WOODWARD

Application Note 51192
(Revision A)

Original Instructions

MicroNet™ Ethernet Module
5466-411

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 Out-of-date translations are marked with ⚠.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

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

Application Note 51192

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.

MicroNet™ Ethernet Module 5466-411

The MicroNet™ Ethernet module (5466-411) is a 32 bit VMEbus module which has been integrated into the NetCon®, MicroNet, and MicroNet TMR® product families. The module is designed to fully support auto-switching 10/100 Base-TX Ethernet connections, *but has been configured to operate at only 10 Mbps for use with legacy products.*

The Ethernet module has a VME adapter board attached to allow its use in a MicroNet chassis. ***However, this module is not "hot swappable" due to signal integrity issues on the VME backplane.*** When inserted into a powered chassis, the module will interrupt VMEbus backplane communications and cause other Woodward modules and expansion racks to shut down.

On power up, the Ethernet board runs a series of self-tests that check the board hardware. After successful completion of the tests, the red FAIL LED will turn OFF. The self-tests may last 10–20 seconds.

IMPORTANT **Due to addressing conflicts with the Pentium CPU, this module can be used only with the Motorola CPU family.**

Ethernet System Requirements

- This module is supported for use in the NetCon, MicroNet, or MicroNet TMR chassis.
- This module is for use with the Motorola x040/060 CPUs and ***cannot be used with the Pentium CPU***.
- System wiring requires using the Ethernet Interface FTM, part number 5453-750.
- System wiring requires using shielded RJ45 Ethernet cables, part numbers:
  5417-391, double shielded Cat-5 Ethernet cable (SSTP), 1.5 ft (46 cm)
  5417-392, double shielded Cat-5 Ethernet cable (SSTP), 3 ft (91 cm)
  5417-393, double shielded Cat-5 Ethernet cable (SSTP), 7 ft (2.1 m)
  5417-394, double shielded Cat-5 Ethernet cable (SSTP), 10 ft (3.0 m)
  5417-395, double shielded Cat-5 Ethernet cable (SSTP), 14 ft (4.3 m)
  5417-396, double shielded Cat-5 Ethernet cable (SSTP), 25 ft (7.6 m)
  5417-397, double shielded Cat-5 Ethernet cable (SSTP), 50 ft (15.2 m)
  5417-398, double shielded Cat-5 Ethernet cable (SSTP), 100 ft (30.5 m)

Ethernet Features

- Industry Standard 6U, VME-32 format.
- Network interface conforming to the IEEE 802.3 standard.
- Configured for 10BaseT communication support.
- Module failure/reset, Link LED, Transmit, Receive, Collision, and 10/100 Mbps LEDs.
- Supports Woodward communications such as Modbus® (trademark of Modicon, Inc.), GAP™ Download, and Tunable Capture/Download.

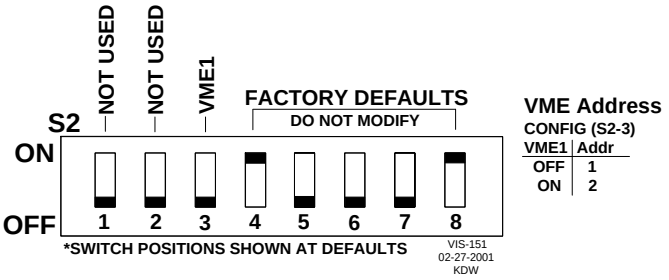
Electrical Specifications

- Voltage: 5.0 Vdc, 5% tolerance
- Power: 15.0 W max (13.5 W typical)
- Processor: PowerPC 750, 400 MHz
- Memory: 64 Mbyte DRAM, 2 Mbyte boot flash, 32 Mbyte user flash
- Bus Interface: 32 bit VMEbus
- On board I/O:
  RJ45 10 Mbps Ethernet port
  PMC daughterboard slots for future use
- Hardware Configuration:
  VME address #1 or #2 configuration for using 2 modules in a system

VME Address Configuration

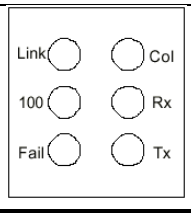
The Ethernet module can be configured for an alternate VME address to support the use of two modules in a MicroNet system. For dual module operation, both the Woodward GAP and the module DIP switch must be configured properly.

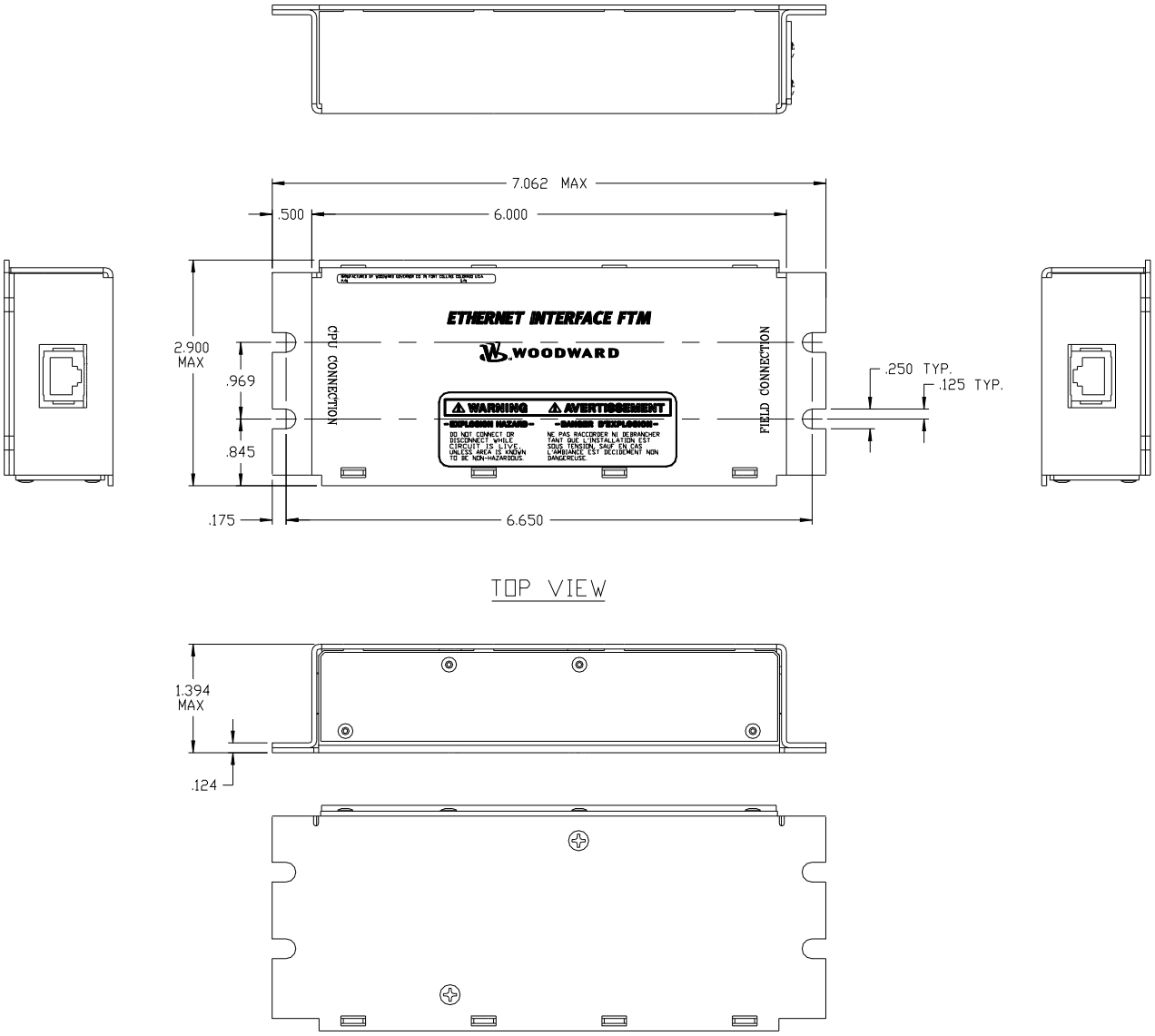
IMPORTANT **The DIP switch (S2) is located directly behind the RJ45 Ethernet connector.**



LED Annunciations

The following LEDs annunciate board failure as well as different functions related to Ethernet communications. When continuous communications are present, the RX and TX LEDs will be ON solid.

LEDs	Name	LED Color	Description
	LINK	GREEN	Indicates the Ethernet connection is good.
	COL	RED	Indicates a collision on the Ethernet.
	100	GREEN	Indicates the Ethernet connection is functioning at 100Mbps.
	RX	GREEN	Indicates data is being received.
	TX	GREEN	Indicates data is being received.
	FAIL	RED	Indicates a module reset or self test failure.



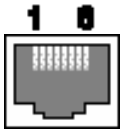
MicroNet Ethernet Module Outline Drawing

10BaseT Ethernet

A 10BaseT RJ45 Ethernet connector is available for system use. This connection is used for control configuration, data gathering, and networking of multiple controls. Additionally, this port may be relied upon for interfacing TCP/IP Distributed I/O devices into the control system.

To ensure signal integrity and robust operation of Ethernet devices, an Ethernet Interface FTM (Field Termination Module) is required when using this port. Its primary function is to implement EMI shielding and cable shield termination of the Ethernet cable. Along with the Ethernet Interface FTM, double shielded Ethernet cables (SSTP) are required for customer installations. See the *Ethernet Interface FTM* section below for more details.

RJ45 Ethernet Pinout

Connector	Signal Mnemonic
RJ45 female 	Shielded RJ45 female receptacle
1	TX+
2	TX-
3	RX+
4	---
5	---
6	RX-
7	---
8	---
Shield	Chassis GND

Ethernet Interface FTM

To ensure signal integrity and robust operation of Ethernet devices, an Ethernet Interface FTM (Field Termination Module) is required when interfacing Ethernet devices to the CPU. Its primary function is to implement EMI shielding and cable shield termination of the Ethernet cable. Along with this FTM, double shielded Ethernet cables (SSTP) are required for customer installations.

Installing Stiffener Plate onto 5466-411 Module
(6886-1010 Kit)

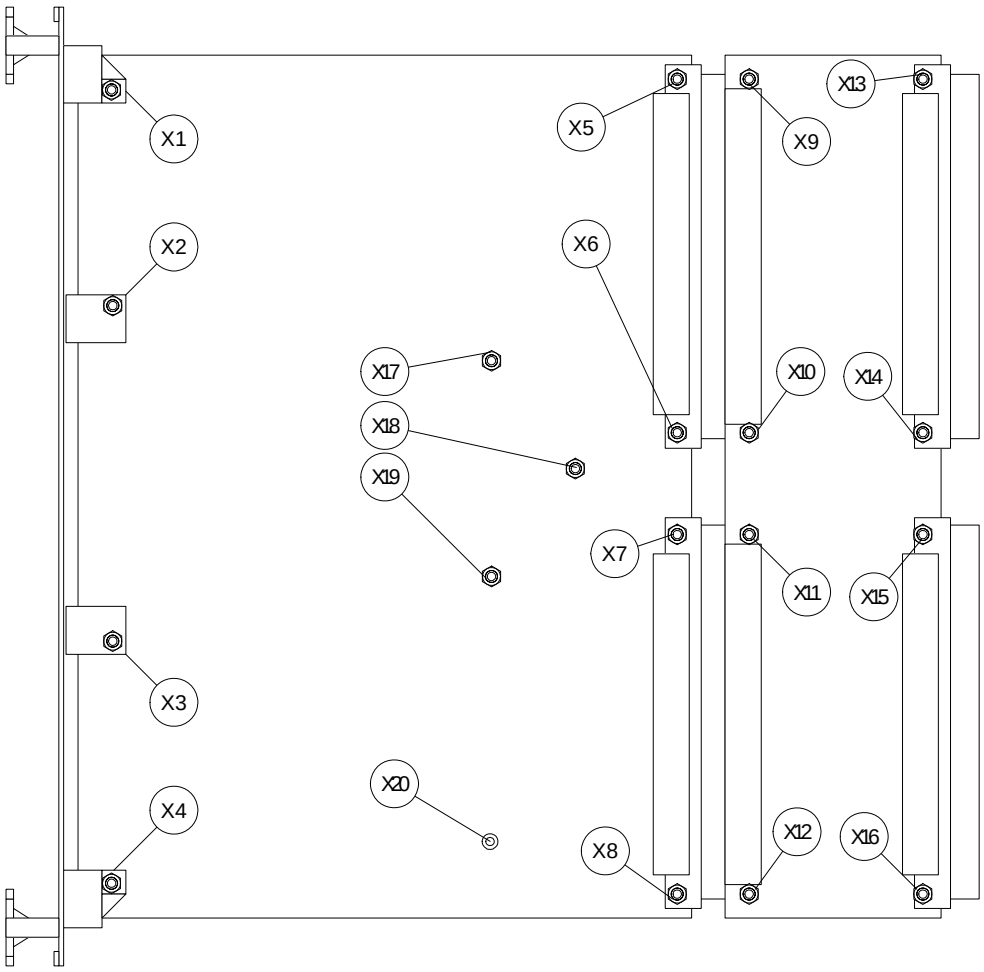
This instruction sheet assists field personnel upgrading the 5466-411 Ethernet modules for Marine compliance. It shows how to install the 4900-295 stiffener plate on a 5466-411 Rev C or lower module. The Marine compliant module will have an E/C revision “D” or later.

Please refer to drawing 9934-780 rev. D (or later) while following these instructions.

See the figure on the next page below for X1–X20 designator locations:

Step-by-step Instructions

1. Remove 16 screws, nuts, and washers at locations X1-X16. Discard all fastener hardware (except #3863-099 retainer) since new fasteners are included in the 6886-1010 kits.
2. Remove and discard 2 standoffs and screws at X19 and X20.
3. Install 2 #1029-935 screws and 2 #1023-357 washers at X1 and X4.
4. Install 2 #1029-935 screws, 2 #1023-357 washers, and 2 #3621-1013 spacers at X2 and X3. Note: The #1023-357 washers are mounted next to the
   #3621-1013 spacers on the component side of the board.
5. Install 3 #1023-439 screws and 3 #3621-1014 spacers at X17, X18, and X19 using Loctite on threads (no lock washers).



Ethernet module shown component side up

6. Install #3863-099 retainer using 4 #1029-439 screws and 4 #3677-129 spacers using Loctite on threads (no lock washers).
7. Install 8 #1029-439 screws, 8 #1023-357 lock washers, and 8 #3677-129 spacers at X5, X8, X9, X12, X13–X16.
8. Check the inside of the module faceplate and verify that the serial number of the 5466-411 module matches the 3082-169 label. If not, correct the label to match the module serial number.
9. Install the #4900-295 stiffener plate using 19 #1029-931 screws and 19 #1023-357 washers.
10. Install the #3082-169 nameplate, #3083-073 ESD label, #3060-207 Woodward label, and #3081-900 warning label as shown in drawing 9934-780 drawing (page 2).

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Send comments to: icinfo@woodward.com

Please reference publication 51192A.

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