



PCC/PCLTA Network Interface User's Guide

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Preface

You can install and configure a PCC-10, PCLTA-20, or PCLTA-21 PCI network interface card on your computer so that you can manage, test, and monitor and control your LONWORKS[®] network with an LNS[®] or OpenLDV[™] application. The PCC/PCLTA cards support a wide range of transceivers, downloadable memory, a network management interface, and Plug n' Play capability.

Purpose

This document describes how to install, configure, and test the PCC-10, PCLTA-20, and PCLTA-21 network interface cards that you can use to connect an LNS or OpenLDV application to a LONWORKS network.

Audience

This guide is intended for developers and end users of LONWORKS networks using the PCC/PCLTA network interface cards.

Requirements

Hardware and software requirements for installing the PCC-10, PCLTA-20, and PCLTA-21 network interface cards on your computer are as follows:

- Empty 32-bit PCI slot for PCLTA-20 and PCLTA-21 cards, or empty PCC slot for PCC-10 card.
- Microsoft® Windows 7, Microsoft Windows Vista®, or Microsoft Windows® XP. Echelon recommends that you install the latest service pack available from Microsoft for your version of Windows.
- OpenLDV 4.0 (or newer) runtime. This automatically installs the drivers for the PCC/PCLTA hardware, and installs the LONWORKS Interfaces Control Panel application you can use to configure and test the PCC/PCLTA network interfaces.

Content

This guide includes the following content:

- *Installing and Configuring the PCC/PCLTA Network Interface Cards*: Describes how to install the PCC/PCLTA network interface cards and configure them using the LONWORKS Interfaces application.
- *Electrical and Mechanical Interfaces*. Describes the hardware interfaces and mechanical layout of the PCC/PCLTA cards.

For More Information and Technical Support

If you have technical questions that are not answered by this document or the LONWORKS Interfaces online help, you can contact technical support. To receive technical support from Echelon, you must purchase support services from Echelon or an Echelon support partner. See www.echelon.com/support for more information on Echelon support and training services.

You can also enroll in training classes at Echelon or an Echelon training center to learn more about developing devices. You can find additional information about device development training at www.echelon.com/training/.

You can obtain technical support via phone, fax, or e-mail from your closest Echelon support center. The contact information is as follows:

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Installing and Configuring the PCC/PCLTA Network Interface Cards

This chapter describes how to install the PCC/PCLTA network interface cards and configure them using the LONWORKS Interfaces application.

Installing the PCC/PCLTA Network Interface Cards

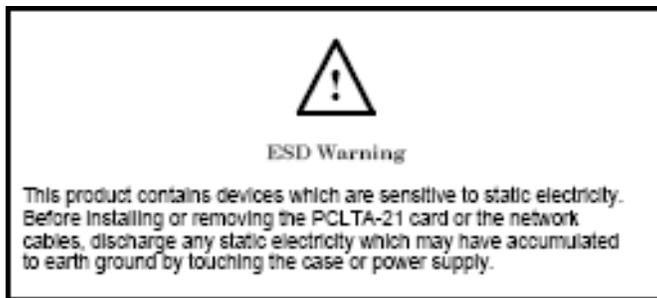
The following section describes how to install and configure the hardware for the PCLTA-21, PCLTA-20, and PCC-10 network interface cards. Make sure the driver software is installed before installing the hardware and configuring the network interface. The driver software is installed automatically when you install OpenLDV 4.0.

Installing and Configuring the PCLTA-21 Network Interface

The PCLTA-21 card is a high-performance network interface for computers equipped with a 3 or 5V 32-bit PCI interface. The PCLTA-21 card features support for TP/XF-1250 and TP/FT-10 channels, downloadable memory, a network management interface, and plug n' play capability with Microsoft Windows 7, Microsoft Windows Vista, or Microsoft Windows XP operating systems. The PCLTA-21 card operates at 10 MHz and includes an integral twisted pair transceiver. The network connection is made via a removable screw terminal block.

The following section describes how to install and configure the hardware for the PCLTA-21 network interface. The driver software is installed automatically when you install the LonMaker[®] Integration Tool. Make sure the driver software is installed before installing the hardware and configuring the PCLTA-21 device.

Installing the PCLTA-21 Hardware



1. Turn off the computer and remove the power cord.
2. Open the computer case and locate an empty PCI slot. The PCLTA-21 is a Universal card that will work in 3.3V, 5V, 32-bit, and 64-bit PCI slots. Remove the corresponding blank panel from the rear of the computer. Set aside the screw.
3. Insert the PCLTA-21 card into the slot, ensuring that the edge connectors are fully mated and the slot in the rear panel mounting lug of the PCLTA-21 card is aligned with the threaded hole in the computer chassis.
4. Replace the screw to hold the PCLTA-21 card firmly in place.
5. Reinsert the power cord and then restart the computer. A New Hardware Found window will be displayed briefly when Windows recognizes the PCLTA-21 card.

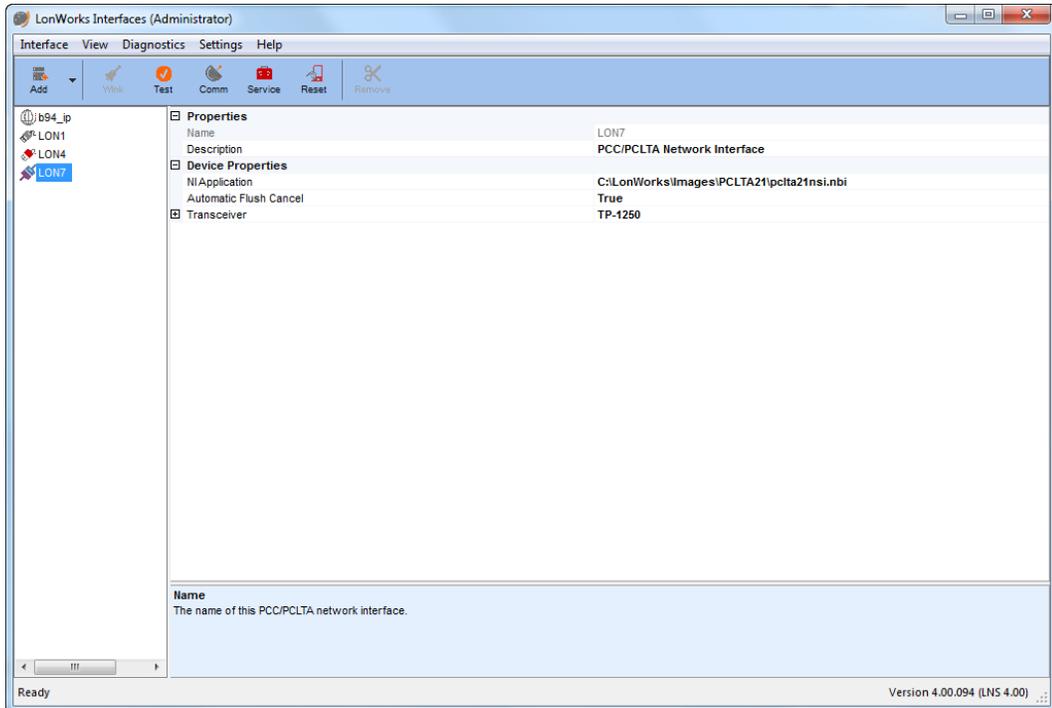
Note: If the PCLTA-21 is too tall to fit inside your computer's enclosure, you can change to the low profile bracket that is shipped in the PCLTA package following these steps:

1. Using a Philips screwdriver, remove the two screws securing the standard bracket to the PCLTA-21 circuit board.
2. Remove the low profile bracket from the PCLTA-21 package.
3. Align the low profile bracket to the PCLTA-21 circuit board and reattach using the same two screws.

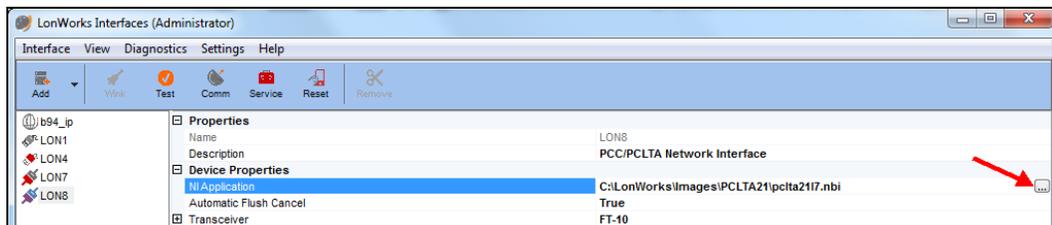
Configuring the PCLTA-21 Network interface

In most cases, PCLTA-21 initialization occurs automatically upon installation of the card and subsequent power-up of the computer. Manual initialization will be required following software installation to a directory other than **c:\lonworks**, or after moving the PCLTA-21 system images. To manually load the firmware image to the PCLTA-21 card after you have installed the hardware, follow these steps:

1. Click **Start** on the taskbar, point to **Settings**, click **Control Panel**, and then open the **LONWORKS Interfaces** application.
2. Click the PCLTA-21 interface in the list view on the left side of the user interface to display the interface's properties in the details pane in the right side.



3. The details pane lists the PCLTA-21 card's system image and transceiver properties.
4. To change the system image used by the PCLTA-21 card, click anywhere in the **NI Application** property, click the box to the right, and then browse to and select the desired system image from the **LonWorks\Images\PCLTA21** folder.



Note: For more information on configuring, testing, and diagnosing the PCLTA-21 network interface, see the LonWorks Interfaces online help.

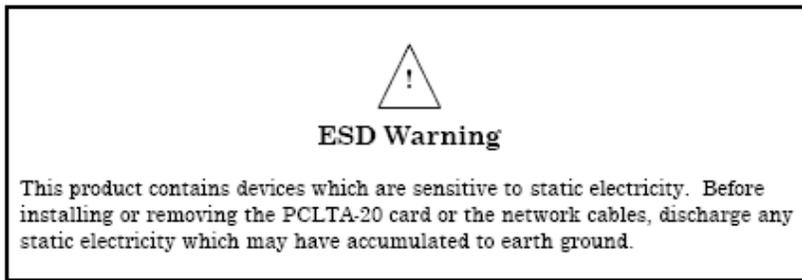
Installing and Configuring the PCLTA-20 Network Interface

The PCLTA-20/SMX interface supports SMX transceivers. The PCLTA-20 card features downloadable memory, a network management interface, and plug n' play capability with Microsoft Windows 7, Microsoft Windows Vista, or Microsoft Windows XP operating systems.

The PCLTA-20 card operates at 10 MHz and, includes an SMX transceiver interface.

The following section describes how to install and configure the hardware for the PCLTA-20 network interface. The driver software is installed automatically when you install the LonMaker tool. Make sure the driver software is installed before installing the hardware and configuring the PCLTA-20 device.

Installing the PCLTA-20 Hardware



1. Turn off the computer and remove the power cord.
2. Open the computer case and locate an empty 32-bit PCI slot. Remove the corresponding blank panel from the rear of the computer. Set aside the screw.
3. Insert the PCLTA-20 card into the slot, ensuring that the edge connectors are fully mated and the slot in the rear panel-mounting lug of the PCLTA-20 card is aligned with the threaded hole in the computer chassis. Insert the SMX transceiver in accordance with the manufacturer's instructions before installing the PCLTA-20—see the *LONWORKS® SMX™ Transceiver Installation Instructions* document 078-0145-01 version D or later if using an Echelon SMX transceiver. **The height of the PLM-10, PLM-2X, and PLM-30 Power Line SMX Transceivers is such that two (2) PCI slots must be allocated for a PCLTA-20 equipped with a PLM transceiver, even though the card will be plugged into only one slot.**
4. Replace the screw to hold the PCLTA-20 card firmly in place.
5. Reinsert the power cord and then restart the computer. A New Hardware Found window will be displayed briefly when Windows recognizes the PCLTA-20 card.

Configuring the PCLTA-20 Network interface

In most cases, PCLTA-20 initialization occurs automatically upon installation of the card and subsequent power-up of the computer. Manual initialization will be required following software installation to a directory other than **c:\lonworks**, or after moving the PCLTA-20 system images. To manually load the firmware image to the PCLTA-20 card after you have installed the hardware, follow these steps:

1. Click **Start** on the taskbar, point to **Settings**, click **Control Panel**, and then open the **LONWORKS Interfaces** application.
2. Click the PCLTA-20 interface in the list view on the left side of the user interface to display the interface's properties in the details pane in the right side.
3. The details pane lists the PCLTA-20 card's system image and transceiver properties.

4. To change the system image used by the PCLTA-20 card, click anywhere in the **NI Application** property, click the box to the right, and then browse to and select the desired system image from the **LonWorks\Images\PCLTA10** folder.

Note: For more information on configuring, testing, and diagnosing the PCLTA-20 network interface, see the LonWorks Interfaces online help.

Installing and Configuring the PCC-10 Network Interface

The following section describes how to install and configure the hardware for the PCC-10 network interface. The driver software is installed automatically when you install the LonMaker tool. Make sure the driver is installed before installing the PCC-10 card and then configuring it.

Installing the PCC-10 Card Hardware

The PCC-10 card conforms to the Personal Computer Memory Card International Association's (PCMCIA) PC Card standard for hot plug-in. The PCC-10 card will not be harmed if it is inserted into, or removed from, a computer PC Card slot that conforms to this standard, whether the computer is on or off. In addition, the PCC-10 card is recognized as an Underwriter's Laboratories (UL) Listed Accessory and is designed to be used with UL Listed equipment. The PCC-10 is not compatible with ExpressCard slots.

Do not force the insertion of a PCC-10 card. You can only insert the PCC-10 card one way into a computer PC Card slot. The keyed notches prevent the card from being inserted upside down. If you reboot the computer after installing the software, insert the PCC-10 card into an open computer PC Card slot. Otherwise, reboot the computer before inserting the card.

Windows does not load the device driver for the PCC-10 card until it discovers the first PCC-10 card. Likewise, when you remove the last PCC-10 card, Windows unloads the device driver, thus freeing any system resources it was using.

Each PCC-10 card requires a single, dedicated interrupt request (IRQ) and four contiguous bytes of I/O address space starting on a modulo-4-based address.

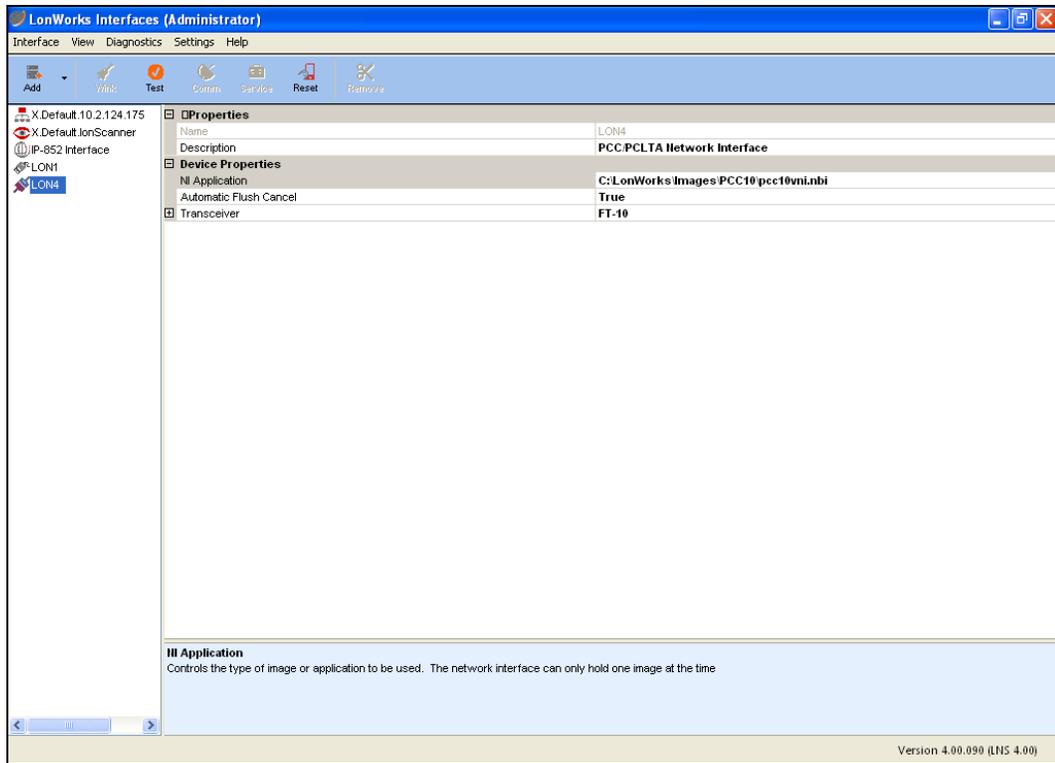
If you remove a PCC-10 card while an application is using the card, Windows will lose communication with the device, which cannot be restored by re-inserting the card. Some applications will display unusual behavior, and will not properly function. Any application using the PCC-10 card must be restarted if a PCC-10 card has been removed to ensure proper operation of the device and software.

The first time you insert a PCC-10 card into a running computer, a window will appear with the words "Echelon Corp.- PCC-10." Another window will appear stating that the Windows operating system is building a new database from the device information installed by the PCC-10 installation diskette. You can configure the new hardware when the computer has finished writing the device information.

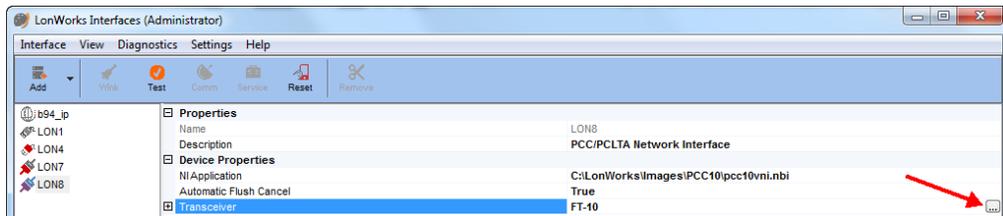
Configuring the PCC-10 Network interface

Once the PCC-10 hardware has been installed, you can manually configure the card following these steps:

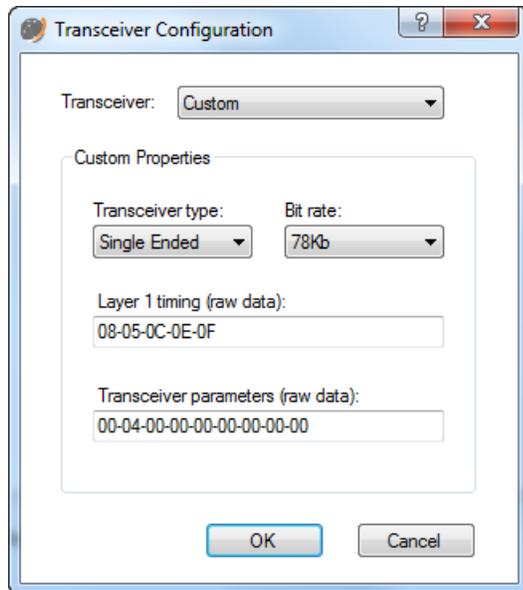
1. Click **Start** on the taskbar, point to **Settings**, click **Control Panel**, and then open the **LONWORKS Interfaces** application.
2. Click the PCC-10 interface in the list view on the left side of the user interface to display the interface's properties in the details pane in the right side.



3. The details pane lists the PCC-10 card's system image and transceiver properties.
4. Optionally, you can modify the PCC-10 card's transceiver properties following these steps:
 - a. Click anywhere in the **Transceiver** property, and then click the box to the right.



- b. The **Transceiver Configuration** dialog opens.
- c. In the **Transceiver** property, select **Custom**.
- d. Configure the properties in the dialog as desired.



e. Click **OK** to save any changes.

Note: For more information on configuring, testing, and diagnosing the PCC-10 network interface, see the LonWorks Interfaces online help.

Electrical and Mechanical Interfaces

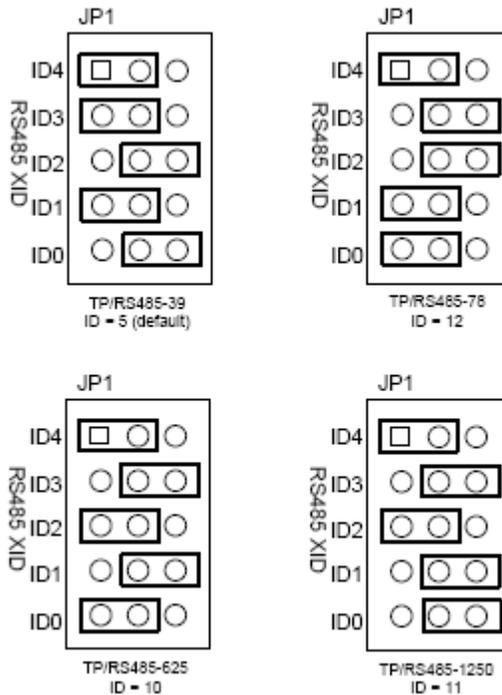
This chapter describes the hardware interfaces and mechanical layout of the PCC/PCLTA cards.

PCLTA-21 Board Layout

The following figure shows the layout of the PCLTA-21 card Models 74501, 74502, 74503, and 74504.



The PCLTA-21 card Model 74504 (TP-RS485) includes jumpers that must be configured to set the correct speed on the RS-485 channel.



P1 and P2 PCI Bus Connector

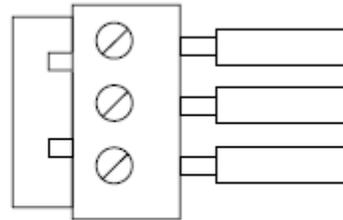
The pinout of the PCI connector is the standard pinout for the 32-bit PCI bus used in Windows-compatible computers. The power drawn from the host is 250 mA @ 5 VDC, typical.

Network Connector

The PCLTA-21 Model 74501-74503 cards are supplied with a removable two terminal, BLZ 5180/2/180 for the network connection. The wiring to the twisted pair channel is polarity insensitive. The connector will accept 12 to 26 AWG (1.2 mm to 0.45 mm) wire. See the *Junction Box and Wiring Guidelines for Twisted Pair LONWORKS Networks*, *LONWORKS FTT-10A Free Topology Transceiver User's Guide* or the *LONWORKS TPT Twisted Pair Transceiver Module User's Guide* for information on suitable cables and cable distances.

The PCLTA-21 Model 74504 card is supplied with a removable three terminal, BLZ 5108/3/180 for the RS-485 network connection. The wiring to the RS-485 twisted pair channel is **polarity sensitive**. The connector will accept 12 to 26 AWG (1.2 mm to 0.45 mm) wire. The terminals are connected as follows (with terminal 3 being closest to the service LED):

<i>Terminal</i>	<i>Connection</i>
3	Shield
2	RS-485 -
1	RS-485+



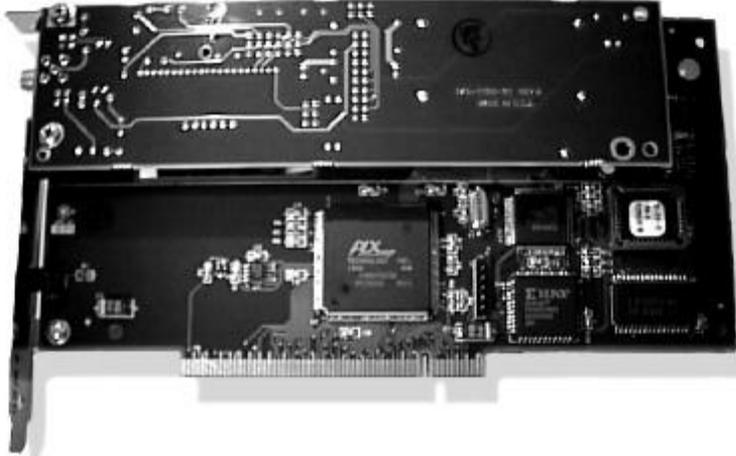
Use only shielded cabling suitable for an RS-485 channel. The use of unshielded cabling could result in damage to the adapter due to common mode voltage associated with differences in ground potential between different devices.

Mechanical Considerations

PCLTA-21 Models 74401 – 74404 measure 2.54” (6.5 cm) H x 4.72” (12 cm) L. All models are equipped with a full-height chassis bracket and a low profile bracket.

PCLTA-20 Board Layout

The following figure shows the layout of the PCLTA-20/SMX Interface. This card has a header connector for an SMX transceiver and does not have an integral transceiver. Attach the SMX transceiver in accordance with the manufacturer's instructions – see the *LONWORKS® SMX™ Transceiver Installation Instructions* document 078-0145-01 version D or later if using an Echelon SMX transceiver.



P1 and P2 PCI Bus Connector

The pinout of the P1 and P2 connector terminals is the standard pinout for the 32-bit PCI bus used in Windows-compatible computers. The power drawn from the host is 250 mA @ 5 VDC, typical. Actual power consumed for the SMX or protocol analyzer card will vary according to the power needs of the selected SMX transceiver.

Mechanical Considerations

The PCLTA-20/SMX card measures 3.69" (9.4 cm) H x 7.36" (18.7 cm) L. It is equipped with a full-height chassis bracket. If a PLM SMX transceiver is used, two PCI slots must be dedicated to the card due to the wider-width of the assembled PCLTA-20/PLM card.

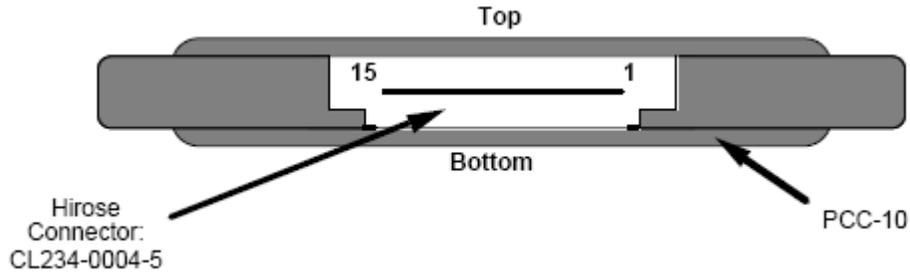
PCC-10 Board Layout

The following section describes the PCC-10 board.

Network Port

The PCC-10 has a 15-pin network port connector for interfacing with a free topology or link power channel, and for connecting external transceiver pods.

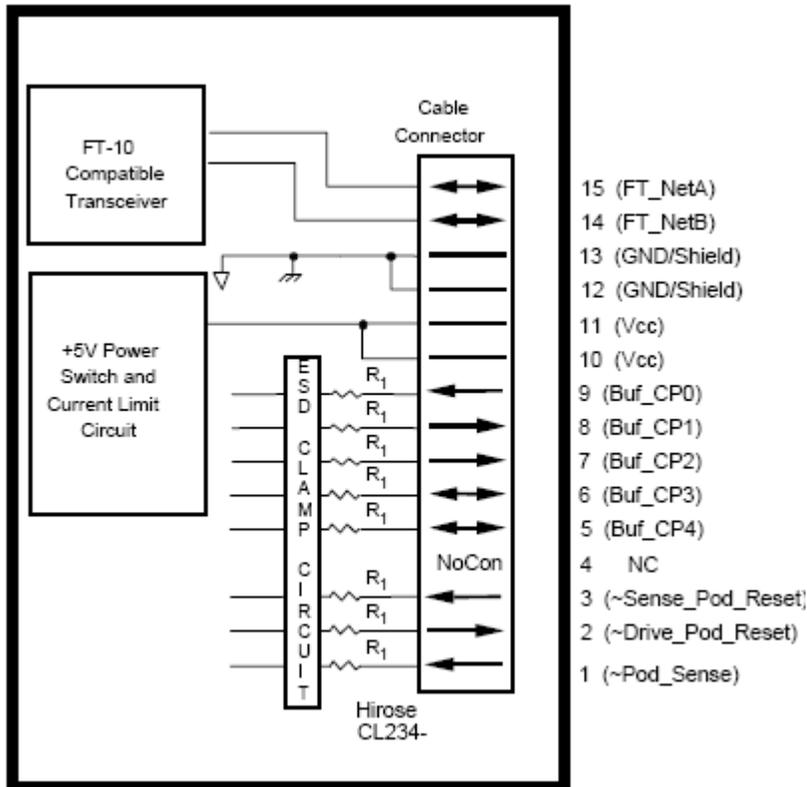
The following figure shows the numbering scheme of the 15-pin Hirose male connector on the PCC-10 card (the top of the PCC-10 card is the side with the product label).



The following figure shows the pin-out of the mating female Hirose NX30TA-15PAA connector to which the network wiring or transceiver pod is connected. The Hirose connector plug should be protected with a cover (Hirose NX-15T-CV1).



The following figure shows a block diagram of the electrical interface of the 15-pin network port.



The R1 resistors used in the PCC-10 card buffer the CPx lines to and from the Neuron[®] 3150[®] Chip, and have a value of $82\Omega \pm 5\%$. Examples of how to interface the PCC-10 card to external transceivers can be found in Appendix A, External Transceivers. The following table describes the functions of the card's network port.

Pin	Signal	Type	Description
1	~Pod_Sense	Digital Input	Pod Connection Indicator
2	~Drive_Pod_Reset	Digital Output	Reset Line for External Transceiver
3	~Sense_Pod_Reset	Digital Input	External Transceiver Reset Indicator
4	no conn		No connection
5	Buf_CP4	Digital Input/Output	Buffered Neuron Chip CP4 Line
6	Buf_CP3	Digital Input/Output	Buffered Neuron Chip CP3 Line
7	Buf_CP2	Digital Output	Buffered Neuron Chip CP2 Line
8	Buf_CP1	Digital Output	Buffered Neuron Chip CP1 Line
9	Buf_CP0	Digital Input	Buffered Neuron Chip CP0 Line
10	Vcc	Power Output	+5VDC supply*
11	Vcc	Power Output	+5VDC supply*
12	GND		Shield Ground
13	GND		Shield Ground
14	FT_NetB	FT-10 Network	FT-10 Network Connection B
15	FT_NetA	FT-10 Network	FT-10 Network Connection A

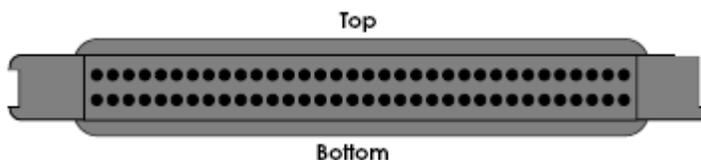
* Note: the +5VDC supply is generated by the host and is electronically current-limited by the PCC-10 card to approximately 600mA.

The following table describes the electrical characteristics of the card's digital inputs and outputs.

Parameter	Symbol	Min	Max	Unit
Low-Level Output Voltage ($I_{OL}=+100\mu A$)	V_{OL}	—	0.45	V
High-Level Output Voltage ($I_{OH}=-100\mu A$)	V_{OH}	2.4	—	V
Low-Level Input Voltage	V_{IL}	—	0.8	V
High-Level Input Voltage	V_{IH}	2.0	—	V
Input Current	I_{IN}	-20	+20	μA

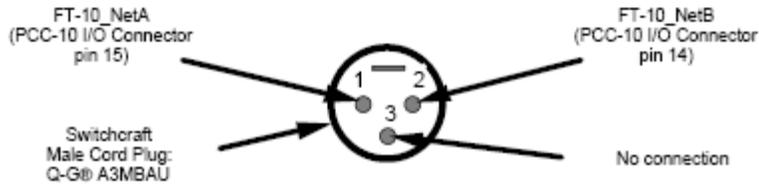
Network Connector

The PCC-10 card includes a standard 68-pin computer PC Card connector for interfacing with a host computer or embedded controller. This connector conforms to PCMCIA PC Card Standard, Release 2.1 guidelines for Type II I/O cards.



Free Topology Network Connection

The PCC-10 card contains an integral TP/FT-10 compatible transceiver to facilitate easy connection to a free topology or link power channel. The free topology network connection, pins 14 and 15 of the 15-pin Hirose connector as previously shown in the electrical interface block diagram, is polarity-insensitive. You can create custom cable assemblies for use with the PCC-10 card. For example, you can create a cable assembly with a 15-pin Hirose connector, a two-conductor cable, and a Switchcraft Q-G® A3MBAU XLR connector. The XLR connector provides a rugged, reliable means of repeatedly connecting and disconnecting the PCC-10 card from a network.



The Switchcraft A3MBAU XLR male connector is compatible with a wide variety of female connectors, as shown in the following table.

Description	Switchcraft Model	Construction
Female XLR-type cord/plug	A3FBAU	black finish, gold contact plating
Female XLR-type Receptacle	E3FSTAUQG	locking, straight terminals, gold contact plating
Female XLR-type Receptacle	E3FSTA4QG	non-locking, straight terminals, gold contact plating
Female XLR-type Receptacle	E3FRAAUQG	locking, right-angle terminals, gold contact plating
Female XLR-type Receptacle	E3FAUQG	non-locking, right-angle terminals, gold contact plating
Female Receptacle Housings	EFHB	for locking female, black finish
Female Receptacle Housings	EFDHB	for non-locking female, black finish

You can create a general purpose cable that includes a 15-pin Hirose connector, a two or 14-conductor cable plus shield, and flying leads for connection to a network or an external pod. An example pinout of a 14-conductor cable assembly is shown in the following table.

Pin	Wire Color Code
1	Black / Blue
2	Blue / Black
3	Black / Yellow
4	No wire
5	Yellow / Black
6	Green / Black
7	Red / Black
8	Brown / Black
9	Orange / Black
10	Black / Green
11	Black / Red
12	Black / Brown
13	Black / Orange
14	White / Black
15	Black / White

