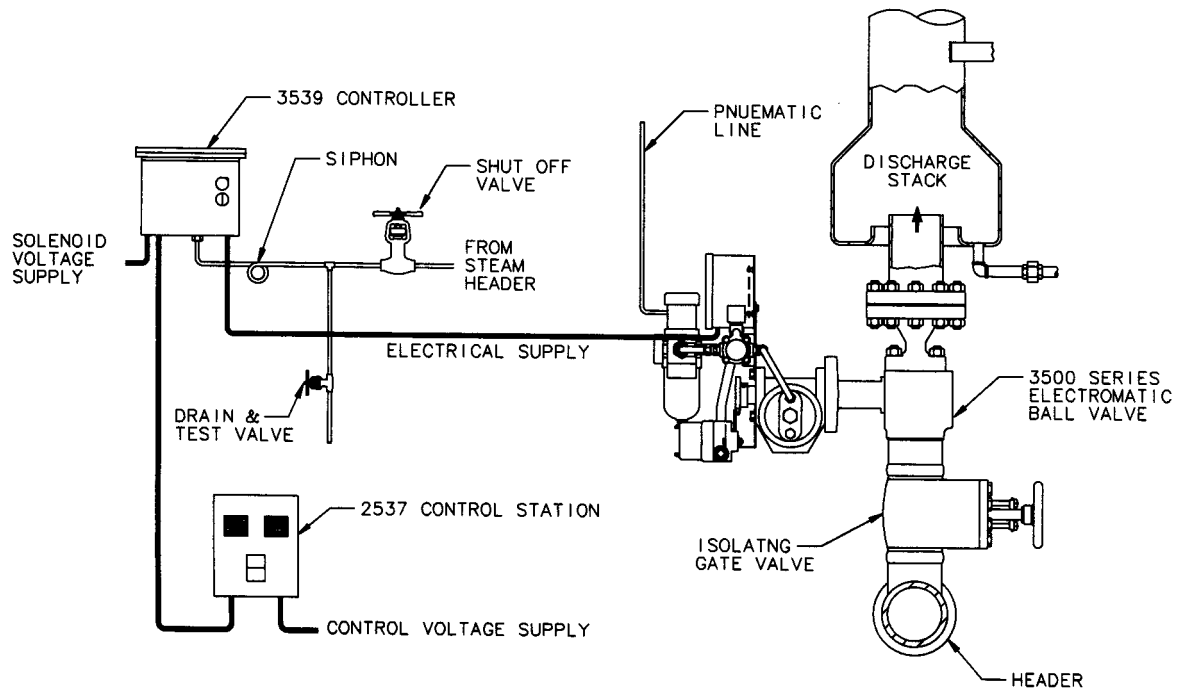
The field wiring must have insulation suitable for at least 600 volts. The solenoid insulation is Class F.

Environmental Conditions

- Indoor or outdoor use
- Elevation (maximum) 2000 M
- Operating ambient temperature maximum 140°F.
(CE certified at 40°C maximum)
- Pollution Degree - 2
- Over voltage category III
- Main supply voltage fluctuations $\begin{smallmatrix} +10\% \\ -5\% \end{smallmatrix}$ of the nominal voltage
- International standards protection classification 1P65

VII. (Continued)

Figure 1



ConsolidatedTM ElectromaticTM Ball Valve System

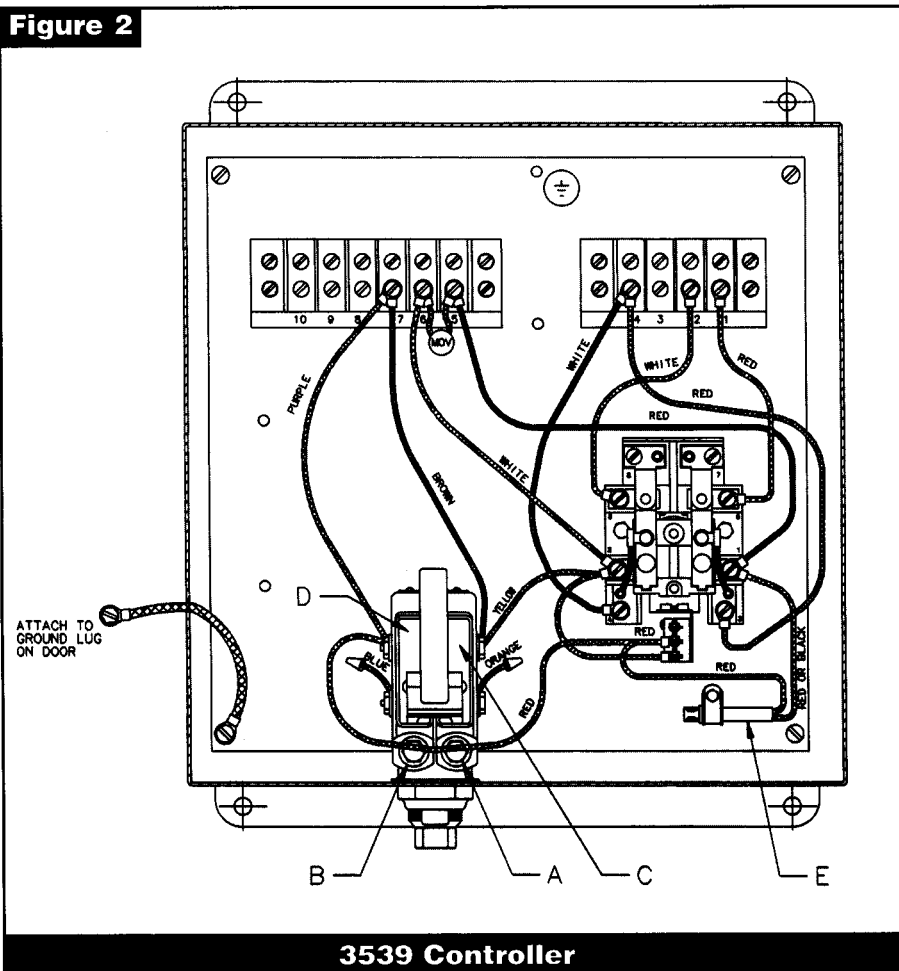
VIII. Operating Principles - Electrical System

The Electromatic Ball Valve is a 90 degree turn "open to close", electrically controlled, pneumatically actuated relief valve. Automatic actuation at a predetermined set pressure is accomplished by a 3539 controller.

VIII. (Continued)

The Field Wiring must have insulation suitable for at least 600 volts.

The Type 3539 Controller is actuated by the pressure in any vessel to which it is connected. The construction of the Controller is such that it will make and break electrical contact with a difference in pressure of 1-1/2% of the "set pressure". Within the Controller (see Figure 2, below) is the Dual Control Pressure Switch.



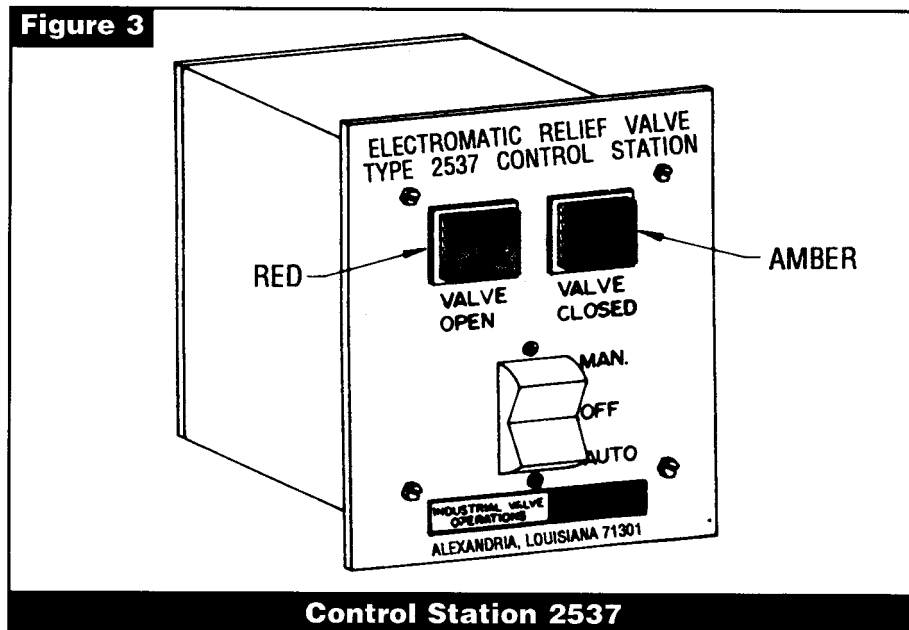
Adjusting Screws A and B determine the operating point of each switch. When the pressure increases to the "set point", High Pressure Switch C is actuated and completes the relay circuit that energizes the valve solenoid. The Low Pressure Switch D then provides for relay control below the actuation value of the High Pressure Switch, thereby allowing an adjustable blowdown for the Electromatic® Valve. This action makes extremely sensitive regulation possible.

The Type 2537 Control Station, which includes a switch and two lights, is a small unit that can be mounted in a control panel.

VIII. (Continued)

The Control Station is electrically connected to the Type 3539 Controller. With the Control Station Switch in the "automatic" position (see Figure 3, below), the "amber" light turns on and remains on until the valve is opened.

Figure 3



Control Station 2537

When the pressure reaches the predetermined point, at which the valve is set to open, contact is made in the Type 3539 Controller, resulting in the relay closing. Accordingly, the solenoid valves are energized, and the valve opens. At this time the "red" light in the Type 2537 Control Station turns on which indicates that the valve is open. When the pressure decreases below the adjusted closing point of the valve, the relay de-energizes and this, in turn, de-energizes the solenoid valves, and causes the valve to close. The "red" light in the Type 2537 Control Station will then go off, and the "amber" light will go on. The lights on the control station are controlled by a position switch on the actuator.

When it is desirable to open the valve "manually", this can be accomplished by simply pushing the Control Station Switch to the "manual" position. To close the valve, it is only necessary to push the Control Station Switch to the "off" position.

NOTE:

Remember that when the switch is in the "automatic" position, the valve will open at the predetermined pressure for which it is set.

IX. Storage and Handling Prior to Installation

The valve, either crated or un-crated, should always be kept with the inlet down, (i.e., never laid on its side).

Never attempt to lift the full weight of the valve by the actuator tubing, solenoid valve, junction box, etc.

Electromatic® Ball Valves should be stored, in their original shipping crates, in a dry environment, to protect them from the weather. They should not be removed from the crates until immediately prior to installation.

The inlet and outlet protectors should not be removed until the valves are ready for installation into the system.

Electromatic® Ball Valves, either crated or un-crated, should never be subjected to sharp impact. This would most likely occur by bumping or dropping during loading or unloading from a truck, or while moving with a power conveyor, such as a fork lift truck. While hoisting during installation, care should be exercised to prevent bumping the valve against structures or other objects.

When Electromatic® Ball Valves are uncrated, and the inlet and outlet protectors are removed immediately prior to installation, meticulous care should be exercised to prevent dirt, or other foreign materials, from entering the inlet and outlet ports while installing the valves.

⚠ ATTENTION



Do not position inlet flange horizontally, or lift valve by tubing assembly or external devices.

⚠ WARNING



Improper tools or improper use of right tools could result in personal injury or product damage.

⚠ CAUTION



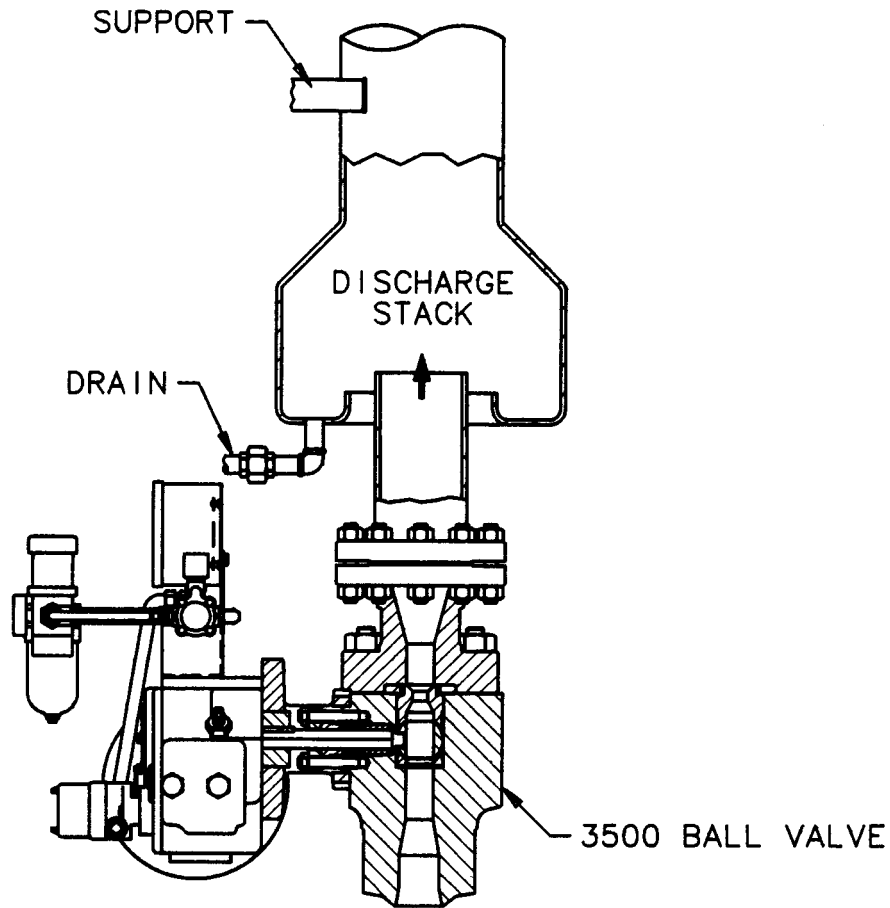
Do not allow dirt or foreign matter to enter the inlet or outlet ports.

X. Recommended Installation Practices

A. Main Valve

The power actuated Relief Valve is customarily installed either on a superheater, or on a manifold fed by two or more boilers. To facilitate servicing, an Isolation Valve should be installed directly below the Main Valve, as shown in Figure 1. (Refer to ASME Code Restrictions for code stamped valves).

Figure 4



Recommended Exhaust Stack Installation

Optional Voltages

Type	Voltage	Frequency	Amperage
3500 Ball Valve	24, 240, 480 AC	60 HZ	.3
	110 AC, 200 AC	50 HZ	.3
	6, 12, 24, 120, 220 DC*	DC	1.0

* Special Limit switches required for DC Voltages

X.A. (Continued)

Care should be taken to ensure that mechanical strains from the discharge piping are not transmitted to the Electronic Ball Valve. Such strains are detrimental to good valve performance. The discharge pipes should have adequate steam capacity and should be of a size to provide for movement caused by thermal expansion. Discharge piping should be drained to prevent the accumulation of water in the valve outlet. At no time should the discharge piping bear against the drip pan, or the nipple therein. The riser piping should be securely anchored to the building structure, and never to the valve, in order for it to resist the reactive forces of the discharged steam. The drains should be piped in such a manner as to prevent the unnecessary escape of steam into any enclosure, and to keep foreign material from being blown back into the valve from other sources (Refer to Figure 4).

Cover the main valve outlet, during system shut downs, when the valve is not in service, or is not pressurized, to prevent foreign matter from entering into the main valve.

WELDING CAUTION

This valve contains carbide coated parts that may be damaged if exposed to extreme temperatures associated with welding and post weld heat treatment. Welding interpass temperatures should be held between 500 and 600 F. Local post weld heat treatment of the weld and heat affected zone is recommended. If the entire valve body is to receive post weld heat treatment, the ball and seat assembly should be removed. The O-ring gasket must not be reused after disassembly. Refer to valve service manual for disassembly and assembly instructions.

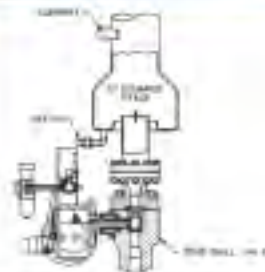
B. Type 3539 Controller

Care must be taken in mounting the Controller, since it will not operate properly if subjected to vibration. It is recommended that the Controller be mounted directly to the building structure and, depending on the installation, it may even be advisable to mount the Controller on some type of shock absorbing material, in order to isolate it from the any vibration in the building structure. Since the sensing line from the pressure vessel may also transmit vibrations to the Controller, precautions should be taken to eliminate this possibility. DVCD suggests that several loops of high-pressure tubing be used to accomplish this task. Further, the pressure sensing connection should be mounted at least eight to ten pipe diameters upstream from the Electronic Ball Valve in order to provide a stable pressure signal. Finally, if the Controller may be subjected to freezing temperatures, a heating element should be added to prevent freezing of the bourdon tube.

C. Required Wire Gauge

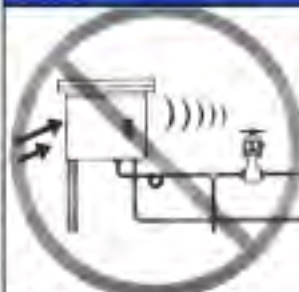
The electrical supply to the Controller (solenoid voltage) should have stranded wiring. The wire should be no smaller than 12 AWG. If necessary, the wire should be larger than 12 AWG, to prevent more than a 5% voltage drop to the solenoid inrush current.

ATTENTION



Do not place mechanical strains on valve discharge piping.

ATTENTION



Do not allow controller to be subjected to vibrations.

DANGER



AVOID ELECTRIC SHOCK



XI. Hydrostatic Testing

When conducting a hydrostatic test involving the Electronic Ball Valve, the sensing line to the bourdon tube should be disconnected, or isolated, to prevent damage to the bourdon tube in the Controller. Be sure to reconnect the sensing line after the hydrostatic test is completed. The hydrostatic test may be conducted with the Isolating Gate Valve closed, unless the Electromatic® Ball Valve is to be subjected to the hydrostatic test. In such case, either the Isolating Gate Valve, or the By-Pass Valve, should be opened.

XII. Start-Up of the System

A. Prior To Start Up Checks

1. Open the isolation valve if it is closed.
2. Turn on the power and set the Type 2537 Control Station switch to the "Automatic" position. If the electrical system is on the amber light will be turned on.
3. Set the Control Station switch to the "Manual" Position. Observe to verify that the valve rotated to the open position. The red light will be turned on at this point.
4. Return the Control Station switch to the automatic position. The valve should close, the red light go out and the amber light will be turned on.

B. System Start Up

1. If the Power Actuated Relief valve is equipped with an isolation valve, this valve **MUST BE OPEN** during system start up. Bringing the system online and then opening the isolation valve **WILL RESULT** in damage to the coating on the ball and seat. This **WILL RESULT** in seat leakage. Isolation valves equipped with by-pass valves may be closed during start up provided the by-pass valve is OPEN.

C. Adjusting the Set Pressure and Blowdown

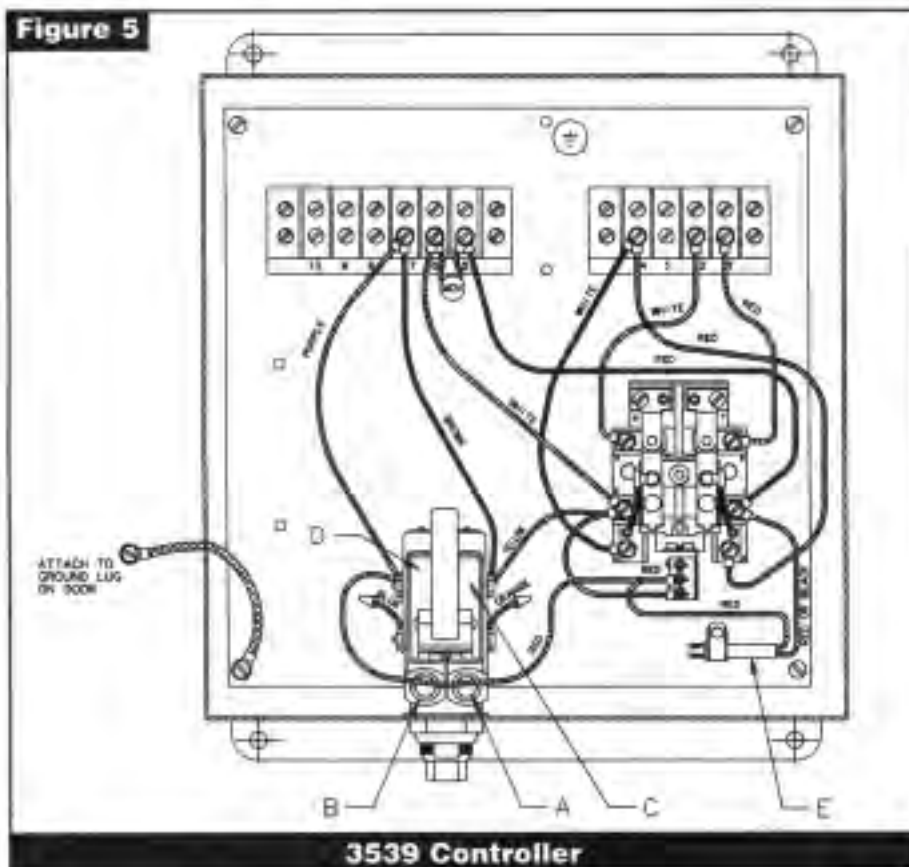
To adjust the bourdon tube for "set point" and blowdown, refer to Figure 5. Open door on controller. Only make contact with Screw "A" and Screw "B" (Figure 5) for adjustment purposes. **DO NOT** make contact with any other terminal or screw due to live voltage and risk of electric shock.

Screw A is used to adjust the "set point". By turning Screw A counter-clockwise, the "set point" will be increased. Conversely, by turning Screw A clockwise, the "set point" will be decreased.

The Low Pressure Switch Indicating Light E is to be utilized in adjusting the blowdown. Accordingly, as the system pressure is increased, the Indicating Light E will come on, indicating actuation of the Low Pressure Switch D.

XII.C. (Continued)

Figure 5



Since the Low Pressure Switch controls the closing pressure of the valve, the closing pressure of the valve is known before the valve opens. As the pressure decreases, the actual "closing point" of the valve is indicated when light E goes out.

Screw B is used to adjust the "closing point" of the valve, which establishes the blowdown of the valve. By turning Screw B counterclockwise, the "closing point" will be increased, thus shortening the blowdown. Conversely, by turning Screw B clockwise, the "closing point" will be decreased, lengthening the blowdown.

Example: With the valve set at a pressure of 2000 psi, the "set point" can be increased to 2020 psi by turning Screw A counterclockwise. To reduce the "set point" to 1990 psi, Screw A must be turned clockwise.

The Type 3539 Controller is capable of being adjusted to an extremely short differential, or blowdown setting. It is not always possible, however, to take full advantage of this short blowdown adjustment, if the pressure connection to the sensing element is connected to the superheater, due to an additional pressure drop. Therefore, if this additional pressure drop, under any load condition, exceeds the closing point setting of the valve, the valve will chatter. Accordingly, it is absolutely essential that the pressure connection from the header be at least 8-10 pipe diameters upstream from the Electromatic® Ball Valve inlet.

⚠ DANGER



AVOID ELECTRICAL SHOCK
Touch only Screw "A" and "B"

⚠ DANGER

Make sure there is no pressure in the valve before disassembly.

XII. (Continued)

D. Minimum Blowdown Setting

The DVCD recommended blowdown settings for the valve are shown in Table I below.

TABLE I	
RECOMMENDED SETTING	
SET POINT	MIN. BLOWDOWN
to 1000 psig	3.0%
above 1000 psig	2.0%

NOTE:

Due to some systems having vibrations or pulsations, it may be necessary to increase the blowdown of the valve.

XIII. Disassembly

CAUTION: Make sure that no pressure is in the valve prior to disassembly. If equipped with an isolation valve, close the isolation valve and actuate the EBV valve open to closed to remove all pressure. If not equipped with an isolation valve, the unit must be shut down prior to disassembly.

A. Ball, Seat and Loader Assembly Removal Refer To Figures 7 and 8

1. If the ball, seat and loader assembly is to be removed while on the unit and the installation is equipped with an isolation valve, close the isolation valve. Actuate the EBV from open to close to relieve any pressure between the EBV and the isolation valve. If not equipped with an isolation valve, the unit must be shut down prior to disassembly.
2. If disassembling on the unit, remove the discharge stack. If the valve is not in the closed position, actuate it to the closed position.

CAUTION: Do not actuate the valve with the collar removed. Damage to the ball may result.

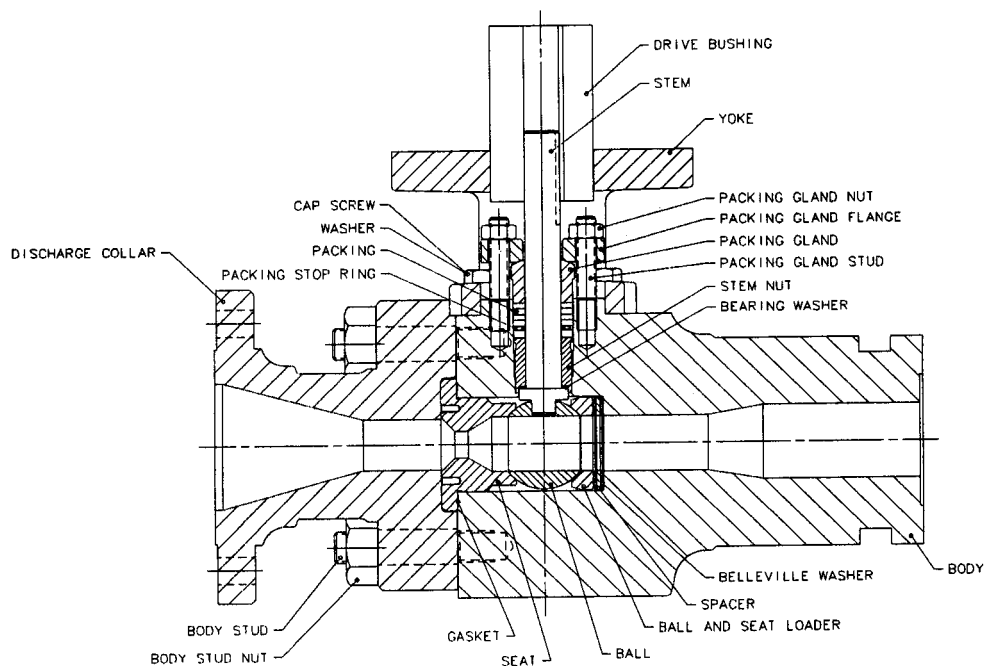
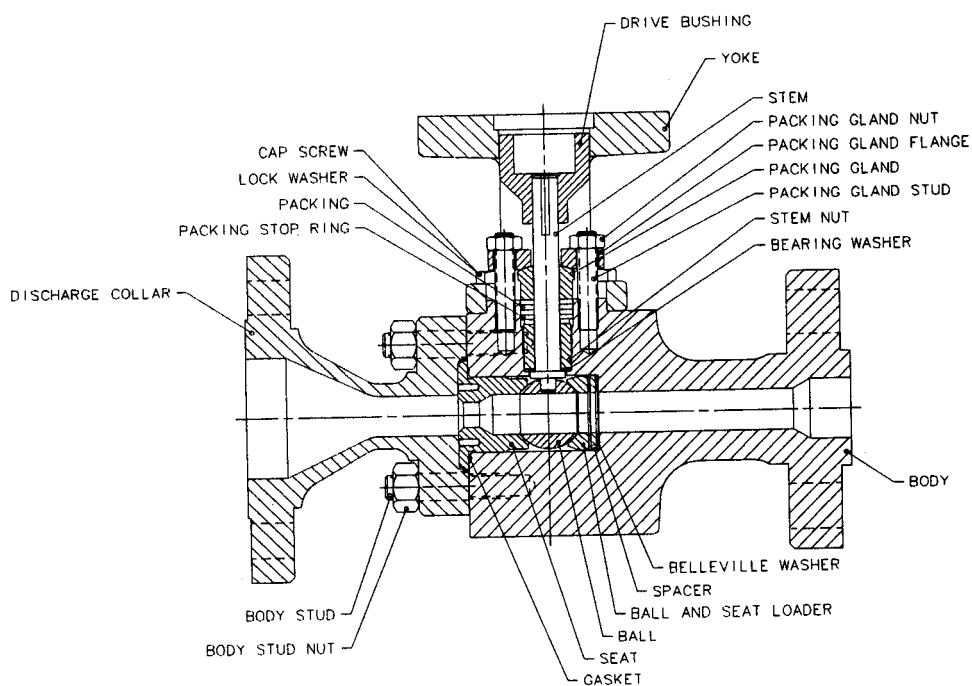
3. Loosen and remove the body stud nuts.
4. Lift the discharge collar off of the valve.
5. Two threaded holes are provided so that a bolt or all-thread can be used to remove the seat. The 1-1/2" and 2" size valves are tapped with a #10-32 thread. The 2-1/2" valves are tapped with a 1/4"-20 thread. Screw two bolts or two pieces of all-thread into the two threaded holes. Lift the seat out of the body.
6. Using two lifting hooks illustrated in Figure 6, remove the ball. This is accomplished by inserting the hooked end into the flow port of the ball and lifting upward.
7. Insert the hook end of one of the lifting hooks under the seat loader and rotate the loader until it's bore is perpendicular to the body bore. Lift the loader up and out of the body.
8. Remove the two Belleville washers and the spacer.

Figure 6



**BALL PLACEMENT AND
REMOVAL TOOL
(Make Locally)**

XIII. (Continued)

Figure 7

Typical 2 1/2" Size
Figure 8

Typical 1 1/2" and 2" Size

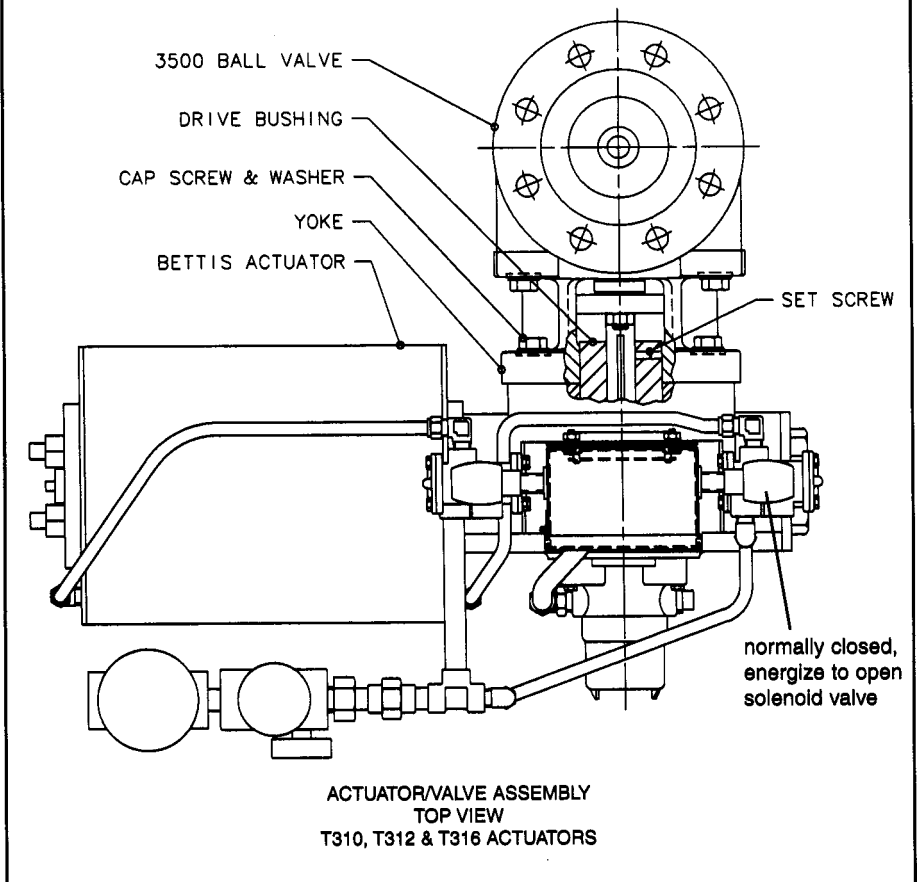
XIII. (Continued)

B. Actuator Assembly Removal

Refer to Figures 9, 10 or 11

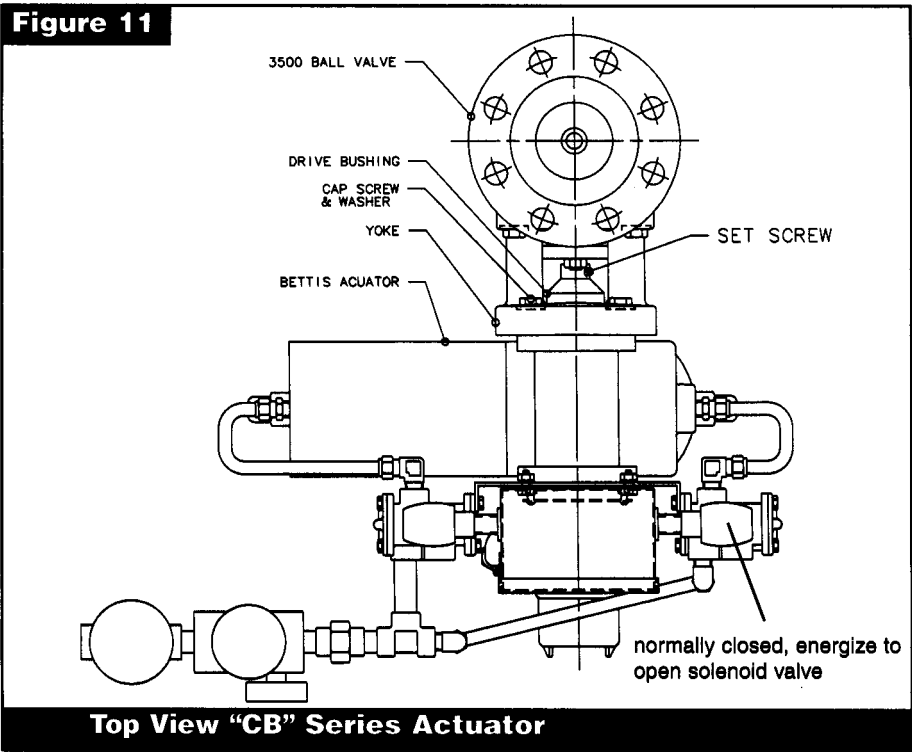
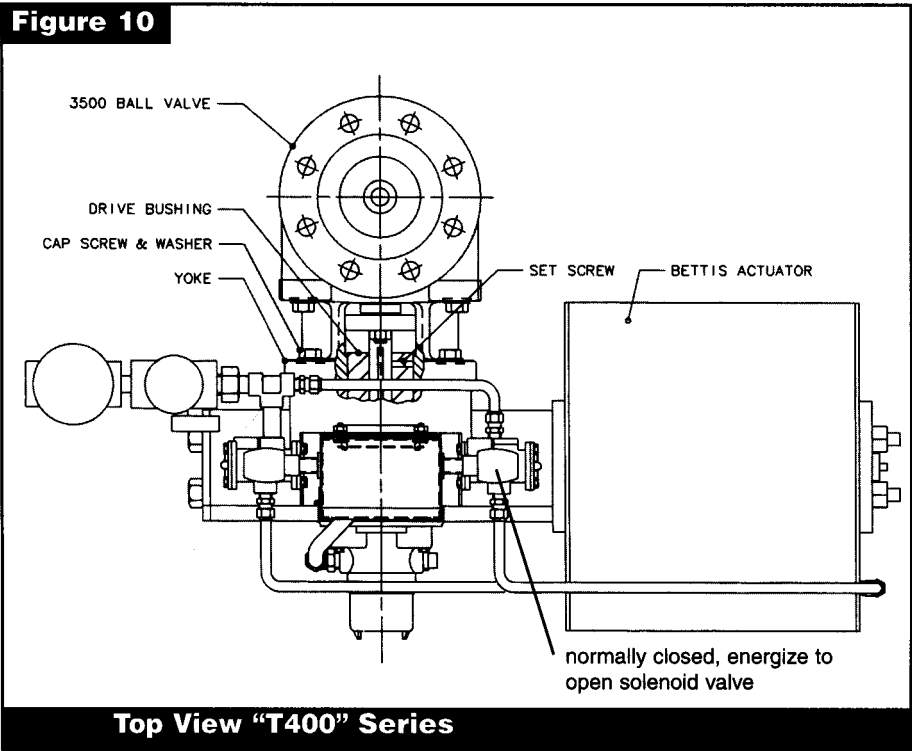
1. Shut off the service air line and disconnect it from the actuator.
2. Shut off the electrical supply to the actuator mounted junction box. Disconnect electrical wires and conduit coming from the controller to the junction box at the junction box.
3. Attach a strap sling around the cylinder portion of the actuator at the end near the housing. **NOTE: Do not connect a lifting device to the junction box, solenoid valves or tubing.** Hook a chain hoist or other suitable lifting device to the strap sling. Adjust the hoist until no slack is in the line. Loosen and remove the four actuator mounting bolts connecting the yoke to the valve body. Slide the actuator and yoke assembly away from the valve until the mounting yoke is clear of the drive bushing.

Figure 9



For "T-300" Series Actuator

XIII. (Continued)



XIII. (Continued)

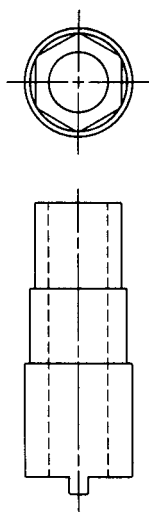
C. Stem Removal

Refer to Figures 7 and 8

1. Loosen the allen head set screw in the drive bushing. Slide the bushing off the stem and remove the drive key.
2. Loosen and remove the two packing gland stud nuts. Remove the packing gland flange and the packing gland.
3. Using a wire hook or screw driver, dig out the grafoil packing. The packing stop washer is drilled and tapped with two #10-32 threaded holes. Screw a piece of all-thread or a #10-32 screw approximately 3" long into one of the holes in the packing stop washer. Slide the packing stop washer off the stem. The stem nut can now be removed using the stem nut wrench, illustrated in Figure 12 & 12A. Rotate the nut counterclockwise to remove it.
4. Remove the stem and bearing washer from the body.

Figure 12

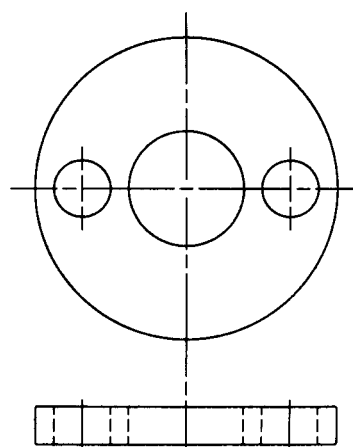
STEM NUT REMOVAL TOOL	
PART NO.	USED ON
4948901	3515, 3525 3516, 3526
4947101	3517, 3527, 3537
4945701	3547



**STEM NUT
REMOVAL TOOL**

Figure 12A

RETAINER PLATE	
PART NO.	USED ON
4949001	3515, 3525 3516, 3526
4947001	3517, 3527, 3537
4946901	3547



RETAINER PLATE

XIV. Cleaning

The 3500 Electronic Ball Valve parts may normally be cleaned with wire brushes, and low pressure air. Whatever method is used, clean the parts safely and use care to prevent damage to the environment. If internal parts are cleaned with industrial solvents or cleaning solutions, take precautions to protect yourself from potential danger of breathing fumes, chemical burns, or explosion. See the Manufacturers Safety Data Sheet for safe handling instructions and information about protective clothing and equipment for use when working with the chemical.

The outside surfaces of the Actuator, 2537 Control Station, and 3539 Controller Box may be cleaned by wiping with a damp cloth.

XV. Inspection

Visually inspect all parts for cleanliness and the presence of foreign materials. Clean and reinspect as necessary.

Inspect the carbide coating of the ball, seat, seat loader, stem and bearing washer for cracking or flaking. Replace if damaged.

Check electrical wires for cracking or other damage to the insulation. Replace as necessary.

Inspect solenoid valves and regulator for obstructions in their ports. Clean or replace as necessary.

XVI. Maintenance

A. Seat Leakage

If leakage should occur use the following procedure to determine and correct the cause:

1. Verify that the normally closed solenoid valve is energized and vented. To accomplish this, check the voltage across terminal 2 and 3 in the actuator junction box. There should be voltage at these terminals when the valve is closed. If no voltage is present, check continuity across terminals 3 and 4. There should be continuity across these terminals when the valve is closed. If there is no continuity, adjust the closed side actuator switch lever cam until the circuit is closed. Actuate the valve and check for leakage.



2. If the switch is properly adjusted and leakage continues, the ball and seat assembly must be removed and checked. The valve must be isolated from system pressure before it can be disassembled. Using the procedures outlined in the disassembly section of this manual remove the Adapter Flange and Ball and Seat assembly. Inspect the spherical radius in the seat for cutting or flaking of the chrome carbide. Inspect the spherical radius of the ball for cutting or flaking of the chrome carbide. Very light flaking at the edge of the bore is acceptable. If the seat is damaged and the ball has galling or flaking of the carbide coating the entire ball and seat and loader assembly must be replaced. Remove the old gasket and clean the gasket surfaces of the body and the busing. Reassemble the valve using the procedures outlined in the assembly section of this manual. Pressurize and actuate the valve. Check for leakage.
3. If a new ball, seat and loader assembly has been installed and the valve still leaks, the stem bearing pad must be replaced. Refer to the disassembly and assembly section of this manual for disassembly and assembly instruction. The valve must be isolated from system pressure when removing and replacing the stem bearing pad. New packing must be installed each time the stem is removed.

B. Actuation System Trouble Shooting

Table II is provided as a guideline to be followed should the actuator fail to function properly. If all the steps listed in Table II are followed and the actuator still does not function, the factory should be consulted.

NOTE:

The valve should be isolated from system pressure while trouble shooting of the actuation system. Accidental actuation of the valve could occur.

XVI. (Continued)

TABLE II		
PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
I. Valve will not open when over pressure occurs	1. 3539 pressure switch CR1 & CR2 not properly set	Check CR1 & CR2 settings. If not correct - Reset pressure switches. If correct - Go to possible cause 2.
	2. No air supply pressure to the solenoid valves	Re-establish air supply pressure to the solenoid valves.
	3. Solenoid valve coil burnt out	Check solenoid coil. Burnt coil - Replace coil. No - Go to possible cause 4.
	4. Loss of electric power supply	Check voltage. No voltage - Re-establish electric power. Has voltage - Go to possible cause 5.
	5. Damaged ON/OFF/AUTO selector switch in 2537 control station	Check continuity of contacts. No continuity - Replace switch has continuity - Go to possible cause 6.
	6. Defective high and/or low pressure switch (CR1 & CR2) in 3539 controller	Check voltage at 3539 terminals T5 & T6 and at T6 & T7. No voltage - Replace pressure switch. Has voltage - Go to possible cause 8.
	7. Relay CR3 in 3539 failure	Check voltage at 3539 terminals T3 to T2 & T3 to T1. No voltage - Replace relay. Has voltage - Go to possible cause 8.
	8. Wiring or terminal lug failure	Check all wire and terminal connections. Replace as required.
II. Valve will not open with the control station selector in the manual mode or reclose when put in "automatic"	1. No air supply pressure to the solenoid valves	Re-establish air supply pressure to the solenoid valves.
	2. Solenoid valve coil burnt out	Check solenoid coil. Burnt coil - Replace coil. No. - Go to possible cause 3.
	3. Loss of electric power supply.	Check voltage. No voltage - Re-establish electric power. Has voltage - Go to possible cause 4.
	4. CR5 in actuator limit switch not properly set or has failed.	Check continuity between junction box terminals 3 & 4. No continuity - Replace switch. Has continuity - Go to possible cause 6.
	5. Damaged ON/OFF/AUTO selector switch in 2537 control station	Check continuity of contacts. No continuity - Replace switch. Has continuity - Go to possible cause 6.
	6. Relay CR3 in 3539 failure	Check voltage at 3539 terminals T3 to T2 & T3 to T1. No voltage - Replace relay. Has voltage - Go to possible cause 7.
	7. Wiring or terminal lug failure	Check all wire and terminal connections. Replace as required.

XVI. (Continued)

C. Packing Leakage

Should packing leakage occur, tighten the two packing gland nuts in quarter turn increments. Check after each quarter turn adjustment to see if leakage has stopped. The packing should be tightened only enough to stop the leakage.

If the leakage cannot be stopped by tightening the gland nuts, the valve should be repacked with new packing. The valve can be repacked without removing the actuator and actuator yoke if split ring service packing is used. Refer to Table III for part numbers. The EBV can also be repacked with grafoil ribbon pack. If the Electronic Ball Valve is equipped with an isolation valve it **must** be closed to isolate the EBV. Open the EBV from open to closed to relieve pressure trapped between the EBV and the isolation valve. If the EBV is **not** equipped with an isolation valve, the unit **must** be shut down.

Loosen the packing gland bolts one full turn. Wait approximately two minutes to verify that the gland and flange does not move and reload the packing gland nuts. Loosen the actuator drive bushing lock screw and move the bushing away from the packing gland flange enough to allow removal of the packing gland stud nuts. If the gland and flange has not reloaded, loosen and remove the two packing gland nuts. Move the packing gland flange and packing gland away from the stuffing box until the flange contacts the yoke. Using a wire hook similar to the one illustrated in Figure 6, or a packing remover, remove the grafoil packing from the stuffing box. Place the split ring packing around the stem below the packing gland. Use the gland to position the packing in the stuffing box. The correct number of rings is specified in Table III. Install the packing gland nuts and tighten. Final adjustment must be made after the valve is pressurized. Tighten just enough to prevent leakage.

TABLE III

SPLIT RING SERVICE PACKING

VALVE TYPE	PART NUMBER	QUANTITY
3515, 3516, 3525 & 3526	4960902	3
3517, 3527 & 3537	4960901	3
3547	4960903	3

XVI. (Continued)

D. Electrical System

To inspect for proper wiring of the Controller, Control Station and the actuator, refer to Figure 13 and 14.

If trouble is encountered in the Controller, the Control Station or the actuator, refer to the Trouble Shooting Chart shown in Table II.

Each block in the chart identifies a particular piece of equipment (i.e., the Controller, the Control Station, the actuator assembly, etc.), and the terminal to check when the system is malfunctioning. Therefore, when numbers and letters, such as T7 or T8, are encountered in the Trouble Shooting Chart, these refer to specific terminals, such as 7 or 8, in a particular piece of equipment.

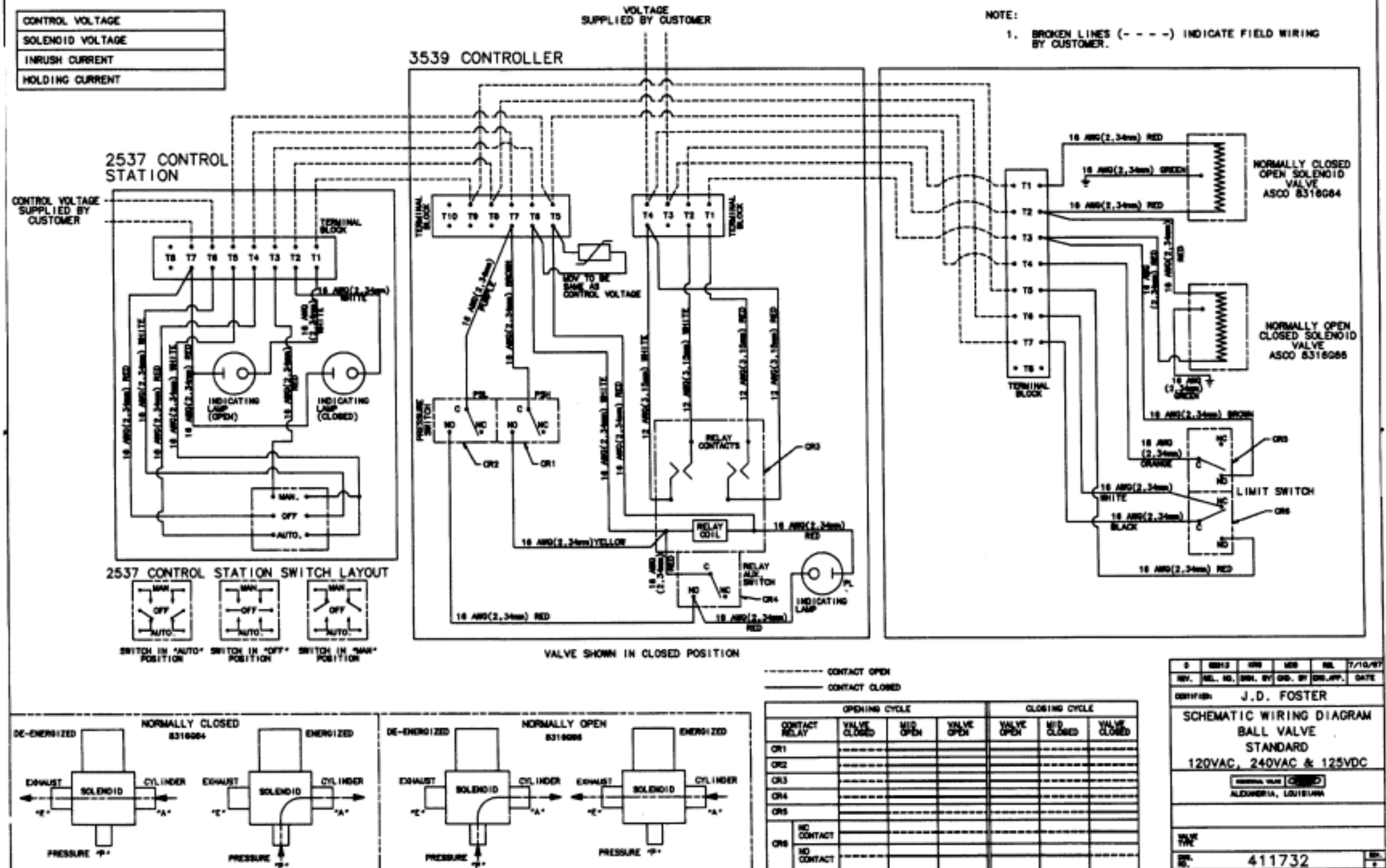
Note: Supply wiring should be large enough to prevent more than a 5% voltage drop to the solenoid in-rush current. A voltage drop may cause the solenoid to fail.

<u>WIRE AWG</u>	<u>DIA (mm)</u>
16	1.52
12	2.66

Note: A 5 AMP circuit breaker should be installed to protect the controller.

XVI. (Continued)

Figure 13



[illegible]

XVII. Reassembly

A. Lubrication

Acceptable lubricants are Molykote GN paste® and Sentry's Twist® antisieze compound.

All threaded fasteners except pipe threads and tube fittings are to be lubricated. Pipe threads must be sealed with pipe thread sealant or teflon tape.

Care must be taken not to get lubricant on any other valve surfaces.

B. Tools Required

1. Stem nut wrench - see Figure 12 & 12A.
2. Two hooks for installation/removal of the ball. See Figure 6.
3. Torque wrench or torque adjustable impact wrench.
4. Various size open x boxed end wrenches.
5. Screw drivers.
6. Wire cutter, stripper and lug crimper combination tool.

C. Valve Assembly

Refer to Figures 7 and 8

1. Place the valve body in a vise or other suitable holding fixture with the seat bushing opening facing up.
2. Place the bearing washer onto the stem and slide against the bearing shoulder of the stem.
3. Place the stem nut onto the stem with the milled wrench slots facing away from the large end of the stem.
4. Insert the stem, bearing washer and stem nut assembly into the stuffing box opening of the body. Screw the stem nut into the body and torque to the value specified in Table IV.
5. Place the packing stop ring over the stem and slide it down into the stuffing box until it contacts the stem nut.
6. Place the packing rings over the stem and slide them down into the stuffing box.
7. Install the packing gland to the stem with the larger spherical radius facing away from the valve.

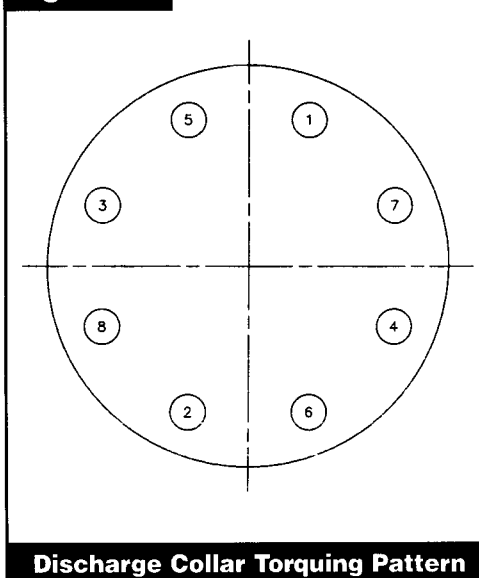
TABLE IV
BOLTING TORQUE - FT/LBS

VALVE TYPE	DISCHARGE COLLAR STUD NUTS	PACKING GLAND STUD NUTS	STEM NUTS	YOKE BOLTS	ACTUATOR BOLTS
3515, 3525, 3516 & 3526	90	35	50	50	50
3517, 3527 & 3537	200	50	100	75	75
3547	275	50	125	100	100

XVII.C. (Continued)

8. Place the packing gland flange onto the stem and align the two holes with the packing gland studs. Slide it down until it contacts the packing gland. Screw the packing gland nuts onto the packing gland studs until they contact the gland flange. Tighten hand tight.
9. Rotate the stem so that the "Tee" of the stem head is perpendicular with the valve center line. With the small tapered end of the Belleville Washer up. Insert the first Belleville Washer into the guide bore at the top of the body. It should rest flat at the bottom of the guide bore. Install the spring spacer, with the tapered end of the second Belleville Washer down, insert it into the guide bore. It should seat on the spacer.
10. Rotate the seat loader so that the bore center line is perpendicular to the body center line. Lower the loader into the bore until the lower edge is below the "Tee" of the stem. Rotate the loader under the "Tee" until it rests flat on the Belleville Washer. The 45 degree seat angle and 15 degree tapered angle must be facing the top of the body.
11. Rotate the stem until the "Tee" of the stem is in line with the valve center line. When viewing the stem from the top the milled keyway must face to the left on T300 series and to the right for T400 series actuator. With the flow port perpendicular to the body center line, use two wire hooks to lower the ball into the body. The slot in the ball must align with the stem "Tee" and rest on the seat loader.
12. Insert a flat blade screw driver between the ball and the body at a location 180° from the "Tee" slot to prevent the stem from moving the ball. Tighten packing by torquing to the values in Table IV. Remove the screwdriver.
13. Prior to assembly of the seat bushing and bushing gasket, the bushing "stand off" must be checked. Follow the steps below to check "stand off":
 - a. Install the seat bushing into the body.
 - b. Lower the bushing until it rests on the ball.
 - c. Rotate the seat bushing back and forth to insure it is not binding.
 - d. Without exerting downward force on the bushing, use a depth micrometer and measure the distance from the top of the bushing to the top of the body.
 - e. The correct dimensional ranges for this distance are in Table V.
14. Remove the bushing from the body. Place the bushing gasket in the gasket recess of the body. Install the bushing in the body.
15. Align the bolt holes of the discharge collar with the discharge collar studs and place the discharge collar onto the body. Screw the discharge collar stud nuts onto the studs. Using the sequence in Figure 15, torque to the values in Table IV.

Figure 15



Discharge Collar Torquing Pattern

TABLE V
BUSHING "STAND OFF" RANGE

VALVE TYPE	STAND OFF
3515	.275-.320
3525	.275-.320
3516	.275-.320
3526	.275-.320
3517	.550-.625
3527	.550-.625
3537	.550-.625
3547	.535-.590

XVII. (Continued)

D. Actuator and Accessory Assembly for Bettis T300 and T400 Series Actuators - Refer to Figures 16 & 17 or 18 & 19

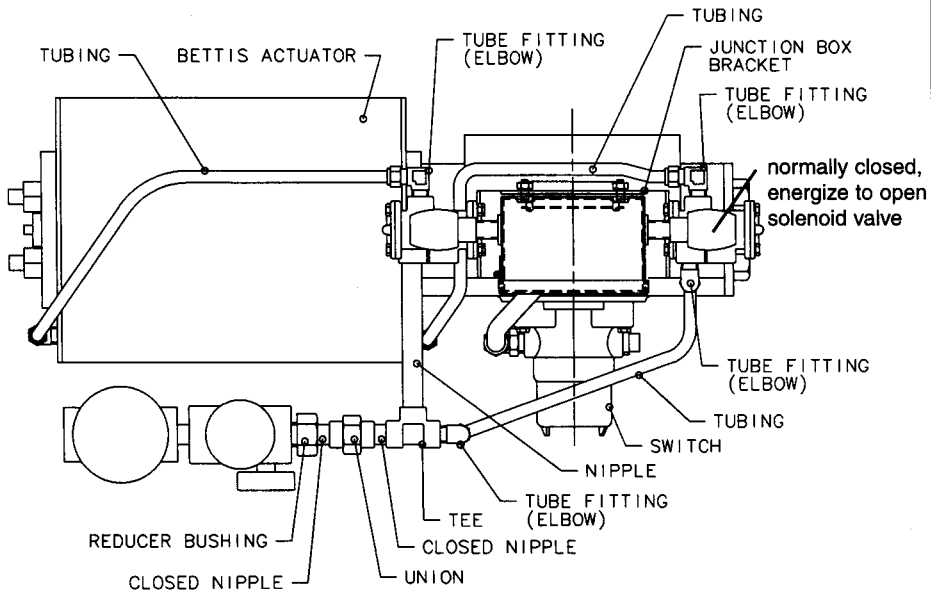
NOTE:

Generally removal of the accessories from the actuator is not required. If maintenance of accessories is not required, they should not be removed. If they were not removed, steps 1 through 6 will not be required.

1. Attach the accessory mounting bracket to the actuator using the bracket mounting bolts.
2. Attach the junction box to the mounting bracket using the box mounting screws.
3. Remove the two appropriate screws from the solenoid valve diaphragm case on the side that is to be attached to the mounting bracket. Using these two screws, attach the solenoids to the mounting bracket. The ASCO HT8316G64 must be mounted on the cylinder side of the actuator and the HT8316G66 on the opposite end.
4. From inside the junction box screw the 1/2" NPT pipe nipples thru the conduit holes and into the 1/2" female thread on the solenoid valve solenoid. Thread and tighten a conduit lock nut onto the nipple end in the junction box. Connect the conduit to the junction box and limit switch with two conduit connectors.
5. Wire the solenoid valves and the limit switch to the terminal block inside the junction box per the wiring diagram.
6. Connect all pipe fittings, tubing fittings and tubing as illustrated in Figure 16 and 17 for the Bettis T300 Series Actuator or 18 and 19 for T400 Series Actuator.

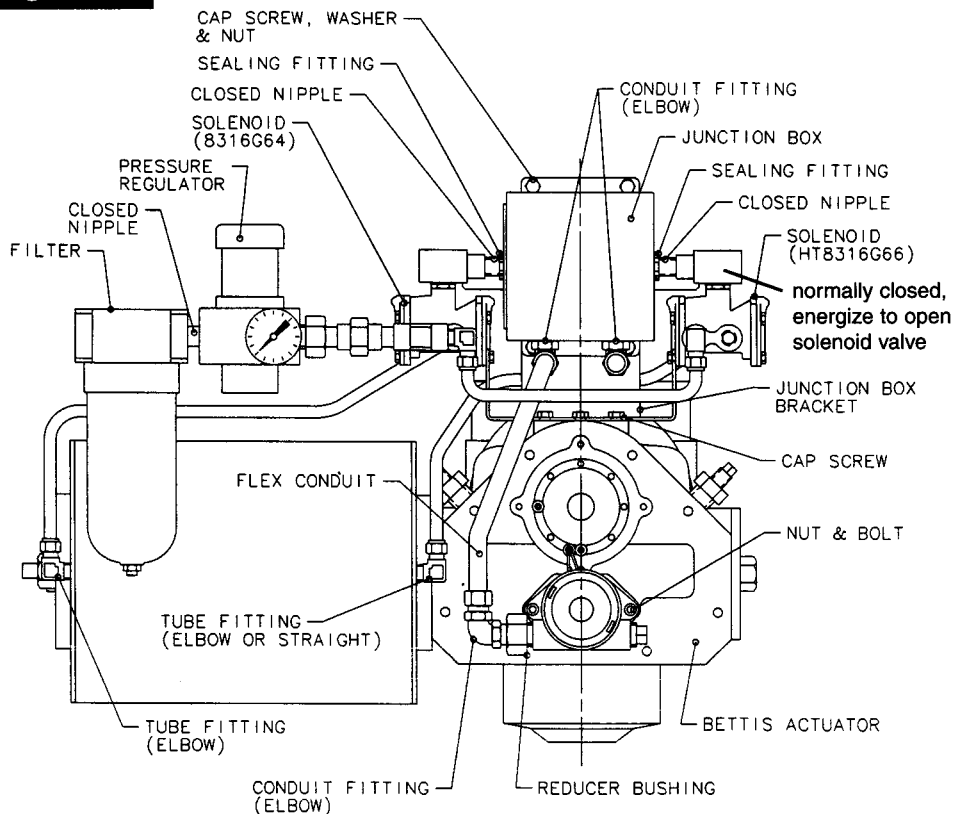
XVII.D. (Continued)

Figure 16



Top View of "T-300" Series Actuator

Figure 17



Front View of "T-300" Series Actuator

XVII.D. (Continued)

Figure 18

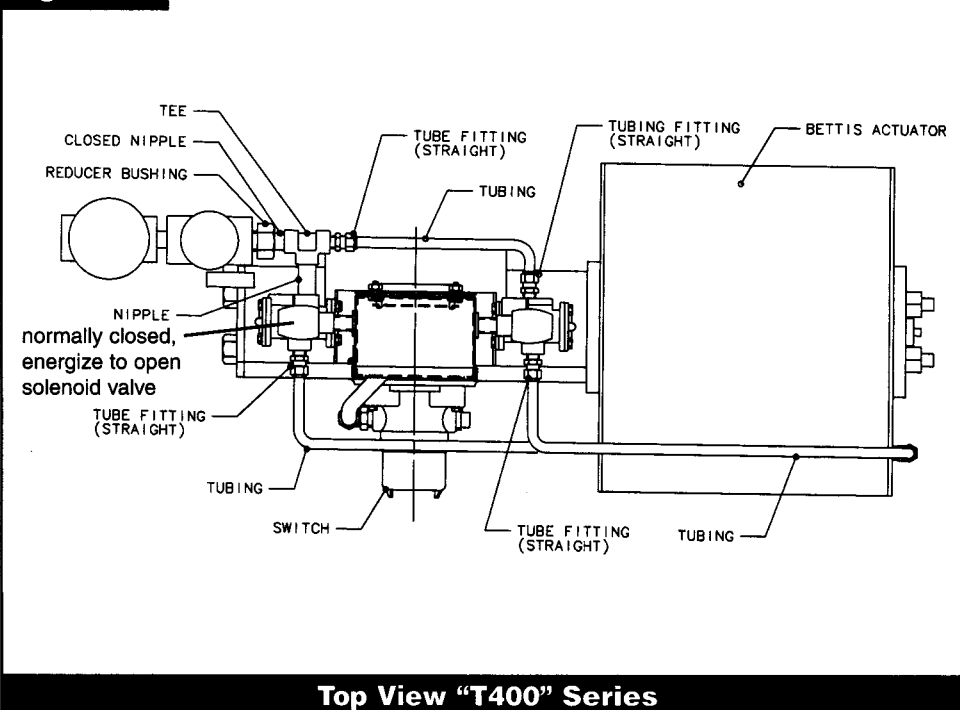
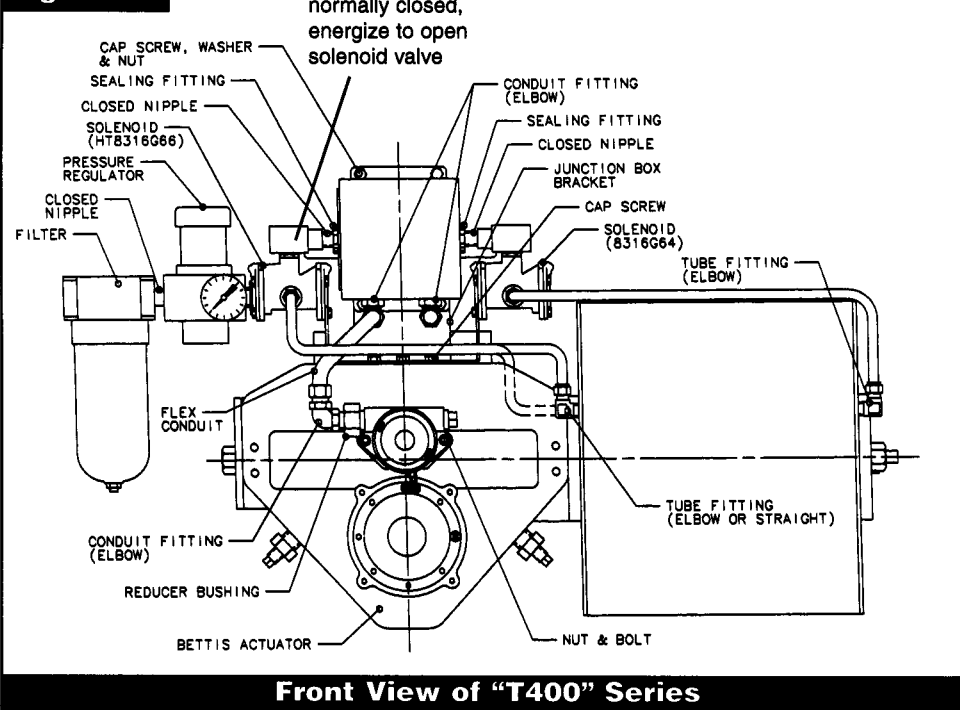


Figure 19



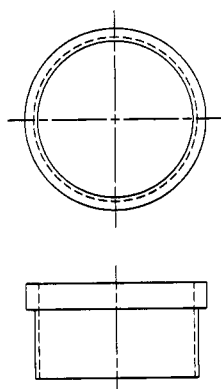
XVII.D. (Continued)

Note: For normal maintenance begin assembly with Step 7.

7. Slide the Actuator Drive Bushing approximately 3" into the Drive Sleeve of the Actuator.
8. Insert the yoke alignment tool (Figure 20) through the bottom of the yoke and into the Bushing Guide Bore of the Actuator Yoke (Figure 21).
9. For proper alignment assemble the Yoke to the Actuator with the Yoke Alignment Tool with the Actuator Drive Bushing in place.
10. Fasten the Yoke to the Actuator using the Cap Bolts provided and torque to the values in Table IV.
11. Remove the Actuator Drive bushing and the Yoke Alignment Tool from the yoke and Actuator.
12. Place the Key into the milled Keyway on the stem.
13. Align the Key in the Keyway of the Actuator Drive Bushing. With the key on the Stem of the Ball Valve.
14. Slide the Actuator Drive Bushing on to the Stem until it is about 1/8 in. from the Packing Gland Studs.
15. Thread the Socket Head Set Screw into the threaded hole in the side of the Actuator Drive Bushing.
16. Tighten to secure the Actuator Drive Bushing to the Ball Valve Stem.

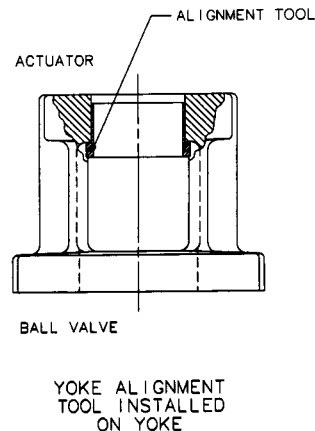
Figure 20

YOKE ALIGNMENT TOOL	
PART NO.	ACTUATOR TYPE
4990101	CB 525 and CBL 725
4990201	T310, T312, & T316
4990301	T410, T412, & T416



**YOKE ALIGNMENT TOOL
(SEE SECTION XV
FOR DETAILS)**

Figure 21



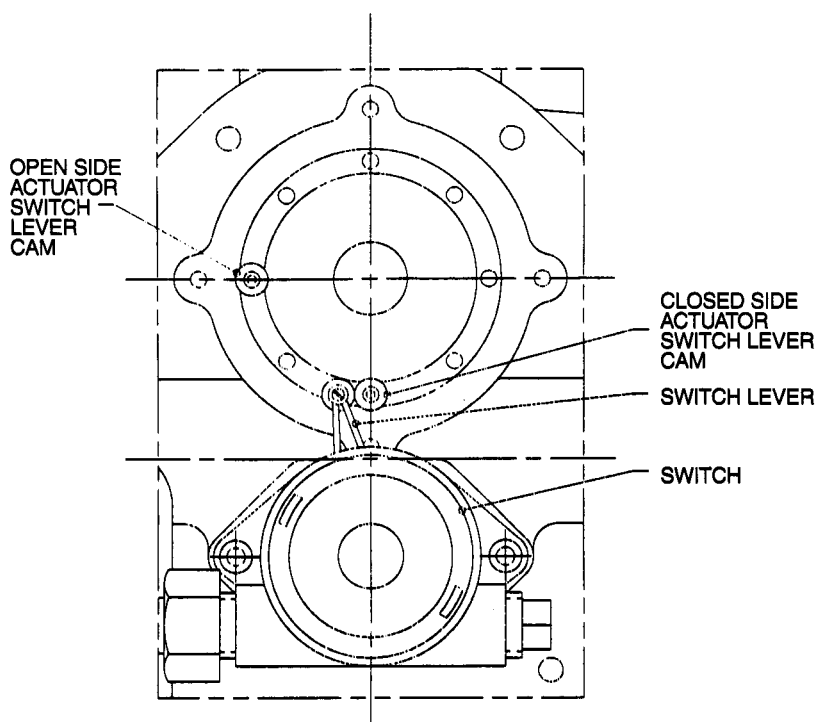
**YOKE ALIGNMENT TOOL
INSTALLED IN YOKE**

XVII.D. (Continued)

17. Temporarily tighten the packing gland nuts to prevent forcing the stem against the ball when assembling the actuator to the valve. Align the stem keyway 90 degrees to the left of the valve center line for T300 Series actuators and 90 degrees to the right for T400 Series actuators. Make sure the actuator is stroked to the closed location. (The keyway will be 45 degrees to the right of the centerline when viewing the actuator from the top.) Slide the actuator and yoke over the stem and seat the actuator yoke over the raised guide face and against the body. Install and tighten the yoke cap bolts to the torque specified in Table IV.
18. Remove the actuator output shaft cover. Rotate the actuator if required to align the keyway. Install the key into the keyway. Replace the actuator output shaft cover.
19. With the valve closed adjust the closed side cam bushing to trip the switch wired to the solenoid piped to close the valve. Refer to Figure 22 for an illustration of the switch tripping cams. Use a continuity tester or volt/ohm meter across terminal 3 and 4 to verify that the switch contacts are closed.
20. With the valve open, verify that the port hole thru the ball is perfectly aligned with the valve ports. If it is not, make adjustments using the open side travel stop. Now adjust the open side cam bushing in the same way described in step 11 above. Check continuity across terminals 5 and 7.
21. Loosen the packing gland nuts and retighten hand tight.
22. The actuator is mounted, the Switch Tripping Cams are set to open or close the 3500 EBV when the Controller indicates that the pressure in the steamline has increased to the set pressure of the valve. The valve is now ready to test to insure it will open and close at the correct pressures. See Section XII, for instructions for setting and testing the valve.

Caution: The contacts on the limit switch are factory set. Do not adjust. Consult factory.

Figure 22



"T-300" and "T-400" Series Actuator Switch Arrangement

XVII. (Continued)

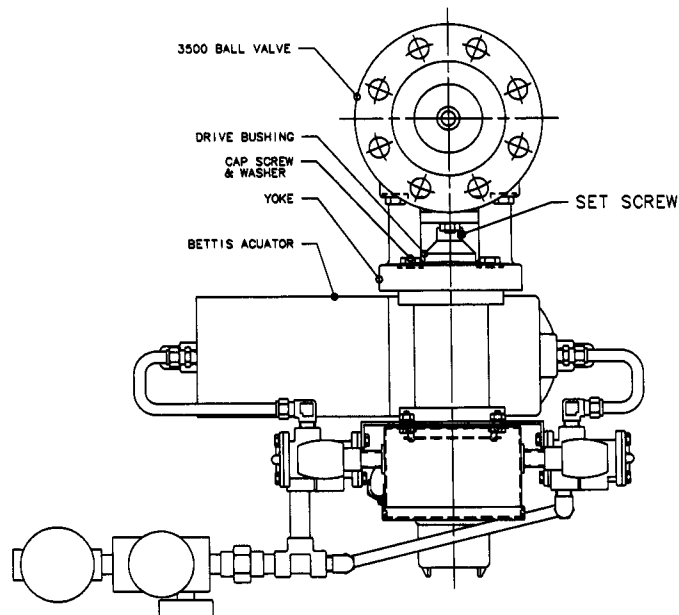
E. Actuator and Accessory Assembly for Bettis Models CB525 and CBL725 Actuators - Refer to Figure 20, 21, 23, 24 and 25

NOTE:

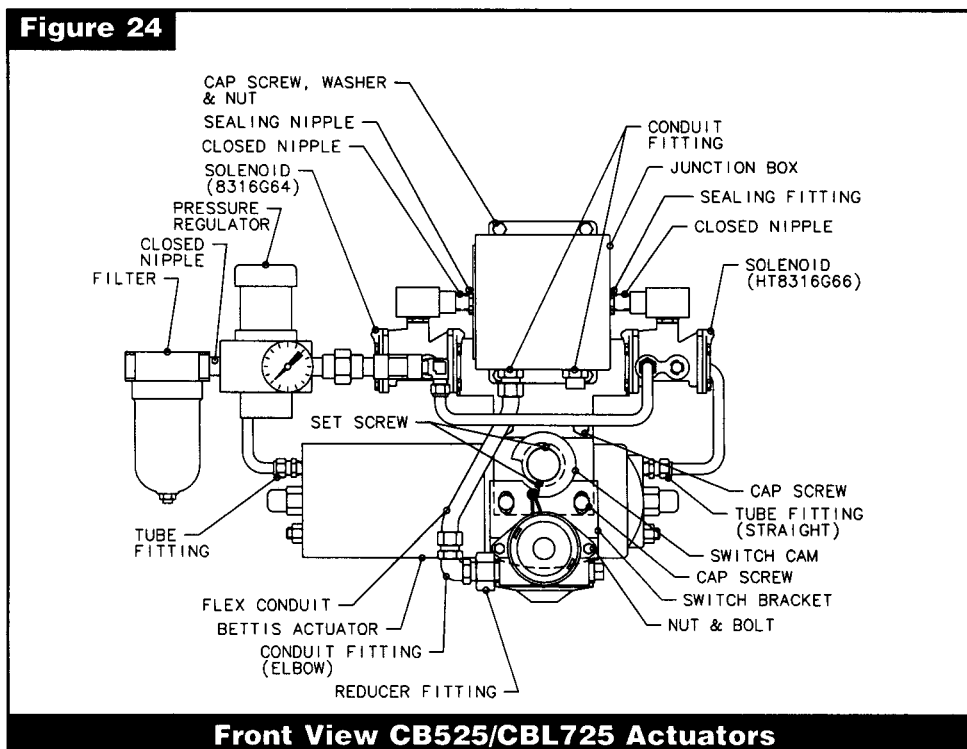
Generally removal of the accessories from the actuator is not required. If maintenance of accessories is not required, they should not be removed. If they were not removed, steps 1 through 6 will not be required.

1. Attach the accessory mounting bracket to the actuator using the bracket mounting bolts.
2. Attach the junction box to the mounting bracket using the box mounting screws.
3. Remove the two appropriate screws from the solenoid valve diaphragm case on the side that is to be attached to the mounting bracket. Using these two screws, attach the solenoids to the mounting bracket. The ASCO 8316G64 must be mounted on the cylinder side of the actuator and the 8316G66 on the opposite end.
4. From inside the junction box screw the 1/2" npt pipe nipples thru the conduit holes and into the 1/2" female npt thread on the solenoid valve solenoid. Thread and tighten a conduit lock nut onto the nipple end in the junction box. Connect the conduit to the junction box and limit switch with two conduit connectors.
5. Wire the solenoid valves and the limit switch to the terminal block inside the junction box per the wiring diagram.
6. Connect all pipe fittings, tubing fittings and tubing as illustrated in Figure 23 and 24.

Figure 23



Top View CB525/CBL725 Actuators

XVII.E. (Continued)**Figure 24**

Note: For normal maintenance begin assembly with Step 7.

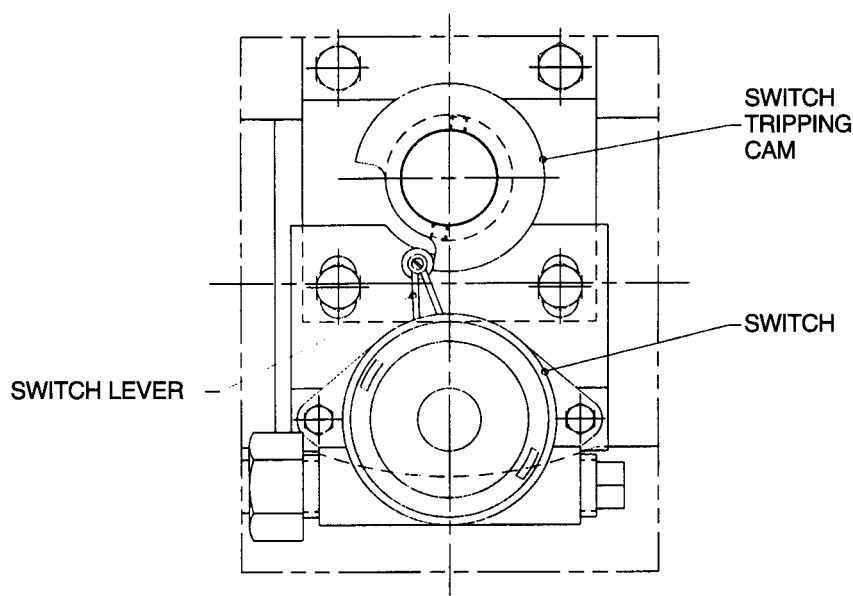
7. Rotate the stem until the milled keyway is located 90° (1/4 turn) to the left of the valve center line and temporarily tighten the Packing Gland Nuts to prevent the stem from moving.
8. Slid the Actuator Drive Bushing into the Drive Sleeve of the Actuator.
9. Insert the yoke alignment tool (Figure 20) through the bottom of the yoke and into the Bushing Guide Bore of the Actuator Yoke (see Figure 21)
10. For proper alignment assemble the Yoke to the Actuator with the Yoke Alignment Tool with the Actuator Drive Bushing in place.
11. Fasten the Yoke to the Actuator using the Cap Bolts provided and torque to the values in Table IV.
12. Remove the Actuator Drive bushing and the Yoke Alignment Tool from the yoke and Actuator.

XVII.E. (Continued)

13. Place the Key in the milled Keyway on the Ball Valve Stem.
14. Align the small diameter end of the Actuator Drive Bushing Keyway with the Key in the Ball Valve Stem.
15. Slide the Drive Valve Bushing onto the Ball Valve Stem.
16. Position the Actuator Drive bushing on the Stem so that the small diameter end is about 3/8 of an inch below the Yoke.
17. Install and tighten the Actuator Drive Bushing Lock Screw.
18. Slide the actuator yoke over the stem and raised guide diameter of the body seat until it seats against the body. Install the yoke cap bolts and tighten to the value specified in Table IV.
19. With the valve closed, adjust the cam bushing to trip the switch wired to the solenoid to close the valve. Refer to Figure 25 for an illustration of switch tripping cam. Use a continuity tester or volt/ohm meter across terminals 3 and 4 to verify that the switch contacts are closed.
20. With the valve open verify that the port hole thru the ball is perfectly aligned with the valve ports. If it is not, make adjustments using the open side travel stop. Now adjust the open indicator limit switch so that it is closed when the valve is open. Check continuity across terminals 5 and 7.
21. Loosen the Packing Gland Stud Nuts and retighten hand tight.
22. The actuator is mounted, the Switch Tripping Cams are set to open or close the 3500 EBV when the Controller indicates that the pressure in the steamline has increased to the set pressure of the valve. The valve is now ready to test to insure it will open and close at the correct pressures. See section XII, for instructions for setting and testing the valve.

Caution : The contacts in the switch are factory set. Do not adjust.
Contact factory.

Figure 25



"CB" Series Switch Cam Arrangement

XVIII. Inventory Philosophy

A. General Information

The importance of maintenance planning is the key to good plant operations. Part of that planning involves making sure that replacement parts needed to repair valves are available at the job-site when required. Developing and implementing a standard valve maintenance plan will quickly pay for itself by eliminating costly downtime, unscheduled outages, etc.

B. Inventory Planning - Replacement Parts List

The basic objectives in formulating a replacement part plan are:

PROMPT AVAILABILITY
MINIMUM DOWN TIME
SENSIBLE COST
SOURCE CONTROL

Having parts immediately available from plant storeroom inventory is obviously the best way to accomplish those objectives. Since it is impractical to have very part that might be needed to accomplish a given repair in stock at all times, guidelines for establishing meaningful inventory levels are summarized in the table below:

Part Description	Quantity Parts/ Number of Valves	Predicted Availability*
CLASS I		70%
1. Packing Set	1/1	
2. Gasket	1/1	
CLASS II		85%
3. Ball, Seat and Loader Assembly	1/2	
4. Bearing Washer	1/1	
CLASS III		95%
5. Belleville Washer (2 Required)	1/2	
CLASS IV		99%
6. Stem Key	1/2	
7. Drive Bushing Set Screw	1/1	
8. Switch Cam Set Screw (1-1/2" & 2" sizes only)	1/1	

NOTE:

Genuine Dresser Parts

The next time replacement parts are needed, keep these points in mind:

- DVCD designed the parts.
- DVCD guarantees the parts.
- Consolidated® valve products have been in service since 1877.
- DVCD has worldwide service.
- DVCD has fast response availability for parts.

* Predicted availability means that percentage of time the user plant will have the right parts to make the proper repair on the product, i.e. if Class I parts are stocked at the owners facility, the parts needed to repair valve in question will be immediately available in 70% of all instances.

XVIII. (Continued)

C. Recommended Spare Parts

Consult the Replacement Parts list (see Section XVIII.B. of this manual) to define the parts to be included in the inventory plan.

Select the desired parts and determine those required for proper maintenance of the valve population in the plant.

Dresser Valve and Controls recommends keeping class I, II, & III, spare parts available, based on the number of valves in the population.

D. Identification and Ordering Essentials

When it becomes necessary to order a replacement part, the order should state:

- Part name
- Valve Size
- Valve Type
- Serial Number of Valve
- Valve Seat Bore (For Ball Seat & Loader Assemblies)

Figure 26

**CONSOLIDATED
POWER RELIEF BALL VALVE**

TYPE

SIZE BORE DIA

CAP LBS/HR

AT PSIG °F

PRESSURE & TEMPERATURE LIMITS

PSIG AT °F

SER NO DATE

B/M

INDUSTRIAL VALVES **DRESSER**
ALEXANDRIA, LOUISIANA USA

Valve Nameplate

All other information will be found stamped on the nameplate attached to the body of the valve. (See Figure 26).

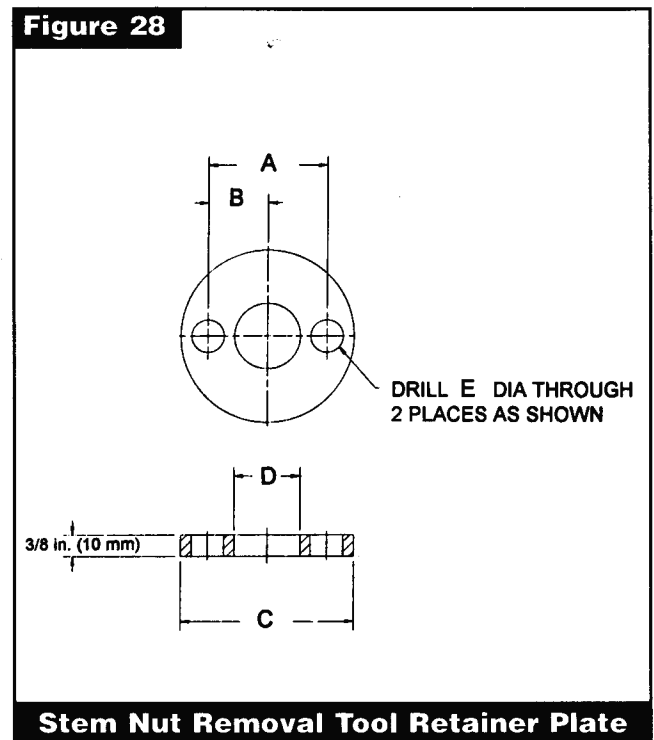
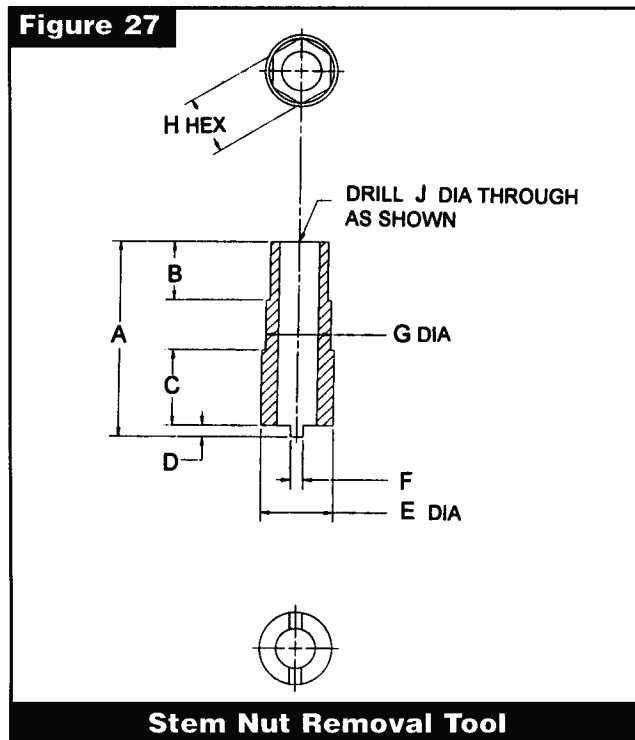
In addition, the serial number is stamped on the top edge of the outlet flange. Be sure to include the one or two letters preceding the figures in the serial number.

XIX. Maintenance Tools

Disassembly and Reassembly require the following tools:

- A. Stem Nut Removal Tool (see Figure 12 for Dresser part number). For manufacturing dimensions see Figure 27 and Table VI.
- B. Stem Nut Remover Retainer Plate (see Figure 12a for Dresser part number). For manufacturing dimensions see Figure 28 and Table VII.
- C. Two wire "S" hook about 6 to 8 inches long (see Figure 6 to shape wire).
- D. Yoke Alignment tool, (see Figures 20, 21 & 29, for identification and Table VIII for manufacturing dimensions).

These tools are available from Dresser Valve and Controls Aftermarket Support at (318) 640-6044, or you may manufacture your own using the dimensions supplied.

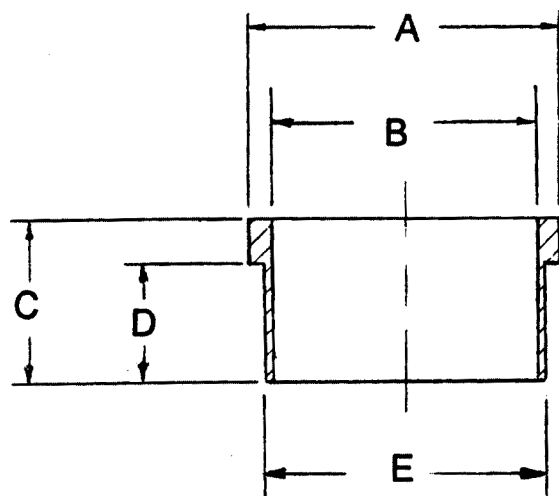
XIX. (Continued)**TABLE VI****MACHINE DIMENSIONS for STEM NUT REMOVAL TOOL**

Valve Type	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)
3515/25/16/26	3-3/8 (85.7)	1 (25.4)	1-5/16 (33.3)	.200 (5.08)	1.250 (31.7)	.220 (5.59)	1.125 (28.57)	1 (25.4)	11/16 (1.6)
3517/27/37	5 (127)	1 (25.4)	2-1/2 (63.5)	.312 (7.92)	1.875 (47.6)	.360 (9.14)	1.625 (41.27)	1-1/2 (38.1)	1-3/16 (14.3)
3547	5-3/4 (146)	1 (25.4)	2-1/2 (63.5)	.200 (5.08)	2.350 (59.7)	.360 (9.14)	1.906 (48.41)	1-13/16 (46.0)	1-17/32 (38.9)

Note: For use with Stem Nut Removal Tool, (Assemblies over the removal tool, and is held in place by the packing gland stud bolts and loosely tightened nuts).

TABLE VII**MACHINING DIMENSIONS for STEM NUT REMOVAL TOOL RETAINER PLATE**

Valve Type	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)
3515/25/16/26	2-1/16 (52.3)	1-1/32 (26.19)	3 (76.2)	1.141 (28.98)
3517/27/37	2-3/4 (69.8)	1-3/8 (34.92)	3-7/8 (98.42)	1.687 (42.85)
3547	3-5/8 (92.1)	1-13/16 (45.97)	5 (127)	2.062 (52.37)

XIX. (Continued)**Figure 29****Yoke Alignment Tool Machine Drawing****TABLE VIII****MACHINING DIMENSIONS for YOKE ALIGNMENT TOOLS**

PART NUMBER	ACTUATOR TYPE	"A" +/- 1/64 in. +/- .4 mm	"B" +/- .001 in. +/- .02 mm	"C" +/- 1/64 in. +/- .4 mm	"D" +/- 1/64 in. +/- .4 mm	"E" +/- .001 in. +/- .02 mm
4990101	CB525 & CBL725	2 5/8 in. 66.68 mm	2.253 in. 57.23 mm	1 3/8 in. 34.92 mm	1 in. 25.4 mm	2.369 in. 60.17 mm
4990201	T-310, T-312 T-316	3 5/8 in. 92.08 mm	3.254 in. 82.65 mm	1 3/8 in. 34.92 mm	1 in. 25.4 mm	3.359 in. 85.32 mm
4990301	T-410, T-412 & T-416	5 in. 127 mm	4.506 in. 114.45 mm	1 3/8 in. 34.92 mm	1 in. 25.4 mm	4.619 in. 117.32 mm

XX. Manufacturer's Field Service & Repair Program

A. Factory Setting vs. Field Setting

Every CONSOLIDATED® Safety Relief Valve is set and adjusted before shipment from the factory. Blowdown adjustments are made as carefully and accurately as possible. However, it must be recognized that actual field operating conditions may vary considerably from factory test conditions.

Conditions beyond the manufacturer's control that affect Safety Relief Valve operation are:

- Quantity of steam being discharged through the valve, i.e. the actual installation capacity exceeding that of the test boiler, thus permitting the valve to flow its full rated capacity.
- Quality of steam being discharged.
Discharge piping stresses and back pressure.
- Ambient temperature.
- Shipping or storage damage.
- Improper bolting of flanges.
- Damage due to foreign material in the steam.

Final Safety Relief Valve adjustments made on the actual installation are the best means of insuring that the valves perform in compliance with the ASME Boiler Code and/or other applicable code requirements.

During the manufacturing process of the 3539 Controller, The Pressure switch is pre-set to the required opening and closing pressures. The ambient temperature when the controller is installed on the boiler will affect material and design of the bourdon tube in the pressure switch and may require the 3500 Electromatic® Ball Valve to be reset at the actual temperature and pressure of the boiler, once the ambient temperature around the boiler stabilizes.

B. Field Service

Utilities and Process Industries expect and demand service on a moment's notice. CONSOLIDATED® Field Service can be depended upon for prompt response, even in extreme off-hour emergency situations.

DVCD maintains the largest and most competent field service staff in the industry. Service Engineers are located at strategic points throughout the United States to respond to customer's requirements for service. Each Safety Engineer is factory trained and long experienced in servicing Safety Relief Valves. DVCD Service Engineers restore disc and nozzle critical dimensions which effect valve performance, and are capable of modernizing valves in the field.

It is highly recommended that the professional talents of a DVCD Field Service Engineer be employed to make final field adjustments during the initial setting of all CONSOLIDATED® Safety Relief Valves.

All Field Service Engineers' activities are coordinated from the Alexandria, Louisiana, Field Service Office. Upon receipt of a purchase order number authorizing the trip, the engineer is dispatched.

Contact: Field Service Dept., Field Service Supv., (318) 640-6055

C. Factory Repair Facilities

The factory at Alexandria, Louisiana, maintains a complete CONSOLIDATED® repair center. The repair Department is staffed to provide you rapid repair that meets your needs.

Contact: Repair Dept., Mgr. Valve Repair, (318) 640-6057.

For service please contact the appropriate sales office below.

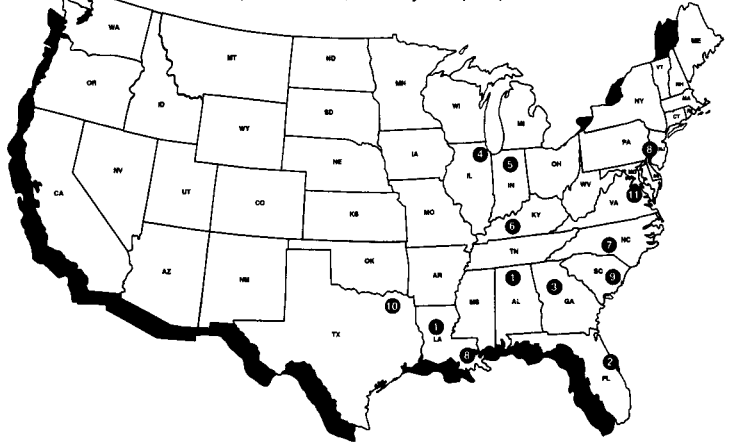
Service Department

Location of Service Engineers

LOUISIANA, Alexandria	1
FLORIDA, Jacksonville	2
ATLANTA, Georgia	3
ILLINOIS, Chicago	4
INDIANA, Crawfordsville	5
KENTUCKY, Maysville	6
NORTH CAROLINA, Charlotte	7
PENNSYLVANIA, Philadelphia	8
SOUTH CAROLINA, Charleston	9
TEXAS, Dallas	10
VIRGINIA, Richmond	11

THE DRESSER FIELD SERVICE ORGANIZATION IS UNEQUALED

For prompt field service, please call
Dresser Industrial Valve Operations Service Department, Alexandria, Louisiana.
Normal Working Hours — (318) 640-6055
After Hours, Weekends, Holidays — (318) 640-2250



Sales Office Locations

UNITED STATES

Dresser Industries, Inc.
Valve & Controls Division
Industrial Valve Operation
LA. Highway 3225 at U.S. Hwy. 167 North
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Fax (*) 1-318-640-6222

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Telephone (*) 1-508-941-8958
Fax (*) 1-508-941-5409

Northern Region

3201 North Wolf Road, Franklin Park, Illinois 60131
Telephone (*) 1-847-451-3913
Fax (*) 1-847-451-3997

Southern Region

15112 Morales Road (77032), P.O. Box 60078
Houston, Texas 77205-0078
Telephone (*) 1-281-871-6600
Fax (*) 1-281-871-6608

Western Region

250 El Camino Real, Suite 200 (92780)
P.O. Box 465
Tustin, California 92781
Telephone (*) 1-714-734-1955
Fax (*) 1-714-734-1963

South American Region

10556 N.W. 26th Street, Suite D-201, Miami, Florida 33172
Telephone (*) 1-305-470-2766
Fax (*) 1-350-470-2743

Central American Region

85 Bodwell
Avon, MA 02322
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Fax (*) 1-508-941-5409

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5010 North Service Road
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Fax (*) 1-905-336-7628

Dresser Canada, Inc., Valve & Controls Division
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Telephone (*) 82-2-274-0792
Fax (*) 82-2-274-0794

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Av. Henry Ford No. 114
Apartado Postal 572
54030 Tlalneapantla, Mexico
Telephone (*) 52-5-310-9863
Fax (*) 52-5-310-5584

SAUDI ARABIA

Dresser Al Rushaid Valve & Instrument Co., Ltd.
P.O. Box 10145, Jubail Industrial City 31961
Kingdom of Saudi Arabia
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Fax (*) 966-3-341-7624

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Dresser Valve & Controls Far East
16, Tuas Ave 8, Singapore 639231
Telephone (*) 65-861-6100
Fax (*) 65-861-7172

SOUTH AFRICA

Dresser Limited, Valve & Controls Division
P.O. Box 2234, 16 Edendale Road, Eastleigh,
Edenvale 1610, Transvaal, Republic of South Africa
Telephone (*) 27-11-452-1550
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Dresser Valve & Controls Division
Units JA01 & JA02
P.O. Box 61302, Roundabout 8
Jebel Ali Free Trade Zone, United Arab Emirates
Telephone (*) 971-4-838752
Fax (*) 971-4-838038

VENEZUELA

Riese & CIA S.A.
Sabana Grande, Av. A. Lincoln, Torre Domus
P. 9, Of. 9-A, Caracas, Venezuela
Telephone (*) 58-2-793-4266
Fax (*) 58-2-794-0791

(*) The appropriate International Access Code will need to provide the telephone/fax number if you are placing a call to a location outside of your country.



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