CMG-CD24S6EAM

Technical Manual

Document No. MAN-C24-0003

Designed and manufactured by
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Issue A May 2011

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1 Prelims

1.1 Proprietary Notice

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1.2 Cautions and Notes

Cautions and notes are displayed and defined as follows:



Caution: A triangle or cautionary symbol indicates a chance of damage to or failure of the equipment if the caution is not heeded.



Note: A circle indicates indicates a procedural or advisory note.

1.3 Manuals and Software

All manuals and software referred to in this document are available from the Guralp Systems website: www.guralp.com unless otherwise stated.

1.4 Conventions

Throughout this manual, examples are given of command-line interactions. In these examples, a fixed-width typeface will be used:

```
Example of the fixed-width typeface used.
```

Commands that you are required to type will be shown in bold:

`Example of the fixed-width, bold-face typeface.`

Where data that you type may vary depending on your individual configuration, such as parameters to commands, these data are additionally shown in italics:

`Example of the fixed-width, bold-faced, italic typeface.`

Putting these together into a single example:

`System prompt:` **`user input with`** ***`variable parameters`***

2 Introduction

2.1 Equipment Overview

The Guralp Systems CMG-CD24S6EAM is an acquisition unit providing a guaranteed 100ms low-latency Ethernet output with full system redundancy.

Inside each acquisition unit are a pair of CMG-CD24 digitisers, a Lantronix Wi-port NR Ethernet module and a CMG-EAM communication and control module.

The CMG-CD24 is an analogue to digital converter that receives signals from connected seismometers and other devices and feeds the digital output to both the Lantronix Wi-port NR and a CMG-EAM modules. The Lantronix Wi-port NR provides a guaranteed 100ms low latency Ethernet output and the EAM provides Ethernet and serial outputs.

GPS timing is used throughout, there is an internal mass storage device and protection is provided through GPS and Network surge protectors.

On the front of the acquisition unit is an LCD display which cycles though a series of status messages such as the IP address and GPS status.

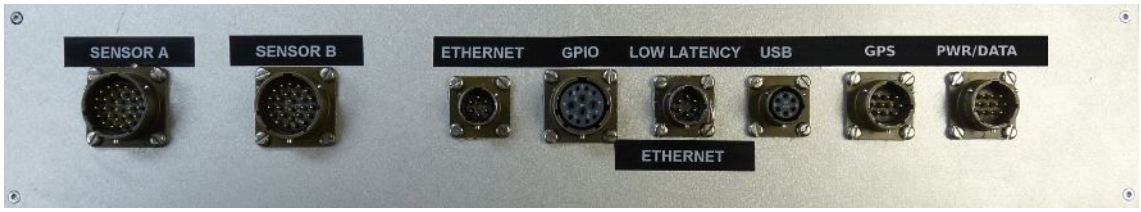
The system architecture is given in section 2.3 on page 5.

2.2 Ports

Note: Refer to Appendix E on page 31 for information on connector pinouts.

2.2.1 External Ports

There are 8 ports on the back of the acquisition unit. These are described below.



2.2.1.1 Sensor A and Sensor B

Two 26-pin connectors that provide power to the instruments and accept analogue signals from connected sensors.

2.2.1.2 ETHERNET

The two 6-pin 100BASE-TX Ethernet ports support connection to a hub, switch or router. The low-latency port connects to the Lantronix WiPort NR device and the other connects to the CMG-EAM.

2.2.1.3 GPIO

The 12-pin GPIO (***G***eneral ***P***urpose ***I***nput/***O***utput) port fulfils three functions: it provides a serial console to the EAM, which can be used for monitoring, configuration and control; it provides USB access from a PC or laptop to the internal mass storage device for data collection and it provides a number of tri-state lines which can be used to control or monitor external equipment. One application is as tamper detection lines, which can be connected to external switches and monitors as part of a secure installation.

2.2.1.4 USB

The 6-pin USB port allows connection of an external USB storage device for data collection. It is also possible to perform firmware upgrades using this port in situations where internet access is not available.

2.2.1.5 GPS

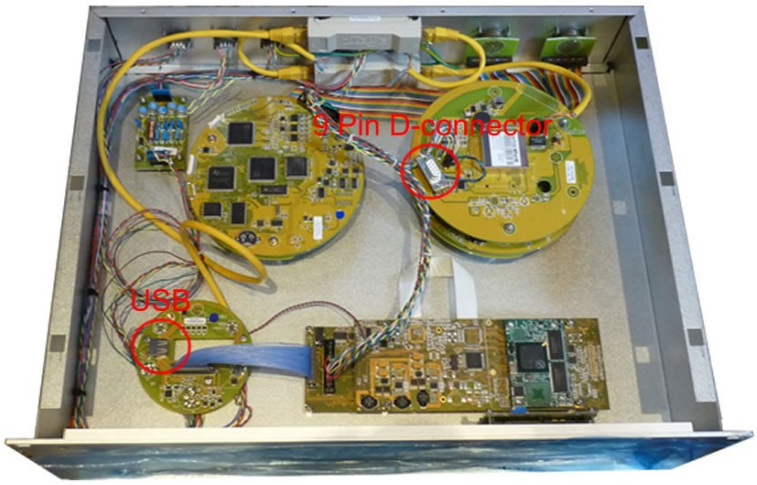
The 10-pin GPS port connects to a Guralp Systems GPS receiver which acts as a timing source for time-stamping seismic data.

2.2.1.6 PWR/DATA

The 10-pin Power/Data Out port is the power input and general-purpose serial port. It is a command line terminal running at 115,200 Baud in the default configuration but it can also be used for GCF output, PPP network connections, inbound GCF (from a digital instrument, for example), NMEA functions, TCP serial conversion, a modem answering service or as a recorder to store and forward data from any instrument with a serial output.

2.2.2 Internal Ports

There are two internal ports that can be accessed by removing the top cover from the acquisition unit. These are described below.



2.2.2.1 USB

The internal USB connector allows for the installation of a suitable mass storage device. An 8Gb mass storage device is supplied as standard and can be upgraded if required.

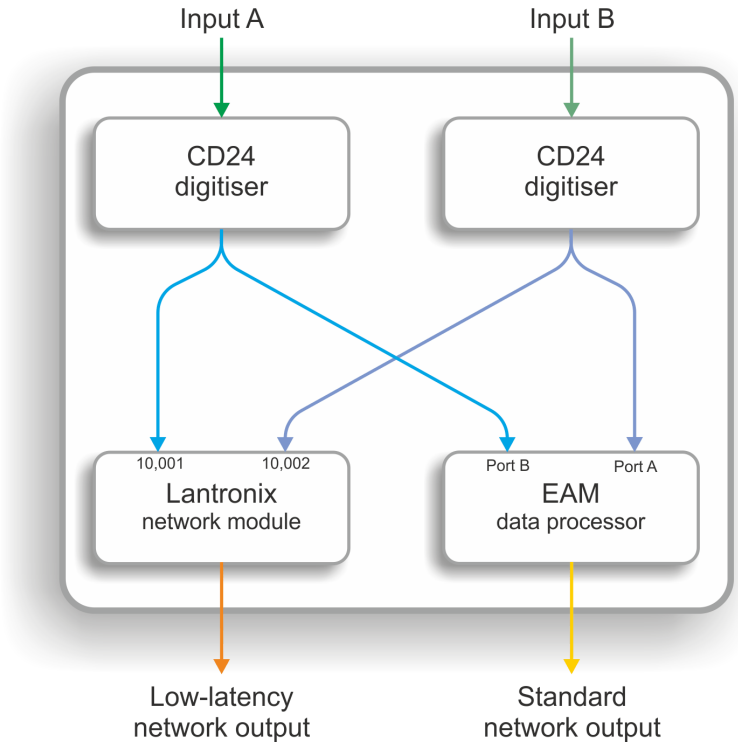
2.2.2.2 D-connector

The 9-pin D connector provides RS232 access to the Lantronix WiPort NR device for advanced configuration (see Appendix C on page 23).

2.3 System Architecture

2.3.1 Acquisition units

The primary system architecture of the acquisition units are given in the figure below. Not all input and output ports are shown, these are listed in section 2.2 on page 2.



The A and B inputs are analogue signals from attached seismometers as shown in the next section.

Configuration and control of the Lantronix Wi-port NR and a CMG-EAM modules is carried out via the web interfaces as detailed in section 3 on page 7.

Configuration and control of the digitisers is carried out via the EAM web interface. The EAM also provides power to the CD24 digitisers.

For more information on the internal devices refer to the following manuals available from the Guralp Systems website: www.guralp.com

MAN-EAM-0003 for the CMG-EAM

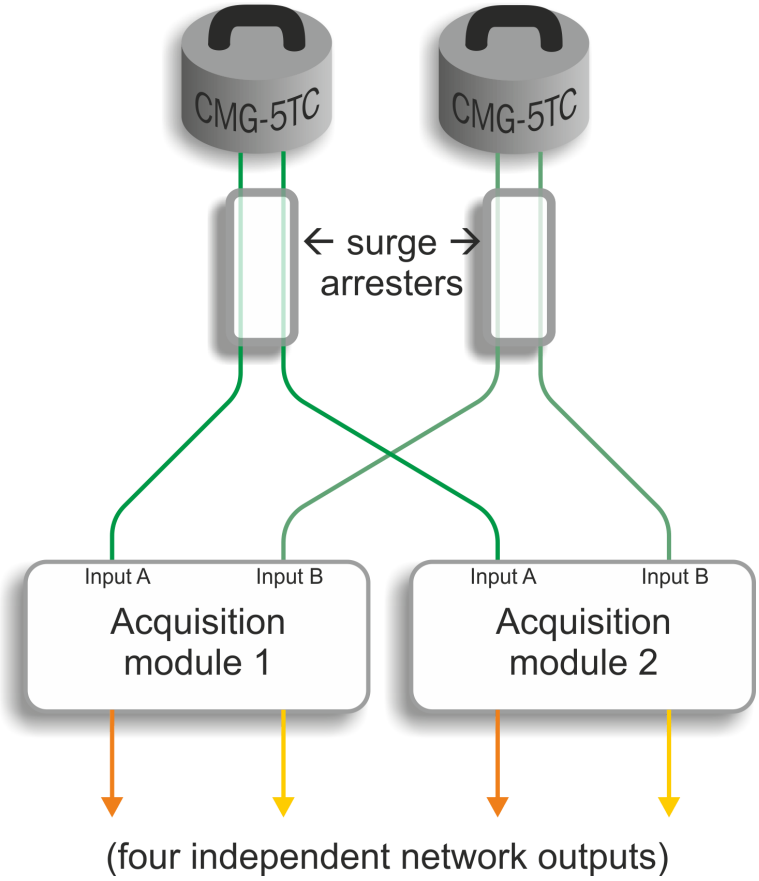
MAN-C24-0001 for the CD24

For more information on the Lantronix WiPort NR refer to the manufacturers documentation:

www.lantronix.com/pdf/WiPort-NR_UG.pdf

2.3.2 Example sensor station

An example of a complete sensor station is shown in the figure below. The dual outputs from each CMG-5TC sensor are split as shown, each feeding an acquisition unit. In this arrangement there is a duplex system with full redundancy from the sensor to the network outputs.



The supplied instruments are standard CMG-5TC accelerometers that have been configured so that all outputs are low gain.

For more information on the instruments refer to the CMG-5TC manual (MAN-050-0004) available from the Guralp Systems website: www.guralp.com.

3 Setting up the CMG-CD24S6EAM

3.1 Initial Installation

Note: Refer to Appendix E on page 31 for information on connector pinouts.

1. Connect the 10-pin connector on the unit to a GPS receiver using the GPS cable. Position the GPS so that it has a good view of the sky. If you do not have a view of the sky, you can operate the unit without a GPS receiver, but timing information may be inaccurate.
2. Connect the instruments to the surge arrestors.
3. Connect the surge arrestors to to the 26-pin connectors in the configuration shown in section 2.3.2 on page 6.
4. Use the power cable to connect the 10-pin Power/Data Out connector to a fused 10 – 28 V power source and wait for the system to boot. This can take up to 90 seconds. The LCD display will indicate when the process is complete.
5. The system is now fully operational and will already be producing data.
6. The acquisition units can be connected to a PC using a serial cable from the 10-pin Power/Data Out port or over a network using the Ethernet ports.
7. Data outputs from the EAM can be viewed using the Guralp Systems Scream application. See the manual MAN-SWA-0001 for information on using Scream.

   Data outputs from the Lantronix WiPort NR can now be accessed using suitable software.

3.2 Connecting to the Lantronix WiPort NR

The Lantronix WiPort NR has been pre-configured so there should be no reason to change any of the settings. If however you wish to make any changes the following procedure for connecting to the Lantronix WiPort NR should be used:

1. Connect the acquisition unit to a DHCP enabled network and note the IP address.
2. Enter the IP address into the address bar of an internet browser.

3. When the **Authentication Required** window displays enter a User Name of 'admin'. Leave the password blank. Click on OK or press the Enter key.

4. Once the Lantronix WiPort NR home page appears you can use the menu list on the left to view and configure the settings:



5. The default settings for the device are given in Appendix A on page 13.

> **Caution:** Making any changes to the default settings may cause the device to stop working.

6. After making any changes click **OK** at the bottom of each screen. On completion click on **Apply Settings**. This will update and reboot the module.

If you are unable to locate the device or have problems connecting, further information is given at Appendix B on page 20.

3.3 Connecting to the CMG-EAM

The CMG-EAM has been pre-configured so there should be no reason to change any of the settings. If however you wish to make any changes to the Low Latency ports the following procedure for connecting to the CMG-EAM should be used:

1. Connect the acquisition unit to a DHCP enabled network and note the IP address.

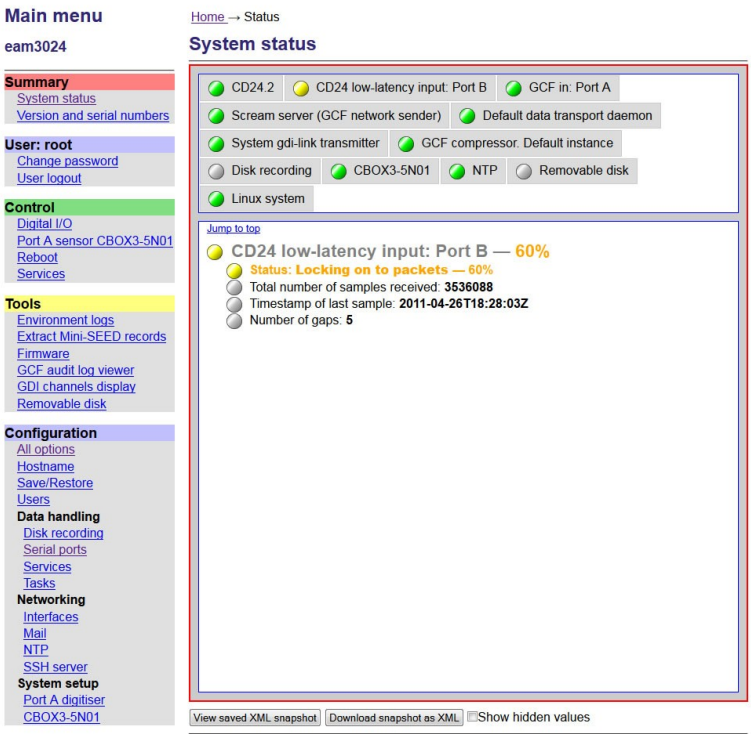
2. Enter the IP address into the address bar of an internet browser.

3. At the EAM homepage click on the **User Login** link in the menu on the left.

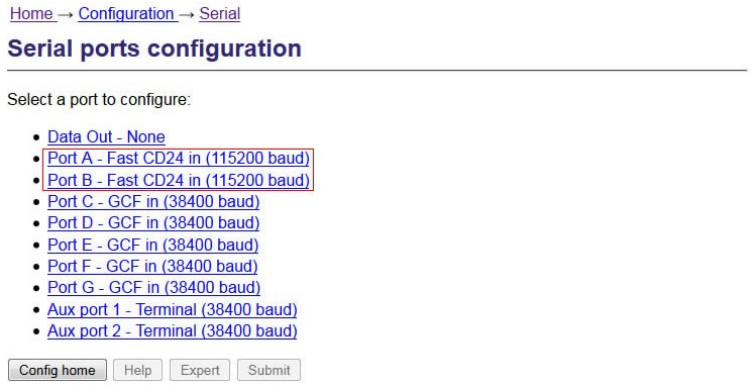
4. When the **Authentication Required** window displays enter a User Name of 'root' and a password of 'rootme'. Click on OK or press the Enter key.

5. Once the full menu appears on the left you have access to all the configuration and control options.

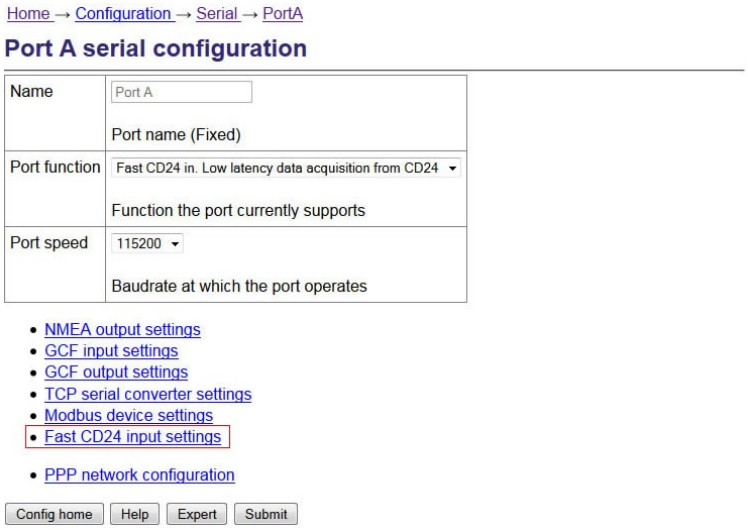
   The right hand part of the widow displays the current status of the system. The links in the main menu will update the main part of the window to the selected configuration and control settings:



6. To see the settings for the low-latency ports first click on the **Serial Ports** link in the main menu then select **Port A** or **Port B** from the list that appears:



7. From the port A or B serial configuration page click on the **Fast CD24 input settings** link:



8. The 5 tabs that appear allow you to the view and change the port settings. The default settings for the ports are given in Appendix A on page 13.

> **Caution:** Making any changes to the default settings may cause the device to stop working.

9. After making any changes click on the **Submit** button at the bottom of each screen.

If you are unable to locate the device or have problems connecting, further information is given in the EAM manual: MAN-EAM-0003.

Other menu items in the EAM allow for their control and configuration of the CMG-CD24 digitisers, ports and other connected devices.

Any changes made in the EAM to the CD24 settings will be reflected in the Lantronix WiPort NR data output.

3.4 Using the internal mass storage device

The acquisition unit has an internal mass storage device which is accessible via the GPIO port (see section 2.2.1.3 on page 3).

To write to the internal mass storage device:

1. Connect to the CMG-EAM as described in section 3.3 on page 8.
2. Click on the Disc Recording link in the main menu.
3. Select **Internal USB storage** from the Recording destination drop-down menu.

When a USB host, such as a laptop or PC, is connected to the GPIO port, internal circuitry detects the USB power and automatically connects the Flash

memory to the GPIO socket, causing it to behave identically to a standard USB memory stick.

When no power is detected at the GPIO port, the Flash memory is available to the system as if it were a standard removable mass storage device. All of the mass storage device recording options described in the CMG-EAM manual MAN-EAM-0003.

3.5 Warning and error reporting

Each component in the station has a predefined warning and error level. The status of the components are indicated on the EAM homepage.

Green indicators are shown when the level is above 70%

Amber warnings are displayed when the level falls below 70%

Red errors are displayed when the level falls below 40%

The status of all components can be monitored and if the level falls below a set percentage a selected output line can be switched from low to high for use by an external indication system.

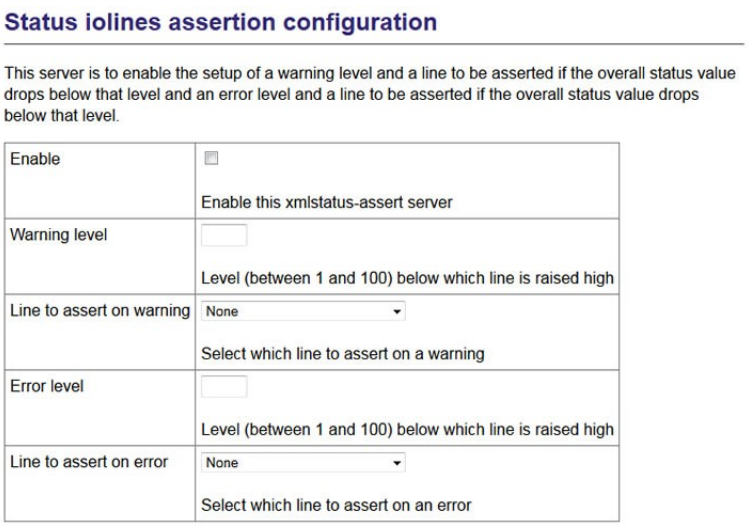
To configure the status iolines using the web interface select:

Configuration > All options > Status iolines assertion configuration

To configure the status iolines from the command line, start gconfig and select "Status iolines assertion configuration" from the top level menu.

3.5.1 Configurable parameters in simple mode

The configurable parameters for recording data in simple mode are shown below:



Enable: Activates the status iolines assertion server.

Warning level: Set the level at which the warning signal is to be triggered.

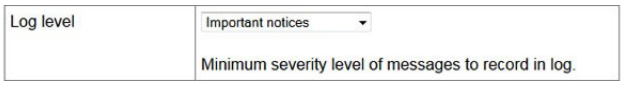
Line to assert on warning: Select the output line from the dropdown list. All output lines are displayed so care should be taken to choose a suitable output line.

Error level: Set the level at which the warning signal is to be triggered. The error level must be less than the warning level.

Line to assert on error: Select the output line from the dropdown list. All output lines are displayed so care should be taken to choose a suitable output line.

3.5.2 Configurable parameters in expert mode

An additional field is displayed in expert mode:



Log level: The drop-down menu controls the level of detail present in log messages. Not all of the standard syslog logging levels are available. The menu offers a choice (in order of decreasing detail) of:

- Debugging information
- Informational messages
- Important notices
- Warnings

4 Appendices

4.1 Appendix A - Default Settings

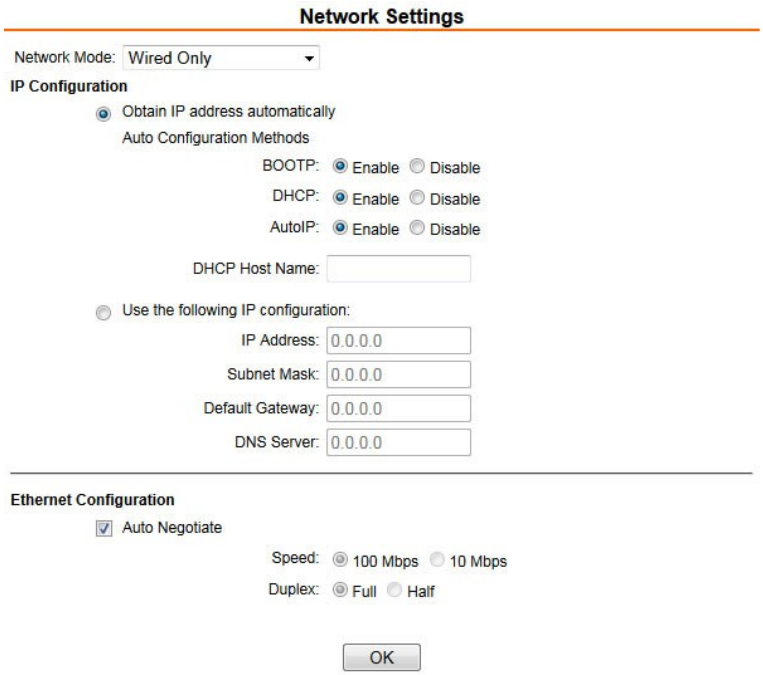
4.1.1 Lantronix WiPort NR Default Settings

Parameter	Setting
Network	
Network mode	Wired Only
IP Configuration	Obtain IP address automatically
Ethernet Configuration	Auto Negotiate
Server	
Server Configuration	Passwords: **Leave blank**
Advanced	ARP Cache Timeout: **600 seconds** TCP Keepalive: **45 seconds** Monitor Mode @ Bootup: **Enable** CPU Performance Mode: **Regular** HTTP Server Port: **80** 0x77FE Server Port: **30718** MTU Size: **1400**
Hostlist	
Retry Settings	Retry Counter: **3** Retry Timeout: **250**
Host Information	All set to zero
Channel 1 and 2 Serial Settings	
Disable Serial Port	Leave un-ticked
Port Settings	Protocol: **RS232** Baud Rate:**115200** Data Bits: **8** Flow Control: **None** Parity: **None** Stopbits: **1**
Pack Control	Enable Packing: **leave un-ticked**
Flush Mode	All set to **No**
Channel 1 and 2 Connection Settings	
Connection Protocol	TCP
Connect Mode	Accept Incoming: **Yes** Password required: **No**

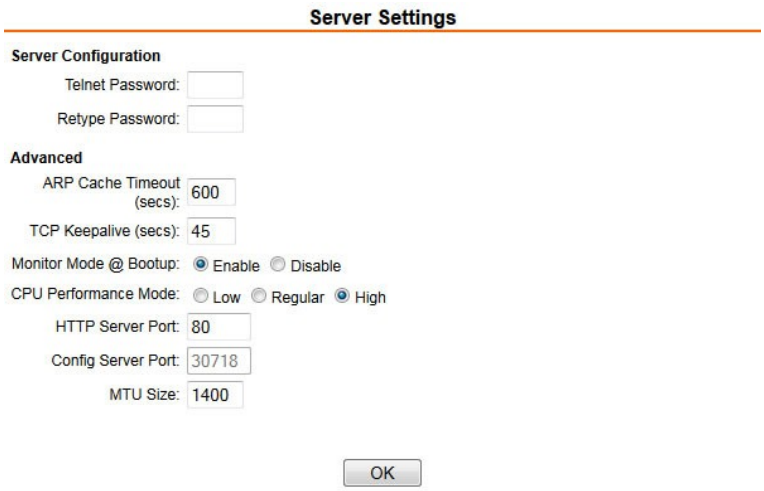
Parameter	Setting
	Modem Escape Sequence Pass Through: **Yes** Active connect: **None** Modem Mode: **None** Show IP Address After RING: **Yes**
Endpoint Configuration	Local Port: **10001** for Channel 1 **10002** for Channel 2 Remote Port: **0** Auto increment for active connect: **NA** RemoteHost: **0.0.0.0**
Common options	Telnet Com Port Cntrl: **Disable** Terminal Name: **NA** Connect Response: **None** Use Hostlist: **No**
Disconnect Mode	On Mdm_Ctrl_In Drop: **No** Check EOT(Ctrl-D): **No** Hard Disconnect: **Yes** Inactivity Timeout: **0 : 0**
Email	NA
Configurable Pin Settings	NA

4.1.2 Lantronix WiPort NR Default Settings Screenshots

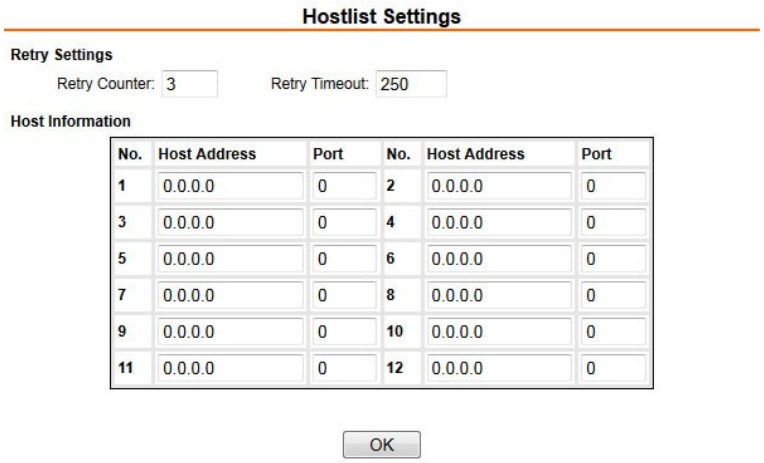
4.1.2.1 Network settings



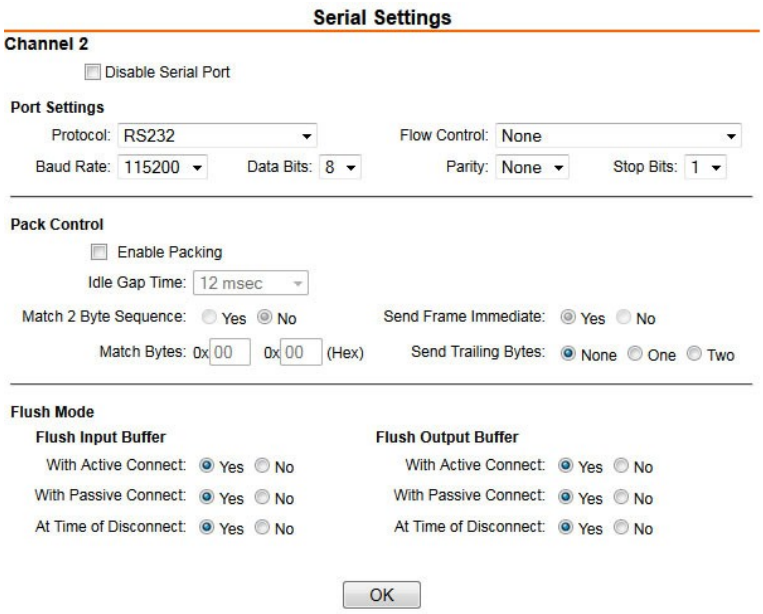
4.1.2.2 Server settings



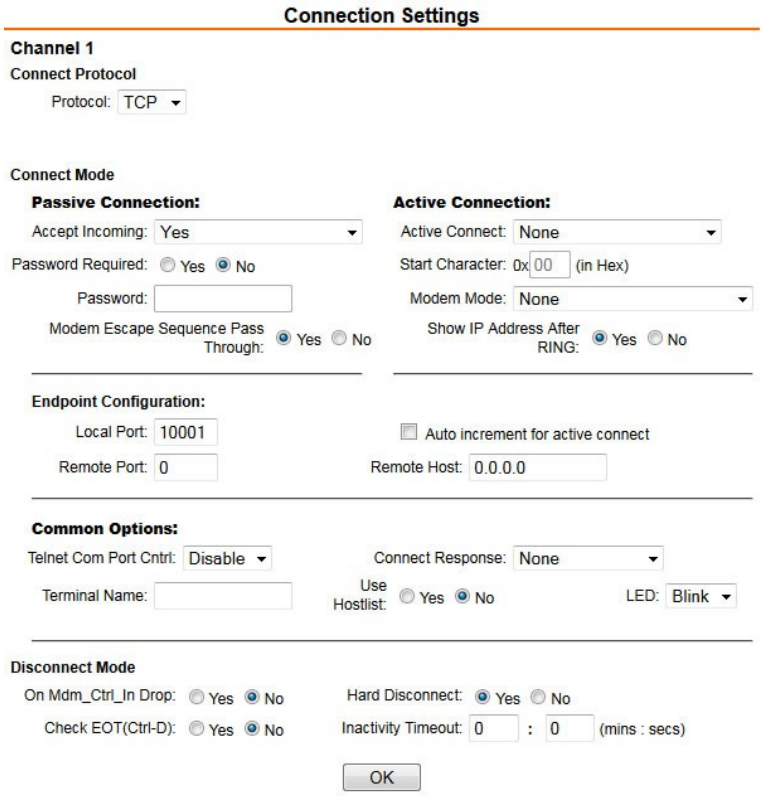
4.1.2.3 Hostlist settings



4.1.2.4 Serial settings



4.1.2.5 Conenction settings

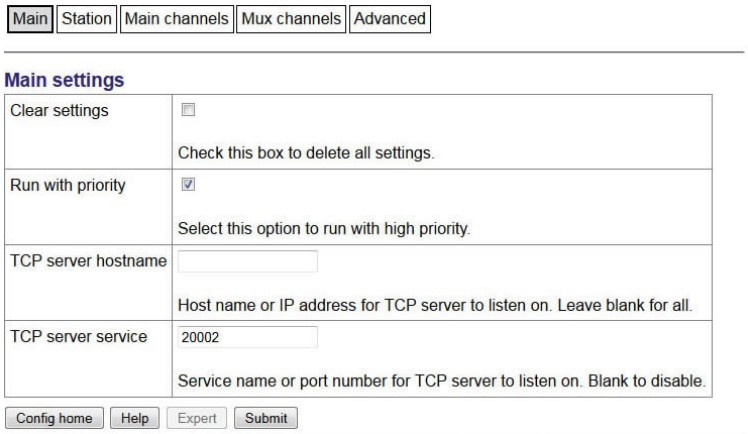


4.1.3 EAM Fast Port Default Settings

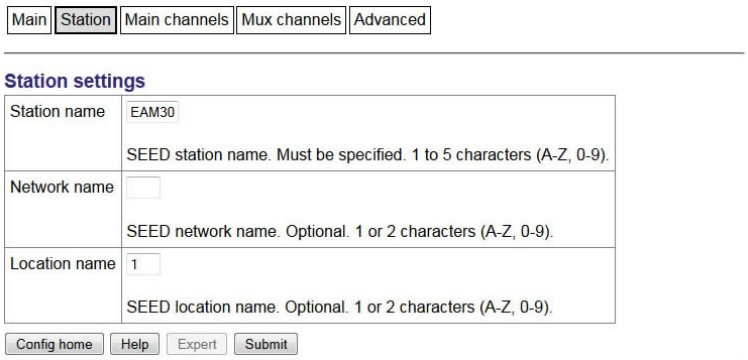
Parameter	Setting
Main	Clear settings: **Leave un-ticked** Run with priority: **Tick** TCP server hostname: **Leave blank** TCP server service: **20002** for Port A, **20001** for Port B
Station	Station name: **Mandatory** (shipped with the serial number of the EAM). Network name: **Optional** Location name: **Optional** If a common station name is used for a number of sensors an additional location name is required to ensure a unique identifier.
Main channels	Sample Rate: **100** High pass filter: **Disabled** Enabled components: **Z N E** Instrument Type: **Accelerometer seismometer**
Mux channels	Component/Instrument Type Z/Mass position seismometer N/ Mass position seismometer E/ Mass position seismometer 0/Calibration input 0/Generic electronic test point 1/Generic electronic test point 2/Generic electronic test point 3/Generic electronic test point
Advanced	Link delay: **Leave blank** GDI Multiplexor: **Default data transport daemon**

4.1.4 EAM Fast Port Default Settings Screenshots

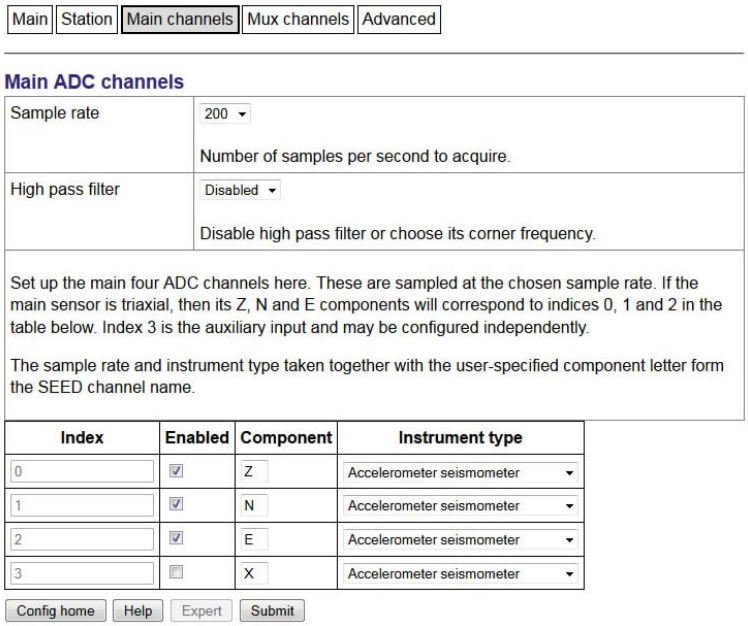
4.1.4.1 Main



4.1.4.2 Station



4.1.4.3 Main channels



4.1.4.4 Mux channels

Main | Station | Main channels | Mux channels | Advanced

Multiplexed ADC channels

Set up the eight multiplexed ADC channels here. The multiplexed channels are sampled at 1 sample per second with a 24-bit range. If the main sensor is a triaxial instrument with mass position outputs, the Z, N and E mass positions are mapped to indices 0, 1 and 2 respectively. If there is a calibration input, it is mapped to index 3.

The sample rate (1sps) and instrument type taken together with the user-specified component letter form the SEED channel name.

Index	Enabled	Component	Instrument type
0	☐	Z	Mass position seismometer
1	☐	N	Mass position seismometer
2	☐	E	Mass position seismometer
3	☐	0	Calibration input
4	☐	0	Generic electronic test point
5	☐	1	Generic electronic test point
6	☐	2	Generic electronic test point
7	☐	3	Generic electronic test point

Config home | Help | Expert | Submit

4.1.4.5 Advanced

Main | Station | Main channels | Mux channels | Advanced

Advanced options

Link delay	Link delay in seconds, used to estimate real time from data.
GDI multiplexor	Default data transport daemon Select which GDI multiplexor instance to send data to.

Config home | Help | Expert | Submit

4.2 Appendix B - Lantronix WiPort NR Device Manager

The acquisition unit uses an embedded Lantronix Wi-Port module to provide the low-latency network interface. The device can normally be accessed using a web-interface as described in section 3.2 on page 7.

If this is not possible configuration of the interface can be carried out using the Lantronix' **DeviceInstaller** utility for Microsoft Windows, using a DHCP server or the via the serial port. You will need a PC with a network interface installed or an RS232 connector.



Note: Refer to Appendix E on page 31 for information on connector pinouts.

1. Download and install the **DeviceInstaller** utility from the Lantronix Web site at www.lantronix.com.

   DeviceInstaller requires the Microsoft .NET framework to be installed. If you do not have this already, it can be downloaded from: www.microsoft.com.

   Note that DeviceInstaller will not work through routers or across the Internet. All the devices need to be on the same network segment as the PC.

2. Find out the MAC address of the network interface. This should be printed on a label on the case.

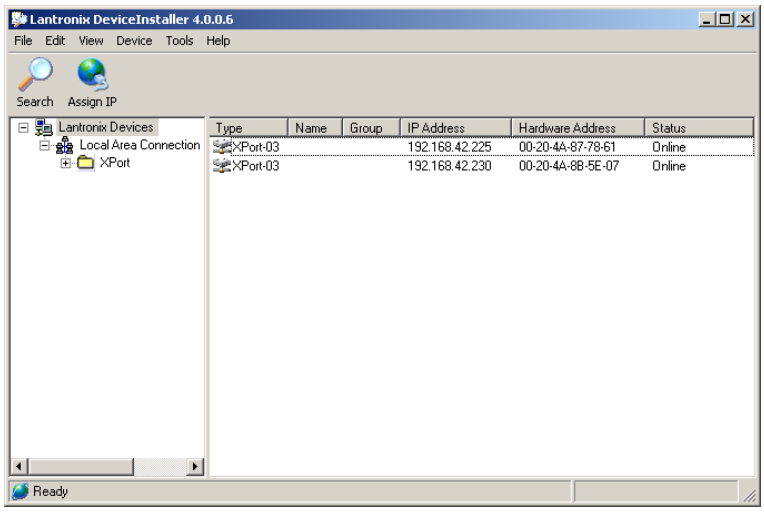
3. Connect the 6-pin Ethernet port to the the PC's network interface either using a crossover Ethernet cable or through a network hub. Note that using a hub, you can connect several CD24s to the same PC and configure them all at the same time.

4. Use the power cable to connect the 4-pin power connector to a fused 10 – 28 V power source. A 12V DC power supply is recommended.

5. Run **DeviceInstaller**.

   DeviceInstaller's main window has two panels, a tree on the left (with *Lantronix Devices* at the top) and a table on the right.

6. The program will automatically look for Lantronix devices on all of your computer's network interfaces. If necessary, you can narrow the selection by clicking on an entry in the tree on the left. If the program does not list the device, press F5 or use Device > Search from the menu system.



7. A WiPort NR entry should appear in the table on the right, denoting that a device has been detected.

8. If more than one WiPort NR entry appears, **DeviceInstaller** has detected several devices.

9. For every detected device, the program shows the *Hardware Address* (*i.e.* the MAC address) and the IP address it is currently using. If you are using a wireless router with a DHCP server, or an access point connected to a network with a DHCP server, the device will use DHCP to assign it an address. Otherwise, a random address will be chosen automatically.

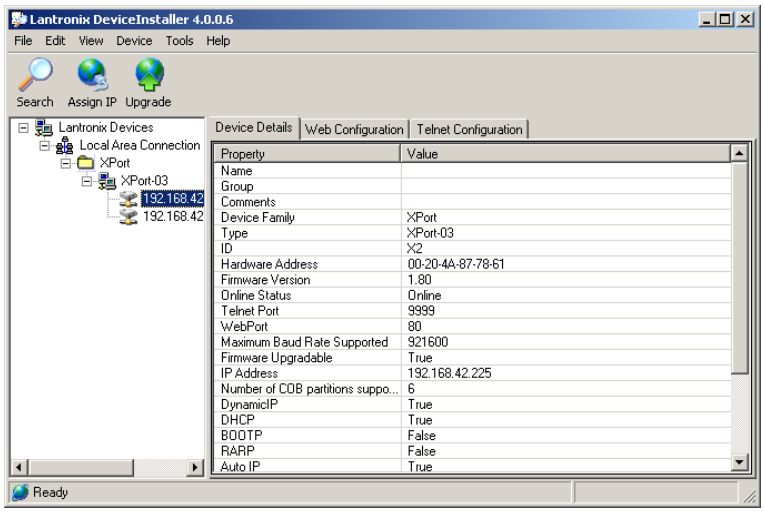
   Note: Automatic random addresses all begin with 169.254. The CD24 will choose a different one every time it is power cycled or rebooted.

10. The address of the CD24 may be shown in red with the status *Unreachable*. If this happens, the sensor and PC cannot communicate because they are not on the same subnet. Click **Assign IP** to start the IP configuration wizard. Follow the instructions in the wizard to set the IP address, or configure DHCP if you are using a DHCP server. When you have finished, press F5 or use Device > Search from the menu system to find the sensor with its new IP address.

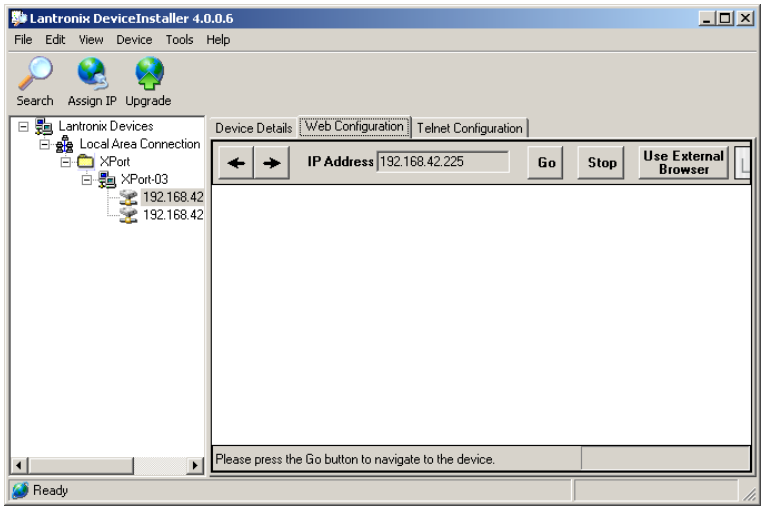
    Note: The IP address of the digitiser must have be on the same subnet as the computer you want to connect to. The LAN setting on the **DeviceInstaller** device tree identifies the IP address of your computer. The first three number groups typically need to be the same on all devices (digitisers and computer).

11. If you want to configure the CD24 to use a static IP address, use the **Assign IP** wizard as above and click **Search** again.

12. Double-click on the entry which corresponds to the CD24 you want to configure. The right-hand panel will change to show the current properties of the device.



13. Switch to the **Web Configuration** tab and click **Go** to open the Web configuration interface.



14. You can also click Use External Browser to use your own Web browser to configure the system.

15. Follow the steps at section 3.2 on page 7.

4.3 Appendix C - Advanced network configuration

The Lantronix WiPort NR networking module has serial-accessible configuration systems which can be used to configure them in the event that communication over a network is lost.

If you have problems connecting to the CD24 over a network, you can access the configuration menu over a serial link by interrupting the boot process. See the following section for instructions. For full information about the WiPort NR configuration options, which are used during the process, please refer to the relevant documentation, which is available on the Lantronix Web site: www.lantronix.com. The detailed documentation is at: www.lantronix.com/pdf/WiPort-NR_UG.pdf

4.3.1 Accessing the configuration menu via the serial Interface

Access to the configuration menu over the serial interface can be obtained using any serial terminal emulator (see Appendix D on page 26).

The procedure for connecting to the device is:

1. Disconnect the power supply.
2. Disconnect the sensors.
3. Remove the top cover from the acquisition unit.
4. Disconnect the 26-way IDE-connector from the digitiser as indicated in the figure below:



5. Connect an RS232 cable between the 9-pin D-connector and a PC. See Appendix E on page 31 for connector pinouts.
6. Open a terminal connection as described in Appendix D on page 26.
7. Hold down the X key while applying power to the acquisition unit.

8. After a few seconds, a banner will appear, showing the MAC address of the network interface, along with software and library version information. Press the Enter key to access the set-up menu. If you do not press a key, the system will proceed to boot normally.

4.3.2 Configuring the network interfaces

Once you have access to the networking module's configuration menu, you can configure it with its proper settings.

During the configuration process, you are prompted, in turn, for every value in the current section. If you are unsure at any point, pressing the Enter key will retain the current value. Please note that many values need to be entered using special codes. These are all documented in the relevant Lantronix manuals.

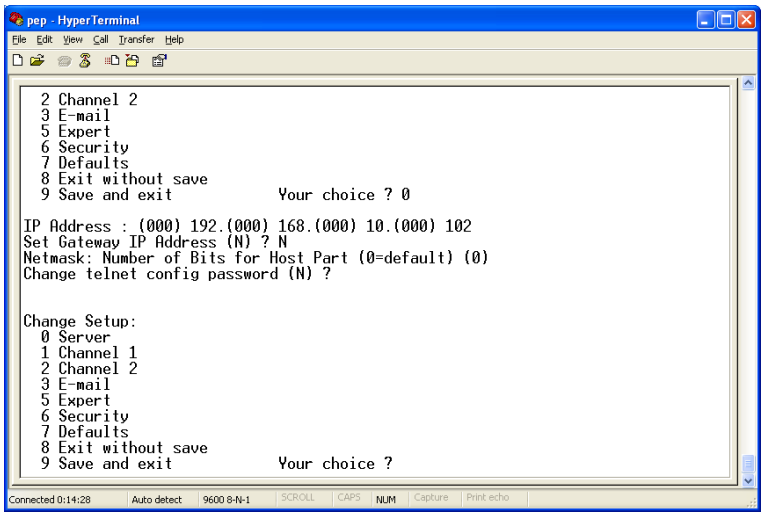
From the main menu:

1. Each channel is configured individually. To configure either press **1** (Channel 1) or **2** (Channel 2).
2. Set the *Baud Rate* to **`115200`**. This is the default baud rate for the CD24's digital output.
3. The remaining settings can be left at their default values, which is done by pressing **Enter** at each prompt until you are returned to the main menu.
4. When you have finished setting up the module, apply the new settings by selecting option **9** Save and Exit. The module will re-boot with the new settings in effect.

4.3.3 Configuring the Ethernet port

To configure the Ethernet port

1. If DHCP is not being used to assign IP addresses, enter the required address manually. The IP address must be set to a unique value in the network. Enter each octet and press Enter to move to the next octet.. The current value is displayed in parentheses. If you do wish to use DHCP, enter 0 at each prompt (an IP address of 0.0.0.0 is used to select DHCP operation).



2. If the digitiser is to be connected to a routed network, enter the address of the default gateway in the same manner.

3. At the netmask prompt, enter **0** if you are using normal (classful) internet addressing. If you have a non-standard or classless addressing scheme, enter the number of bits of the IP address to be used for network identification. Note that this is not the standard way of specifying netmasks; it is more akin to the */n* modifier used in CIDR address specification.

4. When you have finished setting up the module, apply the new settings by selecting option **9** Save and Exit. The module will re-boot with the new settings in effect.

5. Disconnect the power supply from the acquisition unit.

6. Remove the RS232 cable from the 9-pin D-connector.

7. Connect the 26-way IDE-connector to the digitiser.

8. Install the top cover.

9. Connect the sensors to the acquisition unit.

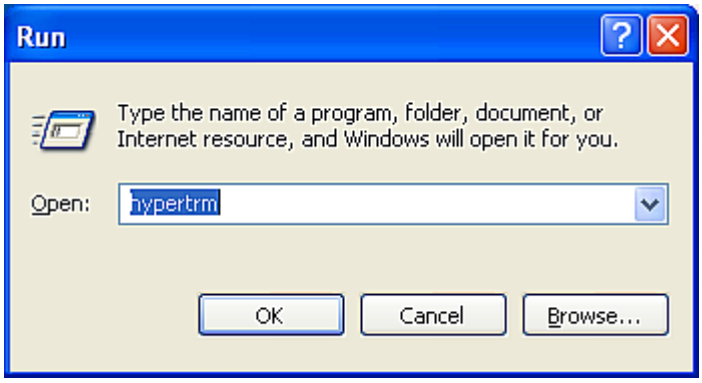
10. Connect the power supply to the acquisition unit.

4.4 Appendix D - Using terminal emulators

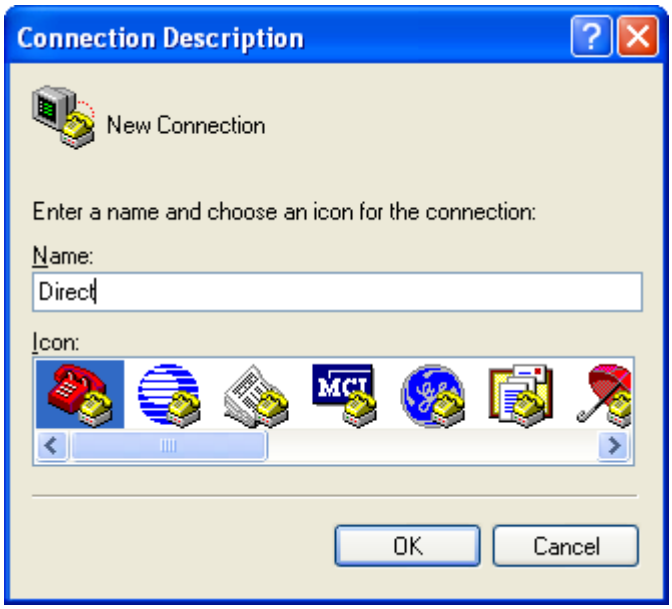
There are a number of terminal emulator programs that you can use to access the serial ports of the digitiser and networking interfaces. Three of these are detailed below.

4.4.1 Hyperterminal, as provided with Windows XP.

1. Click on **Start** and then **Run**.
2. Enter 'hypertrm' and click on **OK**.



3. The program will ask you for a name for the connection:



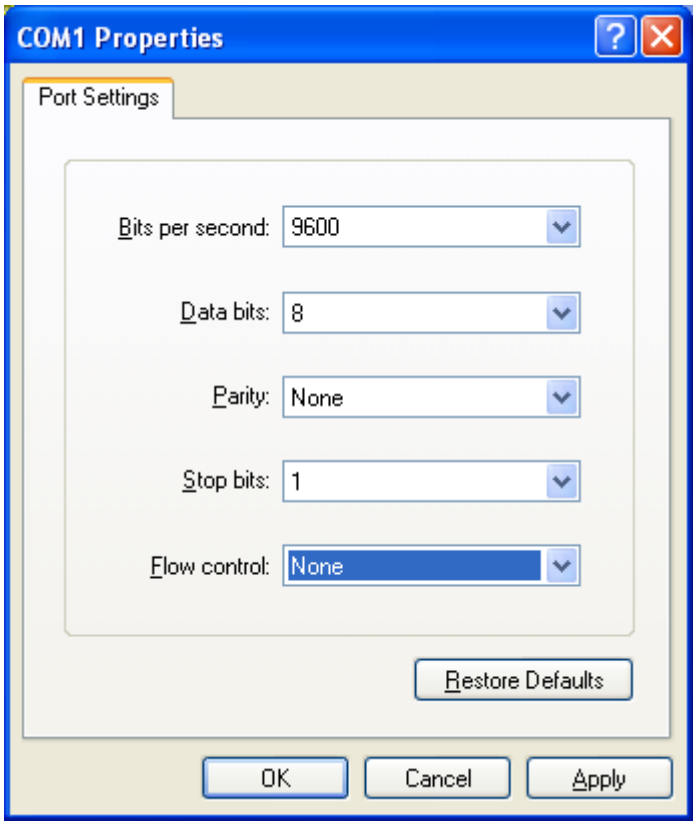
Enter any suitable name, then click **OK**.

4. You will then be prompted to enter COM port and modem details:



The **Country/region**, **Area code** and **Phone number** fields can be ignored: they are only used when working with modem connections. Select the name of the correct COM port from the **Connect using** drop-down menu, then click **OK**.

5. Enter the port configuration settings:



Ensure the following parameters are set:

Bits per second: 9600
Data bits: 8
Parity: None
Stop bits: 1
Flow control: None

6. Click on **OK** and the program will then connect provide you with a terminal emulator screen, from which you can access the command line of your system.

4.4.2 Using Hyperterminal with Windows Vista or Windows 7.

HyperTerminal is not provided with the Windows Vista or Windows 7 operating systems but the necessary files can be copied from the i386 directory of the Windows XP CD if you have one available. The two files you will need are:

hypertrm.dll
hypertrm.exe.

If you do not have a Windows XP disc the files can be downloaded from: www.mediafire.com

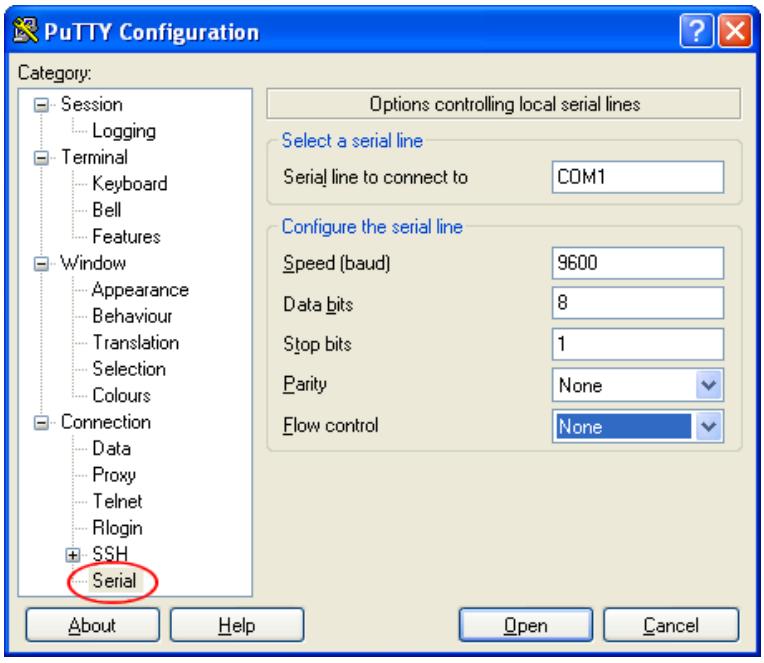
To use Hyperterminal with Windows Vista or Windows 7:

1. Copy the two files into your windows/system32 directory.
2. To access HyperTerminal, use Windows+R on your keyboard. Enter 'hypertrm' and click on **OK**.
3. If Windows open a security warning window click on **Run**. You may also be asked if you wish to use HyperTerminal as a the default terminal window.
4. Now follow the instructions given in section 4.4.1, above.

4.4.3 Using PuTTY.

PuTTY is a free terminal package for windows which is useful if HyperTerminal is not available. It can be downloaded from www.chiark.greenend.org.uk. The easiest package to use is the 'windows installer'. Install PuTTY by following the on-screen instructions.

1. Start PuTTY by clicking on the desktop icon or Start-menu entry
2. Click on **Serial** at the bottom of the category menu on the left:



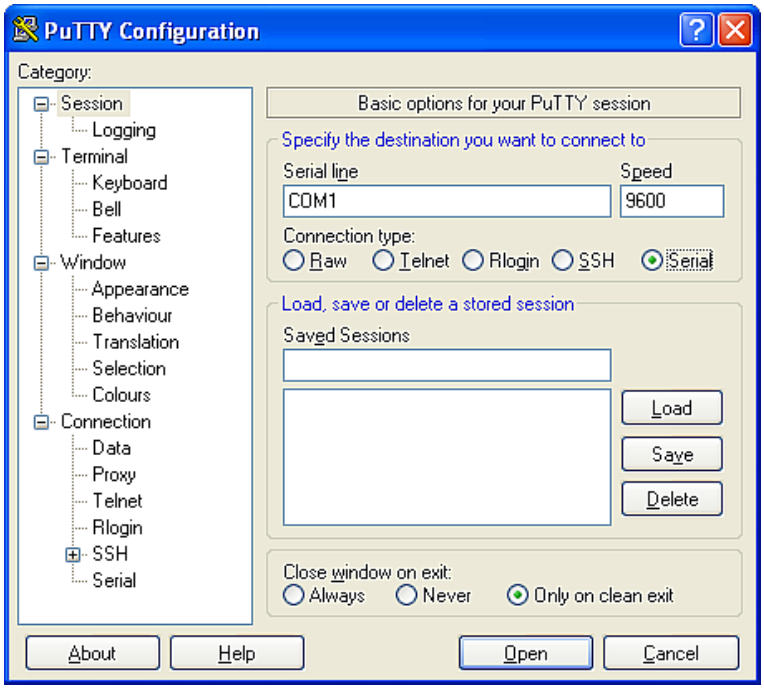
3. Select a serial line to connect to. This is usually COM1.

4. Configure the serial line with the following settings:

   Speed (baud): 9600
   Data bits: 8
   Stop bits: 1
   Parity: None
   Flow control: None

5. Click on **Session** in the main menu on the left.

6. In the right hand part of the window use the radio buttons to select the **Serial** Connection type. Check the **Serial line** and **Speed** fields are correct:



7. To save the settings enter a suitable session name in the **Saved Sessions** field then click **Save**.

   The next time you start PuTTY, your saved session will appear in the list and you can simply double-click it to open a new session with the same settings.

8. Click the **Open** button to start the terminal emulator.

4.5 Appendix E - Connector pinouts

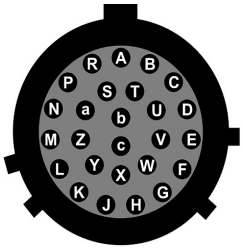
4.5.1 SENSOR A & B

This is a standard 26-pin “mil-spec” plug, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-16-26P although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-16-26S and are available from Amphenol, ITT Cannon and other manufacturers.



Pin	Function	Pin	Function
A	Vertical velocity +ve	P	Calibration signal
B	Vertical velocity –ve	R	Vertical calibration enable
C	N/S velocity +ve	S	N/S calibration enable
D	N/S velocity –ve	T	E/W calibration enable
E	E/W velocity +ve	U	Centre
F	E/W velocity –ve	V	Active-high
G	Vertical mass position	W	Unlock
H	*not connected*	X	Lock
J	N/S mass position	Y	Logic signal ground
K	Busy indicator LED	Z	*not connected*
L	E/W mass position	a	*not connected*
M	*not connected*	b	Power 0 V
N	Signal ground	c	Power +10 to +24 V



Wiring details for the compatible socket, ***-16-26S, as seen from the cable end (i.e. during assembly).

4.5.2 GPIO

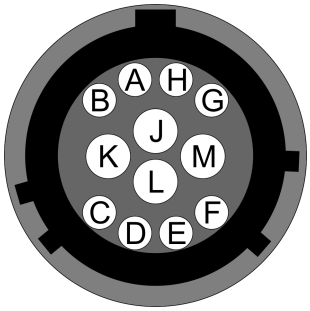
These are standard 12-pin “mil-spec” sockets, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-14-12S although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-14-12P and are available from Amphenol, ITT Cannon and other manufacturers.



The USB lines provide external host access to the internal USB memory device. When power is sensed on pin J, an internal switch disconnects the memory device from the internal circuitry and connects it to this socket.

Pin	Function
A	USB Data -ve (USB Type A pin 2) - see text above.
B	USB Data +ve (USB Type A pin 3) - see text above.
C	Anti-tamper line 4
D	Anti-tamper line 3
E	Anti-tamper line 2
F	Anti-tamper line 1
G	Console transmit (RS232 TXD)
H	Console receive (RS232 RXD)
J	USB Power input (USB Type A pin 1) - see text above.
K	Ground (USB Type A pin 4)
L	Anti-tamper line 0
M	Ground



Wiring details for the compatible plug, ***-14-12P, as seen from the cable end (i.e. during assembly).

4.5.3 GPS



This is a standard 10-pin “mil-spec” plug, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-12-10P although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-12-10S and are available from Amphenol, ITT Cannon and other manufacturers.

Pin	Function
A	Power 0 V
B	Power +12 V
C	1pps signal
D	*not connected*
E	Digitizer console transmit
F	Digitizer console receive
G	RS232 ground
H	Digitizer console ground
J	RS232 transmit to GPS
K	RS232 receive from GPS



Wiring details for the compatible socket, ***-12-10S, as seen from the cable end (i.e. during assembly).

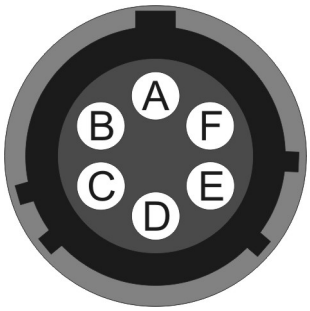
4.5.4 USB

This is a standard 6-pin “mil-spec” socket, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-10-06S although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-10-06P and are available from Amphenol, ITT Cannon and other manufacturers.



Pin	Function
A	+5 V DC (USB Type A pin 1)
B	Data –ve (USB Type A pin 2)
C	Data +ve (USB Type A pin 3)
D	0 V (USB Type A pin 4)
E	Shielding
F	*not connected*



Wiring details for the compatible plug, ***-10-06P, as seen from the cable end (i.e. during assembly).

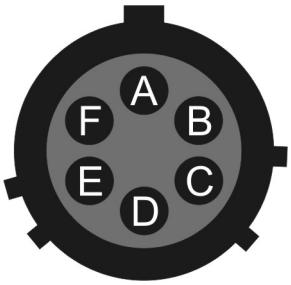
4.5.5 Ethernet



This is a standard 6-pin “mil-spec” plug, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-10-06P although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-10-06S and are available from Amphenol, ITT Cannon and other manufacturers.

Pin	Function
A	Ground
B	Data transmit +ve (RJ45 pin 1)
C	Data receive +ve (RJ45 pin 3)
D	*not connected*
E	Data receive –ve (RJ45 pin 6)
F	Data transmit –ve (RJ45 pin 2)



Wiring details for the compatible socket, ***-10-06S, as seen from the cable end (i.e. during assembly).

4.5.6 Power/Data Out



This is a standard 10-pin “mil-spec” plug, conforming to MIL-DTL-26482 (formerly MIL-C-26482). A typical part-number is 02E-12-10P although the initial “02E” varies with manufacturer.

Suitable mating connectors have part-numbers like ***-12-10S and are available from Amphenol, ITT Cannon and other manufacturers.

Pin	Function
A	Power input, 0 V
B	Power input, +10 to +36 V
C	RS232 CTS
D	RS232 RTS
E	*not connected*
F	*not connected*
G	RS232 ground
H	*not connected*
J	RS232 receive
K	RS232 transmit



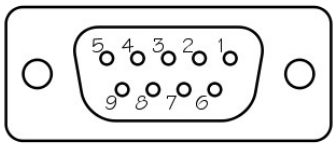
Wiring details for the compatible socket, ***-12-10S, as seen from the cable end (i.e. during assembly).

4.5.7 Lantronix WiPort NR D-Connector



These are standard DE9F (TIA-574) sub-miniature (D-sub) line sockets, conforming to DIN 41652 and MIL-DTL-24308. They are very widely available, as are suitable mating connectors.

Pin	Function
1	*not connected*
2	RS232 transmitted data*
3	RS232 received data*
4	*not connected*
5	Ground
6	*not connected*
7	*not connected*
8	*not connected*
9	*not connected*



Wiring details for the compatible plug, DE9M, as seen from the cable end (*i.e.* when assembling).

4.6 Appendix F - Specifications

Parameter	Specification
Input range	±10V differential
Nominal Sensitivity	0.9μV/count
Standard output format	24-bit
Noise-free resolution (NPR) at 20 samples/s	> 132 dB r.m.s. (> 22 bits)
Digital signal processor	TMS3200 at 144 MHz
Output latency	<100ms at 100sps (low latency port only)
Output baud rate	115200
Operating temperature range	–10 to +75 ℃
Internal thermometer accuracy	±0.33 ℃ (30 ℃) ±0.5 ℃ (10..50 ℃) ±1.0 ℃ (–10..75 ℃)
Internal thermometer linearity	±0.5 ℃
Internal thermometer resolution	0.0625 ℃
Dimensions (excluding connectors)	483 x 280 x 89mm (excluding connectors)
Weight	1.95kg
Voltage requirements	10..24V DC
Current at 12 V DC with GPS	270 mA

4.7 Appendix G - Revision history

24 May 2011 A New document