WOODWARD

Product Manual 82372
(Revision NEW)
Original Instructions

28 Vdc Power Supply with Optional Battery Charger Circuits

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 Out-of-date translations are marked with ⚠.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

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.

28 Vdc Power Supply with Optional Battery Charger Circuits

Description

The 8272-066, 8272-067, and 8272-409 power supplies provide 28 Vdc up to 0.8 A with a ripple of approximately 1% at full load, for modules in 2301, 2301A, and 2500 control systems. The power supplies are protected from transient voltage spikes.

The power input for the power supply models are 95–130 Vac or 190–260 Vac. The input load is a maximum of 0.4 A for all models.

8272-409 Battery Backup Power Supply

In case of ac power failure to the power supply, an internal diode steers battery voltage to the power supply output terminals. This power supply is intended primarily for use where the backup battery is already available in the system and a charger is already provided for the battery.

If the ac power to the power supply fails, a relay provides a failed power supply indication with both a normally open and a normally closed contact signal available.

8272-067 Battery Backup with Charger

The 8272-067 has the same features as the 8272-409 power supply, but also includes an internal charger that keeps the backup battery charged. The charger is designed to be compatible with a Woodward 24 Vdc battery (8272-326).

If the ac power to the power supply fails, a relay provides a failed power supply indication with both a normally open and a normally closed contact signal available.

8272-066 No Battery Backup–Redundant Power Supply

This supply provides a redundant power source for the control's power. It is usually used with a second 8272-067 or 8272-409 power supply. When redundant power sources for the power supplies are required, the 8272-066 must be powered from an ac power source different from the source powering the 8272-067 or 8272-409.

Woodward supplies a 24 Vdc backup battery (8272-326) for use with the 8272-067 power supply, or a similar battery can be supplied by the user.

Due to the unique charging characteristics of different types of batteries, it is strongly recommended to use the Woodward 8272-326 battery when using the 8272-067 power supply. This battery assembly contains sealed lead-acid cells. To prevent an explosive condition, the battery assembly must not be operated in a gas-tight container.

If the ac power to the power supply fails, a relay provides a failed power supply indication with both a normally open and a normally closed contact signal available.

Battery Discharge Characteristics

The following graphs show the discharge voltage profile as a function of time for various ambient temperatures ranging from –40 to +40 °C (–40 to +104 °F) for a 0.25 A load (Figure 1) and 0.5 A load (Figure 2) for the 8272-326 battery assembly.

Figure 3 displays the typical life expectancy for the battery as a function of ambient temperature. This graph applies only for floating applications (applications where the power supply Is continuously charging the battery). If the battery is deeply discharged, the life expectancy will be reduced.

Due to the poor battery capacity at low temperatures and the short life expectancy at high temperatures, it is recommended that the 8272-326 battery assembly be mounted in a location where the normal ambient temperature is between 0 and 38 °C (32 and 100 °F). This battery assembly contains sealed lead-acid battery cells.

⚠WARNING

EXPLOSION HAZARD—This battery assembly must never be operated in a gas-tight container. Minute quantities of hydrogen gas are released under normal operation. Larger quantities of hydrogen are released under various abusive conditions. In large enough quantities, hydrogen can produce an explosive condition.

Installation

All models may be mounted in any position. Operation is not dependent on the orientation of the unit. Four retaining screws secure the power supply to the host unit.

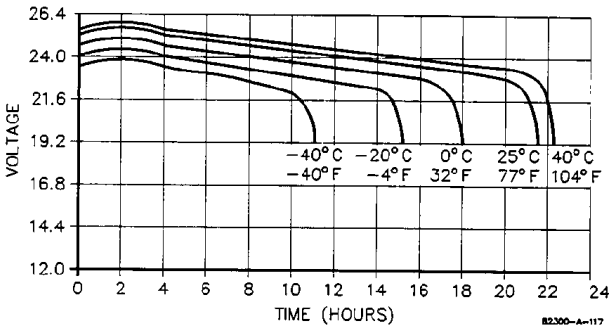

Figure 1. 0.25 A Load Discharge Rate

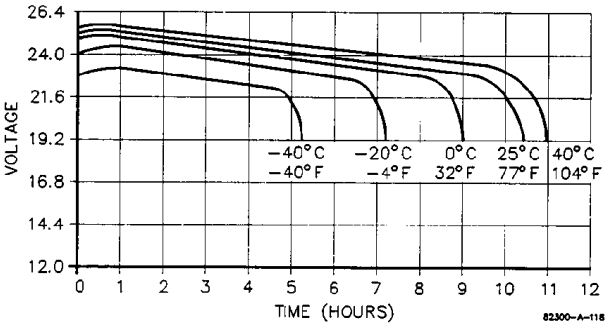

Figure 2. 0.5 A Load Discharge Rate

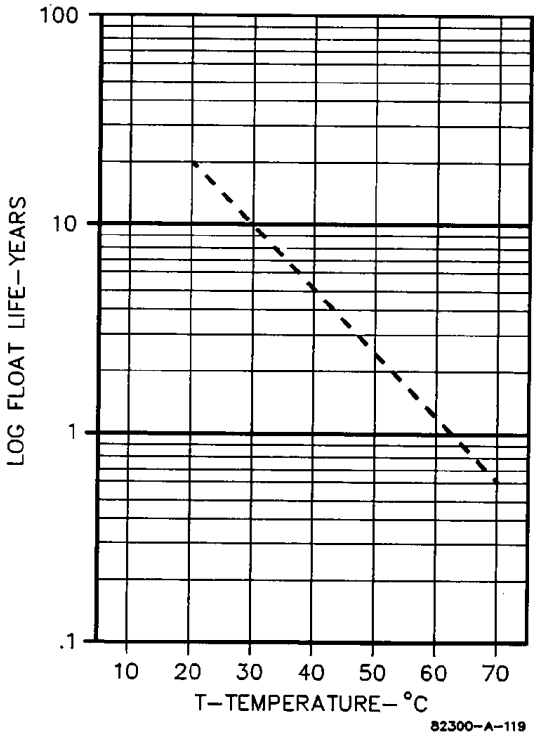

Figure 3. Typical Life Expectancy of Battery (8272-326) as a Function of Ambient Temperature

WARNING

Ensure that input voltages are compatible with the design of the unit. Failure to do so could result In damage to the unit and will void the warranty. Prior to the installation or removal of a power supply, ensure that the input power has been shut off at Its source. Failure to do so could result In serious injury.

WARNING

Always place the insulated protective cover over the ac input terminals.

The units must be wired as shown in Figures 4 or 5:

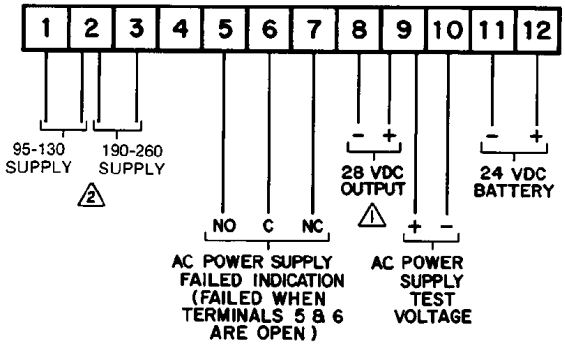

Figure 4. Plant Wiring Diagram (8272-067, 8272-409)

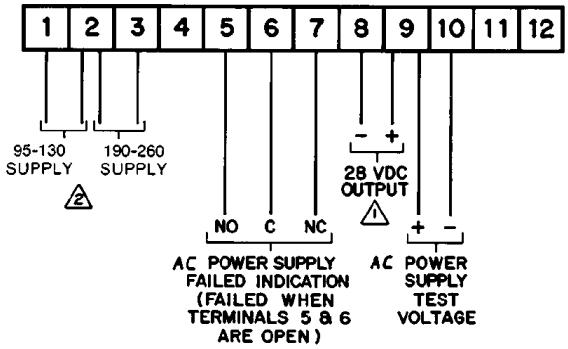

Figure 5. Plant Wiring Diagram (8272-066)

Maintenance

Woodward does not consider these units to be field serviceable. In event of a field failure, the unit should be returned to Woodward for repair or replacement.

Troubleshooting

⚠WARNING **HIGH VOLTAGE—When performing the following tests, hold all probes by their insulated barrels. Do not touch exposed metal parts.**

If the power supply is suspected of being faulty, the following test can be performed on the supply. Most problems occur with incorrect wiring or bad connections, so check the system wiring before performing this test.

The output of the ac-powered supply is high-signal selected (diode selected) with the battery or a second ac-powered supply. Terminals 9(+) and 10(–) provide a test point where output of the ac-powered supply can be monitored before it is selected with a redundant power source. The voltage between terminals 9(+) and 10(–) should be between 27.5 and 30 Vdc. These test terminals are intended to be used to verify correct supply operation in systems requiring redundant supplies or power sources.

Resistance Check

Measure and record the lowest resistance between all terminals and chassis, with all external wires disconnected. The correct reading should be infinite ohms.

Setup

Connect the power supply terminals 1 and 2 to a Variac. Set to 115 Vac. It a Variac is not available, use available utility ac voltage and skip steps 3 and 5.

Operational Test

1. Measure the resistance between terminals 5 and 6. It should be infinite. Turn on the input voltage. Lower the input voltage until the relay changes state (resistance across terminals 5 and 6 should be less than 1 Ω).

2. Adjust the input supply voltage to 115 Vrms. Measure the output voltage at terminals 9(+) and 8(–). It should be 28 ±1.0 V.

3. Adjust the input supply voltage to 130 Vrms. Measure the output voltage. The voltage should be within 1 volt of the voltage in step 2.

4. Load the power supply with a 35 Ω resistor across terminals 9 and 6. Measure the output. The output voltage should be within 1 volt of the voltage measured in step 2.

5. Adjust the input supply voltage to 103 Vrms. Measure the output. The output voltage should be 28 ±1.0 Volts.

Battery Backup (for 8272-067 and 8272-409)

1. Shut off the ac input power. Connect 24 Vdc power supply or 24 Vdc battery to terminal 12(+) and 11(–). The output across terminals 9(+) and 8(–) should measure within 1 volt of the voltage at terminal 12(+) and 11(–).

2. **For 8272-067 only**. Shut off input power. Connect the positive terminal of an ammeter to terminal 12. Attach the CCW (counterclockwise) and wiper leads of a 1 kΩ pot to the negative terminal of the ammeter. Connect the CW (clockwise) lead of the pot to terminal 11. Turn the pot fully CCW and turn on input power.

   Slowly turn the 1 kΩ pot CW and be sure that the current increases, reaches a peak, and then decreases. The peak current should be between 100 and 210 mA.

Replacement

To replace all models of the power supply:

⚠WARNING

HIGH VOLTAGE—Be sure the ac power source is shut off before working on the power supply. If a redundant supply is used with a separate power source, be sure the supply unit is shut off from the ac power source.

1. After the power source and power supply are shut off, remove the insulated protective cover positioned over ac input terminals.

2. Remove all wires. Keep ac input wires separate from dc output wires. If there is an ac power source corresponding to the power supply, label the wires that go to the power supply with the terminals they connect to.

3. Remove the power supply.

4. Replace the power supply with a working unit.

5. Reattach the ac input wires. Ensure that the insulated protective cover is positioned over the ac input terminals.

6. Reattach the dc output wires. Ensure that the positive wire is attached to terminal 9, and if a battery is used, be sure that terminal 12 is positive with respect to terminal 11.

7. Turn on the input power source.

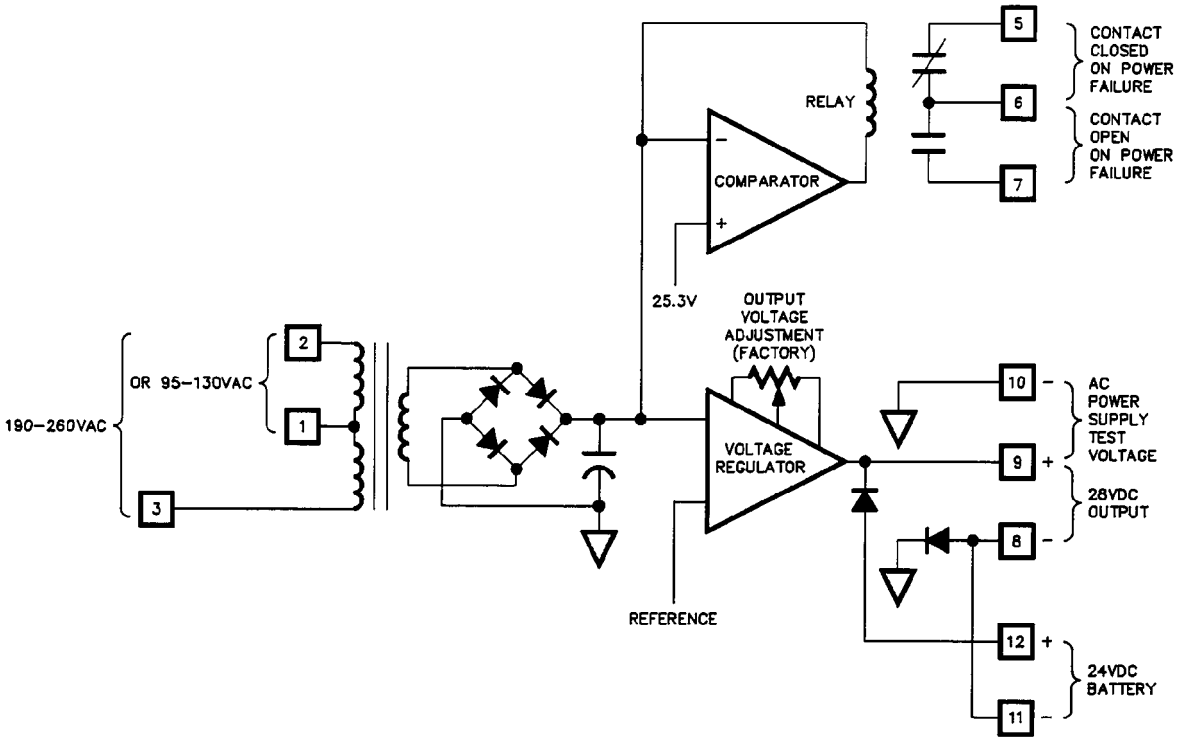

Figure 6. Block Diagram for 8272-409 (Battery Backup)

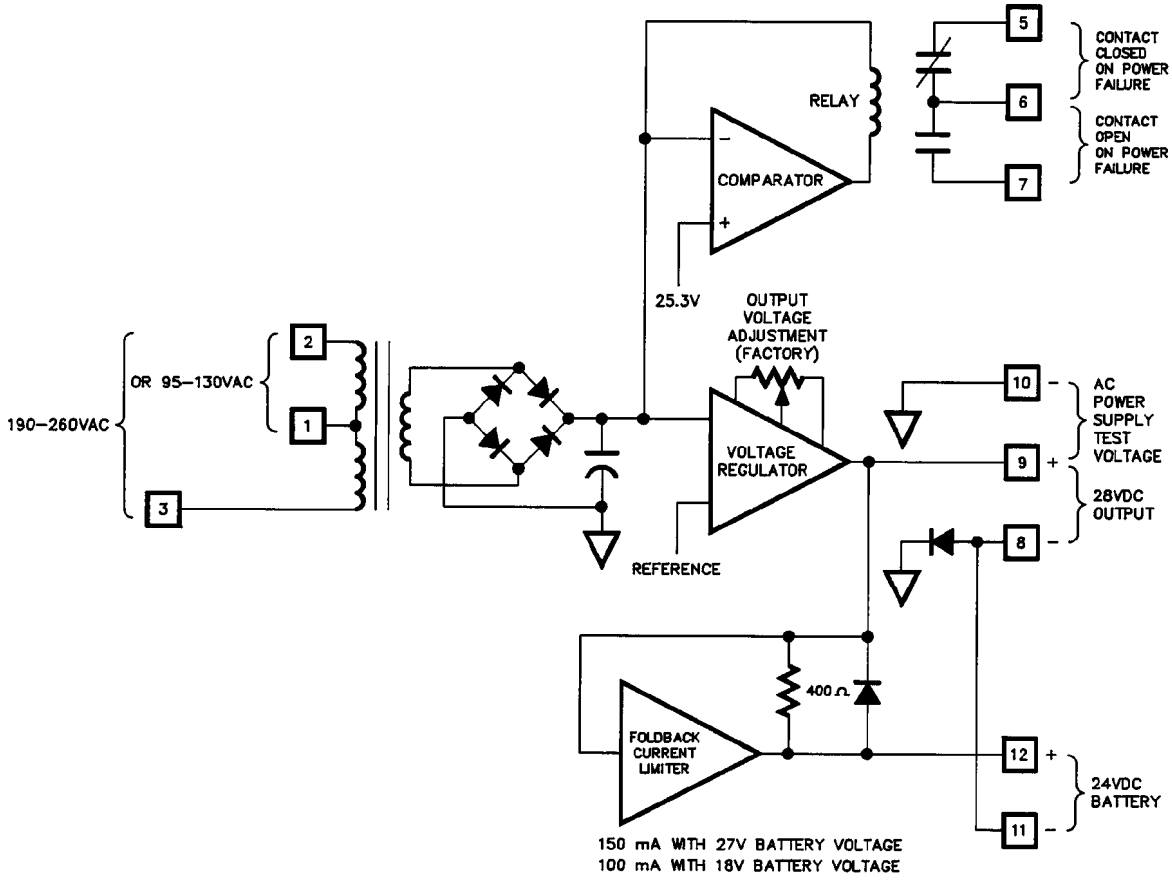

Figure 7. Block Diagram for 8272-067 (Battery Backup with Charger)

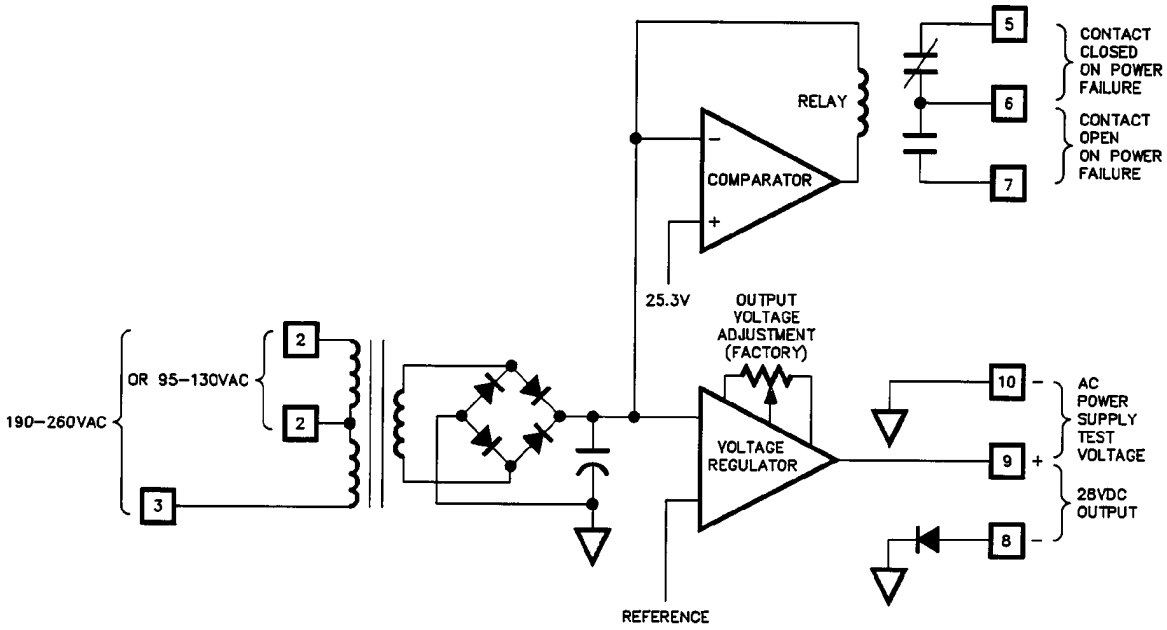

Figure 8. Block Diagram of 8272-066 (No Battery Backup–Redundant)

Repair And Replacement Procedures

Instructions for Returning Equipment for Repair

If any part of the electronic control is to be returned to Woodward for repair, attach a tag to the part with the following information:

- Name and location where control is installed
- Complete Woodward part number(s) and serial number(s)
- Description of the problem
- Instructions describing the desired type of repair

NOTICE

Before handling any electronic component, read manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Use the following materials when returning a complete control:

- Antistatic packing materials that wilt not damage the surface of the unit
- At least 100 mm (4”) 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

Replacement Parts Information

When ordering replacement parts for electronic controls, include the following information:

- The part number (8272-XXX) from the enclosure nameplate
- The unit serial number, which is also on the nameplate

For more information on replacement parts, contact Woodward or your nearest authorized distributor or service facility (www.woodward.com).

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 82372.

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