

Installing, Operating  
and Configuring the  
MaxPak® III Network  
Adapter Module



Instruction Manual D2-3205-1

September, 1991

**RELIANCE**  
**ELECTRIC** 



# Table of Contents

Chapter/Topic	Page
<b>1: Receive and Accept the Network Adapter Module</b> .....	<b>1:1</b>
Scope of this Manual .....	1:1
User Knowledge .....	1:1
Dangers, Warnings and Cautions .....	1:1
Receive and Accept the Shipment .....	1:1
File a Return Request .....	1:1
Storage until Installation .....	1:2
Local Reliance Sales & Service Offices .....	1:2
Reference Documentation .....	1:2
<b>2: Introduction to the Network Adapter Module</b> .....	<b>2:1</b>
Product Description .....	2:1
Model Numbers .....	2:2
Microbus 60-Pin Ribbon Cables .....	2:2
Other Required Parts .....	2:3
Specifications .....	2:3
Ambient Conditions .....	2:3
Network Communications Module (0-57404-2) .....	2:3
Controls and Indicators .....	2:3
<b>3: Installation &amp; Wiring</b> .....	<b>3:1</b>
Plan the Installation .....	3:1
Select the Location .....	3:1
Mount the Network Adapter Module .....	3:1
Grounding .....	3:2
Installing the Network Adapter Module 60-pin, Two-Connector Ribbon Cable (No Signal Interface Kit Installed) .....	3:2
Installing the Network Adapter Module 60-pin, Three-Connector Ribbon Cable (Signal Interface Kit Installed) .....	3:4
Connection to the AutoMax/DCS .....	3:5
Start-Up .....	3:5
<b>4: Software Interface : AutoMax/DCS to MaxPak III</b> .....	<b>4:1</b>
Introduction .....	4:1
NETDEF Statements .....	4:1
MaxPak III to AutoMax/DCS Variable Mapping .....	4:2
Microbus Slot Number .....	4:2
Setting Net_Drop_Depth% .....	4:3
Multiple Drop Depth .....	4:3
Drive Fault Interlocks .....	4:4
Data Transfer .....	4:5
Download .....	4:5
System Initialization .....	4:6
Initialization Errors .....	4:6
Programming Example .....	4:6
<b>5: Troubleshooting</b> .....	<b>5:1</b>
Test Equipment Needed .....	5:1
Circuit Description .....	5:1
Troubleshooting the Network Communications Module (0-57404-2) .....	5:1
Troubleshooting Procedure for the Network Adapter Module .....	5:2
<b>6: Replacement Parts</b> .....	<b>6:1</b>

# Appendices

<b>Appendix A: Verify Errors</b> .....	<b>A:1</b>
<b>Appendix B: Download Errors</b> .....	<b>B:1</b>
<b>Appendix C: Network Adapter Module Peripheral Error Codes</b> .....	<b>C:1</b>
<b>Appendix D: Glossary Of Terms</b> .....	<b>D:1</b>
<b>Index</b> .....	<b>I:1</b>

## List of Figures

<b>Figure/Description</b>	<b>Page</b>
Figure 2-1. Network Adapter Module Typical System Block Diagram .....	2:2
Figure 2-2. Network Adapter Module Controls and Indicators. ....	2:4
Figure 3-1. Network Adapter Module Mounting Dimensions .....	3:2
Figure 3-2. Ribbon Cable, Two-Connector (Network Adapter Module to Regulator, J13A). ....	3:3
Figure 3-3. Ribbon Cable, Two-Connector (Network Adapter Module to Regulator, J13A, to Signal Interface, J2S). ....	3:4
Figure 4-1. Network Adapter Module Motherboard Microbus Slot Number Jumper Settings .....	4:3
Figure 5-1. Electrical Diagram .....	5:3

## List of Tables

<b>Table</b>	<b>Page</b>
Table 2-1. Cable Part Numbers .....	2:2

# 1: Receive and Accept the Network Adapter Module

The products described in this instruction manual are manufactured by Reliance Electric Industrial Company.

## Scope of this Manual

This instruction manual covers the description and identification of components, installation and wiring, specifications and software interface requirements of the Network Adapter Module. The Network Adapter Module is used with the MaxPak® III, D-C Drive, Version 6.

### **DANGER**

**ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THE MANUAL PROVIDED WITH THE DRIVE AND THIS MANUAL IN THEIR ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

This instruction manual should be used in conjunction with either of the following applicable Instruction Manuals:

- D2-3181-2 MaxPak III Startup and Installation Manual
- D2-3203 MaxPak III Reference Manual
- J2-3001 Network Communications Module (M/N 57C404B)

## User Knowledge

This instruction manual assumes the following regarding the user:

1. The user has complete familiarity with the MaxPak III, and has read the applicable documentation provided with the drive.
2. The user has complete familiarity with the AutoMax™/DCS system, and has read the applicable documentation provided with the system.

## Dangers, Warnings and Cautions

Dangers, warnings, and cautions point out potential trouble areas. Their meanings are as follows:

A **danger** alerts a person that high voltage is present which could result in severe bodily injury or loss of life.

A **warning** alerts a person of potential bodily injury if procedures are not followed.

A **caution** alerts a person that damage to, or destruction of, equipment could result if procedures are not followed.

## Receive and Accept the Shipment

Reliance Electric's terms of sale, in all instances, are F.O.B. point of origin. The user is responsible for thoroughly inspecting the equipment before accepting

shipment from the transportation company.

If all the items called for on the bill of lading or on the express receipt are not included or if any items are obviously damaged, do not accept the shipment until the freight or express agent makes an appropriate notation on your freight bill or express receipt. If any concealed loss or damage is discovered later, notify your freight or express agent within 15 days of receipt and request that he make an inspection of the shipment. Keep the entire shipment intact in its original shipping container.

The user is responsible for making claim against the Carrier for any shortage or damage occurring in transit. Claims for loss or damage in shipment must not be deducted from the Reliance Electric invoice, nor should payment of the invoice be withheld while awaiting adjustment of such claims since the Carrier guarantees safe delivery.

## File a Return Request

1. To return equipment, send a written request to Reliance Electric within ten days of receipt.
2. Do not return equipment without a numbered Equipment Return Authorization (ERA) from Reliance Electric.
3. Reliance Electric reserves the right to inspect the equipment on site.

## Storage Until Installation

After receipt inspection, repack the Network Adapter Module in its original shipping container until installation. If a period of storage is expected, store in the original shipping container with its internal packing.

To ensure satisfactory operation at startup and to maintain warranty coverage, store the equipment:

- in its original shipping container in a clean, dry, safe place.
- within an ambient temperature range of  $-40^{\circ}\text{C}$  to  $65^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $149^{\circ}\text{F}$ )
- within a relative humidity range of 5 to 95% without condensation.
- away from a highly corrosive atmosphere. In harsh environments, cover the shipping/storage container.

## Local Reliance Sales & Service Offices

The following is a list of local Reliance Sales and Service Offices in the event that there is a need for assistance in installing, starting up, or servicing the equipment.

Alabama	205-942-8556
California	714-937-5800
Georgia	404-804-0180
Illinois	708-692-7900
Massachusetts	508-366-9993
Michigan	313-828-7070
Minnesota	612-420-4600
North Carolina	704-541-0348
Ohio	513-528-2300 216-266-7000
Oregon	503-659-3906
Pennsylvania	215-687-3511 412-257-0110
Texas	713-931-8100
International (All calls except Hong Kong and Canada)	216-266-7828
Hong Kong	852-833-6607
Canada	416-567-0100

## Reference Documentation

The following documentation (as applicable) should be read in its entirety upon receipt of equipment, and referenced when necessary.

D2-3181-2	MaxPak III, D-C Drive, Start-Up and Installation, and/or,
D2-3203	MaxPak III, D-C Drive Reference Manual
J-3649	DCS 5000/AutoMax Configuration Task Instruction Manual
J-3600	DCS 5000 Enhanced Basic Language Instruction Manual
J-3675	AutoMax Enhanced Basic Language Instruction Manual
J-3601	DCS 5000 Control Block Language Instruction Manual
J-3676	AutoMax Control Block Language Instruction Manual
J-3602	DCS 5000 Control Block Language Instruction Manual
J-3677	AutoMax Ladder Logic Language Instruction Manual
J2-3001	Network Communications Module (M/N57C404B)

# 2: Introduction to the Network Adapter Module

## Product Description

**Note:** This instruction manual only provides the information necessary to install the Network Adapter Module to the MaxPak III Drive, and to configure the MaxPak III to network to the AutoMax/DCS system (through the Network Communications Module, 0-57404-2). Refer to Instruction Manual J2-3001 for information on installation of the Network Communications Module to the AutoMax/DCS system, networking activity of the module, dual port memory definitions, drop registers, program referencing, etc.

The Network Adapter Module provides the interface capability from the MaxPak III D-C Drive to the Reliance Distributed Control System

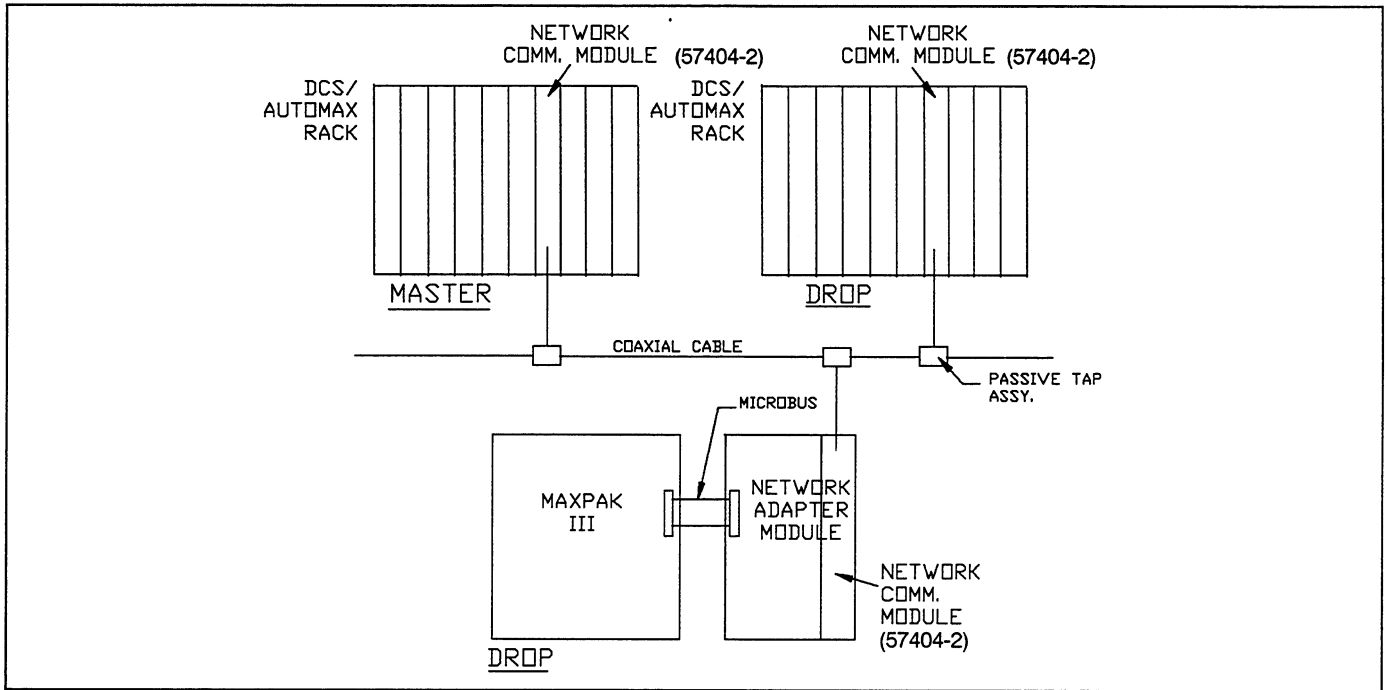
(AutoMax/DCS). A Network Communications Module (0-57404-2) is part of the Network Adapter Module assembly and provides the necessary hardware to transfer control status data to and from the AutoMax/DCS system.

The Network Adapter Module contains its own +5V power supply, powered from a customer-supplied 115VAC line, a test point p.c. board, a motherboard, and the Network Communications Module.

The MaxPak III can read information from any **drop** (any rack or MaxPak III containing a Network Communications Module) on the AutoMax/DCS Network by reading the appropriate dual port registers. All drops on the AutoMax/DCS Network can read MaxPak III registers. The AutoMax/DCS **master** can also write to MaxPak III registers.

Drops communicate from one to another by defining the same registers in the same drop using a **NETDEF** statement. This NETDEF statement will be very similar to that used in the MaxPak III configuration versus that used in the AutoMax/DCS programming language. The MaxPak III is capable of accessing all 64k bytes of the Network card dual ported RAM memory. Each AutoMax/DCS drop on the network (a master and 1-55 slaves) divides this RAM space into 56 (0-55) groups of 64 word registers. Each group of registers is further partitioned into input and output registers (0-31, 32-63). **A maximum of 64 NETDEF statements is permitted for the MaxPak III.**

Figure 2-1 depicts a system block diagram of the Network Adapter Module interface to the MaxPak III and the AutoMax/DCS System.



**Figure 2-1. Network Adapter Module Typical System Block Diagram**

**Model Numbers**

The model numbers for the Network Adapter Assembly are as follows:

**60HP @ 460VAC and  
30HP @ 230VAC**  
911K0100

**40-150HP @ 230VAC  
75-300HP @ 460VAC**  
911K1100

**Microbus 60-Pin  
Ribbon Cables**

The Network Adapter Module is shipped from the factory as an enclosed chassis with two (2) sets of cables in a plastic bag. One shorter cable is used if there is no Signal Interface card installed, and the longer cable would be used if there is a Signal Interface card installed in the drive. The longer cable will have three (3) connectors to connect the Network Adapter Module to the regulator and then to the Signal Interface card.

To verify whether or not a Signal Interface card is installed on the MaxPak III: Pull the regulator carrier forward and all the way down. The Signal Interface card will be installed on the backside of the regulator carrier and a microbus 60-pin ribbon cable will be connected to the microbus connector located on the regulator board (J13A).

Table 2-1 shows the cable part numbers for each model number (Refer to Figures 2-2 and 2-3):

**Table 2-1 - Cable Part Numbers**

Model Number	Cable P/N	Part Number
911K0100	Network Adapter Module to the Regulator	802266-57R
	SIF Installed (3 connectors)	802266-54R
911K1100	Network Adapter Module to the Regulator	802266-57S
	SIF Installed (3 connectors)	802266-54S



## Other Required Parts

The following parts are needed to connect the Network Adapter Module to the AutoMax/DCS rack (these parts are not provided as part of the Network Adapter Module):

Model Number 57C380  
Model Number 45C71  
Model Number 45C72  
Model Number 57C381

Communications Passive Tap Assembly  
Coax BNC 75 OHM Terminating Load  
Coax BNC Male Connector  
Cable – Communications Module to Passive Tap Assembly

The Passive Tap is required at each network or remote drop for connection to the coaxial cabling. All coaxial systems require a terminating load at both ends of the cable.

Refer to Instruction Manual J2-3001 for installation of the Network Communications Module to the AutoMax/DCS system.

## Specifications

### Ambient Conditions

Operating Temperature: 0°C to 55°C

Storage Temperature: -40° to 85°C

Humidity: 5 to 95%  
non-condensing

Altitude: 3300 Ft. (1000 meters)

Power Input Requirements: 115VAC  
@ .8 amps,

+5V Power Supply Fused  
3A, 250V Protection

## Network Communications Module (0-57404-2)

- 1.75 Mbaud (875k bits/sec) synchronous communications port with maximum network length of 3000 feet
- 1200 baud RS232 compatible asynchronous port with maximum cable length of 50 feet
- Dual port memory accessible through the Multibus
- 56 Network Communications Drops

## Controls and Indicators

The Network Adapter Module has a “POWER ON” LED that indicates to the user that the module is receiving +5V from the power supply. (See Figure 2-2.)

The Network Communications Module (Refer to Instruction Manual J2-3001):

1. **FAULT CODE LED:**  
Seven-segment LED used for diagnostic purposes.
2. **DROP NUMBER 1st, 2nd Thumbwheel switches:** Defines the network communications drop number.
3. **MONITOR connector:** 25-Pin ‘D’ shell connector used for the RS-232 compatible asynchronous link.
4. **NETWORK connector:** 9-pin ‘D’ shell connector used for the rack-to-rack communication line.

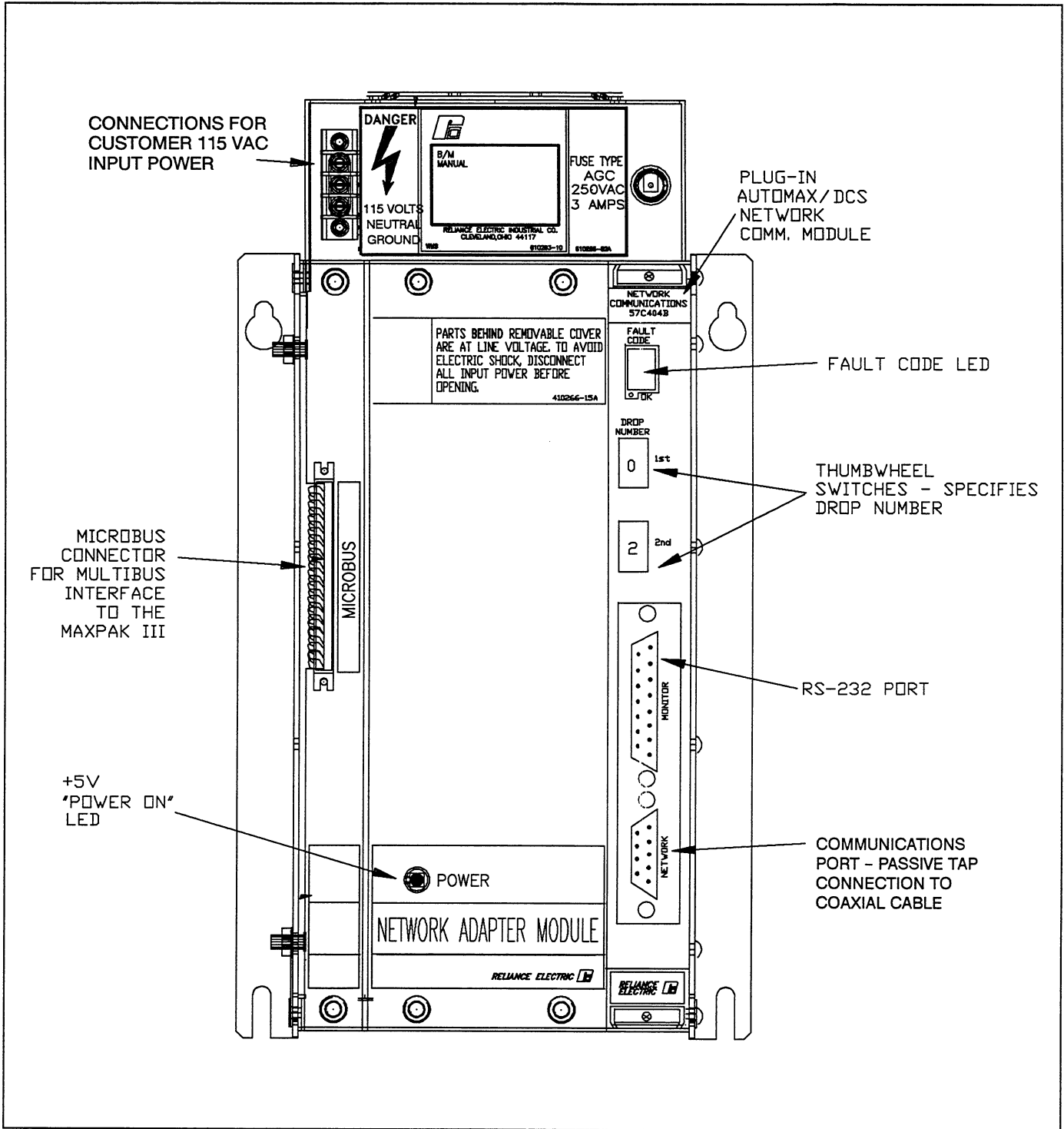


Figure 2-2. Network Adapter Module Controls and Indicators.

# 3: Installation & Wiring

## DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL IT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

## DANGER

THE USER IS RESPONSIBLE FOR CONFORMING TO THE NEC AND ALL OTHER APPLICABLE CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS, AND OVERCURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

## Plan the Installation

Read and understand this section in its entirety before beginning the actual installation. Follow these guidelines and procedures to minimize both installation and operating problems.

## Select the Location

1. Verify that the Network Adapter Module can be kept clean, cool, and dry.
2. Check that the equipment is away from oil, coolant, and other airborne contaminants.
3. Check that the temperatures in the vicinity are between 0°C and 55°C.
4. Check that the relative humidity is between 5 and 95% (noncondensing).

## Mount the Network Adapter Module

Mount the Network Adapter Module 4" to the right of the MaxPak III Drive. Use the (2) mounting holes and (2) mounting slots provided at the four corners of the Network Adapter Module backplate. Make sure the Network Adapter Module is mounted vertically. Refer to Figure 3-1.

Allow 4" clearance between the Network Adapter Module and the MaxPak III Drive. Allow 8" above and 6" on the bottom of the Network Adapter Module for sufficient air circulation.

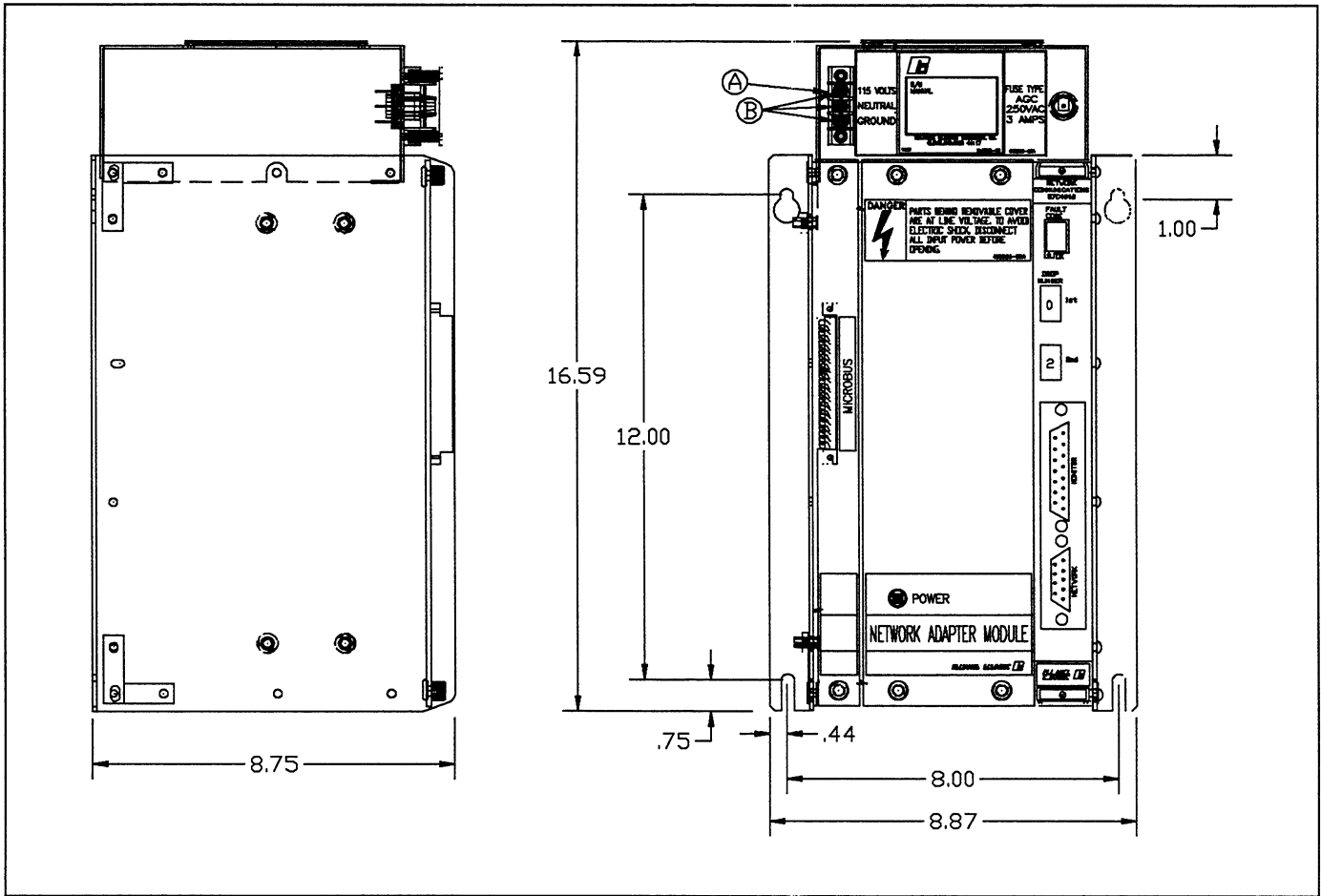


Figure 3-1. Network Adapter Mounting Dimensions

**DANGER**

**THIS EQUIPMENT IS AT LINE VOLTAGE WHEN A-C POWER IS CONNECTED. DISCONNECT AND LOCKOUT ALL UNGROUNDED CONDUCTORS OF THE A-C POWER LINE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

1. Refer to Figure 3-1. Remove the plastic cover (A) by removing the (2) top and bottom screws.
2. Connect a customer-supplied 3-wire, 115v A-C power input line to the terminal board marked 115 Volts, Neutral, and Ground (as shown in (B), Figure 3-1). The input power should be .8

amp nominal rating. Replace cover. Tighten screws.

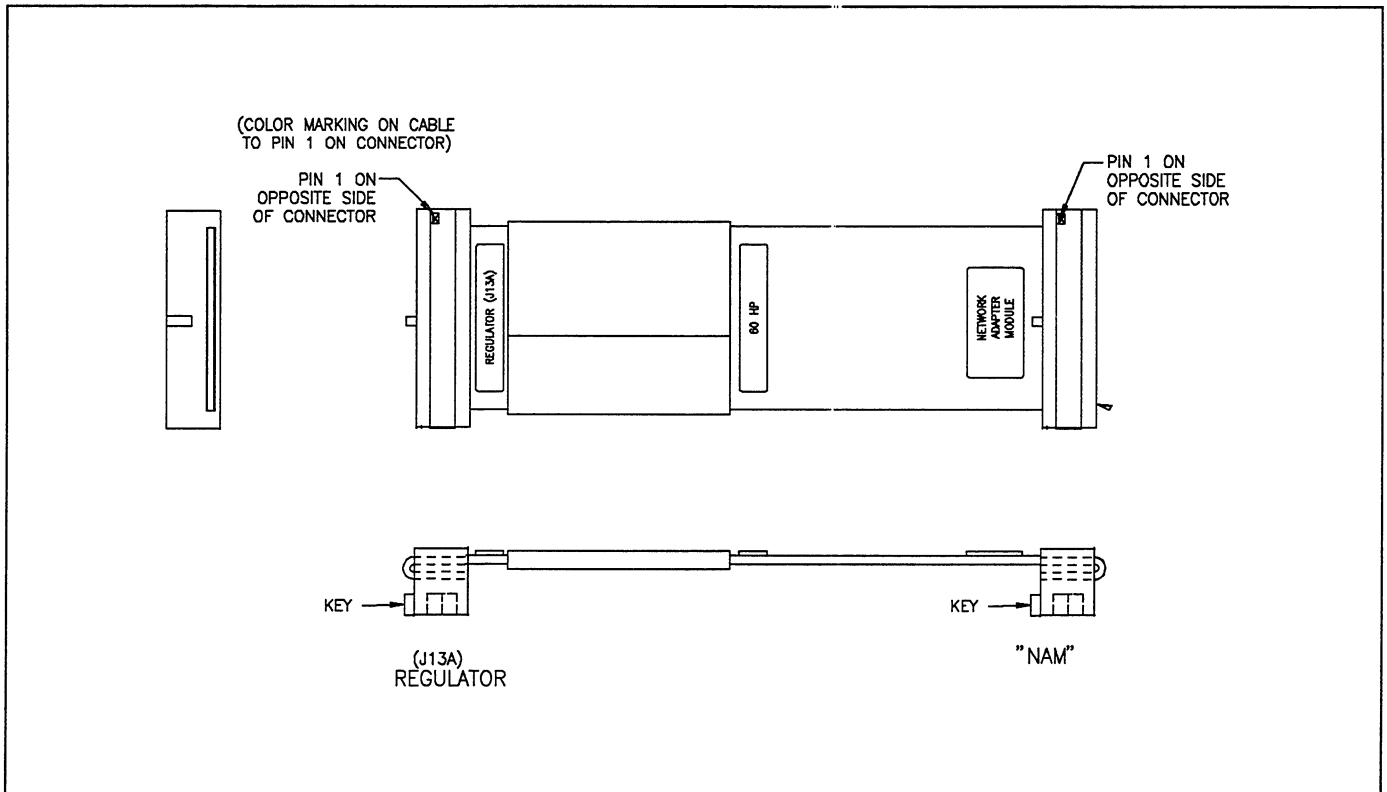
**Installing the Network Adapter Module 60-pin, Two-Connector Ribbon Cable (No Signal Interface Kit Installed)**

**DANGER**

**THIS EQUIPMENT IS AT LINE VOLTAGE WHEN A-C POWER IS CONNECTED. DISCONNECT AND LOCKOUT ALL UNGROUNDED CONDUCTORS OF THE A-C POWER LINE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

1. Remove the front cover of the MaxPak III Drive by lifting the cover up and off.

**Note:** Verify whether or not a Signal Interface Kit is installed. The Signal Interface card will reside on the MaxPak III behind the regulator on the back side of the carrier. (When the carrier is lifted forward). If there is a Signal Interface Kit, the three (3) connector cable will be used. Refer to 'Installing the Network Adapter Module 60-pin, Three-Connector Ribbon Cable (Signal Interface Kit Installed.)'



**Figure 3-2. Ribbon Cable, Two-Connector (Network Adapter Module to MaxPak III Regulator, J13A).**

**Note:** The ribbon cable connectors are keyed for fit to the microbus connectors. A colored stripe running the length of the cable will align with pin 1 of the microbus connectors. The cables will also have an overlap Kapton tape wrapping to prevent tearing of the ribbon cable. **DO NOT REMOVE.**

**CAUTION**

**Mating the ribbon cable connectors to the microbus connectors requires a hard insertion force. Be careful not to force the connectors or damage to the pins will result. Push the connector into the microbus slot until the clips snap into place. Failure to observe this precaution could result in damage to, or destruction of the equipment.**

2. Using the correct two connector cable, connect the connector end labeled "Network Adapter Module" to the connector labeled "Microbus" on the Network Adapter Module. Secure the connector locking clips.
3. Connect the opposite end of the cable with the connector labeled "Regulator (J13A)" to the Microbus connector on the MaxPak III regulator board. Secure the connector locking clips. The colored stripe on the cable should be on top meeting with Pin 1 on the Microbus connector.

# Installing the Network Adapter Module 60-pin, Three-Connector Ribbon Cable (Signal Interface Kit Installed)

## DANGER

**THIS EQUIPMENT IS AT LINE VOLTAGE WHEN A-C POWER IS CONNECTED. DISCONNECT AND LOCKOUT ALL UNGROUNDED CONDUCTORS OF THE A-C POWER LINE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

1. Remove the front cover of the MaxPak III Drive by lifting the cover up and off.

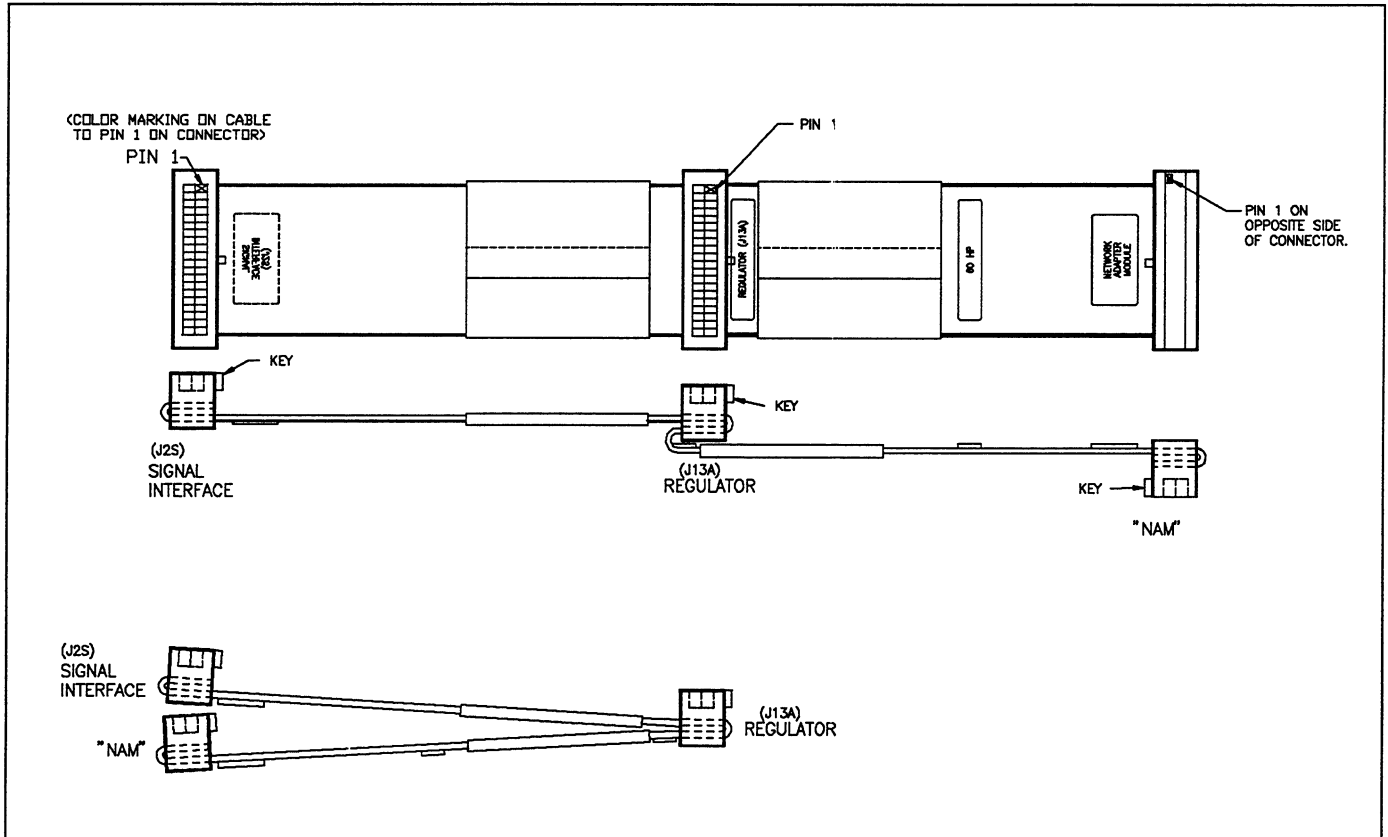
**Note:** The ribbon cable connectors are keyed for fit to the

microbus connectors. A colored stripe running the length of the cable will align with pin 1 of the microbus connectors. The cables will also have a protective overlap Kapton tape wrapping to prevent tearing of the ribbon cable. **DO NOT REMOVE.**

## CAUTION

**Mating the ribbon cable connectors to the microbus connectors requires a hard insertion force. Be careful not to force the connectors or damage to the pins will result. Push the connector into the microbus slot until the clips snap into place. Failure to observe this precaution could result in damage to, or destruction of the equipment.**

2. Remove the existing Signal Interface ribbon cable end connected to the microbus connector on the MaxPak III regulator board.
3. Lift the MaxPak III regulator carrier all the way forward.
4. Remove the existing Signal Interface connector end from the Signal Interface Board.
5. Using the correct three connector cable, insert the cable connector end labeled "Signal Interface (J2S)" through the slot on the right side of the regulator carrier. The microbus connector will show through the slot. At this point the ribbon cable colored stripe will be at the bottom.
6. Loop the cable up and over the Signal Interface Card and connect to the Microbus connector on the card. Secure connector locking clips.



**Figure 3-3. Ribbon Cable, Three-Connector (Network Adapter Module to MaxPak III Regulator, J13A, to Signal Interface, J2S).**

7. Close the carrier and secure into place. When the carrier is brought back up and closed, the colored stripe on the ribbon cable should now be at the top.
8. Connect the connector end of the cable labeled "Regulator (J13A)" to the microbus connector on the MaxPak III regulator board. Secure connector locking clips.
9. Connect the connector end of the cable labeled "Network Adapter Module" to the connector labeled "Microbus" on the Network Adapter Module. Secure connector locking clips.

## Connection to the AutoMax/DCS

Refer to Instruction Manual J2-3001 on how to install the Network Communications Module. This would include information such as mechanical/electrical description, hookup to the rack, cabling practices, cable system protection and isolation, cable type, and cable maintenance.

## Start-Up

### **DANGER**

**THE REMAINING STEPS ARE MADE WITH POWER ON. EXERCISE EXTREME CARE BECAUSE HAZARDOUS VOLTAGE EXISTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

Power up the Network Adapter Module and verify that the "POWER ON" LED on the Network Adapter Module illuminates. This will verify that the Network Adapter Module power supply is functioning. Refer to Instruction Manual J2-3001 for verification that the Network Communications Module is operating properly upon powerup.





# 4: Software Interface: AutoMax/DCS to MaxPak III

## DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL IT.

READ AND UNDERSTAND THIS MANUAL AND OTHER APPLICABLE MANUALS INCLUDING J2-3001 IN THEIR ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

## Introduction

**Note:** This section only provides the information necessary to configure the MaxPak III to act as a drop on the network.

The MaxPak III communicates with the Network Adapter Module allowing the MaxPak III to function as a drop on the AutoMax/DCS communications network.

The MaxPak III can communicate with other drops on the network by first defining the same registers in the same drop using one or more NETDEF statements in the Configuration file.

The network interface will support the following in the MaxPak III:

- All On-Line Integer and Boolean, Input and Output variables (variables with access levels of 0-2)

**Note:** All On-Line input variables can be written to the network without the drive's access level restrictions imposed. (For Example, the drive can be in access level 1, and a variable with access level of 2 can be written without error.

To configure the network interface, the user must perform the following:

1. Assign MaxPak III On-Line variables (access levels 0-2) to network registers via MaxPak III NETDEF statements.
2. Set the drop depth by assigning the variable NET\_DROP\_DEPTH%. (See "Setting NET\_DROP\_DEPTH%")
3. Download the configuration to the MaxPak III.

### MaxPak III Constraints When Using the Network Adapter Module

The constraints specific to the MaxPak III include:

1. The Network Adapter Module is not accessible when the MaxPak III is in an access level greater than 2 (SYS\_ONLINE@ = OFF). Therefore, the MaxPak III will appear as inactive (or not communicating with the Network) when in an access level greater than 2.
2. A maximum of 64 total NETDEF assignments can be made in the Configuration File. Each MaxPak III variable to be communicated requires one NETDEF statement.
3. The MaxPak III Error Log is not accessible over the network. The error log cannot be cleared or its contents read. The user must

access the error log when communications are not active with the network.

## NETDEF Statements

Drops communicate with one another by defining the same registers in the same drop using a NETDEF statement. The statement syntax for both NETDEF statements are identical with the exception of the definition of the slot number. Below is the statement syntax.

**The AutoMax/DCS NETDEF statement is as follows (refer to Instruction Manual J2-3001):**

NETDEF name [SLOT = w, DROP = x, REGISTER = y, {BIT = z}]

Where:

name = AutoMax/DCS variable name. Must conform to AutoMax/DCS system naming conventions.

SLOT = Multibus card slot containing local network card (0-15).

DROP = Drop number which originates register (0-55).

REGISTER = Register Number (0-63).

BIT = Optional field defining the bit position if the variable name type is boolean (@) (0-15).

**The MaxPak III NETDEF statement is as follows:**

NETDEF var\_name [SLOT = w, DROP = x, REGISTER = y, {BIT = z}]

**Note:** A space must follow 'NETDEF', and there must not be a space after 'var\_name'.

Where:

var\_name = MaxPak III variable name.

SLOT = Microbus slot containing the NETWORK Adapter Module (slot 2-6). See "Microbus Slot Number".

DROP = Drop number which originates register (0-55).

REGISTER = Register number (0-63).

BIT = Field defining the bit position if the variable name type is boolean (@) (0-15). Note: Bit designates a boolean variable, while an integer fills the whole 16 Bit register.

The NETDEF statement must be preceded by a line number, and can end with a Comment (!).

The AutoMax/DCS NETDEF statement **defines an AutoMax/DCS variable to a network register**, while the MaxPak III NETDEF statement **assigns a predefined MaxPak III variable to a network register**. The Microbus slot in the MaxPak III statement **is not the physical slot number of the card, but the slot number read by the microbus**. All MaxPak III NETDEF statements must specify the same slot number. See "Microbus Slot Number".

## MaxPak III to AutoMax/DCS Variable Mapping

MP3 NETDEF <u>Statements</u>	AutoMax/DCS NETDEF <u>Statements</u>
---------------------------------	--

Input Variables ---> Input Variables

Input Variables ---> Output  
Variables

Output Variables -> Output  
Variables

The following variable mapping is **not** allowed:

Output Variables -> Input Variables

Some restrictions in the NETDEF statement are as follows:

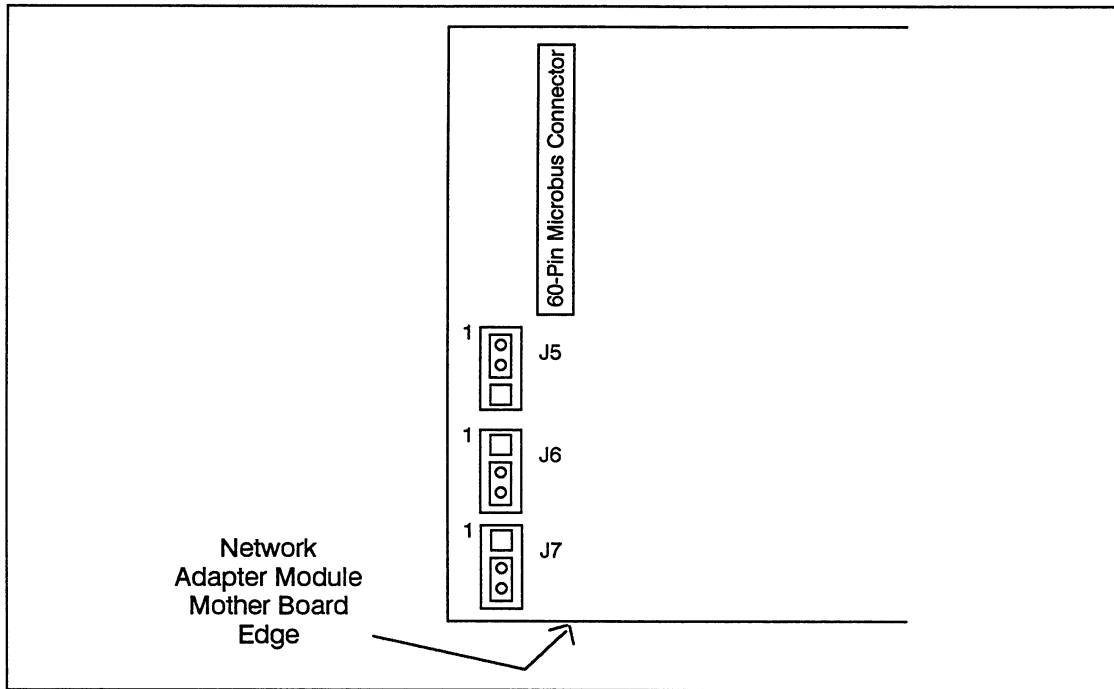
1. The number of NETDEF assignments per configuration is limited. The MaxPak III supports a maximum of 64 inputs and/or outputs in one configuration file.
2. Only on-line variables with access levels 0-2 (for tuning, running, or adjusting) can be NETDEF'd to network registers.
3. Output variables cannot be NETDEF'd to network input registers.
4. The variable SYS\_ACCESS\_KEY% is not allowed in a NETDEF statement.

## Microbus Slot Number

The microbus slot number (in the MaxPak III NETDEF statement) must be assigned correctly or system initialization (upon powerup or on transition to On-Line: SYS\_ONLINE@ = ON) will fail.

The microbus slot number is factory shipped with a default factory setting of "6". It is not recommended that this number be changed, however, the MaxPak III is configured to accept the Network Adapter Module as slot numbers 2 through 6. The slot number is assigned by jumper settings located on the Network Adapter Module motherboard. Each microbus peripheral in the MaxPak III is assigned a microbus slot number. The Network Adapter Module must be the last peripheral assigned a slot number on the microbus. (This is why the default factory setting is the highest slot number: 6.)

To verify assignment of the Network Adapter Module to Microbus Slot 6, (in the event jumpers were inadvertently changed) J5 must have a jumper connecting pins 1-2, J6 must have a jumper connecting pins 2-3, and J7 must have a jumper connecting pins 2-3 as shown in Figure 4-1. The Network Adapter Module must be disassembled to obtain access to the motherboard.



**Figure 4-1. Network Adapter Module Motherboard Microbus Slot Number Jumper Settings.**

**Note:** Pin 1 is the pin closet to the 60-pin microbus connector for each of the connectors, J5, J6 and J7.

## Setting Net\_Drop\_Depth%

A variable needs to be present in the MaxPak III configuration that defines the drop depth value. This variable is NET\_DROP\_DEPTH% = <drop depth value> .

This variable is defined as:

### NET\_DROP\_DEPTH%

Variable Description: Network Drop Depth.  
 Retentive: yes  
 Processed: yes  
 Access Level: 4  
 Source Configurable: no  
 Range: 0-55  
 Typical Value: 1 if Network Slave.

0 if a Network Master.

During the MaxPak III system initialization (Powerup), when this variable is greater than zero (0), the Drive is assumed to be a Network Slave. When this variable = 0, no action is taken, and assumed to be a Master. In order to process the net drop depth for the network slave, the configuration must contain a statement with the variable NET\_DROP\_DEPTH% set to a value greater than zero (0) to establish the Network Adapter Module as a network slave card.

A drop depth equal to 1 denotes a network slave card representing 1 slave drop on the AutoMax/DCS network. Multiple drop depths can also be assigned by setting this variable greater than 1.

If the Network Adapter Module is to be used as a slave, the drop depth

must be between 1 & 55 and be less than or equal to (55 - drop number + 1). The drop number is selected by the thumbwheel switches on the faceplate of the network card and is read only upon power-up of the Network Adapter Module.

## Multiple Drop Depth

The Network Adapter Module can represent consecutive drop numbers beginning with the drop setting (value of the thumbwheel switch). By assigning the NET\_DROP\_DEPTH% to a value of "n" (which must be greater than 1), the Network Adapter Module will perform the function of "n" drops, or "n" \* 32 registers are transmitted and received.

For example:

If NET\_DROP\_DEPTH% is:

Value	Drop Number	Network drops that the MaxPak III Represents
1	4	4
6	50	50,51,52,53,54,55
7	50	invalid drop depth

The drop depth must be configured correctly before the MaxPak III will become active on the network.

## Drive Fault Interlocks

### WARNING

**A DRIVE FAULT INTERLOCK MUST BE PROVIDED TO PREVENT MAXPAK III OPERATION IN THE EVENT THAT THE NETWORK SLAVE (MAXPAK III) STOPS COMMUNICATING WITH THE MASTER. A USER CONTROLLED FAULT CONTACT HAS BEEN PROVIDED FOR THIS PURPOSE (FLT\_EXT\_REQU1@ OR FLT\_EXT\_REQU2@). FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.**

To provide an interlock so that the MaxPak III stops and is inhibited from becoming active if communications stop with the Network Master, two user-controlled drive fault contacts are available. These fault contacts are a MaxPak III node such that it can be controlled from any variable and/or I/O point within the MaxPak III and will generate a drive fault condition when asserted.

These fault contacts are referred to as "External Fault Requests." Two sets of external fault requests are provided, each set consisting of a node (FLT\_EXT\_REQU1@ or

FLT\_EXT\_REQU2@) and a fault latch output variable (FLT\_EXT\_REQU1\_L@ or FLT\_EXT\_REQU2\_L@) which will be latched.

An external fault request must be NETDEF'd to the network status register (Register 4, Bit 0) of the Network Communications Module. An example is shown in "Programming Example" later in this section.

When the [FLT\_EXT\_REQU1@] node transitions from the OFF to the ON state, or if it is ON following a drive fault reset operation (FLT\_RESET@), the following will occur:

1. A communications fault is latched to FLT\_EXT\_REQU1\_L@.
2. An error message is logged to the system error log and is displayed to the Function Display on the MaxPak III.
3. If the MaxPak III armature is active (SEQ\_ARM\_ACTIVE@ = ON) then a drive fault stop sequence is initiated.

Once the external fault request latch is set = ON, a drive fault reset operation must be performed to clear the fault condition. (Set the variable FLT\_RESET @ = ON).

**Note:** When this type of interlock is applied to the network interface, the external fault will be latched each time the MaxPak III goes ONLINE (SYS\_ONLINE@ = ON). The network master program should monitor the MaxPak III external fault and reset accordingly.

These drive fault interlock variables are defined as follows:

### [FLT\_EXT\_REQU1@]

Description: External Fault Request Input One  
 Type: Input node  
 Retentive: No  
 Access Level: 0  
 Value Range: OFF or ON  
 Typical Value: OFF  
 Comments: When the node is ON, an external fault request is latched (FLT\_EXT\_REQU1\_L@ = ON). This node must be OFF in order to reset a latched external fault request.

### [FLT\_EXT\_REQU2@]

Description: External Fault Request Input Two  
 Type: Input node  
 Retentive: No  
 Access Level: 0  
 Value Range: OFF or ON  
 Typical Value: OFF  
 Comments: When the node is ON, an external fault request is latched (FLT\_EXT\_REQU2\_L@ = ON). This node must be OFF in order to reset a latched external fault request.

### FLT\_EXT\_REQU1\_L@

Description: External Fault Request Latch One  
 Type: Output variable  
 Retentive: No  
 Access Level: 0  
 Value Range: OFF or ON  
 Typical Value: OFF  
 Comments: Internal latch of an external fault

request condition. When this variable = ON, the output variable FLT\_DRIVE\_FAULT @ = ON, and inhibits drive operation. A drive fault reset must be performed to reset the variable and allow drive operation.

### FLT\_EXT\_REQU2\_L@

**Description:** External Fault Request Latch Two  
**Type:** Output variable  
**Retentive:** No  
**Access Level:** 0  
**Value Range:** OFF or ON  
**Typical Value:** OFF  
**Comments:** Internal latch of an external fault request condition. When this variable = ON, the output variable FLT\_DRIVE\_FAULT @ = ON, and inhibits drive operation. A drive fault reset must be performed to reset the variable and allow drive operation.

## Data Transfer

Each MaxPak III L2\_SCAN\_PERIOD%, all NETDEF'd variables are transferred to or from the AutoMax/DCS network. Values **received** from the network which exceed the variable's limits will cause one (1) error log entry for each L2\_SCAN\_PERIOD% that the limit is exceeded. The MaxPak III will clamp the variable value to a high or low limit internally, however, the value as seen by outside

references (via the function display, serial port channels, AutoMax/DCS) may appear as the original "exceeded" value. Because each L2\_SCAN\_PERIOD% the value is re-read from the network, attempts to modify an input variable from another source (function display, or serial port channels) will result as:

1. From the function display: The MaxPak III might briefly display the entered value, but immediately (at each L2\_SCAN\_PERIOD%) the value will be overwritten with the value from the network.
2. From the serial channel (e.g. terminal interface, enhanced monitor program, etc.): the value will "toggle" back and forth from the entered value to the network value. However, the network value will always be the real-time value used by the network.

### WARNING

**DO NOT SOURCE A VARIABLES' VALUE FROM MORE THAN ONE INPUT SOURCE (SUCH AS A NETDEF STATEMENT, MODBUS, OR FROM THE FUNCTION DISPLAY OR MONITOR PROGRAMMER). DOING SO CAN RESULT IN INADVERTANT MACHINE OPERATION. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.**

## Download

(Refer to the Instruction Manual provided with the drive for information on Downloading from the host PC.)

The configuration containing the NETDEF definition statements must be downloaded to the MaxPak III

from the host PC. The download program passes the configuration and checks the syntax of all statements prior to the actual download process.

In addition to checking the syntax, the download program also checks the following:

1. That all NETDEF parameters (i.e., Slot, Drop, Register, and Bit) are within valid ranges.
2. That all NETDEF statements involving boolean variables (ending with an "@") contain Bit assignments and that all NETDEF statements involving integer variables (ending with an "%") do not contain Bit assignments.
3. That all NETDEF statements contain the same SLOT assignment value.
4. That the number of NETDEF statements does not exceed the maximum of 64.

If any errors are discovered, no attempt is made to download the configuration file to the MaxPak III. Download will terminate if an error was found. If a download statement causes the MaxPak III to return an error, then an appropriate message will be displayed and a download error will be flagged. See "Download Errors", Appendix B, for a complete list of download errors.

After all discrepancies have been corrected in the configuration file, the actual download to the MaxPak III will begin.

During the download process, if NETDEF statements are found in the configuration file, the Download program reads the peripherals attached to the microbus. If the actual microbus slot containing the Network Adapter Module differs from the slot named in the NETDEF

statement, or if the peripheral was not found, a warning is flagged to the user. The configuration will be accepted and can be saved without the Network Adapter Module present.

**WARNING**

**WHEN DOWNLOADING A CONFIGURATION FILE CONTAINING NETDEF STATEMENTS, THE CONFIGURATION MUST INCLUDE ALL NEEDED NETDEF STATEMENTS. ANY PREVIOUS NETWORK DEFINITIONS IN THE DESTINATION MAXPAK III WILL BE ERASED PRIOR TO DOWNLOADING THE NEW ONES. THE NETWORK COULD STILL BE ACTIVE AND POSSIBLY CONTROL THE MAXPAK III. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.**

The download program does not check the drop depth value. This value cannot be checked by the host initiating the download because the drop number is not known during the download. While the MaxPak III is Off-Line (SYS\_ONLINE@ = OFF), which is required to Download, the microbus peripherals cannot be accessed and, therefore, the network drop number (thumbwheel switch setting on the Network Communications Module) cannot be read.

## System Initialization

After a successful download, the new configuration should be saved to nonvolatile memory as prompted in the Download program. A transition to On-Line (or when power is cycled) causes the MaxPak III to start the network interface based on the present configuration in nonvolatile memory.

The MaxPak III performs a drop depth initialization, and verifies that the slot number specified in the NETDEF statements is the same as the microbus slot containing the Network Adapter Module. (Note that the drop depth value must be greater than zero for the system to initialize.)

Upon transition from Off-Line to On-Line (or when power is cycled), the function display on the MaxPak III will blink a message "MPDx" (where x is the slot number of the microbus peripheral, such as the Network Adapter Module), performs the peripheral diagnostics, and then displays the "Welcome to the MaxPak III....." message.

When the MaxPak III is Off-Line, (can be checked by looking at variable SYS\_ONLINE@ = OFF), the microbus is not accessible, and the drive will appear as inactive and not communicating on the network. Communications on the network occur only when the drive is On-Line (SYS\_ONLINE@ = ON).

## Initialization Errors

If an error is encountered during initialization, the error is logged and a message is displayed on the function display on the MaxPak III. Any initialization error will cause system initialization to fail (SYS\_INIT\_FAIL\_E@ = ON) and inhibits the drive from operating. Refer to Appendix C if any Initialization errors occur.

## Programming Example

The following example configuration involves a AutoMax/DCS network master producing the MaxPak III speed reference. This example also shows how the drive external fault contact interlock is used to poll the status register, and therefore, inhibit the drive from becoming or remaining active in the event of a communications failure.

In this example, the AutoMax/DCS is the MASTER and the MaxPak III is the SLAVE, drop number 1. (The thumbwheel switch on the Network Communications Module is set to '01'.) The drop depth (NET\_DROP\_DEPTH%) is also set to 1. The master network card is located in slot 4 of the AutoMax/DCS rack and the Network Adapter Module is in microbus slot 6.

### AUTOMAX/DCS PROGRAM

```

999      ! The master monitors the status of slave drop 1 via NETOK@.
1000    NETDEF NETW_OK@[SLOT=4, DROP=00, REGISTER=04, BIT=01]
1010    ! Note: A boolean variable must designate a bit value.
1020    ! Drop = 0, indicates the master.
1030    !
1100    NETDEF MP3_L2_REFA@[SLOT=4, DROP=01, REGISTER=32]

```

### MAXPAK III CONFIGURATION

```
500 NET_DROP_DEPTH% = 1!NETWORK card represents 1 drop only.
995 !
996 ! When the Network Slave is NOT active (REG 4, BIT 0 = OFF) then the MaxPak
997 ! III armature is inhibited from becoming active.
998 !
1000 [FLT_EXT_REQU1@] = -FLT_EXT_REQU1@ !Note inverted sense.
1100 NETDEF FLT_EXT_REQU1@[SLOT=6, DROP=00, REGISTER=04, BIT=00]
1200 NETDEF L2_REFA@[SLOT=6, DROP=01, REGISTER=32]
```





# 5: Troubleshooting

This troubleshooting section only applies to isolating problems with the Network Adapter Module. Problems may occur with the MaxPak III, and in that case refer to the Instruction Manual provided with the drive.

## DANGER

**ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD SERVICE IT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

## Test Equipment Needed

Analog or Digital Volt-Ohmmeter for voltage measurements

## Circuit Description

The Network Adapter Module has a +5V Power Supply. The power supply is powered from a customer supplied 115VAC line. The Power Supply assembly is connected to a motherboard at connector J8 and provides the D-C power to the board and the Network Communications Module (0-57404-2). A cooling fan is located at the top of the assembly. A 3A, 250V fuse is located on the top of the Network Adapter Module above the Network Communications Module plug-in card. A line filter is wired into the line. The Network Communications Module is plugged into the Motherboard which resides on the backplane of the Network Adapter Module. A test point LED board is provided to verify voltages. A test point voltage cable connects the Test Point LED board to connector J4 on the Motherboard. The microbus ribbon cable provides the Motherboard interface to the MaxPak III.

## Troubleshooting the Network Communications Module (0-57404-2)

### DANGER

**THE REMAINING STEPS ARE MADE WITH POWER ON. EXERCISE EXTREME CARE BECAUSE HAZARDOUS VOLTAGE EXISTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

If any problems occur with the Network Communications Module, refer to Instruction Manual J2-3001. Problems such as an "OK" light not operating, error codes appearing at startup, communication line failure to the AutoMax/DCS, bus errors, or interrupt allocation errors, are covered in that manual.

Refer to Figure 5-1 for an Electrical Diagram of the Network Adapter Module and interface to the MaxPak III.

## Troubleshooting Procedure for the Network Adapter Module

Symptom	Cause	Actions
<b>“POWER ON” LED for Network Adapter Module will not illuminate</b>	<ol style="list-style-type: none"> <li>1. Fuse</li> <li>2. Incoming Line Voltage</li> <li>3. Wiring</li> <li>4. Bad Power Supply</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace Fuse.</li> <li>2. Check for 115 VAC + 10% -13%. (The frequency range should be between 47-63 Hz.)</li> <li>3. Check connections at: <ul style="list-style-type: none"> <li>- 115V and Neutral</li> <li>- J8 connector (D-C Power)</li> <li>- Leads to transformer on power supply.</li> </ul> </li> <li>4. <ol style="list-style-type: none"> <li>a. Check for proper voltages at the Test Point LED Board at: <ul style="list-style-type: none"> <li>- XTP1 - +5V, <math>\pm</math>.05</li> <li>- XTP2 - +12V, <math>\pm</math>5%</li> <li>- XTP3 - -12V, <math>\pm</math>5%</li> </ul> </li> <li>b. Replace Power Supply Assembly.</li> </ol> </li> </ol>
<b>Fan Will Not Rotate</b>	<ol style="list-style-type: none"> <li>1. No Power to the Network Adapter Module</li> <li>2. Improper or Bad wiring</li> <li>3. Mechanical binding of fan</li> <li>4. Fan Assembly is bad.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that “POWER ON” LED illuminates and verify that 115VAC incoming power is present.</li> <li>2. Check incoming wiring to fan and from line filter.</li> <li>3. Remove Power and check that fan can be rotated by hand.</li> <li>4. Replace Fan Assembly.</li> </ol>
<b>The MaxPak III will not Communicate with the Network Adapter Module, but the “POWER ON” LED Illuminates</b>	<ol style="list-style-type: none"> <li>1. Possibly a Network Communications Module problem.</li> <li>2. The MaxPak III is Off-Line.</li> <li>3. Possible bad ribbon cables and/or connectors.</li> <li>4. The Network Communications Module is not firmly seated at connectors J1 and J2.</li> <li>5. The microbus slot number is incorrect or is not uniform between statements.</li> <li>6. Bad Motherboard.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify that the Network Communications Module is functioning properly. See I/M J2-3001.</li> <li>2. Verify that the MaxPak III is “On-Line”, Access levels 0, 1, or 2. (SYS_ONLINE@ = ON).</li> <li>3. Check connections of the ribbon cables at: <ol style="list-style-type: none"> <li>a. J3 on the motherboard and at the microbus connector on the Network Adapter Module.</li> <li>b. At the microbus connector on the Network Adapter Module to J13A on the regulator board and to J2S on the Signal Interface Kit, if installed.</li> </ol> </li> <li>4. Check that the module is firmly seated from plugs P1 and P2 to J1 and J2 on the motherboard.</li> <li>5. Verify that the microbus slot number used in the NETDEF statements is as installed in the microbus and are uniform throughout all statements. Verify that jumpers on the motherboard are correct. See “Microbus Slot Numbers”.</li> <li>6. Replace the Motherboard.</li> </ol>

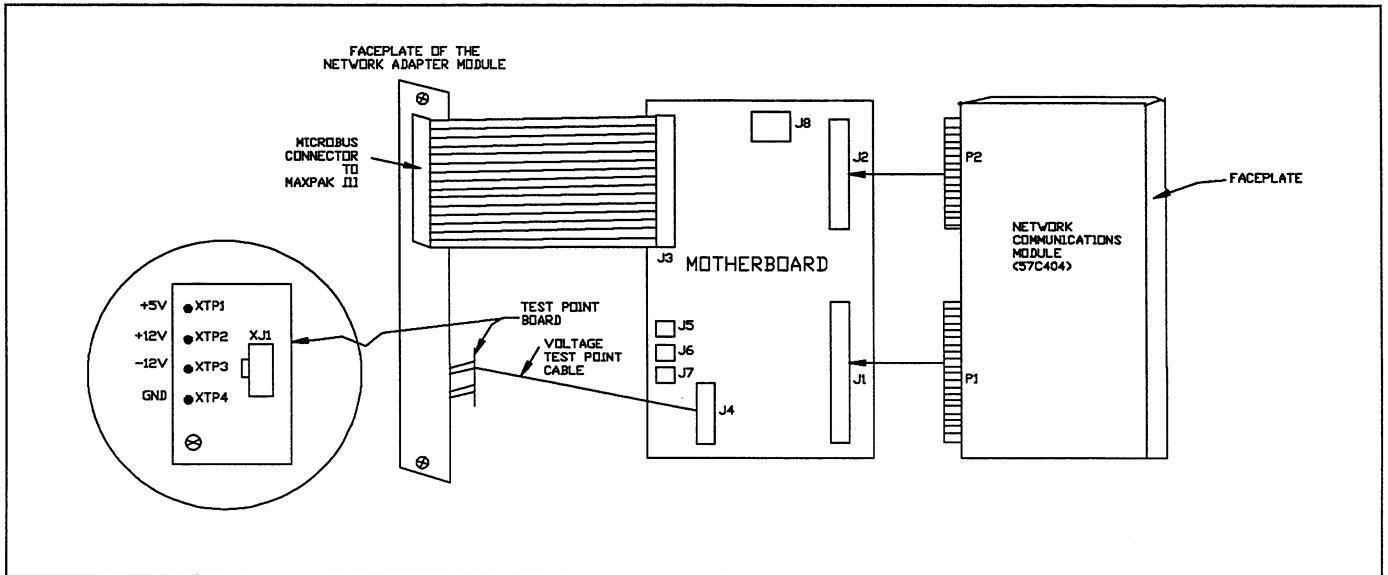


Figure 5-1. Electrical Diagram.



## 6: Replacement Parts

PART NUMBER	QTY	DESCRIPTION
0-58711	1	Motherboard
0-57404-2	1	Network Communications Module
0-58714	1	LED/Test Point PC Board
610266-79R	1	Wire Harness
802266-55R	1	Ribbon Cable
802266-59R	1	Power Supply Assy.
64676-21AD	1	Fuse 3A/250V
610266-80R	1	Wire Harness
612421-B	1	Filter (6A)
69739-27X	1	Fan
608811-37RT	1	A-C Plug Cord



# Appendix A: Verify Errors and Actions

Verify errors will occur before download errors and check that the syntax of the MaxPak III NETDEF statements are correct. These errors will appear on the PC host screen, and are logged into the log file (which the user is prompted to create before executing a download).

<b>Error #</b>	<b>Error</b>	<b>Description</b>
217	<b>SLOT KEYWORD EXPECTED:</b> Action:	The SLOT keyword was expected next in the NETDEF statement. Correct syntax error.
218	<b>SLOT VALUE EXPECTED (1 - 6):</b> Action:	The Slot value was expected as a decimal number between 1 and 6 inclusive. Correct syntax error.
219	<b>DROP KEYWORD EXPECTED:</b> Action:	The DROP keyword was expected next in the NETDEF statement. Correct the syntax error.
220	<b>DROP VALUE EXPECTED (0 - 55):</b> Action:	The drop value was expected as a decimal number between 0 and 55 inclusive. Correct syntax error.
221	<b>REGISTER KEYWORD EXPECTED:</b> Action:	The REGISTER keyword was expected next in the NETDEF statement. Correct syntax error.
222	<b>REGISTER VALUE EXPECTED (0 - 63):</b> Action:	The Register value was expected as a decimal number between 0 and 63 inclusive. Correct syntax error.
223	<b>BIT KEYWORD EXPECTED:</b> Action:	The BIT keyword was expected next in the NETDEF Statement. Correct syntax error.
224	<b>BIT VALUE EXPECTED (0 - 15):</b> Action:	The Bit value was expected as a decimal number between 0 and 15 inclusive. Correct syntax error.
225	<b>MICROBUS SLOT MISMATCH:</b> Action:	The Slot value of this NETDEF statement is not the same as the Slot values of all preceding statements. Make all Slot numbers in all NETDEF statements identical.
226	<b>EXCEEDED MAXIMUM MULTIBUS DEFINITIONS (64):</b> Action:	The maximum number of NETDEF statements (64) has been exceeded. Eliminate all but 64 NETDEF statements.

<b>Error #</b>	<b>Error</b>	<b>Description</b>
<b>227</b>	<b>DUPLICATE MULTIBUS ASSIGNMENT:</b>	This NETDEF statement is identical to a preceding statement. Action: NON FATAL – remove duplicate statement if desired.
<b>228</b>	<b>VARIABLE HAS BEEN ASSIGNED TO MORE THAN 1 MULTIBUS REGISTER:</b>	This NETDEF statement contains a variable which has been NETDEF'd to a different Drop and Register in a previous NETDEF statement. Action: NON FATAL – check that statement is as intended.
<b>229</b>	<b>MULTIBUS REGISTER HAS BEEN ASSIGNED TO MORE THAN 1 VARIABLE:</b>	This NETDEF statement contains a Drop and Register which have been NETDEF'd to a different variable in a previous NETDEF statement. Action: NON FATAL – check that statement is as intended.
<b>230</b>	<b>MULTIBUS REGISTER WAS PREVIOUSLY ASSIGNED TO A BOOLEAN VARIABLE:</b>	This NETDEF statement maps an integer variable to a network register which has been NETDEF'd to a boolean variable in a previous NETDEF statement. Action: NON FATAL – Check that statement is as intended.
<b>231</b>	<b>MULTIBUS REGISTER WAS PREVIOUSLY ASSIGNED TO AN INTEGER VARIABLE:</b>	This NETDEF statement maps a boolean variable to a network register which has been NETDEF'd to an integer variable in a previous NETDEF statement. Action: NON FATAL – check that statement is as intended.
<b>232</b>	<b>VARIABLE IS ILLEGAL FOR THIS STATEMENT TYPE:</b>	The variable assigned in this NETDEF statement is prohibited in NETDEF statements. Action: Remove this NETDEF statement.



# Appendix B: Download Errors And Actions

Download errors are errors discovered during the process of downloading the configuration file containing NETDEF statements. These errors are displayed to the PC host screen and are logged in the log file (which the user is prompted to create before downloading). If the error pertains to a single line entry, then this line (consisting of the line number, and NETDEF statement) is displayed along with the error message. If the error cannot be attributed to one line specifically, the error is displayed alone.

**Note:** "Check Communications" can be any one of the following problems:

1. Serial Link problems.
2. Improper or damaged cabling.
3. Bad or loose connectors.
4. Possibly noise interference.

<b>Error #</b>	<b>Error</b>	<b>Description</b>
<b>60</b>	<b>*MP3 HAS NOT BEEN OPENED FOR MULTIBUS ASSIGNMENTS:</b>	
	Action:	The init Multibus message was not received by the MaxPak III. Check communications.
<b>61</b>	<b>*MP3 HAS NOT RECEIVED MULTIBUS INIT COMMAND:</b>	
	Action:	The download open message was not received by the MaxPak III. Check communications.
<b>62</b>	<b>*MP3 HAS ALREADY RECEIVED MULTIBUS INIT COMMAND:</b>	
	Action:	The init Multibus message was already received by the MaxPak III. Check communications.
<b>63</b>	<b>*MULTIBUS – BAD SLOT NUMBER:</b>	The Slot number contained in the init multibus message was not within the valid range of 1–6 inclusive.
	Action:	Check communications.
<b>64</b>	<b>MULTIBUS – NETDEF SLOT DOES NOT MATCH EXISTING SLOT &lt; existing slot &gt; :</b>	
	Action:	The existing microbus slot (the microbus slot found to contain the multibus I/F peripheral) does not match the NETDEF'd slot. NON FATAL – check that the slot is as intended and verify the microbus peripheral is in the correct microbus slot by verifying the jumper settings on the motherboard. (See "Microbus Slot Numbers".)

\* These errors should not normally occur.

<b>Error #</b>	<b>Error</b>	<b>Description</b>
65	<b>MULTIBUS – MULTIBUS INTERFACE PERIPHERAL NOT FOUND BY MAXPAK III:</b>	The multibus I/F peripheral was not found in a microbus slot. Action: NON FATAL – check that the slot is as intended and verify that the microbus peripheral is in the correct microbus slot by verifying the jumper settings on the motherboard. (See “Microbus Slot Numbers.)
67	<b>*MULTIBUS – TOO MANY ASSIGNMENTS PER MESSAGE:</b>	The number of assignments contained in the multibus message was not within the valid range of 0–5 inclusive. Action: Check communications.
69	<b>*BAD MULTIBUS COMMAND:</b>	An invalid multibus message command was received. Action: Check communications.
70	<b>*MULTIBUS – MAXIMUM ASSIGNMENT COUNT EXCEEDED:</b>	The total number of multibus assignments received by the MaxPak III has exceeded the limit defined by the MaxPak III. Action: Check communications.
71	<b>*MULTIBUS – BAD VARIABLE NAME:</b>	The variable NETDEF'd does not conform to valid naming conventions. Action: Check communications.
72	<b>MULTIBUS – VARIABLE NOT FOUND:</b>	The variable NETDEF'd does not exist in the MaxPak III. Action: Modify variable name to an existing name.
73	<b>MULTIBUS – OFFLINE VARIABLE RECEIVED:</b>	The variable NETDEF'd is an Off-Line variable. Action: Remove this NETDEF statement.
74	<b>*MULTIBUS – BAD BIT NUMBER:</b>	The Bit number contained in the multibus message was not within the valid range of 0 – 15 inclusive. Action: Check communications.
75	<b>*MULTIBUS – BAD REGISTER NUMBER:</b>	The Register number contained in the multibus message was an odd number. Action: Check communications.

**\* These errors should not normally occur.**

# Appendix C: Network Adapter Module Peripheral Error Codes and Actions

These errors are initialization errors. Following a successful download, these errors are detected when the drive attempts to come ONLINE (either from an OFFLINE state or on initial power up).

**DANGER**

**A HAZARD OF ELECTRICAL SHOCK EXISTS. SOME OF THE PROCEDURES BELOW REQUIRE SERVICE TO THE EQUIPMENT WHEN IT IS ENERGIZED. ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE EQUIPMENT AND ITS HAZARDS SHOULD PERFORM THESE PROCEDURES. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.**

Code/Message	Type	SPECIFIC	Cause	Action
'MLBS ACCESS'	2	MLBS register offset	C-1	A-1
'MLBS CONFIG'	2	MLBS count	C-2	A-2
'MLBS IF RAIL'	2	MLBS bank #	C-3	A-3
'MLBS REG RD'	2	MLBS register offset	C-4	A-4
'MLBS SLOT'	2	slot # MLBS periph found in	C-5	A-5
'NET ACCESS'	2	multibus offset	C-6	A-6
'NET CD FAIL'	2	Drop depth value	C-7	A-7
'NET DRP DPTH'	2	Drop number	C-8	A-8

**Causes:**

- C-1 The downloaded configuration file contained a register that was NETDEF'd which could not be read from or written to.
- C-2 The configuration restored from non-volatile memory (either from a MEM\_RESTORE@ or on in initial power up) contained invalid multibus configuration data.
- C-3 The Network Adapter Module peripheral could not be read from or written to. The connecting ribbon cable may not be properly seated or it may be damaged.
- C-4 A MaxPak III output variable was assigned to a network input register.
- C-5 The slot specified by the NETDEF statement is different than the Microbus slot containing the Network Adapter Module peripheral.
- C-6 A NETDEF'd Multibus register was not found to be writable or readable.
- C-7 The drop depth register did not respond during drop depth processing.
- C-8 Network Card drop depth register error bit was found set during drop depth processing or a non-zero drop depth was set for a master (thumbwheel switches = 0).

**Actions:**

A-1

1. Check that the Network card has been properly inserted in the Network Adaptor Module.
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-2 Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-3

1. Check that the Network Adapter Module peripheral has been correctly attached to the MaxPak III.
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-4

1. Check the NETDEF statements in the configuration. Check to make sure an output variable is not assigned to an input register.
2. Check that the Network card has been properly inserted in the Network Adaptor Module.
3. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-5

1. Check that the Microbus slot containing the Network Adapter Module peripheral matches the NETDEF'd slot in the configuration.
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-6

1. Check that the Network card has been properly inserted in the Network Adaptor Module
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-7

1. Check that the Network card had been properly inserted in the Network Adaptor Module.
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

A-8

1. Cross check the drop number (on Network card thumbwheel switches) and the value of NET\_DROP\_DEPTH%.
2. Download a configuration file with one or more NETDEF statements to the MaxPak III.

# Appendix D: Glossary Of Terms

**download** – process of sending the information of the MaxPak III configuration file from the host PC to the drive's retentive memory.

**drop depth** – specifies number of drops that the network slave card represents on the network. Specified by the variable NET\_DROP\_DEPTH%.

**drop** – any rack (or MaxPak III) containing a Network Communications Module.

**external fault request** – fault contact variables (in the form of nodes) to provide a drive fault interlock.

**master** – initiates and controls all transmissions on the network (drop number 0).

**microbus** – parallel microprocessor bus with ribbon cable hardware and connectors.

**multibus** – parallel microprocessor bus.

**NETDEF statement** – MaxPak III configuration statement that assigns Drive variables to a network drop and register.

**network interface** – Communications via NETDEF statements (register to register) from the MaxPak III (or any drop) to the Master.

**Network Communications Module** – card that provides the capability to transmit control and status data between two or more racks to create a distributed control system.

**slave** – any drop that is not the master (drop numbers 1–55).

**slot** – the physical rack location in the AutoMax/DCS system, or the location along the microbus for the MaxPak III.

**syntax** – software statement definition; order of precedence, spacing, etc.

**thumbwheel switch** – rotating switch located on the Network Communications Module faceplate to set the drop number.



# Index

ambient temperature 1:2  
cable installation 3:2  
connector 2:3  
controls 2:3  
data transfer 4:5  
diagnostics, microbus  
  peripheral 4:6  
diagram, electrical 5:3  
diagram, system block 1:2  
documentation 1:2  
download 4:5  
download errors 4:5  
drop 1:2  
drop depth 4:3,4:6  
equipment return authorization  
  (ERA) 1:1  
error log 4:1  
errors, download 4:5,8:1  
errors, initialization 4:6,C:1  
errors, verify A:1  
external fault request 4:4,4:6  
fault interlocks 4:4  
humidity range 1:2  
indicators 2:3  
initialization, network 4:6  
installation 3:1,3:2  
jumper settings 4:2  
location 3:1  
L2\_SCAN\_PERIOD% 4:5  
master 1:2  
microbus slot 4:2,4:5  
model numbers 2:2  
modifying variables 4:5  
motherboard 4:2,4:3  
mounting dimensions 3:2  
multiple drop depths 4:3  
NET\_DROP\_DEPTH% 4:3  
NETDEF statements 4:1  
NETDEF statement restrictions 4:2  
network communications  
  module 2:3  
network connections 3:5  
parts, replacement 6:1  
power input 2:3  
powerup 3:5,4:3  
program, AutoMax/DCS 4:6  
program, MaxPak III 4:6  
programming constraints 4:1,4:5  
programming example 4:6  
ribbon cable 2:2  
service offices 1:2  
slot number 4:2,4:6  
specifications 2:3  
statement syntax 4:1,4:5  
storage 1:2  
thumbwheel switch 2:3,4:3  
troubleshooting 5:1  
variable limits 4:5  
variable mapping 4:2









# D-C DRIVES TRAINING AND AUDIO/VISUAL PRODUCTS

Reliance Electric offers a wide variety of Industrial Training courses for electricians, electronic technicians and engineers who are responsible for the installation, repair and maintenance of production equipment and systems.

Professional quality A/V Programs are also available. These programs have been designed to provide years of efficient in-house training. Available for playback at the user's convenience, these videotape programs allow individual or groups to learn or review subjects at any time.

Printed reference materials come with all diagnostic and troubleshooting programs.

## Training Courses

No.	Title
<b>D-C DRIVE COURSES</b>	
1-1	Principles of Industrial Electricity and Electronics
1-2	Maintenance and Troubleshooting of Standard D-C Drives
1-3	Maintenance and Troubleshooting of Engineered D-C Drives and Systems
1-4	D-C Drives Hands-On Troubleshooting Lab
1-6	Maintenance and Troubleshooting of MinPak™ and FlexPak® Style D-C Drives
1-11	Maintenance and Troubleshooting of MaxPak® Plus Drives
1-14	Maintenance and Troubleshooting of Maxline® and MaxPak® Plus Spindle Drives
1-15	Regional Class - Maintenance and Troubleshooting of D-C Drives and Systems
1-16	Maintenance and Troubleshooting of MaxPak III Drives
1-17	Application Configuration of MaxPak III Software
4-15	Regional Class - Productive Maintenance Training

## Audio/Visual Products

Order No.	Title	Format	Price
<b>D-C DRIVES PROGRAMS</b>			
TM2107	Troubleshooting 3-Phase, Full Wave, Half Control Power Modules using the Oscilloscope	35mm Slides/ Audiotape	<b>\$325</b>
TM2185	Introduction to the MaxPak Plus Drive	Videotape	<b>725</b>
TM2186	Troubleshooting the MaxPak Plus S-6 Power Module	Videotape	<b>995</b>
TM2200	Troubleshooting the S-6 Power Module	Videotape	<b>725</b>
TM2201	Troubleshooting the MaxLine® S-3R Power Module	Videotape	<b>425</b>
TM2202	Concepts of Regulation	Videotape	<b>725</b>
TM2203	Troubleshooting the MaxLine S-6 Regulator	Videotape	<b>725</b>
TM2239	Troubleshooting the S-6R Power Module	Videotape	<b>725</b>
TM2243	Principles of Field Weakened Motor Speed Control	Videotape	<b>725</b>
TM2276	D-C Machine Theory	Videotape	<b>725</b>
<b>NEW VIDEO TRAINING PROGRAMS</b>			
VMBA001	Fundamentals of A-C Motors	Videotape	<b>\$495</b>
VMBV001	Concepts of Digital Controls	Videotape	<b>495</b>
VVVS001	GP2000 Video Training	Videotape	<b>495</b>
VVVS002	HR2000 Video Training	Videotape	<b>495</b>



**For details and prices on these courses, audio/visual products and FREE Training Schedule Brochure, HD-405 contact:**

Industrial Training Department  
Reliance Electric  
35000 Curtis Boulevard  
Eastlake, Ohio 44095

**Call Toll Free:**

**800-RELIANCE  
(800-735-4262)**

Data or Prices subject to change without notice.







**U.S. Drives Technical Support**

Tel: (1) 262.512.8176, Fax: (1) 262.512.2222, Email: [support@drives.ra.rockwell.com](mailto:support@drives.ra.rockwell.com), Online: [www.ab.com/support/abdrives](http://www.ab.com/support/abdrives)

Trademarks not belonging to Rockwell Automation are property of their respective companies.

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

---

**Power, Control and Information Solutions Headquarters**

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846