



Product Manual 82359
(Revision NEW)
Original Instructions

Ramp Generator and Signal Converter

8271-083
for EGM and 2301 Controls

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

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www.woodward.com/publications

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



Proper Use

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



Translated Publications

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

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 Out-of-date translations are marked with ⚠.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

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

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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.

Description

The 8271-083/8271-083A Ramp Generator and Signal Converter combines the functions of a ramp generator and a signal converter in one control. It serves as an interface between a 4–20 or 10–50 mA signal from a current source used to set speeds and a Woodward EGM or 2301 electronic speed control.

Model 8271-083 is the 10–50 mA configuration, and model 8271-083A is the 4–20 mA configuration.

When functioning as a ramp generator, the control facilitates the acceleration of a prime mover at a uniform rate.

As a signal converter, the control converts a mA input signal to a signal that is usable by the EGM or 2301 to control speeds.

The ramp generator/signal converter uses a low signal select bus (LSS) to choose either the ramp generator signal or the signal converter signal—whichever calls for the lesser amount of fuel—to output to the summing point of the control amplifier. The LSS, therefore, prevents the control from simultaneously working in ramp generator mode and in signal converter mode.

Figure 1-1 shows how the ramp generator/signal converter works in the system.

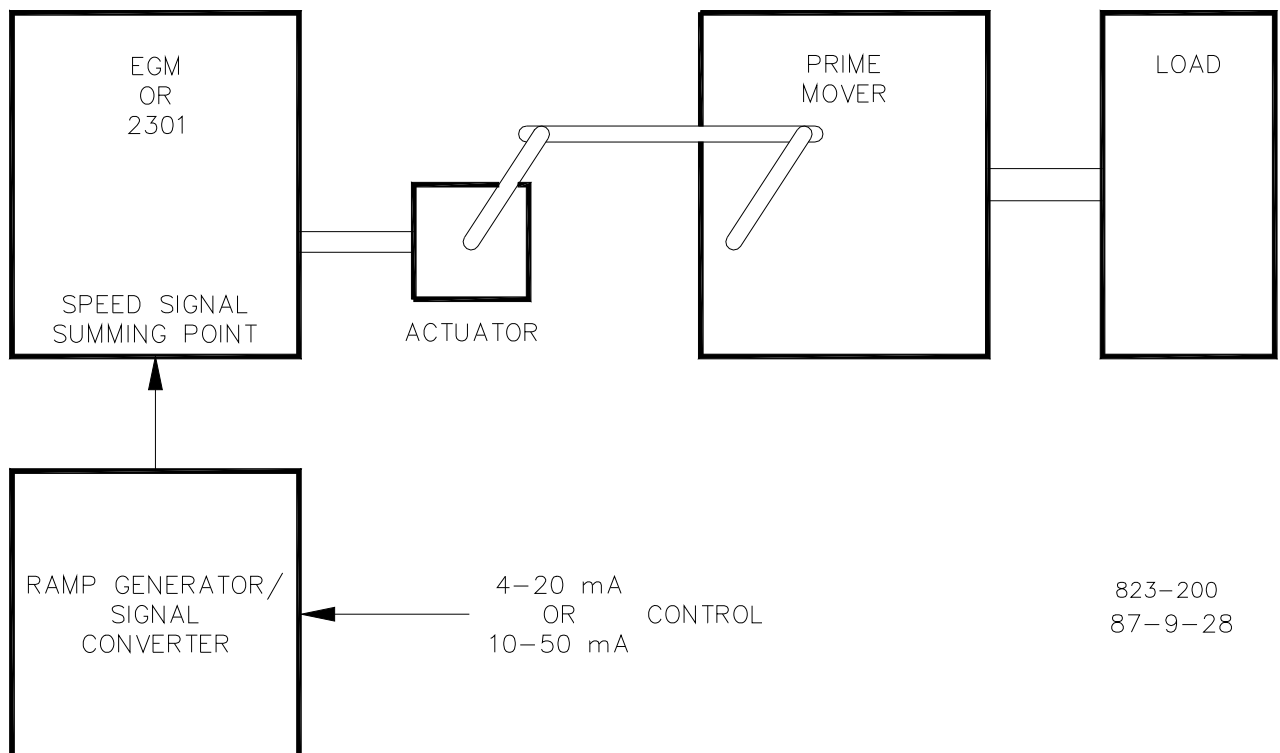


Figure 1-1. System Drawing

Chapter 2. Installation

Unpacking

Be careful when unpacking the ramp generator/signal converter. Check it for signs of damage, including bent or dented panels, scratches, and loose and/or broken parts. If you find any damage, notify the shipper immediately.

Location Considerations

When selecting a location to mount the ramp generator/signal converter, consider the following:

- The control must operate within a temperature range of -50 to $+150$ °F (-46 to $+66$ °C).
- Protect the control from direct exposure to water or a condensation-prone environment.
- Provide adequate ventilation for cooling. Shield the control from radiant heat sources.
- Do not install the control near high-voltage or high-current devices.
- Allow adequate space around the control for servicing.
- Electrically ground the control for proper shielding.

Mounting the Control

You can mount the ramp generator/signal converter in any position that allows adequate ventilation and room for servicing.

Mount the ramp generator/signal converter as shown in the outline drawing (Figure 2-1).

Electrical Connections

Wire all input and output connections for the ramp generator/ signal converter as shown in the plant wiring diagram (Figure 2-2).

Power Supply

Connect the 36 ± 3 Vdc power supply to terminals 1 (+) and 2 (–).

Ramp Switch

Connect the ramp switch to terminals 3 and 4. Close the switch to accelerate to rated speed, and open it to decelerate to idle.

Signal Converter Input

Connect the 10–50 mA (8271-083) or 4–20 mA (8271-083A) current input to terminals 5 (–) and 6 (+).

Speed Control Signal

If you're using an EGM, connect its speed-setting line to terminal 7 ($\pm$). If your speed control is a 2301, connect the speed-setting line to terminal 8 ($\pm$).

Connect the EGM or 2301 signal common to terminal 5.

Jumper Connections

For 8271-083 (10–50 mA configuration), connect a jumper to terminals 10 and 11. For 8271-083A (4–20 mA configuration), connect a jumper to terminals 9 and 10.

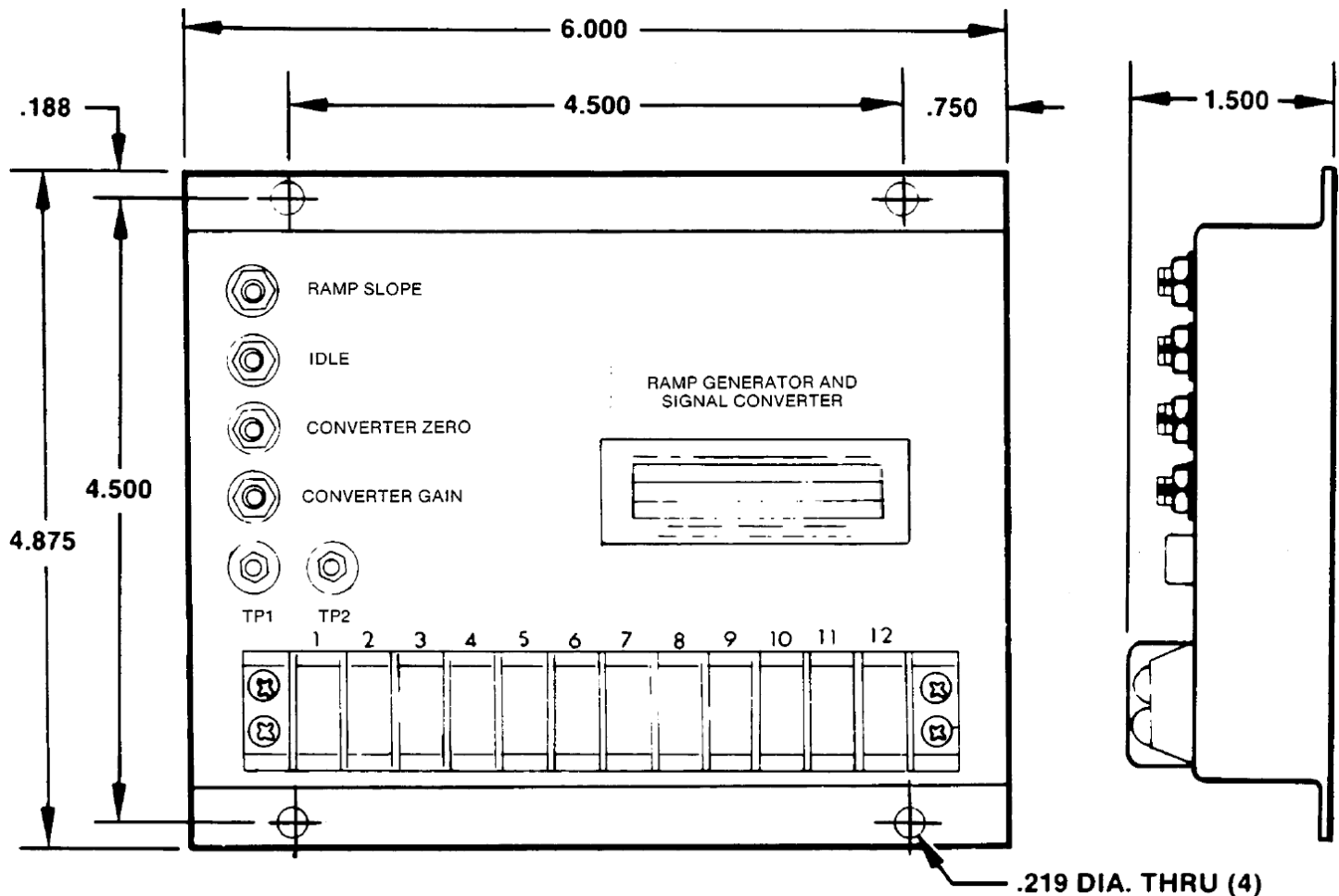


Figure 2-1. Outline Drawing

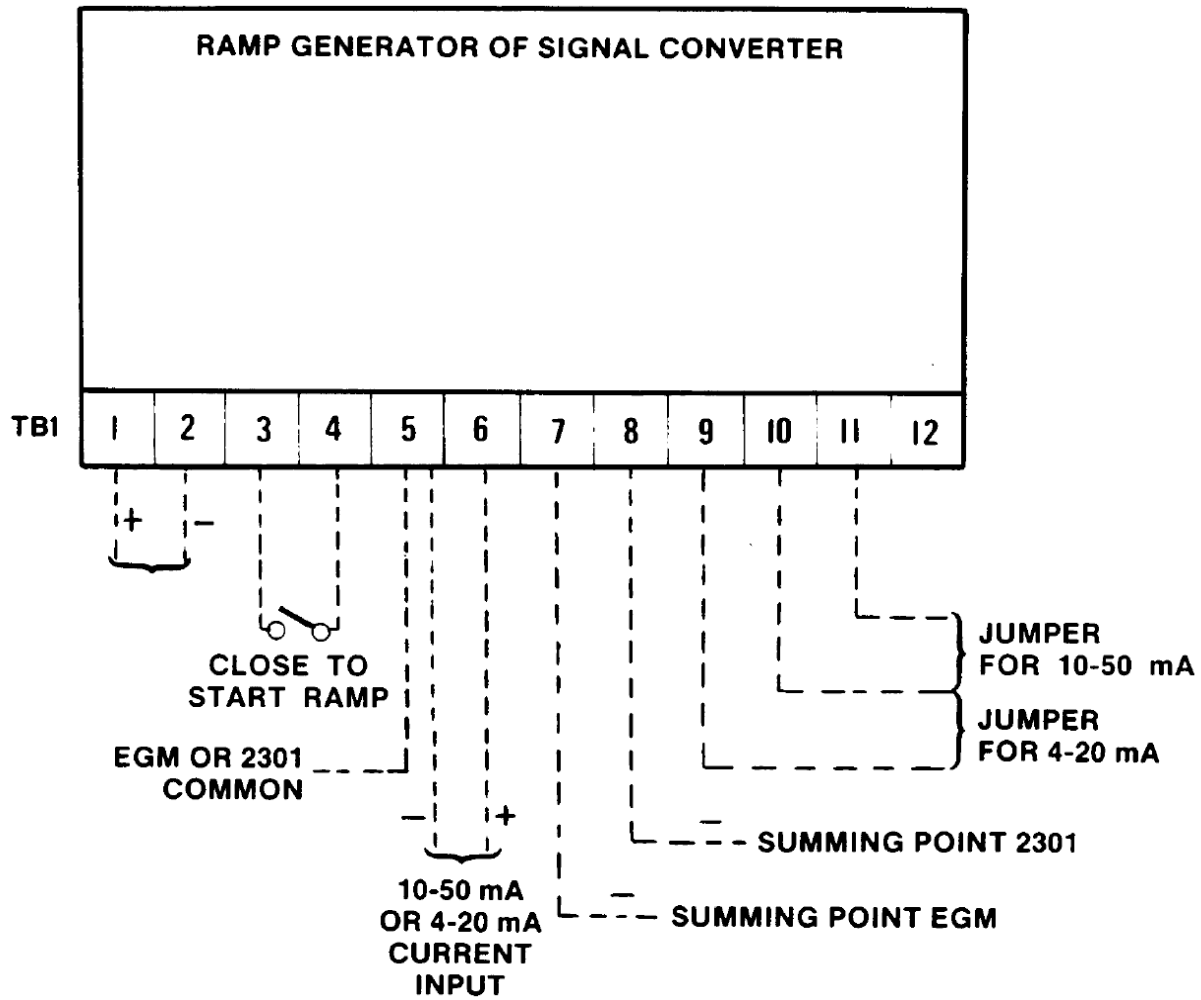


Figure 2-2. Plant Wiring Diagram

Chapter 3. Adjustments

There are four potentiometers on the ramp generator/signal converter chassis.
Make any necessary pre-start-up adjustments as follows:



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.

Potentiometer	Mode	Function
RAMP SLOPE	Ramp Generator	Sets the time the prime mover accelerates from idle to rated speed. NOTICE Having the RAMP SLOPE potentiometer past mid-position counterclockwise causes negative ramping. This will not allow the prime mover to increase speed. To ensure positive ramping, work this potentiometer from mid-position (12.5 turns from either end) to fully clockwise. Turn the potentiometer clockwise to decrease ramp time from 2 minutes to 3 seconds.
IDLE	Ramp Generator	Sets the idle speed. To increase idle, turn the potentiometer clockwise.
CONVERTER GAIN (Slope)	Signal Converter	Sets the output voltage for the maximum current input, which sets the maximum speed. (If the control is reverse-acting, it sets the minimum speed.) Turn the potentiometer clockwise to increase gain. IMPORTANT CONVERTER GAIN and CONVERTER ZERO are not independent adjustments. Alternate adjusting GAIN and ZERO until they are both satisfactory.
CONVERTER ZERO (Level)	Signal Converter	Sets the output voltage for the minimum current input, which sets the minimum speed. (If the control is reverse-acting, it sets the maximum speed.) To increase zero, turn the potentiometer clockwise.

Chapter 4. Troubleshooting

Initial Troubleshooting

If you suspect problems with the ramp generator/signal converter:

- Use the plant wiring diagram (Figure 2-2) to verify all the wiring inputs to, and outputs from, the control.
- Make sure the input current to the ramp generator/signal converter is 10–50 mA (8271-083) or 4–20 mA (8271-083A). Verify the proper jumper is in place for the input used.
- Remove the ramp switch wires to terminals 3 and 4. The speed should decrease to idle. Using the speed-setting potentiometer on the EGM or 2301, slowly accelerate and decelerate the prime mover. If the speed does not follow the speed setting, check the speed control. If the speed does increase with the speed setting, perform the following Static Test.

If you're still having problems after performing the following test, contact Woodward for assistance.

IMPORTANT

Perform the following Static Test after the ramp generator/signal converter has been correctly installed on your prime mover.

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.

Static Test

Resistance Test

1. Make sure there are no external wiring connections to the ramp generator/signal converter during this test.
2. Using a volt-ohmmeter (Simpson 270 or equivalent) selected to a minimum scale of R x 10K, measure the resistance from each terminal to the chassis. The reading at each terminal should be infinity.

If you're using a digital meter, the reading should be 100 M Ω or greater.

3. Verify the following resistance values:

Terminal to Terminal		Resistance
5	11	51.1 $\pm$ 1 Ω
9	11	75.0 $\pm$ 1 Ω
7	TP1	30 k Ω $\pm$ 600 Ω
5	TP2	0.0 Ω
6	9	0.0 Ω

Bench Test Setup

1. Connect a 36 ± 3 Vdc power supply to terminals 1 (+) and 2 (–).
2. Connect a normally open ramp switch to terminals 3 and 4.
3. For 8271-083 (10–50 mA configuration), connect a jumper to terminals 10 and 11. For 8271-083A (4–20 mA configuration), connect a jumper to terminals 9 and 10.
4. Connect a 10–50 mA (8271-083) or 4–20 mA (8271-083A) dc current source to terminals 5 (–) and 6 (+). Also connect a 10–50 mA or 4–20 mA meter in series with this current source.
5. Connect a dc voltmeter across TP1 and TP2, with TP2 as common.
6. Each potentiometer on the chassis can turn more than 25 turns. (These potentiometers have an internal slip clutch and will not be damaged by overtravel.) Set each potentiometer as follows:

Potentiometer	Setting
RAMP SLOPE	Fully clockwise, 25 turns
IDLE	Mid-position, 12.5 turns from either end
CONVERTER ZERO	Mid-position, 12.5 turns from either end
CONVERTER GAIN	Fully clockwise, 25 turns

Static Test

IMPORTANT

This is a static test, performed for troubleshooting purposes only. You must adjust gain, zero, and idle for the speed range of your prime mover.

1. Perform the preceding Bench Test Setup. Power up the control, then the test equipment.
2. Make sure the ramp switch across terminals 3 and 4 is open.
3. Adjust the input current signal to its maximum rated input: 50 mA (8271-083) or 20 mA (8271-083A) across terminals 5 and 6. The output should be 1 ± 1 V.
4. Adjust the IDLE potentiometer for 1 V at TP1 and TP2 (common).
5. Lower the input to 5 mA. There should be no voltage change at either TP1 or TP2.
6. Return the input to the maximum rated input.
7. Close the ramp switch at terminals 3 and 4. The voltage reading across TP1 and TP2 should ramp from idle voltage to a positive maximum of 17 ± 1 Vdc. If there is no ramp or if the ramp is negative, adjust RAMP SLOPE clockwise.

8. Alternate opening (and closing) the ramp switch while adjusting the RAMP SLOPE potentiometer to verify the ramp time from minimum to maximum voltage.

With the switch closed, make sure the fast ramp rate is 3 ± 1 seconds. Adjust RAMP SLOPE clockwise if it is not. For the slow ramp rate, adjust RAMP SLOPE counterclockwise until the voltage starts to decrease. Readjust RAMP SLOPE until the voltage just starts to increase.

Open the ramp switch at terminals 3 and 4. The voltage should drop to 1 ± 1 V.

Close the switch; the ramp time to maximum voltage should be 2 minutes or longer.

Adjust the RAMP SLOPE potentiometer to set your desired ramp time from idle to rated.

IMPORTANT

CONVERTER GAIN and CONVERTER ZERO are not independent adjustments. Alternate adjusting GAIN and ZERO until they are both satisfactory.

9. Adjust CONVERTER GAIN to be 10.5 Vdc with your maximum rate input signal: 50 mA (8271-083) or 20 mA (8271-083A).
10. Adjust the input current signal to the minimum rated signal at terminals 5 and 6: 10 mA (8271-083) or 4 mA (8271-083A).

Adjust CONVERTER ZERO to 0.5 ± 0.05 Vdc at TP1 and TP2.

Set the input current back to your maximum rated input current; readjust CONVERTER GAIN to 10.5 Vdc.

Repeat step 10 as necessary, until both gain and zero are where you want them.

11. Open the ramp switch at terminals 3 and 4.
12. Close the ramp switch; allow the voltage to ramp to 10.5 Vdc.
13. Reverse the polarity of the input current. The output polarity should reverse.
14. Turn off power to, then remove, the test equipment. This completes the Static Test.

IMPORTANT

Set the actual speeds of your primer mover by adjusting the IDLE, CONVERTER GAIN, and CONVERTER ZERO potentiometers on your prime mover while it is running.

Chapter 5.

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) 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.

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.

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.

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.

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 _____

Engine Model Number _____

Number of Cylinders _____

Type of Fuel (gas, gaseous, diesel,
dual-fuel, 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.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 82359.



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Email and Website—www.woodward.com

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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.