Honeywell

Dual Node Module Service

LC13-510

LCN Service - 2

Dual Node Module Service

LC13-510
Release 500
CE Compliant
9/95

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About This Publication

This publication provides instructions for use by system service personnel to service the Dual Node Module. It helps you to determine how to perform service required on a Dual Node Module, identifies spare parts, and provides disassembly/assembly instructions for replacing the required part.

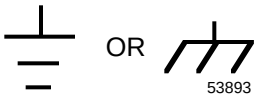
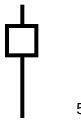
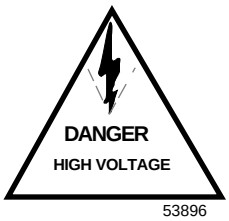
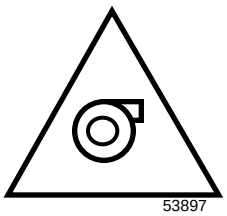
This publication is used to support the service of all nodes that reside in a Dual Node Module, including those in a Universal Station.

This revision supports Release R500 and CE Compliance.

> Any equipment designated as "CE Compliant" complies with the European Union EMC and Health and Safety Directives. All equipment shipping into European Union countries after January 1, 1996 requires this type of compliance—denoted by the "CE Mark."

Change bars are used to indicate paragraphs, tables, or illustrations containing changes that have been made to this manual effective with Release 500 and CE compliancy. Pages revised only to correct minor typographical errors contain no change bars.

Standard Symbols

Scope	The following defines standard symbols used in this publication.
ATTENTION	Notes inform the reader about information that is required, but not immediately evident.
CAUTION	Cautions tell the user that damage may occur to equipment if proper care is not exercised.
WARNING	Warnings tell the reader that potential personal harm or serious economic loss may happen if instructions are not followed.
 OR 53893	Ground connection to building safety ground
 53894	Ground stake for building safety ground
 53895	Electrical Shock Hazard—can be lethal
 53896	Electrical Shock Hazard—can be lethal
 53897	Rotating Fan—can cause personal injury

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INTRODUCTION
Section 1

1.1 OVERVIEW

This publication provides detailed instructions for maintenance, test, troubleshooting and repair of the Dual Node Module (part of the TDC 3000^X system) shown in Figure 1-1. The troubleshooting, disassembly, and assembly procedures are effective down to the optimum replaceable-unit (ORU) level. An ORU parts list is included and is keyed to a module exploded view that is also used with the disassembly and assembly procedures.

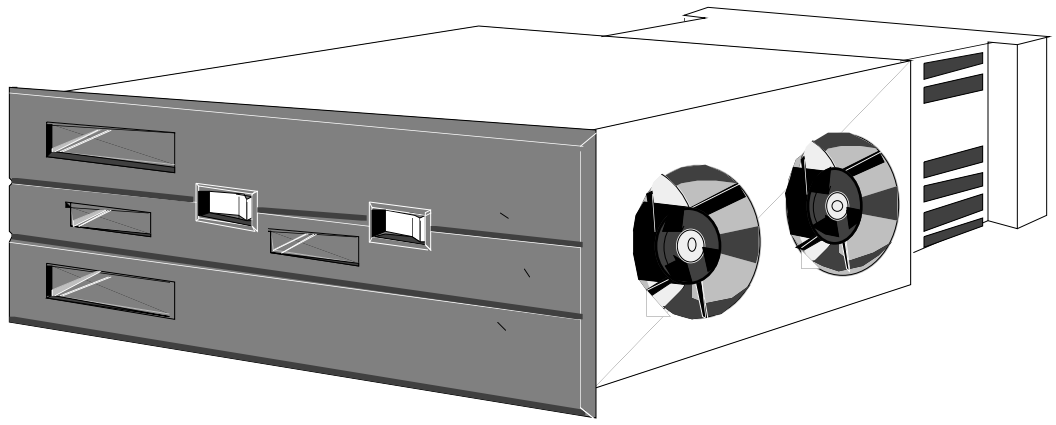

Figure 1-1 — Dual Node Module 4121

1.2 RELATED PUBLICATIONS

The following publications should be referred to as required:

Title	Binder
Maintenance Test Operations	LCN Service - 1
System Maintenance Guide	LCN Service - 1
History Module Service	LCN Service - 2
LCN System Installation	LCN Installation
LCN System Checkout	LCN Installation
Universal Station Service	LCN Service - 1
Universal Station (Ergonomic) Service	LCN Service - 1
Universal Station^X Service	Universal Station^X
Universal Station^X (Ergonomic)Service	Universal Station^X
Universal Workstation Installation, Operation and Service	LCN Service-2

MODULE DESCRIPTION
Section 2

2.1 GENERAL DESCRIPTION

The Dual Node Module is a chassis containing one or two nodes. Each node performs an independent function and occupies a specific address on the Local Control Network (LCN). Figure 2-1 shows the module functions within a typical TDC 3000^X System. The types of nodes available in the Dual Node Module include Application Modules, Network Interface Modules, History Modules, Universal Stations, Hiway Gateways, and other types of gateways.

The Dual Node Module can accommodate one three-board node and one two-board node. Each node has its own power supply—the Dual Node Power Supply (DNPWR). The Dual Node Module also includes a front panel, chassis, and a cooling fan assembly. The chassis consists of a card cage and backplane assembly. The component cards (boards) mount in the front of the card cage assembly, and the associated input/output (I/O) boards mount in the rear, similar to the method used in Five- and Ten-Slot Modules.

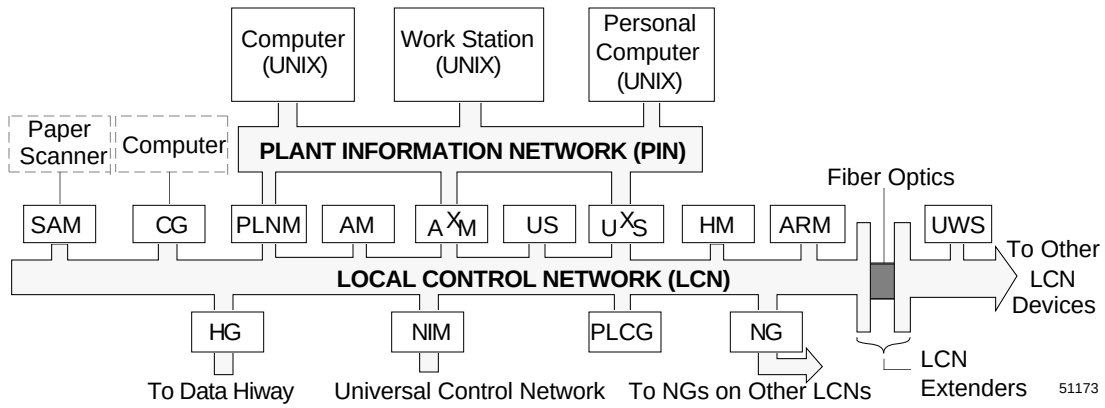

Figure 2-1 — TDC 3000^X Module Functions

The K2LCN or the K4LCN board is a common element of nodes implemented in the Dual Node Module. It combines the functions of kernel (processor), memory, and LCN (Local Control Network) interface in a single board. The K2LCN or K4LCN board is used in conjunction with CLCNA and CLCNB boards. These boards provide the physical interface to the redundant cables of the LCN (the "A" and "B" cables) which interconnect the equipment in a TDC 3000^X control room. The KLCNA and KLCNB boards are installed in the I/O card cage at the rear of the module as shown in Table 2-1. One of each is required, regardless of whether one or both nodes are implemented.

2.2 BASIC MODULE CONFIGURATIONS

A Dual Node Module can accommodate one or two nodes. In a Dual Node Module, there is only one connection to the LCN A coaxial cable and only one connection to the LCN B cable. These connections are made at the CLCNA and the CLCNB boards, respectively, using BNC T-connectors. The LCN signals are communicated between nodes within a Dual Node Module by RS-485 signals on the backpanel. RS-485 is an electrical signaling standard. The CLCNA and CLCNB boards provide interface conversion between the RS-485 backpanel signals and the LCN network.

Table 2-1 shows the basic (minimum) module configurations for single- and double-node modules. The Application Module (AM) uses the basic configuration. Other module types require additional boards, as covered in subsection 2.3. Figure 2-2 is a rear view of a Dual Node Module showing the LCN A and LCN B coaxial cable interconnects and the RS-485 terminator assemblies that are installed on the backplane at the top and bottom ends of the RS-485 signal conductors. Four terminator assemblies are required—two at the top and two at the bottom of the backplane.

CAUTION

SlCLCNA and CLCNB boards. Do not plug any other type of board into these slots unless specifically authorized by Honeywell documentation, or damage may result. This is particularly true for CSR boards—DO NOT plug a CSR board in I/O Slot 1.

As shown in Table 2-1, the CLCNA and CLCNB boards are installed in different nodes in a Dual Node Module. The CLCNA is installed in the upper node, and the CLCNB is installed in the lower node. Each is installed in Slot 1 (the lowest slot) in the I/O card cage of its respective node. The CLCNA and CLCNB boards each receive power from both power supplies in the Dual Node Module. Therefore, if one power supply is not present, or is turned off to perform troubleshooting or maintenance on one node, both the CLCNA and CLCNB boards will receive power and the node which does have power will continue to have access to both the LCN A and LCN B cables in the LCN network. The CLCNA and CLCNB are the only boards in the I/O card cage which are powered from both power supplies. The Fan Assembly is also powered from both power supplies. It will operate if either supply is on (or if both are on). The CLCNA and CLCNB boards are designed to be able to be plugged into and unplugged from the system while power is on, allowing them to be changed without removing power from a node. Do not attempt to do this with any other board type.

Table 2-1 — Basic Module Configurations

Dual Node Module with One Node Installed

Upper Node	Slot	Front	Rear
	2		
	1		CLCNA

Power Supply	Left	Right	Fan Module
		DNPWR	

Lower Node	Slot	Front	Rear
	3		
	2		
	1	K2LCN OR K4LCN	CLCNB

Dual Node Module with Two Nodes Installed

Upper Node	Slot	Front	Rear
	2		
	1	K2LCN OR K4LCN	CLCNA

Power Supply	Left	Right	Fan Module
	DNPWR	DNPWR	

Lower Node	Slot	Front	Rear
	3		
	2		
	1	K2LCN OR K4LCN	CLCNB

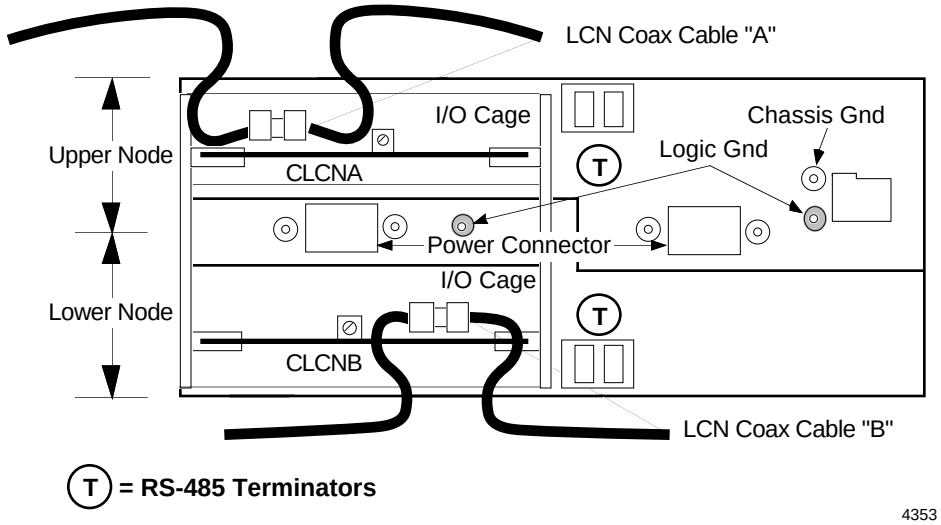

Figure 2-2 — Rear View of Dual Node Module

2.3 SPECIFIC NODE CONFIGURATIONS

Tables 2-2 and 2-3 show the board configurations for the different types of Dual Node Module nodes. Table 2-2 shows configurations available in upper, two-slot nodes, and Table 2-3 shows the configurations available in lower, three-slot nodes.

Table 2-2 — Two-Slot Node Configurations

Application Module (68020)		
Slot	**Front**	**Rear**
2		*(Note 1)*
1	K2LCN	KLCNA

Application Module (68020) CE Compliant		
Slot	**Front**	**Rear**
2		*(Note 1)*
1	K2LCN	CLCN-A

Computer Gateway (68020)		
Slot	**Front**	**Rear**
2	CLI	CLI I/O
1	K2LCN	KLCNA

Computer Gateway (68020) CE Compliant		
Slot	**Front**	**Rear**
2	CLI	CLI I/O
1	K2LCN	CLCN-A

History Module (68020)		
Slot	**Front**	**Rear**
2	SPC	SPC I/O
1	K2LCN	KLCNA

History Module (68020) CE Compliant		
Slot	**Front**	**Rear**
2	SPC	SPC -2
1	K2LCN	CLCN-A

Hiway Gateway (68020) (See Note 6)		
Slot	**Front**	**Rear**
2	DHI	DHI I/O
1	K2LCN	KLCNA

Hiway Gateway (68020) CE Compliant (See Note 6)		
Slot	**Front**	**Rear**
2	DHI	DHI
1	K2LCN	CLCN-A

Network Gateway (NG) (68020) *(Note 5)*		
Slot	**Front**	**Rear**
2	NGI	NGIO
1	K2LCN	KLCNA

Network Gateway (NG) (68020) CE Compliant *(Note 5)*		
Slot	**Front**	**Rear**
2	NGI	NGI
1	K2LCN	CLCN-A

(Continued)

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 2 Redundant units require Relay Switch Board 51304421-100.
Note 3 Cartridge Disks are optional (via EPDG).
Note 4 The EPNI board is a later version of the PNI board.
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.
Note 6 HG permitted if the other node is a reduntant HG for another Data Hiway.

Table 2-2 — Two-Slot Node Configurations, Continued

Network Interface Module (68020) *(Note 4)*		
Slot	**Front**	**Rear**
2	EPNI	NIM MODEM
1	K2LCN	KLCNA

Network Interface Module (68020) CE Compliant *(Note 4)*		
Slot	**Front**	**Rear**
2	EPNI	NIM
1	K2LCN	CLCN-A

PLC Gateway (PLCG) (68020)*(Note 2)*		
Slot	**Front**	**Rear**
2	PLCI	PLCI I/O
1	K2LCN	KLCNA

PLC Gateway (PLCG) (68020) CE Compliant *(Note 2)*		
Slot	**Front**	**Rear**
2	PLCI	PLCI
1	K2LCN	CLCN-A

Universal Station (68020) *(Note 3)*		
Slot	**Front**	**Rear**
2	EPDG	EPDGP I/O
1	K2LCN	KLCNA

Universal Station (68020) CE Compliant *(Note 3)*		
Slot	**Front**	**Rear**
2	EPDG	EPDGC I/O
1	K2LCN	CLCN-A

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 2 Redundant units require Relay Switch Board 51304421-100.
Note 3 Cartridge Disks are optional (via EPDG).
Note 4 The EPNI board is a later version of the PNI board.
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.
Note 6 HG permitted if the other node is a reduntant HG for another Data Hiway.

Table 2-2 — Two-Slot Node Configurations

Application Module (68040) CE Compliant		
Slot	**Front**	**Rear**
2		*(Note 1)*
1	K4LCN	CLCN-A

Computer Gateway (68040) CE Compliant		
Slot	**Front**	**Rear**
2	CLI	CLI I/O
1	K4LCN	CLCN-A

History Module (68040) CE Compliant		
Slot	**Front**	**Rear**
2	SPC	SPC-2
1	K4LCN	CLCN-A

Hiway Gateway (68040) CE Compliant (See Note 6)		
Slot	**Front**	**Rear**
2	DHI	DHI
1	K4LCN	CLCN-A

Network Gateway (NG) (68040) CE Compliant *(Note 5)*		
Slot	**Front**	**Rear**
2	NGI	NGI
1	K4LCN	CLCN-A

(Continued)

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 2 Redundant units require Relay Switch Board 51304421-100.
Note 3 Cartridge Disks are optional (via EPDG).
Note 4 The EPNI board is a later version of the PNI board.
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.
Note 6 HG permitted if the other node is a reduntant HG for another Data Hiway.

Table 2-2 — Two-Slot Node Configurations, Continued

Network Interface Module (68040) CE Compliant *(Note 4)*		
Slot	**Front**	**Rear**
2	EPNI	NIM
1	K4LCN	CLCN-A

PLC Gateway (PLCG) (68040) CE Compliant *(Note 2)*		
Slot	**Front**	**Rear**
2	PLCI	PLCI
1	K4LCN	CLCN-A

Universal Station (68040) CE Compliant *(Note 3)*		
Slot	**Front**	**Rear**
2	EPDG	EPDGC I/O
1	K4LCN	CLCN-A

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 2 Redundant units require Relay Switch Board 51304421-100.
Note 3 Cartridge Disks are optional (via EPDG).
Note 4 The EPNI board is a later version of the PNI board.
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.
Note 6 HG permitted if the other node is a reduntant HG for another Data Hiway.

Table 2-3 — Three-Slot Node Configurations

Application Module (68020)		
Slot	**Front**	**Rear**
3		*(Note 1)*
2		*(Note 1)*
1	K2LCN	KLCNB

Application Module CE Compliant (68020)		
Slot	**Front**	**Rear**
3		*(Note 1)*
2		*(Note 1)*
1	K2LCN	CLCN-B

Computer Gateway (68020)		
Slot	**Front**	**Rear**
3	CLI	CLI I/O
2		*(Note 1)*
1	K2LCN	KLCNB

Computer Gateway CE Compliant (68020)		
Slot	**Front**	**Rear**
3	CLI	CLI
2		*(Note 1)*
1	K2LCN	CLCN-B

History Module (68020)		
Slot	**Front**	**Rear**
3	SPC	SPC I/O
2		*(Note 1)*
1	K2LCN	KLCNB

History Module CE Compliant (68020)		
Slot	**Front**	**Rear**
3	SPC	SPC
2		*(Note 1)*
1	K2LCN	CLCN-B

Hiway Gateway (68020) *(Note 2)*		
Slot	**Front**	**Rear**
3	DHI	DHI I/O
2		*(Note 1)*
1	K2LCN	KLCNB

Hiway Gateway (68020) CE Compliant *(Note 2)*		
Slot	**Front**	**Rear**
3	DHI	DHI
2		*(Note 1)*
1	K2LCN	CLCN-B

Network Gateway (NG) (68020) *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGIO
2	NGI	NGIO
1	K2LCN	KLCNA

Network Gateway (NG) (68040) CE Compliant *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGI or NGFOM
2	NGI	NGI or NGFOM
1	K2LCN	CLCN-B

(Continued)

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.

Note 2 Hiway Gateway can only be combined with another redundant Hiway Gateway node connected to another Data Hiway. Logic and chassis ground must be isolated on a Hiway Gateway Dual Node Module. (Both halves of a Dual Node Module have a common ground system).

Note 8 The NGI and NGIO in Slot 3 are optional. They are present for a redundant cable NG.

Table 2-3 — Three-Slot Node Configurations, Continued

Network Gateway (NG) (68020) *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGIO
2	NGI	NGIO
1	K2LCN	KLCNA

Network Gateway (NG) (68020) CE Compliant *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGI or NGFOM
2	NGI	NGI or NGFOM
1	K2LCN	CLCN-B

Table 2-3 — Three-Slot Node Configurations, Continued

Network Interface Module (68020) *(Note 7)*		
Slot	**Front**	**Rear**
3	EPNI	NIM MODEM
2		*(Note 1)*
1	K2LCN	KLCNB

Network Interface Module (68020) CE Compliant *(Note 7)*		
Slot	**Front**	**Rear**
3	EPNI	NIM
2		*(Note 1)*
1	K2LCN	CLCN-B

Plant Network Module (PLNM) (68020)		
Slot	**Front**	**Rear**
3	*(Note 6)*	*(Note 1)*
2	CNI	CNI I/O
1	K2LCN	KLCNB

Plant Network Module (PLNM) CE Compliant (68020)		
Slot	**Front**	**Rear**
3	*(Note 6)*	*(Note 1)*
2	CNI	CNI
1	K2LCN	CLCN-B

PLC Gateway (PLCG) (68020) *(Note 3)*		
Slot	**Front**	**Rear**
3	PLCI	PLCI I/O
2		*(Note 1)*
1	K2LCN	KLCNB

PLC Gateway (PLCG) (68020) CE Compliant *(Note 3)*		
Slot	**Front**	**Rear**
3	PLCI	PLCI
2		*(Note 1)*
1	K2LCN	CLCN-B

(Continued)

Note 3 Redundant units require Relay Switch Board 51304421-100.
Note 6 Slot not available due to height of CNI board.
Note 7 The EPNI board is a later version of the PNI board.
Note 8 The NGI and NGIO in Slot 3 are optional. They are present for a redundant cable NG.

Table 2-3 — Three-Slot Node Configurations, Continued

Universal Station (68020) *(Note 4)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGP I/O
2		*(Note 1)*
1	K2LCN	KLCNB

Universal Station (68020) CE Compliant *(Note 4)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2		*(Note 1)*
1	K2LCN	CLCN-B

Universal Station with Floppy Drives (68020) *(Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGP I/O
2	FDC	FDC I/O
1	K2LCN	KLCNB

Universal Station with Floppy Drives (68020) CE Compliant *(Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2	FDC	FDC I/O
1	K2LCN	CLCN-B

Table 2-3 — Three-Slot Node Configurations (Continued)

Universal Station with Trend Pen (68020) *(Note 4, Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGP I/O
2	SIO	SIO I/O
1	K2LCN	KLCNB

Universal Station with Trend Pen (68020) CE Compliant *(Note 4, Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2	SIO	SIO I/O
1	K2LCN	CLCN-B

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 4 Cartridge disks are optional (via EPDG)
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.

Table 2-3 — Three-Slot Node Configurations

Application Module CE Compliant (68040)		
Slot	**Front**	**Rear**
3		*(Note 1)*
2		*(Note 1)*
1	K4LCN	CLCN-B

Computer Gateway CE Compliant (68040)		
Slot	**Front**	**Rear**
3	CLI	CLI
2		*(Note 1)*
1	K4LCN	CLCN-B

History Module CE Compliant (68040)		
Slot	**Front**	**Rear**
3	SPC	SPC
2		*(Note 1)*
1	K4LCN	CLCN-B

Hiway Gateway (68040) CE Compliant *(Note 2)*		
Slot	**Front**	**Rear**
3	DHI	DHI
2		*(Note 1)*
1	K4LCN	CLCN-B

Network Gateway (NG) (68040) CE Compliant *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGI or NGFOM
2	NGI	NGI or NGFOM
1	K4LCN	CLCN-B

(Continued)

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.

Note 2 Hiway Gateway can only be combined with another redundant Hiway Gateway node connected to another Data Hiway. Logic and chassis ground must be isolated on a Hiway Gateway Dual Node Module. (Both halves of a Dual Node Module have a common ground system).

Note 8 The NGI and NGIO in Slot 3 are optional. They are present for a redundant cable NG.

Table 2-3 — Three-Slot Node Configurations, Continued

Network Gateway (NG) (68040) CE Compliant *(Note 8)*		
Slot	**Front**	**Rear**
3	NGI	NGI or NGFOM
2	NGI	NGI or NGFOM
1	K4LCN	CLCN-B

Network Interface Module (68040) CE Compliant *(Note 7)*		
Slot	**Front**	**Rear**
3	EPNI	NIM
2		*(Note 1)*
1	K4LCN	CLCN-B

Plant Network Module (PLNM) CE Compliant (68040)		
Slot	**Front**	**Rear**
3	*(Note 6)*	*(Note 1)*
2	CNI	CNI
1	K4LCN	CLCN-B

PLC Gateway (PLCG) (68040) CE Compliant *(Note 3)*		
Slot	**Front**	**Rear**
3	PLCI	PLCI
2		*(Note 1)*
1	K4LCN	CLCN-B

(Continued)

Note 3 Redundant units require Relay Switch Board 51304421-100.
Note 6 Slot not available due to height of CNI board.
Note 7 The EPNI board is a later version of the PNI board.
Note 8 The NGI and NGIO in Slot 3 are optional. They are present for a redundant cable NG.

Table 2-3 — Three-Slot Node Configurations, Continued

Universal Station (68040) CE Compliant *(Note 4)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2		*(Note 1)*
1	K4LCN	CLCN-B

Universal Station with Floppy Drives (68040) CE Compliant *(Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2	FDC	FDC I/O
1	K4LCN	CLCN-B

Universal Station with Trend Pen (68040) CE Compliant *(Note 4, Note 5)*		
Slot	**Front**	**Rear**
3	EPDG	EPDGC
2	SIO	SIO I/O
1	K4LCN	CLCN-B

Note 1 Can be used for FOCT, FOCR, LCNE, or LCNE2.
Note 4 Cartridge disks are optional (via EPDG)
Note 5 This Network Gateway configuration can never be expanded to a redundant cable configuration.

2.4 FRONT PANEL

The module front panel has the necessary windows and switch openings to accommodate two nodes in a single module. Figure 2-3 shows the front panel for the Dual Node Module. For each of the two power supplies, there are openings for the POWER switch and RESET switch and a window to view the light-emitting diode (LED) status indicators. Each power supply has a MARGIN pin jumper option which is a test/diagnostic aid and should be left in the center (N) position at all times. There is also a LED indicator at the right-center of the panel which indicates a fan module failure. For each of the two nodes, the front panel includes an access window to view the indicators that are mounted on the individual circuit boards. These indicators serve to monitor node performance and provide diagnostic information for fault isolation. The detailed functions and operation of the switches and indicators are discussed elsewhere in this manual.

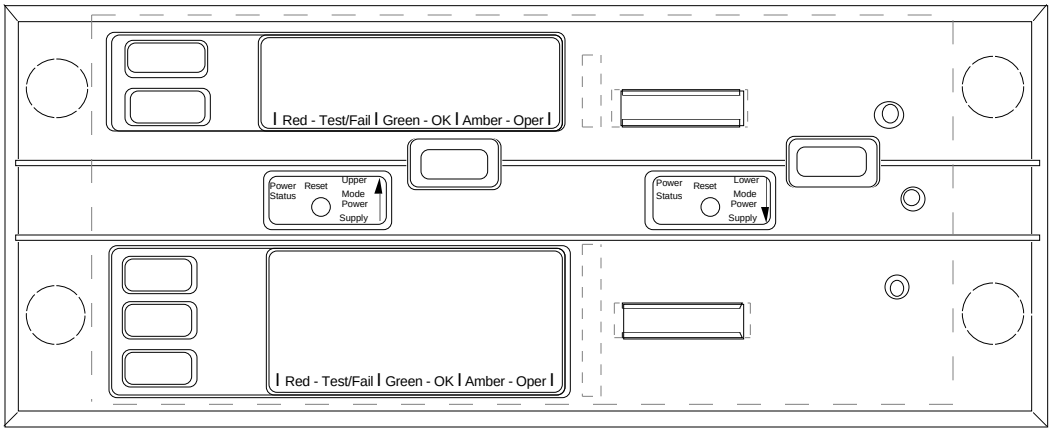

Figure 2-3 — Dual Node Module Front Panel 4120

2.5 REAR PANEL ASSEMBLY

The Rear Panel Assembly includes the Backpanel Printed Wire Assembly (PWA) and the Input/Output (I/O) Card Cage Assembly. The power supplies, the fan assembly and the main circuit boards (such as the K2LCN OR K4LCN) all plug into card edge connectors on the front side of the Backpanel PWA. The I/O boards all plug into card edge connectors on the rear side of the Backpanel PWA. As shown in Tables 2-2 and 2-3, the I/O boards are normally installed in the chassis in the slot corresponding in number to the applicable board installed in the front of the node. The CLCNA (KLCN-A) and CLCNB (KLCN-B) boards are installed as shown in Table 2-1. The various I/O boards support interface to a variety of external networks and devices such as the LCN, Data Hiway, keyboards, monitors, disk drives, and recorders.

Other connections available at the rear panel assembly are:

- Ac Input—The ac input cable for each power supply terminates in a receptacle which is attached to the backpanel support at the rear of the power supply. The power supply plugs into the receptacle when it is inserted into the chassis. The receptacles pass through, but do not connect to, the backplane.
- Remote Reset—There is a 3-pin connector soldered to the backpanel for each node which permits the node to be reset by a remotely-located switch.
- External Clock—There is a 2-pin connector soldered to the backpanel for each node which allows use of an external precision clock source for the system clock.
- RS-485 Connectors—The RS-485 bus communicates the LCN A and B signals between the two nodes in a Dual Node Module. There are connectors at the upper and lower ends of this bus. They provide a place to install resistor terminator assemblies. Two terminator assemblies are installed at the top and two are installed at the bottom.

2.6 LOGIC AND CHASSIS GROUND

There are two threaded posts for logic ground on the Rear Panel Assembly – one behind each power supply. In most applications, logic ground is connected to chassis ground, and this connection is made by installing a jumper wire between the logic ground post and the rightmost mounting screw of the Ac power connector. This connection is made for both nodes in the module. Figure 2-7 and Figure 8 shows these logic-to-chassis ground jumpers installed in two modules. If isolated logic ground is required, the jumpers are not installed. Note that both nodes have a common logic ground through the RS-485 bus, and therefore a single node cannot be ground-isolated by itself. Both nodes must be either connected to chassis ground or isolated from chassis ground, but they cannot be ground-isolated with respect to each other. If the nodes are to be isolated from chassis ground, both jumpers must be removed.

There is also a threaded hole on the Rear Panel Assembly. This is a connection point for chassis ground.

Figure 2-2 also shows the location of the logic ground and chassis ground points on the Rear Panel Assembly. These connection points are also physically marked for identification on the Rear Panel Assembly.

2.7 FIELD ADJUSTMENTS

There are no field adjustments for the Dual Node Module. However, the K2LCN must be pinned for the particular node address it occupies on the LCN. Figure 2-4 shows the pinning options for the K2LCN. The EPDGC-(I/O) board, if present, has pinning options to set the default background shade for the CRT if a palette has not been set in a schematic (Set Palette is a new command in Release 320). You may find additional information on the Set Palette command in the *Picture Editor Reference Manual* in the *Implementation/ Engineering Operations - 2* binder. The EPDGC also has a configuration option that is set for either the Engineer's Keyboard or the Supervisor's Keyboard. (If both keyboards are installed, the EPDGC is set up for the Supervisor's Keyboard and the Engineer's Keyboard is connected into the Supervisor's Keyboard.) Figure 2-5 shows the keyboard and CRT background options for the EPDGC. Also, the power supply has a pinning option for internal or external clock. See subsection 2.9 and Figure 2-9 for additional information. The PLCI board has several pinning options. Refer to the *Programmable Logic Controller Gateway Planning, Installation, and Service* manual in the *Implementation/PLC Gateway* binder for details. Figure 2-10 in subsection 2.10 covers UCN address pinning for the NIM Modem board.

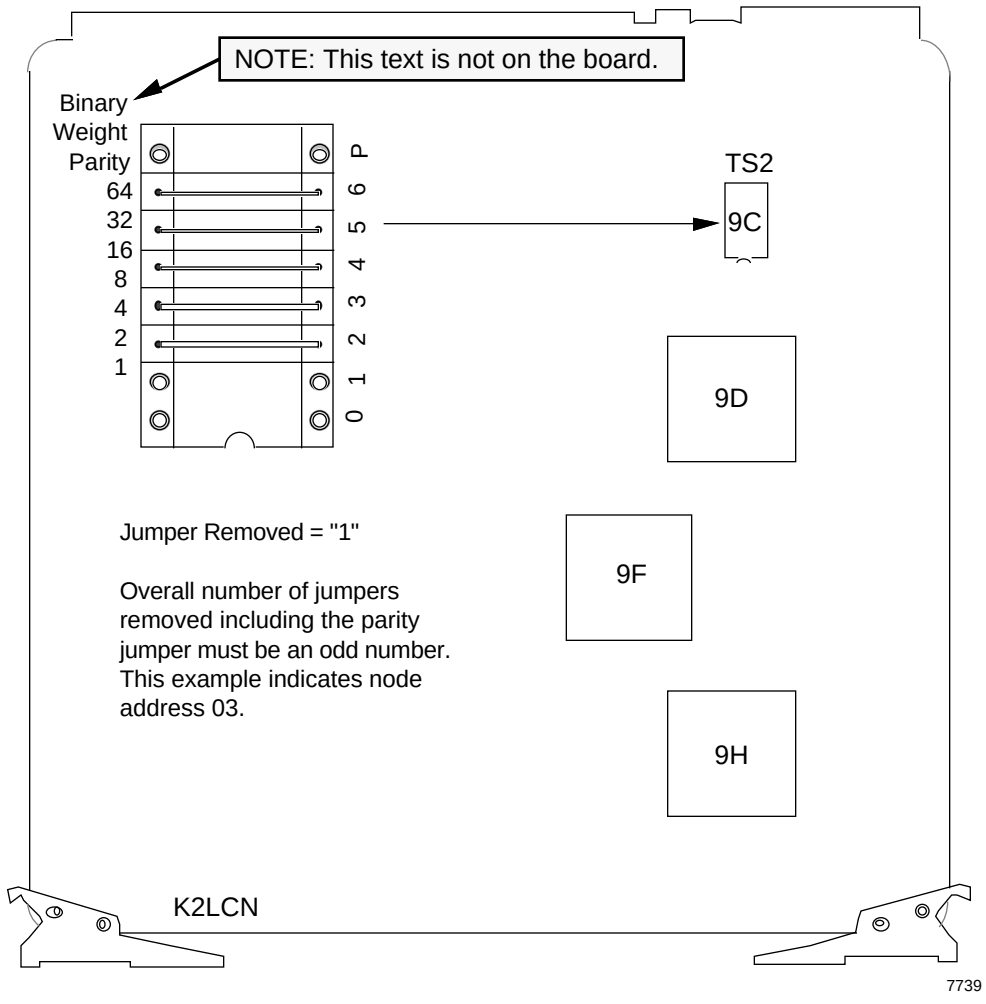

Figure 2-4 — Address Pinning on the K2LCN

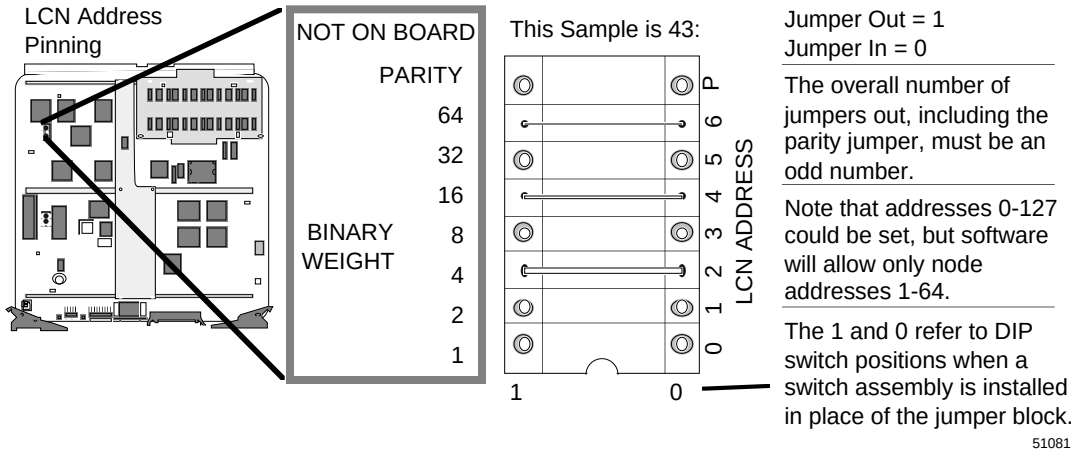

Figure 2-5— K4LCN Pinning

EPDGC (I/O) boards can be pinned for default background shading as shown in Figure 2-6. Figure 2-6 also shows the pinning for vertical sync of the monitor.

Universal Station Type	EPDGP I/O Assembly
Classic with keyboard power supply	51304584-100
Classic without keyboard power supply	51304584-200
Ergonomic furniture with 21" FST monitor	51304584-300

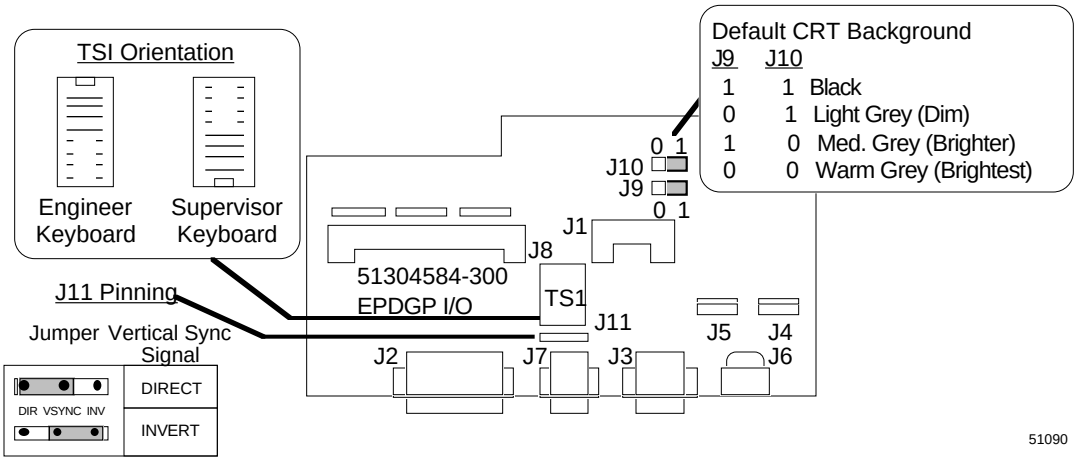

Figure 2-6 — CRT Background Shade Pinning on the EPDGP-I/O

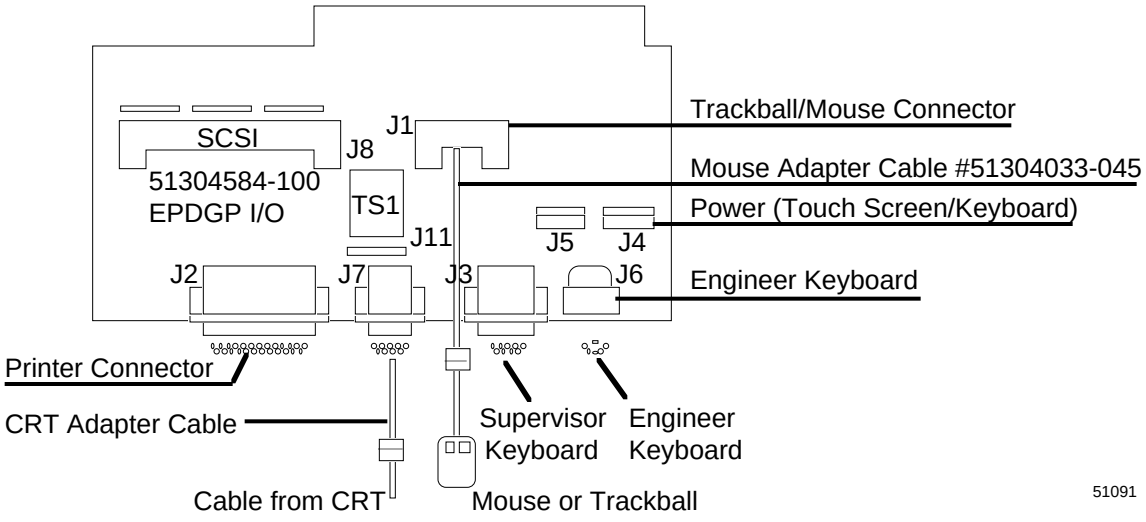

Figure 2-7 — EPDGP-I/O Cabling

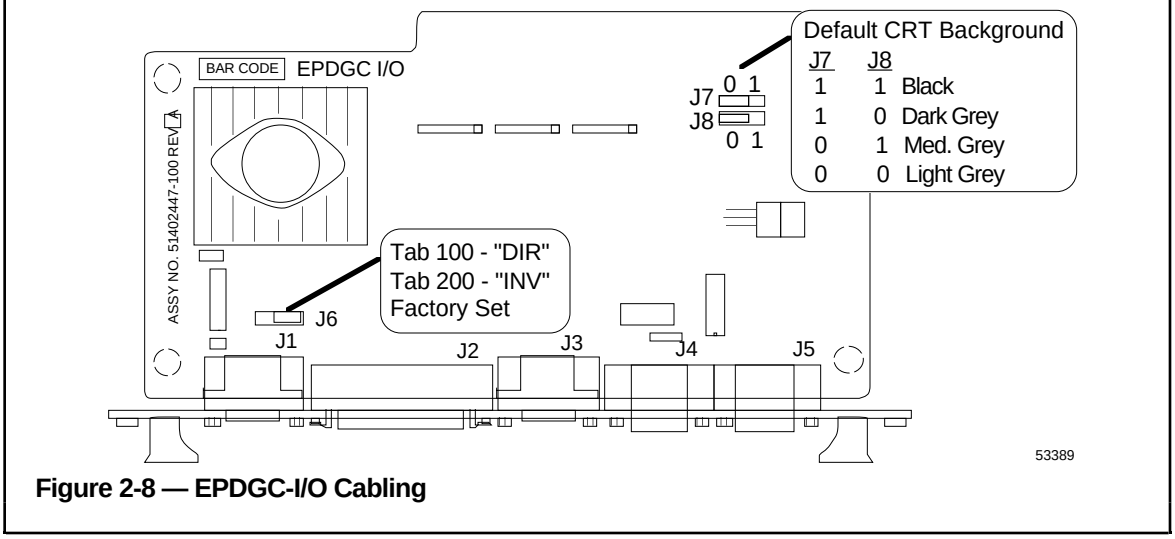

Figure 2-8 — EPDGC-I/O Cabling

2.8 LCN NETWORK GROUNDING

If the LCN coaxial cable bus segment does not have Clock Source/Repeater (CS/R) boards attached (an all-K2LCN segment), a grounding wire must be installed on one, and only one, CLCNA board and on one, and only one, CLCNB board. This grounds the shield of the A coaxial cable and the shield of the B coaxial cable at one point each to logic ground. Honeywell recommends that Cable A and Cable B not be grounded in the same module. This guards against loss of both LCN paths if the module is replaced. Figure 2-9 and Figure 2-10 shows these ground connections in separate modules.

If a coaxial cable segment has CS/R boards, the grounding of the cable sheaths is done at the CS/Rs and must not be duplicated at the CLCNA, CLCNB, or elsewhere.

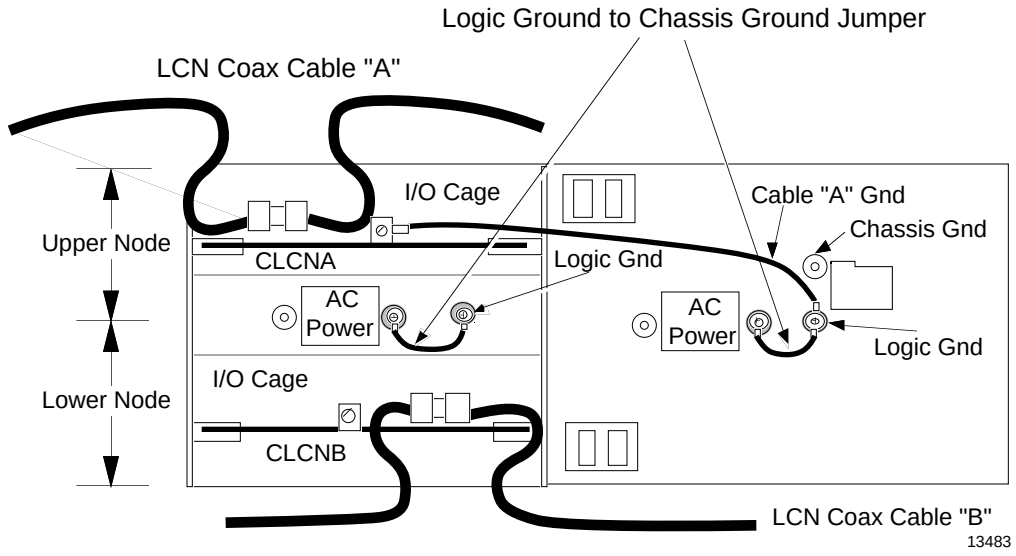

Figure 2-9 — Ground Wire Installation on KLCNA for Coax Cable A Ground

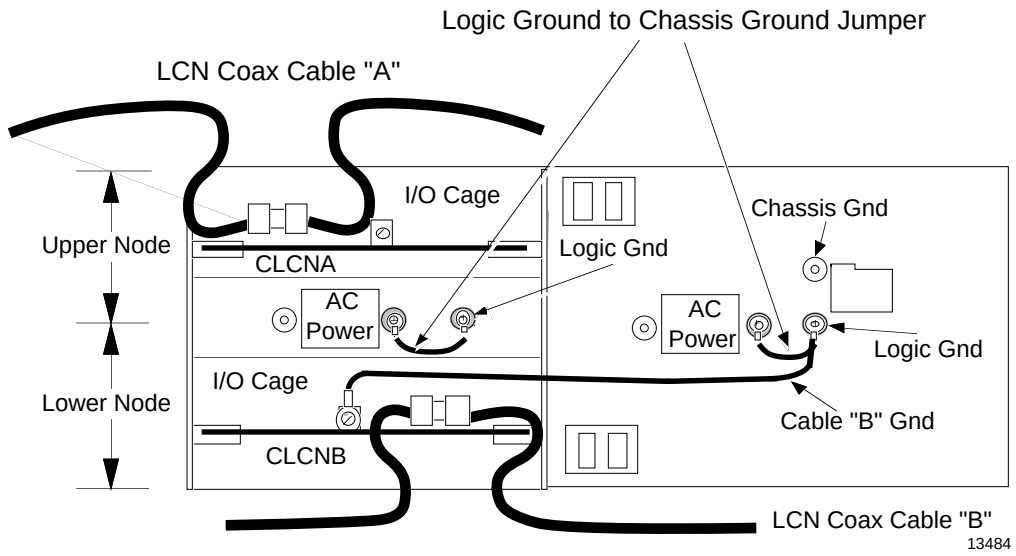

Figure 2-10— Ground Wire Installation on KLCNB for Coax Cable B Ground

2.9 PRECISION CLOCK PINNING (POWER SUPPLY REPLACEMENT)

The power supply has a pinning option for internal or external clock (see Figure 2-11). It is pinned for internal clock unless the Precision Clock Source option is installed.

If you are replacing the power supply, check the pinning on the old supply and ensure that the replacement is pinned the same.

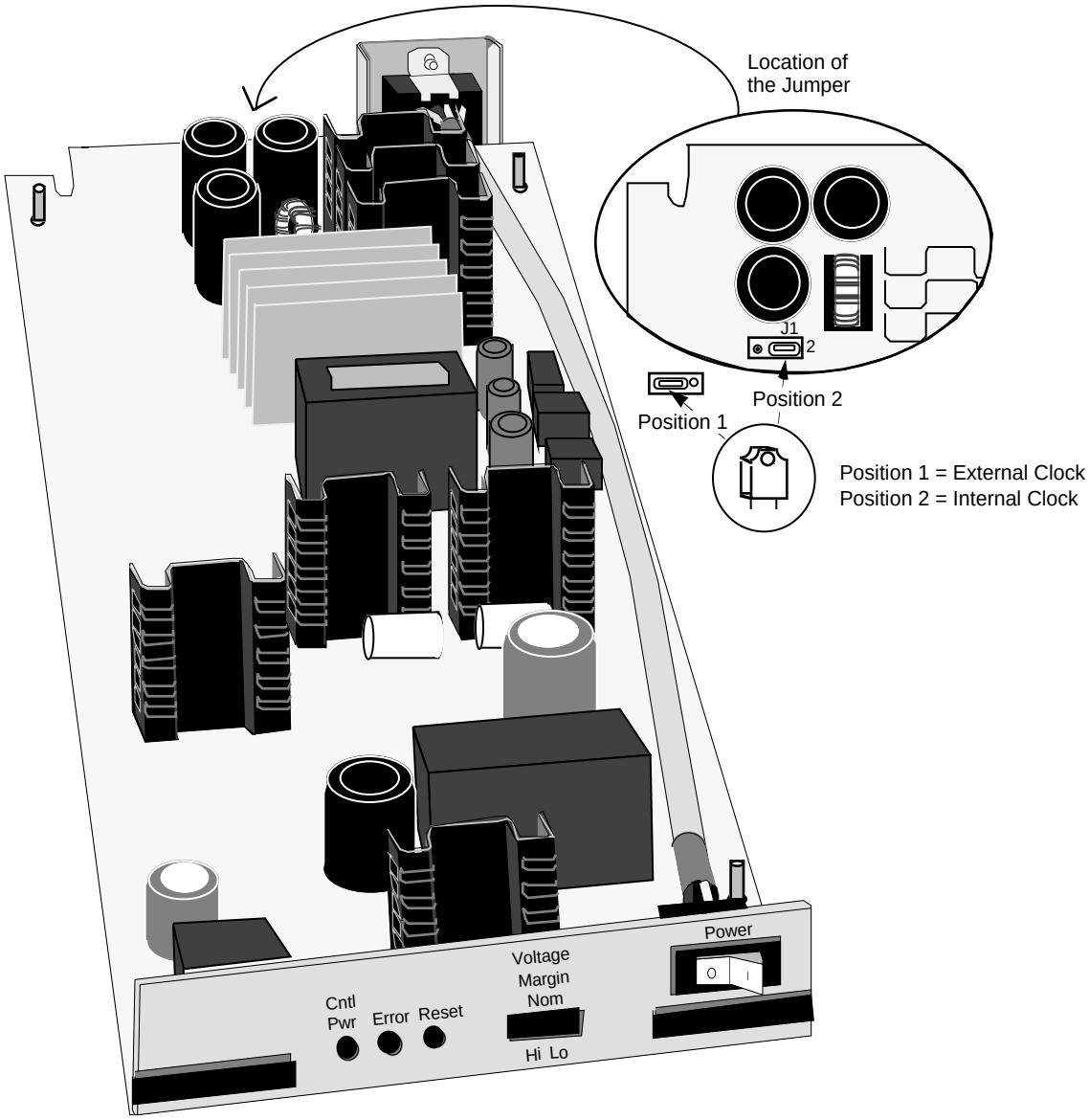

Figure 2-11 — Power Supply Showing Location of Clock Jumper 4242

The CE Compliant power supplies come from two vendors. The external clock source pinning is shown in Figures 2-12 and 2-13.

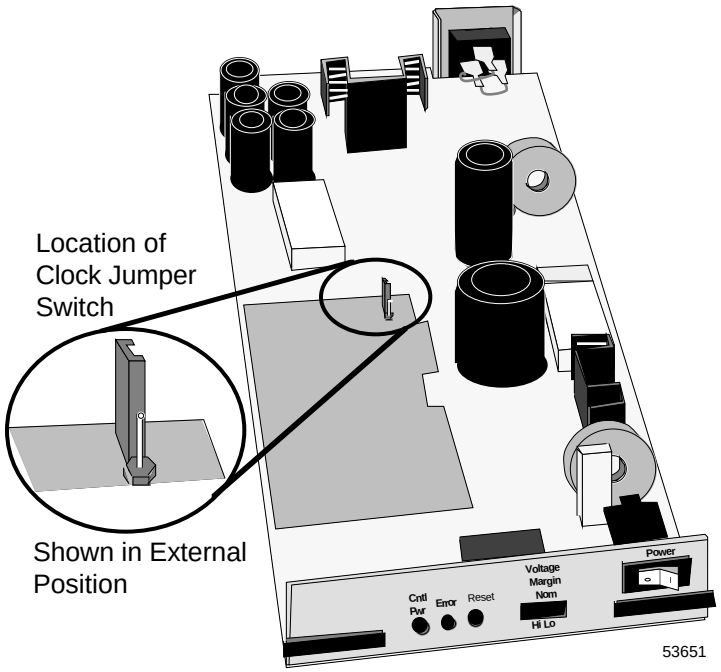

Figure 2-12 — CE Compliant Power Supply Showing Location of Clock Jumper

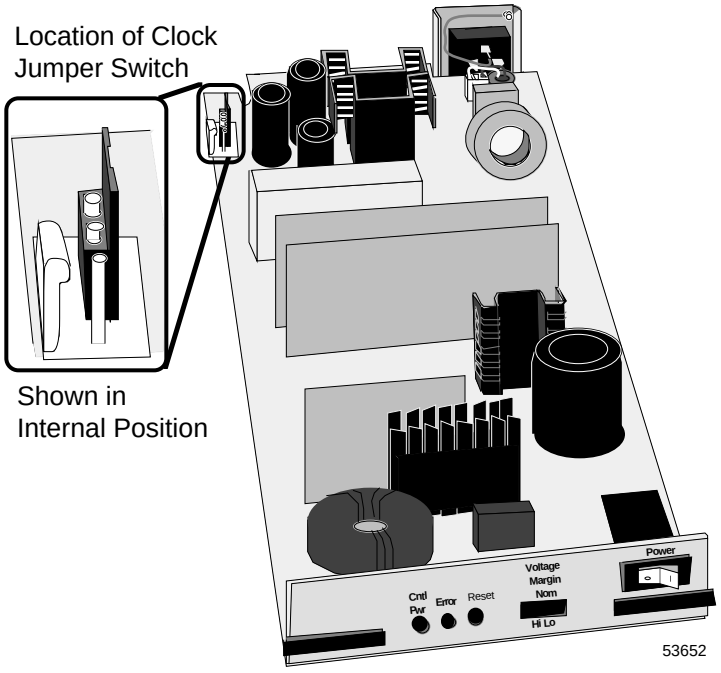

Figure 2-13 — CE Compliant Power Supply Showing Location of Clock Jumper

2.10 NIM MODEM BOARD PINNING

Location SW1 has the revision pinning for the NIM Modem board. This pinning reflects the revision of the board and **is never to be changed unless the board is updated**.

Location SW2 has the pinning for the UCN node address. This address is a binary weighted number and is used only in the **Test** mode. The address entered, is the address of the primary NIM and must be an odd number with odd parity (an odd number of switches must be in the ON position). See Figure 2-14.

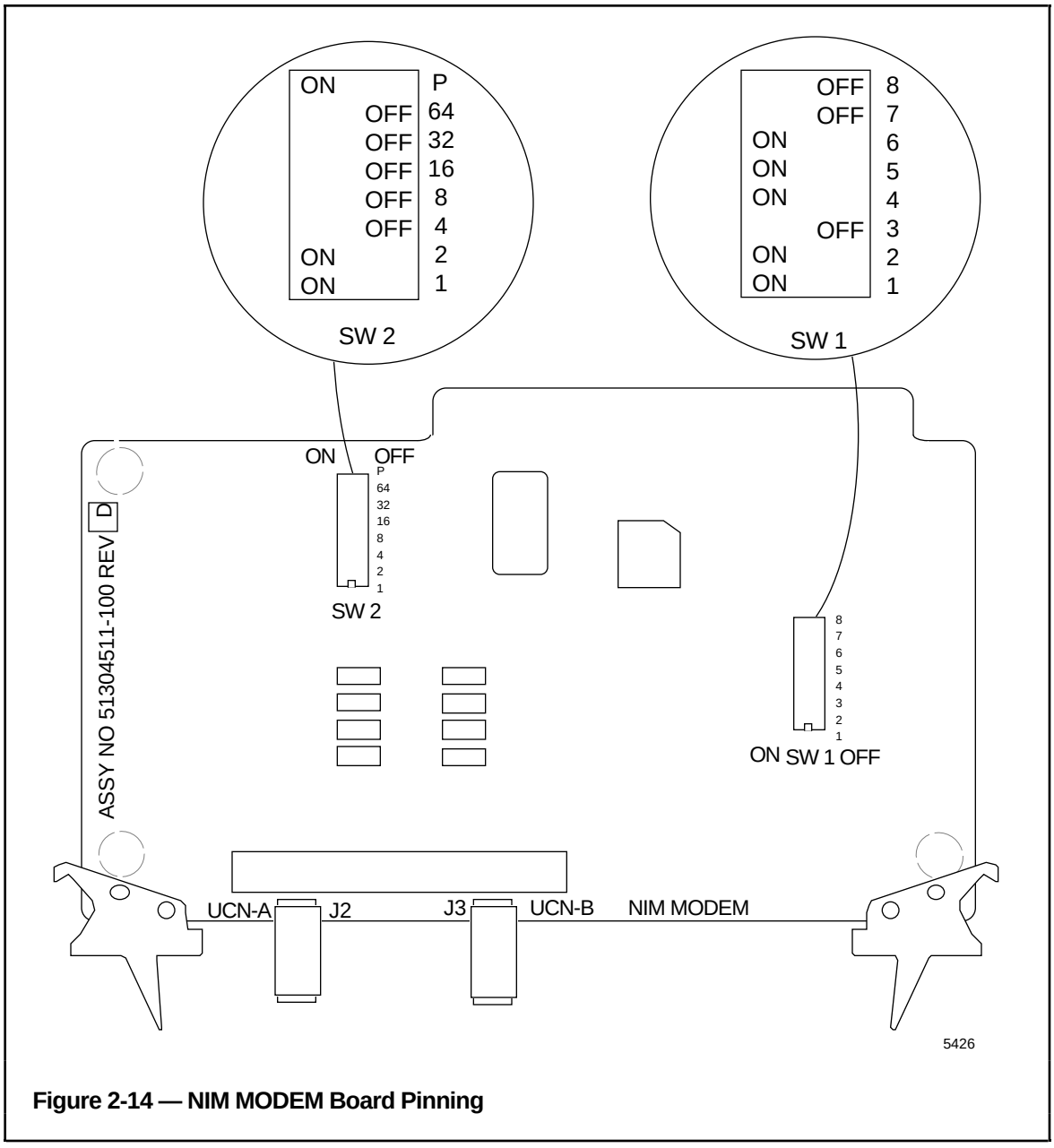

Figure 2-14 — NIM MODEM Board Pinning

The CE Compliant NIM Modem board pinning is shown in Figure 2-15.

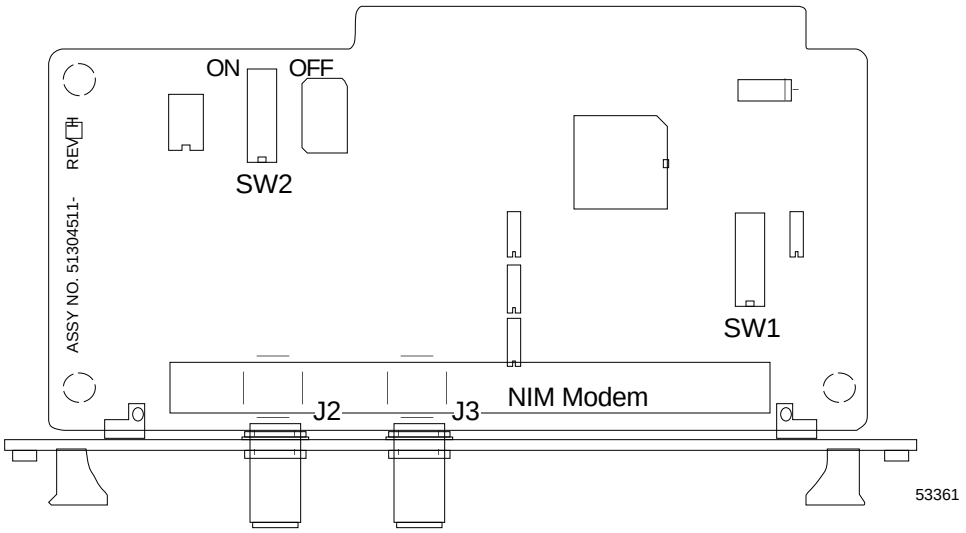

Figure 2-15 — CE Complianrt NIM Modem Board Pinning

2.11 POWER SUPPLY LOADING IN LCNE/LCNE2 HOST NODE

The LCN may be extended with one or more Fiber Optic Links. An otherwise empty node of a Dual Node Module may be used to host the LCNE/LCNE2 fiber optic transmit/receive boards. However, the LCNE/LCNE2 boards alone do not provide adequate load on the power supply to ensure that it will perform to specifications. A version of the KJMP board (51401594-200) with power supply loading resistors is used in this situation. Table 2-4 illustrates this configuration. The table indicates that more than one LCNE/LCNE2 could be installed in a node. While this is physically possible, system convention is to place the LCNE/LCNE2s on separate power supplies to prevent the loss of both Cable A and Cable B at the remote segment of the LCN if a power supply fails. If both nodes of a Dual Node Module are empty, each node could be used to host one of the two required LCNE/LCNE2s, because each node has a separate power supply.

NOTE

The LCNE2 board is a later revision of the LCNE board. They are functionally equivalent and your system may include either or both types.

Table 2-4— LCNE/LCNE2 Host Nodes

Lower Node		
Slot	**Front**	**Rear**
3		*Note*
2	KJMP	*Note*
1		LCNE/LCNE2

Upper Node		
Slot	**Front**	**Rear**
2	KJMP	*Note*
1		LCNE/LCNE2

Note: May be LCNE/LCNE2, FOC/XMTR, FOC/RCVR or empty.

CAUTION

Do not place a CS/R board in I/O Slot 1 of either node or serious damage can result.

TEST/TROUBLESHOOTING
Section 3

3.1 TESTS

Each node of the Dual Node Module is tested through firmware (in hardware) and software checks. Firmware tests built into the node provide two similar means of functionally checking the unit, whether or not it is connected to the LCN. The first firmware test starts when power is applied. Pressing the **RESET** button initiates a second (slightly different) firmware test.

Software tests start after the node is connected to the system. Loading the node personality, for example, initiates a software Quality Logic Test (QLT).

Figure 3-1 is a flow diagram showing the relationship of the hardware and software tests.

3.2 TEST PROCEDURES

Each node must have a K2LCN OR K4LCN installed and must have access to a KLCNA (or CLCN-A) and KLCNB (or CLCN-B) on the RS-485 bus before it can be fully tested.

3.2.1 Power-On Test

Initiate power-on tests by pressing the "1" side of the power switch. Note that the red LEDs on the boards light for a few seconds (less than two minutes); then they should turn off and the green LEDs should turn on as the node passes its Quality Logic Tests. When the tests are complete, each node's alphanumeric display (on the K2LCN or K4LCN board) indicates its node address. Ensure that the expected node address is displayed.

Check the power supply **POWER STATUS** LEDs. Be sure that the green LED is on and that the red LED is off. Check the red **FAN ALARM** LED to ensure that it is not on or blinking.

3.2.2 Reset Test

If this is not a History Module, press the **RESET*** button. The red LEDs should go on momentarily as above, and then should go out when the green LEDs come on. Recheck the power supply, board, and fan LEDs as above. Note that each alphanumeric display indicates its node address.

If any of the above conditions does not pass, refer to subsection 3.3, *Troubleshooting*.

WARNING

* In the case of the History Module only, if you press the RESET button indiscriminately while the system is operating, you may cause damage to the data stored on the disk drives. For more details, see subsection 3.2, *Troubleshooting*, in the *History Module Service* manual, part of the LCN *Service* binder.

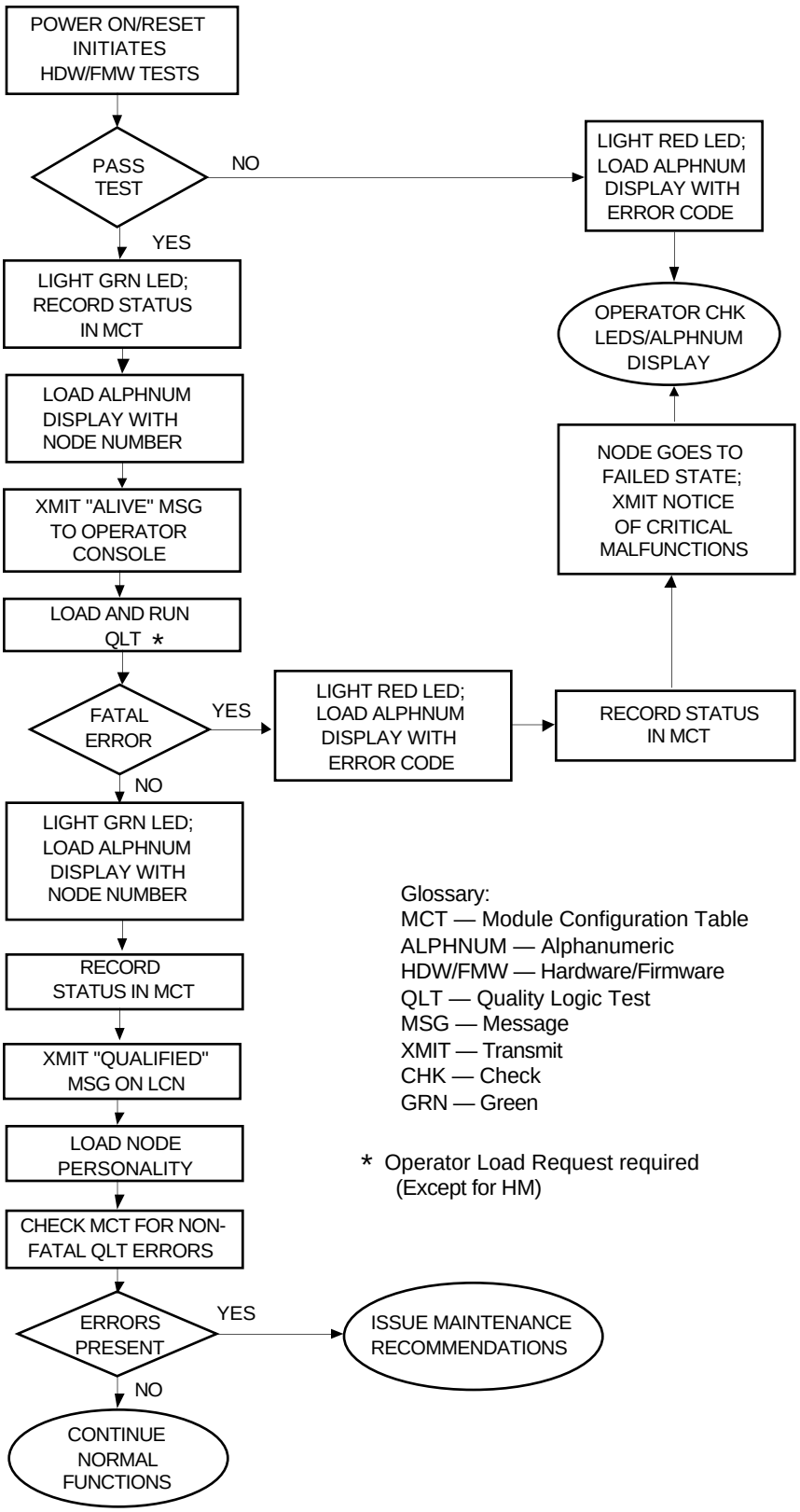

Figure 3-1 — Testing Flow Diagram

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3.2.3 Quality Logic Test

Load the node personality while observing the LEDs on the boards. The first part of the load process automatically loads and runs the Quality Logic Test. As the QLT runs, the red and green LEDs should cycle as they did during the power-on (firmware) test (see subsection 3.2.1). The QLT takes only a few seconds to run, whereas the firmware test takes considerably longer. When the QLT finishes, check that on all boards the green LED is on and no red LEDs are on. Check that the correct node address is displayed on the alphanumeric display on the K2LCN OR K4LCN.

3.3 TROUBLESHOOTING

The troubleshooting procedures in this manual are grouped by affected ORU and are keyed to the LED indicators and the alphanumeric display. First, a malfunction symptom is listed, then instructions are given to check or replace parts in order of the most likely causes. Perform the first indicated step, and then test. If the malfunction is still present, perform the next indicated step and test again, continuing in this manner until the malfunction is corrected. Do not perform the remaining steps after the malfunction has been corrected.

In the following procedures, the indicated LEDs are red unless otherwise stated. Refer to Section 4 for disassembly and assembly instructions.

The KLCNA (or CLCN-A) and KLCNB (or CLCN-B) boards were designed so that they can be replaced while power remains on. Also, the fan may be unplugged for a brief period for troubleshooting while power is on (see subsection 3.3.1). In all other cases, always turn power off before removing or replacing a part on the node, as this protects equipment from voltage transients and ensures proper initialization. You may turn power off for one node while leaving the other node on and operating. If you can't correct the fault by performing these procedures, refer to Appendix A for alphanumeric display troubleshooting. If you still cannot isolate the fault, contact the Honeywell Technical Assistance Center (TAC) in the U.S., or the equivalent service in your area. The telephone number for TAC is 1-800-822-7673 (1-602-863-5558 for Arizona callers).

CAUTION

All assemblies used in this module are likely to contain electrostatically sensitive devices. Use a personnel grounding strap and grounded work surfaces and equipment. Store and transport parts only in electrostatically safe containers.

The K2LCN OR K4LCN board has visual indicators to assist in troubleshooting. These indicators are shown in Figure 3-2. There is a green LED which indicates that the board has successfully completed its self-test program. There is a yellow LED which indicates that data is being transmitted to the LCN network. There is a red LED bar display which indicates errors at the end of the self-test program. Individual indicators in the bar display may blink during the self-test procedure. Successful completion of the self-test program is indicated when the green LED is on and all of the red LEDs in the bar display are off.

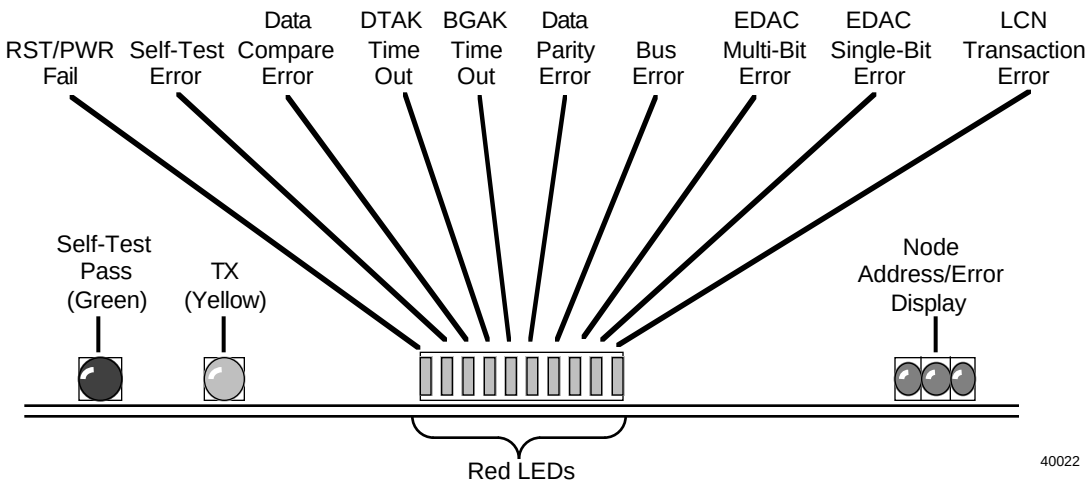

Figure 3-2 — K2LCN , K4LCN Diagnostic Indicators

The following acronyms or abbreviations are used in Figure 3-2:

MOD	Module
LCN	Local Control Network
RST/PWR	Reset/Power
DTAK	Data Transfer Acknowledge
BGAK	Bus Grant Acknowledge
EDAC	Error Detection and Correction

The K2LCN or K4LCN also has a three-digit alphanumeric display. If the self-test program completes without failure, this display will show the LCN node address which has been pinned on the K2LCN OR K4LCN board. If a failure occurs during the self-test program, the display will contain an error identification code preceded by a minus sign. Appendix A contains additional information on interpretation of the alphanumeric display.

3.3.1 Power Supply/Fan

No LEDs are on.

- Check that the power cord is plugged in and that the power switch is on. If they are, unplug the power cord and replace the power supply.

The red LED in the Power Status panel is on but the **FAN ALARM** LED is off.

- Unplug the power cord and replace the power supply.

FAN ALARM LED is on.

> **WARNING**
>
> Keep fingers and other objects clear of fans. They have rotating parts and sharp fan blades.

The Fan Assembly in the Dual Node Module is wired to both power supply connectors. It will operate if either (or both) of the power supplies are turned on. Therefore, if the module contains two power supplies, you must turn both power supplies off in order to turn the Fan Assembly off.

- With power applied to the node, loosen the two quarter-turn bail-headed fasteners holding the fan assembly, and quickly slide the assembly out of the module. If the fans are functioning properly, they will remain turning for a few seconds. After the fans have stopped, check for bearing drag by attempting to rotate the blades with your fingers. In order to prevent overheating of the node, do not leave the fan assembly out of the module for than two minutes while performing this diagnosis.

- If either or both fans are not turning, or if the bearings are dragging (if there is any noticeable resistance to turning), replace the fan assembly. If you do not have a replacement fan assembly with you, put the faulty unit back in while obtaining a replacement (assuming that the faulty unit is partially functional). This will provide some cooling.

- If the problem is still not corrected, check the fan power connector at the backplane. If no problems are observed, replace the power supply.

3.3.2 Controller Boards (FDC, CNI, DHI, CLI, SIO, SPC)

SELF TST/ERR light does not go out.

- Ensure that I/O board is properly installed.
- Replace controller board.
- Replace I/O board.

SELF TST/ERR light goes out, but **PASS MOD TEST** (green) light does not light on one controller.

- Replace controller board, and then board in slot below it, if present (three-board node).
- Replace K2LCN/K4LCN.

SELF TST/ERR light goes out, but **PASS MOD TEST** (green) light does not light on all controllers.

- Replace K2LCN/K4LCN.
- Remove top controller board, then apply power. Repeat for each controller board until fault is cleared. Retry extracted boards.

BUS TRAN ERR light is lighted on controller, and **DTAK TIME OUT** is lighted on the K2LCN/K4LCN.

- Replace controller board and board in slot below it, if present, one at a time.
- Replace K2LCN/K4LCN.

BUS TRAN ERR light is lighted on a controller, and **BGAK TIME OUT** is lighted on the K2LCN/K4LCN.

- Remove top controller board, then apply power. Repeat for each controller board until fault is cleared. Retry extracted boards.
- Replace K2LCN/K4LCN.

3.3.3 PLCI Board

NOTE

For additional information on troubleshooting the PLCI board, refer to the *PLC Gateway Planning, Installation, and Service* manual in the *Implementation/PLC Gateway* binder.

SELF TST/ERR light does not go out.

- Ensure that PLCI I/O board is properly installed.
- Replace PLCI board.
- Replace PLCI I/O board.

SELF TST/ERR light goes out, but **PASS MOD TEST** (green) light does not light on one controller.

- Replace PLCI board.
- Replace K2LCN/K4LCN.

SELF TST/ERR light goes out, but comes back on after the HG personality has been loaded.

- Incorrect software release or incorrect configuration. Refer to the *Programmable Logic Controller Gateway Planning, Installation, and Service* manual in the *Implementation/PLC Gateway* binder.
- Replace PLCI board.
- Replace K2LCN/K4LCN board.

BUS TRAN ERR light is lighted on PLCI.

- Replace PLCI board.
- Replace K2LCN/K4LCN.

3.3.4 Processor Board (K2LCN/K4LCN)

DATA PAR ERR and **BUS ERR** are lighted on K2LCN/K4LCN.

- Check the alphanumeric display. The first two characters indicate the slot number of the failed board. The third character is the failed test number. Refer to Appendix A for specific alphanumeric codes.
- Replace indicated board.
- Replace K2LCN/K4LCN.

3.3.5 EPDG Board

SELF TST/ERR light does not go out on EPDG.

- Replace I/O card.
- Replace EPDG.
- Replace K2LCN/K4LCN.

SELF TST/ERR light goes out on EPDG, but **PASS MOD TEST** (green) light does not light on EPDG.

- Replace I/O card.
- Replace EPDG.
- Replace K2LCN/K4LCN.

BUS TRAN ERR is lighted on EPDGP and **DTAK TIME OUT** is lighted on the K2LCN/K4LCN, but the **BUS ERR** light is not on.

- Replace I/O card.
- Replace EPDG.
- Replace K2LCN/K4LCN.

BUS TRAN ERR is lighted on EPDGP and **DTAK TIME OUT** and **BUS ERR** is lighted on the K2LCN/K4LCN

- Replace I/O card.
- Replace EPDG.
- Replace K2LCN/K4LCN.

3.3.6 EPNI Board

NOTE

The EPNI board is a later version of the PNI board.

The EPNI board is a controller board which interfaces the bus and processor in a similar way as the controller boards listed in subsection 3.3.2. First, check the **SELF TST/ERR** light (red - should be out) and **PASS MOD TEST** light (green - should be on) on the EPNI board.

The **SELF TST/ERR** light (red) is driven by a microprocessor on the EPNI board. If it is on, check for the following causes:

- There was a hardware failure on the EPNI board.
- A problem was detected on-line (for instance, there may have been an EPNI local RAM parity error or a duplicate address may have been detected).
- The node was shut down (stunned) due to a watchdog timeout.
- The number of raw errors detected exceeded a preset threshold, causing the software on the EPNI board to enter the failed state.

If the state of the **SELF TST/ERR** light and **PASS MOD TEST** light are correct, continue with this instruction. Under normal system operating conditions, the following indicators and connections are present on the EPNI board:

- **Red LEDs** are out.
- **Green LED** is on.
- The **TX yellow LED** either blinks on and off (indicating traffic) or stays on (heavy traffic).

Check that there are no disconnected or broken cables. If part of the UCN has failed, the failure reporting and diagnostic tests included in the software will help isolate the problem.

3.3.7 Fiber Optic Extender Boards (LCNE/LCNE2, FOCT, FOCR, LCNFL, CS/R)

NOTE

The LCNE2 board is a later revision of the LCNE board. They are functionally equivalent and your system may include either or both types.

3.3.7.1 Normal Indicators

Under normal system operating conditions, the following indicators and switch settings are present on the LCNE Extender Set.

- **Red LED** is out.
- **Green LED** is on.
- **Yellow LED** is either blinking on and off (indicating traffic) or stays on (heavy traffic).
- **RUN/RESET** switch on the LCNE or LCNE2 is in the run position.

3.3.7.2 Troubleshooting Indicators

If a remote segment has gone dead, check the following:

1. **Red LED on all LCNE or LCNE2 boards should be off**. If a red LED is on, the Antijabber Flag is set. The failure that caused this to happen is on the board with the LED on. Replace that board using the procedures in *LCN Guidelines*, part of the *LCN Installation* binder. See Section 7, *LCNE and Fiber Optic Link Service*, in that manual.
2. **Green LED on LCNE or LCNE2, FOCR, LCNFL must be on steady**. If a green LED is not lit (or is flickering), there is not enough light power being received from the fiber optic cable. Check the following:
    a. Cable integrity: Check for cut, damaged, or kinked cable.
    b. Light received: Measure the light power at the receiving end of the cable. A minimum of 2.5 µW must be measured.
    c. Light transmitted: Measure the light power at the transmitter, a minimum of 50 µW must be measured, using a one-meter length of fiber optic cable.
3. **Yellow indicator should be on as data traffic is passed**.

If a fiber optic connection that had previously worked ceases to do so, and no fault can be found with the LCNE/LCNE2/FOCT/FOCR boards, make the power measurements discussed in *LCN Guidelines*, part of the *LCN Installation* binder. See Section 5, *Post-Installation Power Measurement*, in that manual.

3.3.8 RS-485 to LCN Converter Boards CLCNA (OR KLCNA), CLCNB (OR KLCNB)

For information on troubleshooting LCN problems, see Section 4 in *LCN Guidelines, Implementation, Troubleshooting, and Service* in the *LCN Installation* binder.

If replacement of a CLCNA or CLCNB board is indicated, the following points are important to know. Read all of the following points before beginning the replacement procedure.

- If the CLCNA or CLCNB being replaced is one which has a coaxial cable grounding wire on it (refer to Figure 2-6), use the following procedure. Before disconnecting the LCN coaxial cable from the CLCNA or CLCNB, connect one end of a clip lead to a metal part of the BNC Tee-connector and connect the other end of the clip lead to Logic Ground. This procedure maintains LCN cable ground during the board replacement, allowing communications to continue over the cable.

- Before removing the CLCNA or CLCNB, disconnect the LCN cable by disconnecting the BNC tee from the coaxial connector on the CLCNA or CLCNB. Do not remove the individual cables from the tee—they must remain connected so that communications can continue among the other nodes.

- The CLCNA and CLCNB boards were designed to be plugged and unplugged from the I/O card cage with power on. Therefore, it is not necessary to turn off power to the node during CLCNA or CLCNB board replacement. DO NOT do this with any other board type or substantial damage may occur.

- While the BNC tee is disconnected from the CLCNA or CLCNB, remember that there are exposed metal parts on this Tee-connector (and the clip lead if present), and these parts are at ground potential. Do not allow these metal parts to contact other components, or errors or damage may result.

The CLCN-A and CLCN-B board assemblies have replaced the CLCNA and CLCNB board in current production and are functional on the same boards.

3.3.9 NGI Board

SELF TST/ERR light does not go out.

- Ensure that NGIO board is properly installed.
- Replace NGI board.
- Replace NGIO board.

SELF TST/ERR light goes out, but **PASS MOD TEST** (green) light does not light on one controller.

- Replace NGI board, and then the other NGI board in slot below it, if present (three-board, redundant cable node).
- Replace K2LCN/K4LCN.

SELF TST/ERR light goes out, but **PASS MOD TEST** (green) light does not light on all controllers.

- Replace K2LCN/K4LCN.
- Replace NGI board, then apply power. Repeat for other NGI board, if present. Retry extracted boards.

BUS TRAN ERR light is lighted on controller, and **DTAK TIME OUT** is lighted on the K2LCN/K4LCN.

- Replace NGI board, then apply power. Repeat for other NGI board, if present. Retry extracted boards.
- Replace K2LCN/K4LCN.

BUS TRAN ERR light is lighted on a controller, and **BGAK TIME OUT** is lighted on the K2LCN/K4LCN.

- Replace NGI board, then apply power. Repeat for other NGI board, if present. Retry extracted boards.
- Replace K2LCN/K4LCN.

The **TX** (yellow) light indicates transmit activity. If this light is not on, troubleshoot the Plant Information Network (PIN) cables and other interfaces.

CAUTION

There is a test jumper on the front of the NGI board (near the indicator lamps described above). This jumper has two positions, **TEST** and **NORMAL**. This jumper should always be in the **NORMAL** position when the network is operating. Placing this jumper in the **TEST** position may disrupt operation of other nodes operating on the PIN.

DISASSEMBLY/ASSEMBLY
Section 4

4.1 DISASSEMBLY

WARNING

To protect equipment from voltage transients and ensure reliable operation, always turn power off before removing or replacing boards in a node. While working on one node in a Dual Node Module, you may leave the power on for the other node, leaving it operational. It is **NOT** necessary to turn off power to replace a KLCNA or KLCNB (see subsection 3.3.8).

Disassemble the module only to the extent necessary to service or replace defective parts. The following procedures may require the use of a blade-tip screwdriver, nut drivers, a personnel grounding strap, and antistatic fixtures and equipment. Item numbers enclosed in parentheses in the procedures below refer to circled numbers in the exploded module diagram, Figure 4-1, and are keyed to the item numbers in *Spare Parts*, Section 5.

1. Remove the front panel (1) by turning the two quarter-turn fasteners on the right side of the panel. Gently pull the right edge of the front panel away from the chassis approximately one inch and then slide the panel to the right, approximately one-half inch, until the panel is free. Do not attempt to swing the panel open like a door, or damage will result.

CAUTION

All assemblies used in this module are likely to contain electrostatically sensitive devices. Use a personnel grounding strap and grounded work surfaces and equipment. Store and transport parts only in electrostatically safe containers.

2. Remove the boards (2) by pulling out on the retainers and sliding the boards out of the chassis.

3. Remove the fan assembly (3) by loosening the two quarter-turn bail-headed fasteners and sliding the assembly out of the module.

4. Remove the power supply (4) by pulling the retainers, and sliding the supply out of the chassis.

5. Remove the I/O boards (5) from the rear chassis.

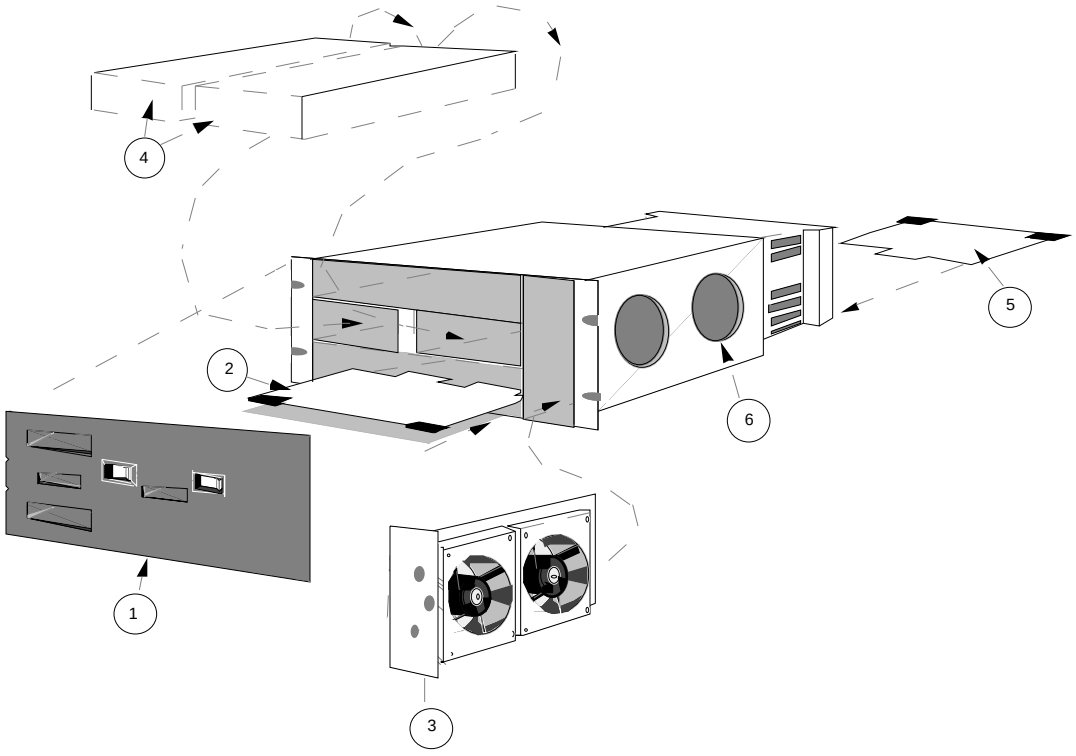

Figure 4-1 — Module Exploded View 4122

NOTE

Before inserting a replacement board:

1. Make certain that the replacement board is at a revision level equal to, or later than, the board being replaced.

2. Make certain that any pins or switch settings (e.g., the node address on the K2LCN OR K4LCN board) match those on the board being replaced. See subsection 2.7 for additional information on pinning options.

4.2 ASSEMBLY

1. Insert I/O boards (5) in the rear chassis, taking care not to damage connectors, and secure the board retainers. Also, be sure that the I/O boards match the primary boards.

2. Insert the power supply (4) into the chassis and secure the retainers.

3. Insert the fan assembly (3) into the chassis and secure the bail-headed screws.

4. Insert the boards (2) into the chassis and secure the retainers.

5. Install the front panel (1) to the chassis (6) and secure the quarter-turn fasteners.

SPARE PARTS
Section 5

5.1 INTRODUCTION

Table 5-1 lists spare parts for the module. Those parts at the ORU level are marked with an asterisk (*). The listing is arranged in item-number order with the items keyed to the circled numbers in Figure 4-1. Also listed are those boards required for the various Dual Node Module configurations, referenced in Tables 2-2 and 2-3. In some cases more than one part is assigned to an item number (for instance, any one of several board assemblies can occupy a slot in the module). In this case, the list is in numerical order by part number.

Table 5-1 — Parts List

Item	Description	Part Number
1	Dual Node Module Front Panel Assembly	* 51401486-100
2	CLI Board Assembly, Computer/LCN Interface	* 80360206-001
	CNI Board Assembly, Computer Network Interface	* 51401088-100
	DHI Board Assembly, Data Hiway Interface	* 51400700-100
	EAMR, Enhanced Application Module Redundancy	* 51401996-100
	EPDG Board Assembly, Enhanced Peripheral Dsply. Gen.	* 51401286-100
	EPNI Board Assembly, Enhanced Network Interface	* 51401583-100
	FDC Board Assembly, Floppy Disk Controller	* 51400669-100
	K2LCN Board	
	With 2 megabyte of memory	* 51401551-201
	With 3 megabyte of memory	* 51401551-301
	With 4 megabyte of memory	* 51401551-401
	With 6 megabyte of memory	* 51401551-601
	With 8 megabyte of memory	* 51401551-801
	K4LCN Board without memory	* 51401946-100
	4 megabyte of memory	* 51201645-400
	8 megabyte of memory	* 51201645-800
	16 megabyte of memory	* 51201645-160
	KJMP Board, Power Supply Load Application	* 51401594-200
	NGI Board Assembly, Network Gateway Interface	* 51401583-200
	PLCI Board Assembly, Programmable Logic Ctrl. Gateway	* 51400997-100
	PNI Board Assembly, Network Interface Module	* 51400955-100
	SIO Board Assembly, System Input/Output	* 51400855-100
	SPC Board Assembly, Smart Peripheral Interface Cont.	* 51401052-100

(Continued)

Table 5-1 — Parts List (Continued)

Item	Description	Part Number
3	Dual Node Fan Assembly	* 51401496-100
4	Dual Node Power Supply	* 51401497-100
	LCN Power Supply Replacement Kit (includes new power cord)—New **CE Compliant Power Supply for all modules** Dual Node, Classic Furniture 120 Vac Dual Node, Classic Furniture 1240 Vac Dual Node, Classic Furniture 120/240 Vac	 * 51402184-100 * 51402184-200 * 51402184-300
5	CLCN-A, LCN I/O Board (Dual Node LCN Coax A I/O Board) EC	* 51305072-200
	CLCN-A, LCN I/O Board (Dual Node LCN Coax A I/O Board) Replaces KLCN-CA	* 51305072-500
	CLCN-A, LCN I/O Board (Dual Node LCN Coax A I/O Board) EC	* 51305072-800
	CLCN-A/B, LCN I/O Board	* 51305072-400
	CLCN-A/B, LCN I/O Board EC	* 51305072-700
	CLCN-B, LCN I/O Board (Dual Node LCN Coax B I/O Board) EC	* 51305072-300
	CLCN-B, LCN I/O Board (Dual Node LCN Coax B I/O Board) Replaces KLCN-CB	* 51305072-600
	CLCN-B, LCN I/O Board (Dual Node LCN Coax B I/O Board) EC	* 51305072-900
	CLI I/O, Communications Line Interface I/O (RS-232C)	* 80360209-001
	CLI I/O, Communications Line Interface I/O (RS-449)	* 80360230-001
	CLI/A, Communications Line Interface (RS-449) EC	* 51196701-100
	CNI I/O, Communications Network Interface	* 51304537-100
	CNI, Communications Network Interface I/O Board EC	* 51304537-200
	Data Hiway Interface I/O	* 51108088-100
	DHI, Data Hiway Interface I/O Board EC	* 51108088-200
	EPDG I/O, Enhanced Peripheral Display Generator I/O	* 51304270-100
	EPDGC-1, Enhanced Peripheral Display Generator I/O Board-1 EC	* 51402447-100
	EPDGC-2, Enhanced Peripheral Display Generator I/O Board-2 EC	* 51402447-200
	EPDGP I/O, Enhanced Peripheral Display Generator I/O (replaces EPDG I/O)	* 51304584-300
	EPLCI I/O, Enhanced Programmable Logic Controller Interface I/O	* 51304812-100
	EPLCI I/O, Enhanced Programmable Logic Controller Interface I/O EC	* 51304812-200
	FDC I/O, Floppy Disk Controller I/O	* 51109336-100

(Continued)

Table 5-1 — Parts List (Continued)

Item	Description	Part Number
	FOC/RCVR, Fiber Optic Link Receiver Board EC	* 51304161-400
	FOC/XMTR, Fiber Optic Link Transmitter Board EC	* 51304161-300
	FOCR, Fiber Optic Clock Receiver	* 51304161-200
	FOCT, Fiber Optic Clock Transmitter	* 51304161-100
	LCNE, Local Control Network Extender	* 51109881-100
	LCNE2, Newer version of LCNE	* 51304540-100
	LCNE2, LCN Extender EC	* 51304540-200
	LCNFL, Local Control Network Fiber Optic Link	* 51108899-100
	LCNFL, LCN Fiber Optic Link EC	* 51108899-200
	NG FOM, Network Gateway Fiber Optic Modem EC	
	NGIO, Network Gateway I/O Board	* 51304472-100
	NIM MODEM, NIM Modem I/O board (put in PNI I/O slot)	* 51304511-100
	NIM Modem, NIM Modem I/O EC	* 51304511-200
	PLCG Relay, Programable Logic Controller Gateway Relay Board	* 51304421-100
	PLCG Relay, Programable Logic Controller Gateway Relay Board EC	* 51304421-200
	PLCI I/O, Programmable Logic Controller Interface I/O	* 51195096-100
	PLCI I/O, Programable Logic Controller Interface I/O Board EC	51195096-200
	PNI I/O, Process Network Interface I/O	* 51303944-100
	PNM I/O, Process Network Modem I/O	* 51303947-100
	SIO I/O, Serial Input Output Interface I/O	* 51108843-100
	SIOI-OE, Serial Input Output I/O Enhanced	* 51304814-100
	SIOI-OE, Serial Input Output I/O Enhanced EC	* 51304814-200
	SPC I/O, Smart Peripheral Controller I/O	* 51304156-100
	SPC-2, Smart Peripheral Controller I/O Board	* 51304907-100
	SPC-2, Smart Peripheral Controller I/O Board EC	* 51304907-200
	SPC-3 I/O, Smart Peripheral Controller I/O Board EC	* 51305088-100

(Continued)

Table 5-1 — Parts List (Continued)

Item	Description	Part Number
	TP485 LCN Interface Board	* 51304776-100
	TP485 LCN Interface Board	* 51304776-200
	TP485-3, TP485 LCN Interface Board EC	* 51304776-300
	TP485-4, TP485 LCN Interface Board EC	* 51304776-400
	WDI, Winchester Drive Interface EC	* 51304903-200
	WDI, Winchester Drive Interface	* 51304903-100
6	Dual Node Module Assembly for Classic Furniture	* 51195752-100
	Dual Node Module Assembly for Ergonomic Furniture	* 51403144-100
	Dual Node Module Assembly for Classic Furniture (CE Compliant)	* 51196727-100
	Dual Node Module Assembly for Ergonomic Furniture (CE Compliant)	* 51196728-100
MISC.	Coax Terminator	30732052-001
	Relay, Solid State (Used on PLCG Relay Switch Board)	* 51190516-100
	Relay, DC Gen. Pur. (Used on PLCG Relay Switch Board)	* 51190526-100
	BNC Tee-Connector	51190728-105
	RS-485 Terminator Assembly	51195511-100
	Ground Cable (Logic to Chassis Ground)	51195754-100
	Ground Cable (LCN Cable Ground)	51195791-100
	PLCG Relay Switch Board Assembly	* 51304421-100
	RS-232 Jumper Cable	51304694-100

STARTUP
Section 6

6.1 VISUAL CHECKS

- Check the Module power and signal cables to ensure that they are present and tight.
- Check the ground strap on rear of chassis for good connection.
- Ensure that all boards and power supply(s) are fully inserted into the connectors and that board retainers are secured.

6.2 INITIALIZE NODE

- Turn the power on by pressing the "1" side of the power switch. After 2 minutes or less, all red LEDs should be off and all green LEDs should be on, and the alphanumeric display should indicate the address of the node. If not, check indicators and LEDs in accordance with subsection 3.2, *Test Procedures*.
- If this is not a History Module, press the **RESET*** button. Check displays and LEDs as above.

WARNING

* In the case of the History Module only, if you press the RESET button indiscriminately while the system is operating, you may cause damage to the data stored on the hard disk. See subsection 3.2, *Troubleshooting*, in the *History Module Service* manual, part of the *LCN Service* binder, for complete details.

NOTE

When you replace or restart a board or module with an outstanding maintenance recommendation, be sure to make an SMCC corrective action entry. Otherwise, the system will not start a recount of errors. See the *System Maintenance Guide* in the *LCN Service* binder for additional information on this procedure.

ALPHANUMERIC DISPLAYS
Appendix A

The alphanumeric display aids troubleshooting by displaying codes provided by firmware and software test programs. In interpreting the codes, pay special attention to the left-most element. As shown in Figure A-1, this element can have four distinct states, and reading the display correctly is critical to interpreting the code.

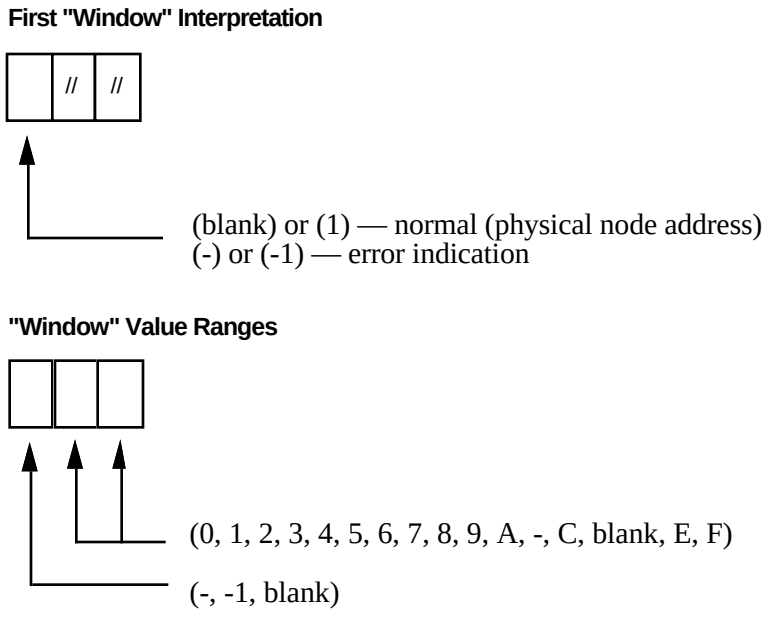

Figure A-1 — Three-Window Display Interpretation 2470

NOTE

Section 4 of the *Messages Directory* in the *LCN Implementation/Startup & Reconfiguration -1* binder contains additional information on some of the error codes.

CAUTION

The error code interpretations that follow do not apply while the node is executing test software such as HVTS.

A.1 Recommended Actions for Specific Code Occurrences

Please note, when multiple recommendations are given for a window code-value, they are organized in order from most to least likely.

Recommendations marked with * indicate an unimplemented code-value. Any such occurrence should be brought to the attention of Honeywell TAC.

Window values marked as | // | are “don’t care” values.

-	0	//

replace the K2LCN OR K4LCN*

-	1	n

n=(-)	replace the K2LCN OR K4LCN; replace the boards in slots 2 and 3 in turn if present
n=(1 thru 8)	replace the K2LCN OR K4LCN
n=(other)	replace the K2LCN OR K4LCN*

-	2	N

n=(1 thru 7)	replace the board in slot 2; replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly
n=(-) or (C)	replace the board in slot 2; replace the K2LCN OR K4LCN; replace the board in slot 3 if present; replace the module backplane or chassis assembly
n=(other)	replace the K2LCN OR K4LCN*

-	3	n

n=(1 thru 7), (-) or (C)	replace the board in slot 3 if present; replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly
n=(other)	replace the K2LCN OR K4LCN*

-	4	n

n=(1 thru 7), (-) or (C) — replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly

n=(other) — replace the K2LCN OR K4LCN*

-	5	n

n=(1 thru 7), (-) or (C) — replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly

n=(other) — replace the K2LCN OR K4LCN*

-	6	n

n=(1 thru 7), (-) or (C) — replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly

n=(other) — replace the K2LCN OR K4LCN*

-	7	n

n=(1 thru 7), (-) or (C) — replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly

n=(other) — replace the K2LCN OR K4LCN*

-	8	n

n=(1 thru 7), (-) or (C) — replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly

n=(other) — replace the K2LCN OR K4LCN*

-	9	n

n=(1 thru 7), (-) or (C)	replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly
n=(other)	replace the K2LCN OR K4LCN*

-	A	n

n=(A) or (C)	replace the K2LCN OR K4LCN
n=(other)	replace the K2LCN OR K4LCN*

-	-	//	replace the K2LCN OR K4LCN*

-	C	//	replace the K2LCN OR K4LCN*

-		n

n=(A)	if value persists beyond 30 seconds, replace the K2LCN OR K4LCN
n=(other)	replace the K2LCN OR K4LCN*

-	E	n

n=(0)	an unexpected interrupt has occurred - replace the K2LCN OR K4LCN
n=(1)	replace the K2LCN OR K4LCN; replace the boards in slots 2 and 3 in turn
n=(2)	no working DRAM - replace the K2LCN OR K4LCN
n=(3)	suspected program error, - replace the K2LCN OR K4LCN
n=(5)	unverified cause of Level 7 interrupt, - replace the K2LCN OR K4LCN; replace the power supply
n=(other)	replace the K2LCN OR K4LCN*

-	F	//

replace the K2LCN OR K4LCN*

-1	0	n

n=(1 thru 7), (-) or (C)	replace the K2LCN OR K4LCN; replace the module backplane or chassis assembly
n=(other)	replace the K2LCN OR K4LCN*

-1	1	//

replace the K2LCN OR K4LCN*

-1	2	//

replace the K2LCN OR K4LCN*

-1	3	//

replace the K2LCN OR K4LCN*

-1	4	//	replace the K2LCN OR K4LCN*

-1	5	//	replace the K2LCN OR K4LCN*

-1	6	//	replace the K2LCN OR K4LCN*

-1	7	n

n=(0), (1)	check for a duplicate node number; check the BNC connectors; check/replace the LCN cable; replace the CLCN (KLCNA) or CLCNA (KLCNB); replace the K2LCN OR K4LCN
n=(2 thru 5)	replace the K2LCN OR K4LCN; check/replace the K2LCN OR K4LCN or LCN in other nodes
n=(6)	replace the Winchester (drive or interface)
n=(7 thru 9)	reload the node; replace the K2LCN OR K4LCN
n=(other)	replace the K2LCN OR K4LCN* or other board in the node that could be hanging up the bus.

-1	8	n

n=(0 thru 2)	replace the EPDG board
n=(3)	reload the node; replace the K2LCN OR K4LCN
n=(4,5,8)	check for proper release version of the software; reboot the system
n=(9)	check/replace the LCN cable; check for proper release version of the software; replace the K2LCN OR K4LCN
n=(A,C,E,F)	suspect the load image - check the software release version and reload the node
n=(other)	replace the K2LCN OR K4LCN*

-1	9	n

n=(0,3,4,5)	reboot the system
n=(1 or 2)	record the error messages and call Honeywell TAC
n=(6)	use SMCC to find defective board
n=(7,8)	check memory capacity; replace the K2LCN OR K4LCN; check and reload the software
n=(9)	check and reload the software; replace the K2LCN OR K4LCN
n=A	Replace K2LCN OR K4LCN
n=(other)	replace the K2LCN OR K4LCN*

-1	A	//

replace the K2LCN OR K4LCN*

-1	-	//

replace the K2LCN OR K4LCN*

-1	C	//

replace the K2LCN OR K4LCN*

-1		//

replace the K2LCN OR K4LCN*

-1	E	n

n=(2)	replace the board in slot 2
n=(3)	replace the board in slot 3 if present
n=(other)	replace the K2LCN OR K4LCN*

-1	F	n

n=(0 thru 8), (E) or (F)	replace the K2LCN OR K4LCN
n=(9) or (A)	replace the K2LCN OR K4LCN*
n=(-) or (C)	replace the CLCNA (KLCNA) or CLCNB (KLCNB); if the error repeats, look for bus problems
n=(other)	check and/or replace the backplane or chassis assembly

REPLACEMENT OF K2LCN WITH K4LCN
Appendix B

This appendix gives the procedure for replacing an K2LCN processor with a K4LCN. It also gives the restrictions and conditions that apply to the replacement procedure.

B.1 INTRODUCTION

This procedure enables a trained technician to replace an K2LCN processor board with a high density 68040-based K4LCN processor board in a Five-Slot or Ten-Slot Module LCN node. The K4LCN board requires software release R500 (or later). To be a candidate for this replacement, the module cannot contain a Clock Source/Repeater board, or any processor with special firmware (such as PCIM). If the module is one of a redundant pair, both processor boards must be replaced with K4LCNs. The K4LCN board provides a processor, LCN interface, clock translation, and contains four, eight or sixteen megawords of on-board memory.

WARNING

REPLACING AN K2LCN WITH A K4LCN REQUIRES TURNING OFF POWER TO THE NODE, AND MUST BE PERFORMED AT AN APPROPRIATE TIME TO AVOID DISTURBANCE TO THE PROCESS AND POTENTIALLY HAZARDOUS CONSEQUENCES TO EQUIPMENT AND PERSONNEL. DETERMINE IN ADVANCE THAT THE SCHEDULING OF THIS PROCEDURE IS IN ACCORDANCE WITH PROPER SYSTEM OPERATION.

WARNING

THE K4LCN CANNOT BE USED IN ANY MODULE CONTAINING A CLOCK SOURCE/REPEATER (CS/R) BOARD. INSTALLING A K4LCN IN THE SAME MODULE WITH A CS/R BOARD MAY DAMAGE THE BACKPLANE AND CAUSE THE ENTIRE MODULE TO FAIL.

B.2 RESTRICTIONS TO TOTAL REPLACEMENT

If you are contemplating the replacement of all K4LCN processors in Five/Ten-Slot Modules, be aware that the Clock Source/Repeater board is the single point ground connection for the LCN cable shield. Therefore, even if the 12.5 kHz (Subchannel) clock function is not being used, a CS/R or other grounding means is still required on each coax segment.

Dual Node Modules can be connected to provide that single point ground without requiring a CS/R. See *Dual Node Module Service* in this binder. If there are no Dual Node Modules on the coax segment to provide that ground, then total replacement can only be accomplished by replacing two Five-Slot Modules with two Dual Node Modules.

B.3 PREREQUISITES

The system must be up and running on Software Release 500 or later before performing the processor replacement. **You must have an LCN I/O card of revision T or later** (either in the module or in spares). **If the card in your module is an LCNFL, it (or one in spares) must be a revision F (or later).**

B.4 NODE APPLICABILITY

Check that the K4LCN replacement is applicable to the intended node:

1. Visually confirm that there is **NOT** a Clock Source/Repeater (CS/R) board in the rear of the module. If there is a CS/R board and if it is necessary to replace the processor board in this node, replace it with the same type processor board. Obtain the same type processor board from the spare parts supply or from another node in the network. If you remove a processor from another node, replace it with a K4LCN per this procedure. Be sure, however, that the memory and other requirements of this procedure are met.

2. For performance compatibility, processor board types in redundant node pairs should not be mixed. If you must replace a processor board and the affected node is one of a redundant pair, a K4LCN processor board must be installed in its partner also. See subsection B.6 below.

B.5 MEMORY SIZE

Determine the amount of memory in the node, including all memory boards and any memory on the processor board to be replaced. The replacement K4LCN must have at least this much memory. Having more memory is not a problem. Because the K4LCN board is available with different memory sizes, ensure you are installing the right size by comparing the tab portion (last three digits) of the part number on your board with the following table:

51401996-100 = 4 megawords
51401996-200 = 8 megawords
51401996-300 = 16 megawords

B.6 REDUNDANT MODULE REPLACEMENTS

1. This section applies only to a redundant Network Interface Module (NIM), Hiway Gateway (HG), or Programmable Logic Controller Gateway (PLCG).

2. Determine in which unit, the primary or secondary, you want to perform the replacement first. The recommended procedure would have you replace the processor in the primary unit first. This will require that you fail-over the primary to the secondary, making the primary available and allowing you to confirm good operation of both units. It is acceptable to perform the replacement to the secondary first, but you will not have validated the secondary's good operation prior to the board changes. In either case, you **must be certain that the intended unit is the backup**. When it is necessary to cause an intentional fail-over, follow the procedure below:

   At a Universal Station, perform a Shutdown to the intended unit. This will cause an "orderly" shutdown to the "POWER ON" condition and notify all nodes that the unit is being shut down, as well as cause the backup to take over as the active unit. If the backup, now the active primary, has successfully performed the "takeover," you are ready to proceed to subsection 1.7, step 2, below. When subsections B.7 through B.10 are completed on the first unit, repeat them on the second unit.

B.7 DISASSEMBLY

1. If the node is "ON LINE," go to a Universal Station and execute a shutdown to the intended unit. This will perform a "controlled" shutdown to the "POWER ON" condition and notify all nodes that the unit is being shut down.

2. Place the ac power switch on the front of the module in the OFF position.

3. Remove the front cover by removing the screws and swinging the right side of the cover out 1 inch and then pulling it out to the right.

4 Be sure to observe proper ESD prevention practices, especially while handling boards during the following steps, including subsection B.9, Reassembly.

5. Remove the K2LCN board from Slot 1 at the front of the module.

6. At the rear of the module, remove the LCN A and B coax cables from the LCN I/O card, one at a time, by removing the T- connector from the board and **not** by removing either cable from the T- connector. Make sure the system is still operational on both cables as it was prior to this step. Remove the LCN I/O card from Slot 2.

   If the module is a single remote node connected with an LCNFL, the LCNFL must be removed and checked to see if it is revision F (or later). If it is earlier than revision F, an **LCNFL with revision F (or later) must be obtained**.

B.8 REASSEMBLY

1. **Check that the LCN I/O card you have is revision T (or later).** Set the correct node address into the LCN I/O card and install it in **Slot 1** in the rear of the module (or the LCNFL, if one was removed in step 6 above. If a replacement LCNFL had to be obtained for revision F, set the correct node address in it, and install it in I/O **Slot 1**). Reconnect the coax T-connectors, being careful to connect the A and B cables to their respective connectors on the board.

2. Make sure there are no address jumpers in the address pinning block TS2 at location 9C on the K4LCN board. Install the board in Slot 1 in the front of the module.

3. Configuration Rules require that no more than two empty slots remain between the K4LCN and the next board. If there are more than two empty slots above the K4LCN, you will now have to move the personality/peripheral board (EPDG, CLI, SIO, DHI, etc.) in Slot 5, and its associated I/O board in the rear of the module, down to Slot 4 or below. The preference is to fill the module from the bottom up, mounting the personality/peripheral board in Slot 2. An EPDG must have one or more empty slots above it. If your Universal Station has Trend Pen Recorders, the SIO and SIO I/O boards should be placed between the K4LCN and the EPDG (and their I/O boards).

4. Fasten the replacement kit label to the rear of the module chassis next to the original label.

5. Replace front cover.

6. Place the ac power switch on the front of the module in the ON position.

B.9 TEST

Observe the indicators at the front of the module and especially on the K4LCN board. If a fault occurs, refer to Section 3 of this manual.

B.10 STARTUP

Restart the node, loading the node's specific personality and database, as required. Refer to the *Engineer's Digest.*

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