

## **Generator Loading Control**

**Installation and Operation Manual**



### General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.



### Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual **26311**, *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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### 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 Out-of-date translations are marked with .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**

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.

**Battery Charging  
Device**

## Electrostatic Discharge Awareness

**NOTICE**

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

**Electrostatic  
Precautions**

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual **82715**, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
  - Do not touch any part of the PCB except the edges.
  - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
  - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.



# Chapter 1.

## General Information

### Description

The Generator Loading Control is used with Woodward load sharing and speed control systems like the EG, 2301, 2500, and EPG. Basically, it controls and allows adjustment of the electrical load assumed by the generator set(s). Operation and adjustment of the Generator Loading Control is different depending on its use in an isolated power system or in a local system paralleled to an infinite bus. (A bus is considered infinite if it has sufficient capacity to maintain frequency when the local system generators are at their maximum power output.)

In an isolated power system, one Generator Loading Control is used with each load sharing and speed control. The Generator Loading Control is connected to the paralleling lines of the load sharing and speed control and senses a voltage that represents the load of the generator. The output of the Generator Loading Control biases that paralleling line voltage to assume a percentage of the total power system load.

For applications in a local power system paralleled to an infinite bus, one Generator Loading Control operates up to 15 load sharing and speed controls. Paralleling lines connect the single Generator Loading Control to all other units in the load sharing system. The output of the Generator Loading Control biases the loading of the entire local system to assume a percentage of the system's full rated load, a load set point. Additionally, each unit in the local system can be fitted with a Generator Loading Control for individual derating and soft load transferring adjustment. This may be desirable in systems made of generators having different kW load capacities.

In both applications, the Generator Loading Control can be used for soft loading and unloading of generators. During synchronization, the externally wired percent generator loading potentiometer sets generator output at no load. After paralleling, load is applied (also removed) manually or with a motor operated potentiometer (MOP) if semi-automatic operation or a uniform rate of load change is desired.

Generators can be operated from zero to full power output, as a convenient method of derating, or at a proportional share of system load.

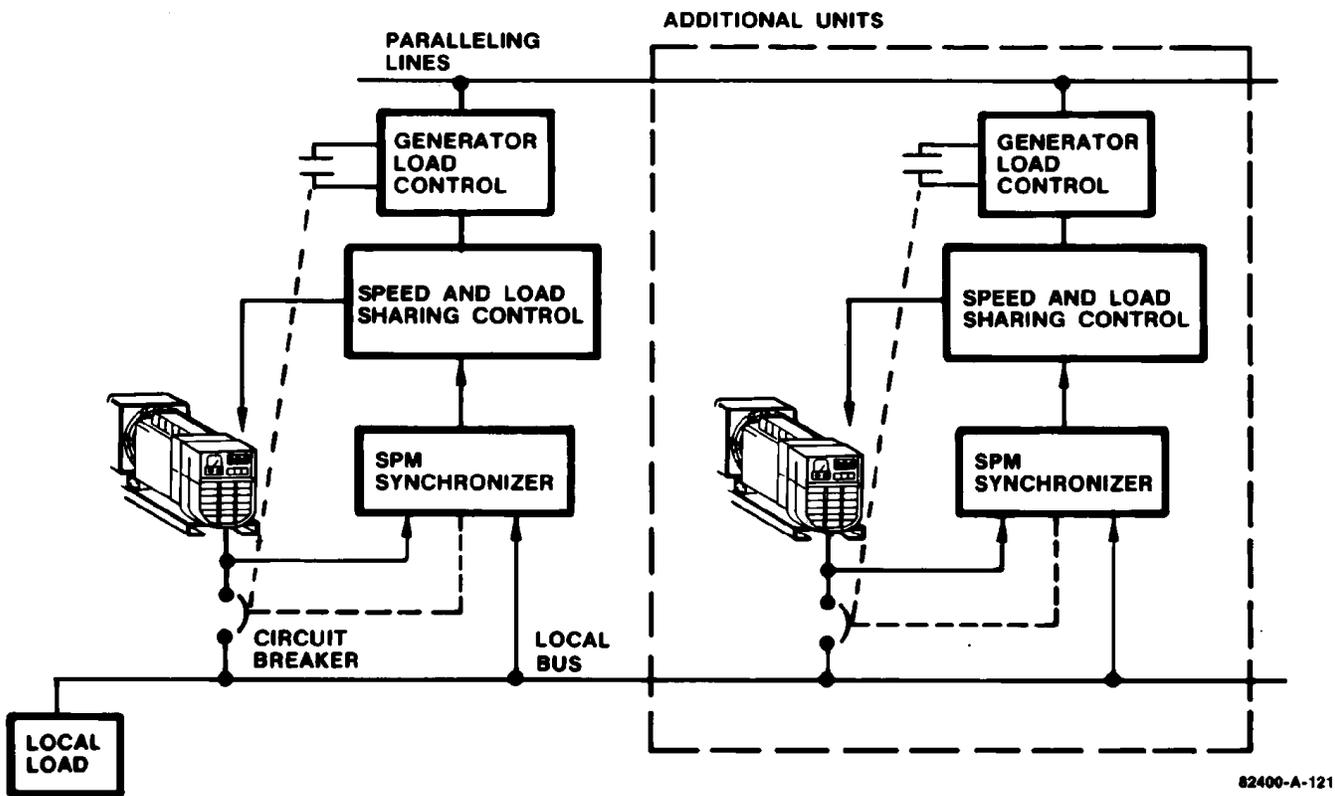
Part Number	Input Power	Color	Application
8271-468	115/230 Vac	Beige	Commercial
8271-923	115/230 Vac	Gray	Commercial
8272-169	18–32 Vdc	Beige	Special
9903-129	115/230 Vac	Beige	Nuclear

### References

The product literature listed here includes auxiliary and optional controls and additional information that may be of interest.

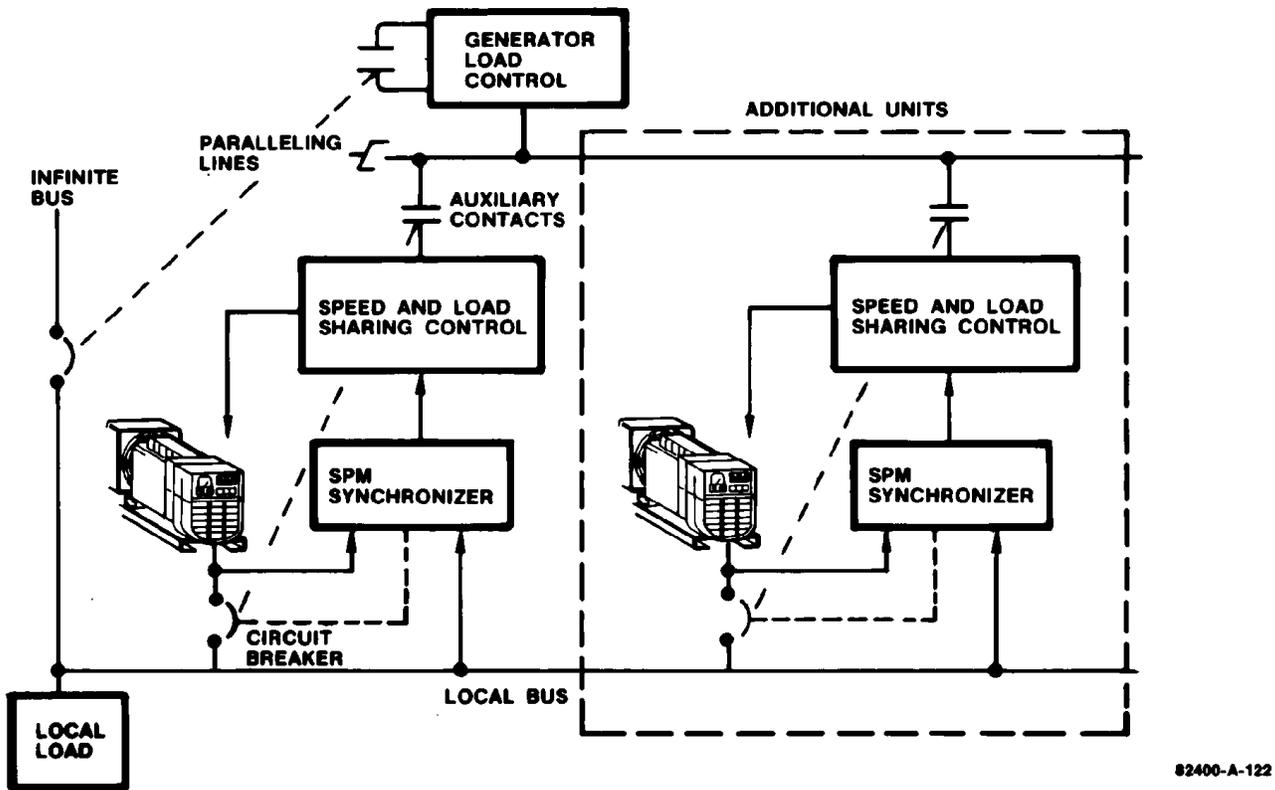
Manual 25070, *Electronic Control Installation Guide*

Product Specification 82436, *Motor Operated Potentiometer*



82400-A-121

Figure 1-1. System Diagram for Isolated Bus Applications



82400-A-122

Figure 1-2. System Diagram for Infinite Bus Applications

## Chapter 2. Theory of Operation

### Isochronous Load Sharing Governor

Isochronous load sharing or paralleling governors are used in isolated power systems which have compatible load sharing controls. That is, in systems where load sensing circuits of the controls share information through paralleling lines. Each electronic governor provides the paralleling lines with a load signal voltage that is adjusted to be a specific voltage when the generator is fully loaded. This voltage is always proportional to load, decreasing proportionally as generator load is decreased.

The load signal voltage of the paralleling lines is average voltage of all controls connected by the paralleling lines. By comparing the paralleling line voltage to its own load signal voltage, each load sharing control calculates an output to raise or lower as necessary its generator output and make its load signal voltage equal to that of the paralleling lines and maintain the desired bus load. When the load signal voltages of all load sharing controls are equal, the kW load is balanced proportionally among the generators.

Isochronous paralleling governors are also teamed with the Generator Loading Control to parallel with an infinite bus or utility. In this application, the Generator Loading Control regulates the power level while the utility maintains frequency. An advantage of this type of control system over the standard droop operation of paralleling is that on parting from the utility, the now-isolated bus is automatically under isochronous speed control without the operator having to readjust the speed settings.

### The Generator Loading Control

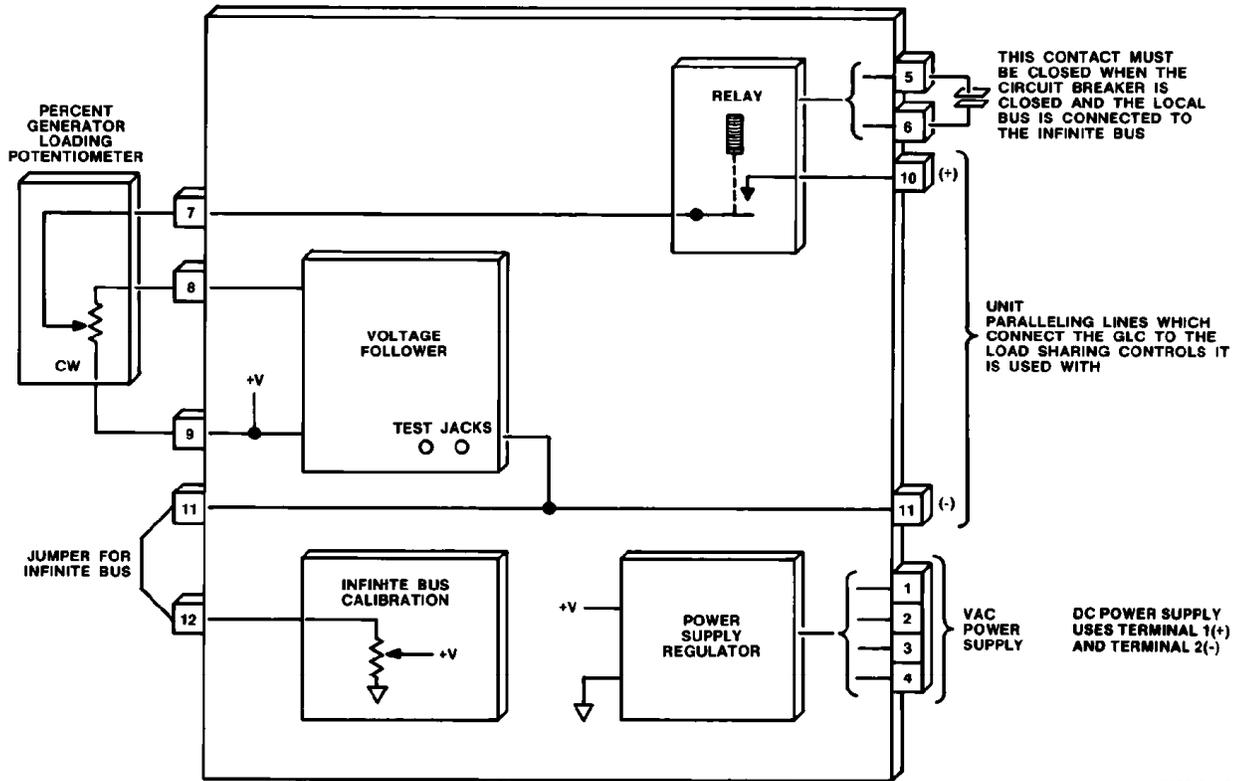
The block schematic diagrams (Figure 2-1) show the two applications of the Generator Loading Control and differences in the wiring.

#### Generator Loading Control Used in Isolated Power Systems

This application uses one Generator Loading Control per load sharing control/generator (a unit). Paralleling lines connect a Generator Loading Control to its load sharing control; these are called unit paralleling lines. System paralleling lines are also used, and these connect all units of the power system.

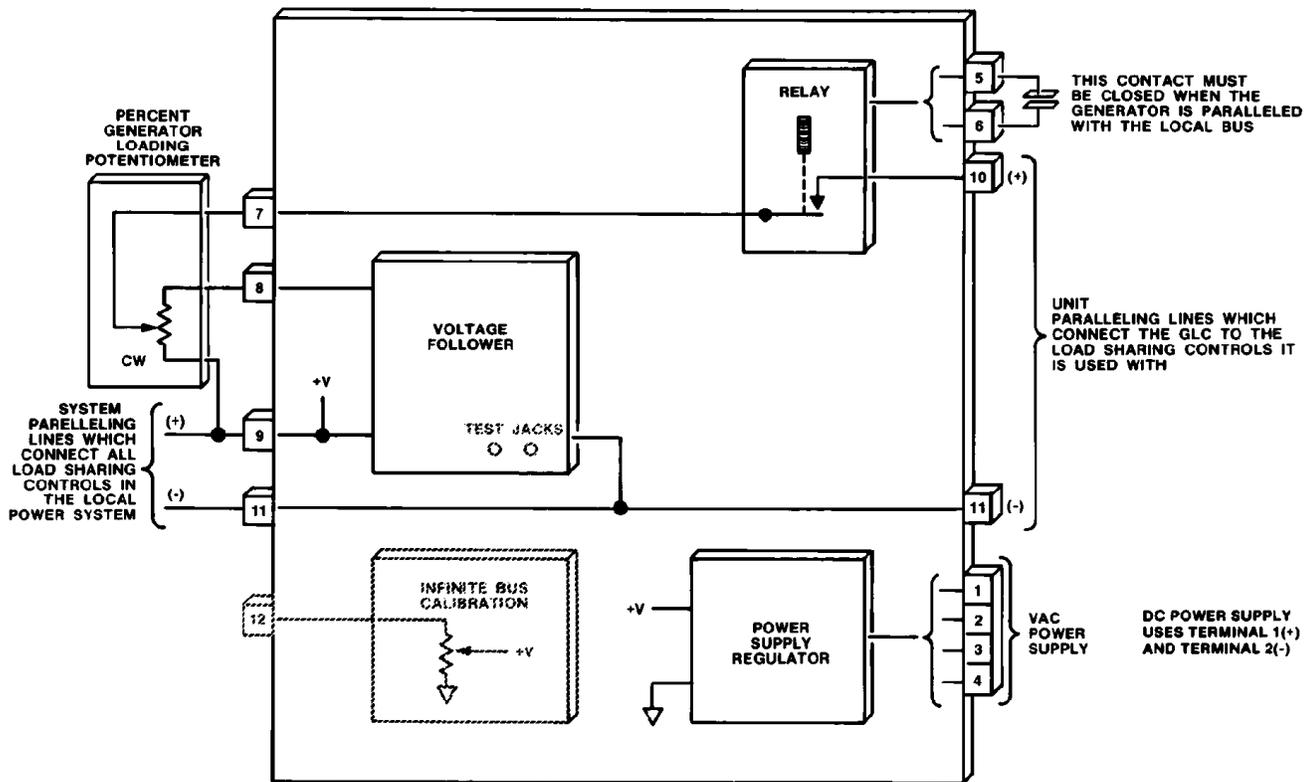
#### Generator Loading Control Used in Applications of a Generator or Power System Tied to an Infinite Bus or Utility

In this application one Generator Loading Control is used with 1 to 15 load sharing controls/generators. It controls the base loading of the entire power system. Additional Generator Loading Controls can also be connected, one to each load sharing control for individual loading control of generators. Unit paralleling lines connect the Generator Loading Control to all load sharing controls.



82400-B-60

As Used in Infinite Bus Applications



82400-B-61

As Used in Isolated Bus Applications

Figure 2-1. Generator Loading Control Block Schematic Diagram

Operation of the Generator Loading Control is similar in both applications. The voltage follower circuit continuously measures:

1. The voltage established across the percent generator loading potentiometer that must be externally wired to the control. The potentiometer adjusts and defines the percent of the kW load the generator(s) is to carry.

AND—

- 2a. In Isolated power systems, the circuit measures the load signal voltage carried by the system paralleling lines.

OR—

- 2b. In power systems paralleled to a utility, it measures a reference voltage supplied by the infinite bus calibration circuit since system paralleling lines are not available.

THEN—

3. The voltage follower circuit compares the desired percent generator load level with either the system paralleling line voltage or the utility reference voltage. The result is an error signal or voltage used to bias the speed setting of the units connected by the unit paralleling lines.

If the percent generator loading potentiometer is adjusted fully clockwise, then the unit paralleling line voltage is kept equal to that of the system paralleling lines or the reference voltage set by the infinite bus adjustment. The generator will then carry its full rated load. If the potentiometer is adjusted to mid position, the generator is derated 50%. The voltage follower provides a voltage to the unit paralleling lines that reduces generator loading by half and balances its signal output to the system paralleling lines, if they are used, to represent that unit is carrying its full share. Additional kW loading on the isolated power system must be taken by other generators in the system while in utility paralleled systems additional loads are taken by the utility. Derating of a generator by this adjustment can be from 0 to 100% of its share of the system load. This adjustment feature is also used for soft loading and unloading of generators described in Operation and Adjustments.

Relay contacts in the Generator Loading Control connect the control for operation. Contacts connected at terminals five and six operate the relay. Usually these are auxiliary contacts of the generator or system tie breaker. These close when the generator is paralleled with the isolated bus or when a local bus is paralleled to the utility.

The Generator uses a power source of 18 to 32 Vdc on some units, or 115/230 Vac, which is selected by terminal strip jumper, and regulates it to operating power with extensive transient overvoltage protection.

# Chapter 3. Installation

## Location

Refer to Figure 3-1, Outline Drawing, for mounting Information. The Generator Loading Control is designed for installation with the switch gear where convenient. It can be mounted in any position. Provide adequate ventilation for cooling and space for installation and servicing. Ambient temperature must be between  $-40$  and  $+85$  °C ( $-40$  and  $+185$  °F). Connect a system ground to the Generator Loading Control's die-cast enclosure for proper shield termination and circuit board shielding.

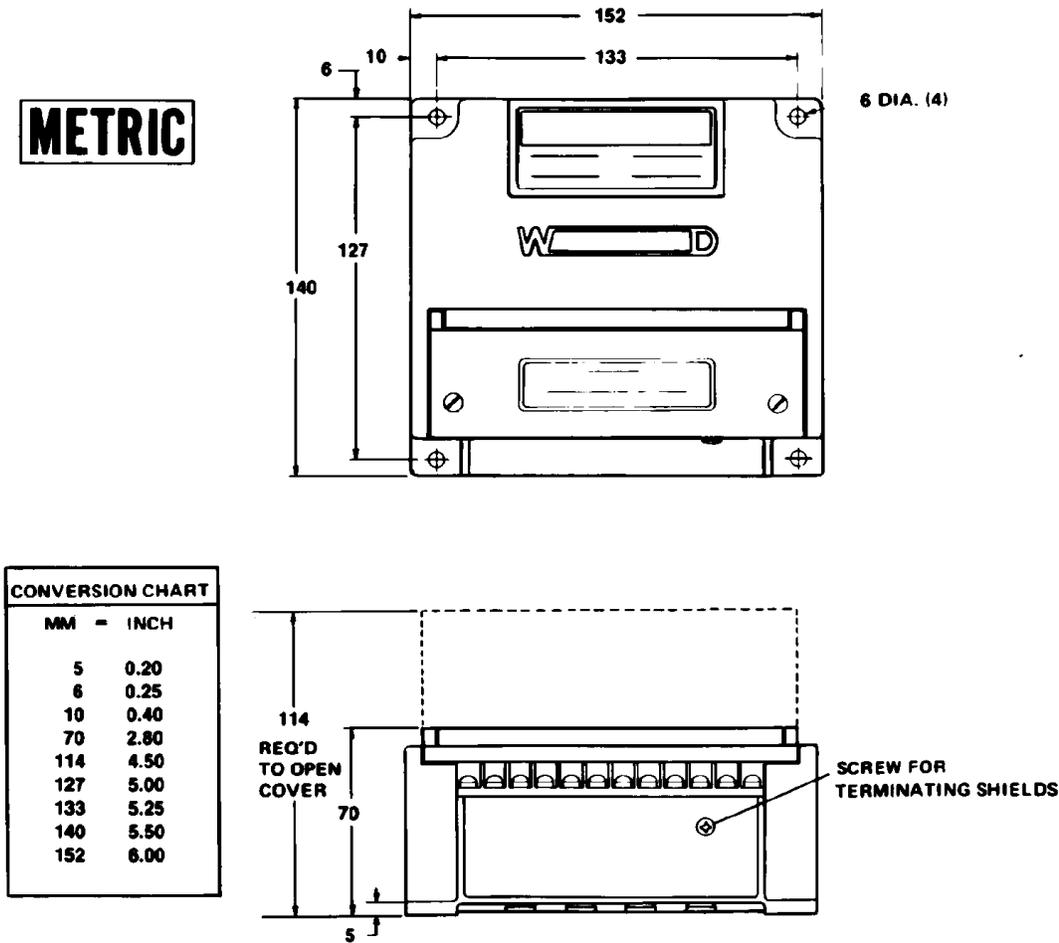


Figure 3-1. Generator Loading Control Outline Drawing  
(Do not use for construction.)

## Electrical Wiring

Figures 3-2 and 3-3 provide wiring instructions for typical infinite bus and isolated bus applications. However, a plant wiring diagram for your specific control's part number must be used for actual wiring installation. Woodward manual 25070, *Electronic Control Installation Guide*, contains information useful in wiring the control.

Some wiring to the Generator Load Control must be shielded, as shown in Figures 3-2 and 3-3. This prevents the control lines, especially the paralleling lines, from picking up strong signals and possibly causing erratic control operation. Connect the shields to the system ground at one end only. A screw is provided on the die-cast box for this purpose. The opposite ends of shields away from the Generator Loading Control must be left open and unconnected. Do not run shielded wiring in conduit with other wiring that carries high current. Do not attempt to tin the braided shields.

**NOTICE**

Make all wiring connections with insulated terminals.

**NOTES:**

- ① JUMPER FOR 115 VAC SUPPLY.
- ② JUMPER FOR 230 VAC SUPPLY.
- ③ FOR UNITS USING DC INPUT POWER, USE TERMINAL 1 FOR POSITIVE AND TERMINAL 2 FOR NEGATIVE.
- ④ THIS IS CLOSED BY THE BREAKER WHEN GENERATORS ARE PARALLELED WITH THE INFINITE BUS.
- ⑤ C.B. AUX CONTACTS TO CLOSE WHEN BREAKER CONNECTING THE GENERATOR TO THE LOCAL BUS CLOSSES. THIS CONTACT MAY BE ELIMINATED IF ONLY ONE GENERATOR IS PARALLELED WITH INFINITE BUS.

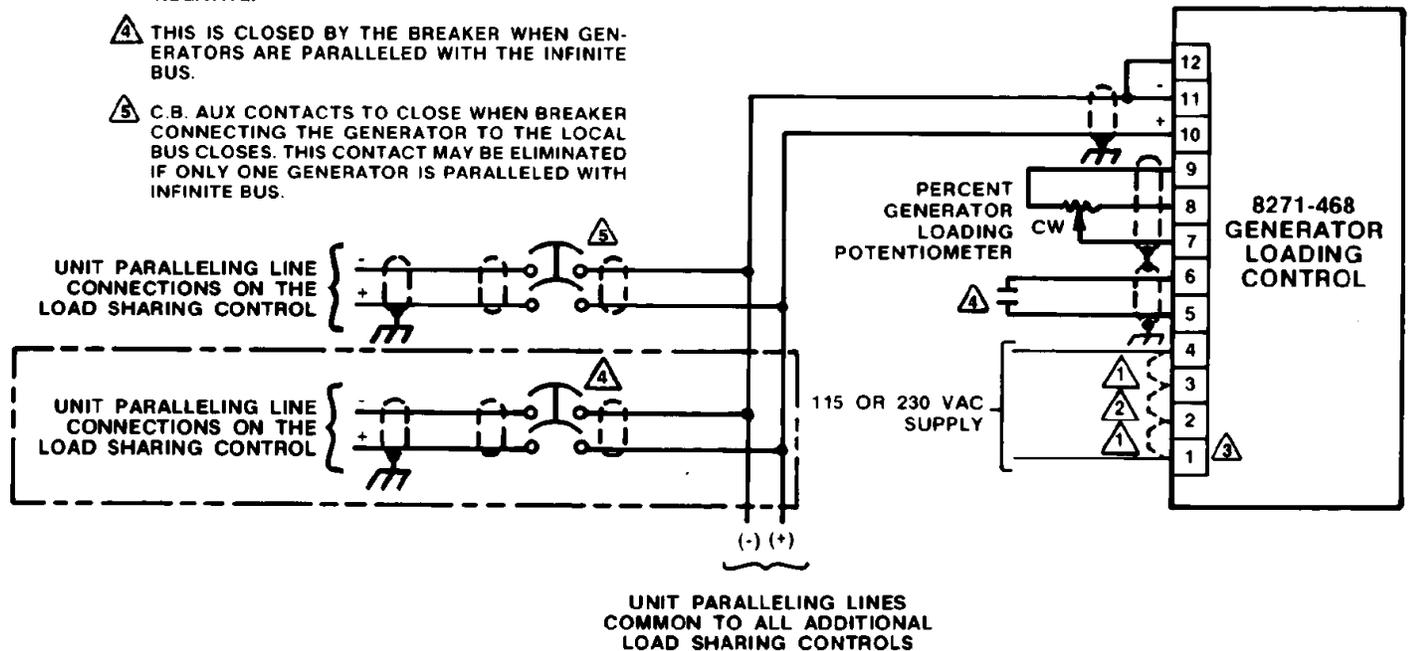


Figure 3-2. Typical Generator Loading Control Wiring, Infinite Bus Application

## Power Supply

The power supply voltage is selected by jumpers on the terminal strip:

- If supply voltage is 90 to 140 Vac, jumper terminal 1 to 2 and terminal 3 to 4.
- If supply voltage is 190 to 260 Vac, jumper terminal 2 to 3.
- Connect power supply wiring to terminals 1 and 4.

## Terminals 5 and 6

Terminals 5 and 6 must be connected together when the circuit breaker connecting the generator to the bus is closed. This is usually accomplished by wiring to auxiliary contacts of the circuit breaker. This wiring must be shielded.

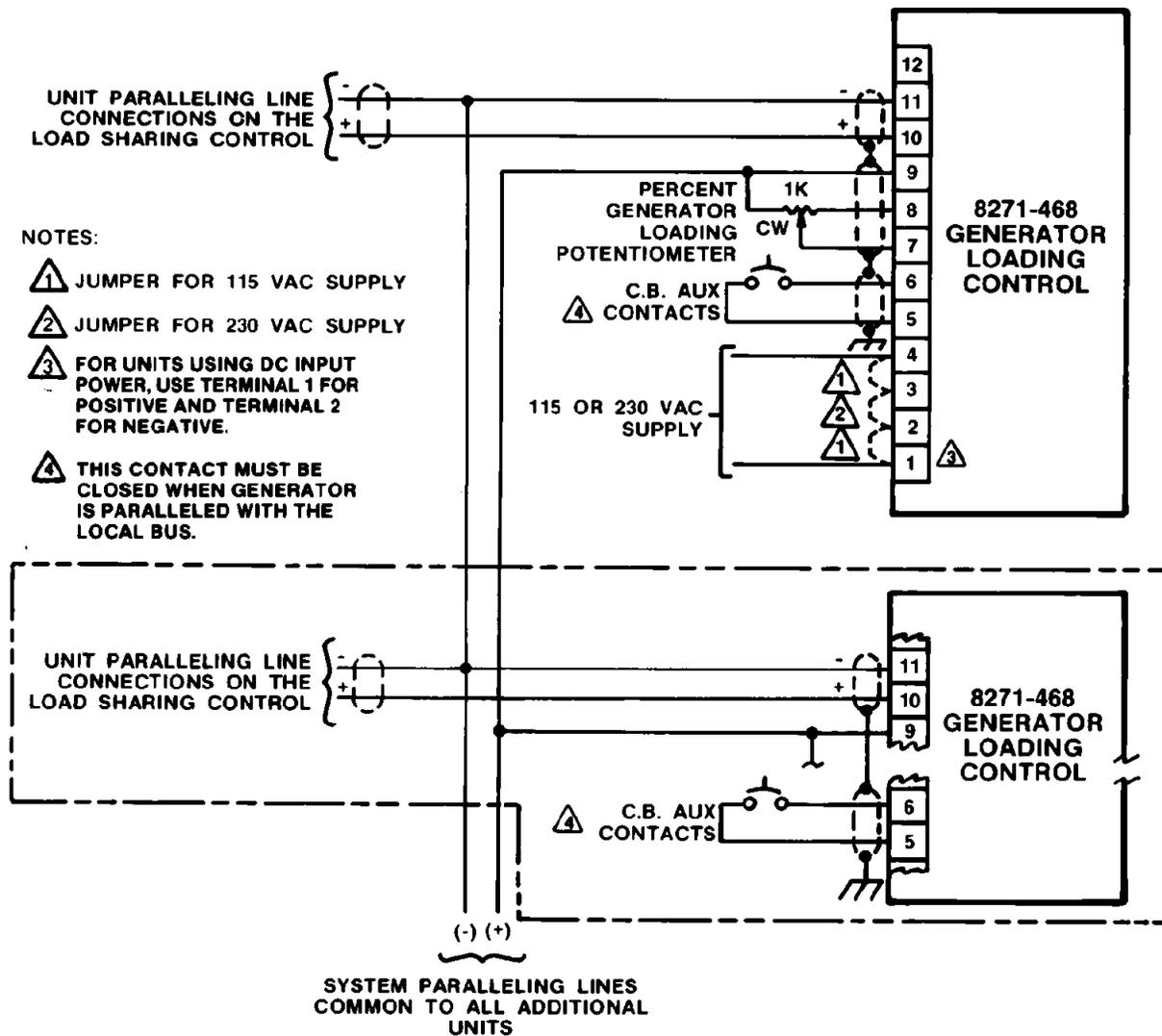


Figure 3-3. Typical Generator Loading Control Wiring. Isolated Bus Application

### Percent Generator Loading Potentiometer

Install potentiometer wiring to terminals 7, 8, and 9. Use Woodward potentiometer part number 5438-526 or one of the Woodward supplied motor operated potentiometers.

The pot must be 1 kΩ, 2 W, with a resistance tolerance of ±5%. The pot may be single turn or multi-turn depending on application. It is preferable that if a multi-turn potentiometer is used, that it count the turns. Wiring to the potentiometer must be shielded.

### Additional Wiring for Isolated Bus Applications

Connect terminals 10(+) and 11(-) of each Generator Loading Control to the paralleling line terminals of each respective load sharing and speed control. Observe correct polarity. These lines must be shielded.

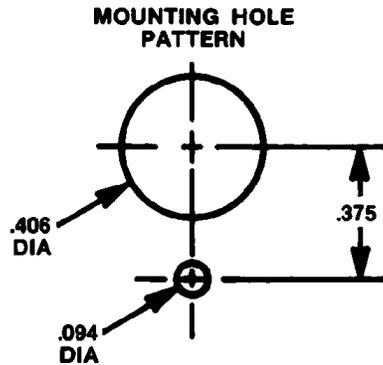


Figure 3-4. Mounting Hole Pattern for 5438-526

Connect terminal 9(+) of all Generator Loading Controls. Connect terminal 11(-) of all Generator Loading Controls. These lines must be shielded.

### Additional Wiring for Infinite Bus Applications

Connect terminals 10(+) and 11(-) of the Generator Loading Control to the paralleling lines common to all the load sharing and speed controls. Observe correct polarity. Also note that the paralleling lines of each load sharing and speed control include contacts which close when the generator is paralleled. This contact can be eliminated if only one generator is paralleled with the infinite bus. These lines must be shielded.

Jumper terminal 11 to 12.

## Installation Check

Before initial operation of the Generator Loading Control, make the following visual and electrical checks. The load sharing and speed control system must operate correctly before operating the Generator Loading Control.

### Visual Checks

- All electrical connections are correctly made. Terminal screws must be tight.
- The control is securely mounted.
- Shielding is correctly installed and grounded at one end only.

### Electrical Checks

**IMPORTANT**

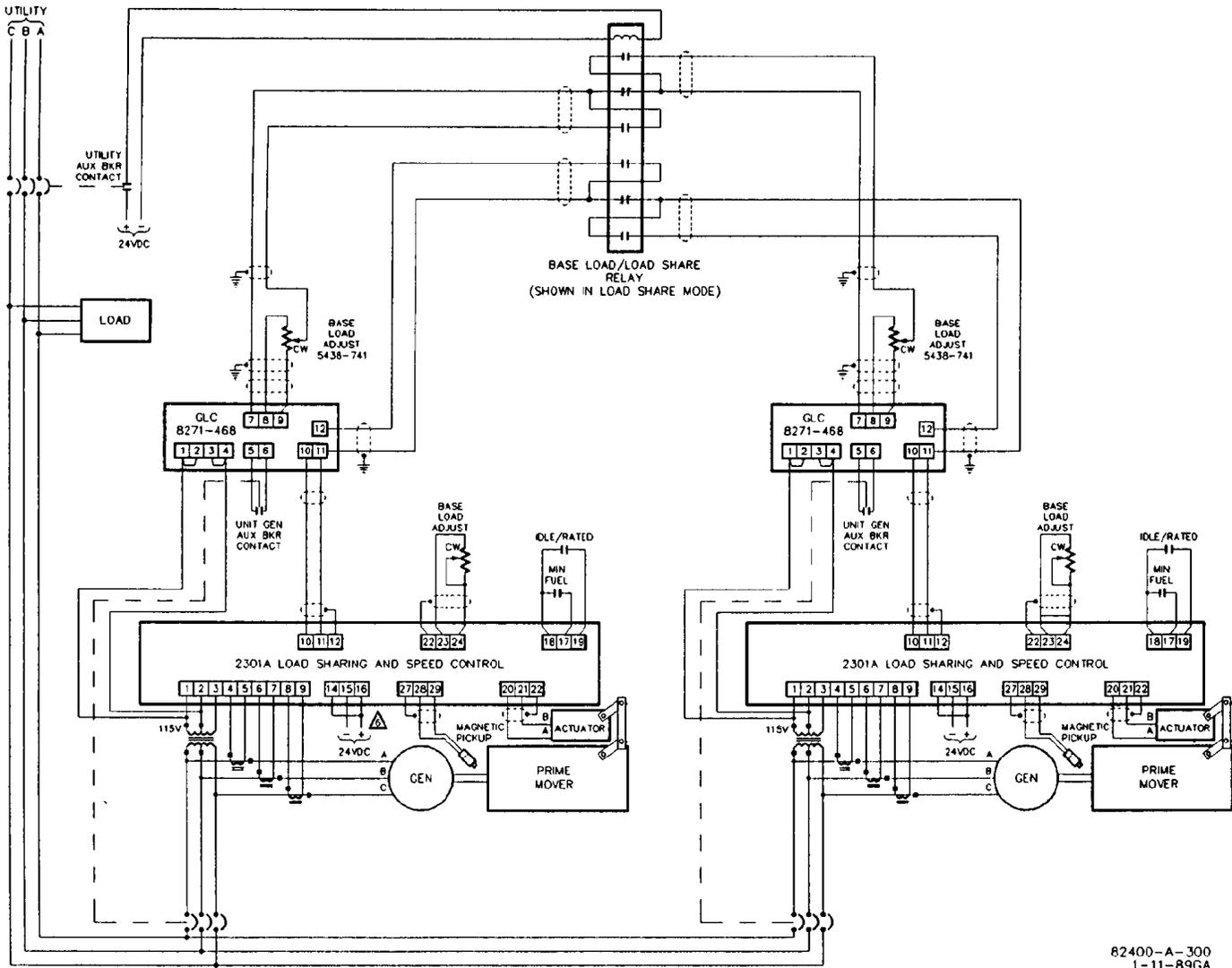
Do not start the engine for electrical checks 1–3.

Apply power to the control and:

1. Measure for correct supply voltage at terminals 1 and 4 for units using ac. For units using dc, use terminal 1(+) and 2(-) to measure input voltage.

2. Check terminals 10(+) and 11(-) for 0 Vdc. If voltage is other than 0 Vdc, and the auxiliary contact at terminals 5 and 6 is open, the control is faulty.
3. Measure voltage at terminals 9(+) and 5(-) for 12 Vdc. If other than  $12 \pm 1$  Vdc, the control is faulty.

With the engine generator operating in single unit configuration and at full load, measure the voltage of the load signal test jacks on the load sharing and speed control or 2500 Load Sensor. It must be approximately 8.0 volts for all units. However, if the CT ratio does not provide 5 A at full load, it is necessary to select a lower voltage. All load sharing controls in the system must be set for the same voltage. See instructions in the appropriate manual.



82400-A-300  
1-11-89GA

Figure 3-5. Generator Loading Controls Used to Independently Base Load Against Utility (and for isolated isochronous load sharing)

## Chapter 4.

# Operation and Adjustments

### Initial Operation and Adjustment

1. Set the percent generator loading potentiometer to the no load position (fully counterclockwise on Woodward potentiometer 5438-526).



**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.**

2. Synchronize and parallel the generators and the bus. Terminals 5 and 6 must be connected by auxiliary breaker contacts when paralleling.
3. Load the generator(s) to full load by adjusting the percent generator loading potentiometer (adjust Woodward potentiometer 5438-526 clockwise).
4. If paralleling to an infinite bus, measure the voltage at the load signal test jacks of the Generator Loading Control while the unit is fully loaded. Adjust the infinite bus calibration potentiometer so its load signal voltage is equal to the load signal voltage of all load sharing and speed controls in the system. This adjustment is not necessary for controls in isolated power systems.

The control adjustments are now complete.

### Operation

#### Soft Loading and Engine Derating—Isolated Bus Application

1. Begin with the percent generator loading potentiometer set at the no load position.
2. Synchronize and parallel the generator to the bus.
3. Apply load by adjusting the potentiometer at the desired rate until the desired load is being carried by the generator.

#### Soft Loading and Engine Derating—Infinite Bus Application

1. Begin with the percent generator loading potentiometer set at the no load position.
2. Synchronize and parallel the generators to the infinite bus.
3. Apply load on the generators in the system by adjusting the potentiometer at the desired rate until the desired system load is carried.

4. Observe the kW loading of each generator. If necessary, adjust the load gain potentiometer of each load sharing control in order to achieve the desired load balance. In this case, the load gain potentiometer is used to derate an engine or to fine tune a generator's kW loading.

If each generator has its own Generator Loading Control, then use the percent generator loading potentiometer for full range adjustment (0 to 100%) of kW loading of each generator.

### **Soft Unloading**

Adjust the percent generator potentiometer to reduce load at the desired rate. The generator(s) can be removed from the bus when there is no load on the generator for soft unloading.



**Removing a loaded unit from the bus can cause large load swings.**

## Chapter 5. Troubleshooting

If incorrect operation of the Generator Loading Control is evident, check first that the load sharing and speed control operates correctly. Use the applicable manuals for troubleshooting these other controls to find the problem.

Check:

- All paralleling line wiring is correct. Observe correct polarity.
- Auxiliary contacts and breakers are operating correctly.
- All shielding is correctly grounded at one end only.
- All terminal screws are tight.

If the Generator Loading Control is not working correctly, use the following troubleshooting chart to find the problem.

When requesting additional information or service help from Woodward or authorized service shop, it is important to include in your correspondence the part numbers of all Woodward components and a complete description of problems or symptoms.



**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.**

<b>Symptoms</b>	<b>Cause</b>	<b>Remedy</b>
The generator set overloads or goes out on reverse power when synchronized and paralleled before the percent generator loading pot can be adjusted.	<ol style="list-style-type: none"> <li>1. Auxiliary contacts not closing or not correctly wired.</li> <li>2. Percent generator loading pot is not wired to the control.</li> <li>3. Percent generator loading pot or wiring is faulty.</li> <li>4. The Generator Loading Control is faulty.</li> </ol>	<p>Check and repair as necessary.</p> <p>Check and repair as necessary.</p> <p>Check and repair as necessary.</p>
The generator overloads with the percent generator loading pot adjusted for full load (infinite bus application).	Infinite bus calibration pot is incorrectly adjusted so the voltage at the test jacks on the Generator Loading Control is greater than the voltage at the test jacks on the load sharing control.	Repeat the adjustment procedure for infinite bus calibration in Chapter 4.
When the generator is paralleled, it immediately takes rated load regardless of the setting of the percent generator loading potentiometer.	<ol style="list-style-type: none"> <li>1. The Generator Loading Control is being operated without a power supply.</li> <li>2. The Generator Loading Control is faulty.</li> </ol>	Check, repair as necessary.
When the generator is synchronized and paralleled, the generator goes out on reverse power as soon as the percent generator loading pot is adjusted.	Paralleling lines are incorrectly wired.	Check wiring and repair as necessary. Observe correct polarity.
When a Generator Loading Control is connected to the power supply, generators already paralleled shift speed (isolated bus application).	Infinite bus jumper is installed for an isolated bus application.	Remove jumper across terminals 11 and 12.
When a generator is synchronized and the breaker is closed, it causes generators already paralleled to decrease speed (isolated bus application).	Paralleling lines are incorrectly wired.	Check wiring and repair as necessary. Observe correct polarity.
Unable to load a generator (infinite bus application).	The jumper across terminals 11 and 12 is not installed.	Install jumper as necessary.
The generator can't be adjusted to take full loads (infinite bus application).	Infinite bus calibration pot is incorrectly adjusted so the voltage at the test jacks on the Generator Loading Control is less than the voltage at the test jacks on the load sharing controls.	Repeat the adjustment procedure for infinite bus calibration in Chapter 4.

## Chapter 6.

# 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.

<b>Products Used In Electrical Power Systems</b>	<b>Products Used In Engine Systems</b>	<b>Products Used In Industrial Turbomachinery Systems</b>
<u>Facility</u> ----- <u>Phone Number</u>	<u>Facility</u> ----- <u>Phone Number</u>	<u>Facility</u> ----- <u>Phone Number</u>
Brazil -----+55 (19) 3708 4800	Brazil -----+55 (19) 3708 4800	Brazil -----+55 (19) 3708 4800
China -----+86 (512) 6762 6727	China -----+86 (512) 6762 6727	China -----+86 (512) 6762 6727
Germany:	Germany-----+49 (711) 78954-510	India -----+91 (129) 4097100
Kempen----+49 (0) 21 52 14 51	India -----+91 (129) 4097100	Japan-----+81 (43) 213-2191
Stuttgart--+49 (711) 78954-510	Japan-----+81 (43) 213-2191	Korea-----+82 (51) 636-7080
India -----+91 (129) 4097100	Korea-----+82 (51) 636-7080	The Netherlands- +31 (23) 5661111
Japan-----+81 (43) 213-2191	The Netherlands- +31 (23) 5661111	Poland-----+48 12 295 13 00
Korea-----+82 (51) 636-7080	United States----+1 (970) 482-5811	United States----+1 (970) 482-5811
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 \_\_\_\_\_

### 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 &amp; Rev. Letter \_\_\_\_\_

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

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

#### Control/Governor #2

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

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

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

#### Control/Governor #3

Woodward Part Number &amp; 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](mailto:icinfo@woodward.com)

Please reference publication **82434C**.



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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.**