



User Guide

Frequency and Time Synthesizer Unit

Model FTSU-100D

P/N 001-0219

Revision A

March 2010

Brandywine Communications
1153 Warner Ave.
Tustin, CA 92780
(714) 755 1050
(714) 755 0175

<http://www.brandywinecomm.com>



Revision History

REVISION	DATE	COMMENTS
A	03/26/2010	Initial Release



Safety Warnings

WARNING: This unit contains lethal AC voltages. Disconnect the unit from the AC supply before removing the cover.



WARNING:

The lightning flash with an arrowhead inside of an equilateral triangle is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product's enclosure. The "dangerous voltage" may be of sufficient magnitude to constitute a risk of electrical shock to people.



CAUTION:

The exclamation point inside of an equilateral triangle is intended to alert the user to the presence of important operation and maintenance instructions in the user guide.

NOTE: In this manual all references made to 70 MHz outputs refer to 96 MHz outputs

Table of Contents

1	Specifications	6
1.1	Inputs	6
1.1.1	1 PPS Input	6
1.1.2	10MHz Input	6
1.2	Outputs	6
1.2.1	10MHz Outputs	6
1.2.2	96 MHz Outputs	6
1.2.3	1 PPS Outputs	6
1.3	Network Port	7
1.4	Status Indicators	7
1.5	Environmental	7
1.6	Mechanical	7
1.7	Rear Panel Connections	8
2	General Description	9
3	Unpacking and Installation	10
3.1	Unpacking	10
3.2	Installation	10
3.3	Connections	11
3.3.1	Power	11
3.3.2	Other Connections	11
4	Getting Started	12
4.1	Powering Up the FTSU-100D	12
4.2	Setting the Network Address	12
4.2.1	IPSetup.exe	13
4.2.2	Web Browser	14
4.3	Latest Version of Java Software	15
5	Configuration	16
5.1	Web Browser Configuration	16
5.1.1	System	16
5.1.2	Setup	17
5.1.3	Password	19
5.1.4	Alarm	20
5.1.5	1 PPS	21
5.1.6	Output	23
5.1.7	Serial	24
5.1.8	SNMP	25
5.1.9	Help	27
6	Uploading Firmware	28
7	Maintenance and Troubleshooting	31
8	Drawings	32

1 Specifications

1.1 Inputs

1.1.1 1 PPS Input

Rate:	1 Hz
Amplitude:	2,5V – 10V
Termination:	50 ohm (menu selectable)
Number of Inputs:	2 with auto selection and manual override.

1.1.2 10MHz Input

Frequency:	10 MHz
Amplitude:	0.5 V – 1 Vrms.
Input Impedance:	50 ohm

1.2 Outputs

1.2.1 10MHz Outputs

Frequency	10 MHz
Connector	QMA
Output level	+5dBm to +13dBm (menu adjustable)
Accuracy	$< 5 \times 10^{-12}$ (24 hour average)
Short term stability (Allan variance)	$< 2 \times 10^{-11}$ (1 s)
	$< 4 \times 10^{-11}$ (10 s)
	$< 8 \times 10^{-11}$ (100 s)
Phase noise	< -120 dBc/Hz (10 Hz)
	< -140 dBc/Hz (100 Hz)
	< -150 dBc/Hz (1000 Hz)
Harmonic distortion	< -30 dBc
Output impedance	50 ohm

1.2.2 96 MHz Outputs

Number of outputs:	8
Connector Type:	QMA
Output Protection:	Short circuit proof
Output Level:	+3dBm to +10 dBm (menu adjustable)

1.2.3 1 PPS Outputs

Amplitude	0-5 V logic compatible $V_{OH} > 2.4$ V & $V_{OL} < 0.55$ V
Connector	Output impedance 50 ohm QMA
Pulse width	100 ns to 6.5 ms (menu adjustable)
On time	Rising edge

Status (Input/ Output)

Connector	DB9
-----------	-----



1.3 Network Port

Port type	Ethernet 10/100BaseT
Protocols supported	NTP (RFC 1305), Telnet (RFC 854), FTP (RFC 959), DHCP (RFC 2132), Time (RFC 867), Daytime (RFC 867), and SNMP (RFC 1157)
Connector	RJ-45

1.4 Status Indicators

- Leds

Auto	
Online A or B	
Available A and/ or B	
Online PLL or Reference	
Available PLL and/or reference	
PLL Locked	
Holdover	
Fault (Red)	Indicates monitored parameter is out of range

1.5 Environmental

- Temperature

Unit	Operating 0-50°C Storage -40 to +85°C
------	--

- Humidity

Unit	10-95% non-condensing
------	-----------------------

- Power

85-264 VAC 50/60 Hz < 40 W

1.6 Mechanical

Size (unit)	17" x 1.72" x 9" excluding the connectors and handles. Front panel width 19".
Weight	5 lbs. nominal
Rack mount slides	General Devices P/N C300-S-116 Brandywine P/N 002000105 General Devices P/N C300-S-124 Brandywine P/N 002000123

1.7 Rear Panel Connections

CONNECTOR REFERENCE	CONNECTOR TYPE	CONNECTOR PIN	SIGNAL
J1, J2, J3, J4, J5, J6, J7, J8	QMA	CENTER	10 MHz Outputs
		SHIELD	GND
J9, J10, J11, J12, J13, J14, J15, J16	QMA	CENTER	96 MHz Outputs
		SHIELD	GND
J17, J18, J19, J20, J21, J22, J23, J24	QMA	CENTER	1PPS Outputs
		SHIELD	GND
J25, J26	QMA	CENTER	1PPS Inputs
		SHIELD	GND
J27, J28	QMA	CENTER	10 MHz Reference inputs
		SHIELD	GND
STATUS INPUT/ OUTPUT, J29	DB-9 MALE	1 2 3 4 5 6 7 8 9	STATUS A IN RX TX ALM OUT NC GND ALM OUT NO STATUS B IN GND ALM OUT COMMON
ETHERNET, J30	RJ-45	1 2 3 4 5 6 7 8	TX+ TX- RX+ - - RX- - -
F101	FUSE		
J101 Power		A B C	NEUTRAL GND LINE

Table 1 Connector Pin outs



2 General Description

The FTSU-100D is a high performance signal distribution amplifier designed for use with the Brandywine model PTS Precision Time System.

The FTSU-100D is contained in a compact IU rack-mount chassis. The FTSU accepts two sets of inputs. An input set comprises a 10 MHz reference frequency, a 1PPS signal and status inputs from the reference generator. The FTSU-100D provides automatic changeover should one of the source inputs fail. Manual source select override is available on the front panel. A variety of status indicators are located on the front panel for visual feedback.

The low phase noise frequency outputs are generated from a low phase noise oscillator that is phase-locked to the reference frequency input. In the event of a reference input failure, the phase -locked oscillator will continue to provide referenced frequency outputs with a stability of 3×10^{-9} over temperature.

3 Unpacking and Installation

3.1 Unpacking

Carefully remove the FTSU-100D from the shipping carton. The following items should be included in the shipment:

- 1 FTSU-100D
- 1 power cord
- 1 user guide

Note the power entry module on the rear of the FTSU-100D chassis. Please take note of the voltage displayed on the rear of the power entry module and verify that the voltage matches the local line's voltage.

Insert the provided power cord into the rear of the power entry module and connect the power cord to an AC power outlet.



CAUTION:

THE FTSU-100D WILL BE DAMAGED IF THE INCORRECT AC LINE SETTING IS USED.



WARNING:

REMOVE THE POWER CORD FROM THE FTSU-100D BEFORE
ADJUSTING THE LINE VOLTAGE.

If the AC line setting is incorrect, detach the power cord from the power entry module. Use a small screwdriver to lift up the fuse cover on the power entry module to remove the fuse holder. Reverse the fuse holder and re-insert the fuse holder, making sure that the correct AC line voltage is now displayed on the rear panel.

3.2 Installation

The FTSU-100D may be bolted directly into a 19" rack mount enclosure or mounted by rack mount slides. The FTSU-100D, when fully populated, has up to 30 cables attached to the rear panel, *therefore it is recommended that some appropriate cable strain-relief system be used to support these cables, particularly when not using rack mount slides.*

If the rack mount slides (P/N 002000105) are used they must be attached to the FTSU-100D chassis with 10/32 screws.



CAUTION:

DO NOT USE SECURING SCREWS LONGER THAN 0.5"
BECAUSE THIS MAY RESULT IN INTERNAL DAMAGE TO THE FTSU-100D.

3.3 Connections

3.3.1 Power

Insert the power cord provided in the shipment into the rear power entry module (see 3.1). Connect the input reference signals to the appropriate connectors on the rear panel.



CAUTION:

FOR CORRECT OPERATION, REFERENCE FREQUENCY A AND REFERENCE
FREQUENCY B MUST BE THE SAME FREQUENCY, WHICH IS TYPICALLY 10 MHz.

Connect the output cables to the desired output connectors. Any unused connectors may be left un-terminated.



CAUTION:

DO NOT OVERTIGHTEN THE REAR MOUNT SMA CONNECTORS BECAUSE THIS MAY
RESULT IN DAMAGE TO THE FTSU-100D. THE CORRECT TORQUE TO USE IS 8 OZ-IN

3.3.2 Other Connections

Connect the output signals as required. For additional help connecting the output signals please refer to Section 1.7.



4 Getting Started

4.1 Powering Up the FTSU-100D

Once all connections to the FTSU-100D have been made, apply power to the unit by setting the On/Off switch to the on position. The On/Off switch is located on the front panel.

If an external reference is fitted, verify that the two green LED's for Reference A Available and Reference B Available are illuminated. This indicates that the FTSU-100D has detected the presence of the external references.

Place the Reference Select Switch in the center (AUTO) position. The green Reference A ONLINE LED and the AUTO LED should illuminate. This indicates that the FTSU-100D outputs will be phase-locked to Reference A and if Reference A fails, it will be automatically switched to Reference B.

Place the Source Select Switch in the PLL position. This is the normal mode of operation for the FTSU-100D and this indicates that the reference frequency output distribution amplifiers are fed from the output of the internal Oven Controlled Crystal Oscillator. Verify that the PLL Available LED and the Reference Available LED are illuminated.

Approximately 5 minutes after the power is applied, the PLL Locked LED should illuminate. The Holdover and Fault LEDs should be extinguished. The FTSU-100D is now ready for operation.

4.2 Setting the Network Address

The FTSU-100D is shipped with a label that indicates the IP address stored in the unit. The default settings are:

- IP Address: 192.168.1.160
- Subnet Mask: 255.255.255.0
- Gateway: 0.0.0.0

To set the network address, the user may use either IPSetup.exe or a web browser. The two processes are described below.

4.2.1 IPSetup.exe

To set up the network address using the IP Setup program, follow the steps given below. 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/public_downloads.html.
2. Double click on the IPSetup.exe icon and Figure 1 will be displayed.

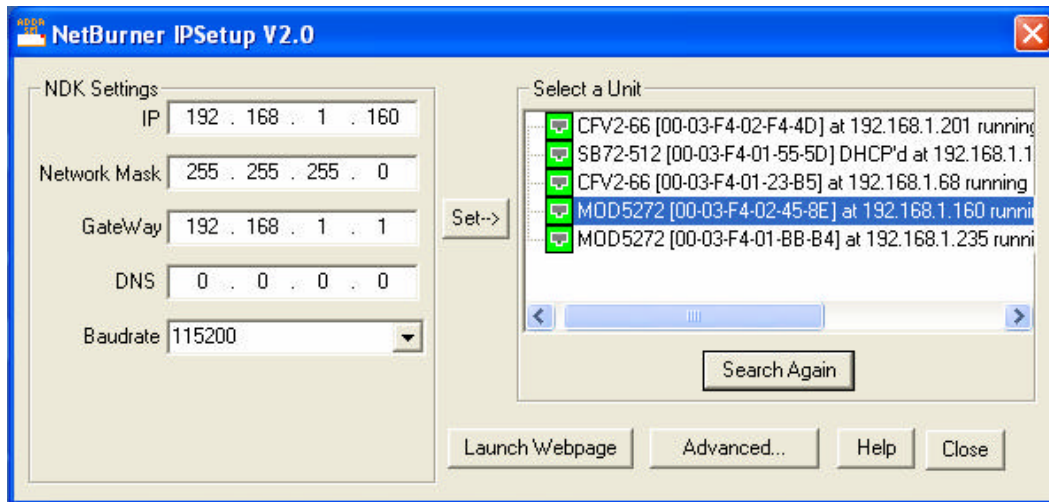


Figure 1 NetBurner IPSetup Screen

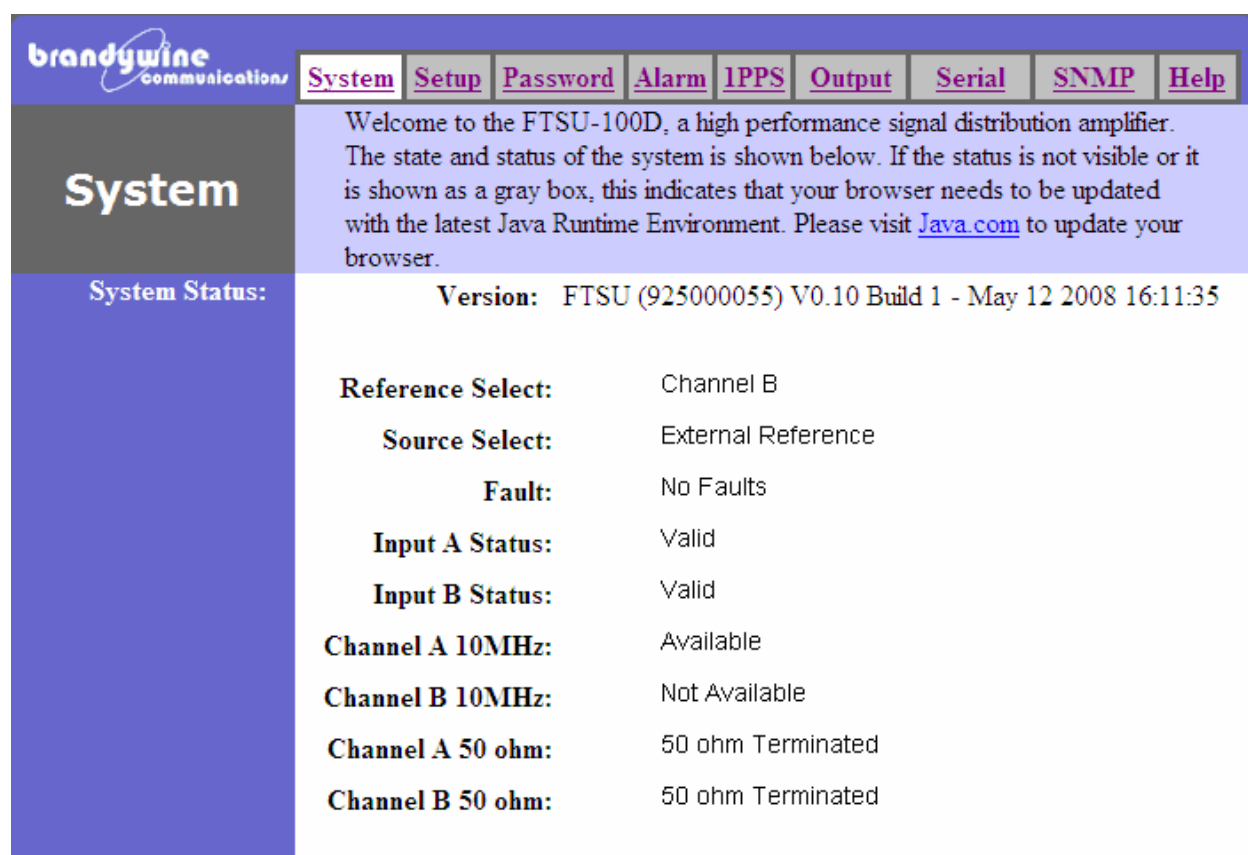
3. Verify that the "Select a Unit" displays the current MAC and IP address of the FTSU-100D unit connected to the network.
4. Click on the FTSU-100D unit that needs to be configured. Note that the FTSU-100D unit is identified by MOD5272.
5. Enter the network settings (IP, Network Mask, GateWay, and DNS).
6. To transfer the settings to the selected FTSU-100D unit, click the **Set-->** button.
7. Wait 15 seconds for the settings to be loaded into the FTSU-100D unit and for the FTSU-100D unit to restart.
8. Verify that the FTSU-100D unit has the correct network settings and is connected to the network by clicking the Search Again button.
9. To exit the IP Setup program, click the Close button.
10. Open a web browser, type the IP Address of the FTSU-100D unit in the Address bar, and press <Enter>. For example, type 192.168.1.160 or <http://192.168.1.160> and press <Enter>.
11. Figure 2 will be displayed.
12. Configure the FTSU-100D unit. For more information on FTSU-100D configuration, refer to the Configuration section of the user guide.
13. If unsure of which device – power off and on again to see which unit is removed from the list and reappears with power on.

IMPORTANT INFORMATION: If the new network settings make the FTSU-100D unit inaccessible from the setup computer, the IP Setup program won't be able to locate the FTSU-100D unit on the network.

4.2.2 Web Browser

To connect to the unit using the web browser, follow the steps given below.

1. Connect one end of an Ethernet cable to the FTSU-100D Network Port.
2. Connect the other end of the Ethernet cable to your network.
3. Open a web browser, type the IP Address of the FTSU-100D unit in the Address bar, and press <Enter>. For example, type 192.168.1.1 or <http://192.168.1.1> and press <Enter>.
4. Figure 2 will be displayed.
5. Configure the FTSU-100D unit. For more information on FTSU-100D configuration, refer to the Configuration section of the user guide.



The screenshot shows the 'System' page of the FTSU-100D web interface. The top navigation bar includes links for System, Setup, Password, Alarm, IPPS, Output, Serial, SNMP, and Help. The main content area displays a welcome message and system status information.

System Status:	
Version:	FTSU (925000055) V0.10 Build 1 - May 12 2008 16:11:35
Reference Select:	Channel B
Source Select:	External Reference
Fault:	No Faults
Input A Status:	Valid
Input B Status:	Valid
Channel A 10MHz:	Available
Channel B 10MHz:	Not Available
Channel A 50 ohm:	50 ohm Terminated
Channel B 50 ohm:	50 ohm Terminated

Figure 2 FTSU-100D System Screen

4.3 Latest Version of Java Software

To properly control and monitor the FTSU-100D via a web browser based interface, Java software must be installed on your computer. To obtain the Java software, follow the steps given below.

1. Go to <http://www.sun.com/>.
2. Click on the Downloads link.
3. Click on the Java Download link.
4. Download Java.
5. Complete the installation process.

Please note that the oldest acceptable Java software version number is 1.4.2_05. To check the Java software version number installed on your computer, follow the steps given below.

1. Go to 'Start'.
2. Go to 'Control Panel'.
3. Go to 'Add or Remove Programs'.
4. Scroll through the 'Currently installed programs' list.
5. Locate the 'J2SE Runtime Environment' program.
6. The version number follows the program's name in step 5.

5 Configuration

The FTSU-100D configuration may be completed in one of three ways.

- Via the web browser (recommended)
- Via a TELNET session
- Via the console port

5.1 Web Browser Configuration

5.1.1 System

The System tab consists of the System Status. This tab allows the user to view the state and status of the FTSU-100D system.

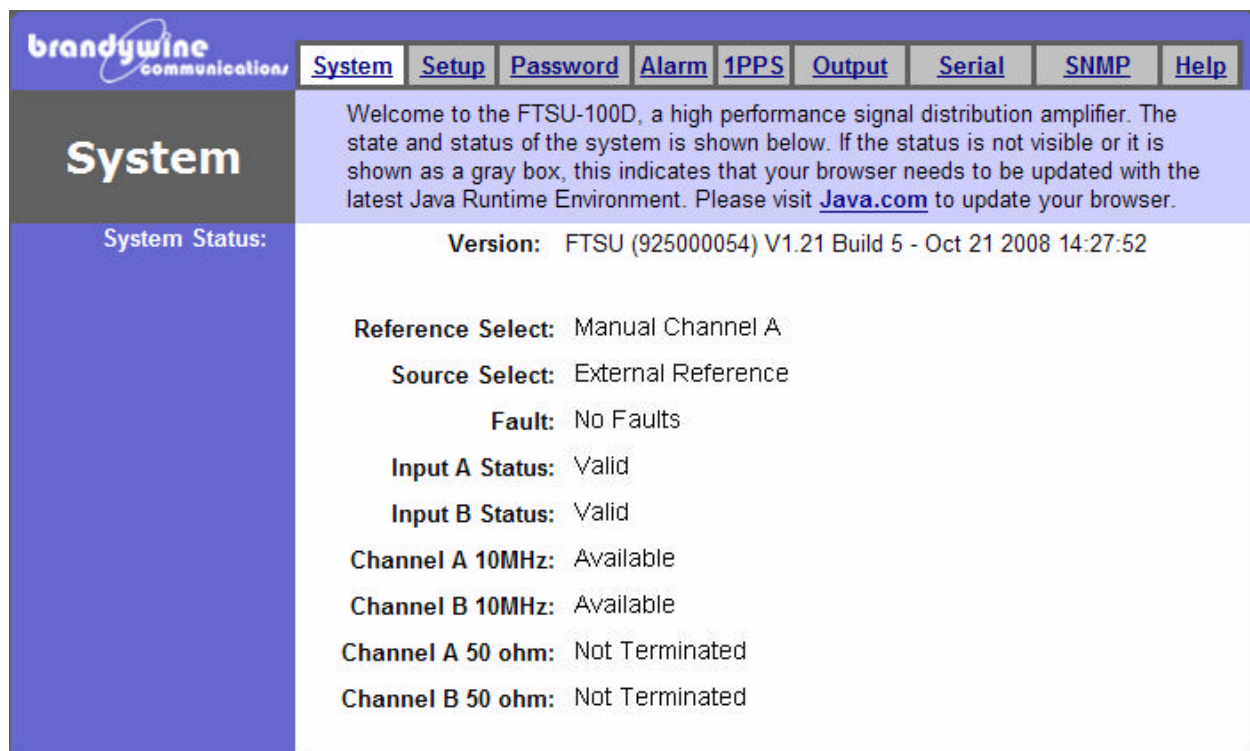


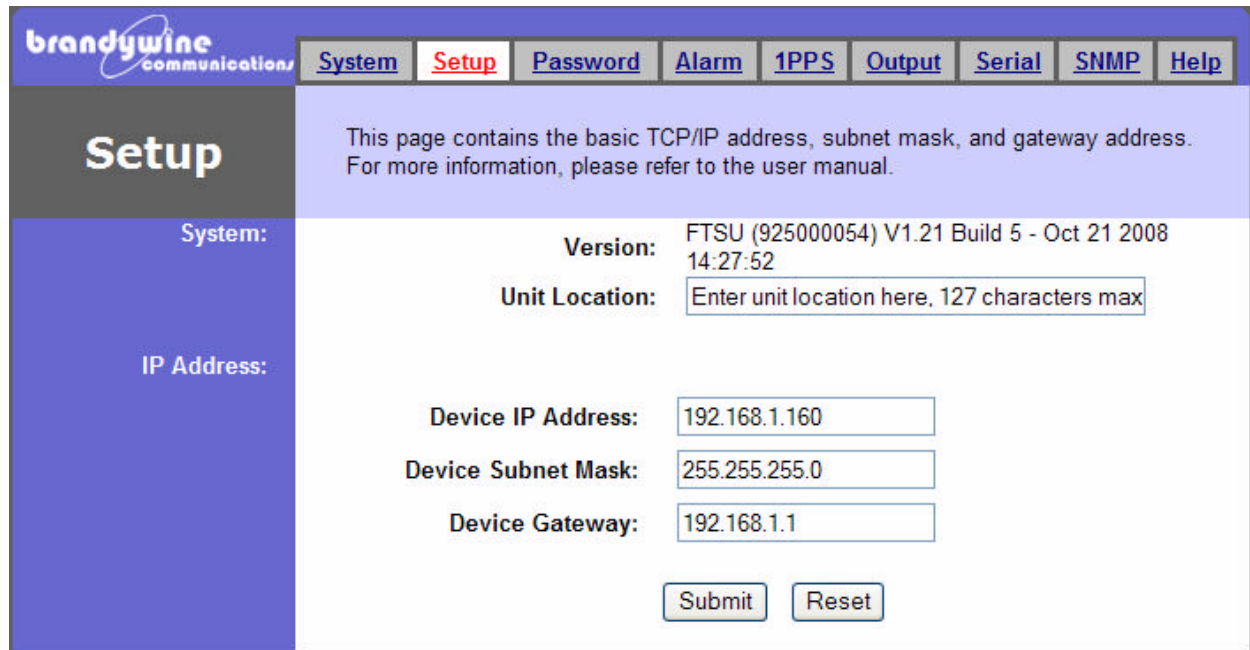
Figure 3 FTSU-100D System Screen

The System Status section consists of ten fields, the Version, Reference Select, Source Select, Fault, Input A Status, Input B Status, Channel A 10MHz, Channel B 10MHz, Channel A 50 ohm and Channel B 50 ohm. The Version refers to the firmware version number of the FTSU-100D.

5.1.2 Setup

The Setup tab consists of two sections, the System and IP Address. This tab allows the user to modify setup information for the FTSU-100D. To save all modifications made to the Setup screen, click the Submit button. This saves all modifications to all changes made to all system parameters and settings. All values changed are written to non-volatile memory.

To undo all modifications made to the Setup screen, click the Reset button. This loads the system defaults.



The screenshot shows the Brandywine Setup screen. At the top is a navigation bar with tabs: System, Setup (highlighted), Password, Alarm, 1PPS, Output, Serial, SNMP, and Help. The main content area has a left sidebar with 'Setup' and two sections: 'System:' and 'IP Address:'. The 'System:' section contains 'Version:' (FTSU (925000054) V1.21 Build 5 - Oct 21 2008 14:27:52) and 'Unit Location:' (a text input field with placeholder 'Enter unit location here, 127 characters max'). The 'IP Address:' section contains 'Device IP Address:' (192.168.1.160), 'Device Subnet Mask:' (255.255.255.0), and 'Device Gateway:' (192.168.1.1). At the bottom right are 'Submit' and 'Reset' buttons.

Figure 4 Setup Screen

5.1.2.1 System

The System section consists of two fields, the Version and Unit Location. The Version refers to the version number of the FTSU-100D software. The Unit Location refers to the location of the unit on your network. A maximum of 127 characters may be entered in the Unit Location field. *Entering apostrophes (') in the Unit Location field is not recommended.*



5.1.2.2 IP Address

The IP Address section consists of three fields, the Device IP Address, Device Subnet Mask, and Device Gateway.

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.

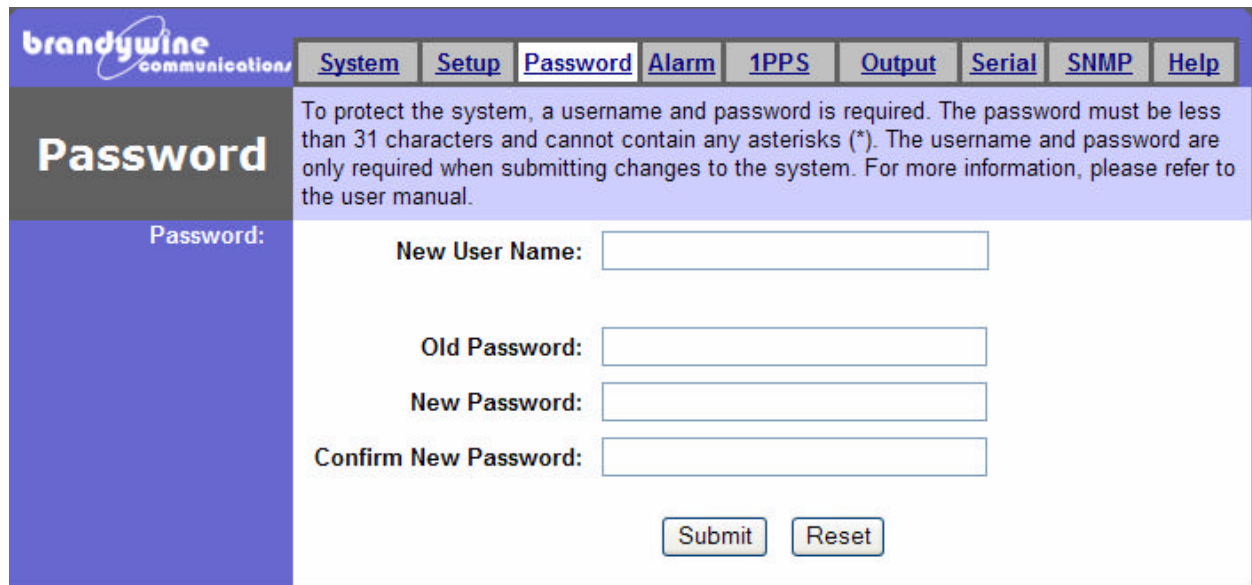
Please note that once the IP address is changed using the web browser, the user must enter the new IP address in the address bar of the web browser to continue monitoring the FTSU-100D. If an IP address is entered that is not reachable from the computer running the web browser, it will not be possible to reconnect to the FTSU-100D via the web browser based interface.

5.1.3 Password

The Password tab allows the user 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:

The default user name and password for the system is BRANDYWINE. The user must always enter a user name and password when submitting changes to the system.



The screenshot shows the Brandywine communications web interface. At the top is a navigation bar with tabs: System, Setup, Password (selected), Alarm, 1PPS, Output, Serial, SNMP, and Help. Below the navigation bar is a header section with the Brandywine logo and the title "Password". A message box states: "To protect the system, a username and password is required. The password must be less than 31 characters and cannot contain any asterisks (*). The username and password are only required when submitting changes to the system. For more information, please refer to the user manual." Below this message are four input fields: "New User Name:", "Old Password:", "New Password:", and "Confirm New Password:". At the bottom right are two buttons: "Submit" and "Reset".

Figure 5 Password Screen

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. The user name and password are case sensitive.

5.1.4 Alarm

The Alarm tab consists of the Index and the Fault Detected sections.

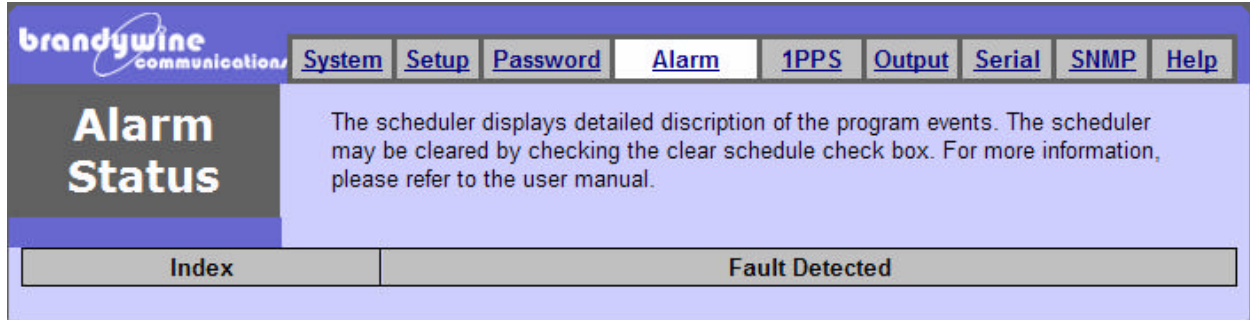
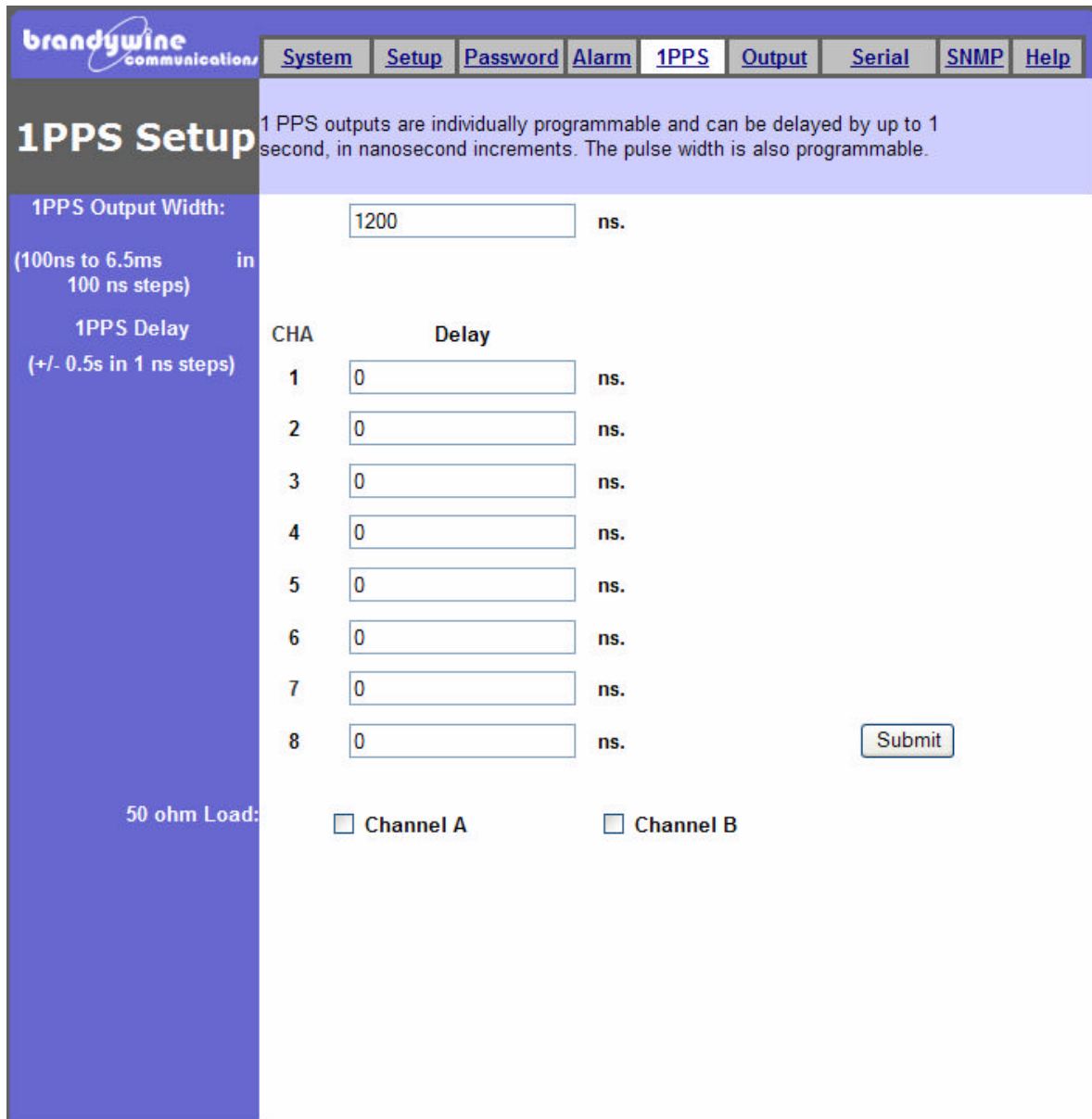


Figure 6 Alarm Screen

5.1.5 1 PPS

The 1 PPS tab consists of three sections, the 1PPS Output Width, 1PPS Delay and 50 ohm Load.



The screenshot shows the '1PPS Setup' web interface. At the top is a navigation bar with tabs: System, Setup, Password, Alarm, 1PPS (selected), Output, Serial, SNMP, and Help. Below the navigation bar is a header section with the 'brandywine communications' logo and the title '1PPS Setup'. A descriptive text box states: '1 PPS outputs are individually programmable and can be delayed by up to 1 second, in nanosecond increments. The pulse width is also programmable.'

The main content area is divided into three sections:

- 1PPS Output Width:** A text input field contains '1200' and is followed by 'ns.'. To the left of the input field, there is a label '(100ns to 6.5ms in 100 ns steps)'.
- 1PPS Delay:** A table with 8 rows, each representing a channel (CHA 1 to 8). Each row has a 'Delay' input field containing '0' and is followed by 'ns.'. To the left of the table, there is a label '(+/- 0.5s in 1 ns steps)'.
- 50 ohm Load:** Two checkboxes labeled 'Channel A' and 'Channel B' are present.

A 'Submit' button is located at the bottom right of the form.

Figure 7 1PPS

5.1.5.1 1 PPS Output Width

The 1 PPS output pulse width can be set by entering the value directly into the box. The range of acceptable values is 100 ns to 6 500 000 ns.

5.1.5.2 1 PPS Delay

Each 1 PPS output can be delayed or advanced by as much as $\frac{1}{2}$ a second. To delay an output, enter " - " followed by the delay value in nanoseconds. A delay value of 327 nanoseconds would be entered as " -327 ".

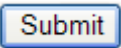
Likewise to advance a 1PPS output signal, enter a positive value in the appropriate box. To advance a 1PPS signal by 85 nanoseconds a value of " 85 " should be entered. Note that no " + " is required.

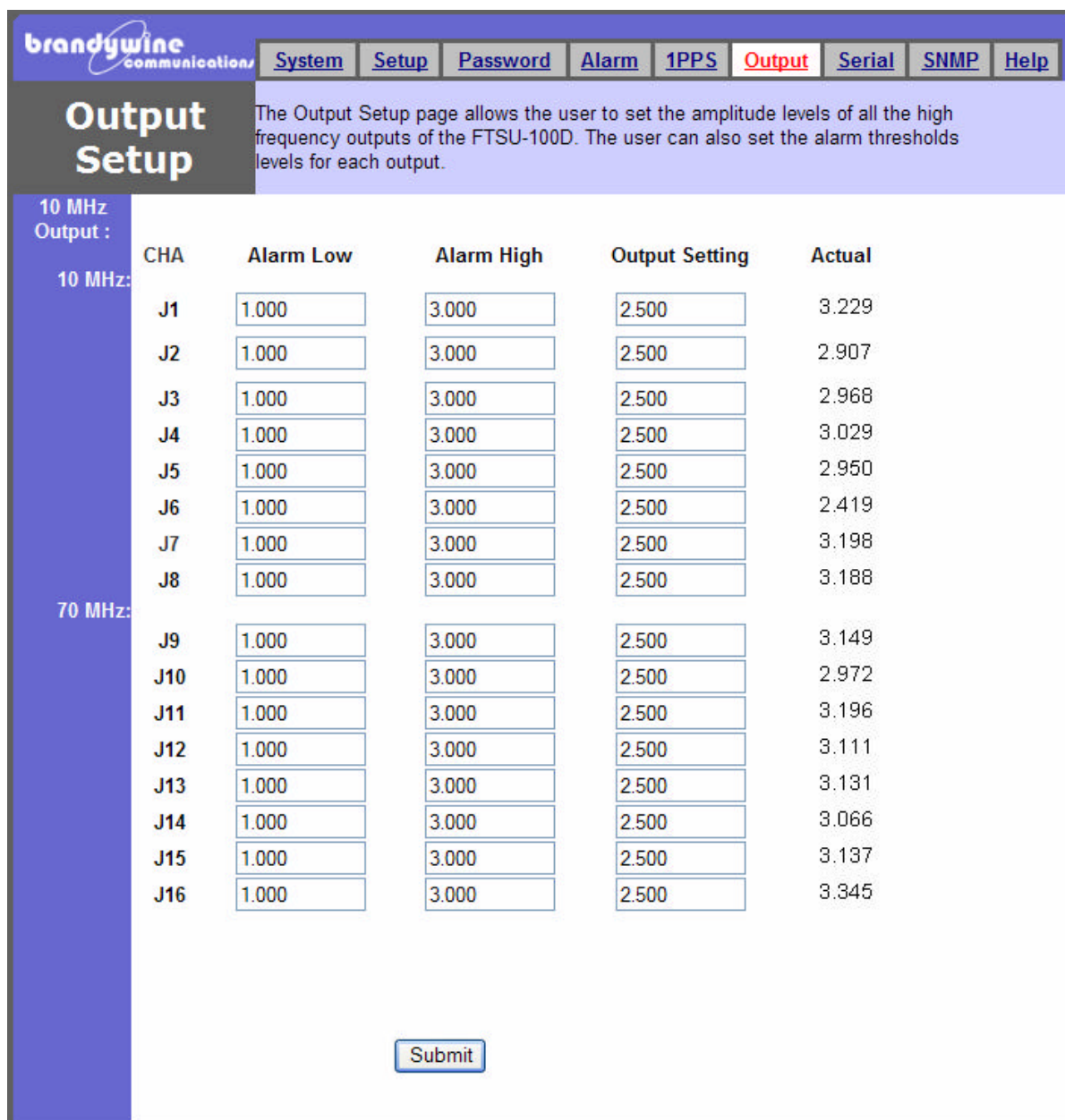
5.1.5.3 50 Ohm load

It is strongly suggested that the 1PPS input signals are terminated with 50Ω loads. Clicking on either the channel A or channel B checkbox will enable or disable the 50Ω termination. A check mark in the box indicates that the input signal is terminated.

All changes or entries will only take effect after the  button has been clicked.

5.1.6 Output

The Output tab consists of the Output Setup for the 10MHz and 70MHz outputs. To save all modifications made to each output, click the  button.



CHA	Alarm Low	Alarm High	Output Setting	Actual
J1	1.000	3.000	2.500	3.229
J2	1.000	3.000	2.500	2.907
J3	1.000	3.000	2.500	2.968
J4	1.000	3.000	2.500	3.029
J5	1.000	3.000	2.500	2.950
J6	1.000	3.000	2.500	2.419
J7	1.000	3.000	2.500	3.198
J8	1.000	3.000	2.500	3.188
J9	1.000	3.000	2.500	3.149
J10	1.000	3.000	2.500	2.972
J11	1.000	3.000	2.500	3.196
J12	1.000	3.000	2.500	3.111
J13	1.000	3.000	2.500	3.131
J14	1.000	3.000	2.500	3.066
J15	1.000	3.000	2.500	3.137
J16	1.000	3.000	2.500	3.345

Figure 8 Output

Each high frequency output has three adjustable settings, and displays the actual output amplitude of that signal.

The third box, labeled " Output Setting ", allows the user to adjust the signal output amplitude. The effective range is 0 to 3,000 Volts. The " Actual " column displays the actual value of the output signal. Note that output signal loading and termination will affect the actual readings.

The first and second entry boxes allow the user to set low and high alarm thresholds to each output signal. If these values are exceeded, an alarm will result.

5.1.7 Serial

The Serial Settings tab sets the Serial Port Configuration. This includes the Baud Rate, Data Bits, Parity and Stop.

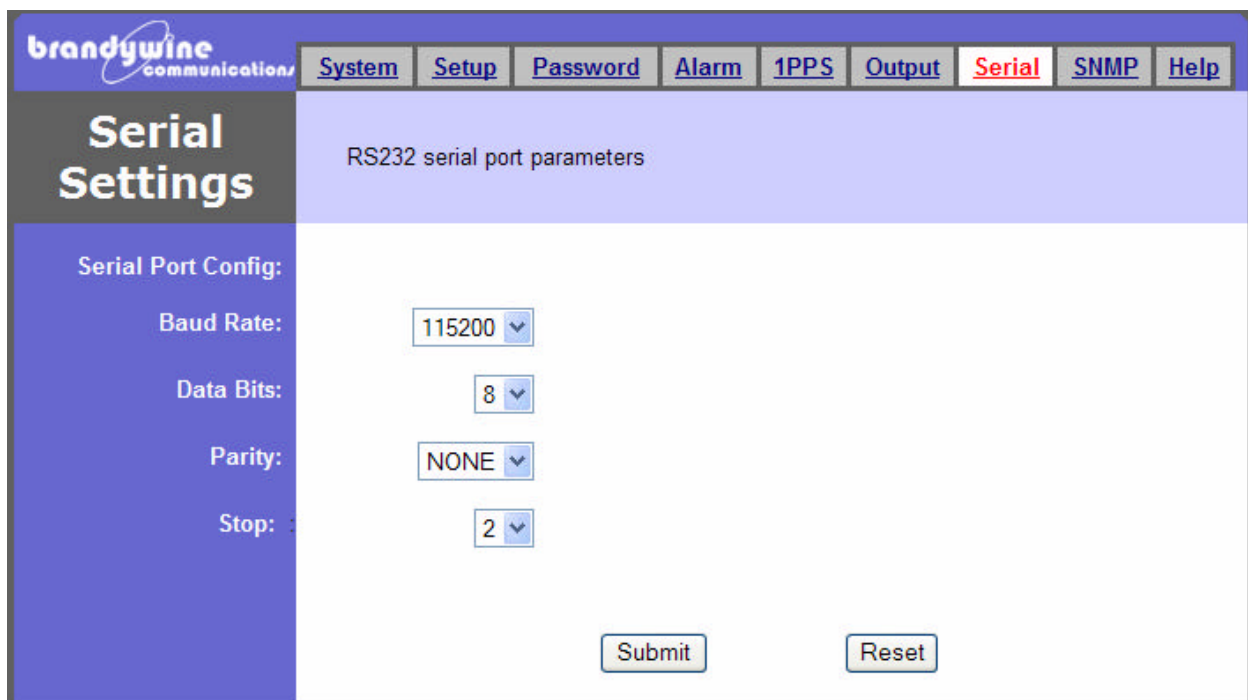


Figure 9 Serial

5.1.7.1 Serial Port Config

The serial port baud rate, number of data and stop bits and the parity can be adjusted here. The default values are:

Baud Rate: 115,200;

Data bits: 8;

Parity: NONE;

Stop bits : 1.

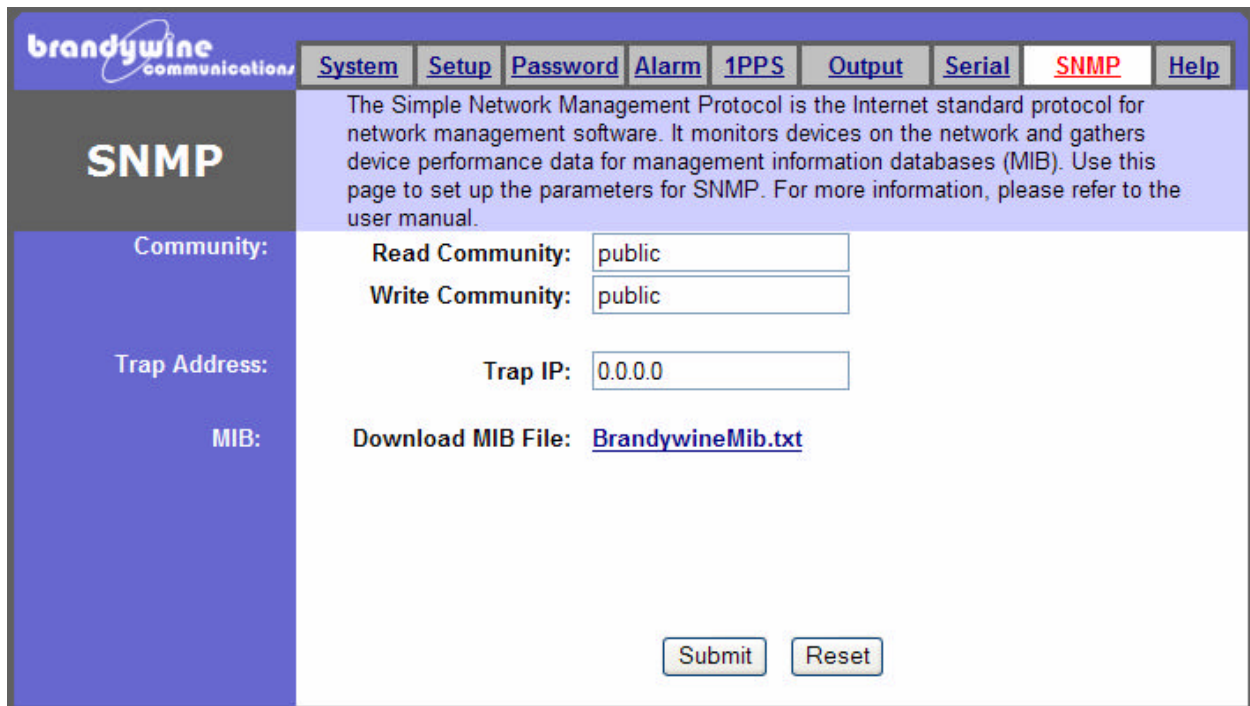
The serial port can be used to view the device network settings during startup.

5.1.8 SNMP

The Simple Network Management Protocol (SNMP) is a protocol used to expose variables to a Network Management System (NMS). The variables are arranged in a Management Information Base (MIB). The Brandywine Communications FTSU-100D SNMP version 1 includes MIB-II and the capabilities listed below.

- FTSU-100D status monitoring via SNMP
- FTSU-100D control via SNMP

Figure 10 is displayed when the SNMP sub-tab is selected. The SNMP consists of three sections, the Community, Trap Address, and MIB. This sub-tab allows the user to modify the read community, write community, and trap IP address and download the MIB file used. To save all modifications made to the SNMP screen, click the Submit button. To undo all modifications made to the SNMP screen, click the Reset button.



brandywine communications

[System](#) [Setup](#) [Password](#) [Alarm](#) [1PPS](#) [Output](#) [Serial](#) **[SNMP](#)** [Help](#)

SNMP

The Simple Network Management Protocol is the Internet standard protocol for network management software. It monitors devices on the network and gathers device performance data for management information databases (MIB). Use this page to set up the parameters for SNMP. For more information, please refer to the user manual.

Community:

Read Community:

Write Community:

Trap Address:

Trap IP:

MIB:

Download MIB File: [BrandywineMib.txt](#)

Figure 10 SNMP Screen

5.1.8.1.1 Community

The Community consists of two fields, the Read Community and Write Community. The Community allows the user to enter the read community and write community names. Once the community names are entered, they are stored in non-volatile memory and will be recalled when the FTSU-100D is powered up. Table 2 describes the read/write commands used by SNMP.

COMMAND	DESCRIPTION
Read	Used by NMS to monitor devices.
Write	Used by NMS to control devices.

Table 2 SNMP R/W Commands

5.1.8.1.2 Trap Address

The Trap Address consists of one field, the Trap IP. The Trap Address allows the user to enter the IP address of the trap. Once the trap address is entered, it is stored in non-volatile memory and will be recalled when the FTSU-100D is powered up. Table 3 describes the trap command used by SNMP.

COMMAND	DESCRIPTION
Trap	Used by devices to report events to NMS.

Table 3 SNMP Trap Command

5.1.8.1.3 MIB

The MIB consists of one field, the Download MIB File. The Download MIB File allows the user to download and view the MIB file used by the FTSU-100D system.

5.1.8.1.4 Status Monitoring via SNMP

The FTSU-100D status should not be requested more often than every 10 seconds. After the FTSU-100D is powered up, the statuses will be invalid for approximately 1 minute (zeroes will be returned).

5.1.9 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. Various topics are discussed in the Help screen.

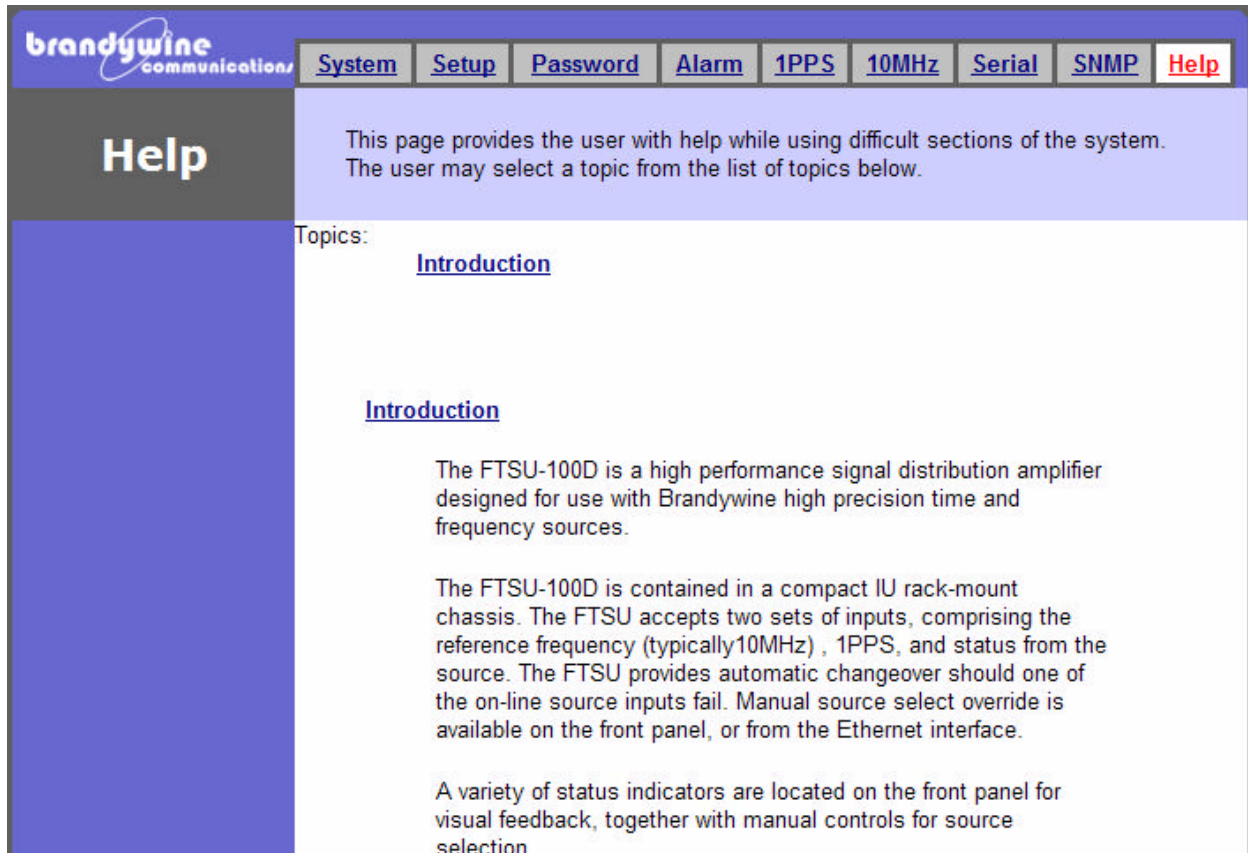


Figure 11 Help Screen

6 Uploading Firmware

To upload new firmware for the FTSU-100D, the user will need a software application such as AutoUpdate, the IP address of the FTSU-100D, and the file name of the new released file. Follow the steps listed below to upload new firmware for the FTSU-100D. Please note that AutoUpdate uses unicast on UDP port 20034.

Download the AutoUpdate program from the NetBurner website located at http://www.netburner.com/support/public_downloads.html.

1. Double click on the AutoUpdate icon and Figure 12 will be displayed.

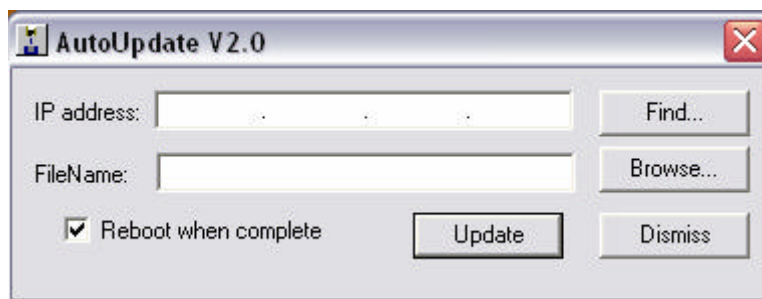


Figure 12 AutoUpdate Screen

2. Enter the IP address of the FTSU-100D in the IP address field. If the user does not know the IP address, press the Find button and Figure 13 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.

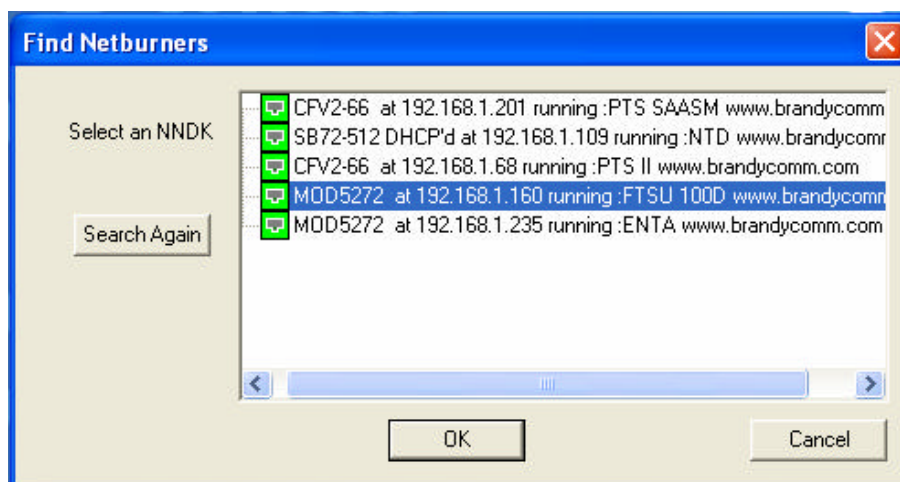


Figure 13 Find NetBurners Screen

3. Enter the path name to the new released file. If the user does not know the path name, press the Browse button and Figure 14 will be displayed. Locate and click on the file and click the Open button. The File Name field will be completed for you.

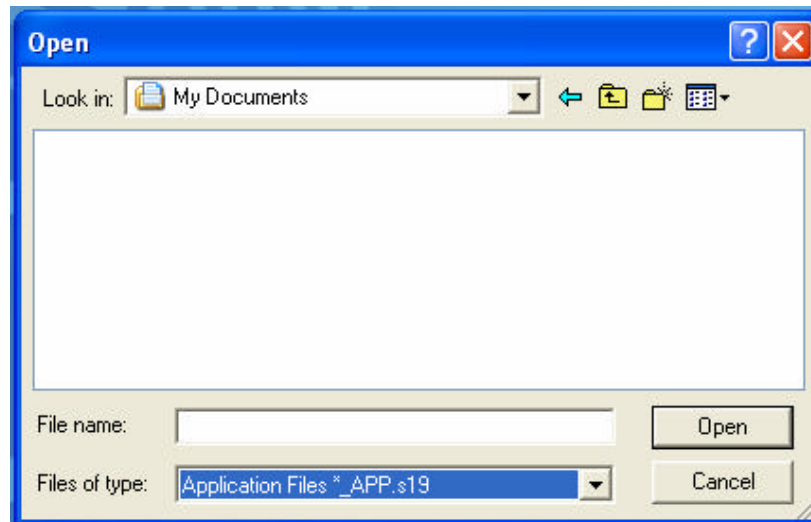


Figure 14 Open Screen

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 Figure 15 will be displayed for a few seconds.

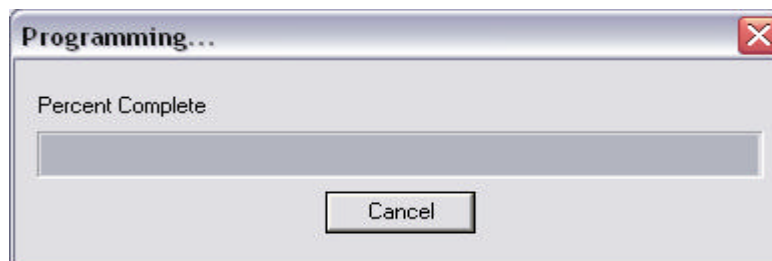


Figure 15 Programming Screen

7. After Figure 15 automatically closes, Figure 16 will be displayed. Click the OK button and now the uploading firmware process is completed.

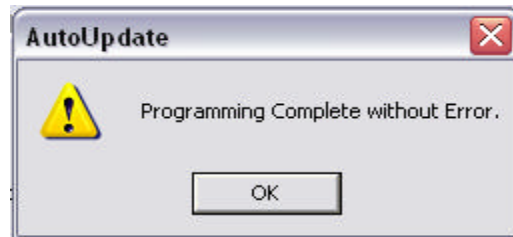


Figure 16 AutoUpdate Complete Screen

7 Maintenance and Troubleshooting

There is no required preventive maintenance for the FTSU-100D. To troubleshoot the problems, refer to Table 4.

SYMPTOM	POTENTIAL CAUSE	CORRECTIVE ACTION
No LEDs illuminate on front panel	<ol style="list-style-type: none"> 1. There is no power. 2. There is a blown fuse. 3. There is a FTSU-100D power supply failure. 	<ol style="list-style-type: none"> 1. Verify that the AC power is available. 2. Replace the fuse. 3. Return unit to the factory.
Fault LED is illuminated	<ol style="list-style-type: none"> 1. One of the output signals is outside its allowable threshold values. 2. One or both of the input signal sets are faulty. 3. PLL is not locked. 	<ol style="list-style-type: none"> 1. Check alarm screen to verify cause of fault. 2. Check alarm screen to verify cause of fault. 3. Input signal is missing or out of range. Switch to other input or " auto ".
Holdover LED is illuminated	<ol style="list-style-type: none"> 1. Both input signals are missing. 2. One input signal set is faulty and is selected. 	<ol style="list-style-type: none"> 1. Connect at least one good set of input signals and ensure selector is set to good set or " auto ". 2. Select other input set, or select " auto ".
No signal outputs	<ol style="list-style-type: none"> 1. There is an internal failure. 	<ol style="list-style-type: none"> 1. Return unit to the factory.

Table 4 Troubleshooting FTSU-100D Problems

8 Drawings

FIGURE		DESCRIPTION
1		FTSU-100D Front Panel
2		FTSU-100D Rear Panel

Table 21 FTSU-100D Drawings

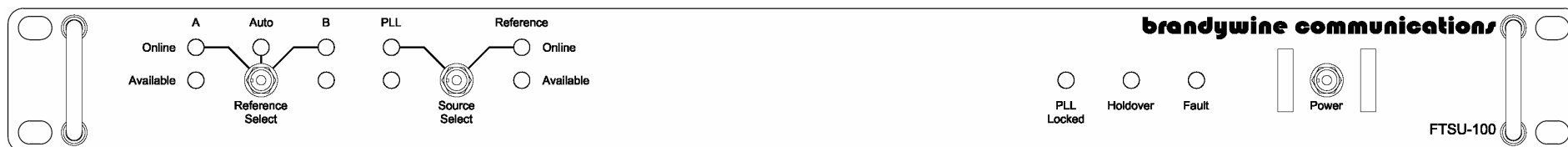


Figure 1 FTSU-100D Front Panel

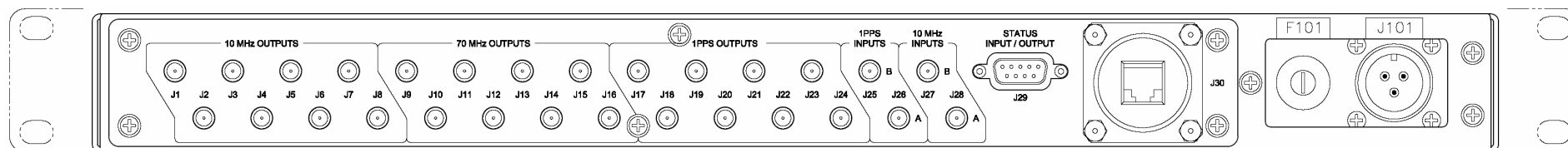


Figure 2 FTSU-100D Rear Panel