



Product Manual 55043
(Revision B)
Original Instructions

Accumulator Assembly and Charging Assembly

8924-828, -829, -904, -948, -949

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 Out-of-date translations are marked with ⚠.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.

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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

General

This manual covers the following Accumulator Assemblies and Accumulator Charging Assemblies:

- 8924-829 Accumulator Charging Assembly
- 8924-828, 8924-904, 8924-948, 8924-949 Accumulator Assembly

Each accumulator assembly consists of an accumulator, mounting bracket, and fittings. The accumulators capacities are either one quart (0.9 L) or one US gallon (3.8 L). The Accumulator Charging Assembly consists of the gauging assembly, hose, and pressure gauge.

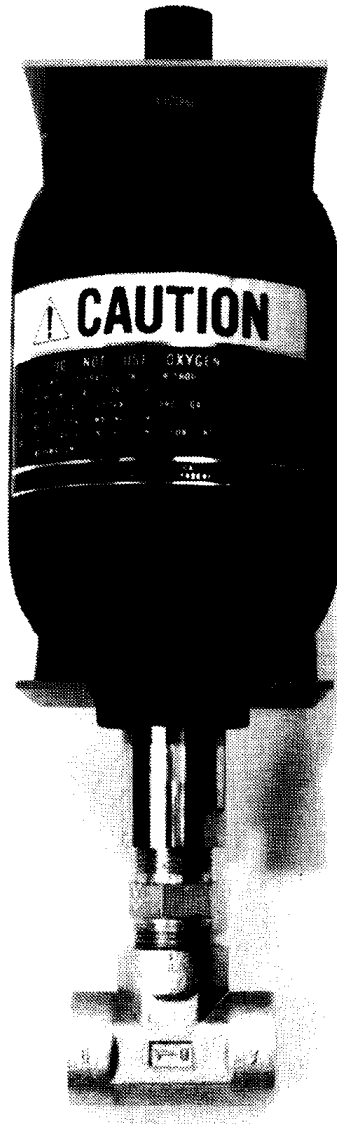


Figure 1-1. Typical Accumulator Assembly

Specifications

The table below shows the specifications for the Accumulator Assemblies and the Accumulator Charging Assembly.

Description:	One Quart (0.9 L) Bladder Accumulator	One Gallon (3.8 L) Bladder Accumulator
Gas Volume	68.4 in ³ 1121 mm ³	226 in ³ 3703 mm ³
Working Pressure	3000 psi maximum 20 685 kPa maximum	3000 psi maximum 20 685 kPa maximum
Physical:		
Height	11.734 in (290.04 mm) (without nipple and Tee)	17.000 in (431.80 mm) (without nipple and Tee)
Width	4.0 in (102 mm) (with bracket)	7.25 in (184.2 mm) (with bracket)
Depth	5.3 in (135 mm) (with bracket)	7.53 in (191.3 mm) (with bracket)
Weight	11.5 lb (5.2 kg)	34 lb (15 kg)
Mounting	2 x 0.625 inch (15.88 mm) holes on 4 inch (102 mm) centers	3 x 0.625 inch (15.88 mm) holes on 3 inch (76 mm) centers
Hydraulic Oil Connections	0.75-14 NPTF	0.75-14 NPTF

Chapter 2. Description

The accumulator assembly (Figure 2-1) is used with a hydraulic power supply to furnish a source of pressurized hydraulic oil to power an actuator on a prime mover. The accumulator should be installed in the oil supply line as close as possible to the actuator. The purpose of the accumulator is to reduce supply pressure fluctuations caused by oil flow demands of the actuator (pressure transients). As the line pressure drops, gas in the bladder (inside the accumulator) pushes down on the oil reservoir and assists the line pressure. Momentary increases in line pressure pushes up on the bladder, compressing the gas which equalizes the line pressure.

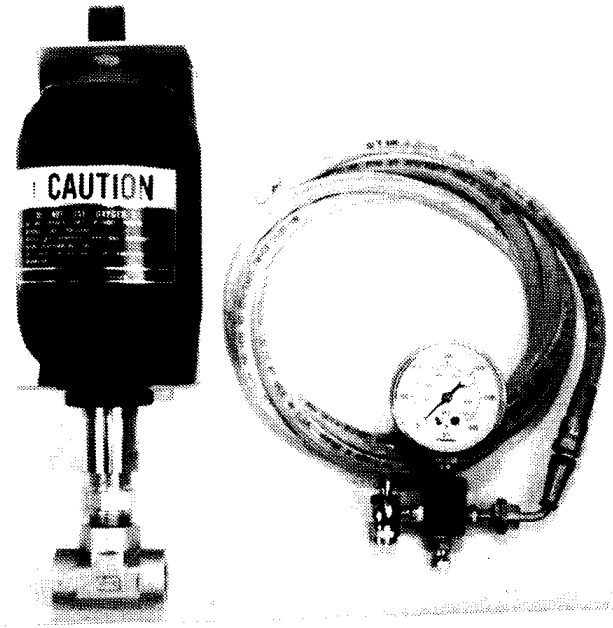


Figure 2-1. Charging Assembly and Typical Accumulator

Chapter 3. Installation

Receiving Instructions

The Accumulator Assembly is carefully packed at the factory to protect it from damage during shipment. However, careless handling during shipment can cause damage. Before unpacking the unit, carefully inspect the container for signs of shipping damage. Notify the shipper if damage is found.

Unpacking Instructions

Carefully open and remove the Accumulator Assembly from the shipping container. Do not remove the shipping plugs from the hydraulic oil connections until ready to connect piping.

Mounting Instructions

The Accumulator Assembly is designed for upright mounting close to the actuator.

Location Consideration

When selecting a location for the Accumulator consider the following:

1. Provide adequate ventilation and avoid placing the unit near heat producing devices.
2. Place the unit as close as possible to the actuator device to reduce the length of the line from the accumulator to the actuator.
3. Allow clearance around the accumulator for servicing.

Mounting Pad Preparation

The accumulator mounting bracket has two or three mounting holes for 5/8 inch bolts (see Figure 3-1 for location). Prepare a mounting pad for the unit that will provide adequate support and protection from excessive vibration.

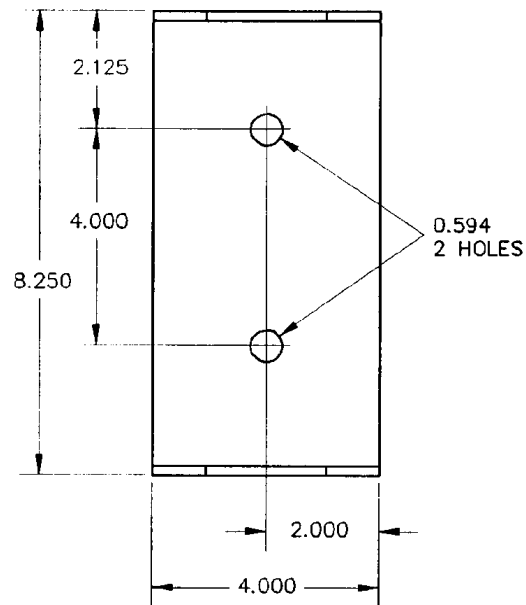


Figure 3-1a. Accumulator Bracket Mounting Detail (1 qt)

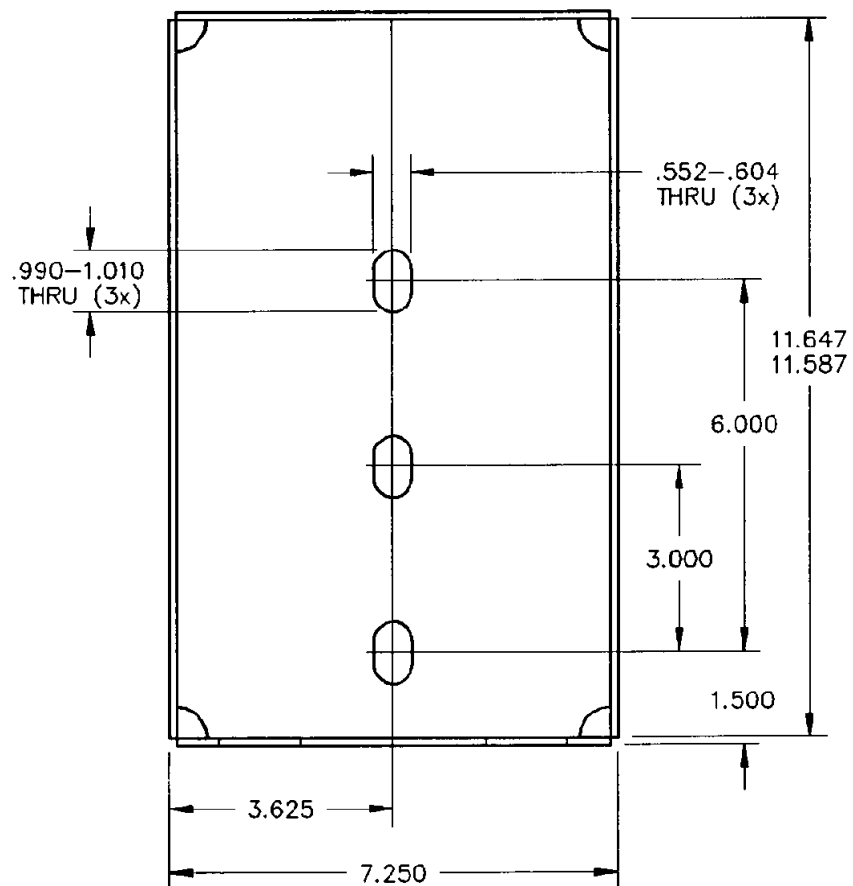


Figure 3-1b. Accumulator Bracket Mounting Detail (1 US gal)

Installation

The following procedure is used to install the accumulator assembly (see Figure 3-2).

1. Install the accumulator mounting bracket on the prepared mounting pad and secure with 5/8 inch diameter bolts and locking devices (lock washers, lock wire, etc.).
2. Install the accumulator in the mounting bracket.
3. Connect the line from the supply to the Tee fitting. Connect the line to the actuator.
4. Refer to the "Accumulator Charging" instructions before operating the system.

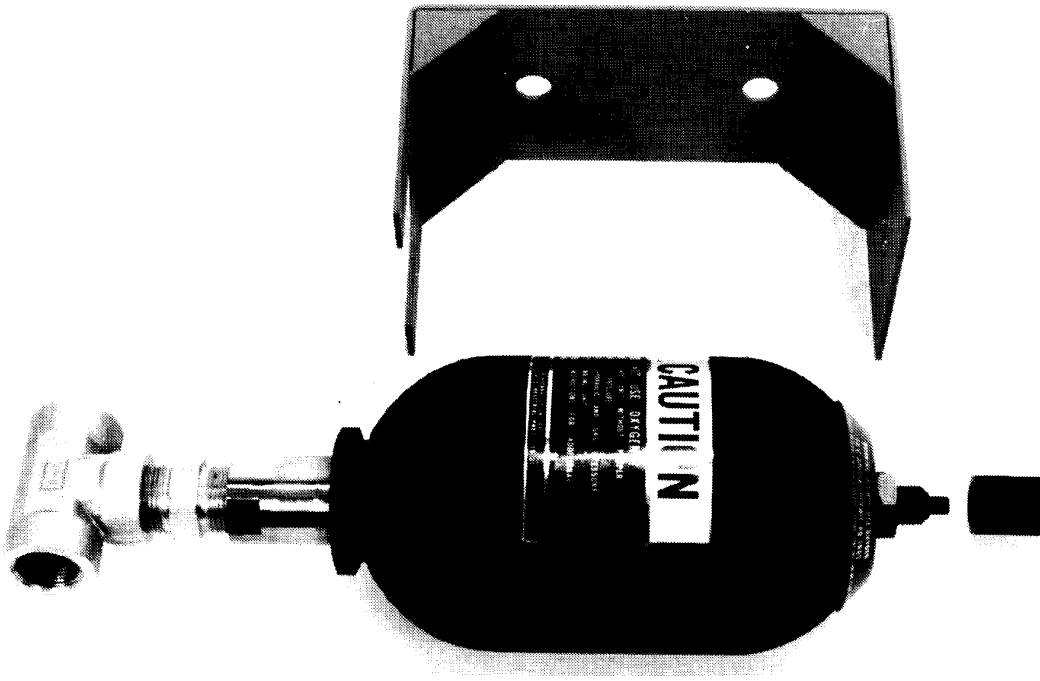


Figure 3-2. Typical Accumulator Installation

Accumulator Charging

After installation of the accumulator assembly and connection of hydraulic lines, the accumulator must be charged with nitrogen before operating. Perform the following procedure and refer to Figure 3-3.

IMPORTANT

For accurate control of nitrogen flow and pressure, a regulator assembly should be used on the nitrogen source. The regulator assembly should have its own high (tank) and low (output) pressure gauges.

1. Verify that all hydraulic lines are properly connected and the fittings tight. The hydraulic supply must be turned off and the system not pressurized.

2. Remove the service cap on the accumulator and connect the accumulator charging assembly.
3. Connect the accumulator charging assembly to the regulator discharge of the nitrogen source with the hose assembly.
4. With the charging valve and bleed valve closed, open the nitrogen source valve.
5. Open the bleed valve slightly to bleed air from the charging assembly. Close the bleed valve.
6. Using the charging valve, charge the accumulator to 375 psi (2586 kPa). Close the charging valve. (If accumulator is overcharged, close the nitrogen source valve and use the bleed valve to reduce pressure.)
7. Close the charging valve and nitrogen source valve. Open the bleed valve to de-pressurize charging assembly.
8. Disconnect the nitrogen source and remove the charging assembly from the accumulator. Replace the service cap on the accumulator fitting.

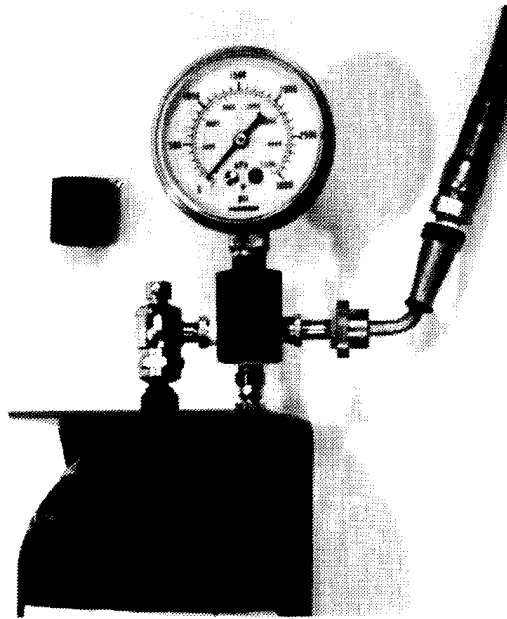


Figure 3-3. Accumulator Charging

System Flush Instructions

Before normal operation of system, it is necessary to flush contaminants from the system (including lines) after installation. Remove the actuator from the system for the flush procedure to prevent contaminants from entering it and becoming trapped in the actuator or its filters or screen. Use a flexible bypass hose jumper.

NOTICE

Equipment damage may result if contaminants from hydraulic lines are not flushed before operation of the system.

1. Remove the actuator from the system by bypassing it with a short hose attached to supply and drain lines of hydraulic system.
2. Turn on the hydraulic supply.
3. Verify that oil is flowing to the accumulator and through the system lines.
4. Operate the system for at least 12 hours to allow all contaminants to be removed from the system lines.
5. While the system is operating, verify that the oil level is correct. Inspect the system for leaks and repair if found.
6. After the 12 hour flush, shut off the hydraulic supply and change filters.
7. Remove the jumper hose and connect the actuator in the system.

Start-up and Air Purging

Before normal operation it is necessary to purge air from the hydraulic system. This must be done after installation or after changing the hydraulic oil in the hydraulic supply reservoir. Equipment damage and erratic operation can result if the air is not purged from the hydraulic lines of the hydraulic supply and actuator before operating the prime mover. To purge air from the system, perform the following procedure:



To prevent personal injury and damage to equipment, secure the prime mover to prevent its operation during the following procedure.

1. Turn on the hydraulic supply.
2. Verify that hydraulic oil is circulating through the system.
3. Using the actuator control device, cause the actuator to stroke from full closed to full open several times to purge air from the actuator.
4. As the hydraulic supply, actuator, and connecting line fill with hydraulic oil and the air is purged, check the oil level in the reservoir. Add more oil if the level is low.
5. Inspect the entire system for leaks, tighten or repair as needed.
6. Continue to run the hydraulic supply and keep stroking the actuator until all air is purged.
7. Close the actuator.
8. The system is now ready for normal operation

Chapter 4.

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 **55043B**.



B55043:B



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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.