WOODWARD

Product Manual 82439
(Revision NEW)
Original Instructions

Remote Speed Reference Unit

8271-375

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 Out-of-date translations are marked with ⚠.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

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

Contents

Illustrations and Tables

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

Description

The Remote Speed Reference Unit (see Figure 1-1) gives four reference level outputs at the same time to four 43027 electronic controls. The unit is in a single sheet steel chassis containing a PCB board. The terminal blocks are directly mounted to the PCB. The PCB has circuit paths on both sides with most components mounted on one side. All potentiometers are accessible from the front of the chassis under the cover.

Function

The function of the Remote Speed Reference Unit is to give up to four electronic controls a reference voltage. The reference levels can be raised or lowered at any of four rates. Four preset reference settings can be selected. The reference outputs can be switched on or off depending on the voltage levels on the remote input terminals.

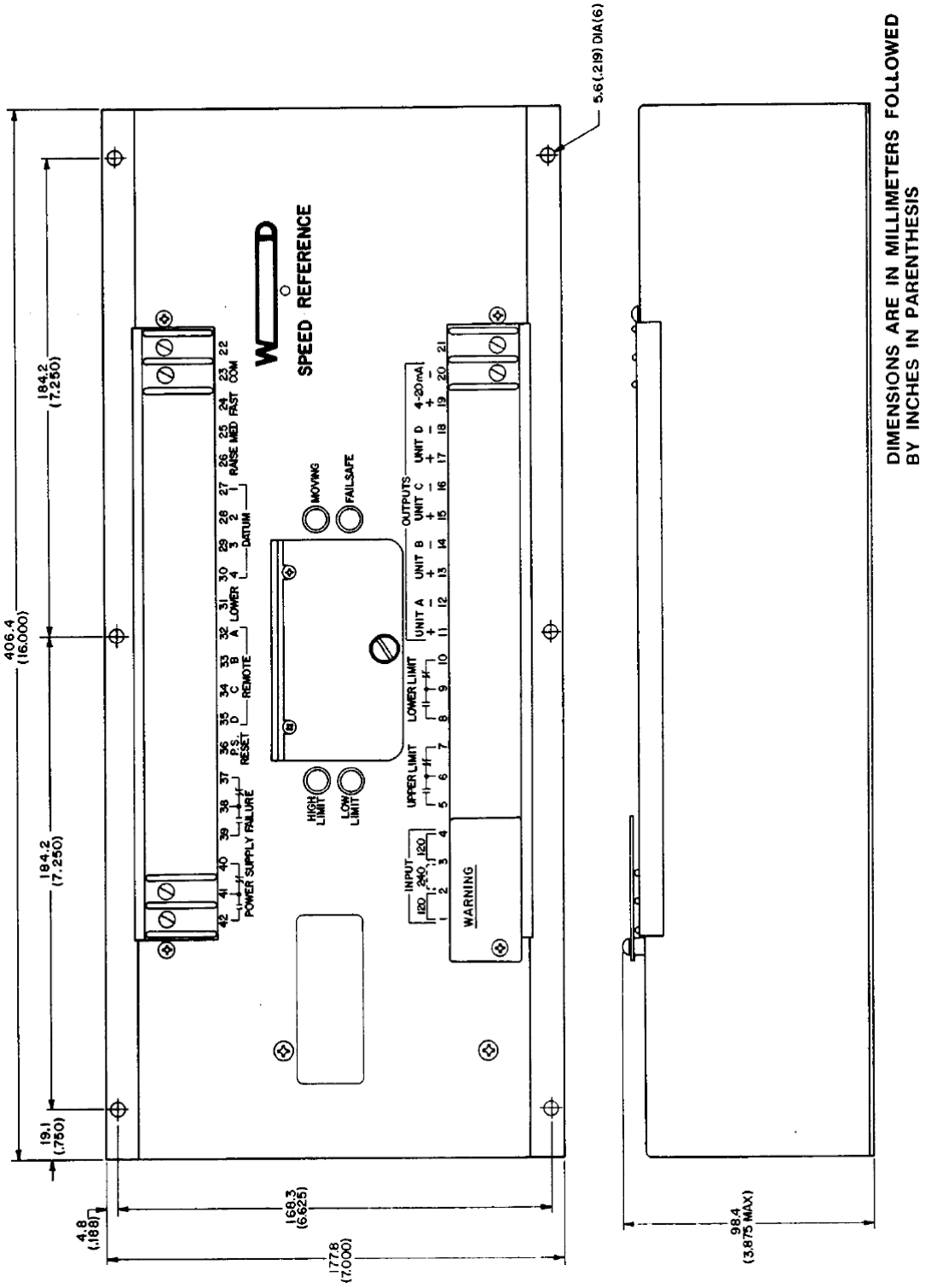

Figure 1-1. Outline Drawing

Chapter 2.
Installation

Application Information

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.

Power Requirements

The Remote Speed Reference Unit is powered by 120 Vac or 240 Vac. The jumper arrangement on terminals 1–4 needed is determined by the voltage input. A jumper is between terminals 1 and 2 and another jumper is between terminals 3 and 4 if the power input is 120 Vac. A jumper is between terminals 2 and 3 if the power input is 240 Vac.

Environmental Cautions

The Remote Speed Reference Unit is designed to operate within a temperature range of –50 to +150 °F (4 to 115 °F). The unit can be mounted in any position with adequate ventilation and space for servicing and repair.

Electrical Connections

The plant wiring diagram (Figure 2-1) shows all wiring connections of the Remote Speed Reference Unit. Be sure to follow all shielding requirements. Use the voltage on terminal 23 for selecting the Reset, Remote, Lower, Datums, Raise, Medium, and Fast input through the terminals.

Static Checks

Visual Inspection

Before beginning the checkout procedure, visually inspect the Remote Speed Reference Unit for damage such as bent or dented panels, loose or broken components. If any damage is found, return the unit for repair.

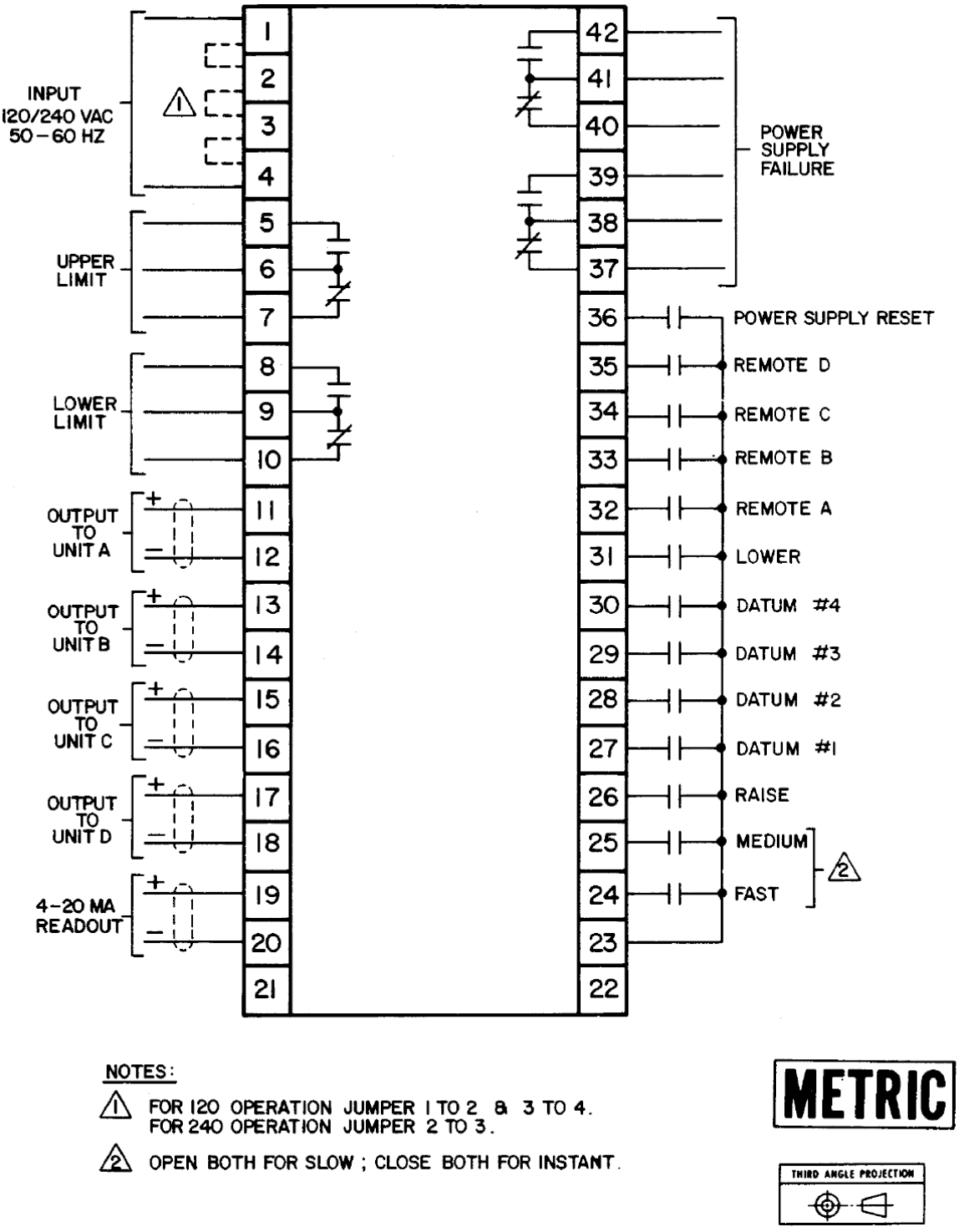

Figure 2-1. Plant Wiring Diagram

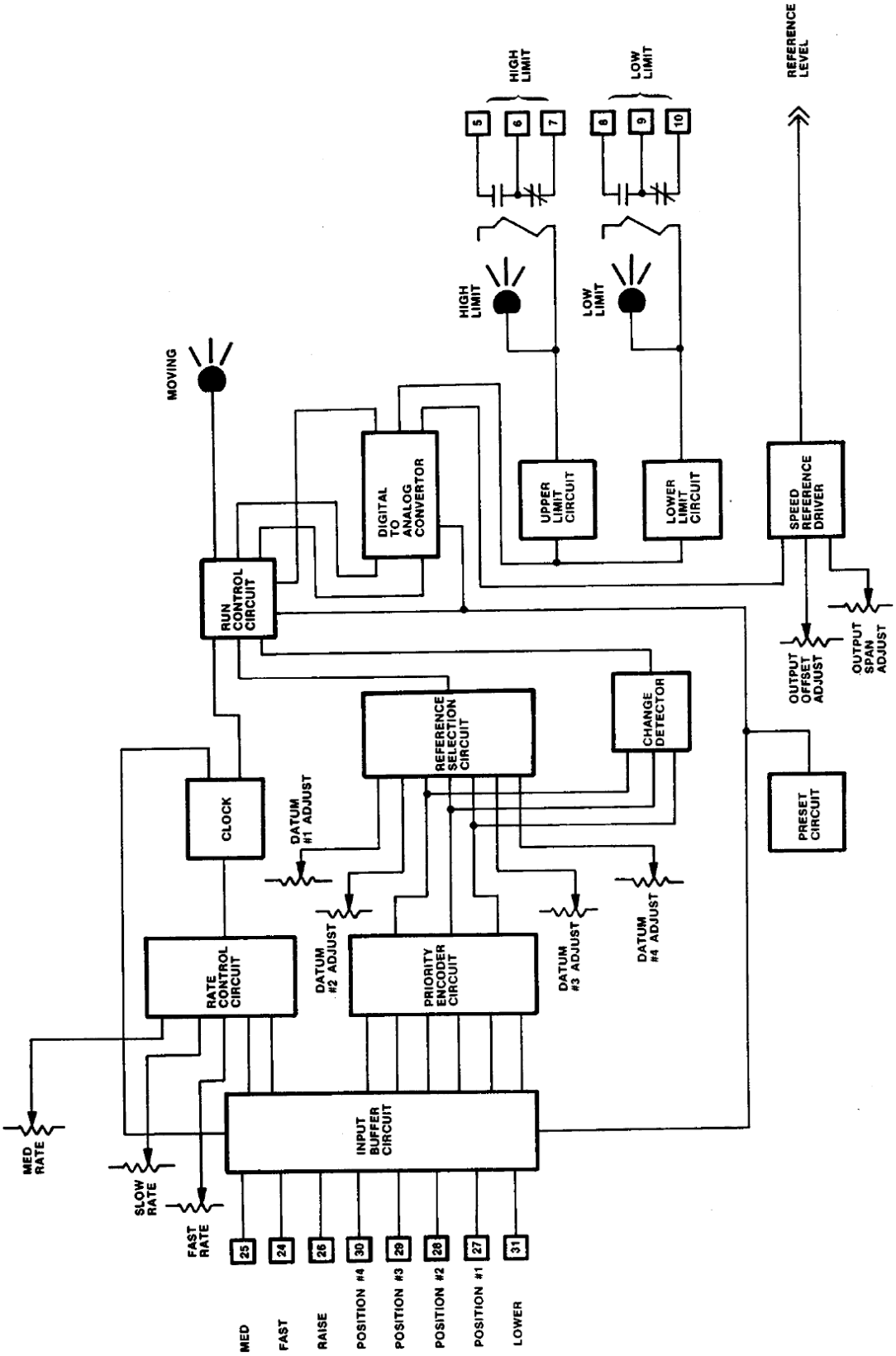

Figure 2-2a. Block Schematic Diagram

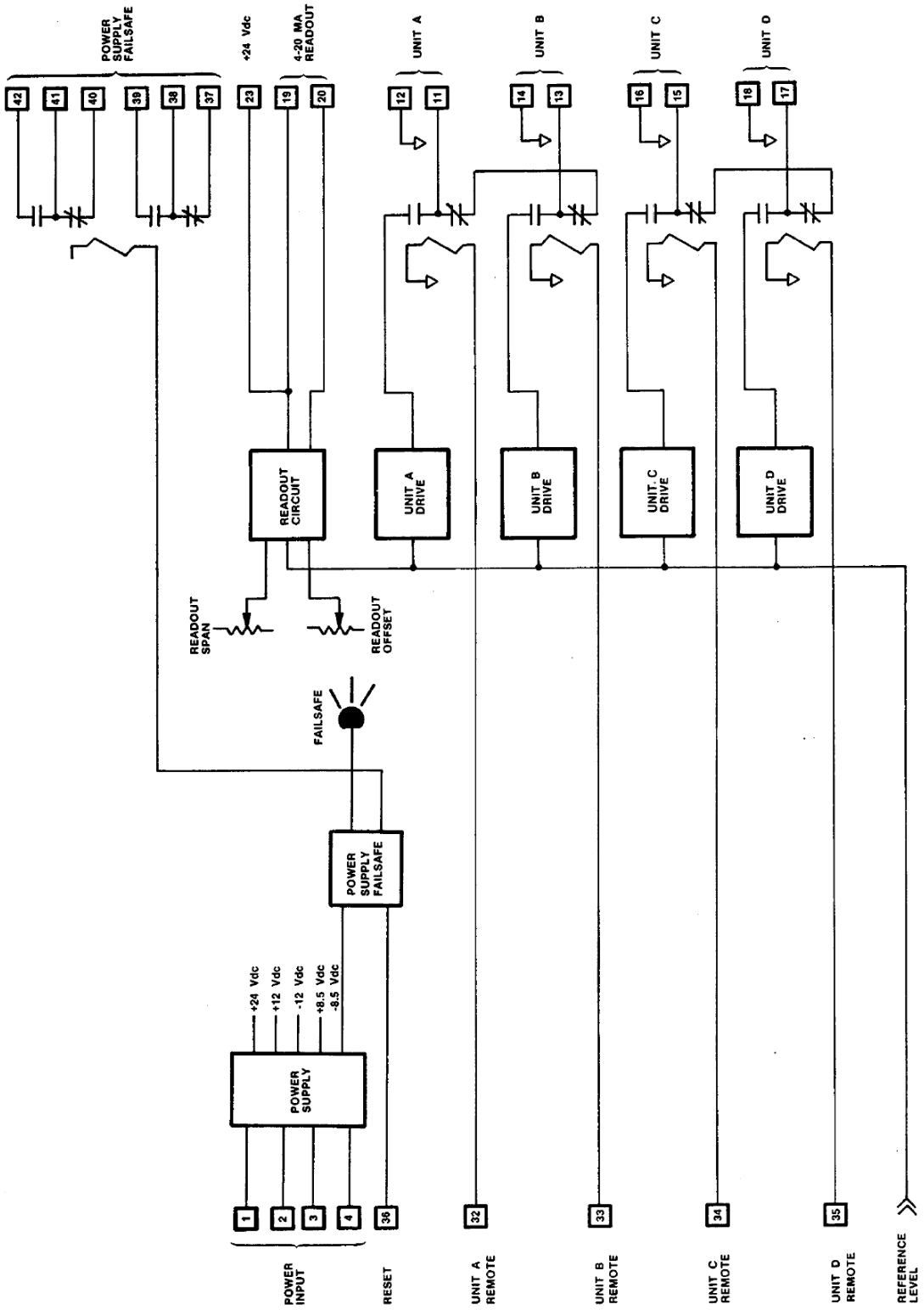

Figure 2-2b. Block Schematic Diagram

Checkout Procedure

The plant wiring diagram (Figure 2-1) and block schematic (Figure 2-2) show all the input and output connections to the unit. Recommended test equipment for testing and troubleshooting the Remote Speed Reference Unit is:

- Digital Multimeter (DMM): DC voltage accuracy of ±0.3%, (Hewlett Packard 3476B or Fluke 8020A).
- Volt-Ohmmeter (VOM): 20 kΩ/V ±2% accuracy, (Simpson 260).
- Power Supply: 120 Vac or 240 Vac

1. With no wires connected to the unit, measure the resistance between each terminal and the chassis of the unit. The correct resistance reading is 10 MΩ minimum.

2. Connect the jumpers on terminals 1–4 for the power input used.

3. Connect the readout meter between terminals 19 and 20.

4. Connect the power input between terminals 1 and 4.

5. The Failsafe LED must not be illuminated and the resistance between terminals 37 and 38 and terminals 40 and 41 must be greater than 10 MΩ. The resistance between terminals 38 and 39 and terminals 41 and 42 must be 0 Ω.

6. Reset the unit. The Failsafe LED must not be illuminated, and the resistance between terminals 38 and 39 and terminals 41 and 42 must be greater than 10 MΩ. Also the resistance between terminals 37 and 38 and terminals 40 and 41 must be 0 Ω.

7. Check the following power supply voltages with terminal 12 as common. For the test point location, see Figure 2-3.

TP3	+12 ±0.5 Vdc
TP4	+8.5 ±0.1 Vdc
TP5	–12 ±0.5 Vdc
TP6	–8.5 ±0.1 Vdc
Terminal 23	+24 ±3.0 Vdc

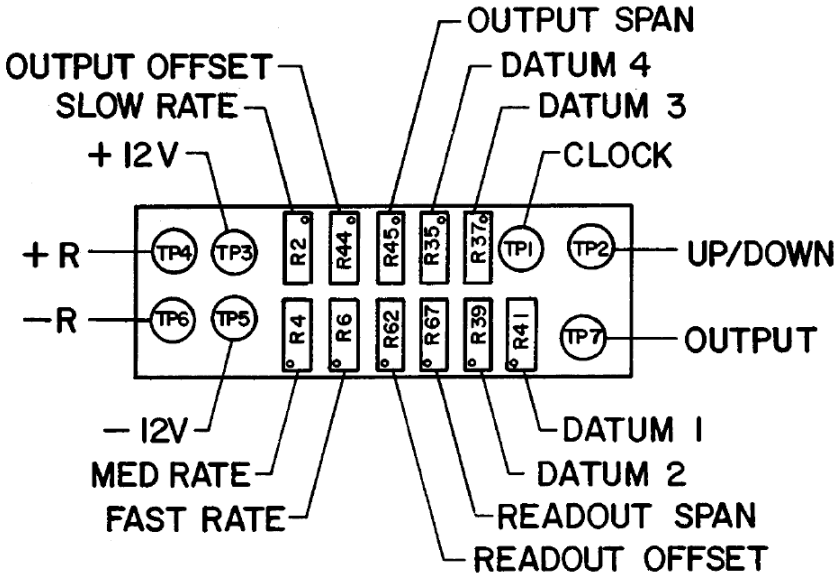

Figure 2-3. Test Point and Potentiometer Location Diagram

8. Check that the resistance between terminals 11 and 13 and terminals 15 and 17 is 0 Ω.

9. With the Low Limit LED not illuminated, check that the resistance between terminals 5 and 6 and terminals 8 and 9 is greater than 10 MΩ. Also check that the resistance between terminals 6 and 7 and terminals 9 and 10 is 0 Ω.

10. Select the Lower selection and the Low Limit LED must be illuminated. Check that the resistance between terminals 8 and 9 is 0 Ω and that the resistance between terminals 9 and 10 is greater than 10 MΩ.

11. Select the Remote A selection. The voltage on terminal 11 must be the same as the voltage on TP7. When the Remote A selection is not selected, the voltage on terminal 11 is 0 V.

12. Select the Remote B selection. The voltage on terminal 13 must be the same as the voltage on TP7. When the Remote B selection is not selected, the voltage on terminal 13 is 0 V.

13. Select the Remote C selection. The voltage on terminal 15 must be the same as the voltage on TP7. When the Remote C selection is not selected, the voltage on terminal 15 is 0 V.

14. Select the Remote D selection. The voltage on terminal 17 must be the same as the voltage on TP7. When the Remote D selection is not selected, the voltage on terminal 17 is 0 V.

15. Select the Lower and Remote A selections. The reference output level must be at the specified Low level. If the reference output level is not correct, adjust R44.

16. Select the Raise selection. The reference output level must not change and the Moving LED must not be illuminated until the Lower selection is disconnected.

17. Disconnect the Lower selection. The Moving LED is illuminated until the High Limit is reached. When the High Limit is reached, the resistance between terminals 5 and 6 is 0 Ω, the resistance between terminals 6 and 7 is greater than 10 MΩ and the High Limit LED must be illuminated.

18. The reference output level must be at the specified High Limit level, lithe reference output level is not correct, adjust R45.

19. Repeat steps 15 and 18 until no adjustments are needed.

20. Disconnect the Lower and Raise selections.

IMPORTANT **In the following steps, if an adjustment is made, the selection must be momentarily disconnected.**

21. Select the Datum 1 selection. The Moving LED is illuminated and the reference output level goes to the Datum 1 reference level. When the Moving LED is not illuminated, the reference level is at the Datum 1 level. If the reference output is not correct, adjust R41.

22. Disconnect the Datum 1 selection and select the Datum 2 selection. The Moving LED is illuminated and the reference output level goes to the Datum 2 reference level. When the Moving LED is not illuminated, the reference level is at the Datum 2 level. If the reference output is not correct, adjust R39.

23. Disconnect the Datum 2 selection and select the Datum 3 selection. The Moving LED is illuminated and the reference output level goes to the Datum 3 reference level. When the Moving LED is not illuminated, the reference level is at the Datum 3 level. If the reference output is not correct, adjust R37.

24. Disconnect the Datum 3 selection and select the Datum 4 selection. The Moving LED is illuminated and the reference output level goes to the Datum 4 reference level. When the Moving LED is not illuminated, the reference level is at the Datum 4 level. If the reference output is not correct, adjust R35.

25. Repeat steps 15, 18, 21, 22, 23 and 24 until no adjustments are needed.

26. Select the Lower selection. When the Low Limit LED is illuminated, the readout meter must be indicating the minimum reference level. If the meter is not indicating the correct level, adjust R62.

27. Disconnect the Lower selection and select the Raise selection. When the High Limit LED is illuminated, the readout meter must be indicating the maximum reference level. If the meter is not indicating the correct level, adjust R67.

28. Repeat steps 26 and 27 until no adjustments are needed.

29. Select the Lower and Raise selections. The reference level must decrease to the Low Limit.

30. Disconnect the Lower selection and determine if the time needed for the reference level to go from the Low Limit to the High Limit is as specified for the slow rate. If the rate is not correct, adjust R2.

31. Select the Lower selection and check that the time needed for the reference level to go from the High Limit to the Low Limit is the same as the time needed to go from the Low Limit to the High Limit.

32. Select the Fast selection. Check that the time needed for the reference level to go from Limit to Limit at the fast rate is as specified. If the rate is not correct, adjust R6.

33. Select the Med selection and disconnect the Fast selection. Check that the time needed for the reference level to go from Limit to Limit at the medium rate is as specified. If the time is not correct, adjust R4.

34. Select the Fast selection and do not disconnect the Med selection. Check that the reference output level jumps from limit to limit instantly.

Chapter 3.
Principles of Operation

Control Circuits

Power Supply and Power Supply Failsafe Circuits

The Remote Speed Reference Unit uses the 120 Vac or 240 Vac input voltage and generates 24 Vdc, ±12 Vdc, and ±8.5 Vdc. The outputs of the power supplies are monitored by the Power Supply Failsafe circuit. If the ±12 Vdc or ±8.5 Vdc supplies fail, the Failsafe LED is not illuminated and the Power Failsafe relay is de-energized. The Failsafe circuit is reset when the Reset terminal is connected to terminal 23. The Power Supply Failsafe circuit when activated, is activated until reset.

Input Buffer Circuit

The Input Buffer gives the connections between the Raise, Lower, Datum, Med, and Fast terminals and the reference circuits. The Input Buffer gives signals to the Priority Encoder and Rate Control circuits to control the reference of the unit and the rate at which the reference changes.

Priority Encoder Circuit

The Priority Encoder uses the outputs from the Input Buffer to control the reference selected. If more than one input is selected, the input with the lowest reference level is selected by the Priority Encoder. The Priority Encoder generates a digital code for the reference selected. The digital code is used by the Reference Selection and Change Detector circuits.

Reference Selection Circuit

The Reference Selection circuit uses the digital codes to connect a potentiometer to the Run Control circuit. Each code connects a different reference potentiometer. The reference levels are between the Upper and Lower Limit of the Digital to Analog Converter (DAC) output.

Rate Control and Clock Circuits

The Rate Control circuit uses the rate signals from the Input Buffer circuit to control the frequency of the Clock circuit output. The Clock circuit generates the pulses counted by the DAC circuit.

Change Detector Circuit

The Change Detector circuit uses the digital codes from the Priority Encoder to determine if the reference selection is changed. When a change is detected, the circuit gives a signal to the Run Control circuit.

Run Control and Digital-to-Analog Converter Circuits

The Run Control circuit uses the signals from the Clock, Reference Selection, Change Detector and DAC circuits. When the signal from the Change Detector indicates a change in reference level is needed, the clock pulses are given to the counters. The circuit compares the output level of the DAC with the reference selection output to determine if the counters count up or down. When the DAC and reference selection signals are equal, the clock pulses are disconnected. When the Clock pulses are being counted, the Moving LED on the front is illuminated. The DAC circuit counts the clock pulses and gives an analog output that is proportional to the count. The DAC analog output is used for setting the size of the reference unit outputs. The DAC circuit gives signals to the Upper and Lower Limit circuits.

Lower and Upper Limit Circuits

The Lower and Upper Limit circuits indicate when the counters in the DAC circuit are at the Lower or Upper Limits. The Lower and Upper Limit circuits monitor the carry out and the highest binary digit of the counters. When the two levels match, the Lower Limit LED illuminates and the Lower Limit relay energizes. When the carry out and the inverse of the binary digit match the High Limit LED illuminates and the High Limit relay energizes.

Speed Reference Driver and Preset Circuits

The output of the DAC circuit is used by the Speed Reference Driver circuit. The Speed Reference Driver changes the DAC circuit output to the system reference needs. The Preset circuit sets the Run Control, Input Buffer and the counters in the DAC circuits for the Lower Limit when the power is first connected to the Remote Reference Unit.

Readout and Unit Drive Circuits

The Readout circuit uses the output of the Speed Reference Driver circuit and changes the voltage into a current proportional to the reference level. The readout delivers 4 mA at the low reference level to a meter connected to the read out terminals and 20 ma at the high reference level. The Unit Drive circuits use the output of the Speed Reference Driver circuit. The circuit outputs are the same as the Speed Reference Driver. The outputs of the Unit Drive circuits are connected to the contacts of the remote relays. When the voltage on the Remote terminal is high, the Unit Drive output for that remote terminal is connected to the Unit Drive output terminal. When the voltage on the Remote terminal is low, the Unit Drive output is not connected to the output terminal. If the A and B or C and D remote terminals are low the A and B outputs or C and D outputs are connected.

Operation

The following gives the operating information on test points, adjustments, function indicators, selectable inputs, relays and outputs.

The Remote Speed Reference Unit can increase or decrease the reference output by selection of the Raise or Lower terminal. The reference rate of change can be selected from Slow, Medium, Fast and Instant rates. Any one of the four reference levels can be selected by connecting the Datum inputs. All selections can be selected manually and/or automatically depending on the system.

Test Points and Adjustments

The test points and adjustments are located under the cover of the front of the unit. For each test point and adjustment, the function is given in the following list. For the location of the test points and adjustments see Figure 2-3.

Test Points	
TPI	Clock Output
TP2	Up/Down Logic Output
TP3	+12 Vdc Supply
TP4	+8.5 Vdc Supply
TP5	–8.5 Vdc Supply
TP6	–12 Vdc Supply
TP7	Output Reference Level

Adjustments	
R41	Datum 1 Adjust
R39	Datum 2 Adjust
R37	Datum 3 Adjust
R35	Datum 4 Adjust
R45	Output Span Adjust
R44	Output Offset Adjust
R67	Readout Span Adjust
R62	Readout Offset Adjust
R2	Slow Rate Adjust
R4	Med Rate Adjust
R6	Fast Rate Adjust

Datum Adjustments

The Datum adjustments set the reference output levels between the Lower and High Limit.

Output Adjustment

- Output Offset—This adjustment sets the reference output at the Low Limit.
- Output Span—This adjustment sets the reference output at the High Limit.

Readout Adjustments

- Readout Offset—This adjustment sets the minimum readout output.
- Readout Span—This adjustment sets the maximum readout output.

Rate Adjustments

The Rate Adjustment set the rates of change in the reference output.

Function Indicators

The function indicators are the Light Emitting Diodes (LED) located on the front of the Remote Reference Unit.

- High Limit—Illuminates when the reference has reached the Upper Limit.
- Low Limit—Illuminates when the reference has reached the Low Limit.
- Moving—Illuminates while the reference level is changing.
- Failsafe—Illuminates during normal operation. The LED is not illuminated when a failsafe occurs.

Rate Selection

- Med—Connecting terminal 23 to the Med terminal, selects the Med Rate.
- Fast—Connecting terminal 23 to the Fast terminal, selects the Fast Rate.
- Slow—Not connecting terminal 23 to the Med or Fast terminals, selects the Slow Rate.
- Instant—Connecting terminal 23 to both the Med and Fast terminals, selects the Instant Rate.

Reset

- Power Supply Reset—Connecting terminal 23 to the P.S. Reset terminal reset the Power Supply Failsafe.

Reference Selections

IMPORTANT **The lowest reference selection controls the output of the Remote Reference Unit.**

- Lower—Connecting terminal 23 to the Lower terminal selects the minimum reference level.
- Datum—Connecting terminal 23 to a Datum terminal selects that Datum reference level.
- Raise—Connecting terminal 23 to the Raise terminal selects the maximum reference level.

Remote Selection

When the remote terminals are connected to terminal 23, the reference output is connected to the Unit outputs for the remote terminal selected. When the remote terminals are not connected, the reference output is not connected to the Unit outputs for the remote terminals. When both Remote A and Remote B terminals are not connected, the Unit A and Unit B outputs terminals are connected together and the reference outputs are not connected to either Unit A or Unit B terminals. When both Remote C and Remote D terminals are not connected, the Unit C and Unit D outputs are connected together and the reference outputs are not connected to either Unit C or Unit D terminals.

Relays

- Power Supply Failure—Energized when the Failsafe LED is illuminated.
- Upper Limit—Energized when the High Limit LED is illuminated.
- Lower Limit—Energized when the Low Limit LED is illuminated.

Outputs

- Unit—Reference outputs connected to the contacts of the remote relays.
- 4–20 mA—Readout Meter connection to the Reference Readout circuit.

Chapter 4. Troubleshooting

Introduction

This chapter gives the troubleshooting information for the Remote Speed Reference Unit. The troubleshooting information is for only determining if the unit is not functioning correctly.

Visual Inspection

Before troubleshooting the Remote Speed Reference Unit, visually inspect the unit for burned or broken parts or bad wire connections. A burned resistor often indicates a shorted transistor or a shorted wire. Be sure all connections are tight and making good contact. If nothing is found proceed with the troubleshooting.

IMPORTANT **A difference in color of the potting compound on the power resistors is common and does not indicate a burned out condition.**

Initial Troubleshooting Setup

The following must be completed before using the troubleshooting procedure.

- Connect all wires to the terminals as needed.
- Connect the correct power input jumpers and connect the power input.
- Using a digital voltmeter, check the voltages on the test point as in Chapter 2.
- Monitor the voltage on TP7.

Symptom	Procedure	Results
Not able to select a new reference level.	Check that when the new level is selected, the Moving LED is illuminated.	If the Moving LED is not illuminated, go to the next step.
	Check that the new level is lower than the old level.	If OK, return the unit for repair.
The reference level cannot be raised or lowered (voltage on TP7 will not change).	Check that the Lower terminal is not selected and that the reference level is not at the Low Limit.	If the Lower terminal is not selected and the reference level is not at the Low Limit, go to the next step.
	Check that the voltage on TP6 is correct.	If the voltage is correct, go to the next step.
	Check that the Output Span adjustment is not counterclockwise.	If correct, return the unit for repair.
Upper or Lower Limit LED or relay is not working. Not able to change the rate.	Check that the input terminals are correct.	If the inputs are correct, return the unit for repair.
	Check that the input voltages on the Med and. Fast terminals are correct.	Zero voltage on both for Slow Rate. High voltage on MED for MED Rate. High voltage on Fast for Fast Rate. High voltage on both for Instant Rate.
	Monitor TP1 with a scope or counter. With Slow selected, vary the Slow adjustment and observe the clock rate change. Repeat the procedure for the Fast and MED adjustments.	If an adjustment has no effect or the instant is not instant, return the unit for repair.

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

Facility	Phone Number
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

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

Products Used In Industrial Turbomachinery 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

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 82439.

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Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
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.

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