STU2

Installation and Configuration Manual

This Manual describes the STU2 remote serial terminal unit, its uses and set up.

Effective: 09 Feb., 1999

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Introduction

The STU is a remote serial terminal unit for a multi-drop RS-485 4-Wire serial network, supporting the Square D PowerLogic suite of protocols, including: SY/MAX, PLOGIC, PNIM, and MODBUS RTU. The STU is designed to be used with a string of PowerLogic devices, to provide additional Input/Output capabilities. The STU is designed to be used with other Niobrara Research & Development communication devices, such as the NRD PEN, the NRD PMN, and other standard PowerLogic communication devices. The STU provides NON-VOLATILE memory storage for setup and data, such as the configuration parameters for Ethernet communications across an Ethernet network. The STU allows monitoring of digital signals, such as: switch, relay, contactor, or over temperature sensor, open/closed status, and modification of outputs to control units such as: relays, contactors, or motor controls, as a small list of examples. The STU supports RS-485 4-wire configurations.

Specifications

Mounting Requirements

4 Mounting holes 0.209 inch I.D.

3.600 inch center to center vertically

4.865 inch center to center horizontally

Input / Output Specifications

16 Digital Inputs having a digital threshold at approximately 2.5 V.

These are protected against overloads over the range -48 to +48 V.

These are jumperable configurable as pull-up or pull-down (default).

12 Digital Outputs capable of sinking continuously 120mA each,

at 50 C and 48 VDC. 500 mA 1 channel continuous at 25 C.

Current and Voltage Requirements for power supply

9 to 36 Vdc

Typical power consumption: 1 watt (9 Mhz), 1.5 watt (18.432 Mhz)

Operating Temperature

0 to 50 degrees C with LCD display.

Humidity Rating

5% to 90% non-condensing.

RS-485 4-Wire Communication Port

9 pin male D-connector.

(See Connector Pinout for connections)

Indicator lights

1 LED: Red Power On/Active.

Physical Dimensions

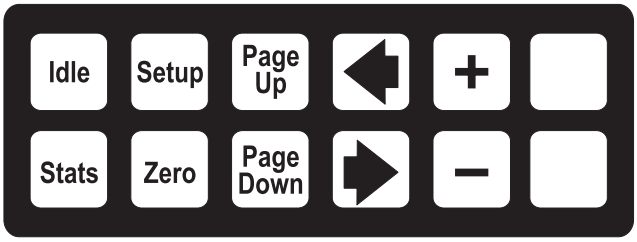
Weight.: 1 lb. max
Unit Size: 4.00" high by 5.50" wide by 1.35" deep. max

2

Operation

LCD Display and Descriptions

STU KEYPAD KEYS



IDLE key displays:

```
Niobrara R&D Corp
25Nov1997  10:03:48
```

Returns the keypad and display to idle after adjusting the setup or viewing the statistics screens. Pressing the IDLE key displays the screen that is selected in the setup under IDLE SCREEN MODE. The STU default display is DATE/TIME of the choices Date/Time, I/O Status, or Nameplate.

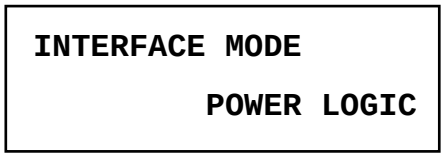
Note: The unit is always capable of communicating regardless of the keypad/display state.

SETUP key displays:

Selectable entries - 1 through 255

Accesses configuration setup screens. Use PAGE DOWN and PAGE UP to scroll through individual screens. Pressing the SETUP key displays the setup screen for DEVICE ADDRESS. The default is 1. Valid device addresses are 1 through 255. The device address of all units on the RS-485 4-Wire serial communications daisy-chain MUST each be different or unique.

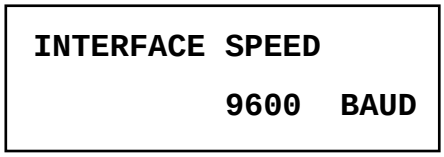
Page DOWN



Selectable entries - POWER LOGIC, MODBUS RTU

INTERFACE MODE is the mode of communication. POWER LOGIC is Square D PNIM mode and MODBUS RTU is Modicon MODBUS RTU slave mode. The default is POWER LOGIC. The two options are POWER LOGIC, or MODBUS RTU. The interface mode of all units on the RS-485 4-Wire serial communications daisy-chain MUST be the same.

Page DOWN



Selectable entries -
75,150,300,600,1200,1800,2400,3600,4800,7200,9600,14400,19200

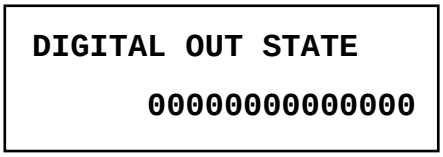
INTERFACE SPEED is the Baud Rate at which the device communicates. This value should be set to match the baud rate of the communication device the unit is attached to. The default is 9600. Valid baud rates are 75, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, or 19200. The baud rate of all units on the RS-485 4-Wire serial communications daisy-chain MUST all be the same.

Page DOWN

Selectable entries - EVEN, NONE, ODD

INTERFACE PARITY is the parity used for communications. The default is EVEN. The selections are EVEN, NONE, or ODD. The parity of all units on the RS-485 4-Wire serial communications daisy-chain MUST all be the same.

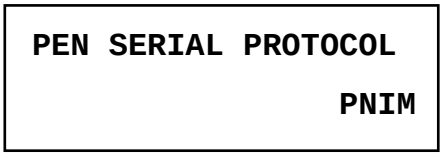
Page DOWN



Selectable entries - 00000000000000
msb lsb
The msb (most significant bit) corresponds to Digital Output 14 - named HV14
The lsb (least significant bit) corresponds to Digital Output 1 - named HV01

The DIGITAL OUT STATE screen displays the current status of the 14 output bits.
0 being low/off/not set/open. 1 being hi/on/set/closed.

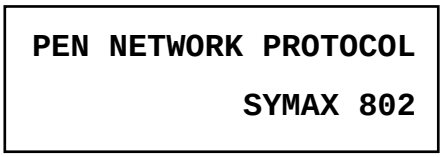
Page DOWN



Selectable entries - PNIM, MODBUS RTU

PEN SERIAL PROTOCOL is the serial communications protocol for the NR&D PEN. The default is PNIM. PNIM is the Square D PNIM protocol, and MODBUS RTU is the Modicon MODBUS RTU slave protocol. The protocol of all units on the RS-485 4-Wire serial communications daisy-chain MUST all be the same.

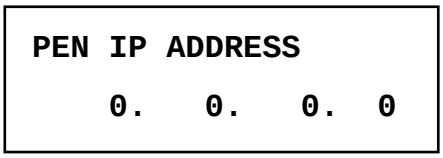
Page DOWN



Selectable entries - SYMAX 802, NRD/TCP, MODBUS/TCP

PEN NETWORK PROTOCOL is the PEN's Ethernet network communications protocol. SYMAX 802 is the Square D SY/MAX 802 protocol. NRD/TCP is the Niobrara R&D TCP protocol used by devices such as the NRD PEN. MODBUS/TCP is the Modicon MODBUS TCP protocol. The default is SYMAX 802. The network protocol of all units on the Ethernet network MUST all be the same.

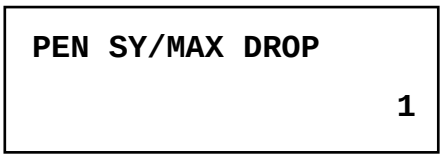
Page DOWN



Selectable entries - 0. 0. 0. 0 through 255.255.255.255

The PEN IP ADDRESS is only used when the PEN NETWORK PROTOCOL is configured to NRD/TCP. This is the IP address that the NRD PEN reads from the STU unit designated as slave #1, registers 6996 and 6997, to establish the PEN IP ADDRESS. The default is 0.0.0.0 . The PEN IP ADDRESS of all units on the network MUST each be different or unique.

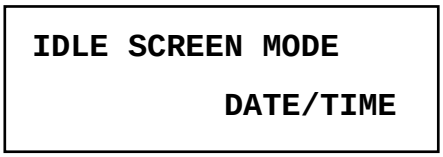
Page DOWN



Selectable entries - Any 3 digits, 0 through 199

The PEN SY/MAX DROP number is only used when the PEN NETWORK PROTOCOL is configured to SYMAX 802. The default is 1. Valid values are 0 through 199. The PEN SY/MAX DROP of all units on the network MUST each be different or unique.

Page DOWN



Selectable entries - Date/Time, I/O Status, Nameplate

The IDLE SCREEN MODE selects the screen that will be displayed whenever the IDLE key is pressed on the keypad, or after 1 minute after a key was pressed on the keypad that changed the displayed screen. The default screen is the DATE/TIME which displays NIOBRARA R&D CORP on the top line of the display, and the DATE/TIME on the lower line of the display. The selections are Date/Time, I/O Status, or Nameplate. The NAMEPLATE selection displays the LABEL (will be blank if not designated in the setup) and the NAMEPLATE (will be blank if not designated in the setup) on the top line of the display. The I/O STATUS will display for example:

IN: 1111111111111111 The current 16 bits of Input status - top line.

msb lsb
The msb (most significant bit) corresponds to Digital Input 16 - named PIN16
The lsb (least significant bit) corresponds to Digital Input 1 - named PIN01

OUT: 00000000000000 The current 14 bits of Output status - lower line.

msb lsb
The msb (most significant bit) corresponds to Digital Output 14 - named HV14
The lsb (least significant bit) corresponds to Digital Output 1 - named HV01

Page DOWN

Selectable entries - Any 4 characters, blank or 0 through 9 or A through Z

The LABEL selection allows you to enter a label consisting of any 4 characters, as shown above, that will be displayed as the left most 4 characters on the top line of the display, when NAMEPLATE is selected as the IDLE SCREEN MODE. The LABEL default is 4 blank characters. The Date/Time will be displayed as the lower line of the display.

Page DOWN

Selectable entries - Any 16 characters, blank or 0 through 9 or A through Z

The NAMEPLATE selection allows you to enter a nameplate consisting of any 16 characters, as shown above, that will be displayed as the right most 16 characters on the top line of the display, when NAMEPLATE is selected as the IDLE SCREEN MODE. The NAMEPLATE default is 16 blank characters. The Date/Time will be displayed as the lower line of the display.

Page DOWN

Selectable entries - 1 through 8192

The DIGITAL IN ADDRESS is the register address for the 16 digital inputs. The default is 6800.

NOTE: If this function is programmed at the same address as another function, the I/O register will respond to the specified address and the standard function will be inaccessible.

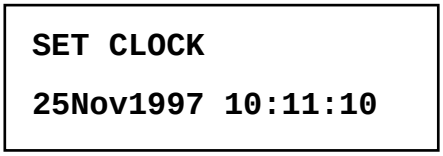
Page DOWN

Selectable entries - 1 through 8192

The DIGITAL OUT ADDRESS is the register address for the 14 digital outputs. The default is 6801.

NOTE: If this function is programmed at the same address as another function, the I/O register will respond to the specified address and the standard function will be inaccessible.

Page DOWN



The SET CLOCK selection allows you to set the PRESENT Date/Time. To set the Date/Time, use the arrow left or arrow right keys to position the cursor (an underline) under the desired character to be modified and then press either the + key (to increase the value) or the - key (to reduce the value) to change the character to the character desired. Move the cursor to the next character to be modified and repeat, if necessary. You may press the idle key to return to the idle screen or the 1 minute time-out timer will return the display to the IDLE SCREEN MODE display after the last key press. You may also press any key other than + or - when finished (STATS, SETUP, PAGE UP or PAGE DOWN).

Page DOWN

Selectable entries - Any four digits 0 through 9999

The EDIT SETUP PASSWORD screen allows you to either NOT have or to select a 4 digit password that will be required any time the SETUP key is pressed. Setting the password to 0 (zero) disables the password requirement. This feature would prevent unauthorized modifications of the setup, or unauthorized changes to values of registers in the STU unit. The default is 0 (zero) with the password requirement disabled.

Page DOWN

Selectable entries - Hexadecimal, Binary, Signed, Unsigned

The REGISTER EDIT MODE selects the format of the characters used to enter values into a register. The selection of Hexadecimal requires the values to be input as a hexadecimal number using the characters 0 through 9 and ’a’ through ’f’. The selection of Binary requires the values to be input as a 16 bit binary number using only the characters 0 or 1. The selection of Signed requires the values to be input as a signed (+ = positive, - = negative) number in the range of -32768 to +32768.

NOTE: You MUST pay attention to the SIGN and enter a + for a positive number or enter a - for a negative number. The selection of Unsigned requires the

values to be input as a unsigned (positive only) number in the range of (positive) 0 to 32768.

Page DOWN

```
Press ZERO to edit
register 6995
```

Selectable entries - Any register 1 through 8192

The PRESS ZERO TO EDIT REGISTER ---- allows you to view, or edit (change), the value of any register that can be written to.

NOTE: Be sure you have entered the register number of the register you want to edit (change). Also, be sure of the mode selected in the REGISTER EDIT MODE to know how the value is to be entered.

To view or edit a register, use the arrow left or arrow right keys to position the cursor (an underline) under the desired digit of the register number, to be modified and then press either the + key (to increase the value) or the - key (to reduce the value) to change the digit to the digit desired, then press then ZERO key to view or edit (change) the contents. To edit (change) the contents of that register, use the arrow left or arrow right keys to position the cursor (an underline) under the desired character to be modified and then press either the + key (to increase the value) or the - key (to reduce the value) to change the character to the character desired. Move the cursor to the next character to be modified and repeat, if necessary. If you are using the **SIGNED** REGISTER EDIT MODE, either the + (plus) key or the - (minus) key will toggle the displayed SIGN + or - displayed to the other sign. **BE SURE THE SIGN DISPLAYED IS CORRECT**. Default is last accessed register.

All unsupported registers respond with 8000 in Hexadecimal, with -32768 in Signed, with 32768 in Unsigned, with 1000000000000000 in Binary.

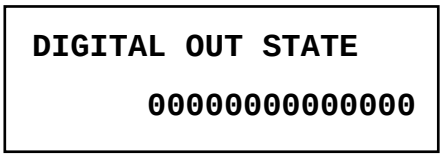
STATS key displays:

```
DIGITAL IN STATE
    1111111111111111
```

Digital Input Status bits - 1111111111111111
msb lsb
The msb (most significant bit) corresponds to Digital Input 16 - named PIN16
The lsb (least significant bit) corresponds to Digital Input 1 - named PIN01

The STATS key displays the DIGITAL IN STATE of the 16 Digital Input bits.

Page DOWN

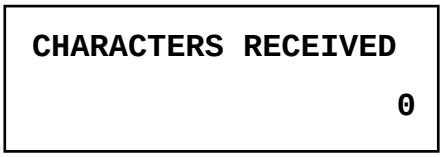


Digital Output Status bits - 00000000000000
msb lsb
The msb (most significant bit) corresponds to Digital Output 14 - named HV14
The lsb (least significant bit) corresponds to Digital Output 1 - named HV01

This selection displays the DIGITAL OUT STATE of the 14 Digital Output bits.

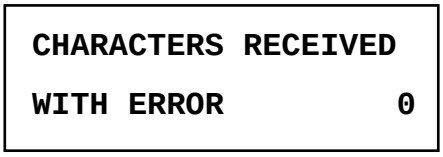
NOTE: Changing the status of the output bits may be DANGEROUS. Please use CAUTION.

Page DOWN



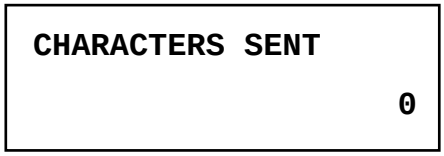
This selection is a Status Counter which counts the number of CHARACTERS RECEIVED by the unit.

Page DOWN



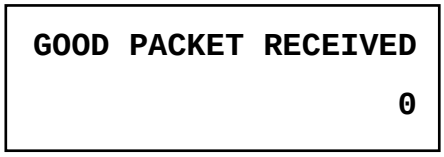
This selection is a Status Counter which counts the number of CHARACTERS RECEIVED WITH ERROR by the unit.

Page DOWN



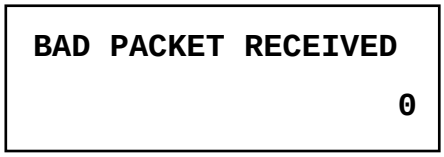
This selection is a Status Counter which counts the number of CHARACTERS SENT by the unit.

Page DOWN



This selection is a Status Counter which counts the number of GOOD PACKET RECEIVED by the unit.

Page DOWN

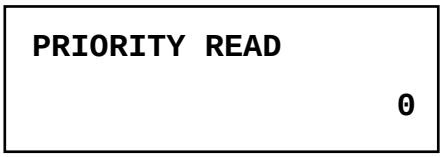


This selection is a Status Counter which counts the number of BAD PACKET RECEIVED by the unit.

Page DOWN

This selection is a Status Counter which counts the number of PACKETS SENT by the unit.

Page DOWN

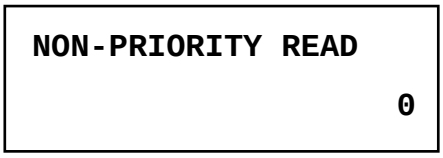


This selection is a Status Counter which counts the number of PRIORITY READ commands sent to the unit.

Page DOWN

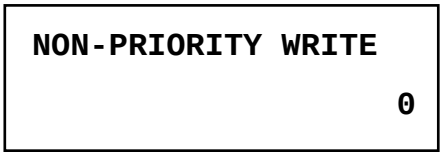
This selection is a Status Counter which counts the number of PRIORITY WRITE commands sent to the unit.

Page DOWN



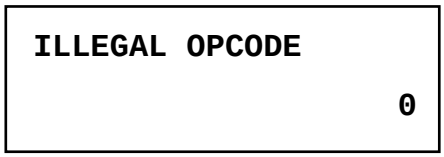
This selection is a Status Counter which counts the number of NON-PRIORITY READ commands sent to the unit.

Page DOWN



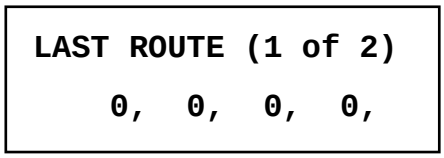
This selection is a Status Counter which counts the number of NON-PRIORITY WRITE commands sent to the unit.

Page DOWN



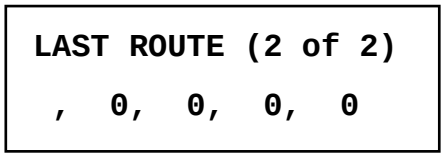
This selection is a Status Counter which counts the number of commands containing an ILLEGAL OPCODE sent to the unit.

Page DOWN



This LAST ROUTE selection is a Status display which shows the last (1 of 2) route of communication sent to the unit. SEE the NOTE at end of next display description.

Page DOWN



This LAST ROUTE selection is a Status display which shows the last (2 of 2) route of communication sent to the unit.

NOTE: The LAST ROUTE (1 of 2) and (2 of 2) display the last route sent to the STU unit, that the unit responded to. There are 8 bytes for storage of the last route. Bytes 1 through 4 of the last route are displayed in the LAST ROUTE (1 of 2) and bytes 5 through 8 of the last route are displayed in the LAST ROUTE (2 of 2). The entire LAST ROUTE,, a total of 8 bytes, is viewed by combining LAST ROUTE (1 of 2), followed by LAST ROUTE (2 of 2).

Page DOWN

```
LAST POWER UP
25Nov1997  9:54:41
```

The LAST POWER UP selection is a Status display which shows the last Date/Time for power up of the unit. It would either show the first Date/Time it was powered up or it would show the last Date/Time of a power failure when power was restored to the unit..

Page DOWN

```
Nerd-I/O Rev 26Nov97
by Niobrara R&D Corp
```

This selection is a Status display which shows the Revision date of the firmware in an Eprom inside the STU unit.

3
Installation

Module Installation

1 Mount the STU on any suitable mounting surface, in a position such that the LCD display screen is above the keypad and at a good height for viewing the LCD screen, using 4 screws, one in each corner of the unit. Route the wiring in such a manner as to allow unobstructed LCD screen viewing and easy access to the mounting screws and terminal strips for future additional wiring, and/or changeout of the unit.

2 With power applied to the unit, the red LED (on Engage Networks Inc. units, the red LED is hidden behind the terminal strip connector below the RS-485 4 wire terminals at the top right corner of the unit as viewed while looking at the LCD screen) should be illuminated and remain lit. The LCD screen should display the screen that is configured in the 'SETUP-IDLE SCREEN MODE' parameter (default is the NRD logo and Date/Time). This indicates that the STU has passed its internal self checks and is ready.

Cable installation

STU Power Supply

A 9 to 36 VDC power supply is required for the Z-World Little Star STU unit. Z-World can supply a 24 VDC wall power supply. Typical draw at 24 VDC is 60 mA. The transformer Ground and DC wires connect to the GND and +DC terminals, respectively, on the top of the unit, at the left end, when looking at the LCD display.

RS-485 Connector

The STU connects to a RS-485 4-wire communication unit, such as a NRD PEN device, using a cable with a male DB9 connector. The pinout of this connector and the suggested wire colors for the RS-485 cable is shown in Table 3-1.

Table 3-1 STU RS-485 4-wire Connector

DB9M Pin	Function	Suggested Wire Color	STU RS-485 4 wire connection
1	In -	White	In - (21)
2	In +	Green	In + (20)
3	Out -	Black	Out - (23)
4	Out +	Red	Out + (22)
5-6	DB9M pins jumpered in hood	Any color	
7-8	DB9M pins jumpered in hood	Any color	
9	Not connected	None	

NOTE: The NET I/O RS-485 4 wire terminals are NOT in numerical order. They are from the upper right end of the terminal strip, when viewed while looking at the LCD screen, - in order - 21, 20, 23, 22 - please see label. (Your connection wire colors should be - in order - White, Green, Black, Red from outer edge toward center of top of unit).

STU Configuration

The STU keypad has different keypad definitions from the Engage Net-I/O. A keypad label insert is supplied with STU ROMs. The STU key definitions are as follows:

Idle	Setup	Page Up	<---	+	(none)
Stats	Zero	Page Down	--->	-	(none)

IDLE - Returns the keypad and display to idle after adjusting the setup or viewing the statistics screens. Pressing the IDLE key displays the screen that is selected in the setup under IDLE SCREEN MODE. The STU default display is DATE/TIME of the choices Date/Time, I/O Status, or Nameplate.

NOTE: The unit is always capable of communicating regardless of the keypad/display state.

SETUP - Access configuration setup screens. Use PAGE DOWN and PAGE UP to scroll through individual screens.

STATS - Access statistic counter display screens. Use PAGE DOWN and PAGE UP to scroll through individual screens.

ZERO - When displaying any statistics counter, the Zero will clear all statistics counters. The Zero key is also used to toggle between the register number and register data screens when editing a register from the front panel.

PAGE UP - Display the previous setup or statistics screen.

PAGE DOWN - Display the next setup or statistics screen.

<--- - Move the cursor to the left in a setup screen.

---> - Move the cursor to the right in a setup screen.

\+ - Increase the digit or option at the cursor.

\- - Decrease the digit or option at the cursor.

(none) - STU firmware does not use these keys.

4

Internal Registers

REGISTERS

The register address of the Digital Inputs and Digital Outputs are programmable.

NOTE: If either of these functions is programmed at the same address as another function listed below, the I/O register will respond to the specified address and the standard function will be inaccessible.

Date and Time is stored in two circuit-monitor compatible formats: expanded (6 regs) and compressed (3 regs).

Table 4-1 Expanded Date and Time Registers

Last Power Up Registers R[760-765]	Present Date & Time Registers R[[784-789]	Description and Valid Values	Valid Values
Register 760	Register 784	Seconds	0 - 59
Register 761	Register 785	Minutes	0 - 59
Register 762	Register 786	Hours	0 - 23
Register 763	Register 787	Day	1 - 31
Register 764	Register 788	Month	1 - 12
Register 765	Register 789	Year	1900 - 2099

Table 4-2 Compressed Date and Time Registers

Last Power Up Registers R[1830-1832]	Present Date & Time Registers R[1842-1844]	MSB Description and Valid Values	LSB Description and Valid Values
Register 1830	Register 1842	Month (1-12)	Day (1-31)
Register 1831	Register 1843	Year (0-199)	Hour (0-23)
Register 1832	Register 1844	Minutes (0-59)	Seconds (0-59)

The year is zero based on the year 1900.
(1989 is 89 and 2009 is 109)

Last Power Up: R[1830-1832] and R[760-765]
Present Time: R[1842-1844] and R[784-789]

Either copy of the present time may be written to set the real-time clock.

The Label and Nameplate registers are supported. This string may optionally be displayed on the LCD display when the display/keypad is idle.

Table 4-3 Label and Nameplate Registers

Register	Description	Data Type
R[2040-2041]	Label	Packed ASCII
R[2042-2049]	Nameplate	Packed ASCII

Table 4-4 Statistical Counter Registers

Register	Description
R[2081]	Good packets received
R[2083]	Bad packets received. CRC or checksum error
R[2086]	Packets transmitted
R[2090]	Illegal Sy/Max or Modbus opcode
R[2091]	Sy/Max Priority Read
R[2092]	Sy/Max Priority Write or Modbus opcode 6 write
R[2093]	Sy/Max Non-Priority Read or Modbus opcode 3 or 4 read
R[2094]	Sy/Max Non-Priority Write or Modbus opcode 16 write
R[2095]	Character with parity or framing error
R[2096]	Character transmitted
R[2097]	Good character received
R[2108-2111]	Last route received (one drop per byte)

Table 4-5 IP Address Registers for NR&D PEN

Register	Description
R[6995]	Mode word for PEN
R[6996-6997]	The IP address as defined from the front panel setup screens or written from the serial port.
R[6998-6999]	Nonvolatile, read/write. Not used by STU or PEN.

Table 4-6 Setup Registers

Register	Description
R[8035]	Drop Number/Slave Address
R[8036]	Baud Rate 0=75, 1=150, 2=300, 3=600, 4=1200, 5=1800, 6=2400 7=3600, 8=4800, 9=7200, 10=9600, 11=14400, 12=19200
R[8037]	Data Bits Read only constant 8
R[8039]	Parity Bits 0=none, 1=odd, 2=even
R[8062]	Options Bit mapped options. None used.
R[8040]	Protocol Mode 0=PowerLogic, 1=Modbus RTU
R[8044]	Input Register Defines register number for digital inputs
R[8045]	Output Register - Defines register number for digital outputs
R[8174]	Write 0x9090 to clear setup to factory default
R[8176]	Port Number Read only constant 0x8001
R[8177-8186]	Module ID Packed ASCII
R[8188]	Sy/MAX ID Read only 0x9990

If Protocol Mode is set to 0 (Power Logic), the unit will automatically identify and respond to PLOGIC-SY/MAX and PNIM type packets.
PLOGIC-SY/MAX packets use a BCC checksum. PNIM packets use a CRC.

Modbus mode supports opcodes 03, 04, 06, 16, 100, and 08 with the echo back.

Power Logic mode supports SY/MAX opcodes 0x00, 0x02, 0x04, 0x20, 0x1E, and 0x22.

Opcode 0x22 (network print) causes a message to be displayed on the LCD panel.

All unsupported registers respond with 0x8000.

5
Examples

Example 1, A Simple Configuration

This example covers a very simple RS-485 4 wire system consisting of a NRD PEN, STU, an over temperature sensor (open/closed), and an output controlling a relay.

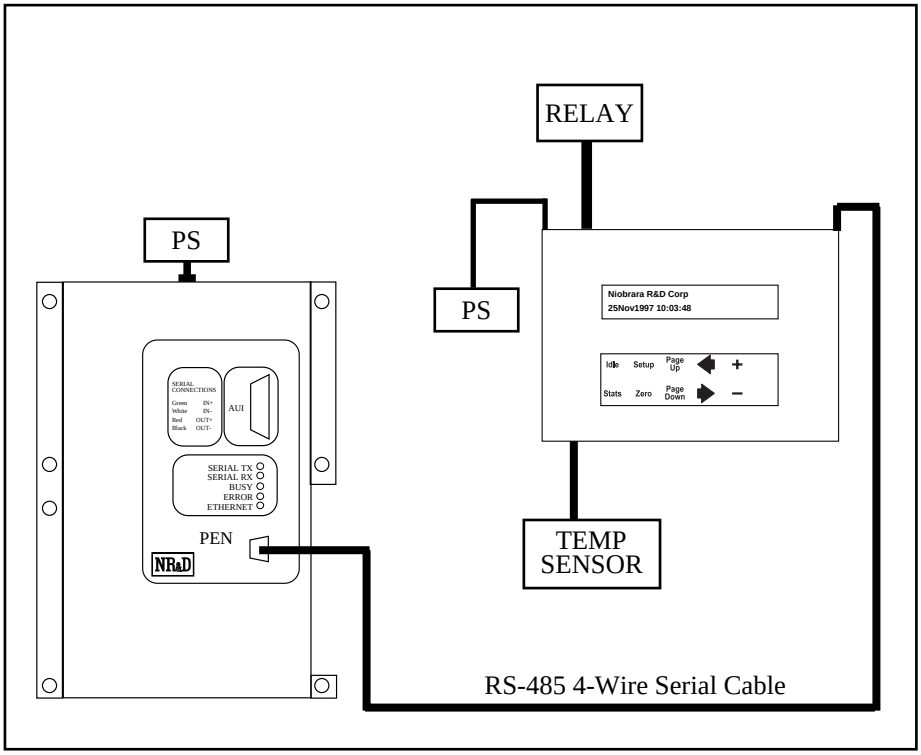


Figure 5-1 Example 1

The STU modules may be placed anywhere in the chain of RS-485 4 wire units attached to a communication unit (NRD PEN). More RS-485 4-Wire serial devices may be daisy chained from each unit to each added unit. The last serial device MUST be terminated with a terminating device such as a Square D model MCT-485 device.

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Connector Pinouts

STU RS-485 4-Wire Cable with male DB9 connector

DB9M Pin	Function	Suggested Wire Color	STU RS-485 4 wire connection
1	In -	White	In - (21)
2	In +	Green	In+- (20)
3	Out -	Black	Out - (23)
4	Out +	Red	Out + (22)
5-6	DB9M pins jumpered in hood	Any color	
7-8	DB9M pins jumpered in hood	Any color	
9	Not connected	None	

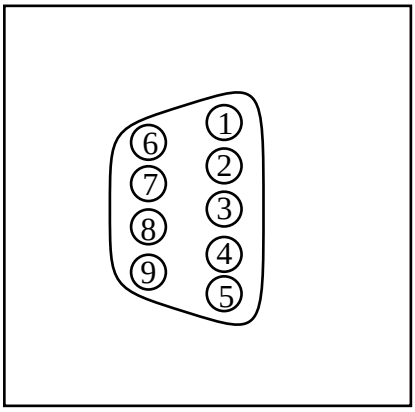

Figure 6-1 RS-485 4-Wire Male Cable Connector Front Pinout

(looking at male pins of connector)

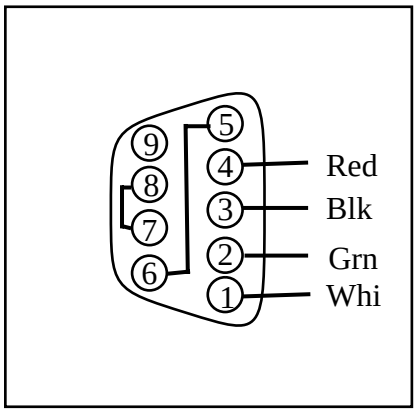

Figure 6-2 RS-485 4-Wire Male Cable Connector Back Pinout

(looking at wire solder cup side of pins of connector)

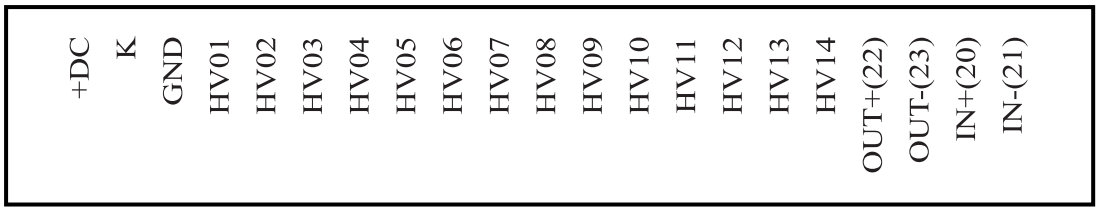

Figure 6-3 Top of NET I/O RS-485 4-Wire unit

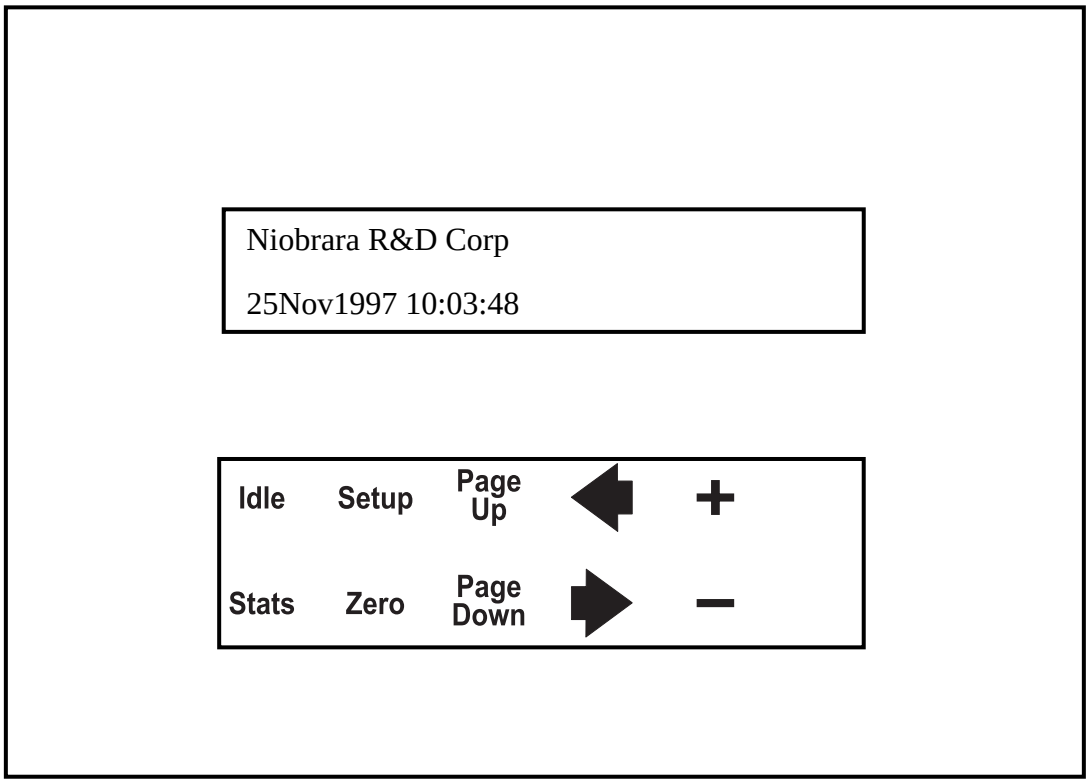

Figure 6-4 Front of STU Remote Serial Terminal Unit

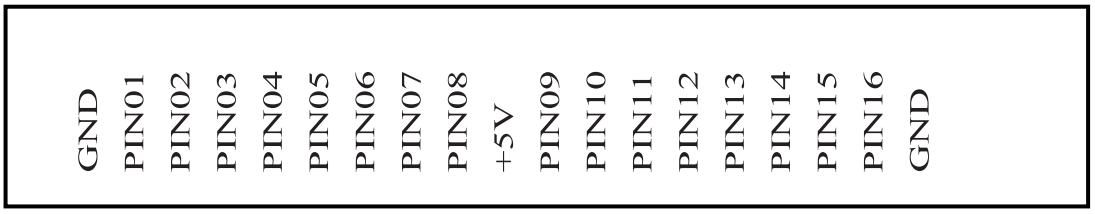

Figure 6-5 Bottom of STU Remote Serial Terminal Unit

7

Trouble Shooting

Troubleshooting the STU

The first step in troubleshooting the STU is to inspect the setup of the STU itself.

Booting

When the STU is first powered up, the screen selected in the IDLE SCREEN MODE should be displayed. If the STU is not displaying this screen, it may be due to no power being supplied to the unit. Causes may include low or no 12V power from the wall transformer or an external connection hardware problem on the STU unit itself. Please check the voltage at the terminal strip and the tightness of the connections. If the connections are tight and the proper voltage is measured at the terminal strip, the unit may need to be returned to the factory for inspection and service. Call NR&D for a Return Material Authorization number (RMA) before sending the unit in.

Troubleshooting the RS-485 network

RS-485 device communications

RS-485 serial communications can be either 2-wire or 4-wire communications. RS-485 serial communications may be multi-drop. The STU supports RS-485 4-Wire multi-drop communications.

- **Incorrect RS-485 Cable Connection.** Check that the STU's RS-485 pigtail is connected with the GREEN wire to the IN+, the WHITE wire to the IN-, the RED wire to the OUT+, and the BLACK wire to the OUT-. Check all other connected devices to be sure that all of the IN+s are connected to the other IN+s, IN-s to the other IN-s, OUT+ to OUT+, and OUT- to OUT-. There should be a terminator on only the last slave device on the network. The Shield should be grounded at only one location of the RS-485 network. Initial troubleshooting may be easier if only device #1 is connected; then adding additional units after communication is established with device #1.
- **Incorrect addressing of slaves.** All slave devices on the RS-485 network must be uniquely addressed. These addresses must be within the range of 1 through 8 inclusive. There MUST be one slave with the Address = 1. Make certain that all devices have their own address and that one is set for 1. Initial troubleshooting may be easier if only device #1 is connected; then adding additional units after communication is established with device #1.

The statistical registers can be used to troubleshoot communications.

The STU unit contains statistcal registers, which are Registers R[2081], R[2083], R[2086], R[2090-2097], and R[2108-2111].

R[2095], Character with Parity or Framing Error
: can be monitored to see if the count is increasing, which could indicate the Parity is set wrong, or the communication mode set wrong. Be sure that all communication parameters match for all devices on the RS-485 wire daisy-chain.

R[2083], Bad Packets Received. CRC or Checksum Error
: can be monitored to see if the count is increasing, which could indicate the Checksum is set wrong. Be sure that all communication parameters match for all devices on the RS-485 wire daisy-chain.

R[[2081], Good Packets Received
: can be monitored to see if the count is increasing, and closely matches the number of packets sent by the transmitting communication device that the STU unit is connected to.

R[2108-2111], Last Route Received (one drop per byte)
: can be monitored to see that the unit is responding to the messages for the correct drop number.

Additional troubleshooting help may be found in the Troubleshooting section for the communication device that the STU unit is conected to.

Appendix A

NR&D Internet

Niobrara is on the World Wide Web! Visit our home page at **http://www.niobrara.com** to see product information, cutsheets, application notes, and ftp current software releases.

Technical support questions may be E-mailed to

techsupport@niobrara.com

Marketing questions may be E-mailed to:

marketing@niobrara.com

Appendix B
Upgrading Net-I/O to STU Firmware

Because NRD I/O comes in a 512 Kbit (64 Kbyte) EPROM and Net-I/O firmware used varying sizes of Kbyte EPROMs, depending on the Revision, it is necessary to check/change some jumper settings on the Little Star PCB when replacing Net-I/O firmware.

On the jumper block, JP2 located above the EPROM, U6, move the jumper block to pins 3-5 and the jumper block to pins 2-4. The following diagram is not to scale. The jumpers should be positioned like Figure B-1.

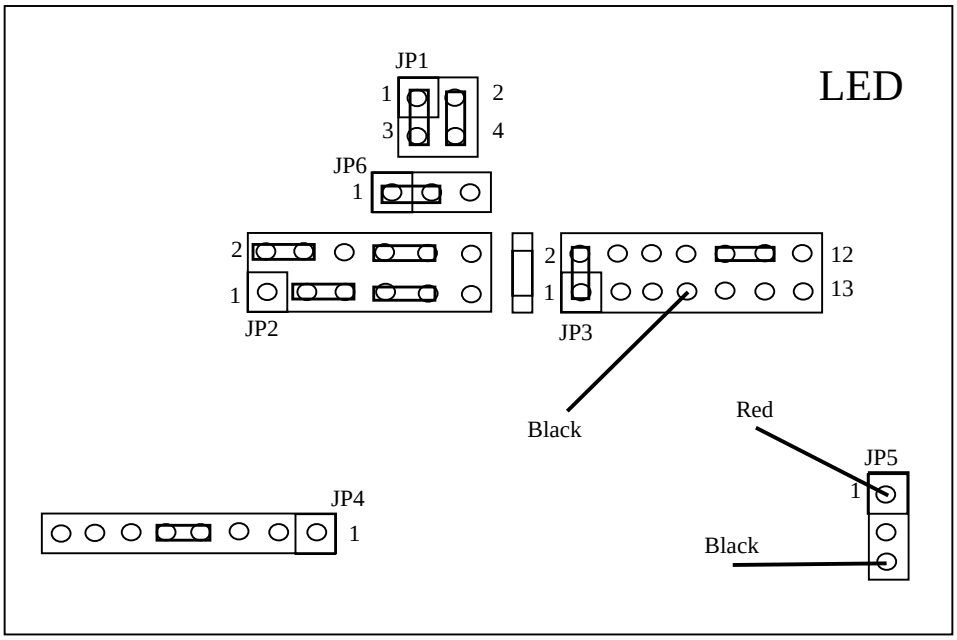

Figure B-1 Jumper Setting for Upgrading NET I/O to STU firmware.

NOTE: Default positions are shown for JP2. 3-5 and 2-4 determine Eprom size. Jumpers 7-9 and 8-10 are for pull up inputs. Jumpers 9-11 and 10-12 are for pull down inputs. These should be set for the input type you are using.

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