

1395 Node Adapter Board Troubleshooting

Specifications

Electrical:

Board power provided by Drive (+5V)
Discrete Input 24V DC or 115V AC, jumper selectable

Environmental:

Ambient Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-40° to +85°C (-40° to +185°F)
Relative Humidity	5% to 95% non-condensing
Altitude:	3,300 feet (1,000 Meters)
Firmware Version	3.xx

Communications:

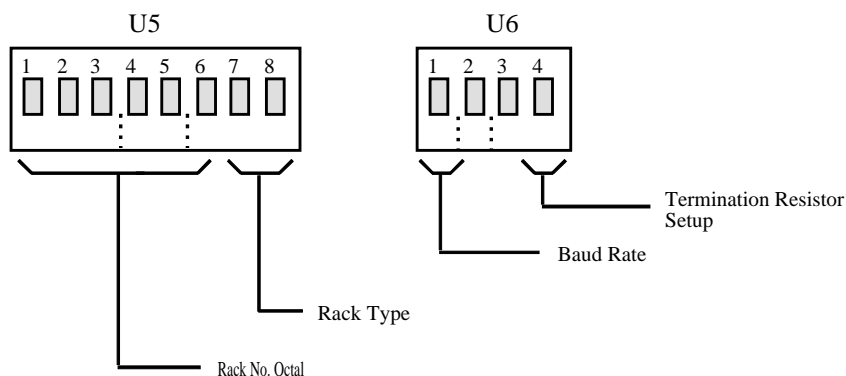
Allen-Bradley Remote I/O (RIO)
Baud Rates: 57.5 KB/ 115 KB
Rack Configurations: 1/2 to Full

This is not intended to be an all encompassing technical description of each hardware component. This document provides information to aid service personnel in:

- Identifying the Node Adapter board.
- Understanding the hardware content of the board.
- Understanding the hardware requirements necessary to interface the Node Adapter board with external devices.

General Board Description

The Node Adapter Board (Fig. 1.3) contains a smaller surface mounted board. This smaller board contains the hardware which performs the Node Adapter functions related to communication with a PLC Controller and allows for discrete type PLC Controller I/O and block transfer. Additional hardware on the board allows selection of the baud rate, the rack number and also provide an interface to the Bulletin 1395 Main Control Board. DIP switches U5 and U6 on the Node Adapter are used to select communication type, baud rate, and rack address in octal.



Switches SW1 through SW5 on U5 determine the rack address in Octal, while switches SW7 and SW8 determine the rack type. Switch SW1 on U6 determines the baud rate of the communication between the PLC Controller and the Node Adapter Board. Switch SW4 on U6 determines whether a terminating resistor is used. Switches SW2 and SW3 are not used. Refer to the Installation for switch settings.

Board Configuration

The Node Adapter Board causes the Bulletin 1395 Drive to appear as a remote I/O rack to the PLC Controller. Data transfer between the PLC Controller and Drive (at the PLC level) is the same as if the PLC Controller were transferring data to a remote I/O rack. The rack structure consists of two specific types : full or half rack. A full rack is defined as an 8 group rack, while a half rack is defined as a 4 group rack. Each group, whether in a full or half rack configuration contains 16 input and 16 output bits, which are mapped directly into the PLC Controller I/O image table. Refer to Figures 1.1 and 1.2 for further information on the full and half rack configurations.

Figure 1.1 Full Rack Configuration

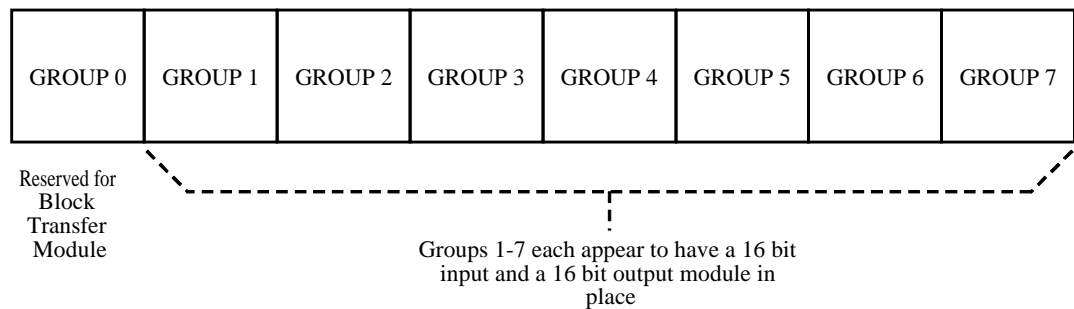
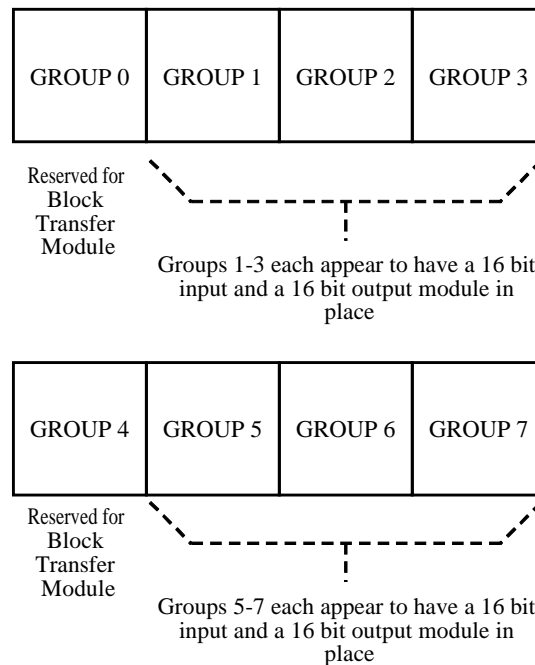


Figure 1.2 Half Rack Configuration



LED Indicators

The Node Adapter board contains two LED indicators. The red Processor Fault LED will illuminate only when a processor malfunction on the Node Adapter Board has occurred. The green "OK" LED indicates the communication status between the Node Adapter Board and the PLC Controller, (Refer to Table 1.A).

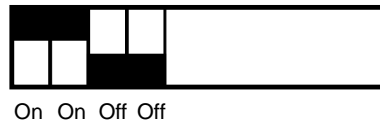
Table 1.A

LED	State	Function
OK	LED Green	Normal PLC Communications
	LED Off	No communication to PLC Controller
	LED Blinking Green	PLC is in Reset/Program/Test Mode

DIP Switch Orientation DIP Switch orientation (Figure 1.3) on the Node Adapter board is as follows:

CLOSED = "ON" = "1"
 OPEN = "OFF" = "0"

Figure 1.3 DIP Switch Orientation



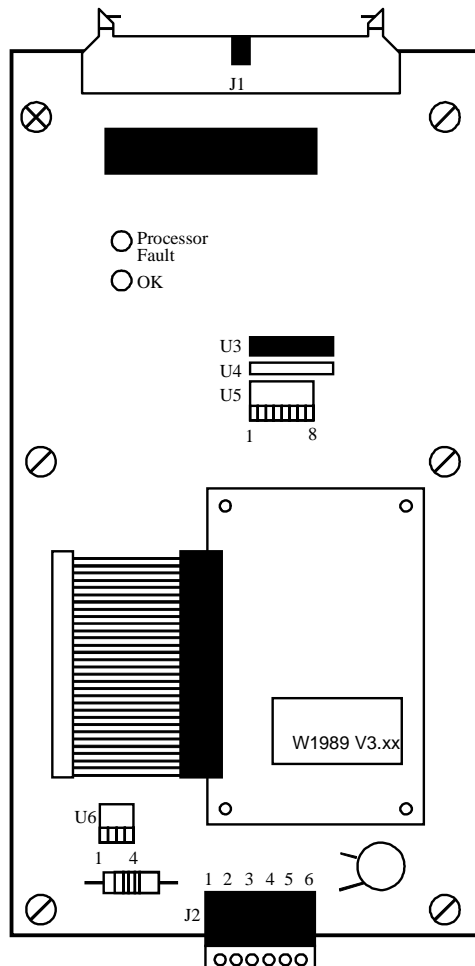
Firmware Location

The Node Adapter Board contains firmware version 3.xx (the "xx" designator may vary but does not effect information in this document). Figure 1.4 shows the physical location of the firmware chip on the small surface mount board.

Board Location

The standard mounting position for the Node Adapter board is Port B of the Drive (Right Hand). If required, the Adapter can be mounted in Port A. Note that each port uses different parameters to store Adapter setup and configuration information.

Figure 1.4 Node Adapter Board Components



General Precautions

In addition to the precautions listed throughout this manual, the following statements which are general to the system must be read and understood.



ATTENTION: This drive may contain ESD (Electrostatic sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, *Guarding Against Electrostatic Damage or any other applicable ESD Protection Handbook.*



ATTENTION: Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Hazardous voltages may exist in the cabinet even with the circuit breaker in the off position. Recommended practice is to disconnect and lock out control equipment from power sources and discharge stored energy in capacitors, if present. If it is necessary to work in the vicinity of energized equipment, the safety related work practices of NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*, must be followed. **DO NOT** work alone on energized equipment!



ATTENTION: Potentially fatal voltages may result from usage of oscilloscope and other test equipment. The oscilloscope chassis may be at a potentially fatal voltage if not properly grounded. If an oscilloscope is used to measure high voltage waveforms, use only a dual channel oscilloscope in the differential mode with X 100 probes. It is recommended that the oscilloscope be used in the A minus B Quasi-differential mode with the oscilloscope chassis correctly grounded to an earth ground. Refer to equipment safety instructions for all test equipment before using with the 1395.



ATTENTION: The CMOS devices used on the control circuit can be destroyed or damaged by static charges. If personnel will be working near static sensitive devices, they must be appropriately grounded.

Troubleshooting and Maintenance Procedures

The following describes the Node Adapter board fault diagnostics and how they are processed by the 1395 Drive. All Adapter Boards provide initial fault handling based on conditions within their environment, and then signal the Bulletin 1395 which provides further disposition based on system requirements. Faults are divided into three categories:

Hard Faults

Hard Faults are non-recoverable. That is, the Bulletin 1395 must either be RESET or POWER-CYCLED in order to clear the fault condition. An Adapter Board transmits its fault to the Main Control Board through the dual-port RAM as explained in the Bulletin 1395 Instruction Manual. A Hard Fault in an adapter is designed to create an E-Coast Stop. The following examples are considered Hard Faults:

- Internal RAM
- External RAM
- Microbus RAM
- EPROM Checksum
- Watchdogs - which monitor internal states.

Soft Faults

Soft Faults occur when an Adapter Board detects a condition which may result in undesirable operation. The Adapter takes appropriate action within its domain to guard against further operation and signals the condition to the 1395 Drive. In addition, the fault may be cleared and normal operation resumed at the point the fault occurred. Examples of Soft Faults are:

- Microbus Handshake
- Bridge Over temperature
- Serial Link Time-out

Warning Faults

These faults indicate error conditions which are generally transient in nature, but could result in unpredictable operation if allowed to persist. Examples of Warning Faults are:

- Overload Pending
- Excessive Armature Volts
- Serial Overrun

Certain fault conditions in the Bulletin 1395 can be configured in terms of their Soft or Warning Fault nature. That is, the user/operator may specify the action taken, either Soft Fault or Warning Fault (Report Only).



ATTENTION: Ignoring faults that have been configured as Report

Only could damage certain components in the drive.

Examples of Soft/Warning Faults configurable by users are:

- Motor Over temperature
- AC Line Out of Tolerance
- Heat Sink Over temperature

Node Adapter Fault Messages

The fault messages available on the Discrete Adapter Board are:

- **NA-01 - NODE ADAPTER - PROCESSOR OK**
Default state, no error exists.
- **NA-02 through NA-05 - NOT USED**
Reserved for future use.
- **NA-06 - HANDSHAKE TIME-OUT**
Communication malfunction between Node Adapter Board and Main Control Board. Replace Adapter Board, replace Main Control Board.
- **NA-07 - NOT USED**
Reserved for future use.
- **NA-08 - NO COMSOF**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-09 - ILLEGAL MODE SEQUENCE**
Incorrect mode detected. Replace Main Control Board, replace Node Adapter Board.
- **NA-10 - NO INPUT IMAGE**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-11 - OUTPUT IMAGE LOST**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-12 - SIU BUFFER OVERFLOW**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-13 - PLC COMMAND ILLEGAL**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-14 - BLOCK TRANSFER TYPE**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-15 - BLOCK TRANSFER LENGTH**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-16 - NO COMM RECEIVED**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-17 - IDLE LINE LOST**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.
- **NA-18 - UNREQ BLOCK TRANSFER**
Communication malfunction between Node Adapter Board and PLC Controller. Check PLC Controller program, replace Adapter Board.
- **NA-19 - COMM LOST STATE**
Communication malfunction between Node Adapter Board and PLC Controller. Check wiring, PLC Controller, replace Adapter Board.

- NA–20 - RESET/ PROGRAM/ TEST
Communication malfunction between Node Adapter Board and PLC Controller. Check PLC Controller Mode Switch, replace Adapter Board.
- NA–21 through NA–23 - NOT USED
Reserved for future use.
- NA–24 - IL RACK CONFIGURE
Incorrect DIP switch settings on Adapter Board.
- NA–25 - IL BT REQUEST VALUE
Internal error during handling of a block transfer.
- NA–26 through NA–99 - NOT USED
Reserved for future use.

Adapter Troubleshooting

Each processor or Adapter Board provides its own set of sophisticated diagnostics which the user can examine to determine the exact nature of problems that may arise. Maintenance is done at the board level. Examining the diagnostic/fault messages available determines whether a board should be replaced. The malfunctioning board may be returned to Allen–Bradley for further disposition.

Periodic Maintenance



ATTENTION: Servicing energized industrial control equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lock out control equipment from power sources, and allow stored energy in capacitors to dissipate, if present. If it is necessary to work in the vicinity of energized equipment, the safety related work practices of NFPA 70E, Electrical Safety Requirements for Employee Workplaces, must be followed.

Periodic Inspection

Industrial control equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions, and adjusted as indicated by experience. An initial inspection within 3 to 4 months after installation is suggested. Applicable parts of the following guidelines should be used:

Contamination

If inspection reveals that dust, dirt, moisture or other contamination has reached the control equipment, the cause must be eliminated. This could indicate an incorrect or ineffective enclosure, unsealed enclosure openings (conduit or other) or incorrect operating procedures. Dirty, wet or contaminated parts must be replaced unless they can be cleaned effectively by vacuuming or wiping.

Terminals

Loose connections can cause overheating that can lead to equipment malfunction or failure. Check the tightness of all terminals and bus bar connections and securely tighten any loose connections. Replace any parts or wiring damaged by overheating.

Solid-State Devices

Solid-state devices require little more than a periodic visual inspection. Printed circuit boards should be inspected to determine whether all ribbon cables are properly seated in their connectors. Board locking tabs should also be in place. Necessary replacements should be made only at the PC board or plug-in component level. Solvents should not be used on printed circuit boards. Where blowers are used, air filters if supplied should be cleaned or changed periodically depending on the specific environmental conditions encountered. For additional information see NEMA Standards Publication No. ICS 1.1-1984 entitled: "Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control."



ATTENTION: Use of other than factory recommended test equipment for solid state controls may result in damage to the control or test equipment or unintended actuation of the controlled equipment.

Static Sensitive Items

While performing maintenance on the 1395 Drive and the Node Adapter Board, special precautions must be observed in handling or touching certain static sensitive components in the cabinet. All circuit cards and SCR's in the drive can be damaged by Electro-Static Discharge. If personnel will make contact with an ESD sensitive component during maintenance, they must be grounded. Grounding should be accomplished with a wrist strap which is connected to an approved ground.

Programming Terminal

The Programming Terminal controls are non-servicable items that should not be disassembled. If the display face becomes dirty, it should only be cleaned with a damp cloth. Cleaning solvents and detergents must not be used to clean the panel. Remote Programming Terminals should not be subjected to liquid or submerged for cleaning. Non-operable panels should be returned to the factory for replacement as a complete unit.

Tests and Records

Final Check Out

After maintenance or repair of industrial controls, always test the control system for proper functioning under controlled conditions that avoid hazards in the event of a control malfunction.

"Keep Good Maintenance Records"

This rule will be most helpful in locating possible intermittent problems by pointing to a particular area of recurring trouble within the overall system. Further, good maintenance records will help reduce major costly shutdowns by demanding the use of proper test equipment and an appropriate inventory of spare parts. For additional information See "NFPA 70B, Recommended Practice For Electrical Equipment Maintenance," published by the National Fire Protection Association.