User Guide

Network Time Device

Model NTV-100XX

P\N 06000000X

Revision 1.2

May 2005

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Network Time Device Models and Part Numbers

MODEL	PART NUMBER	DESCRIPTION
NTV-100RK	060000001	½" Network Time Device Display Rack
NTV-100RG	060000002	½" Network Time Device Display Rack with GPS
NTV-100DK	060000003	½" Network Time Device Display Desk
NTV-100DG	060000004	½" Network Time Device Display Desk with GPS

Revision History

REVISION	DATE	COMMENTS
NC	09-21-04	Original release of the Network Time Device user guide.
1.0	10-13-04	Revision of entire user guide.
1.1	05-02-05	Added the UDP port used by IPSetup and AutoUpdate.
1.2	05-27-05	Revised section 2.3.1 of the user guide.

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Table of Contents

1 Overview

1.1 Units Without GPS Receiver Option

The Brandywine Communications Network Time Device's (NTV) purpose is to display time with accuracy. The Network Time Device uses a Proportional Integral (PI) algorithm to set/synchronize its clock once and control its internal clocks with a reference. The most used references are NTP Time Server, Serial Port Input, and GPS (optional). When the Network Time Device connects to the reference, the Network Time Device will resynchronize its time and internal clocks with the reference's time. Using a closed loop control system, the Network Time Device will correct its clocks based on the time difference between its internal clocks and the reference. A second order digital phase lock loop (PLL) is used to adjust the internal clocks of the Network Time Device to match the time of the reference over long time intervals.

1.2 Units With GPS Receiver Option

The Brandywine Communication Network Time Device's (NTV) purpose is to function as a network time server for other devices (clients) on a computer network. A built-in GPS receiver receives precise time signals from orbiting GPS satellites and uses these signals to synchronize the internal clock of the Network Time Device. Using a closed loop control system, the Network Time Device will correct its clocks based on the time difference between its internal clocks and the reference. A second order digital phase lock loop (PLL) is used to adjust the internal clocks of the Network Time Device to match the time of the reference over long time intervals.

2 Specifications

2.1 Inputs

The Network Time Device may receive its input from three references. The three references the Network Time Device receives input from are the NTP Time Server, Serial Port Input, and GPS (optional).

2.1.1 NTP Time Server

The Network Time Device may receive time from the NTP Time Server through the Ethernet. To receive time from the NTP Time Server, connect one end of an Ethernet cable to the Network Time Device Ethernet and connect the other end of the Ethernet cable to a hub.

2.1.2 Serial Port Input

The Network Time Device may receive time from the Serial Port Input through the Serial Port. To receive time from the Serial Port Input, connect one end of a serial cable to the Network Time Device Serial Port and connect the other end of the serial cable to the serial port of a computer, modem, or Brandywine Communications Master Clock.

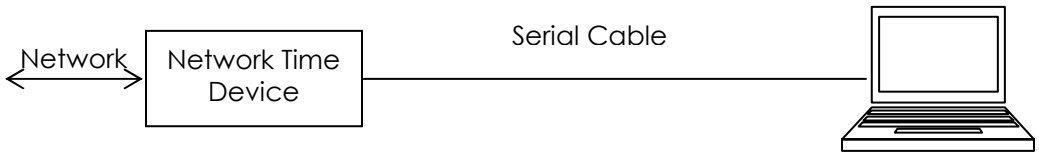
2.1.3 GPS (Optional)

The Network Time Device may receive time from the GPS through the Antenna. To receive time from the GPS satellites, connect the cable to the Network Time Device Antenna.

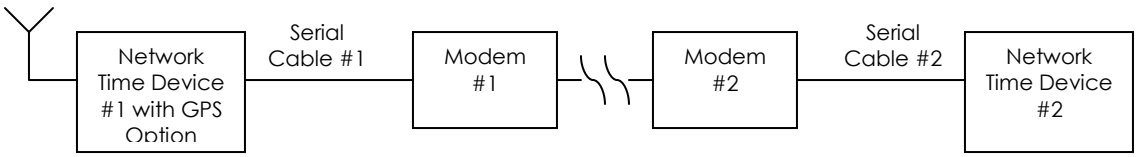
2.2 Outputs

The Network Time Device may output its time through the Serial Port. To output its time through the Serial Port, connect one end of the serial cable to the Network Time Device Serial Port and connect the other end of the serial cable to the serial port of the computer. **OR** connect one end of the serial cable (1) to the Network Time Device Serial Port (1), connect the other end of the serial cable (1) to the serial port of the modem (1), connect the modem (1) to another modem (2), connect one end of another serial cable (2) to the serial port of the modem (2), and connect the other end of the serial cable (2) to another Network Time Device Serial Port (2). Using a communications program such as HyperTerminal the user may output the time of the Network Time Device to the display terminal.

2.2.1 Computer Output Example



2.2.2 Modem Output Example



2.3 Button and Indicators

The Network Time Device has one button, the Brightness and three indicators, the Power, Link, and Speed.

2.3.1 Brightness Button – Brightness, IP Address, and Test Mode (Rear Panel)

The Brightness button functions as the brightness button, IP address button, and test mode button. The Network Time Device has eight levels of brightness. To increase the level of brightness, press the Brightness button one time.

To display the IP address of the Network Time Device, press the Brightness button two times. Use the same speed you would use to double click a mouse when pressing the Brightness button two times.

To get to the test mode, press and hold down the Brightness button for more than a second and all lights in the display window will glow. The test mode is useful because the user may test the lights in the display window to see if all of them are currently working.

2.3.2 Brightness Button – Default Mode (Rear Panel)

To get to the default mode, press and hold down the Brightness button for more than ten seconds and all lights in the display window will flicker. The default mode will default the unit's memory to factory default settings.

2.3.3 Power Indicator (Rear Panel)

The Power Indicator indicates that the power cord for the Network Time Device is currently plugged into an electrical socket by glowing green.

2.3.4 Link Indicator (Rear Panel)

The Link Indicator indicates that the Network Time Device is currently connected to a hub by glowing green.

2.3.5 Speed Indicator (Rear Panel)

The Speed Indicator indicates that the network speed is 100 MB by glowing green.

3 Unpacking and Installation

3.1 Unpacking

Remove the Network Time Device from the shipping carton. The following items should be included in the shipment:

- 1 Network Time Device
- 1 user guide

3.2 Installation

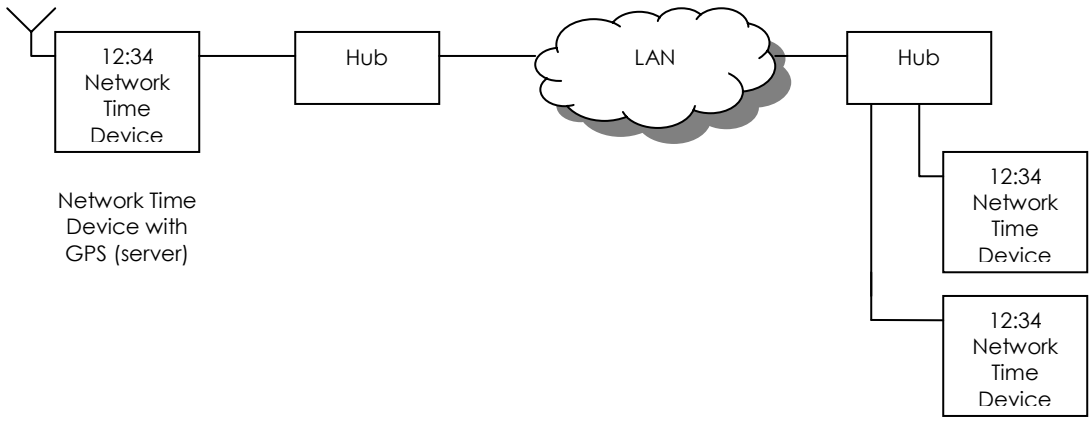
To complete the Network Time Device installation process, follow the steps given.

1. Insert the power cord into an electrical socket.
2. Connect one end of an Ethernet cable to the Network Time Device Ethernet.
3. Connect the other end of the Ethernet cable to a hub. Within a few seconds the IP Address of the device is displayed and the time currently being displayed is automatically corrected.
4. Open your Internet browser and type the IP Address of the device in the Address bar. For example, if the IP Address of the device is 192.168.1.1 then type either 192.168.1.1 or http://192.168.1.1 and press <Enter>.
5. Configure the Network Time Device. For more information on Network Time Device configuration, refer to the Configuration section of the user guide.

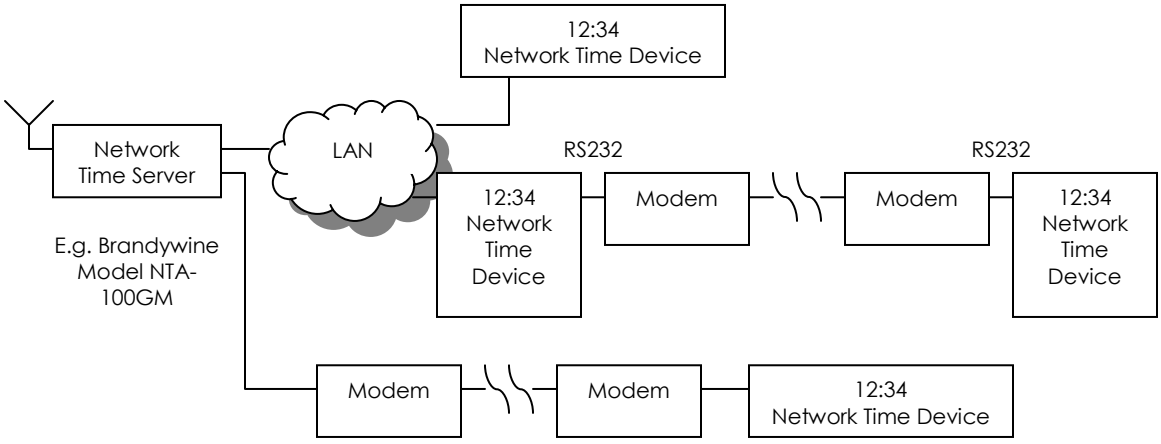
Furthermore, the Network Time Device may be mounted onto a standard rack mount enclosure using four 10/32 screws only if the part number for the Network Time Device is either 060000001 or 060000002.

3.3 Connections

3.3.1 Hub Connection Example



3.3.2 Modem Connection Example



3.3.3 Serial Port Pin Connections

The Network Time Device serial port uses either RS232 or RS422 standard pinout. The RS232 Pinout (DB-9 Connector) Table lists the pins used by the Network Time Device serial port for RS232. The RS422 Pinout (DB-9 Connector) Table lists the pins used by the Network Time Device serial port for RS422.

RS232 Pinout (DB-9 Connector) Table

PIN	DESCRIPTION
1	---
2	Receive Data
3	Transmit Data
4	---
5	Signal Ground
6	---
7	---
8	---
9	---

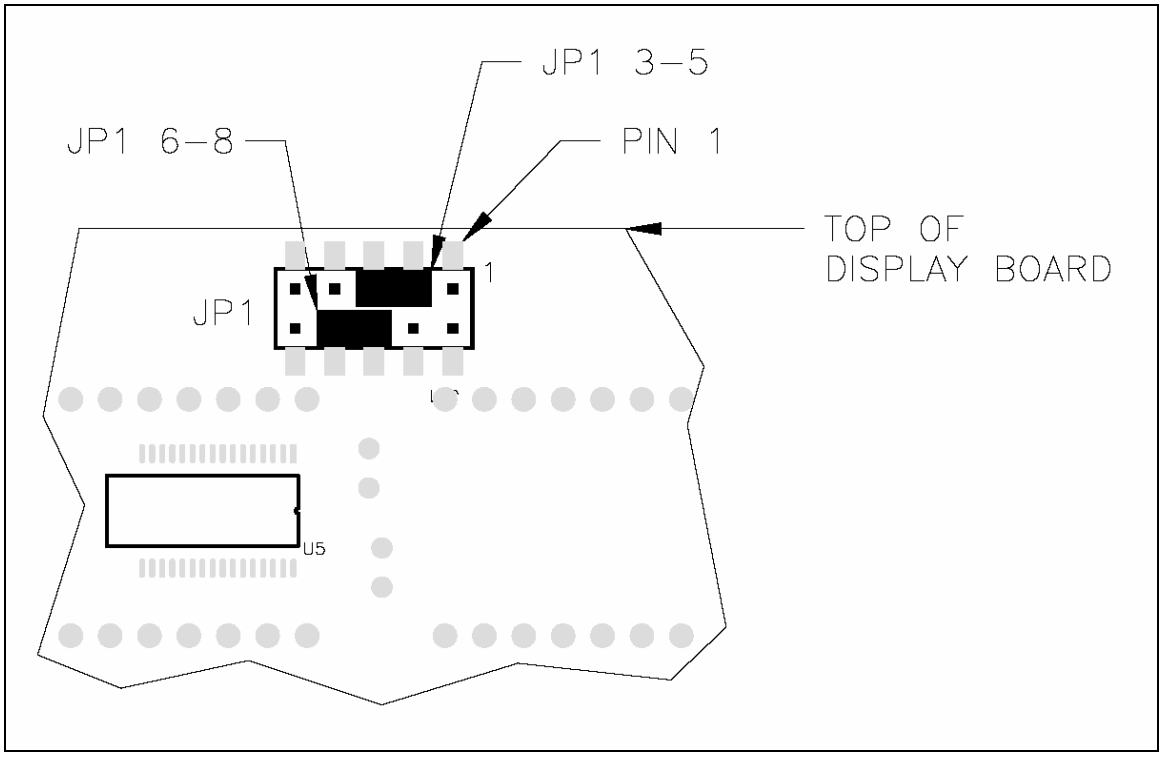
RS422 Pinout (DB-9 Connector) Table

PIN	DESCRIPTION
1	---
2	---
3	---
4	---
5	---
6	---
7	Transmit/Receive Data B (–)
8	Transmit/Receive Data A (+)
9	---

3.3.4 Serial Port Link Configurations

To configure the links, remove the back cover of the unit, locate the links, and configure them using the Link Location Drawing and Link Configuration Table.

Link Location Drawing



Link Configuration Table

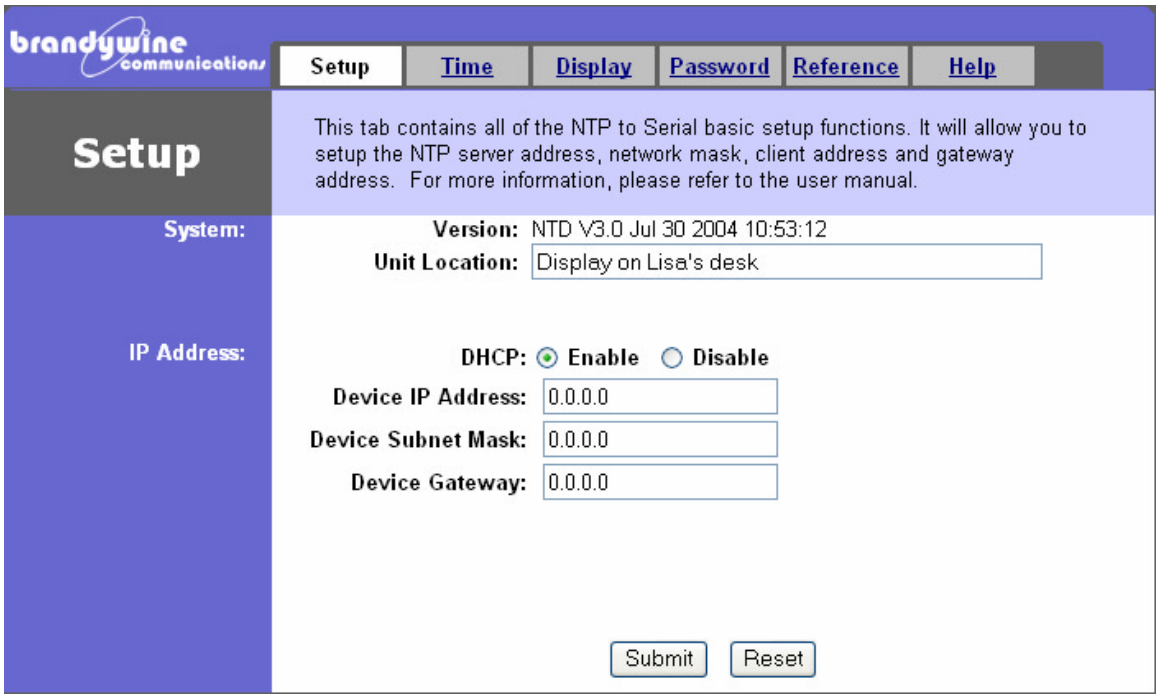
LINK SETTING	DESCRIPTION
JP1 1 - 3	RS422
JP1 6 - 8	RS422 transmit data
JP1 8 - 10	RS422 receive data
JP1 3 - 5	RS232

Please note that two links need to be set for RS422 configuration. To receive only, set link 1-3 and link 8-10. To receive and transmit, set link 1-3 and link 6-8.

4 Configuration

4.1 Setup

The Setup tab consists of two sections, the System and IP Address. This tab allows you to modify setup information for the Network Time Device. Please note that the Class C Network is being used therefore valid IP addresses are between 192.0.0.0 to 223.255.255.0. To save all modifications made to the Setup screen, click the Submit button. To undo all modifications made to the Setup screen, click the Reset button.



4.1.1 System

The System section consists of two fields, the Version and Unit Location. The Version refers to the version number of the Network Time Device. The Unit Location refers to the location of the unit. A maximum of 127 characters may be entered in the Unit Location field. Entering apostrophes (‘) in the Unit Location field is not recommended.

4.1.2 IP Address

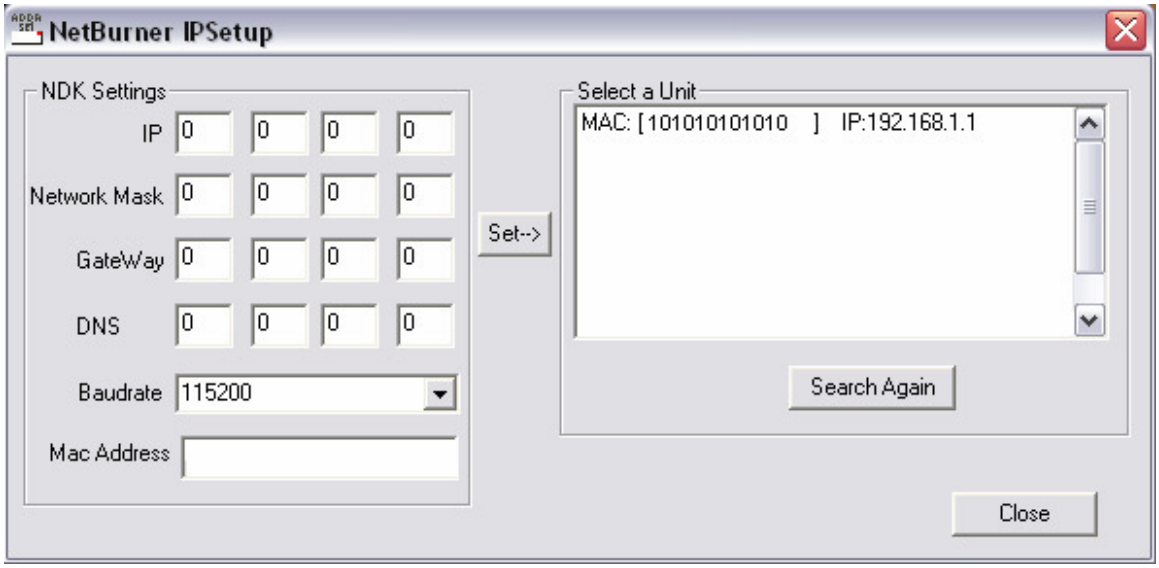
The IP Address section consists of two radio buttons, the DHCP Enable and DHCP Disable and three fields, the Device IP Address, Device Subnet Mask, and Device Gateway. If the DHCP Enable radio button is selected, the Network Time Device will retrieve its configurations from the DHCP server. If the DHCP Disable radio button is selected, the user must manually enter the configurations for the device.

The Device IP Address is a 32-bit number that identifies the device on an IP network. The Device Subnet Mask is a 32-bit number that enables the user to define sub-networks. The Device Gateway is a 32-bit number used as the point of entrance from one network to another.

4.1.3 Using IPSetup To Set IP Address

To setup the network address using the IP Setup program, follow the steps given below. Please note that IPSetup uses a local broadcast on UDP port 20034.

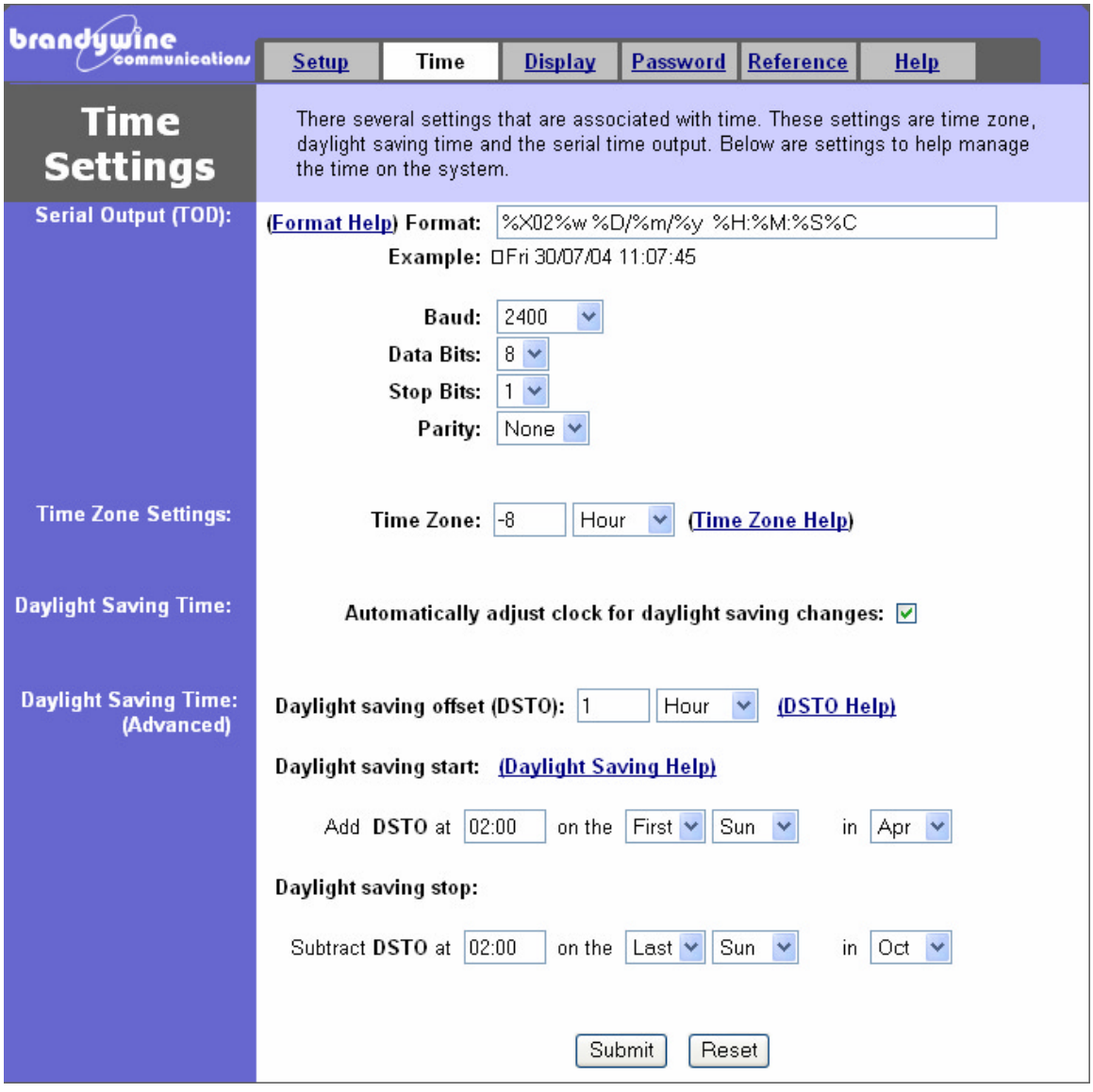
1. Download the IP Setup program from the NetBurner website located at http://www.netburner.com/support/downloads.html .
2. Double click on the IPSetup.exe icon and the NetBurner IPSetup screen will be displayed.



3. Verify that the "Select a Unit" displays the current MAC and IP address of the NTV connected to the network.
4. Click on the NTV that needs to be configured.
5. Enter the NDK Settings (IP, Network Mask, GateWay, and DNS).
6. To transfer the NDK Settings to the selected NTV, click the Set → button.
7. Wait 15 seconds for the NDK Settings to be loaded into the NTV and for the NTV to restart.
8. Verify that the NTV has the correct NDK Settings and is connected to the network by clicking the Search Again button.
9. To exit the IP Setup program, click the Close button.

4.2 Time

The Time tab consists of four sections, the Serial Output (TOD), Time Zone Settings, Daylight Saving Time, and Daylight Saving Time (Advanced). This tab allows you to modify the time settings for the Network Time Device. To save all modifications made to the Time Settings screen, click the Submit button. To undo all modifications made to the Time Settings screen, click the Reset button.



4.2.1 Serial Output (TOD)

The Serial Output (TOD) consists of one field, the Format and four combo boxes, the Baud, Data Bits, Stop Bits, and Parity. The Format refers to the format of the time outputted from the Network Time Device when the serial port is being used. The Format Characters Table lists the characters and descriptions used in the Format field. The Baud refers to the number of bits transmitted per second. The Data Bits and Stop Bits follow RS232 standard. The Parity enables the user to check the validity of the data by using either odd or even parity checking.

Format Characters Table

CHARACTER	DESCRIPTION
%A	AM/PM
%C	Carriage return (ASCII 13)
%D	Day of the month
%H	24 hour format
%h	12 hour format
%L	Shows locked, 1 = locked, 0 = not locked
%M	Minutes
%m	Number of the month
%N	Full name of the month
%n	3 character name of the month
%O	3 digit day of the year starting at 0
%o	3 digit day of the year starting at 1
%R	Line feed (ASCII 10)
%S	Seconds
%W	Full day of the week
%w	3 character day of the week
%X	Any hexadecimal value (%X20 = ASCII space)
%y	2 digit year (2004 = 04)
%Y	4 digit year (2004 = 2004)
%%	% symbol

4.2.2 Time Zone Settings

The Time Zone Settings consists of two fields, the Time Zone text field and Time Zone combo box. The Time Zone text field allows the user to enter the Standard Time offset from the Universal Time. The Time Zone combo box allows the user to select either hour or minute. The Time Zone Table lists all time zones and their Standard Time offsets from the Universal Time.

Time Zone Table

TIME ZONE	STANDARD TIME OFFSET FROM UNIVERSAL TIME
Eniwetok (Marshall Islands)	-12
Samoa (Polynesian Islands)	-11
Hawaii	-10
Alaska	-9
Pacific Time	-8
Mountain Time	-7
Central Time	-6
Eastern Time	-5
Atlantic Time	-4
Brazilia (Brazil)	-3
Mid-Atlantic	-2
Azores (Azores Islands)	-1
Rome (Italy)	1
Israel	2
Moscow (Russia)	3
Baku (Azerbaijan)	4
New Delhi (India)	5
Dhakar (Jordan)	6
Bangkok (Thailand)	7
Hong Kong	8
Tokyo (Japan)	9
Sydney (Australia)	10
Magadan (Russia)	11
Wellington (New Zealand)	12

4.2.3 Daylight Saving Time

The Daylight Saving Time consists of the “automatically adjust clock for daylight saving changes” check box. If the user clicks the check box, the system will automatically adjust the time of the Network Time Device when daylight saving time occurs. If the user does not click the check box, the system will not automatically adjust the time of the Network Time Device when daylight saving time occurs.

4.2.4 Daylight Saving Time (Advanced)

The Daylight Saving Time (Advanced) consists of three fields, the Daylight saving offset (DSTO), Daylight saving start, and Daylight saving stop. The Daylight saving offset is a number that is added to or subtracted from the time zone setting. The Daylight saving offset entered by the user may be either in hours or minutes.

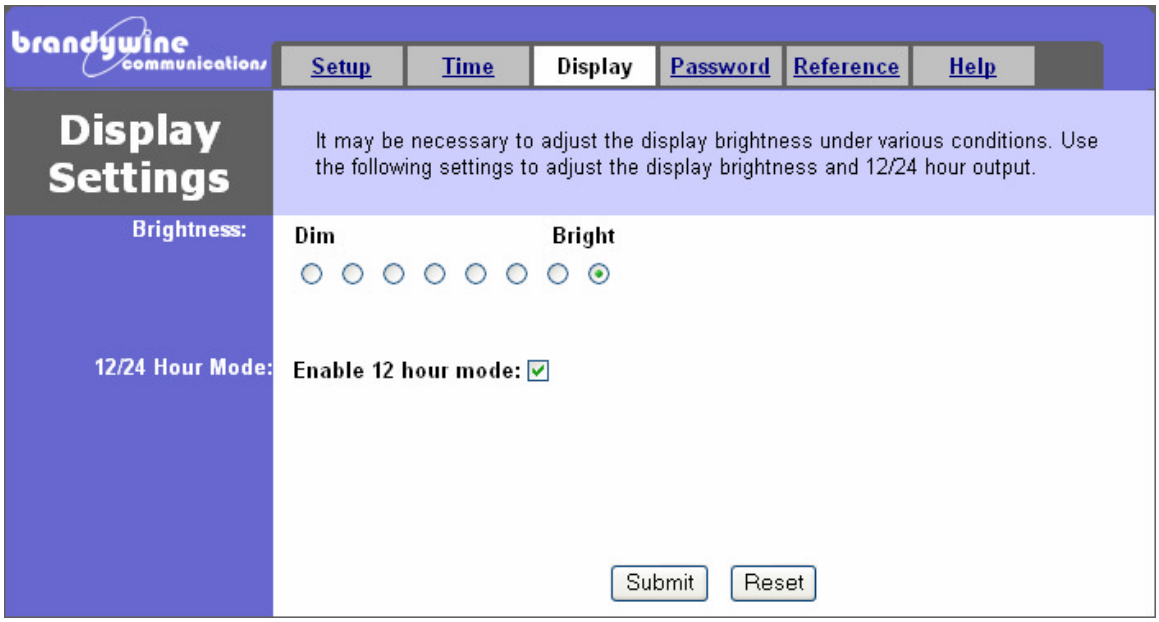
The Daylight saving start allows the user to add the daylight saving offset to the time the daylight saving should start. The user must enter the daylight saving start time, the occurrence of the specific day, the day of the week, and the month that the daylight saving should start. For example, Pacific Standard Time adds an hour at 02:00 on the first Sunday of April.

The Daylight saving stop allows the user to subtract the daylight saving offset to the time the daylight saving should stop. The user must enter the daylight saving stop time, the occurrence of the specific day, the day of the week, and the month that the daylight saving should stop. For example, Pacific Standard Time subtracts an hour at 02:00 on the last Sunday of October.

Please note that the daylight saving start time and daylight saving stop time must be in 24 hour format. For example, if daylight saving start time and daylight saving stop time are at 1:00 pm, the user must enter 13:00.

4.3 Display

The Display tab consists of two sections, the Brightness and 12/24 Hour Mode. This tab allows you to modify display settings for the Network Time Device. To save all modifications made to the display settings, click the Submit button. To undo all modifications made to the display settings, click the Reset button.



4.3.1 Brightness

The Brightness consists of eight radio buttons from Dim to Bright. The user may modify the level of brightness for the Network Time Device by selecting one of the eight radio buttons.

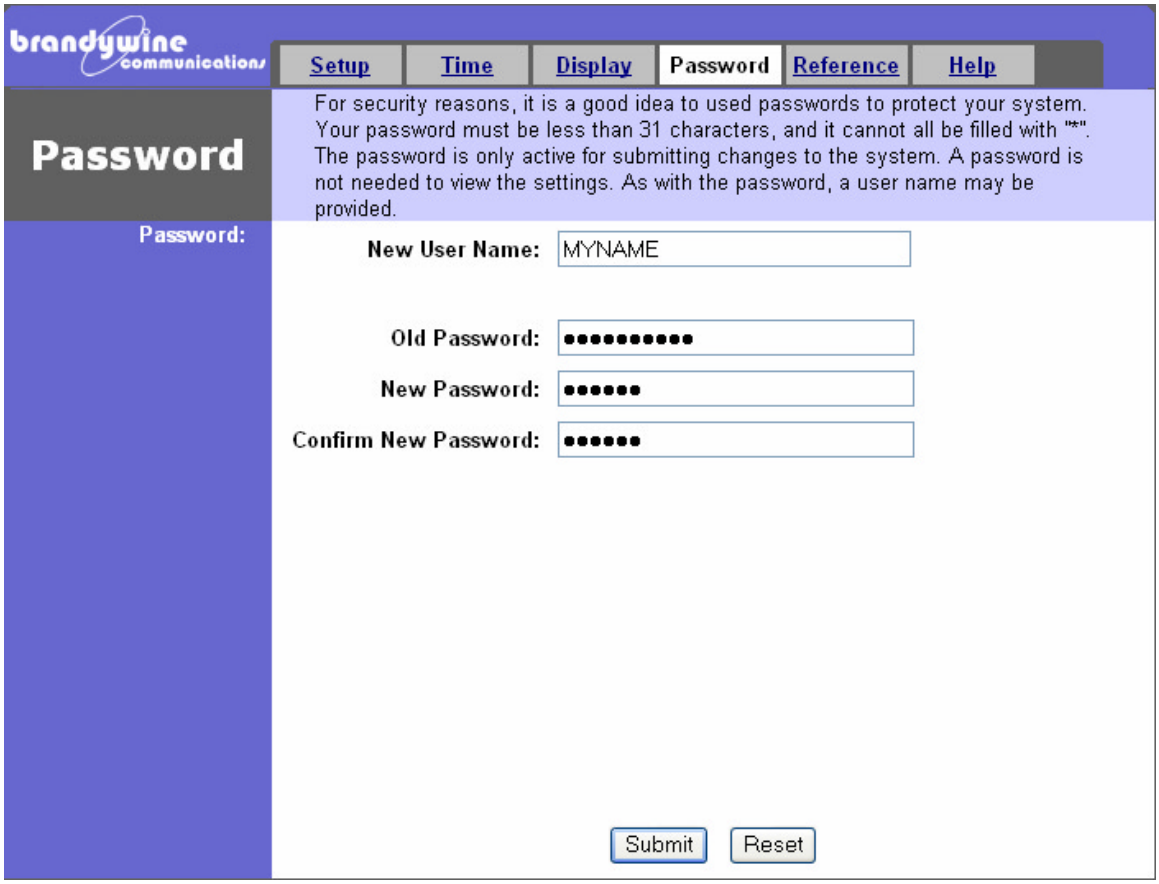
4.3.2 12/24 Hour Mode

The 12/24 Hour Mode consists of a check box, the enable 12 hour mode. If the user clicks the check box the time for the Network Time Device will be displayed in 12 hour mode. If the user does not click the check box the time for the Network Time Device will be displayed in 24 hour mode.

4.4 Password

The Password tab consists of one section, the Password. This tab allows you to change the user name and password for the system. To save all modifications made to the Password screen, click the Submit button. To undo all modifications made to the Password screen, click the Reset button.

IMPORTANT INFORMATION:
Please note that the default user name and password for the system is BRANDYWINE and the user must always enter a user name and password when submitting changes to the system.

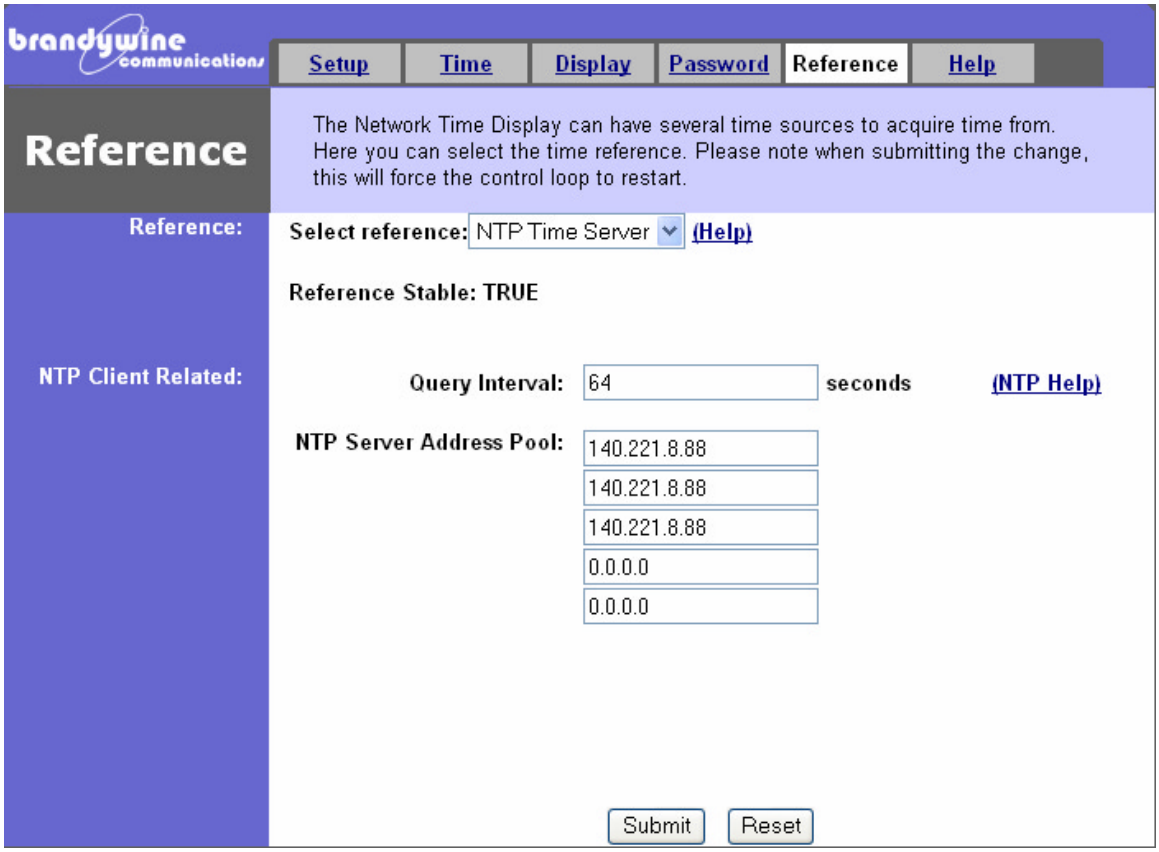


4.4.1 Password

The Password consists of four fields, the New User Name, Old Password, New Password, and Confirm New Password. The new password must be less than 31 characters and cannot contain any asterisks. Moreover, the system is case sensitive.

4.5 Reference

The Reference tab consists of two sections, the Reference and NTP Client Related. This tab allows you to modify the reference for the Network Time Device. Please note that while the Network Time Device is acquiring time from the reference the colons on the Network Time Device will be flashing. Once the Network Time Device has acquired time from the reference the colons on the Network Time Device will stop flashing. To save all modifications made to the Reference screen, click the Submit button. To undo all modifications made to the Reference screen, click the Reset button.



4.5.1 Reference

The Reference consists of two fields, the Select reference and Reference Stable. The Select reference allows the user to select one of the three references to acquire time from. The three references used by the system are NTP Time Server, Serial Port Input, and GPS (optional).

The NTP Time Server reference uses the Network Time Protocol to synchronize the internal clocks of a computer to the reference's time. The stratum level may vary depending on the current reference setting. To use this reference the NTP Server Address Pool must be setup.

The Serial Port Input reference continuously receives an update every second. The stratum level for this reference is 2.

The serial time format is [STS][DOW][%x20][DAY]/[MONTH]/[YEAR][%x20 %x20][HOUR]:[MINUTE]:[SECOND][%x0D]. The Serial Time Format Table lists the data and descriptions used.

Serial Time Format Table

DATA	DESCRIPTION
STS	Start of the message %x02 and this character acts as the 1PPS timing mark
DOW	Day of the week written as three letters: Sun, Mon, Tue, Wed, Thu, Fri, and Sat
%x20	Space character
DAY	Two digit number of the day (01 - 31)
%x2F	Slash character '/'
MONTH	Two digit number of the month (01 - 12)
%x2F	Slash character '/'
YEAR	Two digit number of the year (00 - 99)
%X20	Space character
%x20	Space character
HOUR	Two digit number of the hour (00 - 23)
%x3A	Colon character ':'
MINUTE	Two digit number of the minute (00 - 59)
%x3A	Colon character ':'
SECOND	Two digit number of the second (00 – 59)
%x0D	End of message – carriage return

The optional GPS reference uses a GPS receiver to synchronize the internal clocks. The stratum level for this reference is 1. To use the optional GPS reference, the GPS option must be installed.

The Reference Stable may be either 'TRUE' or 'FALSE'. It is 'TRUE' when the Network Time Device has acquired time from a reference. It is 'FALSE' when the Network Time Device has yet to acquire time from a reference.

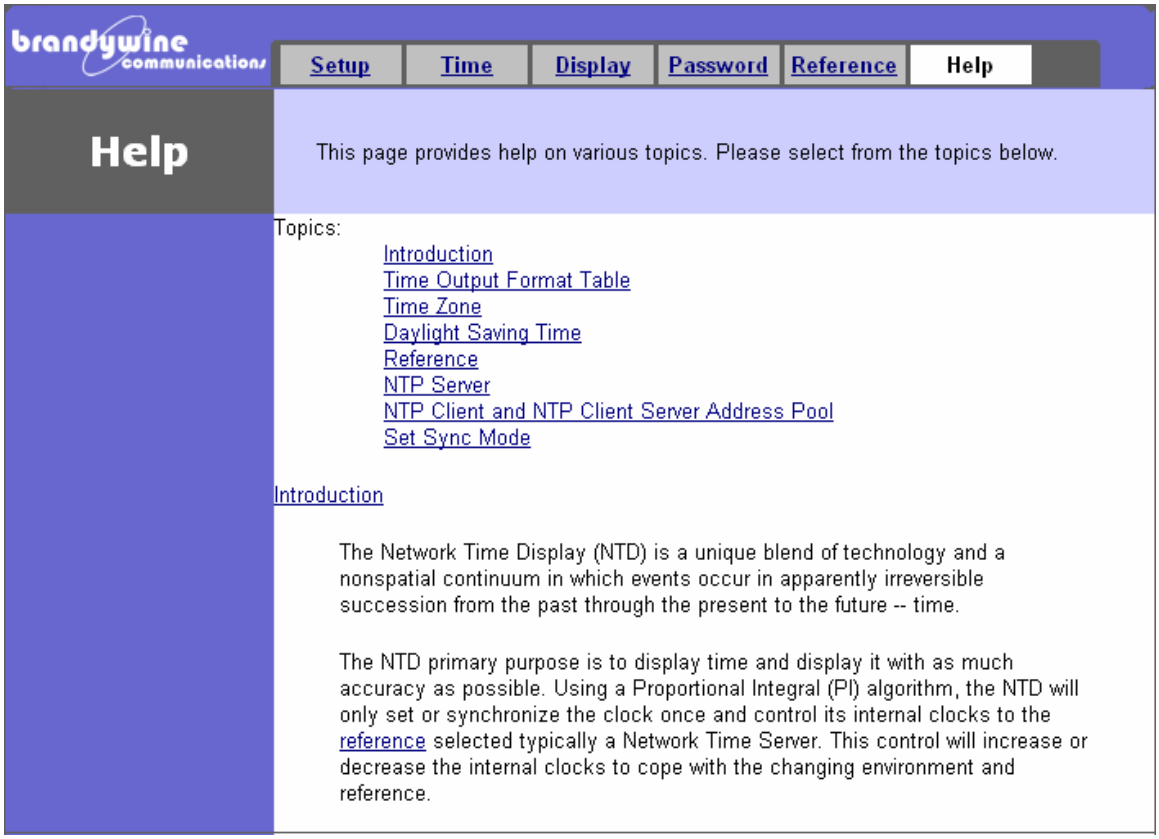
4.5.2 NTP Client Related

The NTP Client Related consists of six fields, a Query Interval and five NTP Server Address Pool entries. The Query Interval is a number (in seconds) entered by the user. The Query Interval will be invalid for the first 300 seconds because the NTP client will be sampling the time once every second and adjusting the internal clocks in the NTP servers using the internal Proportional Integral algorithm. After the first 300 seconds, the NTP client will begin repeatedly querying the server after every query interval.

The NTP Server Address Pool allows the user to enter up to five NTP server addresses. The system will read the five NTP server addresses and any non-zero address. The system will try to connect to each address to get time synchronization. Then the system will calculate the average time for all retrieved times to get a more accurate time reference.

4.6 Help

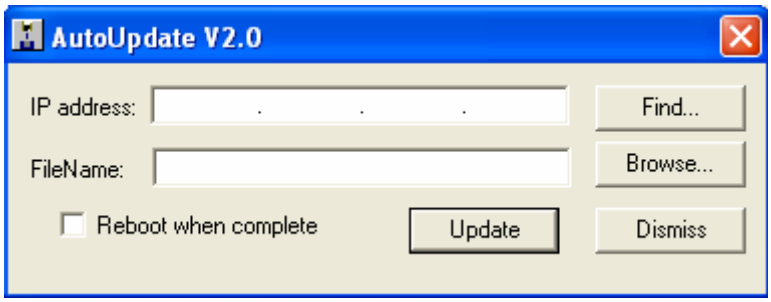
The Help tab provides the user with help while using difficult areas in the system. Help links are located throughout the entire system so the user has access to the Help screen whenever the user encounters a problem. Once the user clicks on the help link the user will be automatically redirected to the Help screen. Topics discussed in the Help screen include an introduction, theory of operation, time zone, daylight saving time, daylight saving time (DSTO), time output format table, reference, NTP server, and NTP client and server address pool.



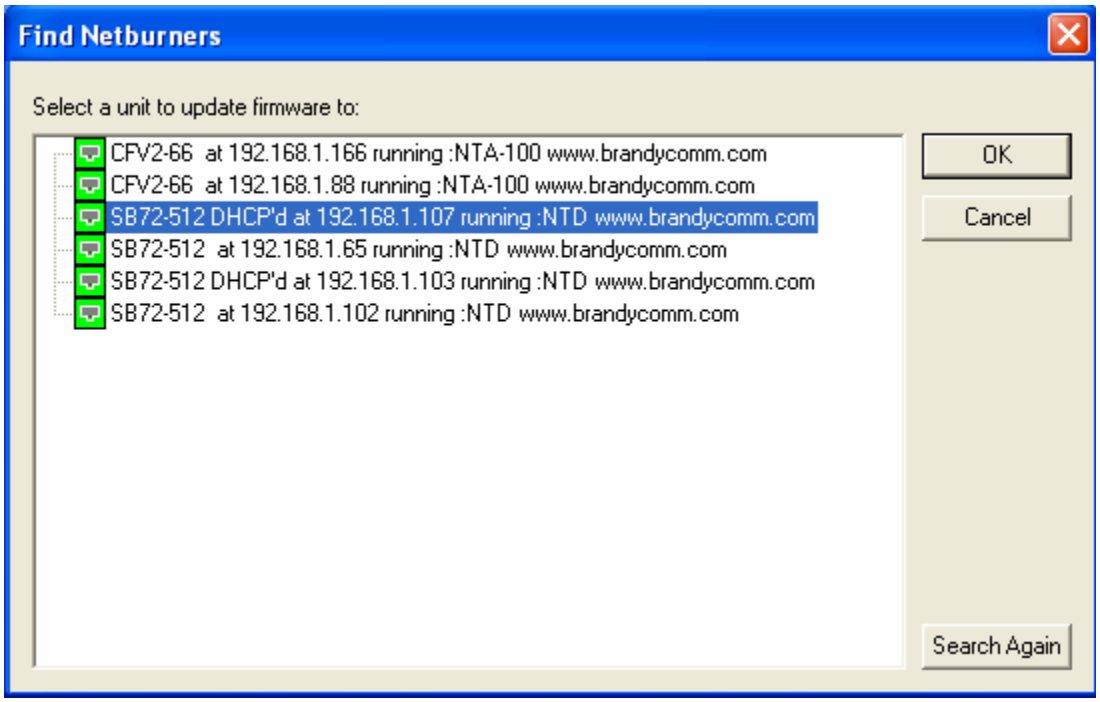
5 Uploading Firmware

To upload new firmware for the Network Time Device, the user will need a software application such as AutoUpdate, the IP address of the Network Time Device, and the file name of the new released file. Follow the steps listed below to upload new firmware for the Network Time Device. Please note that AutoUpdate uses unicast on UDP port 20034.

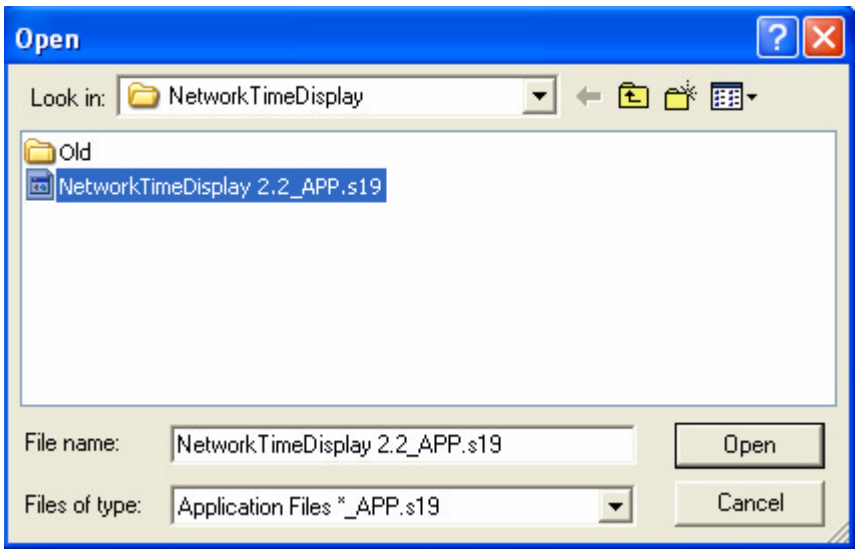
1. Double click on the AutoUpdate icon and the AutoUpdate V2.0 screen will be displayed.



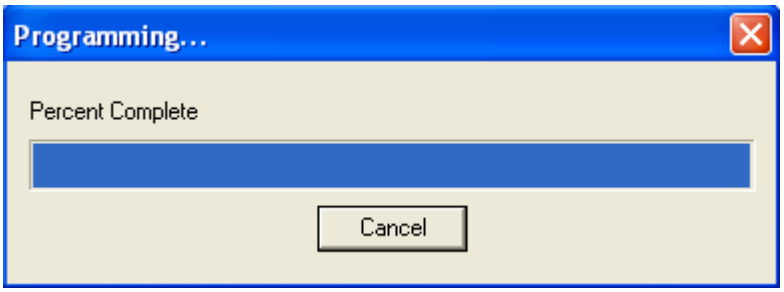
2. Enter the IP address of the Network Time Device in the IP address field. If the user does not know the IP address, press the Find button and the Find Netburners screen will be displayed. Locate and click on the IP address of the unit and click the OK button. The IP address field will be completed for you. If the unit is not on the list, click the Search Again button.



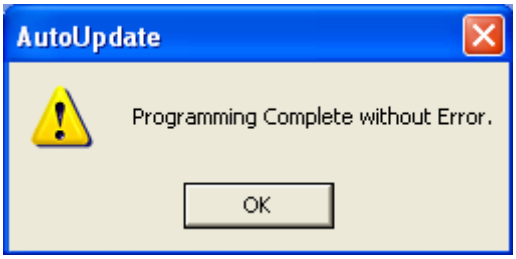
3. Enter the path name to the new released file. If the user does not know the path name, press the Browse button and the Open screen will be displayed. Locate and click on the file and click the Open button. The File Name field will be completed for you.



4. Now, click on the "Reboot when complete" check box.
5. To close the application, click the Dismiss button.
6. To upload the new firmware, click the Update button and the Programming screen will be displayed for a few seconds.



7. After the Programming screen automatically closes, the AutoUpdate screen will be displayed. Click the OK button and now the uploading firmware process is completed.



6 Drawings

FIGURE	DESCRIPTION
1	½" Network Time Device Display Rack Front Panel
2	½" Network Time Device Display Rack Mechanical Outline
3	½" Network Time Device Display Desk Front Panel
4	½" Network Time Device Display Desk Mechanical Outline
5	½" Network Time Device Display Rack/Desk Rear Panel
6	½" Network Time Device Display Rack/Desk Antenna Voltage Link Setting

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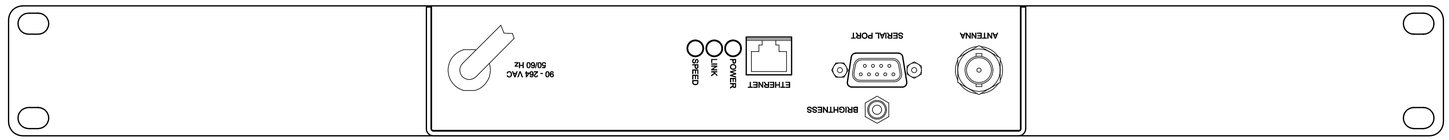
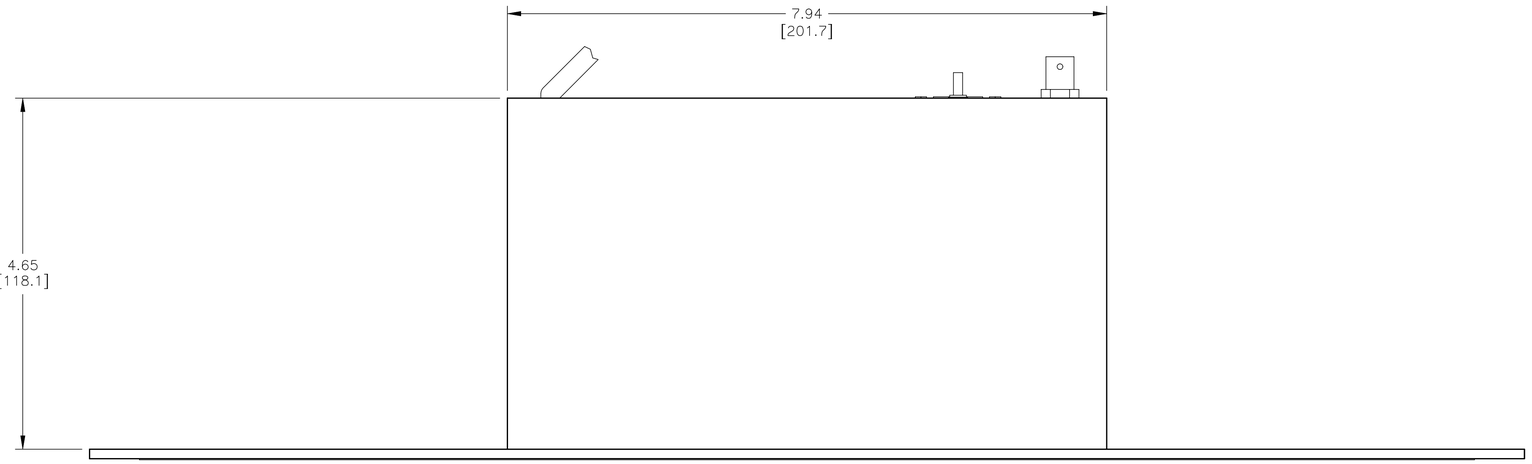
23:50:47

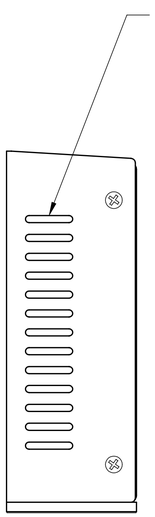
Network Time Device

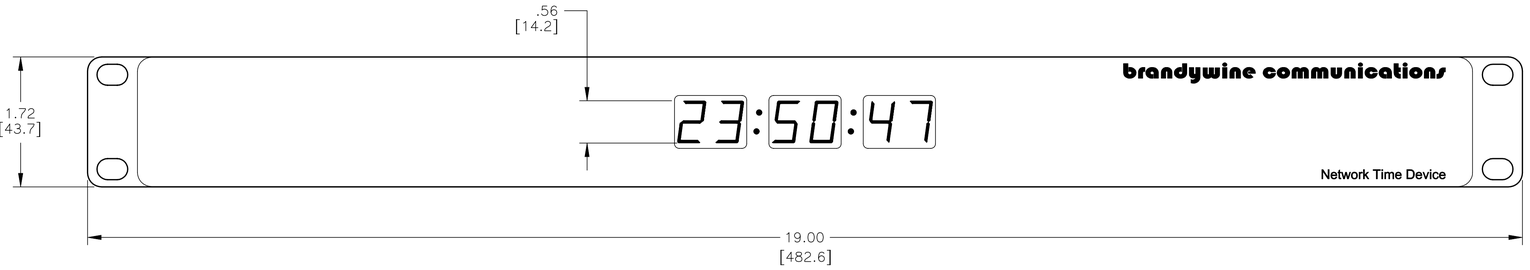
THIRD ANGLE PROJECTION

REVISION				
REV	DESCRIPTION	DRFT	DATE	APPROVED









QTY REQD	QTY REQD	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	CODE
–2	–1						

2. WEIGHT: 1.6 POUNDS [0.7 KG] NOMINAL.

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN BRACKETS ARE IN MILLIMETERS.

NOTE: UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	PROG/PROJ	NTD–XXX	
DIMENSIONS APPLY AFTER FINISH	DRAWN	Jeff Lind	9/30/–4
TOLERANCES	ENGINEERING	GHS	SEP 04
HOLE DIA± .XX ±			
ANGLES± .XXX ±			
MATERIAL			
FINISH			
QTY N/A / QTY U/O / NEXT ASSEMBLY / USED ON APPLICATION			
SURFACE ROUGHNESS √			

brandywine communications
2230 South Fairview, Santa Ana, California 92704

TITLE
OUTLINE DRAWING – NETWORK TIME DEVICE – RACK MOUNT

SIZE	CAGE CODE	DWG NO.	REV
D	03NF8	850000045	N/C

SCALE 1/1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

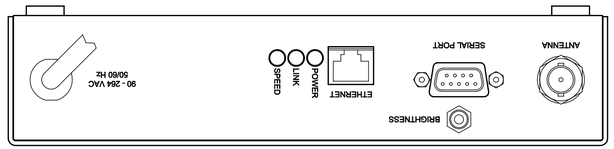
850000045 N/C

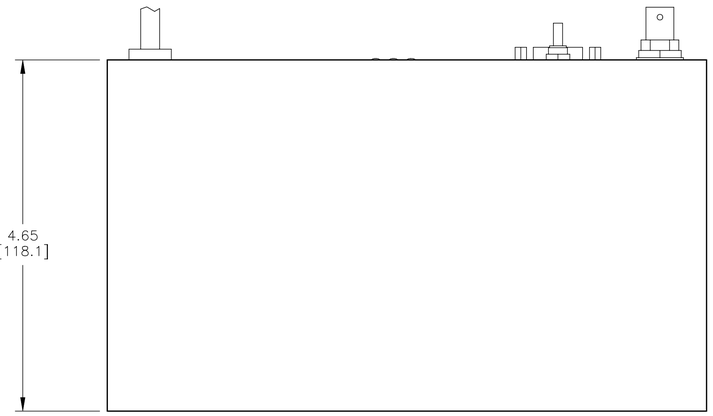
brandywine communications

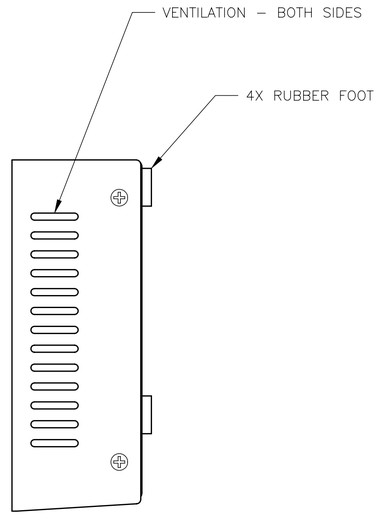
Network Time Device

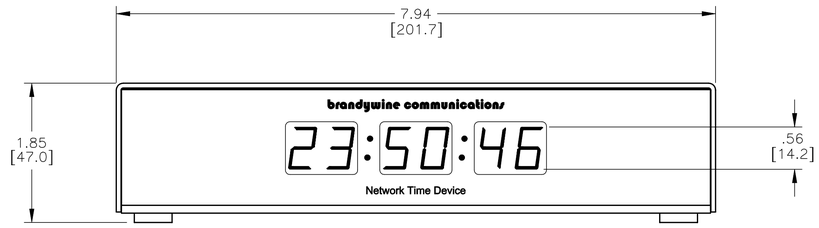
THIRD ANGLE PROJECTION

REVISION				
REV	DESCRIPTION	DRFT	DATE	APPROVED









2. WEIGHT: 1.6 POUNDS [0.7 KG] NOMINAL.

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN BRACKETS ARE IN MILLIMETERS.

NOTE: UNLESS OTHERWISE SPECIFIED.

QTY REQD	QTY REQD	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	CODE
–2	–1						

QTY N/A	QTY U/O	NEXT ASSEMBLY	USED ON APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DIMENSIONS APPLY AFTER FINISH

TOLERANCES

HOLE DIA± .XX ±

ANGLES± .XXX ±

MATERIAL

FINISH

SURFACE ROUGHNESS ✓

PROG/PROJ	NTD–XXX	
DRAWN	Jeff Lind	9/30/04
ENGINEERING	GHS	SEP 04

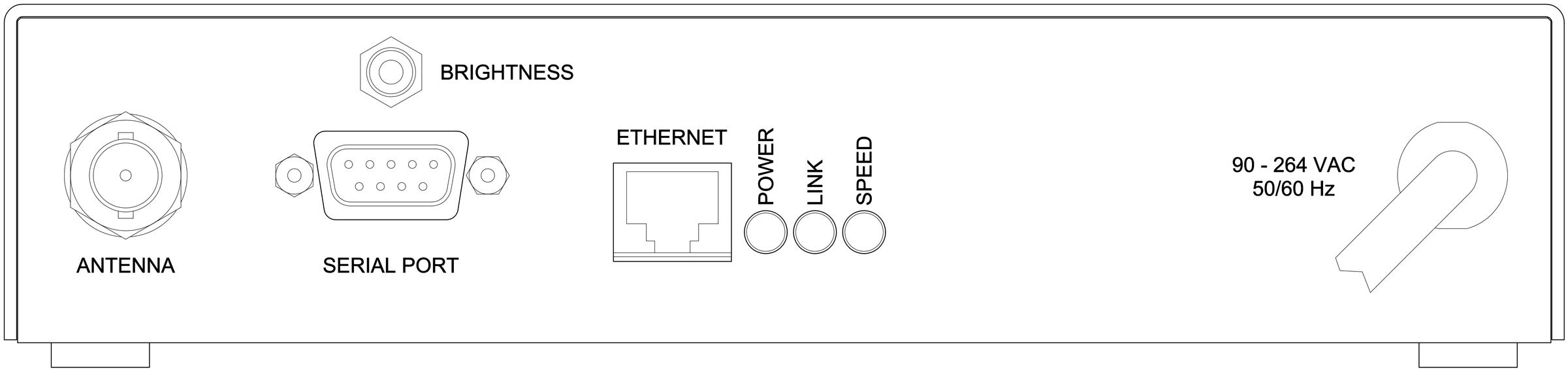
brandywine communications
2230 South Fairview, Santa Ana, California 92704

TITLE
OUTLINE DRAWING – NETWORK TIME DEVICE – DESKTOP

SIZE	CAGE CODE	DWG NO.	REV
D	03NF8	850000044	N/C

SCALE 1/1 | DO NOT SCALE DRAWING | SHEET 1 OF 1

850000044 N/C


BRIGHTNESS
ETHERNET
POWER
LINK
SPEED
90 - 264 VAC
50/60 Hz
ANTENNA
SERIAL PORT

5V ANT: J7 3–4
3.3V ANT: J7 4–5