

# Net232™ Ethernet/RS-232 Converter

*for MultiScan, TempScan, and ChartScan Applications*

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## **Net232 User's Guide**

p/n 1037-0901 rev 2.0

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## Overview

Net232 provides a means of connecting ChartScan, TempScan, and MultiScan data acquisition devices to the ethernet. This guide will show you how to configure your Net232's address, connect the Net232 to your acquisition device, identify the four basic network scenarios, and connect your system to the ethernet. The final page of this document includes Net232 product specifications.



**For successful Net232 operations, your computer needs to have the following:**

- 10BASE-T Ethernet card
- Available COMM Port
- PC system with Pentium® processor
- Windows 3.1+, Windows 95, or Windows 98
- At least 8 Mbytes of RAM for Windows 3.1+ (16 Mbytes recommended)
- At least 16 Mbytes of Ram for Windows95/98 (32 Mbytes recommended)



**Although this guide provides instructions for connecting the acquisition device to the ethernet, you may need to refer to your device user's manual for additional instructions, such as DIP switch configuration for RS-232 serial communications.**

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## Check Your Order

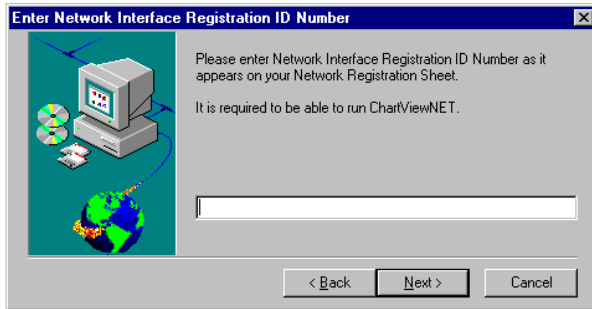
If you have not already done so, carefully unpack your shipping carton and check all contents for damage which may have occurred during shipment. Immediately report all damage to the shipping agent and your sales representative. Retain all shipping materials in case the unit must be returned to the factory. The Net232 package should contain the following, depending on your order:

Net232	Ethernet/RS-232 Converter
483-0601	ChartView Software
1035-0971	ChartViewNET Registration ID Sheet
1037-0901	Net232 User's Guide
TR-2	Power Supply
CA-192-5	10BASE-T "straight through" ethernet cable, 5 ft.
CA-192-Adapter	10BASE-T "cross-over" adapter

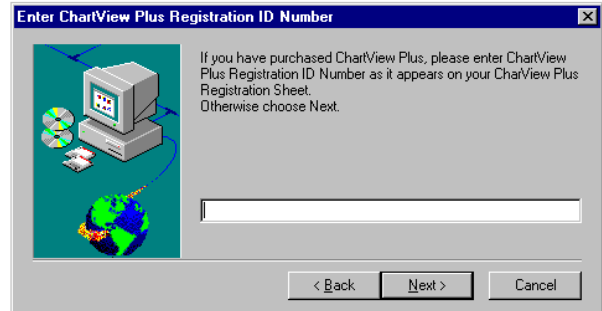
## Install Software

Use Microsoft Windows **Run** dialog box to configure Net232's address and install the *ChartView* program group. Direct Windows to run the **SETUP . EXE** file found on *Installation Diskette 1* (or CD-ROM, if applicable). Follow the *on-screen* dialog boxes to complete a successful installation.

Early in the setup you will be prompted to enter your Registration ID Number. This number appears on your Network Registration Sheet (1035-0971) and must be entered to enable *ChartViewNET*.



Screen Prompt for Entering the Registration ID Number



Screen Prompt for Entering the ChartView Plus ID Number

If you ordered *ChartView Plus*, enter the registration ID number as it appears on your ChartView Plus Registration Sheet (1035-0970). Otherwise, press *Next* and continue to follow the screen prompts.

## Configure Net232's Address Settings



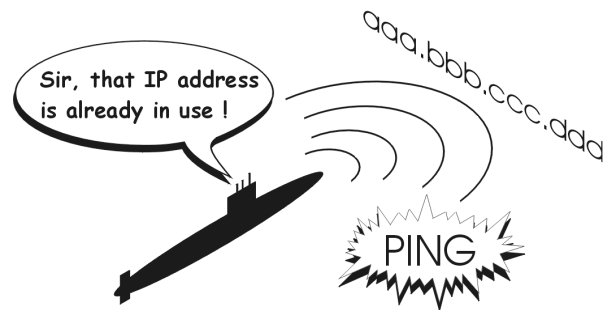
**Prior to configuring the Net232 and connecting it to your network, use the PING utility (provided by Windows™). The PING utility will inform you if your intended address is already in use by another device.**

### Example:

For a given address: aaa.bbb.ccc.ddd, enter as follows from the DOS prompt:

```
C:> PING aaa.bbb.ccc.ddd
```

If no other device is using the address, the PING utility will report a "device time out" and a 100% loss of data. Any other response indicates that a device on the network is already using the IP address, and that you will need to use another address.



### Using the NetScan Configuration Utility

Net232 must be configured before putting it to use. Configuration is accomplished through the NetScan Configuration Utility. The utility installs after you select "Net232" as your device type.

You can access the NetScan Configuration Utility from Window's desktop Start Menu, as follows:

**Start ⇒ Programs ⇒ ChartView ⇒ Interface Configuration**

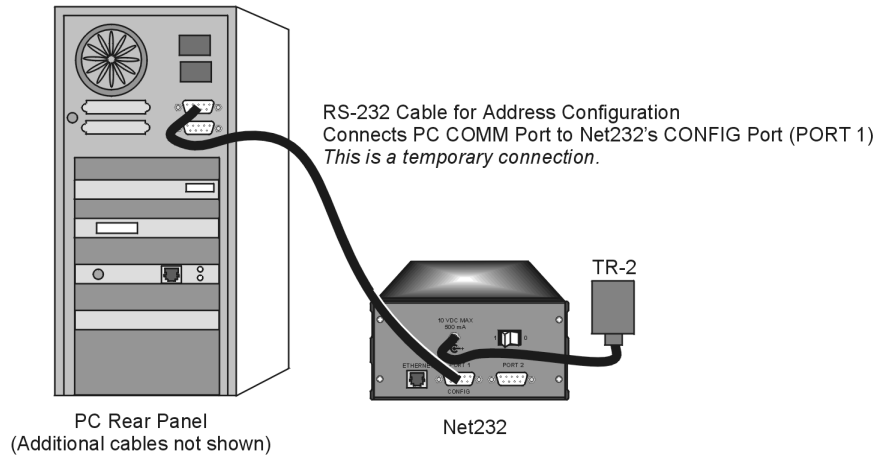
The utility's window displays a "welcome" prior to prompting you through the required configuration steps. The following steps appear in the utility's screen prompts. Note that each "step" has a corresponding tab (see following figure).



**The network interface must be properly configured before Net232 can communicate with a computer via the ethernet.**

## Step 1

- a) Connect an RS-232 serial cable to an available serial communication port (COMM Port) on your computer. Note that CA-47 cables can connect to 25 pin COMM ports or 9 pin COMM ports.
- b) Connect the other end of the RS-232 cable to Net232's CONFIG port (PORT 1).



### *COMM Port Connections for Configuring Net232's Address Settings*

## Step 2

- a) Cycle Net232's power switch "Off," then "On."
- b) In the NetScan Configuration Utility, check (3) the on-screen box that states, "I have performed the actions described above."

## Step 3



**Basic information regarding TCP/IP Addressing for Net232 is presented below. If you have any difficulty regarding address settings, please contact your network administrator.**

- a) Review the following terminology as needed, then proceed to step 3b.

### **Protocol**

The Net232 uses TCP/IP (Transport Control Protocol/Internet Protocol) for communications over the ethernet. You can access Net232-connected devices from virtually anywhere in the world since the World Wide Web uses this same protocol.

TCP/IP addressing consists of three parameters: the *IP address*, the *Sub-net Mask*, and the *Gateway Address*. Each of these parameters consists of four different numbers which range from 0 to 255. The numbers are typically represented in a dotted decimal format, for example: 192.88.247.11.

### **IP Address**

The IP (Internet Protocol) address is unique to one specific device on the network, and can not be shared by any other device on the network. The only restrictions on the IP address are:

- 1) the first number must be between 127 and 255
- 2) the last number must be between 1 and 254.

### **Sub-net Mask**

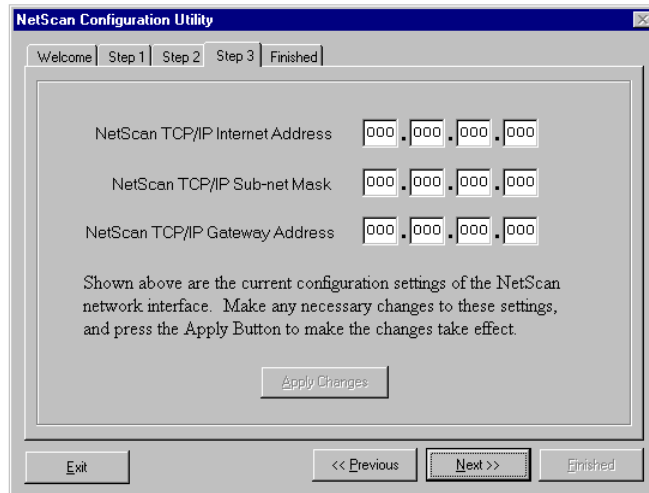
The *Sub-net Mask* determines how many addresses are on the network. Note that Class C networks consist of up to 256 addresses; and are quite common. For a Class C Network the *Sub-net Mask* would be 255.255.255.0. All computers on the network must have the same *subnet mask*.

## Gateway Address

A *gateway address* is needed to access a device (gateway, or router) that can route traffic from one network to another. The *gateway address* is the actual address of the gateway (router) device.

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- b) If necessary, make changes to the address settings, then press the **Apply Changes** button. You may need contact your network administrator.
- c) Press the **Next** button (see following figure).



*NetScan Configuration Utility, Step 3*



You will receive a “>>Communications Error<<” if the NetScan Configuration Utility fails to communicate with your setup. Likely causes are:

- 1) Wrong COMM Port selected in the utility (step1).
- 2) Serial cable connected to wrong connector on Net232, PC, or both.

If you received the error message, check system cable connections, correct the problem, then return to Step 2 and perform the requested actions.

## Finished

- a) Exit the NetScan Configuration Utility.
- b) Cycle Net232’s power switch “Off” and “On.”
- c) Disconnect the RS-232 cable from Net232’s CONFIG port (PORT 1). Remove the other end of the cable from your PC’s COMM port.

---

## Configure Acquisition Device for RS-232 Communications

ChartScan, TempScan, and MultiScan units have a DIP switch located on the unit’s rear panel. Prior to connecting Net232 to your data acquisition device, refer to your device user’s manual to ensure the unit is configured for RS-232 operation.



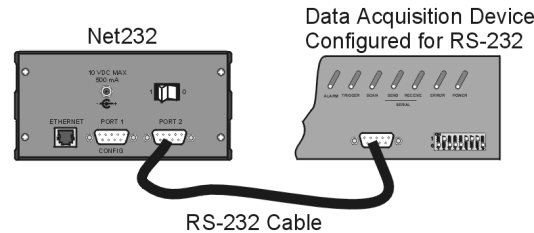
Refer to your acquisition device user’s manual to ensure proper RS-232 configuration.

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## Connect Net232 to the Acquisition Device

The rear panels of ChartScan, TempScan, and MultiScan have an RS-232/422 nine pin (DB9) connector. Connect Net232 to your acquisition device as follows:

1. Connect the a CA-47 cable (or equivalent DB9 cable) to Net232's PORT 2 (see note).
2. Connect the other end of the cable to your acquisition device's 9-pin RS-232/422 connector.



*RS-232 Connection of Net232's PORT 2 to the Acquisition Device*



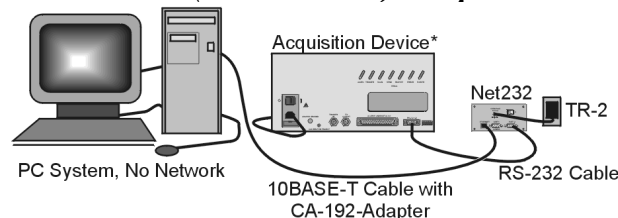
The *Network Interface Settings* dialog box (accessed through *ChartView's* Device pull-down menu) allows you to select PORT 1 or PORT 2 for your acquisition device. PORT 2 is the default. For this reason the acquisition device should be connected to Net232's PORT 2. A second device can be connected to Net232 (through PORT 1). You can only communicate with one Net232-connected device at a time.

---

## Identify your Network Scenario

There are four basic network scenarios that pertain to Net232 ethernet operation. Note that proper TCP/IP configuration is extremely important, and you must obtain TCP/IP addressing parameters before configuring the protocol. The rules for configuration differ for each scenario as follows:

### 1) Point-to-Point (Non-Network) Setup



*Point-to-Point Setup*

In the *Point-to-Point* scenario, Net232 is connected directly to a PC using a 10BASE-T cable and cross-over adapter (CA-192-Adapter).

*Since there is no actual network* the only requirements are:

- 1) The first three numbers of Net232's IP address must match the first three numbers of the network's interface IP address (as specified in ChartView).
- 2) The *sub-net mask* should be set to 255.255.255.0
- 3) The gateway address can be omitted.

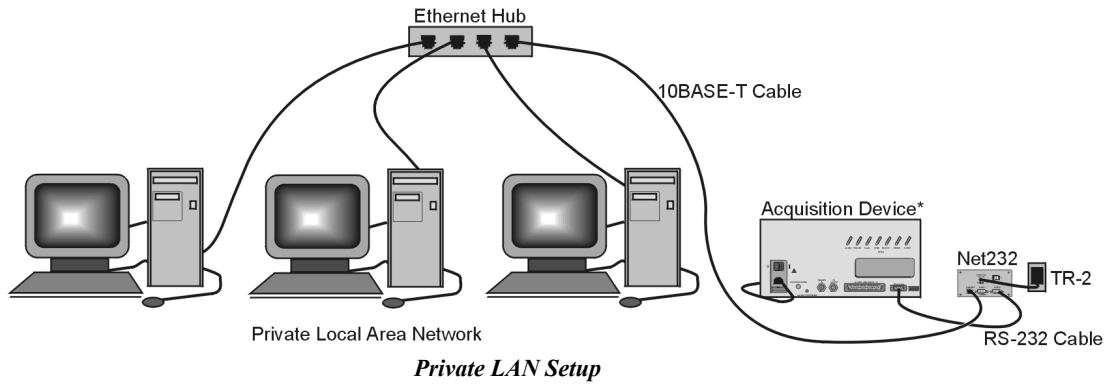
#### *Example*

TPC/IP address set to 192.88.247.1

*Sub-net mask* set to 255.255.255.0

\* *Acquisition Device* refers to ChartScan, TempScan, or MultiScan. Two of these devices (in any combination) can be connected to the Net232 via PORT 1 and PORT 2.

## 2) Private Local Area Network (LAN) Setup



In this simple LAN scenario, Net232 is connected to a network with several PC's using the TCP/IP protocol. These networks typically use a system administrator or network analyst to address TCP/IP issues.

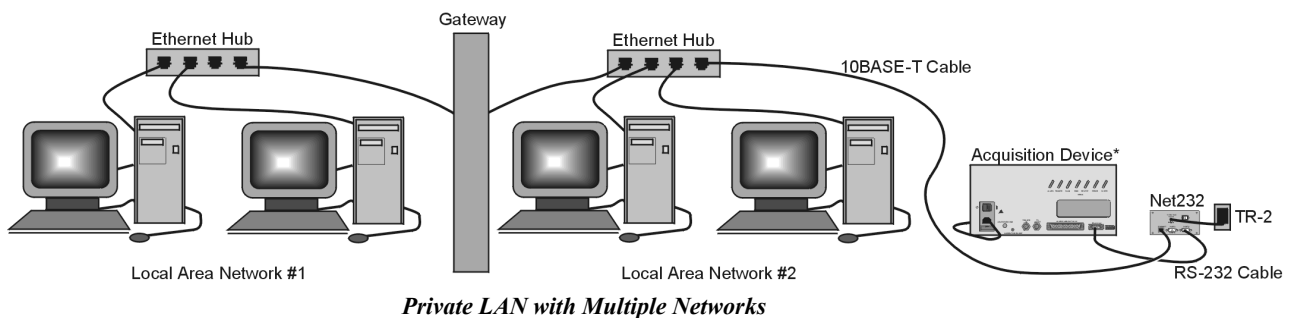
For private LAN setups, requirements are:

- 1) A unique IP address must be assigned to the Net232 device
- 2) The first three numbers of the IP address must be the same for all devices on the network
- 3) The *sub-net mask* should be set to 255.255.255.0
- 4) The *gateway address* can be omitted

### **Example**

TPC/IP address set to 192.88.247.1 for Net232 device  
First three numbers of all network devices are 192.88.247  
*Sub-net mask* is set to 255.255.255.0

## 3) Private LAN Setup with Multiple Networks

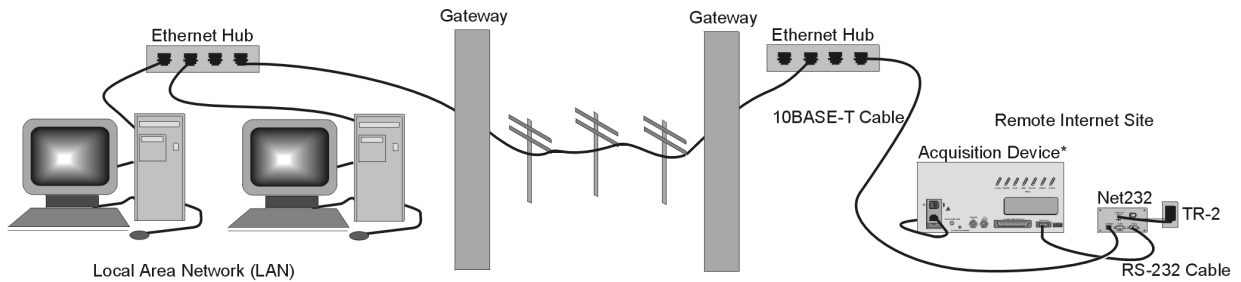


In multiple-network scenarios, two or more networks connect to a common gateway via ethernet hubs. In regard to multiple networks, a qualified network administrator should assign all TCP/IP parameters.

**\*Acquisition Device** refers to ChartScan, TempScan, or MultiScan. Two of these devices (in any combination) can be connected to the Net232 via PORT 1 and PORT 2.



#### 4) LAN Setup with Internet Access



*LAN Setup with Gateway Access to Internet*

In *internet access* scenarios, a network administrator usually assigns TCP/IP parameters. Configuring for this scenario is identical to that of scenario 2 (Private LAN Setup), with the following exception: The *internet access* scenario requires the *gateway address* to be set to the address of the *gateway* (router) device that handles routing to the internet.

\**Acquisition Device* refers to ChartScan, TempScan, or MultiScan. Two of these devices (in any combination) can be connected to the Net232 via PORT 1 and PORT 2.

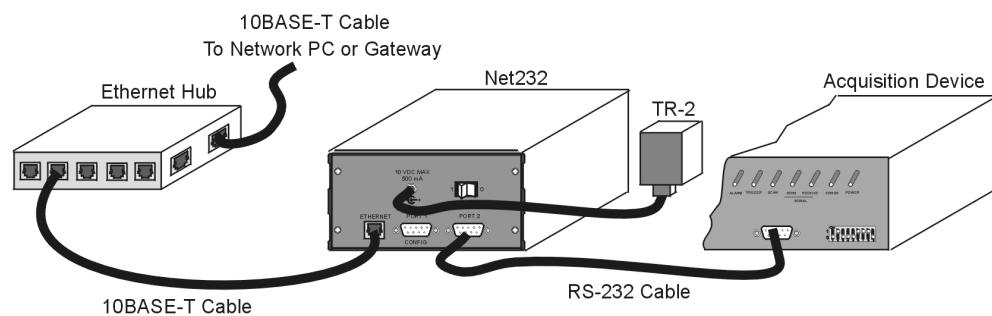
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## Make Ethernet Connections



You may want to review the four basic network scenarios before making connections to the ethernet. These are discussed in the preceding section of this guide, *Identify your Network Scenario*, beginning on page 7.

1. Ensure your acquisition device power switch is in the “0” (OFF) Position.
2. Ensure Net232’s power switch is in the “0” (OFF) position.
3. ***If connecting Net232 to an ETHERNET Hub:***
  - (a) connect a “straight-through” 10BASE-T ethernet cable (CA-192-5) to the ethernet hub
  - (b) connect the other end of the cable to Net232’s ETHERNET Port



*Connecting Net232 to an Ethernet Hub*

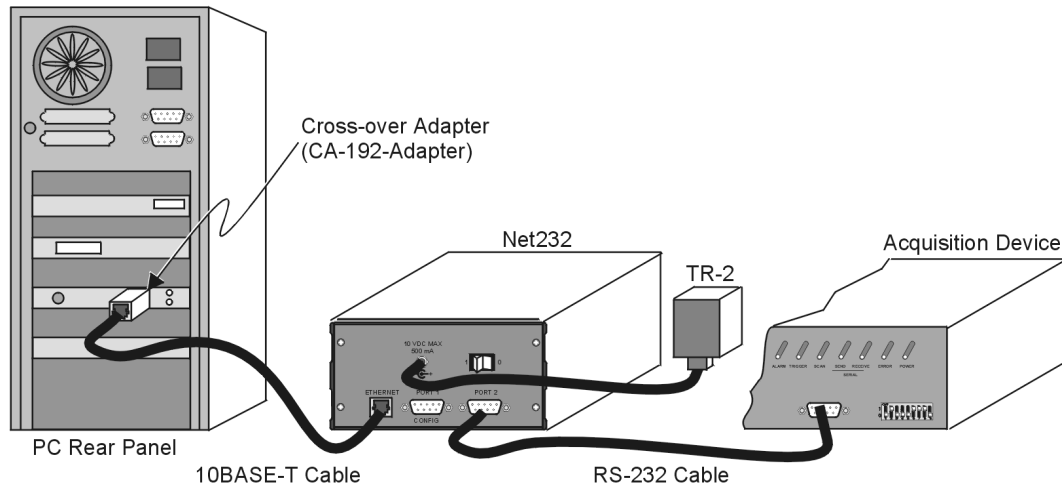
**If connecting Net232 directly to your PC's ETHERNET Port:**



**Most users connect Net232 to an ethernet hub. This portion of step 3 applies only to users wanting to connect Net232 directly to their PC.**

- (a) connect the cross-over adapter (CA-192-Adapter) to your PC's ethernet connector
- (b) connect the "straight-through" 10BASE-T cable (CA-192-5) to the cross-over adapter
- (c) connect the other end of the straight-through cable to Net232's ETHERNET Port

**Option:** A 10BASE-T cross-over cable may be used in place of the adapter/straight-through cable.



***Connecting Net232 Directly to a PC***

**Note:** When connecting Net232's CA-192-5 ethernet cable directly to a PC, a cross-over adapter (CA-192-Adapter) must be used.

4. Plug power adapter TR-2 into Net232's power connector (located on the rear panel). Plug the prong end of the adapter into an appropriate power receptacle.
5. Power-up your acquisition device. The *Power* LED should light up.
6. Turn Net232's power switch to the "1" (ON) position. The *Power* LED should light up.



**At initial power-up your acquisition device performs automatic self-tests to ensure it is fully functional. ChartScan, MultiScan and TempScan units contain rear panel LEDs that will indicate errors, should they occur. Possible error conditions and their corresponding indicator light patterns are shown in your device user's manual.**

If no problems are found, your acquisition device will begin a power-up initialization. This self-test is performed each time the unit is powered up regardless of whether power-on was caused by the power switch or the Power-On Reset (\*R) command.

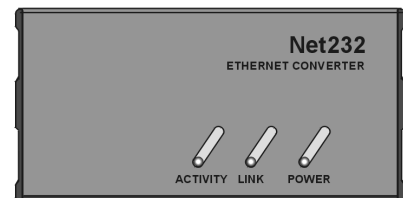
The self-test takes approximately 5 seconds to complete.

**Net232 contains 3 indicator LEDs. These indicators have the following meanings when lit:**

**ACTIVITY** – Data is being transmitted over the ethernet.

**LINK** – There is a good connection to the ethernet.

**POWER** – Net232 has power.



***Net232 Front Panel***

# Ethernet API Reference

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## Overview

Users can write their own programs with an ethernet API. The API is provided by two software files: **NPCI\_WIN.DLL** for 16-bit windows developers, and **NPCI\_W3V.DLL** for 32-bit windows developers. The only system requirement is that the Windows TCP/IP protocol be loaded and configured.

With a mechanism called *session handles*, the API can simultaneously handle multiple Net232 units. All functions rely on the *session handle* to keep track of the Net232 selected for communication.

A typical session with a Net232 consists of the following basic parts:

- **Initialization** - Initialization requires several functions to be called in appropriate order. These functions include: **nSWInit**, **nSessionBegin**, **nIOLock** and **nSERIALConfigure**.
- **Actual communications** (during the session) - Communication functions include **nSerialReceive** and **nSerialSend**.
- **De-initialization** - De-initialization is for ending a session, and uses the functions: **NSessionEnd** and **NSWDeinit**.

Detailed descriptions of each function are covered in the following section. Examples programs are also included on the distribution disk.

---

## Functions

### nSWInit

**Function:** int nSwInit(void);

**Parameters:** None

**Returns:** 0 if successful, error code if not.

**Description:** This function is used to allocate system resources prior to beginning a session. This function must be called before any others.

**Example:**

```
ErrVal = nSWInit ();
```

---

### nSessionBegin

**Function:** int nSessionBegin (short adapter, char FAR \*local, char FAR \*remote, unsigned long flags, unsigned long reserved, long FAR \*session);

**Parameters:**

Short	adapter	Always a 0.
Char FAR *	local	Always a null string.
Char FAR *	remote	A null terminated string, which contains the IP address of the Net232.
Unsigned long	flags	Always zero
Unsigned long	reserved	Always zero
Long FAR *	session	A variable used to receive the session handle.

**Returns:** 0 if successful, error code if not.

**Description:** This function is used to establish a session with a specific Net232. If a successful connection is made, then a session handle is assigned and placed in the session argument. Since each session is unique, it is possible to have multiple sessions active at any given time.

**Example:**

```
ErrVal = nSessionBegin(0,"\\0", "192.0.0.1\\0",0,0.session);
```

---

## nIOLock

**Function:** int nIOLock (long session, short iotype, short channel, short lock);

**Parameters:**

Long	session	The session handle of the Net232
Short	iotype	Always a 9
Short	port	The serial port being locked (1 for the Net232, 0 for the AUX port)
Short	lock	0 to unlock, 1 to lock

**Returns:** 0 if successful, error code if not.

**Description:** This function is used to lock the serial port of the Net232 so that another session can't have access to it. If a serial port is left unlocked, then another session could gain access to that port, causing unpredictable results.

**Example:**

```
ErrVal = nIOLock(session, 9, 1, 1);
```

---

## nSERIALConfigure

**Function:** int nSERIALConfigure (long session, short port, long baudrate, short parity, short databits, short stopbits, short flowctrl, long reserved);

**Parameters:**

Long	session	The session handle of the Net232
Short	port	The serial port being configured
Long	baudRate	The baud rate to be used
Short	parity	The parity setting to be used
Short	databits	The number of data bits to be used
Short	stopbits	The number of stop bits to use
Short	flowControl	The handshaking method to use
Long	reserved	Always 0

**Parameter Values:**

Port:	Aux = 0 Net232 = 1
Baud Rates:	300, 1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200.
Parity Settings:	odd = 79 Even = 69 None = 78
Data Bits:	7, 8
Stop Bits:	1,2
Flow Control:	none = 0 Xon/Xoff = 1 Dtr/Dsr = 2 Rts/Cts = 3

**Returns:** 0 if successful, error code or warning if command not completed.

**Description:** This function is used to configure the selected serial port parameters of the Net232 ethernet interface. The parameters used must match the Net232 serial port configuration switches on the rear of the unit. Because this function may take some time to complete, the return value must be tested to see if the command has completed. The return value for command pending is -801.

**Example:**

```
Do {  
    ErrVal = nSERIALConfigure(session, 1, 38400, 78, 8, 1, 3, 0);  
} while (errVal == -801);
```

---

## nSerialReceive

**Function:** int nSERIALReceive (long session, short port, unsigned short flush, long timeout, short terminator, short length, char FAR \*data, short FAR \*xlength, unsigned short FAR \*status);

**Parameters:**

Long	session	The session handle of the Net232
Short	port	The port being read from.
Unsigned short	flush	Flag to indicate if the receive buffer should be cleared.
long	timeout	The time, in milliseconds, to wait for received data.
Short	terminator	The terminator to be used for serial input.
Short	length	The maximum number of characters to be Read into the data buffer.
Char FAR *	data	A buffer where the received characters will be placed.
Short FAR *	xlength	The number of characters that were read.

**Parameter Values:**

Port	Net232 = 1 Aux = 0
Flush	retain = 0 Empty = 1
Terminator	none = -1 CRLF = -3 User defined = 0 to 255

**Returns:** 0 if successful, error code or warning if command not completed.

**Description:** This function's primary use is to read data from the Net232's ethernet interface. The secondary use is to flush all characters from the Net232's ethernet interface transmit buffer. Because this function may take some time to complete, the return value must be tested to see if the command has completed. The return value for command pending is -801.

**Example:**

```
Do {  
    ErrVal = nSERIALReceive(session, 1, 0, 1000, 13, 100, &dataBuffer,  
        &xlength);  
} while (errVal == -801);
```

---

## nSerialSend

**Function:** int nSerialSend (long session, short port, unsigned short flush, long timeout, short terminator, short length, char FAR \*data, short FAR \*xlength, unsigned short FAR \*status);

**Parameters:**

Long	session	The session handle of the Net232
Short	port	The port being read from.
Unsigned short	flush	Flag to indicate if the receive buffer should be cleared.
long	timeout	The time, in milliseconds, to wait for received data.
Short	terminator	The terminator to be used for serial input.
Short	length	The maximum number of characters to be Transmitted from the data buffer.
Char FAR *	data	A buffer where the transmitted Data resides.
Short FAR *	xlength	The number of characters that were sent.
Unsigned short FAR *	status	Not used

**Parameter Values:**

Port	Net232 = 1 Aux = 0
Flush	retain = 0 Empty = 1
Terminator	none = -1 CRLF = -3 User defined = 0 to 255

**Returns:** 0 if successful, error code or warning if command not completed.

**Description:** This function's primary use is to send data to the Net232's ethernet interface. The secondary use is to flush all characters from the Net232's ethernet interface receive buffer. Because this function may take some time to complete, the return value must be tested to see if the command has completed. The return value for command pending is -801.

**Example:**

```
Do {  
    ErrVal = nSerialSend(session, 1, 0, 1000, 13, 100, &dataBuffer,  
        &xlength, &status);  
} while (errVal == -801);
```

---

## nSessionEnd

**Function:** int nSessionEnd (long session);

**Parameters:**

long	session	The session handle of the Net232
------	---------	----------------------------------

**Returns:** 0 if successful, error code if not.

**Description:** This function is used to end an active session. When operations with the Net232 are completed, this function should be called to end the session.

---

## nSwDeinit

**Function:** int nSwDeinit (void);

**Parameters:** None

**Returns:** 0 if successful, error code if not.

**Description:** This function is used to de-initialize all resources allocated by the nSWInit function.  
This is the last function that should be called.

---

## Specifications

### Ethernet Interface

**TCP/IP parameters are configured using the serial configuration port.**

**Protocol:** TCP/IP

**Media:** 10BASE-T

**Interface:** RJ-45 shielded connector

### Serial Interface

**All parameters are configured using the Ethernet Interface.**

**Serial Ports:** **Port 1** - used for TCP/IP configuration and serial communications.

**Port 2** - used for serial communications.

**Electrical Characteristics:** Supports RS-232.

**Duplex:** Full.

**Data Bits:** 7 or 8.

**Stop Bits:** 1 or 2.

**Parity:** Odd, even, or none.

**Baud Rates:** 300, 1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200

**Terminator:** CR, LF, CR-LF, User, or None

**Control:** Supports Clear To Send/Request To Send, Data Terminal Ready/Data Set Ready, XON/XOFF, or None.

**Connector:** Accepts 9-pin sub D female: DCE configured.

### General

**Indicators:** LED's for Ethernet Activity, Ethernet Link, and Power.

**Power:** 105 to 125V or 210 to 250V, 50/50 Hz; 10 VA max.

**Environment:** 0 to 50° C; 0 to 95% RH non-condensing.

**Dimensions:** 190mm long x 138mm wide x 68mm high (7.5 x 5.4 x 2.7 inches)

**Weight:** 1.1 kg (2.3 lbs)

**Controls:** Power switch (rear panel)