



Product Manual 35023
(Revision B, 7/2018)
Original Instructions

Electric Large Actuator (ELA)

Re-greasing Procedure for ELA Actuator

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 **26455**, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 **26455**, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 Out-of-date translations are marked with .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— A bold, black line alongside the text identifies changes in this publication since the last revision.

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 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.

Regulatory Compliance

For Regulatory Compliance information, refer to the Electric Linear Actuator manual B26844.

Safety Symbols



Direct Current



Alternating Current



Both Alternating and Direct Current



Caution, risk of electrical shock



Caution, refer to accompanying documents



Protective conductor terminal



Frame or chassis terminal

Chapter 1. General Information

Introduction

CAUTION

Wear protective eyewear and gloves during this maintenance procedure to avoid contact with the grease.

IMPORTANT

Prior to starting this procedure, the actuator needs to be in the fully retracted (100%) position.

This manual contains instructions on the proper techniques and equipment to properly lubricate the Electric Large Actuator (ELA). Images show you grease port locations and the proper installation of adaptor in the actuator to ensure adequate lubricants are efficiently and effectively applied to keep the ELA working according to manufacturer's specifications. Prior to beginning the procedure, here are where the grease ports are located.

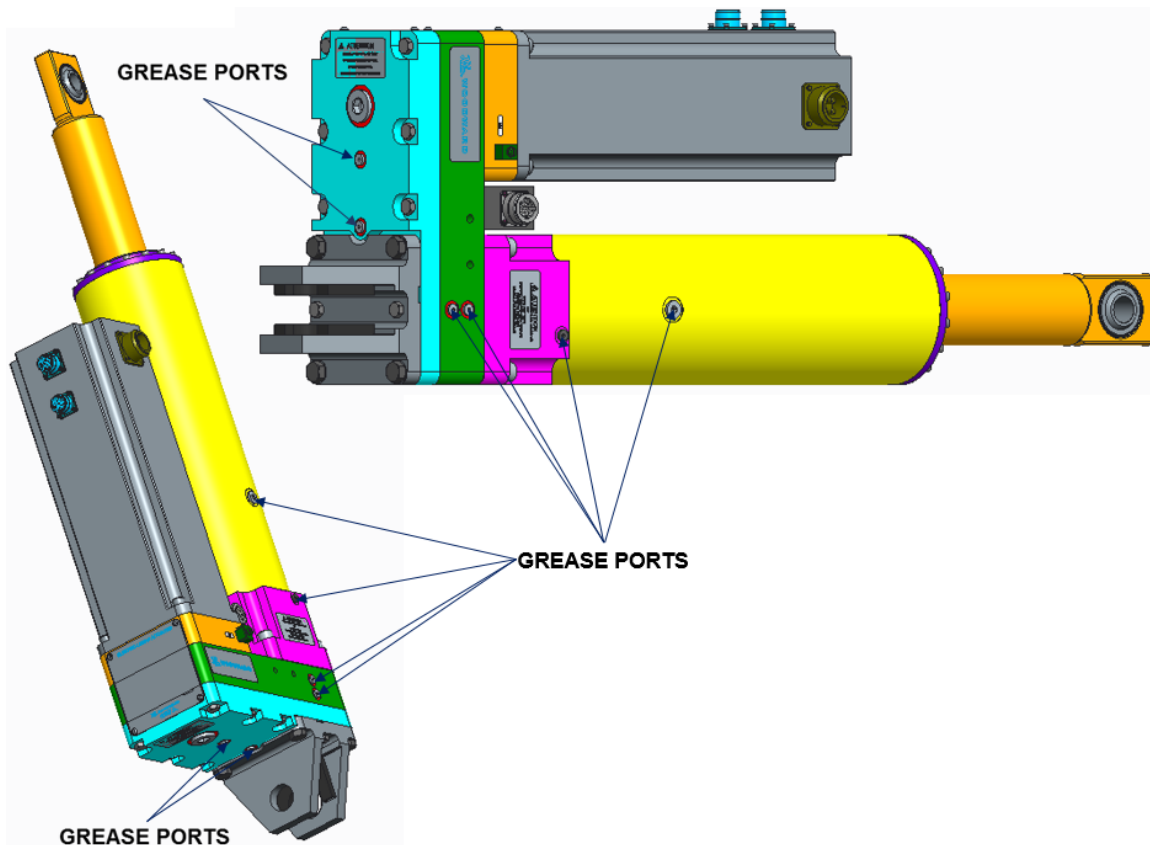


Figure 1-1. ELA 80 Grease Port Locations

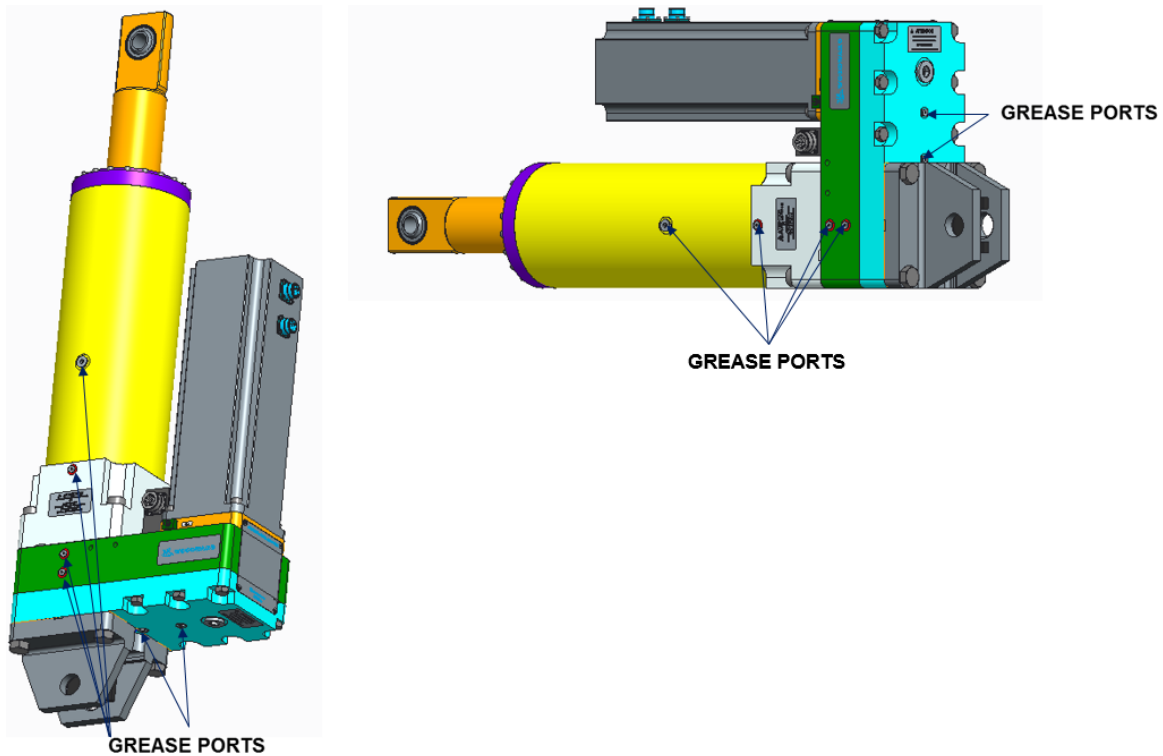


Figure 1-2. ELA 150 Grease Port Locations

Grease Kit Contents

The Grease Kit, part number 8923-2288 contains:

Table 1-1. Grease Kit Contents

Item	Part Number	Description	QTY
	8923-2283	Assembly (Grease Syringe)	6
	1249-1301	Adapter (Assembly Adapter with O-ring)	1
	1246-907	Plug (STR THD,(T-214),-6,.562-18,SOC,STL)	1
	1249-379	Plug (STR THD,(T-214),-2,.312-24,SOC,STL)	2
	B35023	Manual (Re-Greasing Procedure for ELA Actuator)	1
	1355-1028	O-Ring, Low Temp, (T2000),3-906,.078 W,.468 ID	1
	1355-1155	O-Ring Low Temp, (T-2000), 3-902,.064 W,.239 ID	5

The kit will arrive in a bag with the part number 89023-2288 and revision number printed on the outside of the bag. Each syringe arrives with a premeasured amount of grease when they arrive in the kit. Do not refill the syringe

For the shallow grease ports represented in Figures 1-7 and 1-9, insert the syringe with the adapter attached and depress the plunger until dispensing the recommended volume of grease into the grease port. Reuse the adaptor for each syringe during the greasing operation.

Grease Port Locations

The ELA has six grease ports. Three of the ports are located on the side of the actuator base and two are located on the bottom of the actuator base. Use these ports to lubricate the gear and bearing assembly. Use the one port is located on the actuator body to lubricate the roller screw assembly.

Port locations are shown in Figures 1-3, 1-4, and 1-5. Some of the plugs require a 1/4 inch hex wrench and the remainders require a 1/8 inch hex wrench to remove them prior to installing the Greasing Adaptor.

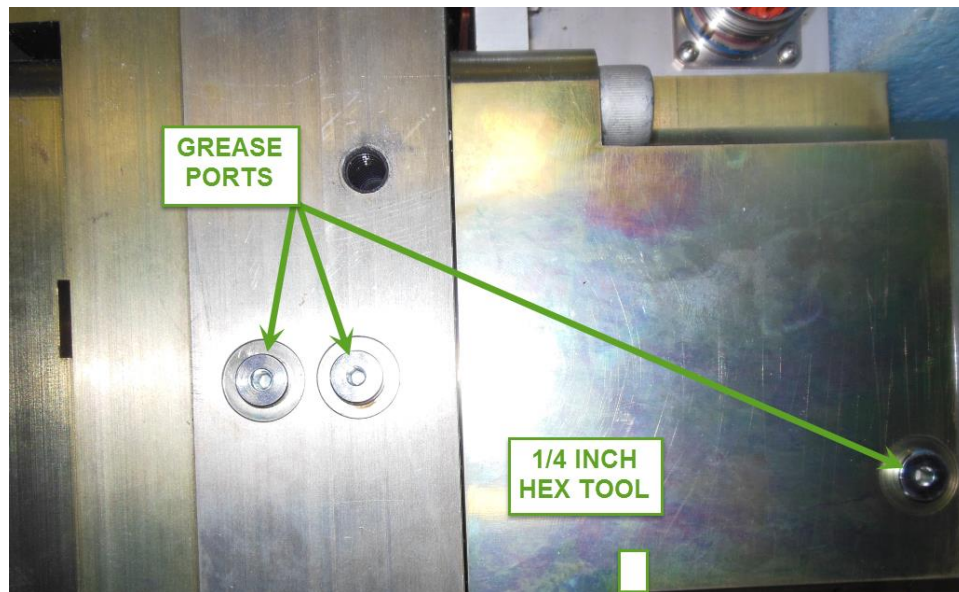


Figure 1-3. Side Grease Ports with Plugs Installed

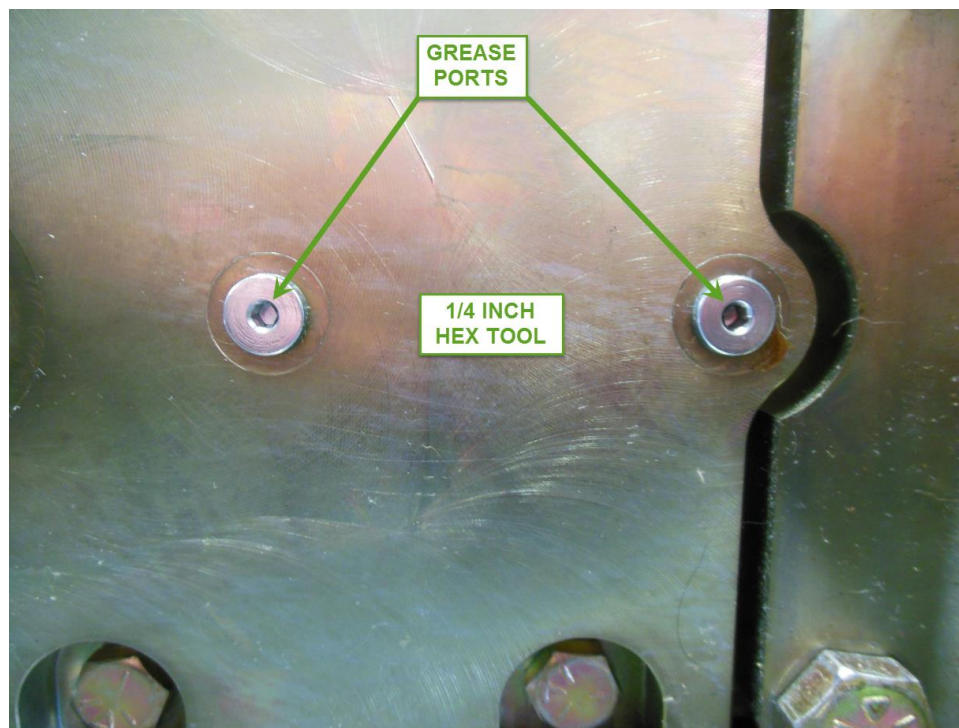


Figure 1-4. Bottom Grease Ports with Plugs Installed



Figure 1-5. Actuator Body Grease Port with Plug Installed

The five ports located on the actuator base are flush mounted and threaded to facilitate the installation of the Greasing Adaptor. The port located on the actuator body is recess mounted and threaded to receive the re-greasing adaptor. Figures 1-7, 1-8, and 1-9 show the grease ports with the plugs removed.

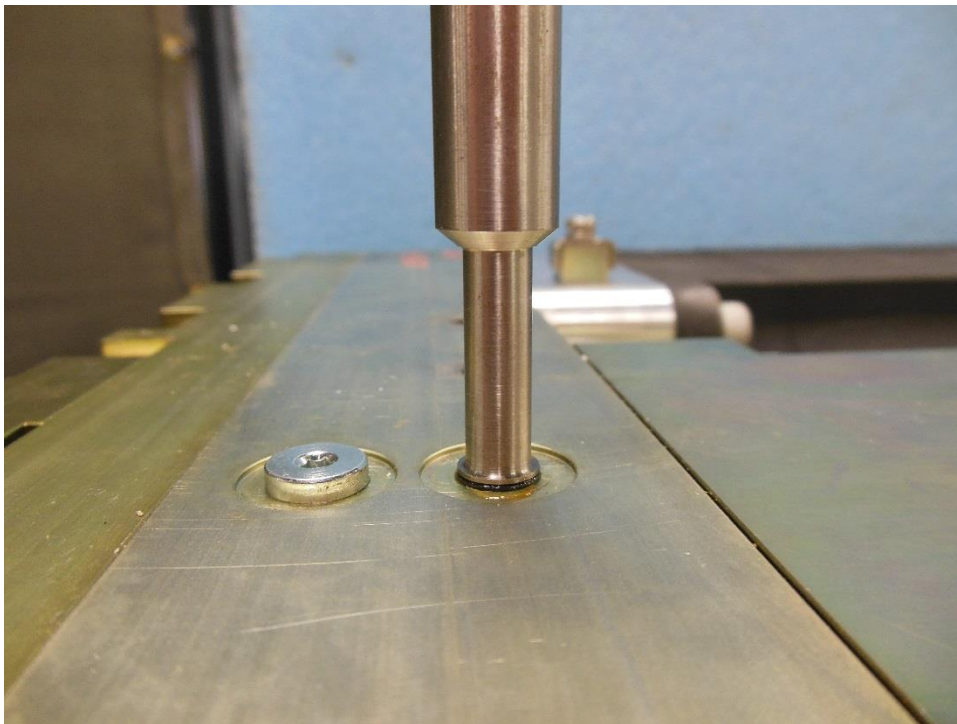


Figure 1-6. Base Grease Port with Greasing Adapter Installed.



Figure 1-7. Body Grease Port Unplugged



Figure 1-8. Body Grease Port with Greasing Adaptor Installed

Chapter 2

Re-Greasing Procedures

Introduction

There are two different procedures to lubricate the ELA. One is lubricating the roller screw assembly and two is lubricating the gear and ball assembly. These procedures are found below.

Lubricating the Roller Screw Assembly

1. Clean the outside of the actuator to ensure that no debris gets inside the actuator during the lubrication process. Any debris on the internal components will reduce its life.
2. Command the actuator to the 100% position (fully retracted) so that the Roller Screw Port Plug will align with the Roller Screw Grease Port per Figure 2-1.
3. Remove the roller screw port plug with a 1/4 inch hex wrench (Figure 2-1).
4. Set the port plug aside and keep clean, ensuring that they are not scratched or marred.
5. Attach the thread connector of the grease syringe to the threaded grease port of the roller screw, fully seating the fitting.
6. Inject prefilled amount of Woodward approved grease contained in one syringe into the roller screw grease port.
7. Remove the grease syringe from the roller screw grease port and install the roller screw port plug and torque the port plug to 7.9-9.0 N·m / 70-80 lb.-in (Figure 2-1).

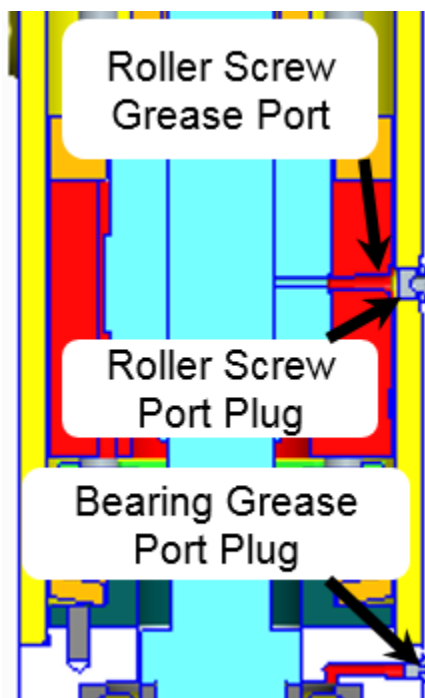


Figure 2-1. Ball Screw Assembly Lubrication

Lubricating the Gear and Bearing Assembly

1. Clean the outside of the actuator to ensure that no debris gets inside the actuator during the lubrication process. Any debris in the gears and bearings will reduce its life.
2. Remove the bearing port plug with a 1/8 inch hex wrench (Figure 2-2).
3. Set the plug aside and keep clean, ensuring that the inside plug surface is not scratched or marred.
4. Attach the thread connector of the grease syringe to the threaded bearing grease port. The fitting should be fully seated (Figure 2-2).
5. Inject prefilled amount of Woodward approved grease contained in one syringe into the bearing grease port.
6. Remove the grease syringe from the bearing port and install the port plug. Torque to 2.5–3.2 N·m / 22–28 lb.-in (Figure 2-2).
7. Repeat this process for all 4 gear/bearing access ports.

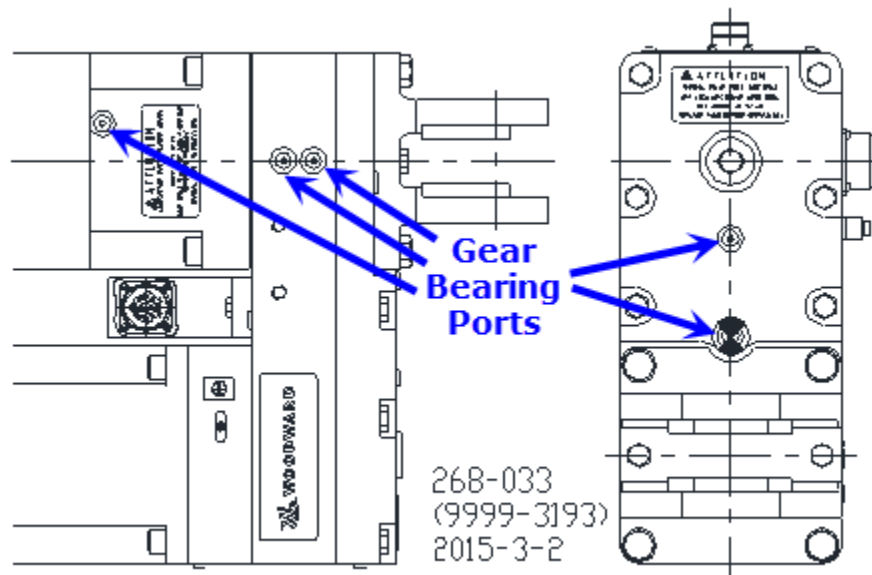


Figure 2-2. Gear/Bearing Access Ports

Chapter 3.

Product Support and Service Options

Product Support 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 or 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 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.

A current list of Woodward Business Partners is available at www.woodward.com/directory.

Product Service 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.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at www.woodward.com/directory, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used in Electrical Power Systems

<u>Facility</u>	<u>Phone Number</u>
Brazil -----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
Germany:	
Kempen----	+49 (0) 21 52 14 51
Stuttgart -	+49 (711) 78954-510
India -----	+91 (124) 4399500
Japan-----	+81 (43) 213-2191
Korea-----	+82 (51) 636-7080
Poland -----	+48 12 295 13 00
United States-----	+1 (970) 482-5811

Products Used in Engine Systems

<u>Facility</u>	<u>Phone Number</u>
Brazil -----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
Germany -----	+49 (711) 78954-510
India -----	+91 (124) 4399500
Japan-----	+81 (43) 213-2191
Korea-----	+82 (51) 636-7080
The Netherlands--	+31 (23) 5661111
United States-----	+1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems

<u>Facility</u>	<u>Phone Number</u>
Brazil -----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
India -----	+91 (124) 4399500
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

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number _____

Prime Mover Information

Manufacturer _____

Turbine Model Number _____

Type of Fuel (gas, steam, etc.) _____

Power Output Rating _____

Application (power generation, marine,
etc.) _____

Control/Governor Information

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 _____

Symptoms

Description _____

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.

Revision History

Changes in Revision B—

- Added part number 1355-1028 to Table 1-1
- Added part number 1355-1155 to Table 1-1
- Figure of kit contents and reference to figure removed

Changes in Revision A—

- Customer specific nomenclature removed

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We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **35023**.



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