

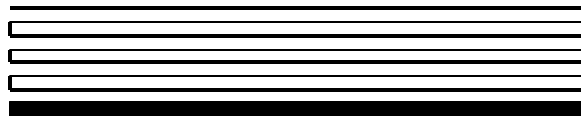
LONWORKS[®]

**PCLTA-20 PCI Interface
User's Guide**

Version 3



078-0179-01C



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- Consult the dealer or an experience radio/TV technician for help.

Changes or modifications not expressly approved by Echelon Corporation could void the user's authority to operate the equipment.

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c-UL (CSA)	Certified, per C22.2 no. 950

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CE Declaration of Conformity

1

PCLTA-20 Introduction

This guide describes the mechanical characteristics and the hardware and software driver installation for the Echelon PCLTA-20 Interface (Models 74401, 74402, 74403, 74404, and 74405) and the Echelon PCLTA-20 Protocol Analyzer Card (included with Model 33100-20). Except where noted, the term “PCLTA-20” used in this guide refers to both cards.

Echelon’s PCLTA-20 card is a high-performance LONWORKS® interface for desktop, and embedded personal computers equipped with a 32-bit PCI interface and a compatible operating system. Designed for use in LONWORKS networks that require a PC to monitor, manage, or diagnose the network, the PCLTA-20 card is ideal for industrial control, building automation, and process control applications. The PCLTA-20 card features support for a wide range of transceivers, downloadable memory, a network management interface, and Plug n’ Play capability with Microsoft® Windows 95, 98, Me, NT, and 2000 operating systems. The PCLTA-20 protocol analyzer requires Windows 95 or 98.

The four versions of the PCLTA-20 interface with integral twisted pair transceivers support the TP/FT-10 (Model 74401), TP/XF-78 (Model 74402), TP/XF-1250 (Model 74403), and TP-RS485 (Model 74404) channels, respectively. The Model 74405 PCLTA-20/SMX interface and the PCLTA-20 Protocol Analyzer support SMX transceivers, and may therefore be used on a wide range of channels, including Echelon’s

TP/FT-10 free topology and PL-10, PL-20, and PL-30 power line channels.

The PCLTA-20 card can be used as an LNS Fast Network Interface, a standard LNS network interface, or a LonManager API-compatible interface.

The LONWORKS PCLTA-20 Protocol Analyzer provides LONWORKS manufacturers, system integrators, and end-users with a rich set of Windows tools and a PCLTA-20 card for observing, analyzing, and diagnosing the behavior of LONWORKS networks. In addition to providing the network analysis functionality, the PCLTA-20 card included with the protocol analyzer also provides all the functionality of the PCLTA-20 PCI Interface.

Introduction

The PCLTA-20 card provides any PC equipped with a 32-bit PCI interface and compatible Windows operating system with access to a LONWORKS network.

Installation software for the PCLTA-20 card is included with the Model 33100-20 LONWORKS PCLTA-20 Protocol Analyzer, the Model 37000 LonMaker Integration Tool, the Model 37200 LNS DDE Server, the Model 34309 LNS Application Developer's Kit, and the Model 58030-01 Connectivity Starter Kit (which must be purchased separately). The software provides a software-based control panel and a software driver for Microsoft Windows 95, 98, Me, NT, or 2000 operating systems (the PCLTA-20 Protocol Analyzer requires Windows 95 or 98). Installation software also is available on Echelon's web site at www.echelon.com/toolbox. The control panel provides a convenient means of setting and modifying installation parameters, as well as displaying error messages. The adapter supports Windows 95, 98, Me, and 2000 Plug n' Play operation, simplifying installation and use.

The PCLTA-20 card operates at 10MHz and, depending on the model selected, includes either an integral twisted pair transceiver or an SMX transceiver interface. For models with an integral twisted pair transceiver, the network connection is made via a removable screw terminal block.

As shown in figure 1.1 below, the LNS network operating system allows any number of installation, maintenance, monitoring, and control devices to exist in a system and to adapt to network configuration changes automatically. That is, it allows users to reconfigure the system from any user interface device anywhere on the network and ensures that all monitoring and control stations are always up-to-date with respect to the system's configuration. When used with the appropriate software, the LNS Fast Network Interface functionality of the PCLTA-20 card allows the attached host to tap into the LNS infrastructure as a client or server application.

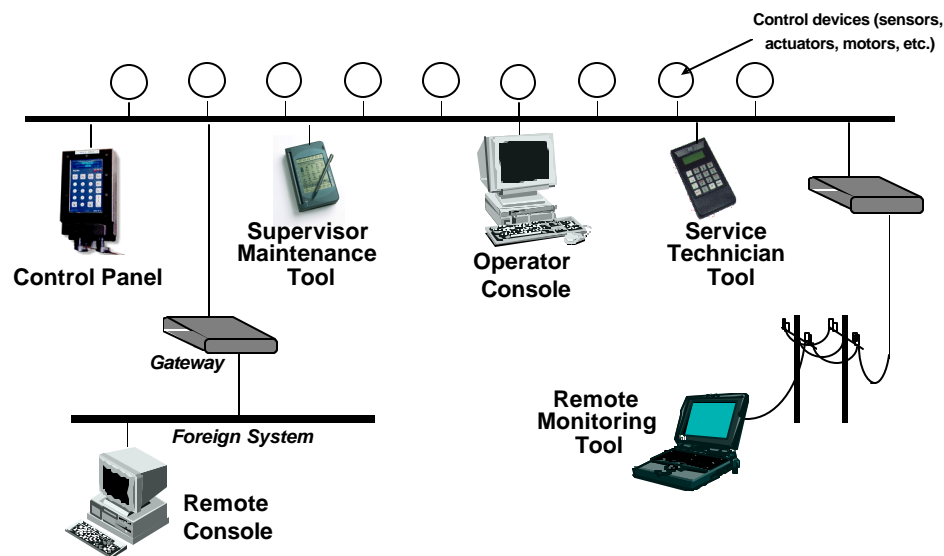


Figure 1.1 Multiple System Level Tools based on LNS

The card also permits the host PC to act as a LONWORKS network device, running application-specific programs while the card handles lower layer functions such as media access control, collision avoidance, and message validation

Firmware for the card is downloaded from the host PC. This allows the card to be updated as new versions of the software and firmware are released, without modifying or physically accessing the PCLTA-20 card. This feature extends the useful service life of the card, and minimizes the cost and time associated with software and firmware updates. The card is provided with 32Kbytes of off-chip RAM for use as network and application buffers.

Audience

This manual is intended for developers and end users of LONWORKS systems using the PCLTA-20 card, and for network integrators and end users of the PCLTA-20 Protocol Analyzer.

Content

This manual provides detailed technical specifications on the electrical and mechanical interfaces and operating environment characteristics for the PCLTA-20 card.

Related Documentation

The following Echelon publications are suggested for additional information:

- *LONWORKS® SMX™ Transceiver Installation Instructions* (078-0145-01)
- *LONWORKS FTT-10A Free Topology Transceiver User's Guide* (078-0156-01)
- *LONWORKS Junction Box and Wiring Guidelines Application Note* (005-0023-01)
- *LONWORKS TPT Twisted Pair Transceiver Module User's Guide* (078-0025-01)
- *LNS for Windows Programmer's Guide* (078-0177-01)
- *LonManager Protocol Analyzer User's Guide* (078-0121-01)
- *LonMaker User's Guide* (078-0168-02)
- *LNS DDE Server User's Guide* (078-0170-01)

2

Installing the PCLTA-20 Card

This chapter describes the procedures for installing the PCLTA-20 card.

PCLTA-20 Card Software Installation

There are three versions of the PCLTA-20 installation software, one for Windows 95/98/Me, one for Windows NT, and one for Windows 2000. Each version installs the files required by the associated Windows operating system to recognize the PCLTA-20 card, as well as the downloadable LNS, protocol analyzer, and MIP images.

PCC-10 Card Software Installation



Installation of the PCLTA-20 software must precede insertion of a PCLTA-20 card into a PCI slot.

Failure to install the software before inserting the card will render the card unusable until the software is removed, and then reinstalled.

The installation process is as follows:

1. If you have purchased the LonManager PCLTA-20 Protocol Analyzer, install the protocol analyzer applications following the instructions provided in the *LonManager Protocol Analyzer User's Guide*. You cannot use the LonManager ISA Protocol Analyzer card and a PCLTA-20 card in the same PC.
2. If you have purchased a LonMaker Integration Tool, LNS DDE Server, or LNS Application Development Kit, install the software as described in the documentation included with the software. Select the option to install the PCLTA-20 driver. If you do not have one of these products, install the PCLTA-20 driver software as described below.
3. Insert the PCLTA-20 card, as described later in this chapter.

Note: If the LONWORKS Protocol Analyzer software is installed *after* installing the PCLTA-20 card software, the PCLTA-20 card software must be re-installed.

The PCLTA-20 software can support DOS applications via the DOS virtual device driver. The default mode of operation is as an LNS network interface; the LonManager API-compatible MIP mode image may be enabled through the driver software control panel.

Windows 95/98/Me Software Installation Procedure

To install the PCLTA-20 software on a Windows 95/98/Me PC, follow the instructions below. The PCLTA-20 software cannot be installed from DOS or a DOS shell.

1. Close all open programs. Do not insert the PCLTA-20 card into a PCI slot at this time.
2. Insert the installation diskette into the PC.
3. Open the Windows Start menu and select the Run command.
4. When prompted for a program name, enter the following:

```
a : SETUP . EXE
```

If necessary, replace a: with the drive letter that corresponds to the drive containing the PCLTA-20 installation diskette.

5. When prompted with a list of languages, click on the desired language. A checkmark will appear to the left of the language to be installed.
6. When prompted for a destination directory, enter the desired installation directory. By default this directory is `c:\lonworks`, unless previous LONWORKS products have been installed and registered a different path in the Windows Registry. The path may be modified using the Browse button; however, if a directory other than `c:\lonworks` is chosen, the PCLTA-20 images path will have to be specified to enable use of the PCLTA-20 card. This is accomplished during PCLTA-20 Configuration. See Chapter 3, *Configuring and Testing the PCLTA-20 Adapter*.
7. When the 16-bit Application Support prompt appears, select “Yes” to enable the use of 16-bit applications with the PCLTA-20 card. This option is required for the PCLTA-20 Protocol Analyzer, but is not required for the LonMaker Integration Tool, LNS DDE Server, LNS Application Developer’s Kit, or other LNS applications. This causes the installation program to add references to the DOS `CONFIG.SYS` file for the stub device drivers named `PCCLON1` and `PCCLON2`. This allows existing 16-bit applications to recognize these device names and use the PCLTA-20 card as a network interface. If more than two PCLTA-20 cards are installed in the PC, additional stub drivers can be created manually. To do so, add the following lines to the `CONFIG.SYS` file:

```
DEVICE=C:\LONWORKS\BIN\LDVSTUB.SYS /D:PCCLON3  
DEVICE=C:\LONWORKS\BIN\LDVSTUB.SYS /D:PCCLON4
```

There is a limit of six (6) PCLTA-20 cards in a single PC.

8. If the installation software discovers the `SYSTEM.INI` entry that loads the `ECHLMPA.386` ISA bus driver, it will comment out the entry and display the following message, "SETUP has modified your `SYSTEM.INI` file by removing the following entry: `device=echlmpa.386`." It is not possible to use the ISA-bus protocol analyzer card and the PCLTA-20 card on the same PC.
9. The installation software for the Windows 95/98/Me version will issue a prompt to add a DOS virtual-mode device driver file named `LDVVDD.SYS` to the `DOS CONFIG.SYS` file to support DOS applications calling `LON1`. This will allow DOS applications to be used in a Windows 95/98/Me DOS shell/window. For more information see *Virtual-Mode DOS Driver* later in this chapter. The following line is added to the `CONFIG.SYS` file:

```
DEVICE=C:\LONWORKS\BIN\LDVVDD.SYS /D1
```

10. Software installation is complete. At the prompt to restart the computer, remove the PCLTA-20 installation diskette and shut down the computer. Next insert the PCLTA-20 into a PCI slot and turn the computer back on.

Windows NT 4 and Windows 2000 Software Installation Procedure

To install the PCLTA-20 software on a Windows NT 4 or Windows 2000 PC, follow the instructions below. The PCLTA-20 software cannot be installed from DOS or a DOS shell.



Only install the PCLTA-20 card *after* the software has been installed.

1. Close all open programs.
2. Insert the installation diskette into the PC.
3. Open the Windows Start menu and select the Run command.
4. When prompted for a program name, enter the following:

```
a : SETUP . EXE
```

If necessary, replace `a:` with the drive letter which corresponds to the drive containing the PCLTA-20 installation diskette.

5. When prompted with a list of languages, click on the desired language. A checkmark will appear to the left of the language to be installed.

6. When prompted for a destination directory, enter the desired installation directory. By default this directory is `c:\lonworks`, unless previous LONWORKS products have been installed and registered a different path in the Windows Registry. The path may be modified using the Browse button; however, if a directory other than `c:\lonworks` is chosen, the PCLTA-20 images path will have to be specified to enable use of the PCLTA-20 card. This is accomplished during PCLTA-20 Configuration. See Chapter 3, *Configuring and Testing the PCLTA-20 Adapter*.
7. There is a limit of six (6) PCLTA-20 cards in a single PC.
8. The installation software for the Windows NT and Windows 2000 versions will issue a prompt to add a DOS virtual-mode device driver file to the DOS `CONFIG.NT` file to support DOS applications calling `LON1`. This will allow DOS applications to be used in a Windows NT or 2000 DOS shell/window. For more information see *Virtual-Mode DOS Driver* later in this chapter. The following line is added to the `CONFIG.NT` file:


```
DEVICE=%SYSTEMROOT%\SYSTEM32\PCLTDOS.SYS /D1
```


The argument `/D1` names this DOS device as `LON1`.
9. Software installation is complete. At the prompt to restart the computer, remove the PCLTA-20 installation diskette, turn off power, install the PCLTA-20 card, and then reboot the computer.

Windows 95/98/Me Software Removal Procedure

To remove the PCLTA-20 software, follow these steps:

1. Choose the Add/Remove Programs icon from the Windows Control Panel.
2. Select “LonWorks® PCLTA-10/20/PCC-10 for Windows® 95/98/Me” from the list under the Install/Uninstall tab.
3. Click the Add/Remove button.
4. Confirm file deletion at the prompt. Most of the PCLTA-20 software will be removed automatically.
5. If necessary, edit the `CONFIG.SYS` file to remove any references to the stub driver.

Windows NT 4 and Windows 2000 Software Removal Procedure

To remove the PCLTA-20 software under Windows NT 4.0 or Windows 2000, follow these steps:

1. Choose the Add/Remove programs icon from the Windows Control Panel.
2. Select “LonWorks® PCLTA-10/20/PCC-10 for Windows® NT or Windows 2000” from the list under the Install/Uninstall tab.
3. Click the Add/Remove button.
4. Confirm the deletion at the prompt. Most of the PCLTA-20 software will be removed automatically.

5. If necessary, edit the `CONFIG.NT` file to remove any references to the `PCLTADOS.SYS` driver.

Windows 95/98/Me Virtual-Mode DOS Driver Installation Results

The Windows 95/98/Me PCLTA-20 card installation software will prompt the installer to automatically add the virtual-mode DOS driver. This driver is small in size, and allows a DOS session under Windows to have access to the PCLTA-20 through the device driver running as a part of Windows. The driver will not function unless a Windows session is running and the PCLTA-20 device driver is installed.

The following line will be added to the `CONFIG.SYS` file:

```
DEVICE=<directory of file>\LDVVDD.SYS /Dn /Ln
```

`/Dn` where (n) is 1-9. This defines LON1-LON9 and corresponds to devices 1-9 as determined by the PCLTA-20 device driver under Windows. This parameter is optional; the default is "1".

`/Ln` where (n) is 1-9. This defines the *logical* device 1-9 as determined by the PCLTA-20 device driver under Windows. This parameter is optional, the default is the value determined by the `/Dn` parameter. This allows overriding the actual device accessed from being based on the `/Dn` parameter.

For example, using `/D9 /L1` will in fact create a DOS driver named LON9 that will actually access the 1st PCLTA-20 in the system. Without the `/L1` parameter you would access the 9th device, as determined by the `/D9` option. These options are typically needed when more than one LONWORKS network interface is present in the system.

Windows NT and Windows 2000 Virtual-Mode DOS Driver Installation Results

The Windows NT and Windows 2000 PCLTA-20 installation software will prompt the installer to automatically add the virtual-mode DOS driver. This driver is small in size, and allows a DOS session under Windows to have access to the PCLTA-20 card through the device driver running as a part of Windows. The driver will not function unless a Windows session is running and the PCLTA-20 device driver is installed.

The following line will be added to the system32 folder under the Windows system directory:

```
DEVICE=<directory of file>\PCLTDOS.SYS /Dn
```

`/Dn` where (n) is 1-9. This defines LON1-LON9 and corresponds to devices 1-9 as determined by the PCLTA-20 device driver under Windows.

The following is an example of the line that would be added to the CONFIG.NT file:

```
DEVICE=C:\LONWORKS\BIN\PCLTDOS.SYS /D1
```

PCLTA-20 Card Hardware Installation



ESD Warning

This product contains devices which are sensitive to static electricity. Before installing or removing the PCLTA-20 card or the network cables, discharge any static electricity which may have accumulated to earth ground.

1. Turn off the PC and remove the power cord.
2. Open the PC case and locate an empty 32-bit PCI slot. Remove the corresponding blank panel from the rear of the PC. 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 PC chassis.

If using a Model 74405 PCLTA-20/SMX Interface, or a Model 33100-20 PCLTA-20 Protocol Analyzer, 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 PC. A New Hardware Found window will be displayed briefly when Windows recognizes the PCLTA-20 card.

Troubleshooting

As a plug-and-play device, the PCLTA-20 card should operate as desired following completion of the installation process. If the card does not function correctly, the most likely causes are system resource constraints or software incompatibilities. These problems are described in detail in the following sections.

Installing the PCLTA-20 Card Before Software Installation

The following section applies to Windows 95/98/Me only.

If the PCLTA-20 card was inserted into the PC prior to PCLTA-20 software installation, the Windows operating system will be unable to associate a device driver with the card. When Windows 95/98/Me starts up, a New Hardware Found window will appear. Click the Cancel button, then install the PCLTA-20 software as described above.

If the option "Do not install a driver (Windows will not prompt you again)" was inadvertently selected, the operating system will mark the PCLTA-20 card as an unknown device. As a result, the card will not function even if the PCLTA-20 software is installed. To correct this problem, remove the device using the following steps:

1. Open the System icon in the Windows Control Panel and select the Device Manager tab.
2. Double-click the Other Devices icon.
3. Select the PCLTA-20 device and click the Remove button.
4. Install the PCLTA-20 software and reboot the PC.

System Resources

Each PCLTA-20 card requires sixteen contiguous bytes of I/O address space starting on a modulo-4 based address, i.e., an address evenly divisible by 4. A dedicated interrupt request (IRQ) is also required for each PCLTA-20 card used.

Solving IRQ and I/O Conflicts under Windows 95/98/Me

I/O resource problems are rare under Windows 95/98/Me for the PCLTA-20 card since the card can handle a wide range of I/O settings. However, IRQ resource problems may occur more often in multimedia computers which may have very few spare IRQs. The Windows 95/98/Me operating system handles most allocations of IRQs, but there are some instances where the operating system cannot properly allocate interrupt requests.

When the Windows 95/98/Me Device Manager does not locate a free IRQ for a newly inserted PCLTA-20 card, it will not assign an IRQ to the card. As a result, there may be no indication to the user that a problem has occurred, since no true resource conflict has occurred. This is a consequence of the PCLTA-20 card's ability to be assigned any of the system's 16 IRQs.

IRQ usage in the system can be determined by opening the System icon in the Windows Control Panel. The Device Manager tab allows viewing of devices by type or connection.

The PCLTA-20 LONWORKS Network Interface device icon is found under the LonWorks Interface device type. If there is a problem with the card, there will be a red circle with an exclamation point next to its icon.

IRQ resource problems may generally be resolved by disabling another device in the system. More information can be found in the Hardware Conflict troubleshooting portion of the Windows 95/98/Me on-line Help file.

Access the hardware conflict troubleshooter through the procedure outlined below:

1. Open the Windows 95/98/Me on-line help by clicking the Windows Start button and selecting Help.
2. In the Help Topics window, choose the Contents tab, or from another Help window, choose the Contents button.
3. Double-click the Troubleshooting topic, and then select the If You Have A Hardware Conflict help topic.

Extensive trouble-shooting documentation can be found in the Microsoft Windows 95/98/Me Resource Kit Help File. This help file is part of the Windows 95/98/Me Resource Kit, which is available from Microsoft.

If a DOS real-mode driver is in use for a specific device that is installed in the PC, Windows 95/98/Me may not know about that device's resource requirements. Unlike Windows driver conflicts, this problem is difficult to diagnose.

There are rare I/O conflict situations of which the Device Manager may be unaware. Such a conflict may occur when an I/O resource is not properly specified for a device, and a new driver overlays onto the true I/O space of that device. In the event of such a conflict, it may become necessary to manually reserve I/O or IRQ resources using the Device Manager. This process is described in the Windows 95/98/Me on-line Help.

Once these resources have been reserved, the Device Manager will recognize and attempt to resolve any resource conflicts between the DOS driver and any Windows drivers. If a conflict still occurs, it will be visible, and may be resolved as described in *Solving IRQ and I/O Conflicts under Windows 95/98/Me* earlier in this chapter.

If a device resource requirement is hardwired into the PC (i.e., configured by a jumper or not modifiable from the system BIOS) then there is little that the Windows 95/98/Me operating system can do to free the resources.

Common Resource Problems under Windows 95/98/Me

The following situations produce an additional drain on system resources that may be hard to manage. Conflicts arising from these situations can generally be resolved by selectively disabling devices to free up the required resources.

- COM ports that may not have a connector, but are consuming resources and cannot be disabled through the BIOS
- Unused IDE controllers that can not be disabled through the BIOS
- Unused/nonexistent PS/2 mouse ports
- Sound cards that support both 8-bit and 16-bit compatibility modes, consuming two IRQs

An additional problem often associated with sound cards is the improper reporting of I/O resource usage. This problem may be recognized by examining a device's I/O address allocation for unusual one-byte assignments (since devices typically use more). For example, if a device's stated I/O range is 0x201-0x201 but its actual range is 0x201-0x204, a conflict will occur if the PCLTA-20 card is assigned an I/O range of 0x204-0x207. If this problem is suspected, manually move the PCLTA-20 card's I/O range to a safer location to prevent I/O overlap.

Solving Conflicts under Windows NT 4

The PNPLON.SYS device driver works with the Windows NT operating system to locate PCLTA-20 cards. The driver is completely Plug n' Play, and because the device is a PCI card, the system BIOS will determine a useable I/O port and IRQ setting. There is no user-configurable resources setting from the Windows NT operating system.

If more control is required over the choice of IRQs used for the PCLTA-20, there is an optional system setting that can be used. The Preference button on the LONWORKS Plug 'n Play control panel brings up a self-explanatory dialog that allows the setting of the preferred and alternative IRQ list.

The Preference button also allows a choice of the numeric base for the device naming convention, i.e, the value of x in LONx. By default this will start at "LON1". This could create a conflict if another device driver is also trying to create a device named "LON1" (such as a PCNSS/PCNSI driver). In this case choose another value.

If other values are chosen for the device naming convention then you may want to assure that the DOS driver defined in your CONFIG.NT file reflects this setting. It is this DOS driver in the CONFIG.NT file that defines the device name used by 16-bit Windows applications running under NT, so such an application will refer to devices named "LON1", "LON2", and so on.

The first place to go for information if problems arise should be the Event Log under System Events.

Software Compatibility

The PCLTA-20 software is designed to be compatible with LONWORKS software. However, the following issues may arise when using the PCLTA-20 adapter with some software.

Device Name Aliasing under Windows 95/98/Me

The PCLTA-20 card should operate with most third-party LONWORKS software. However, some 16-bit Windows applications are limited in the device names that can be selected. For example, only the names "LON1" through "LON9" may be available, preventing the use of a PCLTA-20 card. This problem can be corrected through the use of device name aliasing. To create a device alias, follow these instructions

1. Open the file named ECHELON.INI, which should reside in the Windows directory. If this file does not exist, then create one with a text editor.
2. Create a driver alias section in the file, by adding the following line:

```
[DRIVERALIAS]
```

3. On the following line, add the following driver alias:

aliasname=devicename

where *aliasname* is the device name accessed by the software, such as "LON1", and *devicename* is the device to be used.

4. Add additional aliases, as necessary.

The following example creates a device alias that routes all service requests for LON1 to the PCCLON1 PCLTA-20 card.

```
[DRIVERALIAS]  
LON1=PCCLON1
```

LonManager ISA Protocol Analyzer Compatibility

The device driver for the PCLTA-20 card and the driver for the Model 33100-00 LonManager Protocol Analyzer ISA-bus card share the same Windows VxD identifier. As a result, both types of cards cannot run on a PC at the same time. So, the PCLTA-20 installation software will comment out the `SYSTEM.INI` entry that loads the ISA-bus driver.

The LonManager Protocol Analyzer software does not run under Windows Me, Windows NT 4, or Windows 2000.

PCC-10 and PCLTA-10 Compatibility

The LONWORKS Plug n' Play control panel can only support one type of downloadable-image network adapter at a time unless the system image files are copied and renamed. PCC-10, PCLTA-10, and PCLTA-20 cards may not be used or installed in the same PC unless the system image files are copied and renamed.

Plug 'n Play Issues Under Windows NT 4

If both a PCLTA-20 and PCNSI card are running and both devices have created "\\.\Lon1.0" values for the device key then a named device conflict will occur. The only option is to change the device name for the PCLTA-20 card. To do this, call up the LONWORKS Plug 'n Play control panel and click the Preferences button. This will present a window with which the name can be changed, e.g., 'LON2'. Reboot the PC. The PCLTA-20 card will now be renamed LON2 and the named device conflict will be resolved.

Under certain circumstances the LONWORKS Plug 'n Play control panel diagnostics functions states that the PCLTA-20 and driver are functioning; however, the

LonMaker Integration Tool or any other LNS tool does not work. You will notice that when the network is open the tool indicates that it is unable to communicate with the PCLTA-20. This is because the PCLTA-20 card features a downloadable firmware image and the LONWORKS Plug 'n Play control panel must be reconfigured to support LNS. The NI Application must read PCL10VNI, and not PCC10L7 or PCL10L7.

If, after pressing the test button after installation of a PCLTA-20 card, an ****Error-Image Load Failure**** message is reported, then there is either an I/O conflict with the PCLTA-20 card, or the card is broken. If there is an I/O conflict, then Windows NT is not granting an unused I/O port to the PCLTA-20 driver. To rule out a broken card, check the card using a Windows 95/98/Me or Windows 2000 configuration known to be reliable.

Automatic Flush Cancel Issues

If the PCLTA-20 card appears to install and test normally, but still will not communicate on the network, check to be sure that the Automatic Flush Cancel checkbox in the LONWORKS Plug 'n Play control panel applications is still in its default (set) state. For more information, see the **Automatic Flush Cancel** section in Chapter 3.

3

Configuring and Testing the PCLTA-20 Card

This chapter explains how to configure and test the PCLTA-20 card using the Control Panel application installed in Chapter 2.

PCLTA-20 Configuration

PCLTA-20 configuration is accomplished by using the LONWORKS Plug 'n Play control panel application. Open the control panel application by selecting the LONWORKS ® Plug 'n Play icon in the Windows Control Panel.

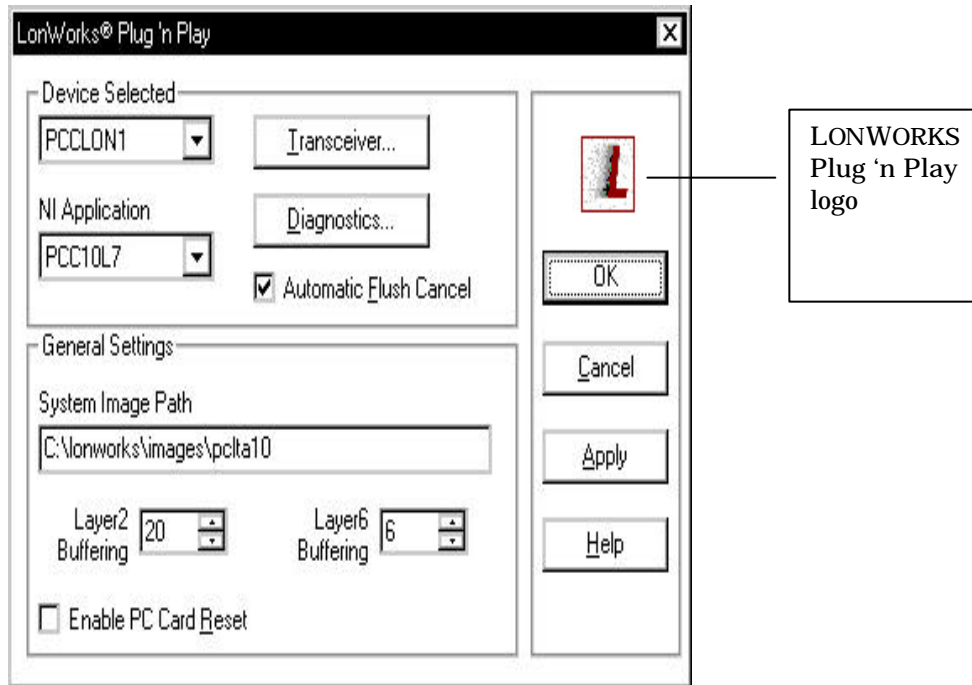


Figure 3.1 PCLTA-20 Control Panel and Icon

The LONWORKS Plug 'n Play control panel application is divided into three parts: a device selection area, a general settings area, and a control section. The device selection area contains configuration settings and diagnostic controls that are specific to an individual PCLTA-20 card and its device driver. The general settings area contains settings for all PCLTA-20 cards used with the PC. The control section contains buttons for accepting or canceling the changes made in the control panel, as well as a Help button.

PCLTA-20 Initialization

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 following the moving of the PCLTA-20 system images.

To manually initialize the PCLTA-20 card, verify that the control panel application's System Image Path entry is correct, then click the Apply button.

An error will be reported if an attempt is made to view the transceiver type before the PCLTA-20 card is initialized. Testing the card with the Diagnostics button, as

suggested by the error message, produces the diagnosis: “Image file not found.” In this case, return to the control panel application’s main window and manually initialize the PCLTA-20 card.

Device Specific Settings

The PCLTA-20-specific options consist of five separate controls (figure 3.2). These controls are defined as follows:

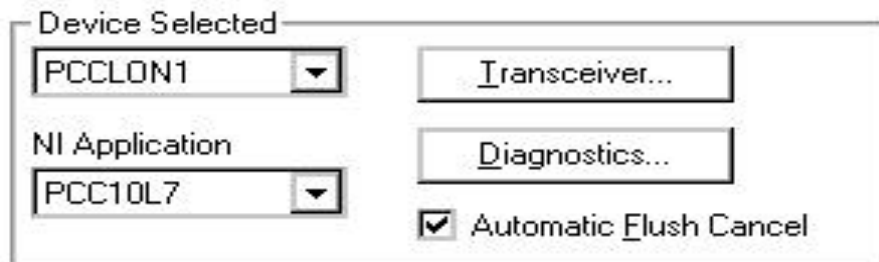


Figure 3.2 PCLTA-20-specific Controls

Device Selected

Controls which PCLTA-20 card is selected for configuration. The PCCLON1 and PCCLON2 drivers are installed by the installation software. If additional drivers have been manually installed, they also will be available.

Automatic Flush Cancel

For non-LNS images, this function controls whether the device driver will automatically force the network interface for the selected PCLTA-20 card to leave the post-reset flush state whenever it is reset; an LNS network interface does not and cannot come up in the flush state. The post-reset flush state prevents any inbound or outbound network traffic following a reset. **If this box is not checked, it is up to the client application to manage this state.** If it is checked, the device driver will automatically allow network traffic to resume. **The default is checked.**

NI Application

Controls the type of image or application to be used on the PCLTA-20 card. This selection is handled automatically by the protocol analyzer software. For all other applications, a PCLTA-20 card can only hold one image at a time. Loading a new image will replace the currently loaded image. The choices for these images are determined by the image files (.NBI extension) found in the system image path specified under General Settings. Some of the possibilities include the following:

- *PCL10VNI*, the LNS Fast Network Interface image (for use with LNS 3 and newer)

- *NSIPCLTA*, the LNS network interface image (for use with LNS 1 and LNS 2 only)
- *PCC10L7*, the basic network interface application image

Transceiver

Opens the PCLTA-20 Transceiver dialog (figure 3.3). Choosing this option will retrieve the transceiver configuration of the selected PCLTA-20 card. If there is no PCLTA-20 card currently installed in a PCI-bus slot, a message appears stating that the operating system has removed, or has not loaded, the PCLTA-20 device driver.

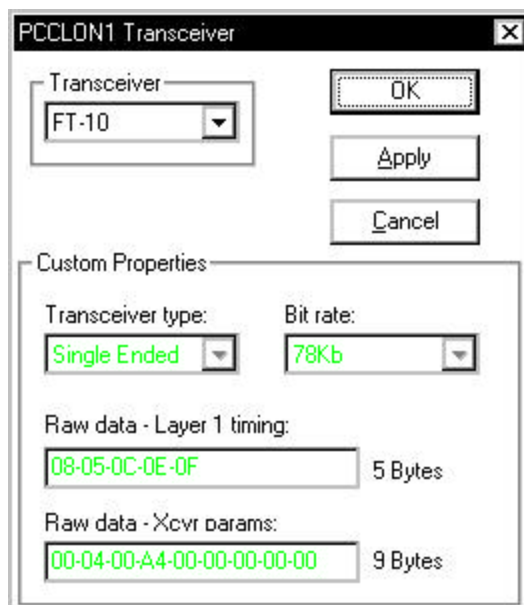


Figure 3.3 PCLTA-20 Transceiver Dialog Box

The Transceiver value specifies the transceiver type for the selected PCLTA-20 card. The default transceiver is a TP/FT-10 compatible transceiver. Other standard transceiver configurations, and a custom configuration, may be chosen. The Custom Properties values are not accessible unless the Custom transceiver type is selected: you cannot modify the transceiver type as it is a product of the transceiver ID (XID), however, if the XID is custom then you can modify the fields using the Custom Properties dialog box. If an incorrect transceiver type error is received while modifying the transceiver type, click the Apply button, then proceed to modify the transceiver type.

The Custom Properties area contains custom transceiver properties. The information in this area reflects the current configuration within the PCLTA-20 card. It will not change until a transceiver is selected, and then configured using the OK or Apply buttons.

When configuring a custom transceiver or adding custom parameters for a standard transceiver, the Custom Properties Raw Data values must be entered as hexadecimal values separated by dashes. Further explanation of Raw Data values can be found in the *LonBuilder® User's Guide*.

Diagnostics

Opens the PCLTA-20 Diagnostics dialog. For more information, see the section on PCLTA-20 Diagnostics.

General Settings

The PCLTA-20-generic options consist of four controls (figure 3.4). These controls are defined as follows:

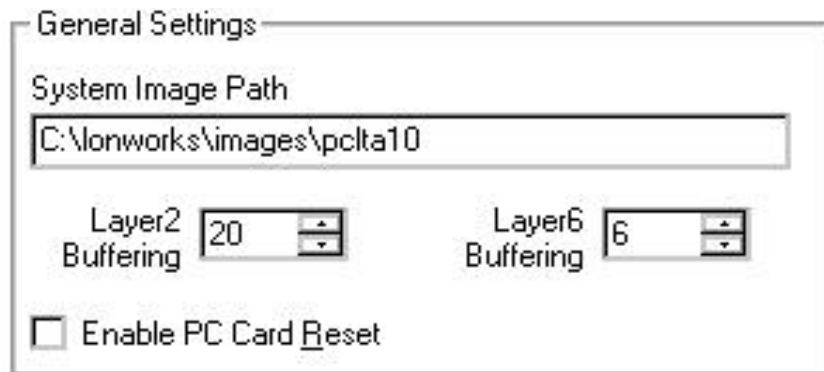


Figure 3.4 PCLTA-20 Generic Controls

System Image Path

Specifies the full directory path for the PCLTA-20 system images. This path is set by the PCLTA-20 Installation Software but may be modified by the user.

Layer2 and Layer6 Buffering

Controls the number of 4Kbyte operating system pages that are allocated for message buffering within the driver. The **Layer2** setting is used by the PCLTA-20 protocol analyzer only and should not be modified from the default of 20 pages. The **Layer6** setting is used for all other system images. The default setting of Layer6 Buffering is 6 pages. This value should be appropriate for most applications; embedded systems may need to change the number of buffering pages.

Enable PC Card Reset

This control is not used with the PCLTA-20 card. It is provided for owners of the PCC-10 PC Card (PCMCIA card) and controls whether the hardware reset line is enabled. The state of this checkbox is irrelevant to the operation of the PCLTA-20 card.

PCLTA-20 Diagnostics

A number of diagnostic and testing services are provided by the PCLTA-20 control panel application. Clicking the Diagnostics button in the main control panel window displays the PCLTA-20 Diagnostics dialog. This dialog contains buttons for the diagnostic commands and displays the version number and current status of the PCLTA-20 device driver. If no PCLTA-20 card is installed in a PCI-bus slot, the Diagnostics window will display “(no driver found)”.

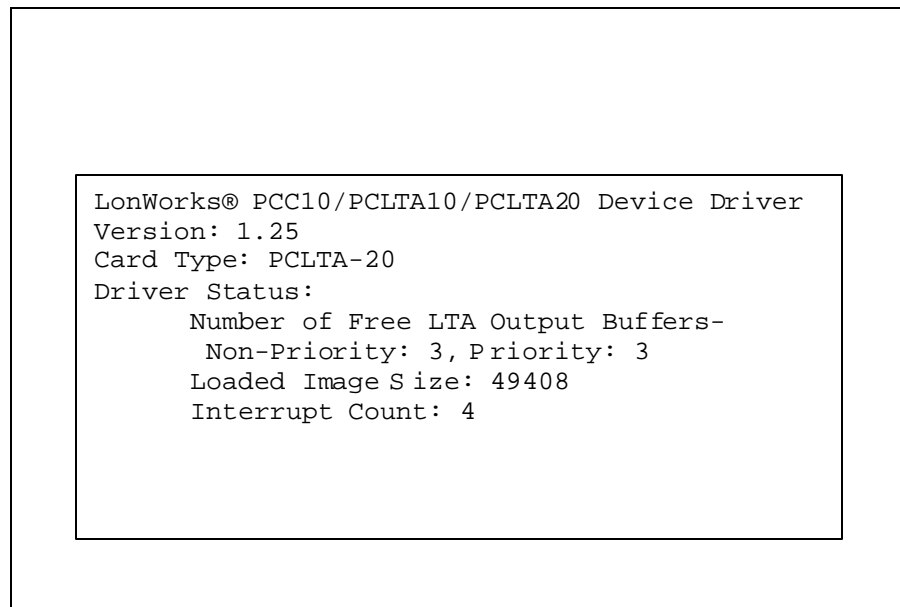


Figure 3.5 PCLTA-20 Diagnostics Dialog Box

Driver Status

The content of the device driver status displayed in the Diagnostics window is as follows:

- Number of Free PCLTA-20 Output Buffers:
 - Non-Priority: the non-priority application output buffer count, as calculated by the driver based on information retrieved from the PCLTA-20 card's non-volatile EEPROM.

Priority: the priority application output buffer count, as calculated by the driver based on information retrieved from the PCLTA-20 card's non-volatile EEPROM.

- Loaded Image Size: the size, in bytes, of the currently-loaded PCLTA-20 system image. This may be zero if the PCLTA-20 card is in the initial boot state.
- Interrupt Count: the number of interrupts the driver has processed for this device. This value is set to zero when the device is physically reset.

Diagnostic Commands

The diagnostic commands are invoked by clicking one of the buttons displayed in figure 3.6. If a diagnostic command results in the "Image file not found" error message, close the Diagnostics dialog by clicking the OK button, then click the Apply button in the PCLTA-20 control panel application. This re-initializes the card and allows use of the diagnostic commands.

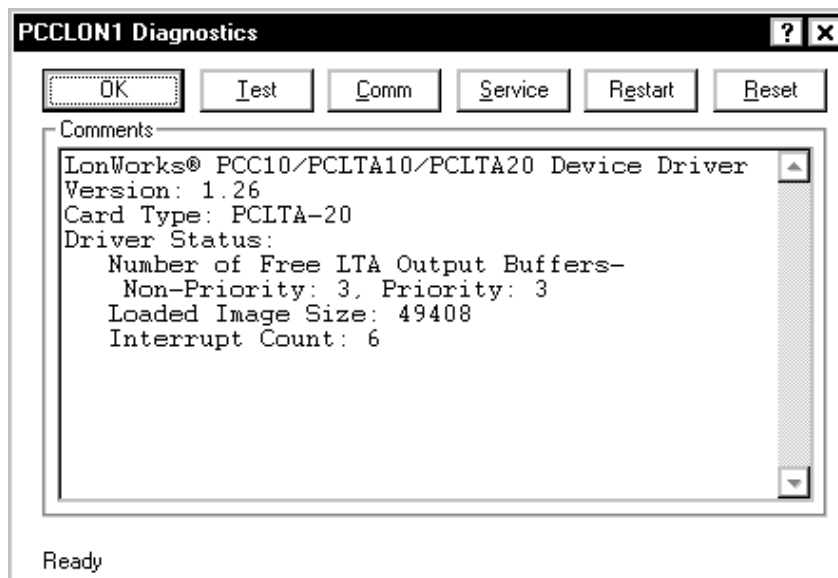


Figure 3.6 Diagnostics Dialog Box Commands

Test

The Test button retrieves status and error counts from the PCLTA-20 card. The results of this message will be displayed in the format shown in figure 3.7.

```

-- Network Interface Node Status --
CRC Errors:                [00000]
TX Timeouts:               [00000]
Lost (APP) Messages:      [00000]
Missed (NET) Messages:    [00000]
Node State:                Unconfigured
Most recent error:        0
Reset Cause:               External

```

Figure 3.7 Example Network Diagnostics Status Response

Comm



The Comm button is not available if you are using the PCL10VNI image. If you are using the PCL10VNI image, first select the NSIPCLTA image, click Apply, run the Comm test, then reselect the PCL10CNI image, and click Apply.

The Comm button verifies communications between the PCLTA-20 card and another device on the network. When this function is chosen, a dialog will appear asking for confirmation of this command, as follows:

This procedure will configure the Network Interface for a zero-length domain if it is not already configured. Do you want to proceed?

Choosing OK causes the control panel to first check the network interface for the configured state. If it is already in the configured state, it will not be modified further. If it is not in the configured state it will install the network interface with a zero-length domain on index 0, a subnet of 1, and a node ID of 126, and then change its state to configured.

Once the device is in the configured state, the control panel application enters the receive-ready state and displays the following message while waiting for a service pin message from another device on the network:

Now waiting for a service pin message.

Once the service pin is activated on the other device and a service pin message is received, the control panel application sends a diagnostic message to the other device using Neuron ID addressing. It will repeat this message, referred to as a “ping,” once

per second until either the OK or the Quit button is chosen (the Quit button will appear in place of the Comm button).

This series of tests confirms that the PCLTA-20 card can be configured and can communicate with a device on the network. The Comm function is intended to eliminate the PCLTA-20 card, the card drivers, the network connection, the hardware of the other device, and the topology configuration from the list of possible problem points or points of failure during network troubleshooting. The Comm function test does **not** eliminate the possibility that the wrong type of media has been used. Be sure that the medium is suitable for use with the selected channel type. The Comm function also does not eliminate the possibility of a missing or improper network termination.

The network wiring may work for this test but may fail if multiple devices are communicating. Be sure to verify that the proper termination is used when troubleshooting communication problems.

The Comm feature is not designed to work across routers.

Service



The Service button is not available if you are using the PCL10VNI image. If you are using the PCL10VNI image, first select the NSIPCLTA image, click Apply, click the Service button, then reselect the PCL10CNI image, and click Apply.

The Service button will cause the PCLTA-20 card to broadcast a service pin message on the network. The service pin message will not be sent if the card is in the post-reset flush state (see **Automatic Flush Cancel**).

Restart

The Restart button clears the card's Neuron Chip image and places the device into the boot state. This is the device state found following a re-boot of the Windows operating system. When this function is chosen a dialog will appear asking for confirmation of this command.

Reset

The Reset button causes a reset of the card's Neuron Chip, but does not clear its Neuron Chip image.

4

Electrical and Mechanical Interfaces

This chapter describes the hardware interfaces and mechanical layout of the PCLTA-20 card.

PCLTA-20 Board Layout

Figure 4.1 shows the layout of the PCLTA-20 card Models 74401, 74402, 74403, and 74404. Model 74404 (TP-RS485) includes jumpers that must be configured to set the correct speed on the RS-485 channel (figure 4.2).

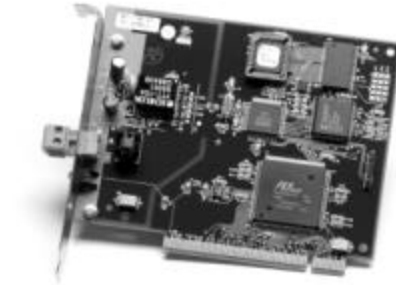


Figure 4.1 PCLTA-20 Models 74401-74404 Mechanical Layout and Interfaces

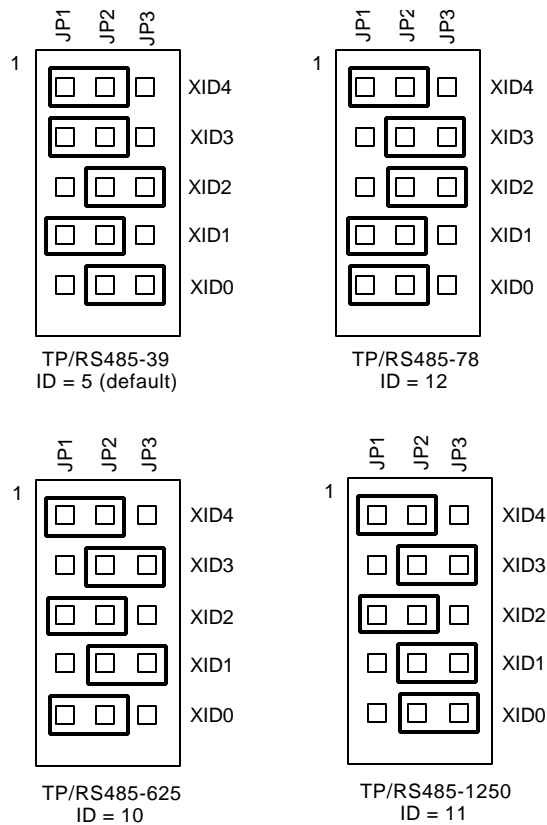


Figure 4.2 PCLTA-20 TP-RS485 Jumper Settings

Figure 4.3 shows the layout of the PCLTA-20/SMX Interface and the PCLTA-20 Protocol Analyzer Card. These cards are equipped with a header connector for an SMX transceiver; they do 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.



Figure 4.3 PCLTA-20 SMX Interface and PCLTA-20 Protocol Analyzer with PLM-22 SMX Transceiver Installed

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 PCs. The power drawn from the host is 250mA @ 5VDC, typical. Actual power consumed for the SMX or protocol analyzer card will vary according to the power needs of the selected SMX transceiver.

Network Connector

The PCLTA-20 Model 74401-74403 cards are supplied with a removable two terminal, Weidmüller BLA connector (BLA 2B OG) for the network connection. The wiring to the twisted pair channel is polarity insensitive. The connector will accept 12 to 26AWG (1.2mm to 0.45mm) 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-20 Model 74404 card is supplied with a removable three terminal, Weidmüller BLA connector (BLA 3B OG) for the RS-485 network connection. The wiring to the RS-485 twisted pair channel is **polarity sensitive**. The connector will

accept 12 to 26AWG (1.2mm to 0.45mm) 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-20 Models 74401 – 74404 measure 3.87" (9.8cm) H x 5.20" (13.2cm) L. Model 74405 and the PCLTA-20 Protocol Analyzer Card measure 3.69" (9.4cm) H x 7.36" (18.7cm) L. All models are equipped with a full-height chassis bracket. If a PLM SMX transceiver is used with an SMX or protocol analyzer card, two PCI slots must be dedicated to the card due to the wider-width of the assembled PCLTA-20/PLM card.



DECLARATION OF CONFORMITY

PC LonTalk® Adapter, PCLTA-20

Application of Council Directive: 89/336/EEC

Manufacturer's Name: Echelon Corporation

Manufacturer's Address: www.echelon.com

Manufacturer's Address:
in Europe Echelon BV
Printerweg 3
3821 AP Amersfoort
The Netherlands

Product Model Number: 74401, 74402, 74403, 74404, 74405

Type of Equipment: Information Technology Equipment

Standards to which:
Conformity is
Declared

EN 60950:1992;	EN 50082-1:1997
EN 55022:1994/A1-1995	EN 61000-4-2
EN 61000-4-3	ENV 50204
EN 61000-4-4	EN 61000-4-5
EN 61000-4-6	EN 61000-4-8
EN 61000-4-11	

I, Paul Smith, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Place: Amersfoort, The Netherlands Date: Position: Controller, Echelon BV
