

3055 VSV Servovalve and VSV Actuators

VSV Servovalve 9902-222
VSV Actuators 9902-223

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:

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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 Out-of-date translations are marked with .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.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

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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 3055 VSV Servovalve and two VSV Actuators operate with an electronic control to provide closed loop position control of the VSV Actuator output shafts. These shafts are attached to the VSV hardware on the gas turbine. A hydraulic pump provides hydraulic pressure to operate the servovalve and the actuators. (See manual 40123 for information on the pump.) The servovalve is designed to be installed, with a gasket plate, on a manifold plate which fits directly over the pump. Hydraulic supply and drain feed through the base of the servo through the manifold plate.

The servovalve has an aluminum case with through-hardened stainless steel internal parts. The servovalve dry weight is 12 lb (5 kg).

Hydraulic ports on the side of the servo are marked "ROD" and "HEAD". These ports are connected to similarly marked ports on the two actuators. 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 exact position readout of the output position of each actuator.

A third port on the servo is marked "ACC". This port is connected to an accumulator. The accumulator provides enough pressurized oil to move the actuators to the commanded position should the hydraulic pump fail.

Filters and screens in the system prevent contamination of essential orifices.

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 the 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 from the factory. These ties 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 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 the 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 and manifold plate to which it attaches.

The bolt pattern on the manifold plate will permit only one location of the servo, assuring correct positioning.

The gasket between the servo and the manifold plate is provided by the turbine manufacturer, as are the hydraulic connections between the servo and the actuators and the fasteners. 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.

A and B channel electrical connections are available on the servovalve. The torque motor in the valve has redundant coils, allowing the use of either channel at a given time and providing continued availability of control should one of the channels fail. Only one channel can be used at a given time.

The 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.

Six-contact electrical connectors are provided on each of the actuators, for use of the LVDT channels. Connect according to the wiring diagram included in Figure 2-1. Both LVDTs are used simultaneously by the electronic control.

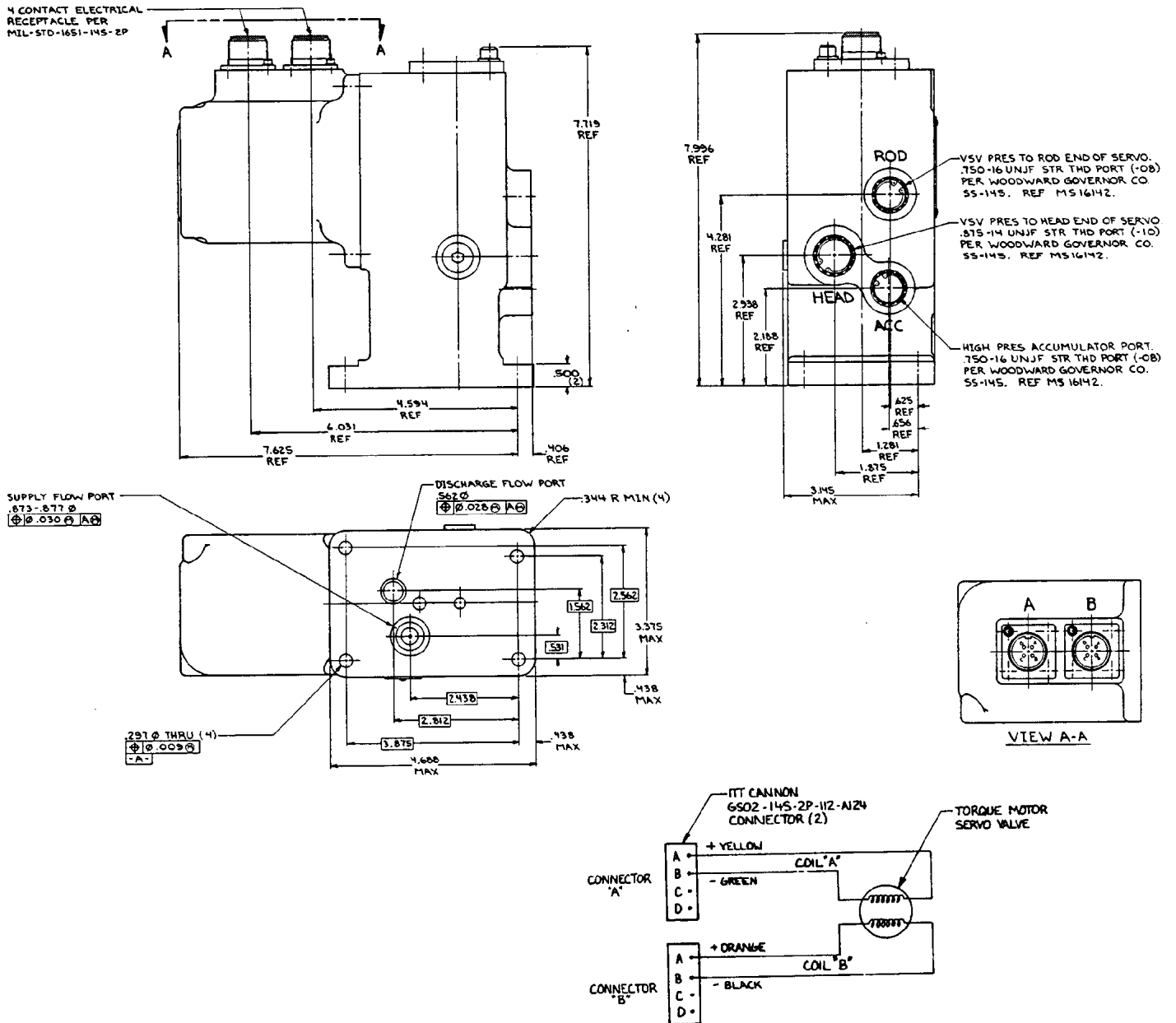


Figure 2-2. Outline Drawing of 3055 Servovalve

Chapter 3. Operation and Adjustments

Initial Operation

Before initial operation of the actuator, 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 VSV 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 a 20 mA nominal null current. All adjustments in the actuator have been sealed at the factory and cannot be changed in the field.

The LVDTs in the VSV 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 is adjustable up to ± 0.125 inch (3.18 mm) in increments of 0.0063 inch (0.160 mm).

Chapter 4.

Principles of Operation

Torque Motor and Servo

The servovalve consists of a torque-motor servovalve which uses a double nozzle and flapper to generate a differential pressure to operate the second-stage spool valve. The torque motor receives a dc current signal from the electric control and applies torque to the single-piece armature and flapper which is supported on a torsion flexure. The servo valve 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 two VSV actuators which are mounted on the turbine.

Hydraulic pressure for the VSV control system is supplied by the gear pump described in Woodward manual 40123.

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 20 mA control signal (null current) this flapper is centered and the second-stage valve is centered, maintaining the existing position of the actuators.

If the control signal decreases below the 20 mA null current, control pressure (C2) is decreased and control pressure (C1) is increased. This causes the second-stage valve to move up from its spring centered position, sending additional pressure oil to the rod connection on the actuators and allowing the head connection to drain to the oil return. This causes the actuators to retract.

If the control signal increases above the 20 mA null current, the flapper movement results in an increase in pressure C2 and a decrease in pressure C1. This causes the second-stage valve to move down from its spring centered position, and the VSV actuators to extend.

Check Valve and Accumulator

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

VSV Actuators

The servovalve controls the position of matched VSV actuators on the turbine. Each VSV actuator has an LVDT which is capable of sending an exact position signal to the electronic control. The electronic signals from both of the LVDTs are used simultaneously by the electronic control. The LVDT core rod is adjusted at the factory and the adjustment sealed with a plug. No field adjustment of the LVDT is possible.

The rod end location is adjustable over a distance of ± 0.125 inch (3.18 mm).

Increased "Head" pressure will cause the actuator to extend. Increased "Rod" pressure will cause the 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.

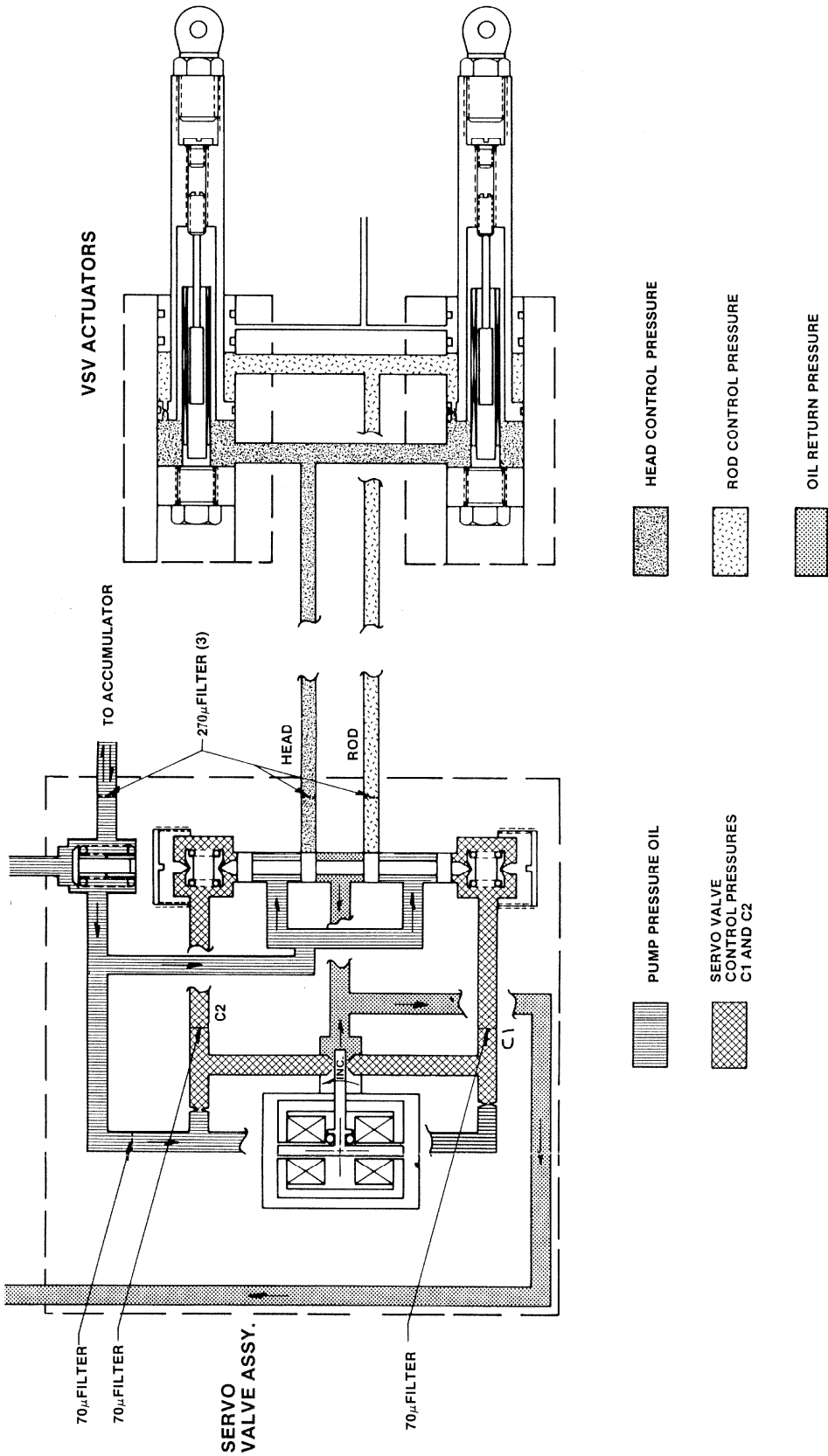


Figure 4-1. Schematic of 3055 Servovalve and Actuators

Chapter 5.

Maintenance and Troubleshooting

Maintenance

Maintenance is not planned for elements of the VSV control at the assembly level.

Filters and Screens

A 10 μm nominal filter must be installed on the complete flow of pressure oil that leaves the gear pump. 70 μm filters protect both sides of the second-stage valve. 270 μm screens are provided on the Head, Rod, and Accumulator outputs from the servovalve.

Clogged filters or screens are normally seen as slowing the response of the servo. The 270 μm screens on the servovalve outputs are available for cleaning by removing the fitting and a snap ring retainer from the port. There are no filters in the VSV actuators.

General Cleanliness

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

Drain Line

The drain line from the VSV actuators must remain open without back pressure. Back pressure at the drain port could decrease the effectiveness of the shaft seals.

Troubleshooting

Redundant control channels are provided for both the VSV servovalve assembly and the VSV actuators. At the first sign of trouble, the control channel should be switched. If using the alternate channel cures the problem, plan to replace elements of the system as soon as possible.

If hydraulic pressures are present and changing the control channel does not correct a problem, carefully inspect the electronic control for the source of the problem.

Should the VSV actuators not provide identical positions, inspect the hydraulic connections for blockage between the servovalve and the actuators. If the hydraulic lines appear open and clean, carefully inspect the linkage and mechanical connections which the actuators are operating.

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 40124)
- Part reference number in parts list

Parts List for Figure 6-1

Ref. No.	Part Name	Quantity
40124-1	Body Assy, Servo Actuator	1
40124-2	Transducer, LVDT	1
40124-2a	O-ring, 0.614 x 0.070	1
40124-3	Screw, 0.250-20 x 0.625	10
40124-4	Orifice-Lee	1
40124-5	Piston Assy, Servo Actuator	1
40124-5a	O-ring, 1.612 x 0.103	1
40124-5b	Seal, 1.867 O.D. Glyd Ring.....	1
40124-6	Plug, 0.281 x 0.250 Lee.....	1
40124-7	Sleeve Servo Actuator	1
40124-7a	O-ring, 1.612 x 0.103	2
40124-7b	O-ring, 1.112 x 0.103	1
40124-7c	Seal Excluder Ring	1
40124-7d	O-ring, 1.112 x 0.103	2
40124-7e	Seal, 1.065 I.D. Step.....	2
40124-8	Plate Servo End.....	1
40124-9	Not Used	
40124-10	Nut	1
40124-11	Lock – Rod End	1
40124-12	Rod End.....	1

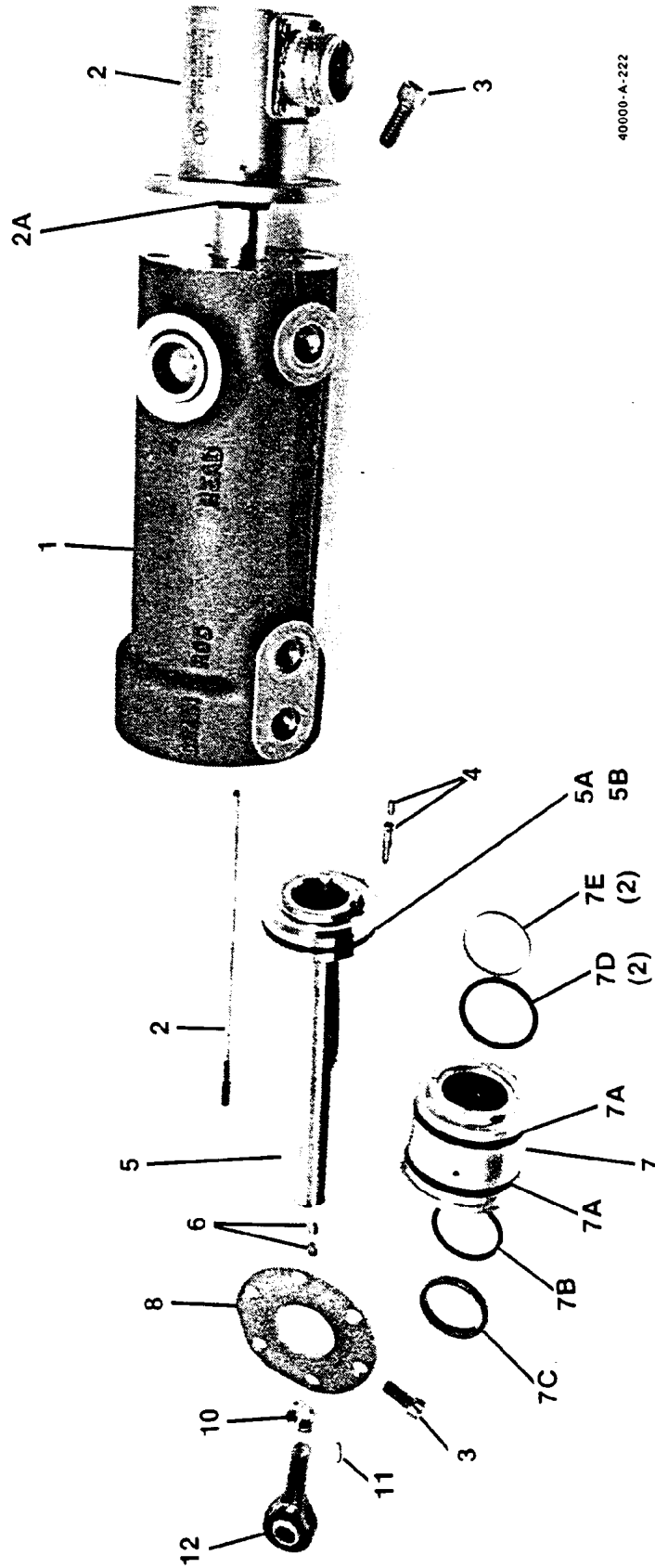


Figure 6-1. Parts for VSV Actuator

Parts List For Figure 6-2

Ref. No.	Part Name	Quantity
40124-26	Body Assy.....	1
40124-27	Plug, 0.250 Dia. Access.....	1
40124-28	Ring, 0.689 Dia. Spirolox.....	1
40124-29	Seat Assy.....	1
40124-30	Spring, Check Valve	1
40124-31	Plunger, Check Valve	1
40124-32	Body, Check Valve	1
40124-32a	O-ring, 0.676 x 0.070	1
40124-33	Ring, 0.875 Dia. Spirolox.....	1

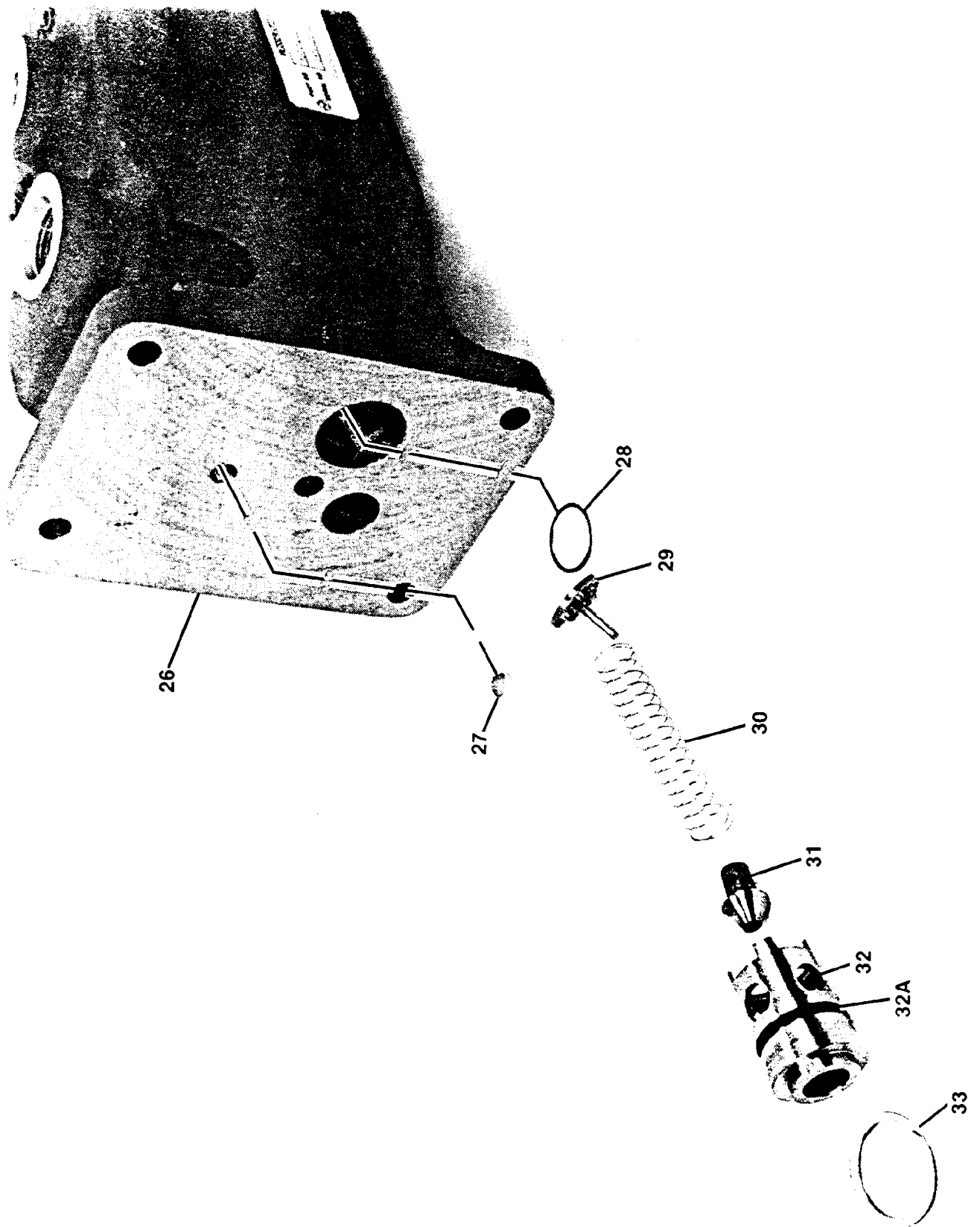
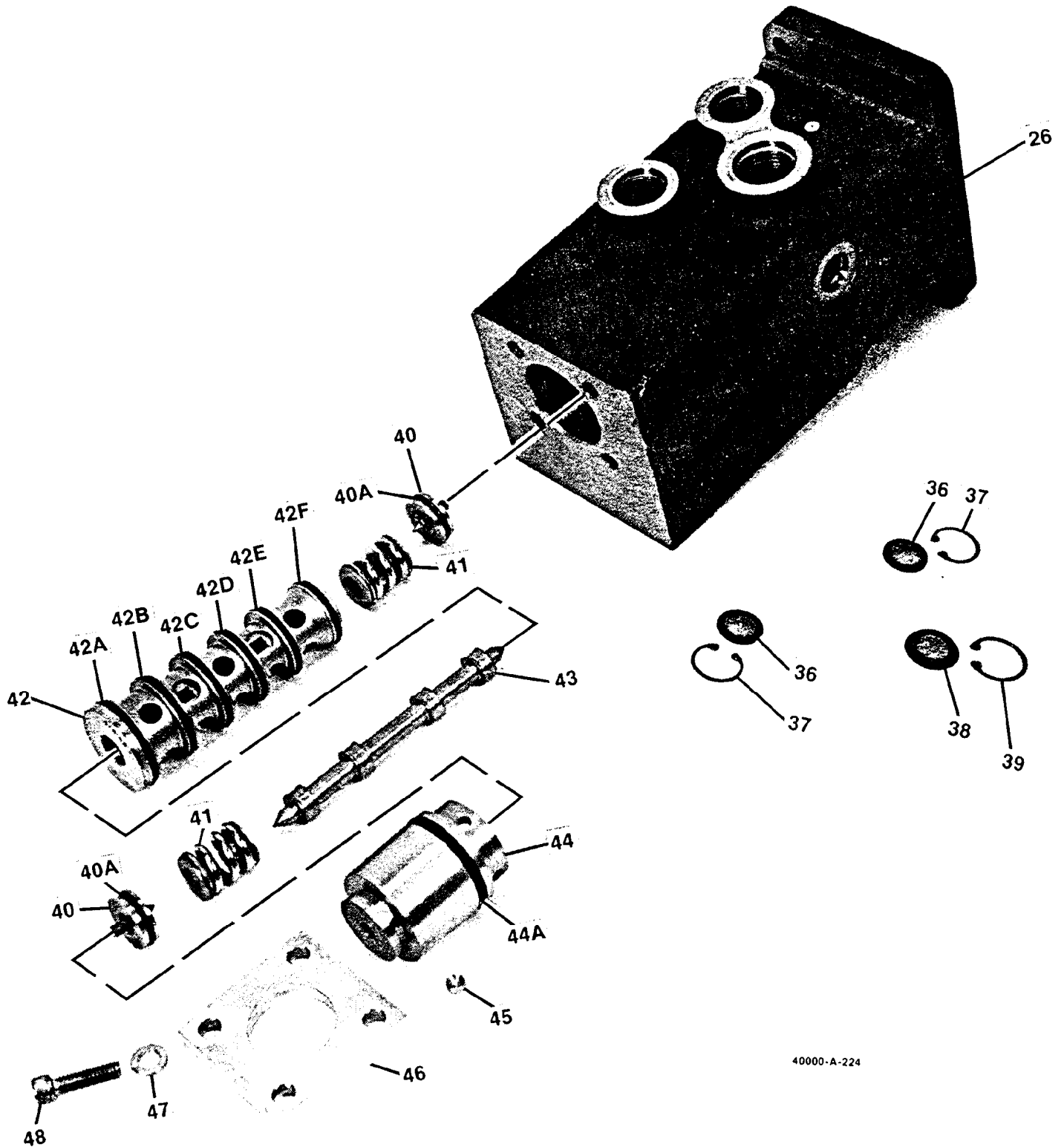


Figure 6-2. Parts for VSV Servovalve Check Valve

Parts List For Figure 6-3

Ref. No.	Part Name	Quantity
40124-36	Screen Assy.....	2
40124-37	Ring, Int 0.763 Free Dia.....	2
40124-38	Screen Assy.....	1
40124-39	Ring, Int. 0.901 Free Dia.....	1
40124-40	Adjuster Assy.....	2
40124-40a	O-ring, 0.676 x 0.070	2
40124-41	Spring Assy.....	2
40124-42	Sleeve, Servo Valve	1
40124-42a	O-ring, 1.239 x 0.070	1
40124-42b	O-ring, 1.176 x 0.070	1
40124-42c	O-ring, 1.114 x 0.070	1
40124-42d	O-ring, 1.051 x 0.070	1
40124-42e	O-ring, 0.989 x 0.070	1
40124-42f	O-ring, 0.926 x 0.070	1
40124-43	Plunger	1
40124-44	Retainer Assy	1
40124-44a	O-ring, 1.237 x 0.103	1
40124-45	Plug, 0.250 Dia. Access.....	1
40124-46	Cover	1
40124-47	Washer, 0.250 Splitlock	4
40124-48	Screw, 0.250-20 x 0.875	14



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Figure 6-3. Parts for VSV Servovalve

Parts List For Figure 6-4

Ref. No.	Part Name	Quantity
40124-51	Torque Motor	1
40124-52	Screw, #10-32 X 1.250	14
40124-53	Washer, #10 Splitlock	14
40124-54	Cover, Torque Motor.....	1
40124-55	Connector, Electric 14 Pin	2
40124-56	Gasket, Connector.....	2
40124-57	Screw, 4-140 x 0.375.....	8
40124-58	Washer, SpringLock #4 0.112.....	8
40124-59	Screw #10-32 x 0.750.....	14
40124-60	Washer, #10 Splitlock	4
40124-61	Plug, 6 Str Thrd Sst	1
40124-61a	O-ring, 0.468 x 0.078	1
40124-62	O-ring.....	3
40124-63	O-ring.....	1

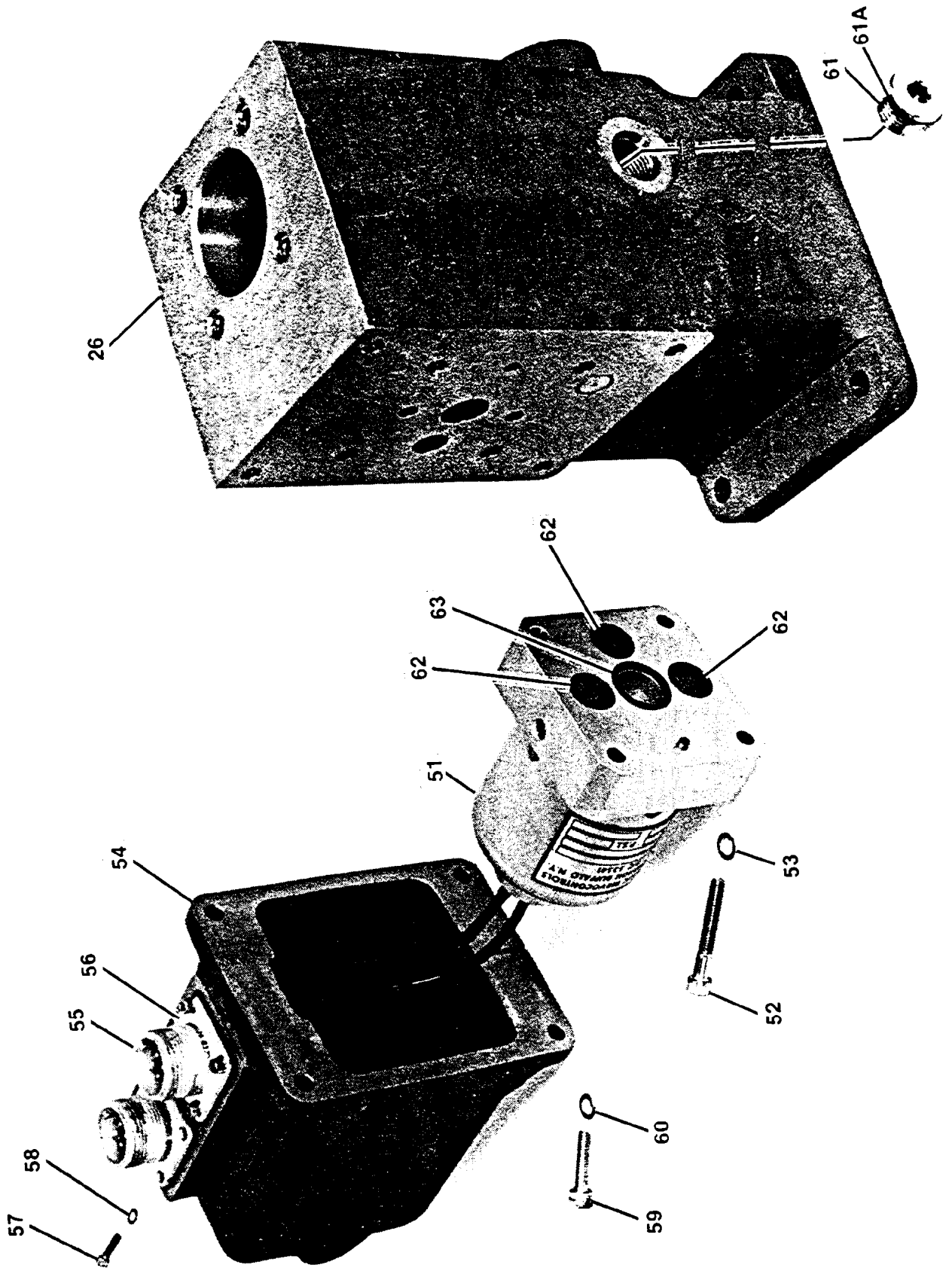


Figure 6-4. Parts for VSV Servovalve Torque Motor

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 **40124**.



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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.