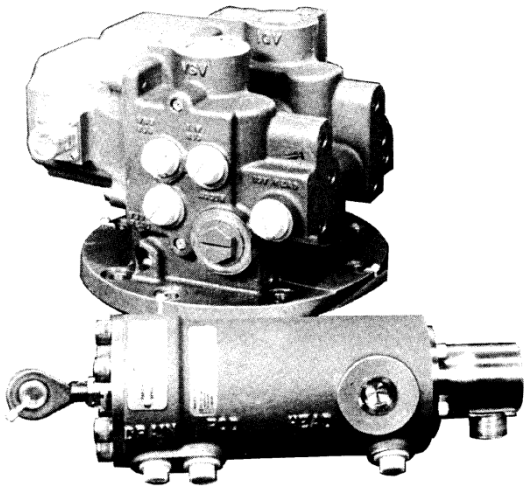
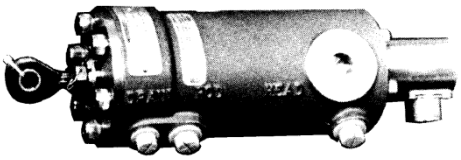
WOODWARD

Product Manual 40136
(Revision NEW)
Original Instructions





Dual Servovalve and VSV and IGV Actuators

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Contents

Illustrations and Tables

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Chapter 1.
General Information

Description

The Dual Servovalve, Inlet Guide Vane (IGV) actuator, and Variable Stator Vane (VSV) actuator operate with an electronic package to provide closed-loop position control of the VSV and IGV Actuators. The actuator output shafts are attached to the hardware on the inlet guide vanes and variable stator vanes of a gas turbine. A hydraulic pump provides hydraulic pressure to operate the servovalve and the actuators. (See manual 40133 for information on the pump.)

The servovalve is designed to be installed, with kit 8924-874, directly over the pump. The kit includes two O-rings, which fit in O-ring grooves in the pump housing, and the bolts and washers needed to attach the servovalve unit to the pump. Hydraulic supply and drain feed through the base of the servo to the pump.

The servovalve has an aluminum case with through-hardened stainless steel internal parts.

Identical torque motor servovalve and pilot valve units are located in the dual Servovalve. The two torque motors are controlled through separate final drivers (part number 8924-874), one for the IGV and one for the VSV. The outputs from the servovalve are then used to position the individual IGV and VSV actuators.

Hydraulic ports on the servovalve, marked "ROD" and "HEAD," are provided for both the IGV and VSV actuator. These ports are connected to similarly marked ports on each actuator. Each actuator can provide up to 3.445 inches (87.50 mm) of output. A Linear Variable Differential Transformer (LVDT) is an integral part of each actuator. The LVDT provides an electrical signal proportional to the output position of each actuator. This signal is fed back to the final driver, where it is used to close the actuator-position control loop.

An additional port on the servo is marked "ACC." This port is connected to an accumulator, if used. The accumulator provides enough pressurized oil to move the actuators to the commanded position, should the hydraulic pump fail. The accumulator is not provided by Woodward.

Filters and screens in the system prevent contamination of essential orifices. It is important to protect the hydraulic system from contamination at all times.

Chapter 2.
Installation

Introduction

Use care while handling and installing the servovalve and actuators. Abuse can damage seals, installation surfaces, and factory adjustments. Protect hydraulic connections with plastic shipping caps whenever an actuator is not connected to the normal piping.

IMPORTANT

The center pieces in the actuator rod ends will drop out of the body if they are turned 90 degrees from parallel. Take care that the center pieces in the rod ends are not dropped. They are retained in the sockets with plastic straps when shipped form the factory. These straps should be left in place until ready for installation.

Receiving

The actuators and the servovalve are calibrated and drained of calibration fluid at the factory. They are then placed in cardboard containers filled with urethane foam for delivery to the customer. Additional cleaning or calibration is not necessary before installation or operation.

Storage

The dual servovalve and actuators may be stored as received from the factory for up to one year. For extended storage, flush both the servovalve and the actuators with MIL-C-6529 Type 3 oil or equivalent. Add MIL-D-3464, Class 1 desiccant or equivalent to the original shipping package. Place protective closures in open ports, wrap and seal the units in barrier material (MIL-B-121, Type 1, Grade A, Class 1, or equivalent), and seal with a moisture-resistant tape. Items properly prepared for storage do not require periodic flushing.

Installation

See outline drawings, Figures 2-1 and 2-2, for overall dimensions, installation-hole locations, hydraulic-fitting sizes, output-shaft dimensions, and electrical connectors.

Installation attitude does not affect actuator performance. The servovalve attitude is determined by the location of the pump to which it attaches.

The bolt pattern and locating pins in the top of the pump will permit only one location of the servo, assuring correct positioning.

The hydraulic connections between the servo and the actuators, the cables, and miscellaneous items used in the installation are to be provided by the turbine manufacturer. Take care during installation that dirt is not introduced into the hydraulic system as it could seriously damage the equipment. All filters and screens must be in place during operation.

All adjustments of the servovalve and actuators are made at the factory and sealed. There are no adjustments available to the user of the system.

The IGV and VSV actuators are installed on 0.625” (15.88 mm) diameter pivots at the turbine. Instructions for the pivot installation are provided by the turbine manufacturer. Installation of hoses between the servovalve, actuators, and accumulator will be specified by the turbine manufacturer.

Electrical connectors are provided on each of the actuators for the LVDT. Connect according to the wiring diagram included in Figure 2-1. The dual servovalve provides independent positioning of the IGV and VSV actuators.

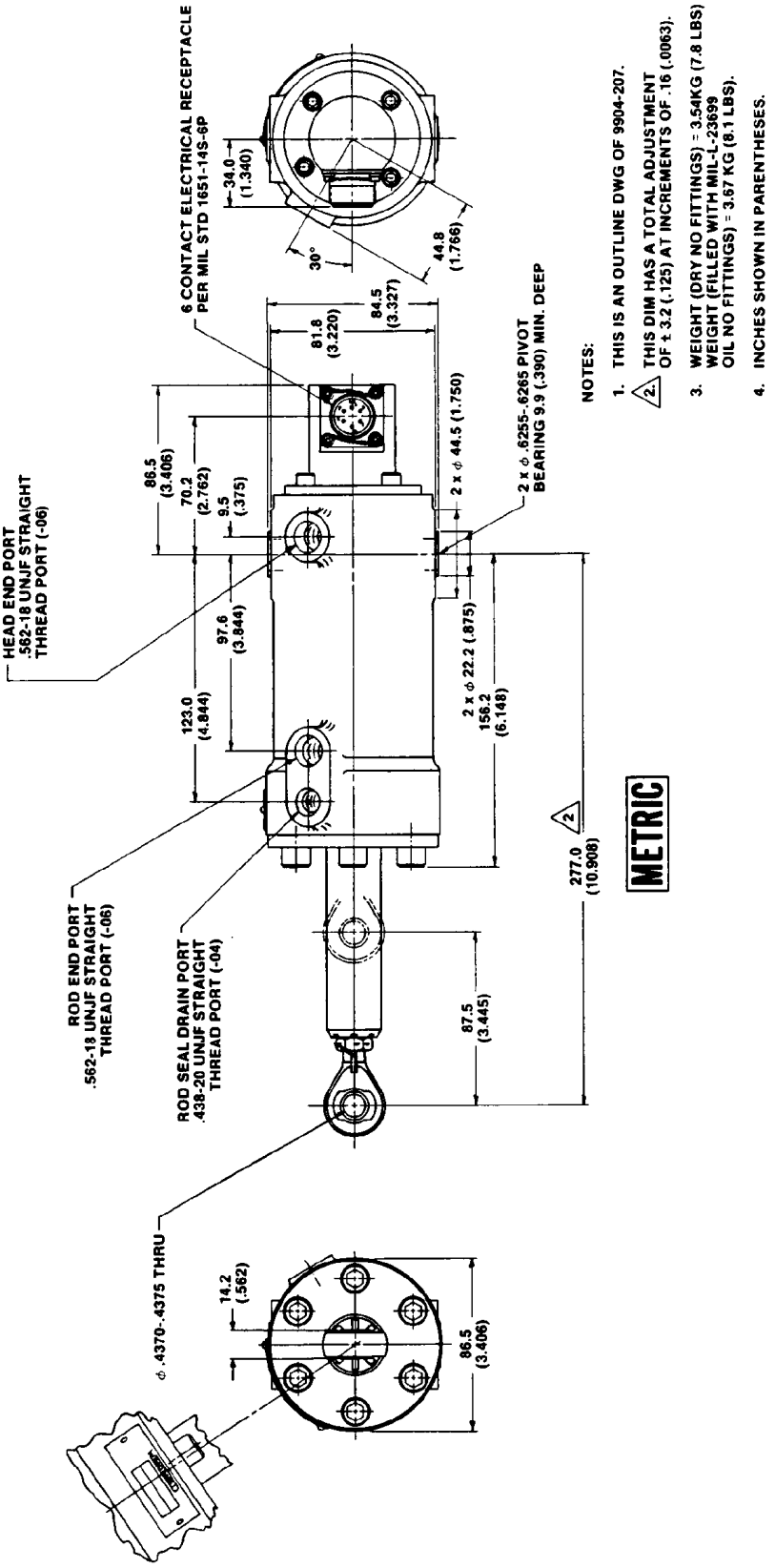


Figure 2-1. Outline Drawing of VSV or IGV Actuator
(Do not use for construction.)

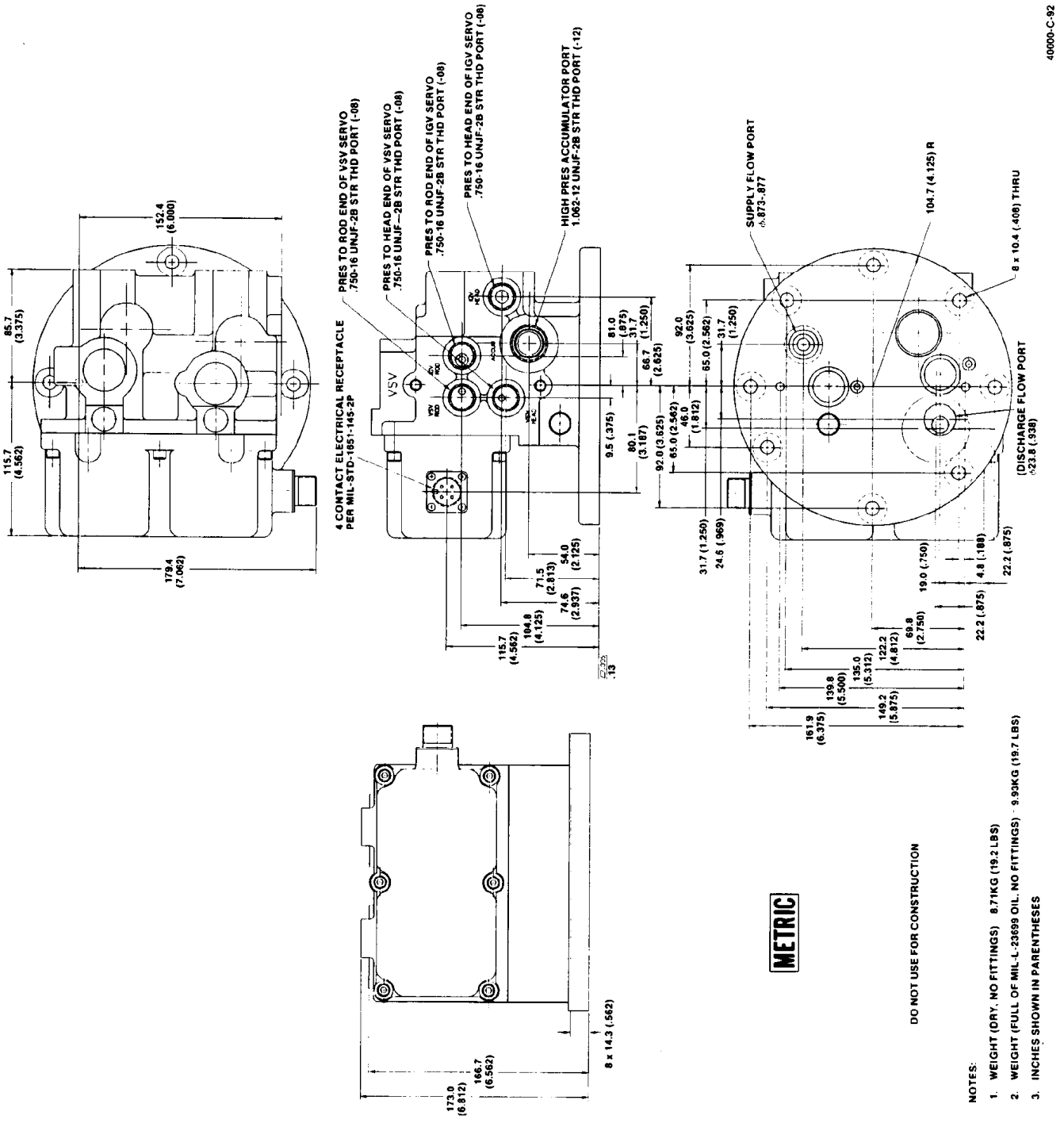


Figure 2-2. Outline Drawing of 3230 Dual Servovalve

Chapter 3.
Operation and Adjustment

Initial Operation

Before initial operation of the IGV/VSV control system, make sure all previous installation and hookup steps are accomplished and that all linkages, electrical connections, and hydraulic fittings are secure and properly attached.

Trapped air within the hydraulic system may cause erratic behavior of the actuators during the first few minutes of initial operation.

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Adjustments

The servovalve has been factory adjusted for 110 mA nominal null current. All adjustments in the servovalve and the actuators have been sealed at the factory and cannot be changed in the field.

The LVDTs in the actuators were adjusted and sealed at the factory. No LVDT adjustment is available in the field. The location of the rod end on the actuators has been set at the factory to the dimension shown on the outline drawing, Figure 2-1. However, if necessary, the rod end position is adjustable up to ±0.125 inch (3.18 mm) in increments of .0063” (0.160 mm).

Chapter 4.
Principles of Operation

Introduction

The VSV and IGV sides of the servovalve and actuators are identical in operation. For this reason only one system is shown in the schematic.

Torque Motors and Servos

Each side of the servovalve consists of a torque motor servovalve which uses a double nozzle and flapper to generate a differential pressure to operate a second-stage spool valve. The torque motor receives a dc current signal from the electronic control and applies torque to the single-piece armature and flapper which is supported on a torsion flexure. The servovalve uses the flapper as a variable flow restriction and throttles the flow of hydraulic fluid from a nozzle on each side of the flapper. The two nozzles are supplied hydraulic fluid from the gear pump through separate, fixed orifices. The pressures, controlled by the torque motor flapper, position the second-stage valve to direct pressure oil to the actuator being controlled.

Hydraulic pressure for the VSV/IGV control system is supplied by the gear pump described in Woodward manual 40133.

Pressure oil, which has been strained through the filter attached to the gear pump, is directed past a lightly loaded check valve in the servovalve to nozzles on both sides of a flapper on the torque motor. With a 110 mA control signal (null current), the existing position of the actuator is maintained.

Should the control signal decrease below the 110 mA null current, control pressure C_2 is decreased and control pressure C_1 is increased. This causes the second-stage valve to move up from its null position, sending additional pressure oil to the rod connection on the actuator and allowing the head connection to drain to the oil return. This causes the actuator to retract.

If the control signal increases above the 110 mA null current, the flapper movement results in an increase in pressure C_2 and a decrease in pressure C_1. This causes the second-stage valve to move down from its null position, and the actuator to extend.

Check Valve and Accumulator

The servo is designed for use with an accumulator which is filled with pressure oil. Should the gear pump fail, the spring-loaded check valves in the servo will close and accumulator oil will move the actuators to the commanded positions.

Check valves also isolate the IGV and the VSV systems from each other, preventing disruption of VSV actuator position due to shock loads on the IGV actuator.

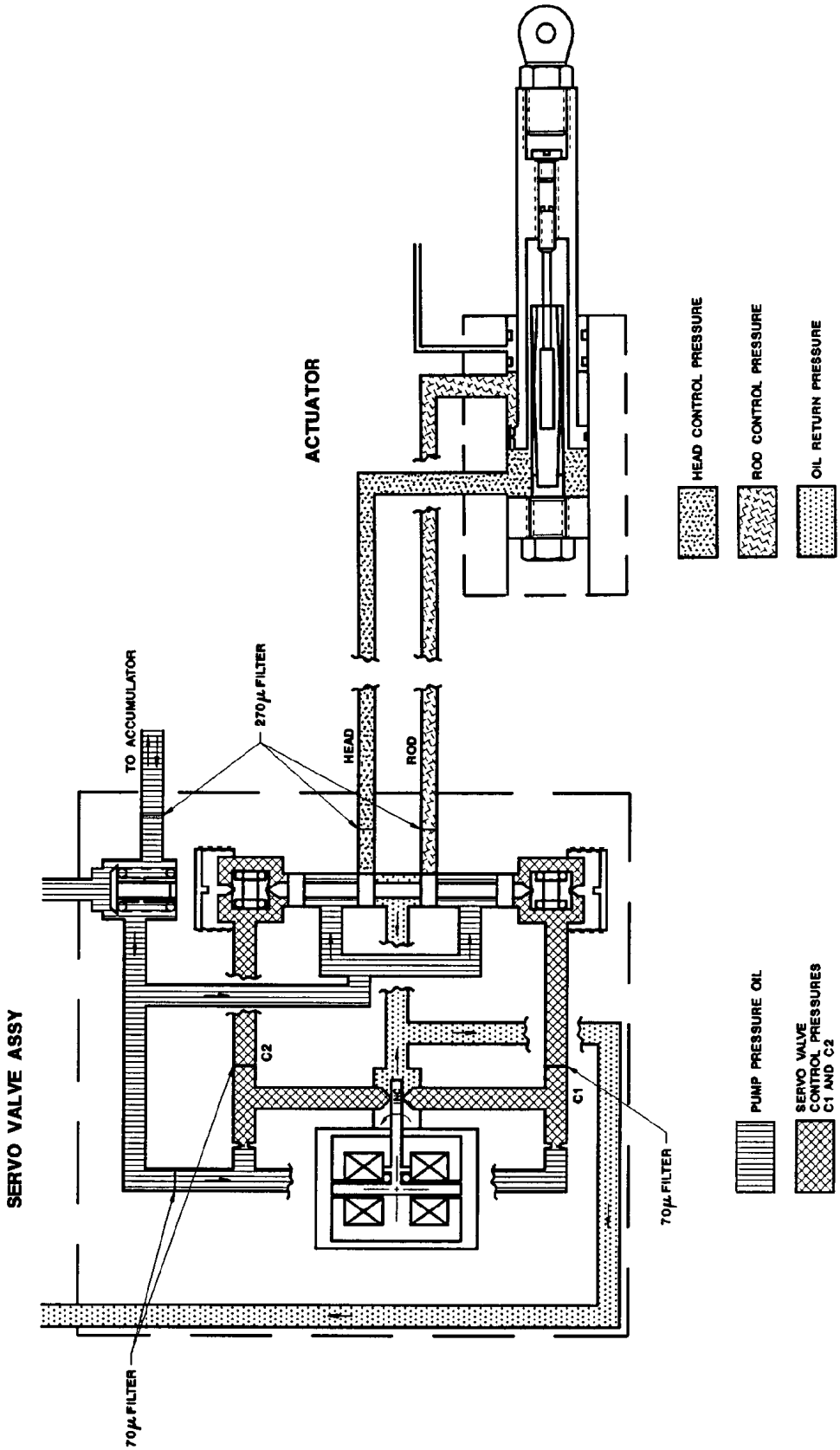


Figure 4-1. Schematic of 3230 Servo Valve and Actuator

VSV And IGV Actuators

Each side of the dual servovalve controls the position of an actuator. Each actuator has an LVDT to send a position signal to the electronic control. The electronic signals are used by the control to evaluate the position of the inlet-guide vanes and the variable stator vanes in the turbine.

The LVDT core rod is adjusted at the factory and the adjustment sealed with a plug. No field adjustment of the LVDT is possible.

Increased "Head" pressure will cause an actuator to extend. Increased "Rod" pressure will cause an actuator to retract.

A small orifice between the Head and the Rod side of the power piston is provided to maintain a small bleed flow between the Rod and Head sides of the piston. This bleed flow prevents heat accumulation in the actuator and aids in purging air from the system during initial start-up.

Chapter 5.
Maintenance and Troubleshooting

Maintenance

Maintenance is not planned for elements of the 3230 VSV/IGV control system. Maintenance consists of removal and replacement of units.

Filters and Screens

A 25 µm absolute filter is installed on the discharge side of the pump which supplies oil to the servovalve. 70 µm screens protects both sides of the torque motor servovalves.

Clogged filters or screens are normally seen as slowing the response of the VSV or IGV servos. There are no filters in the actuators.

General Cleanliness

Take extreme care not to introduce contamination into the system should the connections between the servovalve and the actuators or the servovalve and the accumulator be removed.

Drain Line

Interseal drain ports are provided between the two actuator rod seals. These drain lines from the actuators must remain open without back pressure. Back pressure at a drain port could decrease the effectiveness of the shaft seals.

Excessive oil flow from this drain port indicates that the first rod seal should be replaced.

Troubleshooting

Should both the VSV and IGV actuator exhibit unacceptable control qualities, a careful inspection should be made of the hydraulic pump and hydraulic oil supply. Hydraulic pressure may be measured at the accumulator port on the dual servovalve. The system is designed to operate with 750 psi (5171 kPa) hydraulic pressure at the accumulator port.

Should only one of the actuators exhibit unacceptable vane positioning, first check the linkage involved to make sure it has not changed. Check the 0.625” (15.88 mm) mounting studs on the actuator to be sure they are not binding.

If no binding or other problems are found in the linkage or mounting studs, interchange the electronic feed to the dual servovalve to determine if the problem is in the hydraulic portion of the control system or in the electronic portions of the control system.

If convinced the problem is in the servovalve-actuator portion of the control loop, the two actuators can be interchanged to see if the problem is with an actuator or an LVDT.

Should the problem be determined to be in the dual servovalve, the unit must be replaced or returned to an authorized service center for repair. Most problems are caused by contamination of the hydraulic supply. Completely flush all filters and replace the oil supply before installing a replacement dual servovalve.

Chapter 6.
Replacement Parts

When ordering replacement parts, it is essential to include the following information:

- Serial number and part number on nameplate
- Manual number (this is manual 40136)
- Part reference number in parts list

Parts List for VSV/IGV Servo Assembly

Ref. No.	Part Name	Quantity
40136-1	Body Assembly	1
40136-2	LVDT Transducer	1
40136-3	Screw, 0.250-20 x 0.625	4
40136-4	O-ring Seal, 0.614 x 0.070	1
40136-5	Lee (Jeta) Jet	1
40136-6	NOT USED	
40136-7	NOT USED	
40136-8	Glydring Seal, 1.867 OD	1
40136-9	O-ring Seal, 1.612 x 0.070	3
40136-10	Piston Assembly	1
40136-11	Step Seal and O-ring	2
40136-12	Sleeve	1
40136-13	Excluder Ring and O-ring	1
40136-14	NOT USED	
40136-15	NOT USED	
40136-16	Plug	1
40136-17	O-ring, 0.114 x 0.070	1
40136-18	Hex Nut	1
40136-19	Lock, Rod End	1
40136-20	Rod End	1
40136-21	End Plate	1
40136-22	Screw, 0.375-16 x 1.000	6
40136-23 through 25	NOT USED	

Parts List for Dual Servovalve Assembly

Ref. No.	Part Name ..... Quantity
40136-26	Servovalve Housing Assembly
40136-27	Torque Motor.....2
40136-28	Screw.....14
40136-29	Plug.....2
40136-30	O-ring, 0.364 x 0.070 2
40136-31	Retainer (wire clamp and screw.....2
40136-32	TM Cover Assembly.....1
40136-33	NOT USED
40136-34	Screw, 4-40 x 0.375 4
40136-35	Connector, Electric, 4-pin.....1
40136-36	Washer.....6
40136-37	NOT USED
40136-38	NOT USED
40136-39	NOT USED
40136-40	Spirolox.....2
40136-41	Valve Seat.....2
40136-42	Spring.....2
40136-43	Check.....2
40136-44	Valve Housing Assembly.....2
40136-45	O-ring
40136-46	Snap Ring 2
40136-47	Spring Support 4
40136-48	O-ring, 0.737 x 0.103 4
40136-49	Spring Plunger 4
40136-50	O-ring, 0.755 x 0.097 1
40136-51	Plug, Straight Thread 1
40136-52	Retainer.....2
40136-53	PV Plunger.....2
40136-54	O-ring, 0.551 x 0.070 12
40136-55	O-ring, 0.676 x 0.070 2
40136-56	Spring, Ext.....2
40136-57	Bushing.....2

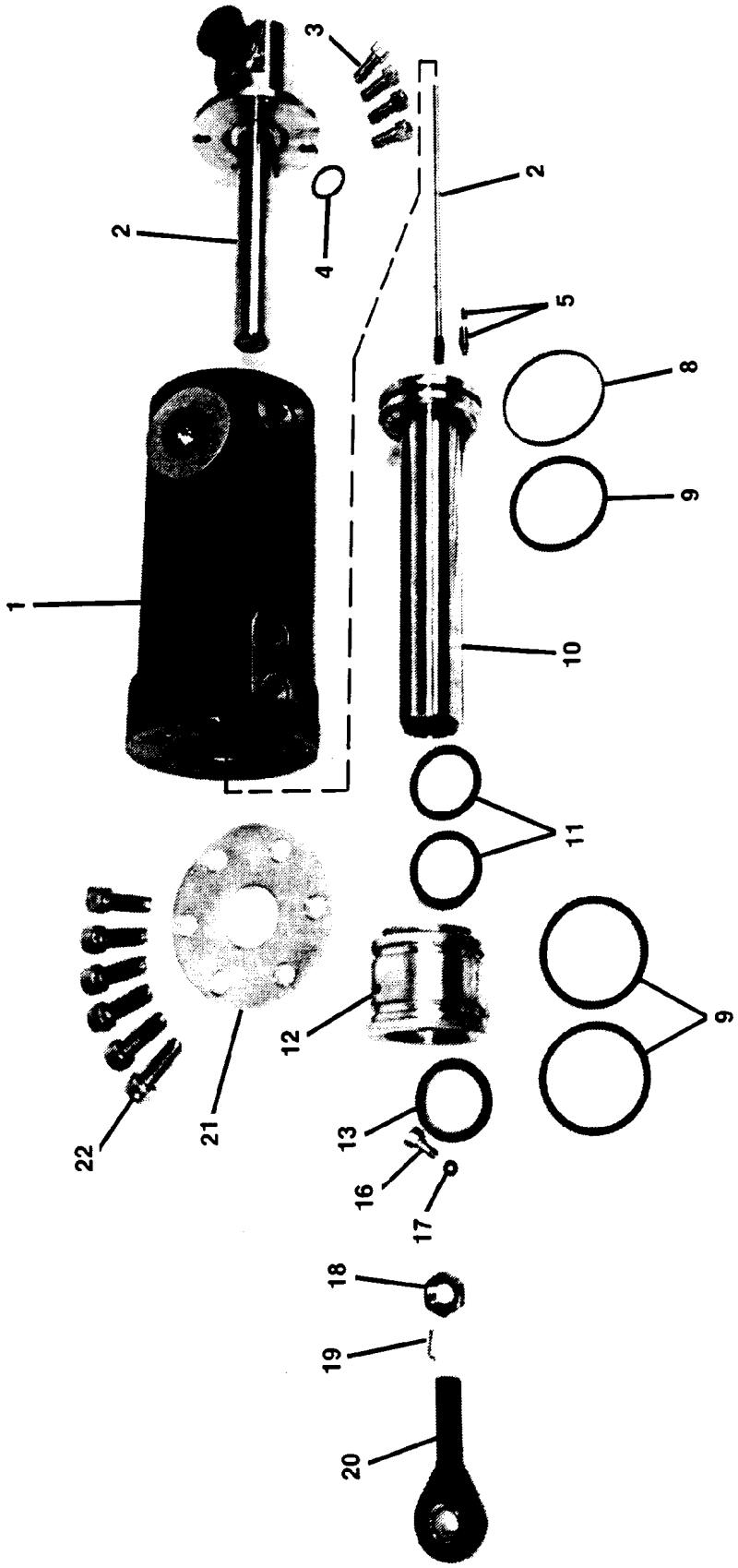


Figure 6-1. Actuator Parts

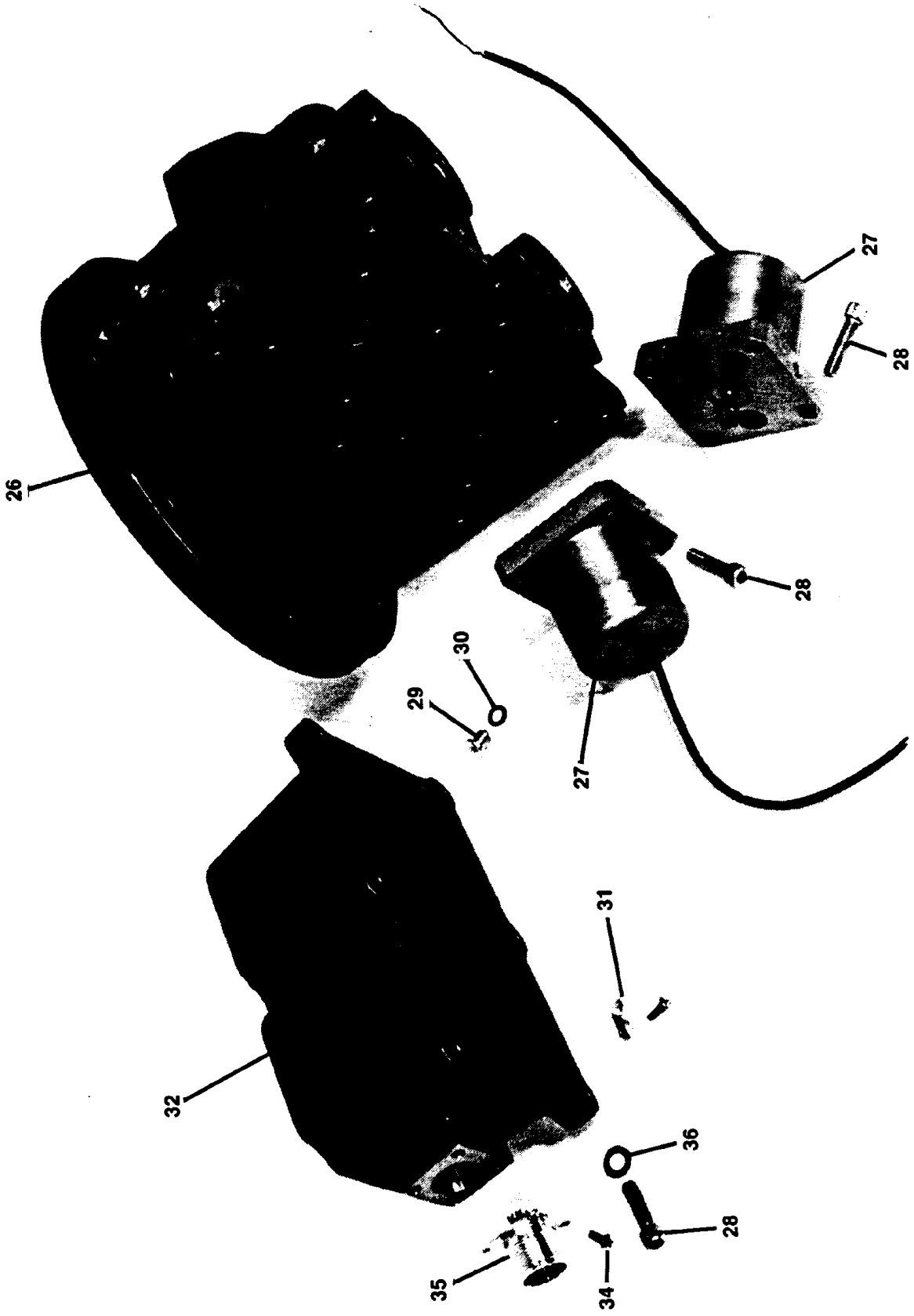


Figure 6-2. Torque Motor Servovalve Parts

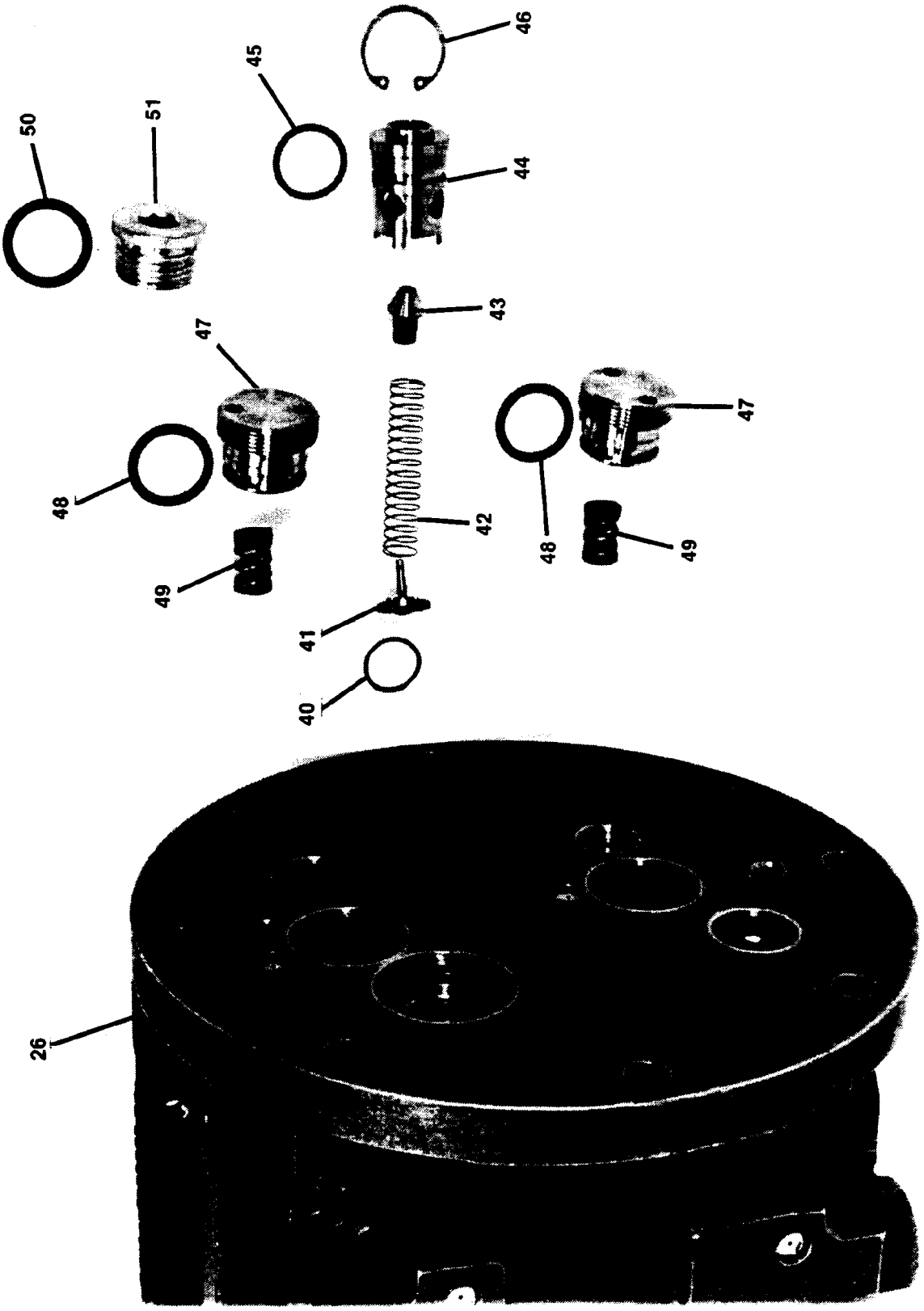


Figure 6-3. Pump Side of Dual Servovalve

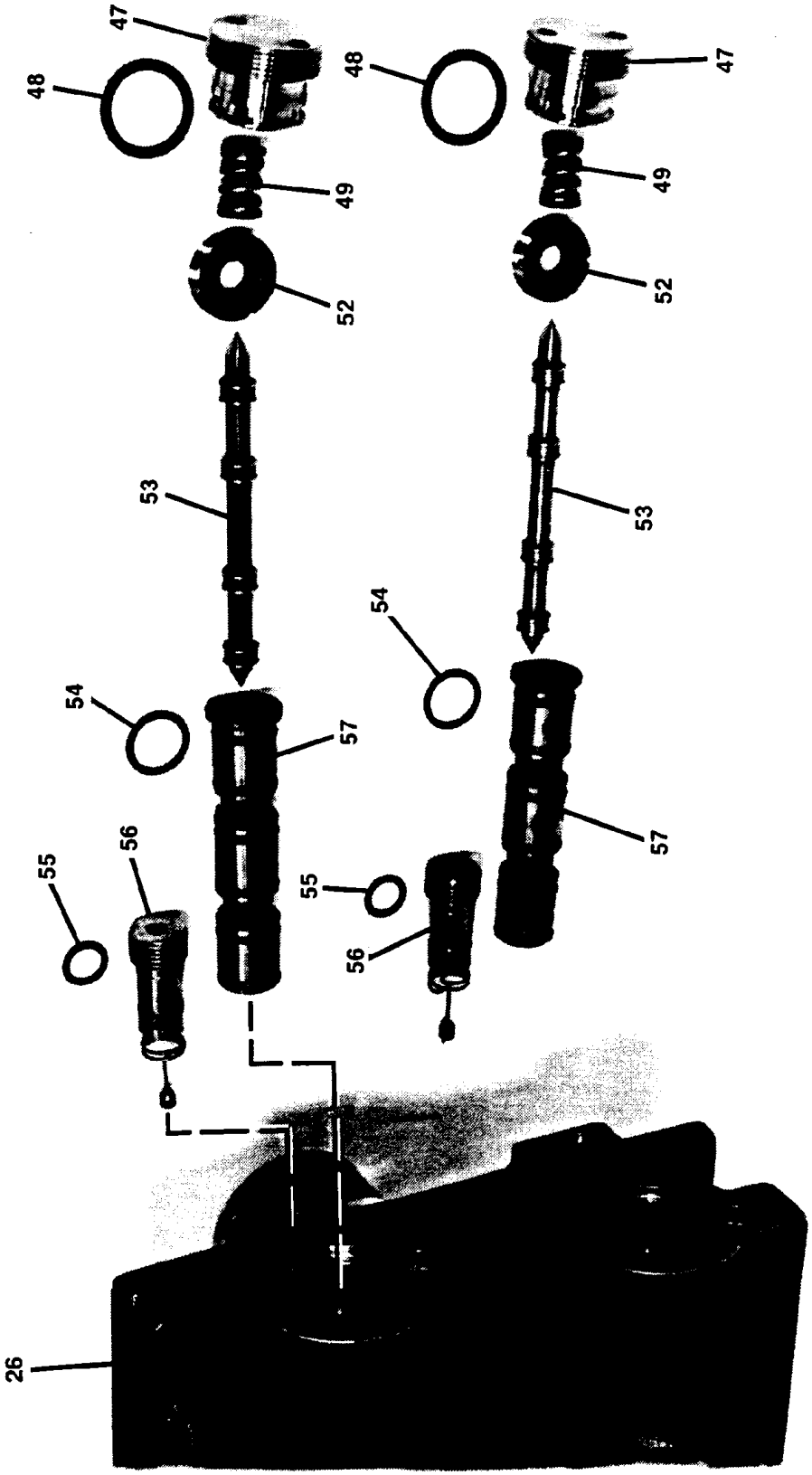


Figure 6-4. Access Side of Dual Servovalve

Chapter 7.
Service Options

Product Service Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM and Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.
- A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

Woodward Factory Servicing Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return authorization number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:
- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.
- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: **www.woodward.com**.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (0) 21 52 14 51
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Turbine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

You can also locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	
Site Location	
Phone Number	
Fax Number	
Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	
Control/Governor #1	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #2	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	
Control/Governor #3	
Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 40136.

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Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2013/1/Colorado