DIONEX

UI20 UNIVERSAL INTERFACE
OPERATOR'S MANUAL

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1 • Introduction

1.1 Overview

The PeakNet Chromatography Workstation consists of a personal computer, PeakNet software, and a DX LAN™ computer interface card. The workstation provides complete control and data processing for DX 500 systems via the DX LAN instrument network.

The UI20 Universal Interface (P/N 046017) functions as the communications and control link between the workstation and other instruments, such as the DX-100 Ion Chromatograph. This enables PeakNet to collect data from any chromatographic detector with an analog output.

> **NOTE**
> PeakNet Release 4.10 or higher must be installed on the host computer (the PC). Software releases prior to 4.10 do not support the UI20 Universal Interface.

The UI20 has two relays and four TTL outputs for instrument control. Four TTL inputs allow control of the UI20 via signals from other devices (autosamplers, pumps, detectors, etc.). Each UI20 supports up to two detectors, and up to two UI20s can be used with each instrument system. A single PeakNet workstation can control from one to eight instrument systems, depending on which PeakNet software model you purchase.

During operation, the host computer downloads timed events to the UI20. Once started, the UI20 conducts timed events and collects data independently of the host computer. The host computer can upload a copy of the data from the UI20 in real time, or after the run is completed.

The UI20 front panel features a 16-character alphanumeric liquid crystal display (LCD) that shows the interface status and elapsed event clock time. Pressing the front panel **Status** button displays additional status information, while pressing the front panel **Test** button selects the UI20 diagnostic programs.

1.2 About This Manual

Chapter 1, **Introduction**, is an overview of the UI20.

Chapter 2, **Description**, consists of a description of the physical aspects of the UI20, followed by a functional description of the operating features.

Chapter 3, **Operation**, describes the operating features and methods.

Chapter 4, **Troubleshooting**, lists possible causes of operating problems, plus step-by-step instructions for isolating and eliminating their sources.

Appendix A, **Specifications**, lists the UI20 specifications and facility requirements.

Appendix B, **Installation**, describes the installation and interface necessary to place the UI20 into operation.

1.3 Safety Messages

The UI20 has been designed to comply with the requirements for safety set forth in IEC 1010 *Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use.*

This manual contains warnings that can prevent personal injury and/or damage to the UI20 when properly followed. Safety messages appear in bold type and are accompanied by the icon shown below.

CAUTION — Indicates a potential hazard to the operator or damage to the instrument or other property. Example: Overtightening a connector may break it off.

2 • Description

2.1 Physical Description

2.1.1 Front Panel

- The 16-character LCD displays the main status message: the interface status and elapsed event clock time. It also displays the status of TTL functions and the results of diagnostic testing, when those options are selected.

- Press **Status** to display information about the following: the Moduleware and BIOS versions, DX LAN ID, TTL inputs and outputs, relays, data collection rate, voltage scale, and channel configuration. Each time you press **Status**, the next message in this sequence appears. After 2 seconds, the selected message is replaced by the main status message.
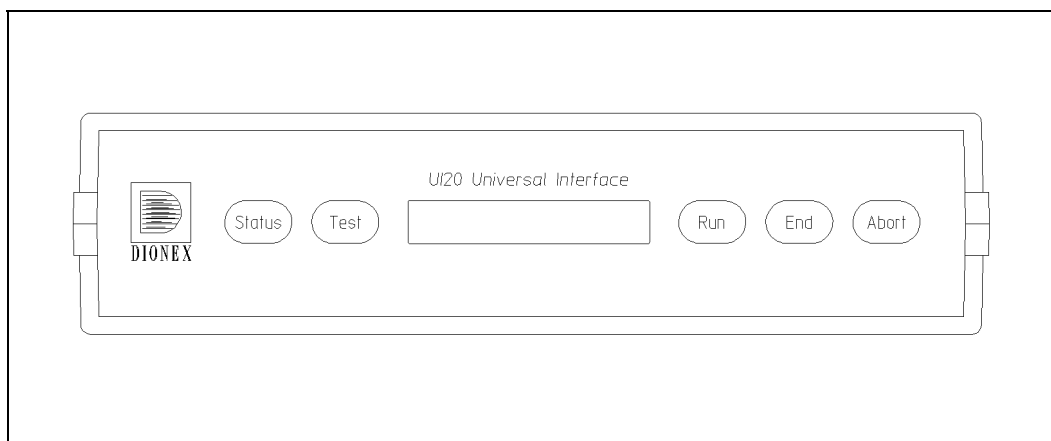
Figure 2-1. The UI20 Front Panel

- Press **Test** to access the UI20 diagnostic programs. These include tests of the DX LAN RAM, RS-232 ports, and voltage reference, as well as an option that clears the Method stored in memory and returns the UI20 to the Not Loaded state (see Section 2.2.2).

  Each time you press **Test**, the LCD displays the name of the next test option; to start a test, press **Run**. When you finish, press **End** or **Abort** to exit the diagnostics.

- Press **Run** to begin executing timed events, *if* a Method has been downloaded and the UI20 is in the Ready state (see Section 2.2.2).

- Press **End** during a run to stop executing timed events before the run is complete. This also sets the TTL and relay outputs to the End conditions for the timed events in the current Method.

  When using the UI20 diagnostics, pressing **End** exits the program.

- Press **Abort** during a run to stop executing timed events before the run is complete. This discards all data collected, and sets the TTL and relay outputs to the End conditions for the timed events in the current Method. The computer then prepares the UI20 for the next analysis.

  When using the UI20 diagnostics, pressing **Abort** exits the program.
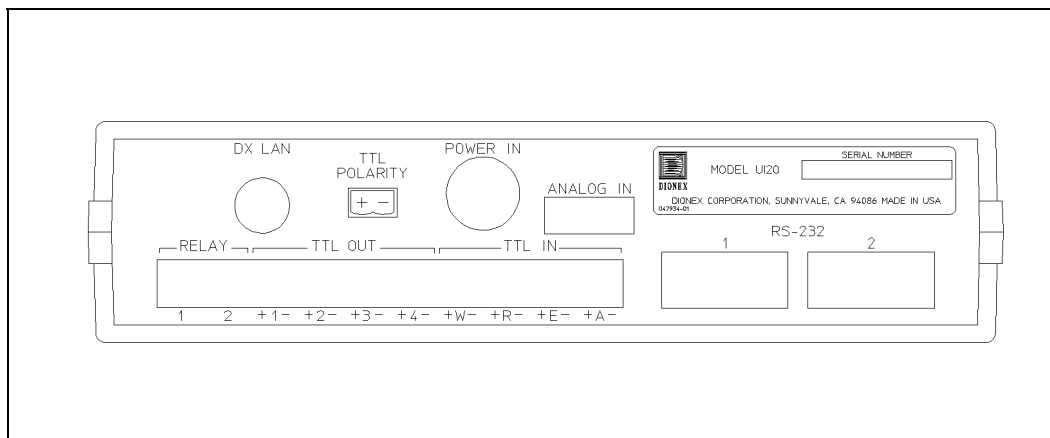
Figure 2-2. The UI20 Rear Panel

2.1.2 Rear Panel

For more information about connections to the UI20 rear panel, see Appendix B.

- DX LAN is a standard BNC connector that provides a connection from the UI20 to the PeakNet workstation, using the DX LAN cable (P/N 960404) and BNC tee connector (P/N 921914) provided in the UI20 Ship Kit (P/N 047789).

- Two **RELAY** connections provide programmable switch closures for controlling accessories. The solid-state relays are rated at 0.1 amp at 300 volts AC or DC and are normally open.

- Four **TTL OUT** lines provide connections to accessories that require only a simple digital level for control. The outputs are open-collector transistors (common ground), with a 180 Ω internal pull-up to +5 volts.

- Four **TTL IN** lines provide connections to an external device that can control the Wait, Run, End, and Abort functions for the timed events.

- The **TTL POLARITY** legend indicates the positive and negative (ground) orientation of the two terminals of each TTL.

To prevent damage to the UI20, be sure to observe TTL polarity during installation.

- POWER IN provides a connection to the external power supply (P/N 940042). Use of an external power supply minimizes electrical noise and drift in the system.

- ANALOG IN provides connections to two independent analog detectors, using the analog cable (P/N 960226).

- The two RS-232 ports are IBM AT-style ports. For more information about the interface, refer to the *PeakNet Software User's Guide* (Document No. 034914).

2.2 Functional Description

2.2.1 Control States

Direct Control

Use Direct Control to change the settings for the TTL and relay outputs, or the voltage scale, directly from the PeakNet Run program.

Before Direct Control can be activated, the UI20 must be in the Ready state (see Section 2.2.2). If you select Direct Control when a Method is running, PeakNet asks for confirmation that you wish to abort the Method and switch to Direct Control.

Method Control

When the UI20 is under Method Control, commands are executed according to Methods, which you create in the PeakNet Method Editor. The workstation can download one Method at a time to the UI20. Once the UI20 is in the Ready

state (see Section 2.2.2), selecting the Run command begins the analysis.

The UI20 then runs the timed events and buffers all detector data, even if the workstation is temporarily unavailable for communication. When the workstation is again available, the UI20 will send a copy of all currently collected data.

After the workstation receives the complete chromatogram and writes it to disk, the UI20 reverts to the Ready state. If a Schedule is running, the workstation then downloads the next Method and begins running it.

The workstation can monitor baseline conditions whenever PeakNet is not running a Method.

2.2.2 States of Operation

This section describes the five UI20 operational states: Not Loaded, Ready, Waiting, Running, and Ended. A status message on the UI20 front panel indicates the active state.

Figure 2-3 depicts the transition states.

State: Not Loaded
Status Message: NOT LOADED

At power-up, the UI20 is in the Not Loaded state and all default parameters are in effect. The UI20 immediately checks memory for a Method. If a Method is found, the UI20 enters the Ready state. If no Method is found, the UI20 remains in the Not Loaded state and waits for the host computer to download a Method or send a command.

When using one of the UI20 diagnostic programs, select the Clear All option to delete any Method currently stored in memory and return the UI20 to the Not Loaded state.
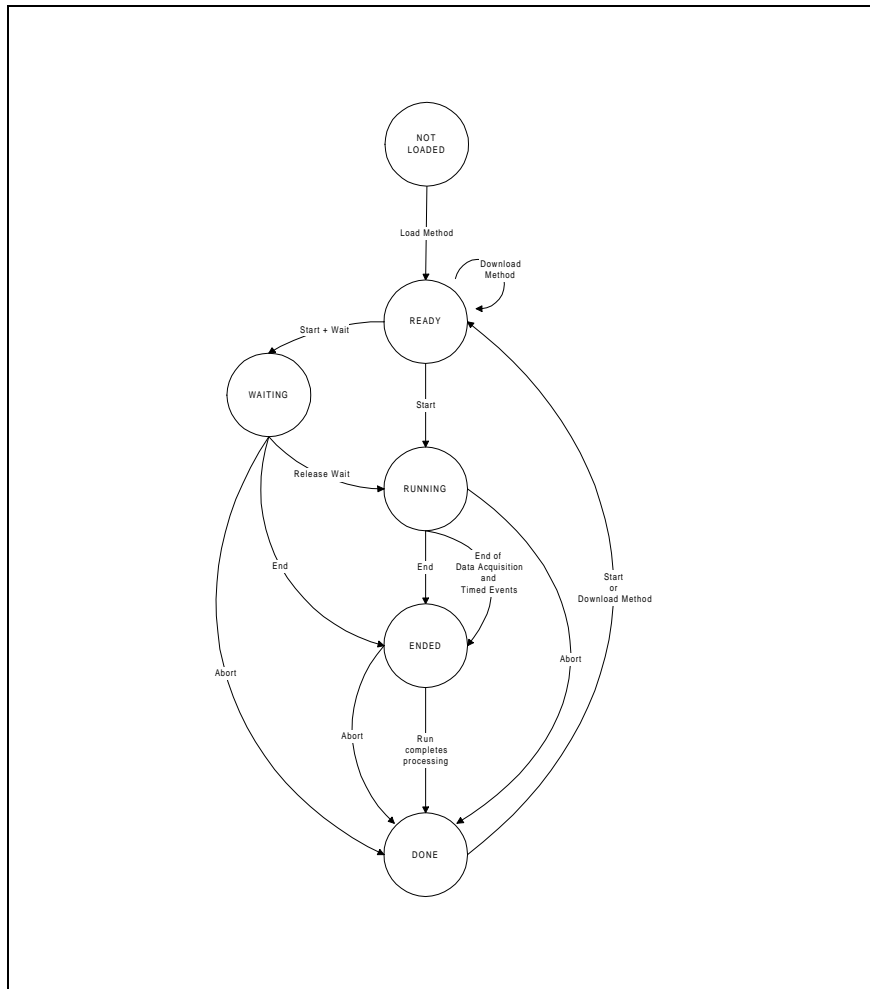
Figure 2-3. UI20 Transition States

State: Ready
Status Message: READY

The Ready state is in effect after a Method has been downloaded from the host computer to the UI20, but before the Method begins running. The TTL and relay outputs are set to the initial conditions.

In the Ready state, a run can begin at any time. There are three ways to start a run: via the front panel **Run** button, a TTL input, or the host computer.

After the run is complete and the UI20 has uploaded all data to the host computer, the UI20 reverts to the Ready state. At that point, the TTL and relay outputs are set to the End conditions for the current Method.

State: Waiting
Status Message: WAITING

In the Waiting state, the UI20 has received a Run command, the Wait TTL input is active, and the TTL and relay outputs are at the initial conditions. You must clear the Wait signal before the run can start.

State: Running
Status Message: * X.X MIN *or* *** A:XXXX.X MV** *or* *** B:XXXX.X MV**

In the Running state, timed events and/or data acquisition are in progress and the TTL and relay outputs are controlled by the timed events in the current Method.

The status message will alternate between displays of the Method run time and the voltage value for the active analog channel(s) (A and/or B). An asterisk in the leftmost column of the LCD means that data collection is in progress.

State: Ended
Status Message: METHOD ENDED *or* **X.X MIN**

In the Ended state, timed events and data acquisition have been completed. The TTL and relay outputs are set to the End conditions for the timed events in the current Method.

The status message alternates between displaying "Method Ended" and the Method run time. Although the run time is not always displayed, the Method clock runs continuously.

2.2.3 Instrument Interface

Relay and TTL Outputs

The two UI20 solid-state relays provide control of all instruments that cannot be controlled via the DX LAN interface. These include pumps, detectors, and autosamplers.

The four TTL outputs can be used to control accessories that require only a simple digital level for control. The TTL outputs operate in toggle state and may be controlled by either Direct Control or Method Control (see Section 2.2.1).

TTL Inputs

The four TTL inputs allow the UI20 to be controlled by signals from autosamplers, pumps, detectors, or other devices. The following functions can be controlled: Wait, Run, End, and Abort. Each function assigned to a TTL input can be independently enabled or disabled. The polarity for each input can be set to either High or Low in the Method or in the Run program, through Method Control.

RS-232 Interface

The UI20 rear panel includes two IBM AT-style RS-232 ports. For more information about the serial interface, refer to the *PeakNet Software User's Guide* (Document No. 034914).

External Analog Signal Input Connections

A high-resolution analog-to-digital (A/D) converter allows the UI20 to monitor signals from two external analog detectors.

The A/D converter measures, or collects, the voltage at the two analog inputs on the UI20 rear panel, digitizes the analog signals, and then saves them in its buffer.

The two analog inputs must use the same input voltage range and data collection rate. Set the data collection rate in the PeakNet Method Editor.

The table below indicates for how long the UI20 can buffer detector data at various collection rates before the host computer must upload data. If the Run program is closed and the UI20 data capacity is exceeded, the UI20 will stop buffering new data.

For a discussion of the significance of the data collection rate for peak integration, refer to Appendix B of the *PeakNet Software User's Guide* (Document No. 034914).

UI20 DATA COLLECTION CAPACITY

Collection Rate (Hz)	Using One Detector (minutes)	Using Two Detectors (minutes)
0.1	21,840	10,920
0.2	10,920	5,460
0.5	4,368	2,184
1	2,184	1,092
2	1,092	546
5	437	218
10	218	109
25	88	44
50	44	22

3 • Operation

3.1 Routine Operation

> **NOTE**
> Do not turn on the UI20 unless it is at room temperature (10 to 40 °C; 50 to 104 °F). If the UI20 is moved from a very cold environment to a warm environment, allow at least one hour for condensation to evaporate before turning on the power.

Routine operation consists of using PeakNet software to control and collect data through the UI20. If you are not an experienced user of PeakNet, review the *PeakNet Software User's Guide* (Document No. 034914) before initial operation of the UI20.

After a Method has been created in the PeakNet Method Editor and downloaded to the UI20, the UI20 can begin a run. There are three ways to start a run:

- the UI20 front panel **Run** button
- a TTL input signal to the UI20
- the host computer (from the Run program)

> **NOTE**
> If the Wait TTL input is active, the run does not begin until the Wait signal is cleared.

You can end a run at any time, using an **Abort** or **End** command issued from any of the following:

- the UI20 front panel **Abort** or **End** button
- a TTL input signal to the UI20
- the host computer (from the Run program)

For a description of the UI20 functions and operational states, see Chapter 2 of this manual.

4 • Troubleshooting

This chapter is a guide to troubleshooting minor problems that may occur while operating the UI20 Universal Interface. Turn to the section of this chapter that best describes the operating problem. There, the possible causes of each problem are listed in order of probability, along with the recommended course of action. If you are unable to eliminate a problem, notify your local Dionex office.

4.1 UI20 Does Not Communicate with PeakNet

- No power to the UI20

Check the connections between the power supply, UI20, and power receptacle.

- Incorrect DX LAN connections

    1. Verify that the DX LAN cables (P/N 960404) are correctly connected, with each device joined to the DX LAN network via a BNC tee connector (P/N 921914) (see Section B.3.4). Make sure that these devices correspond to the system assignments you made in the PeakNet Configuration Editor.

    2. Verify that a terminator plug (P/N 921034) is installed on the free end of the BNC tee connector (P/N 921914) on the device at each end of the DX LAN network (see Section B.3.4).

4.2 No Data from ANALOG IN Connector

- No detector connected to the UI20

Connect the detector to the **ANALOG IN** connector on the UI20 rear panel, using the analog cable (P/N 960226) provided in the UI20 Ship Kit. See Section B.3.3 for details.

- Incorrect detector selection

Check the Method and make sure that the detector connected to the UI20 corresponds to the UI20 Signal (Channel A and/or B) selected in the Method.

- Incorrect range setting

Make sure the sensitivity settings selected from the detector and in the Method agree. A 1 mV or 10 mV full-scale signal from the detector provides barely enough signal for a usable record if the UI20 is set to 1 V or 10 V full-scale.

4.3 No Relay or TTL Control

- No power to the UI20

Check the connections between the power supply, UI20, and power receptacle.

- Incorrect connections to the RELAY or TTL connectors

Verify that the cables (P/N 921370) are connected to the correct pins on the UI20 rear panel.

- No timed events step that turns on the relays or TTLs

Add a step turning on the relays or TTLs to the UI20 timed events in the Method.

- Faulty or damaged TTL electronics

Use Direct Control to test the TTLs.

4.4 No Data Collected

- The wrong PeakNet Method is running

Abort the run and select the correct Method.

- No Begin Data Collection timed event

Add a Begin Data Collection step to the UI20 timed events in the Method.

- Incorrect connection to the detector

    1. Check the Method to verify that this detector is assigned to this Method.

    2. Use the analog cable (P/N 960226) provided in the UI20 Ship Kit to make the connection between the detector and **ANALOG IN** on the UI20 rear panel. See Section B.3.3 for details.

A • Specifications

A.1 Component Specifications

Front Panel Controls   Status, Test, Run, End, Abort

Front Panel Display   16-character liquid crystal display

Communication with Host Computer   DX LAN interface

TTL Inputs   Four 0 to 5 V open-collector inputs for remote control of Wait, Run, End, and Abort

TTL Outputs   Four time-programmable 0 to 5 V, 20 mA outputs, configurable for level-change signals

Relay Outputs   Two normally open, time-programmable, solid-state relays

RS-232 Ports   Two DB 9-pin ports configured as DTE (male)

Detector Inputs   Two external analog signals, using the same voltage and data sampling rates

Data Collection Rates   0.1, 0.2, 0.5, 1, 5, 10, 25, and 50 Hz

Diagnostics   Tests the DX LAN RAM, RS-232 ports, and voltage reference; clears a stored Method from memory, if present

A.2 Physical Characteristics

Power Requirements   90-265 Vac, 50/60 Hz, 900 mA

Operating Temperature Range   10 to 40 °C (50 to 104 °F)

Operating Humidity Range   5-95% relative humidity, non-condensing

Dimensions (H x W x D)   6.4 x 23.7 x 30.0 cm (2.5 x 9.3 x 11.8 in)

Weight   2 kg (4.4 lbs)

B • Installation

B.1 Facility Requirements

For other electrical and environmental specifications for the UI20 installation site, refer to Appendix A.

Bench Space

The UI20 can be installed beside, or on top of, another instrument. An instrument or accessory weighing a maximum of 14 kg (30 lbs) can be installed on top of the UI20.

Power

The UI20 requires a grounded, single-phase main power source of 90 to 265 Vac, 47/63 Hz. A modular power cord ensures a safety ground.

The UI20 is designed to meet safety standards IEC 1010 and UL 1262. It is designed for immunity to electromagnetic field interference (EMI) and to be free of harmful EMI emission levels.

⚠ **CAUTION**

Operation at input levels outside the specified range may damage the UI20.

SHOCK HAZARD—A grounded receptacle must be used to avoid electrical shock. Do not operate the UI20, or connect it to AC power mains, without an earthed ground connection.

PeakNet Software

Verify that PeakNet Release 4.10 or higher is installed on the host computer. PeakNet releases prior to 4.10 do *not* support the UI20.

B.2 Installation Instructions

> **NOTE**
> **Do not turn on the UI20 unless it is at room temperature (10 to
> 40 °C; 50 to 104 °F). If the UI20 is moved from a very cold
> environment to a warm environment, allow at least one hour for
> condensation to evaporate before turning on the power.**

As an example, Figure B-1 illustrates the connections for a system
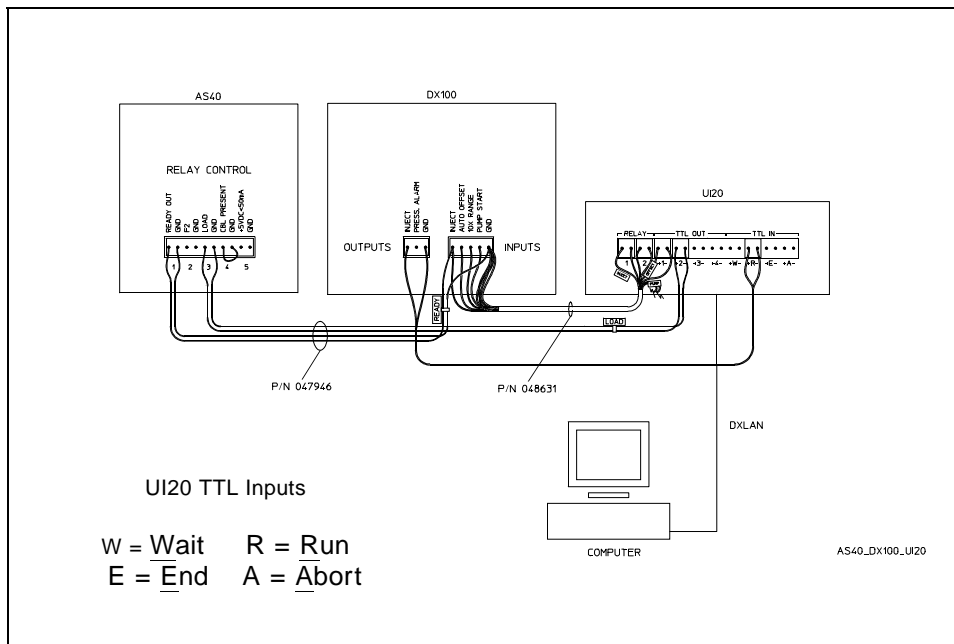that includes a UI20, a DX-100 Ion Chromatograph, and an AS40
Automated Sampler.

Figure B-1. System Connections (UI20, DX-100, AS40)

B.2.1 Power Supply Connections

1. Locate the cord from the external power supply (P/N 940042) in the UI20 Ship Kit (P/N 047789). Plug the cord into the **POWER IN** connector on the UI20 rear panel.

2. Connect the UI20 modular power cord (IEC 320 C13) to the power supply and plug it into a wall outlet.

B.2.2 Relay/TTL Connections

The UI20 Ship Kit includes black wire (P/N 010451), red wire (P/N 216158), and five 2-pin connectors (P/N 921370) for Relay/TTL connections.

Attach individual wires, twisted pairs, or coaxial cables to the Relay/TTL connectors. Strip the end of the wire(s) and insert them into the connectors. Insert the connectors into the **RELAY**, **TTL OUT**, and **TTL IN** connectors on the UI20 rear panel.

For the TTL outputs, the right pin is Gnd (ground) and the left pin is TTL voltage. Ground is common to all outputs and to the digital ground on the main circuit board.

⚠ **CAUTION**

The UI20 relay outputs, TTL outputs, and TTL inputs all use the same type of connector. Connecting relay loads and their power sources to the TTL outputs can damage the TTL output stage if the relay loads can supply more than 200 mA at 5 volts or higher.

B.2.3 External Analog Signal Input Connection

Connect the recorder output of the detector to the **ANALOG IN** connector on the UI20 rear panel, using the analog cable (P/N 960226) provided in the UI20 Ship Kit. Route the cable away from the external power supply and the AC power cord. Leave the cable shield unconnected at the detector end.

B.2.4 DX LAN Connection

Each device must be connected to the DX LAN cable by a tee connector, and the tee connectors at the ends of the network must be capped with terminator plugs. Before initial operation of the UI20, verify that a terminator plug is installed at each end of the DX LAN, as shown in the figure below).

1. Connect the BNC tee connector (P/N 921914) to the **DX LAN** connector on the UI20 rear panel.

2. Connect the DX LAN cable (P/N 960404) to one side of the BNC tee connector.

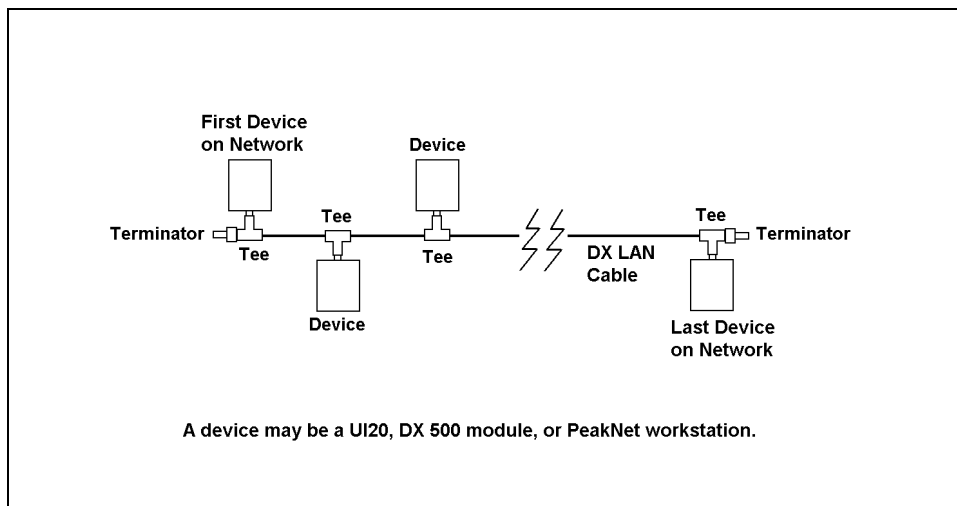3. If there are additional devices connected to the DX LAN, install the terminator plug (P/N 921034) on the end of the network. The terminator is shipped with PeakNet software.

Figure B-2. DX LAN Connections