



## **Groschopp Speed Adjusting (Synchronizing) Motor**

**Operation Manual**

## IMPORTANT



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.

## DEFINITIONS

- **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

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.



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.



This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to check the *publications page* on the Woodward website:

[www.woodward.com/publications](http://www.woodward.com/publications)

The current revision and distribution restriction of all publications are shown in manual **26311**.

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.



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.

## NOTICE

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.

## 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*.

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# Chapter 1.

## Speed Adjusting Motor

### General Information

The Groschopp motor is used on Woodward SG, PSG, and UG governors for speed adjusting or synchronizing purposes. These motors are suitable for 100% duty cycle without danger of overheating under normal ambient temperature. For pulsed operation with automatic load sharing or synchronizing systems, or other demanding applications, consult Woodward.

The Woodward manuals for governors which normally use this motor are listed below.

#### **Governor Type Manual Number**

EGB Governor	82340
SG Governor	04048
PSG Governor	37013/37017
UG Dial Governor	03039/03040

Two different Groschopp motor types are used:

	<b>Groschopp No.</b>
Universal Type (ac/dc)	KM 58–20
Permanent Magnet Type (dc)	PM1 48–25

See Figures 1-1 and 1-2 for an outline drawing of the universal, permanent magnet, and capacitor type Groschopp motors, respectively.

All Groschopp motors are protected against water and foreign particle contamination, and meet the requirements of IP44 (IEC 144). On request, IP55 also is available.

All motors are supplied with a two-stage worm gear gearbox, type Z21. The following gearbox ratios are available:

<b>Ratio</b>	<b>Status</b>	<b>Motor Type</b>	<b>Speed</b>
300:1	optional	KM/PM1	9 rpm
900:1	standard	KM/PM	3 rpm
1350:1	optional	KM/PM	2 rpm

A friction loading kit for the KM motor can be added to the standard gearbox, as an option. The friction loading device is used to stop possible armature rotation caused by vibration from the engine when the motor is not powered.

This manual describes the maintenance of these motors.

## Lubricating Instructions

The following instructions apply to this motor model regardless of voltage input or output shaft speed.

### IMPORTANT

The bearing and the speed reduction gear housing of a new motor is filled with sufficient grease to last for two years under normal, intermittent operation. Under extensive use, when the motor is run for long periods of time, the lubricant will last about a year.

To replace grease, if the motor is equipped with a friction loading device, first remove the nut, screw, spring, washer, disk, and ball (see Figure 1-3). Remove screws a, b, c, and d (see Figure 1-4) and slip off gear housing. Clean out old grease from the housing, and refill the housing (3/4 full) with one of the following greases:

- Supermil Grease No. A 72832, by Standard Oil Company if in the US or Multemp SRL if in Europe.
- Dow Corning Grease No.33 (Temperature range is  $-73$  to  $+204$  °C [ $-100$  to  $+400$  °F]) when motor is used on EGBs or LSGs or when otherwise specified.

For sintermetal bearing lubrication, use a good grade of SAE 10W automotive oil or "Konstant GL 2000" designation oil.

Table for Figure 1-1

Motor Shaft Tabulation				
Shaft	L	L <sub>1</sub>	L <sub>2</sub>	Application
A 038040	13.84 (.545) 13.39 (.527)	9.1 (.358) 8.9 (.350)	1.96 (.077) 1.30 (.051)	UG-8 PLAIN COVER
B 038041	24.84 (.978) 24.38 (.960)	9.1 (.358) 8.9 (.350)	1.96 (.077) 1.30 (.051)	UG-8 CAST COVER UG-40 PLAIN COVER
R 038042	30.84 (1.214) 30.39 (1.196)	9.1 (.358) 8.9 (.350)	1.96 (.077) 1.30 (.051)	UG-40 CAST COVER
F 038043	5.33 (.210) 4.88 (.192)	17.6 (.693) 17.4 (.685)		SG/PSG/LSG-1
AB 3348-019	23.85 (.939) 23.39 (.921)	9.1 (.358) 8.9 (.350)	1.96 (.077) 1.30 (.051)	EGB PSG (SPECIAL)
V 3348-025	5.33 (.210) 4.88 (.192)	12.6 (.496) 12.4 (.488)		SG/PSG (SPECIAL)
3350-011	40.36 (1.589) 39.90 (1.571)	9.1 (.358) 8.9 (.350)	1.96 (.077) 1.30 (.051)	SPECIAL
3348-045	13.84 (.545) 13.39 (.527)	9.1 (.358) 8.9 (.350)	-2.36 (-.093) -1.70 (-.067)	SPECIAL
AG 3345-055				SPECIAL UG-8-RUB MNTG
NH 3345-051				SPECIAL UG-40-RUB MNTG

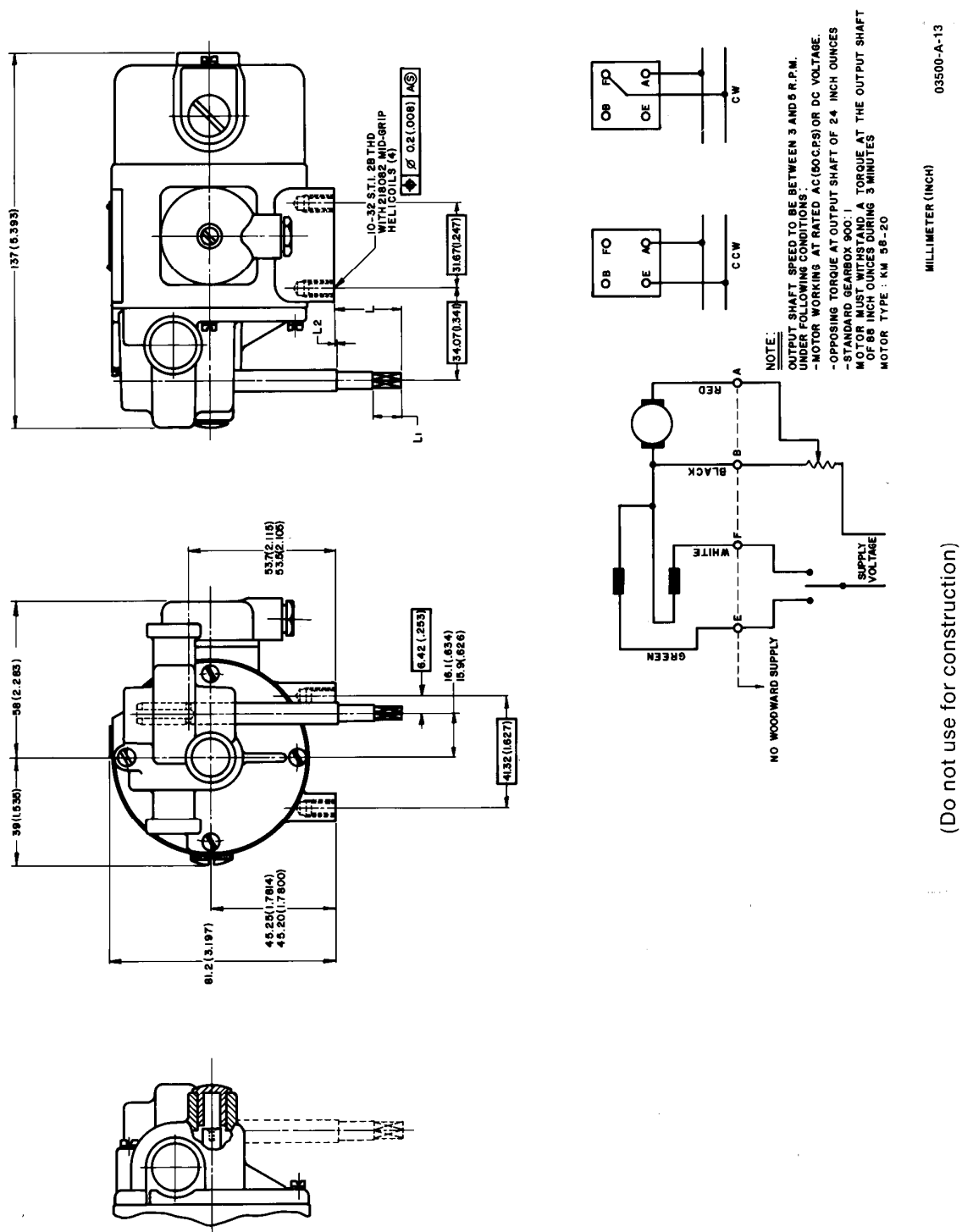


Figure 1-1. Outline Drawing of Groschopp Universal Type Motor with Motor Shaft Tabulation

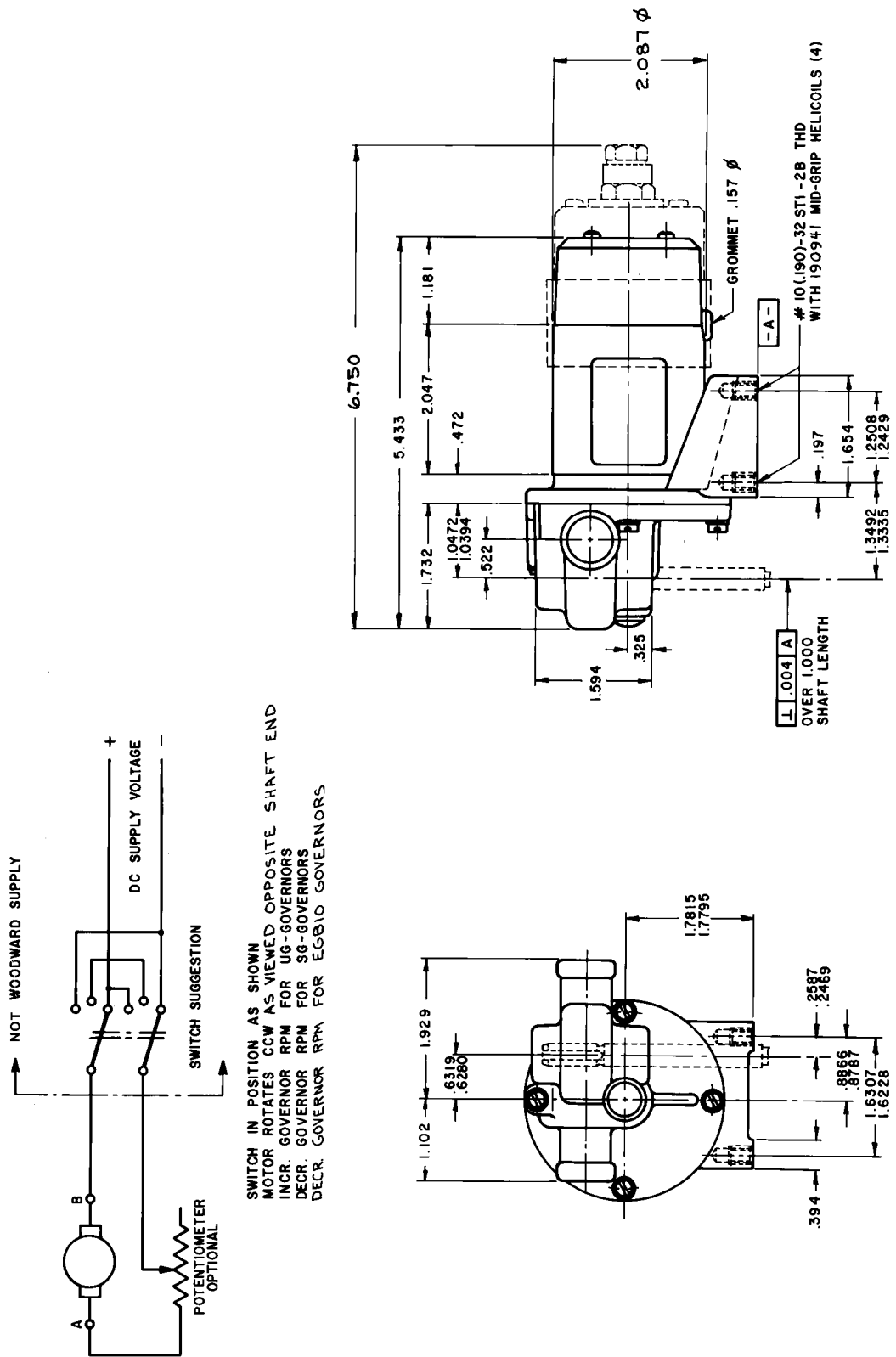


Figure 1-2. Outline Drawing of Groschopp Permanent Magnet Type Motor

(Do not use for construction)

MOTOR TYPE: PM I 48-25

03500-A-14

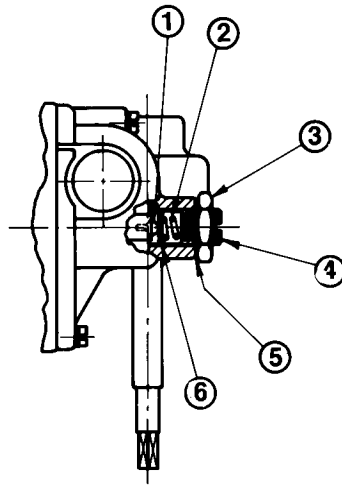
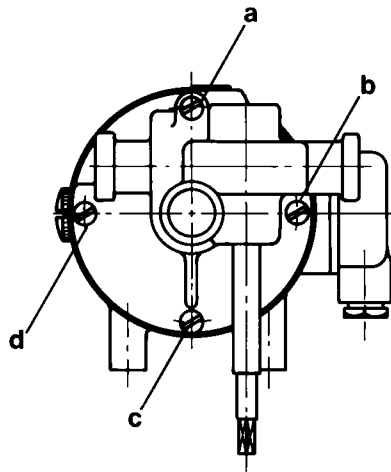


Figure 1-3. Friction Loading Device



03500-A-11

Figure 1-4. Gear Assembly Housing Screws

Reinstall the gear housing and fasten it to the motor housing with screws a, b, c, and d (see Figure 1-4). Reinstall friction loading device if used, installing parts in the reverse order from which removed: ball (1), disk (6), washer (5), spring (2), screw (4), and nut (3). Set the correct tension on the friction loading device using the following procedure: Apply the correct voltage and run the motor while at the same time increasing the tension on the friction spring until the motor slows. Back off friction screw until normal speed is regained. Tighten the friction nut while holding the friction screw stationary.

Be sure to make the correct electrical connections when reinstalling the motor on the governor cover. Refer to the decal inside the connector cap on the motor for correct wiring connections to the posts on the connector block: see Figure 1-5 for UG Governors and Figure 1-6 for EGB, SG, and PSG Governors. If the speed adjustment option is used, the rheostat or resistor is connected to the black post on the connector block.



Note that for the EGB, SG, and PSG Governors, Green is DECREASE and White is INCREASE. Also see Figures 1-1 and 1-2 for a wiring schematic for the particular type of Groschopp motor used.

Standard cable assemblies are available which easily connect to the motor connector block (see Principal Replacement Parts).

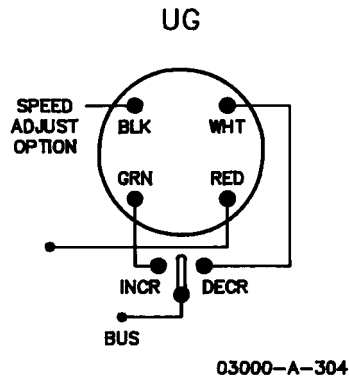


Figure 1-5. Typical Wiring for UG Governor

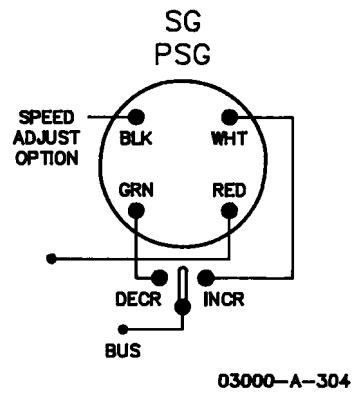


Figure 1-6. Typical Wiring for EGB, SG, and PSG Governors

## Adjustments

All adjustments for the correct operation of the Groschopp motor have been made at the factory, and no further adjustments are needed.

## Motor Shaft Replacement

If the motor shaft needs replacing, remove the shaft by fastening the end of the shaft in a vise. With a plastic-head hammer, tap lightly on the gear box housing to slip off the motor shaft from the housing.

To install the motor shaft, align the groove in the motor shaft with the keyed stud in the gear box assembly (Figure 1-7). With a plastic-head hammer, tap the end of the motor shaft until it is fully engaged. At this point, a snap ring fitted in the bore will fit into a groove on the shaft and keep it in position.

For various shaft types available and shaft dimensions, see Motor Shaft Tabulation in Figure 1-1.

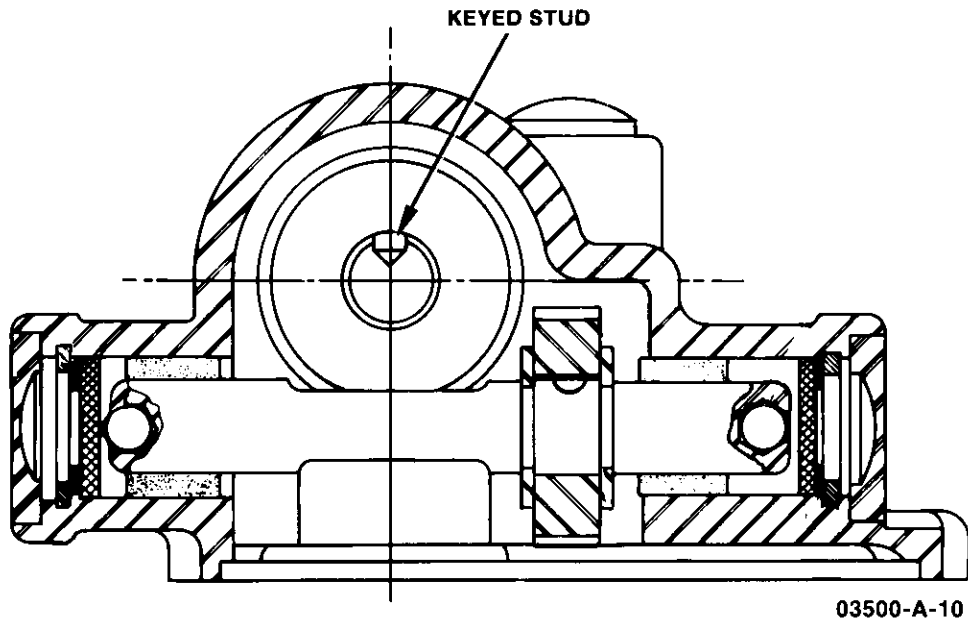


Figure 1-7. Gear Box Assembly

## Principal Replacement Parts

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

- Serial number of governor and motor type
- Voltage of motor
- Part number, name of part, or description of part
- Gearbox ratio
- Manual number (this is manual 03508)

See Chapter 2 for details on contacting Woodward and for securing service.

Ref. No.	Part Name .....	Quantity
03508-1	Ball .....	1
03508-2	Spring .....	1
03508-3	Nut .....	1
03508-4	Screw .....	1
03508-5	Washer .....	1
03508-6	Disc .....	1
03508-7	Brush Cap .....	9
03508-8	Motor Brush with Spring .....	2
	U 7.012/v511 for WM and WKM motors	
03508-8A	Motor Brush with Spring .....	2
	U 7.555/v511 for PM motors	
03508-9	Connector Block .....	1
03508-10	Connector Cap .....	1
03508-11	Output Shaft .....	1
03508-12	3 Wire Cable Ass'y STD (not shown) .....	1
03508-12A	2 Wire Cable Ass'y PM (UG8) (not shown) .....	1
03508-12B	2 Wire Cable Ass'y PM (UG40) (not shown) .....	1
03508-12C	3 Wire Cable Ass'y STD with Limit Switches .....	1
	(not shown)	

Parts 03508-1 through 03508-6 also are furnished as a kit, Woodward Part No. 5308-015.

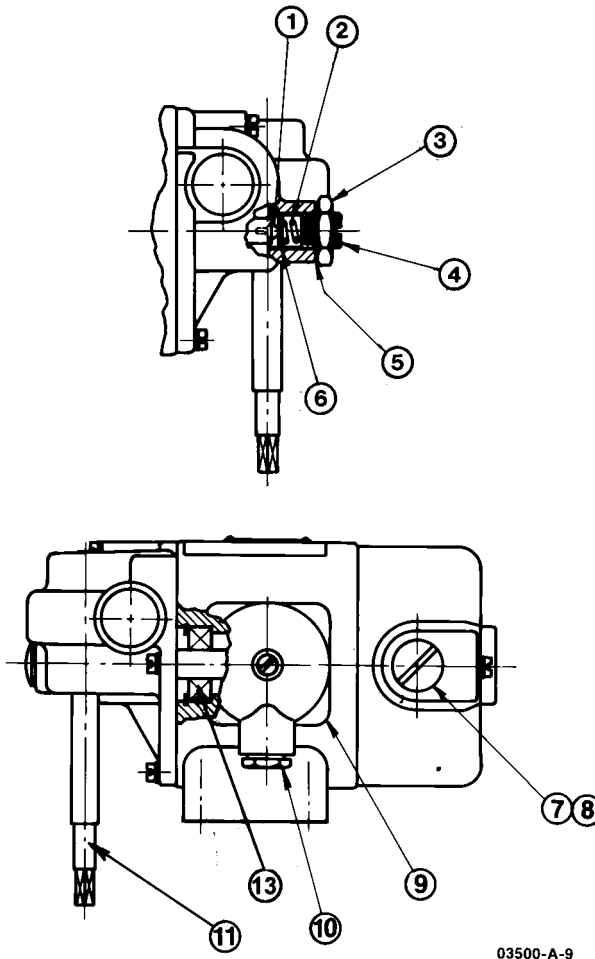


Figure 1-8. Principal Replacement Parts

## Chapter 2.

# 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:

1. Consult the troubleshooting guide in the manual.
2. Contact the **OE Manufacturer or Packager** of your system.
3. Contact the **Woodward Business Partner** serving your area.
4. Contact Woodward technical assistance via email ([EngineHelpDesk@Woodward.com](mailto:EngineHelpDesk@Woodward.com)) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5. If the issue cannot be resolved, you can select a further 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 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 current list of Woodward Business Partners is available at [www.woodward.com/directory](http://www.woodward.com/directory).

### Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- 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 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.

**Flat Rate Repair:** Flat Rate Repair is available for many of the standard mechanical products and some of the electronic 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.

**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. 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 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's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- 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.

**Product Training** is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor 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 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 one of the Full-Service Distributors listed at [www.woodward.com/directory](http://www.woodward.com/directory).

## Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at [www.woodward.com/directory](http://www.woodward.com/directory).

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 (129) 4097100
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 (129) 4097100
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 (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

For the most current product support and contact information, please visit our website directory at [www.woodward.com/directory](http://www.woodward.com/directory).

## 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 \_\_\_\_\_

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### Prime Mover Information

Manufacturer \_\_\_\_\_

Engine Model Number \_\_\_\_\_

Number of Cylinders \_\_\_\_\_

Type of Fuel (gas, gaseous, diesel,  
dual-fuel, etc.) \_\_\_\_\_

Power Output Rating \_\_\_\_\_

Application (power generation, marine,  
etc.) \_\_\_\_\_

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### Control/Governor Information

#### Control/Governor #1

Woodward Part Number &amp; Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #2

Woodward Part Number &amp; Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #3

Woodward Part Number &amp; Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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### 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.*

We appreciate your comments about the content of our publications.

Send comments to: [icinfo@woodward.com](mailto:icinfo@woodward.com)

Please reference publication **03508A**.



B03508:A



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