



Broadcast Electronics

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## XPi 10esp Exporter Operation Manual

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## **XPi 10esp Exporter**

### **Operation Manual**

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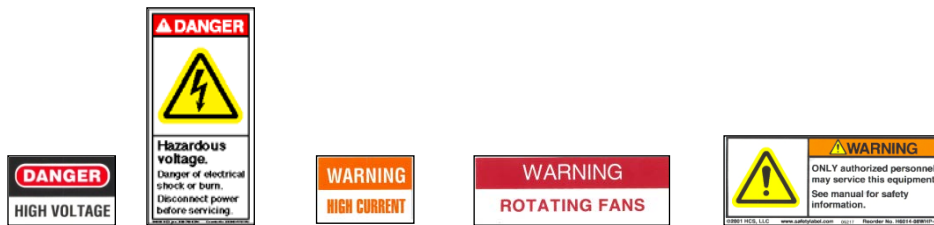




## SAFETY PRECAUTIONS

### PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES, POWER TRANSISTORS, OR EQUIPMENT WHICH UTILIZES SUCH DEVICES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. EXERCISE EXTREME CARE AROUND SUCH PRODUCTS. UNINFORMED OR CARELESS OPERATION OF THESE DEVICES CAN RESULT IN POOR PERFORMANCE, DAMAGE TO THE DEVICE OR PROPERTY, SERIOUS BODILY INJURY, AND POSSIBLY DEATH.



### DANGEROUS HAZARDS EXIST IN THE OPERATION OF POWER TUBES AND POWER TRANSISTORS

The operation of power tubes and power transistors involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

- A. HIGH VOLTAGE** - Normal operating voltages can be deadly. Additional information follows.
- B. RF RADIATION** - Exposure to RF radiation may cause serious bodily injury possibly resulting in Blindness or death. Cardiac pacemakers may be affected. Additional information follows.
- C. HOT SURFACES** - Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.
- D. RF BURNS** - Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

## HIGH VOLTAGE

Many power circuits operate at voltages high enough to kill through electrocution. Personnel should always break the primary AC Power when accessing the inside of the transmitter.

## RADIO FREQUENCY RADIATION

Exposure of personnel to RF radiation should be minimized, personnel should not be permitted in the vicinity of open energized RF generating circuits, or RF transmission systems (waveguides, cables, connectors, etc.), or energized antennas. It is generally accepted that exposure to “high levels” of radiation can result in severe bodily injury including blindness. Cardiac pacemakers may be affected.

The effect of prolonged exposure to “low level” RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm<sup>2</sup> per one tenth hour average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard protection guide for employee work environments. An even stricter standard is recommended by the American National Standards Institute which recommends a 1.0 mW/cm<sup>2</sup> per one tenth hour average level exposure between 30 Hz and 300 MHz as the standard employee protection guide (ANSI C95.1-1982).

RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leak proof. Never operate a power tube without a properly matched RF energy absorbing load attached. Never look into or expose any part of the body to an antenna or open RF generating tube or circuit or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

## HOT SURFACES

The power components in the transmitter are cooled by forced-air and natural convection. When handling any components of the transmitter after it has been in operation, caution must always be taken to ensure that the component is cool enough to handle without injury.





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# 1 Installation and HD Radio™ System Architecture Overview

Broadcast Electronics Inc.'s XPi 10esp Exporter and FXi 60/250 Exciter (w/Engine card) together enable the next Generation of HD Radio™ System Architecture. For detailed instructions regarding the hardware installation of the XPi 10esp Exporter please see "XPi 10esp Exporter Quick Installation Guide, 597-0542-XM4". This document is typically included in a binder with this guide in the shipment from B.E. but may also be accessed on the B.E. website using the link here:

<http://www.bdcast.com/information-center/manuals/>

The Remote Graphical User Interface Java Application "XPi.jar" and the latest versions of embedded software are included in the USB drive that is shipped with the XPi10esp package. This software can also be downloaded from the B.E. website at the link here:

<http://www.bdcast.com/information-center/product-information>

The main function of the XPi 10esp Exporter is to receive audio and data from the IDi 20 Data Importer and/or other audio processing equipment, then compress this audio and data for delivery via Ethernet to the Engine card in the FXi 60/250 Exciter. The Engine card receives the compressed Ethernet audio and data and creates OFDM data carriers for HD Radio™. FM signals are then added to the OFDM carriers by the Exciter for reception by HD Radio™ receivers.

Figure 1 below shows the most common installation. Other configurations are possible and details/requirements can be found in the Install Guide.

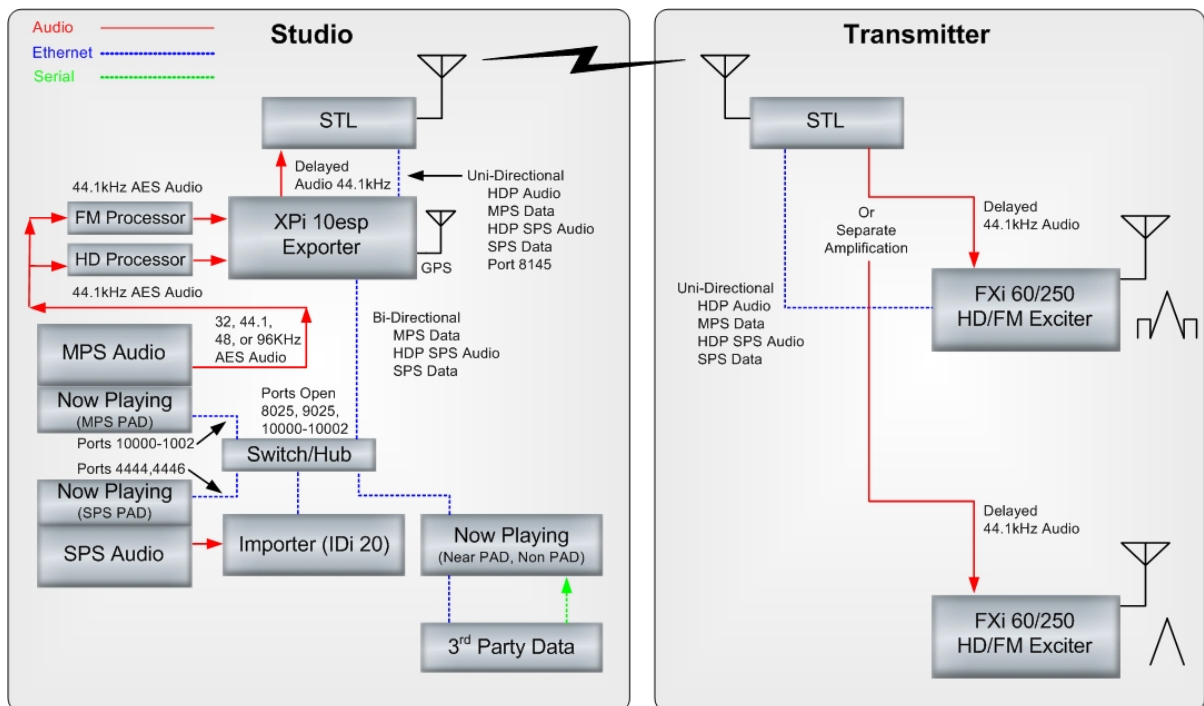


Figure 1 - HD Radio™ System Architecture (Typical Installation)

## 2 Default XPi 10esp Factory Settings

The XPi 10esp has factory default settings. If settings become irreversibly corrupted to the point that the system no longer functions, the system settings must be restored to factory defaults, see section 6.6 for the necessary procedure.

- Remote GUI Ethernet Module
  - IP Address – 10.2.1.94
  - Subnet Mask – 255.255.0.0
  - Gateway Address – 0.0.0.0
- Data Ethernet Module
  - IP Address – 10.2.1.95
  - Subnet Mask – 255.255.0.0
  - Gateway Address – 0.0.0.0
- Engine Target Ethernet Module
  - IP Address – 10.2.1.53
  - MAC Address – 0.0.0.0.0.0
- Password
  - Password – “password” (lower case)
  - Password protection - disabled
- Primary Carrier Configuration - FM Hybrid (MP1-MP11)
- Diversity Delay – 319488 Samples (7.245 s)
- Delay Ramp Rate – insert/remove 1 Sample every 100 Samples
- Audio Bypass – Disabled
- Blend Mode – Enable Audio Blend
- Program Type – 001 News
- Surround Sound – 000 NONE
- Channel Modes – None/Automatic
- Aux Audio Input – Unused/Silence Backup
- Audio Monitor Mode – Main/bypass AES Audio Input
- Headphone Input – Main/bypass AES Audio Input
- Headphone Volume Level – %0
- Silence Sense for channels Main/bypass Input, HD AES Audio Input, HD AES Audio Output, and Delayed FM AES Audio Output
  - Threshold - -20 dBFS
  - Time – 45 Seconds
- FCC ID – 1
- Country Code – US
- Call Sign Standard – HD
- Call Sign Standard Append - True
- Call Sign Universal – HDradio.com
- Call Sign Universal Encoding – Latin-1
- Call Sign Universal Append – True
- Station Slogan Standard – BE HD Radio...bdcast.com
- Station Slogan Universal - BE HD - Hardcore Radio
- Station Slogan Universal Encoding – Latin-1
- Station Message - The Radio Experience...bdcast.com
- Station Message Encoding – Latin-1
- Station Message High Priority – False
- Station Slogan Standard Use Standard as Universal - False



### 3 Specifications

**Table 1 – Hardware Specifications**

<b>Parameter</b>	<b>Specification</b>
<b>Physical</b>	
Height	2RU (3.5", 8.89 cm)
Width	19" (48.3 cm)
Depth	12" (30.48 cm)
Weight	9 lbs (4.1 kg)
Air Outlet Size	5 in2 (32.3 cm2)
<b>Environmental</b>	
Temperature	-10°C to +50°C
Altitude	10,000ft (3048M)
Humidity	95% max., non-condensing
Peak Power Use	60 W
Airflow	23 CFM (0.66 m3/Min)
<b>AC Input</b>	
Voltage	90 to 264 VAC, Single Phase
Frequency	47-63 Hz
Surge Protection	None: outside surge protection required
<b>GPS Antenna Input</b>	
Connector	TNC Female
Impedance	70 Ohms
<b>AUX Input</b>	
Connector	BNC Female
<b>10 MHz Input</b>	
Connector	BNC Female
Impedance	50 Ohms
<b>Ethernet</b>	
Connectors	RJ45 Female
<b>Audio Align Inputs</b>	
Connectors	RCA Female
Impedance	600 Ohms
Level	Variable via potentiometers
<b>Word Clock Output</b>	
Connector	BNC Female.
Impedance	50 Ohms
Frequency	44.1 kHz Square
Level	3.3V p-p
<b>10 MHz Output</b>	
Connector	BNC Female
Impedance	50 Ohms
Level	1 Vpp into 50 ohms

<b>Headphone Output</b>	
Connector	1/8" Headphone
Impedance	8-32
<b>Serial Port</b>	
Connector	Female 9-Pin D-Sub
Baud Rate	115.2 kHz
Data Bits	8
Stop Bits	1
Parity	None
<b>Audio Input (qty 3)</b>	
Connector	XLR Female
Impedance	110 Ohms
Sample Rates	32kHz, 44.1kHz, 48kHz, or 96kHz
Level	-36 to 0 dBFS
<b>Audio Output (qty 4)</b>	
Connector	XLR Male
Impedance	110 Ohms
Sample Rates	44.1 kHz (or same as input)
Level	-36 to 0 dBFS
<b>Remote Inputs (qty 2x8-pin)</b>	
Number Of Inputs	11
Level	Active Low
Operation	Momentary
Connector	Screw Terminal Type
<b>Remote Outputs (qty 3x8-pin)</b>	
Number Of Outputs	17.
Level	Active Low
Operation	Momentary or Latching
Connector	Screw Terminal Type



## 4 Operation

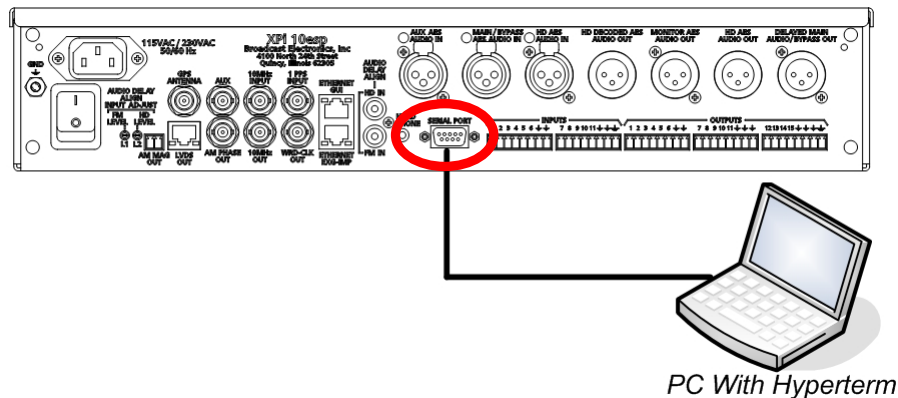
The following text presents XPI 10esp operation procedures. If the feature operation requires Login to the Remote Graphical User Interface (GUI), please refer to Sections 5.1 through 5.3 before attempting to use the program. When instructed to load a specific Remote GUI screen, the navigation tree in Section 5.2 can be used to easily find the appropriate navigation route.

Note: Before using the Serial Command Line interface for programming, you must connect the XPI 10esp to an active network via an Ethernet cable. It needs to be connected to the Ethernet EXG-IMP port. If this is not done, programming will be difficult and hyper-terminal will continually give a port error message.

### 4.1 Serial Command Line Interface

The command line user interface must be utilized to change the Remote GUI IP settings as well as various Remote GUI password-related settings. See sections 4.2 and 4.3 after accessing the Command-line User Interface (CUI) using the procedures in this section. The Data port can be configured through the command line, or by using the Remote GUI itself, see section 4.4.

1. Connect a PC with the HyperTerminal program (or equivalent RS232 serial command line program) to the XPI 10esp SERIAL PORT using a serial cable.



**Figure 2 – XPI 10esp and PC Serial Connections**

2. Set connection to:
  - a. Baud Rate – 115200
  - b. Data Bits – 8
  - c. Stop Bits – 1
  - d. Parity – No
 If desired, enable local echo in order to emulate sent characters.

```

FFCRLF
Broadcast Electronics Inc.                                U. 1.0CRLF
+=====+CRLF
+   Embedded Exporter Command Line Terminal   +CRLF
+=====+CRLF
For usage, type 'help'.CRLF
LFCRLF
-->CRLF
LFCRLF
Type:[COMMAND] LFCRLF
LFCRLF
COMMANDS: help          displays available commandsCRLF
            ipconfig0 -h  EXG-IMP, BOTTOM PORTCRLF
            ipconfig1 -h  GUI-Port, TOP PORTCRLF
            setpw <new pw> Set remote passwordCRLF
            getpw         Get remote passwordCRLF
            reqpw <n>     Require PW <n> 0: false, <n> 1: trueCRLF
            reqpw?        Password Required statusCRLF
                        CRLF
-->

```

**Figure 3 – Serial Communications Screen**

- Once a connection is established, return to verify a live command prompt. Basic troubleshooting includes checking the cable connection, verifying the correct PC com port is open and selected, and matching the Baud Rate and other connection settings.

**Table 2 – Command Line User Interface Commands**

Command	Notes
help	Displays all valid commands, see Figure 3
ipconfig0	Data Port IP Settings
ipconfig1	Remote GUI Port IP Settings
setpw	Sets the Remote GUI password
getpw	Displays the Remote GUI password
reqpw	Turns Remote GUI password protection on or off
reqpw?	Displays whether password protection is on or off

## 4.2 Remote GUI Password Protection

The XPi10esp is shipped defaulted with password protection disabled (when logging into the Remote GUI, a connection is made regardless of what has been entered in the PASSWORD field). Remote GUI communications are not encrypted, thus any modification of passwords or enabling/disabling of password protection must be done through the command line.

See section 4.1 for required steps to connect to and use the command line interface. Relevant commands are “setpw”, “getpw”, “reqpw”, and “reqpw?” Proper usage instructions are included in the help prompt, see Figure 3.

## 4.3 Remote GUI Port IP Settings

See section 4.1 for required steps to connect to and use the command line interface. If necessary, type the command with –h as suggested by ‘help’ to view a list of sub-commands.

- Enter the appropriate command and the new IP information after the command (separated by a single space) and return.
- Restart the Exporter for these settings to take effect.





#### 4.4 Data Port IP Settings

1. Login to the Remote GUI and navigate to the IP Setup Screen. See Section 5.14.
2. In the EXPORTER IP MODULE panel, enter the desired IP information in the three editable entry fields.
3. Click the SAVE button when finished and any modified fields are saved to the Exporter.
4. Restart the Exporter for these settings to take effect.

#### 4.5 Exgine Port IP Settings

The physical port for Exgine data is the same Ethernet jack used by the Data server, the top port. Exgine target settings control where the Exgine's data is directed. Currently, Uni-directional IP messages are the only type of connection supported. This ensures compatibility with all broadcast system configurations. Requirements for target Exgine MAC settings and usage depend on network configuration. Please contact your network administrator with any Ethernet network related concerns.

1. Login to the Remote GUI and navigate to the IP Setup Screen. See Section 5.14.
2. In the EXGINE TARGET panel, use the keyboard and mouse to enter the I.P. address in the IP ADDRESS entry box.
3. In the EXGINE TARGET window, use the keyboard and mouse to enter the MAC address in the MAC ADDRESS entry box. For broadcast mode, enter "FF:FF:FF:FF:FF:FF" in this field.
4. If network configuration allows/requires MAC ARP for UDP messages, uncheck the "ENABLE UDP MAC CONTROL". Otherwise, the MAC ADDRESS setting is used without attempting to resolve the MAC address of the UPD target. This setting is saved on change.
5. Click the SAVE button when finished.

#### 4.6 Set Audio Input Phase

1. Login to the Remote GUI and navigate to the Audio Setup Menu. See Section 5.5.
2. Feed audio to the MAIN/BYPASS AES AUDIO IN. The meter should indicate peak holds from -4 to 0 dBFS. If level adjustment is required, adjust the audio processor (not part of the XPi10esp sub-system).
3. If the MAIN/BYPASS AES AUDIO IN phase needs to be inverted, use the mouse to check the MAIN/BYPASS AES AUDIO IN INVERT PHASE checkbox.
4. Repeat the procedure for the HD AES AUDIO IN and AUX AES AUDIO IN invert phase checkboxes if necessary.

#### 4.7 Setting the Delay Ramp Rate

The DELAY RAMP RATE determines how fast the delay changes. A larger rate control makes a slower ramp process while a smaller rate control ramps the delay more quickly. If the rate is too fast, the MPS audio will be audibly disrupted whenever ramping occurs.

1. Login to the Remote GUI and navigate to the Audio Delay Setup Screen. See Section 5.7.
2. Enter the new ramp rate control value in the DELAY RAMP RATE entry box and click SAVE.

#### 4.8 Changing The Audio Delay

Time alignment of a hybrid MPS system is critical to HD Radio System quality. Receivers blend between FM and HD signals in various situations, including a shift from digital to analog when a receiver is on the edge of the broadcast range. If the MPS signals are misaligned due to an

incorrect diversity delay, an undesirable discontinuity in the audio is audible to listeners as a skip or jump in audio.

An HD Radio receiver is required for a system operator to get feedback regarding the delay alignment. Some receivers are able to enter split FM/HD mode, which makes the time alignment process much easier. To utilize the XPi 10esp manual delay control system, follow the steps below:

1. Login to the Remote GUI and navigate to the Audio Delay Setup Screen. See Section 5.7.
2. Enter the desired change in delay in the INCREMENT SIZE field and click SAVE
3. Click the INCREMENT DELAY command button to increase the delay by the entered sample size or click DECREMENT DELAY to decrease the delay by the entered number of samples. Note that the delay ramps to the new control value without further input.
4. Listen for alignment and repeat the increment/decrement commands using smaller steps until the FM and HD MPS signals are acceptably aligned.

Alternatively if the exact desired delay is known:

1. Login to the Remote GUI and navigate to the Audio Delay Setup Screen. See Section 5.7.
2. Enter the desired delay in the DIVERSITY DELAY samples field.
3. Click SAVE to save the new value and initiate a ramp.

If a split-mode receiver has been connected to the RCA inputs for FM/HD signal feedback, automatic mode can be used to maintain the audio delay. To use automatic mode:

1. Login to the Remote GUI and navigate to the Audio Delay Setup Screen. See Section 5.7.
2. Click the AUTOMATIC MODE checkbox. After a few seconds of measurement and calculations, the system ramps the delay appropriately.

#### 4.9 Ramp Up/Down The Diversity Delay

The XPi10esp supports “ballpark mode” which corresponds to the smallest delay possible on analog MPS audio by the software system. Ramp down commands are used to put the system in ballpark mode. To leave ballpark mode and restore manual control, a ramp up command is used.

1. Login to the Remote GUI and navigate to either the Main Menu or Audio Delay Setup Screens, see sections 5.4 and 5.7 respectively.
2. To ramp down the delay and enter ballpark mode, use the mouse to click the RAMP DOWN button. This command is only functional when in manual mode. If already ramped down to ballpark mode or in automatic delay mode, this command is ignored.
3. To ramp up the delay, use the mouse to click the RAMP UP button. This command is only functional when in/entering ballpark mode. If already in manual delay mode or if in automatic delay mode, this command does nothing.

#### 4.10 Select Audio Monitoring

For convenience, there are two outputs, AES Monitor Out and Headphone Out, which allow monitoring of system audio channels. A static test tone option is also available for convenience. To control the audio connected to these monitoring channels:

1. Login to the Remote GUI and navigate to the Audio Inputs and Outputs Screen. See Section 5.9.



2. Select the audio monitor mode by using the mouse to select the appropriate radio button. This setting updates on change.
3. Adjust the headphone level by dragging the slider that is below the Headphone selections list up (to the right) or down (to the left).

#### 4.11 Manually Select The AUX Audio Input Routing

1. Login to the Remote GUI and navigate to the Audio Inputs and Outputs Screen. See Section 5.9.
2. Select the auxiliary input source routing by using the mouse to select the appropriate radio button. Note that this is software re-routing of audio data that does not necessarily affect a bypassed system.

#### 4.12 Force Bypass Mode On

The audio bypass relay has two states. During normal operation, the audio bypass is disabled and audio is routed from the Main/Bypass AES input through the internal audio system to the output. In the "bypass" state, audio is routed straight from the Main/Bypass AES input to the Delayed FM AES Audio Output. When power is off, the audio system is nonfunctional during initialization, or due to other failure detections the system is always bypassed. Because of this, the only user control is to force the bypass on during other (normal) operation scenarios.

1. Login to the Remote GUI and navigate to the Audio MPS Setup Screen. See Section 5.8.
2. Enable the bypass by using the mouse to select the FORCE BYPASS RELAY ON checkbox.

#### 4.13 Blending Setting

MPS blending is utilized by receivers when a broadcast system is in hybrid MPS mode. The behavior of the blending system is controlled by three settings:

**Table 3 – Hybrid MPS Blending**

Setting	Behavior
Enable Audio Blend	Always Blend
Blend Only When Alignment Is Complete	Receiver-Selectable when ramping or in ballpark mode, otherwise Blend
Disable Audio Blend	Always Receiver-Selectable

When the system is in all digital modes, blending is entirely disabled. To control the hybrid MPS blending behavior:

1. Login to the Remote GUI and navigate to the Audio MPS Setup Screen. See Section 5.8.
2. Select the checkbox FORCE ENABLED checkbox next to 1. ENABLE AUDIO BLEND. This setting saves on change.

#### 4.14 Silence Sense Fault Fine Tuning

1. Login to the Remote GUI and navigate to the Silence Sense Setup Screen. See Section 5.10.
2. For the four audio inputs/outputs listed, the THRESHOLD and FAULT IF MISSING FOR fields are used to enter the level and time the audio is missing before a fault is declared for that audio feed. Use the keyboard to enter a threshold level in the THRESHOLD field. Use the keyboard to enter the amount of time in the FAULT IF MISSING FOR box.
3. Use the mouse to select SAVE when finished to save any changes.



#### 4.15 Silence Fault Automatic Remediation

By default, the XPi10esp fault system does not alter the way the XPi10esp system functions, but simply provides warnings when there is an interruption in normal operation. There are, however, options that allow the system to automatically attempt to correct some faults, such as silence on either of the two primary audio inputs. Note that this rerouting of Main AES Input source from Auxiliary AES Input only functions if the audio system is fully functional and the bypass is not on. An engaged bypass relay always routes audio from Main AES Input to the Delayed AES Output.

1. Login to the Remote GUI and navigate to the Silence Sense Setup Screen. See Section 5.10.
2. Select either checkbox labeled AUTOMATICALLY REROUTE FROM AUX AES IN WHEN SILENT for the appropriate audio input. This setting saves on change. Both can be selected if desired.

It is recommended to avoid setting the Delayed AES Output fault period shorter than the analog MPS diversity delay. If there is silence on the Main/Bypass AES Input, a fault reset will always cause a fault on the Delayed Out channel before audio has time to flow through the system.

3. If the HD Input should also reroute to AUX In when the MAIN Input goes silent, check the ALSO REROUTE HD IN FROM AUX... checkbox. Note: this behaves as an OR with the HD silence rerouting, i.e. when both settings are checked, the system reroutes HD In to AUX In when either MAIN or HD In trigger silence faults.

#### 4.16 Fault Resetting

1. Login to the Remote GUI and navigate to the Diagnostics Screen. See Section 5.16.
2. Follow the steps on-screen to troubleshoot the problem that likely caused the fault.
3. Click the FAULT RESET button to attempt to clear the active fault.

#### 4.17 Station Information Messaging Service Setup

1. Login to the Remote GUI and navigate to the Station Information Setup Screen. See Section 5.11.
2. Enter the desired messages that are to be displayed at HD Receivers.
3. APPEND "-FM" checkboxes add "-FM" to the string when displayed at the receiver.
4. If expanded Latin or other more complex characters are desired for display, the Universal and/or Station Message string settings must be utilized and the appropriate character set selected. Note that Unicode only supports 16-bit characters for more complex character entries.
5. When finished modifying, press the SAVE button to save any modified fields to the XPi10esp. Any text format or sizing errors will prevent any changes from saving.

#### 4.18 Modifying SIS Data Transfer Order

SIS data is sent in one L1 frame 16 blocks at a time (8 blocks for AM systems). The data transfer cycles about once per minute. Due to restrictions on data size and packaging, certain data message types take up an entire block while other message types allow two messages per block. Also, there cannot be a Call Sign Standard and Call Sign Universal in any two message entries. Slogan Standard and Slogan Universal similarly cannot both be used in the data schedule unless the use-standard-as-universal setting is checked.



1. Login to the Remote GUI and navigate to the Station Information Service Schedule Setup Screen. See Section 5.12.
2. Select the desired data message by clicking the dropdown box to choose the first payload in each block, and then selecting one of the available options in payload 2 (if there are any). Do this for all 16 blocks.
3. When finished, click the SAVE button.

#### **4.19 Set The Primary Carrier Configuration**

1. Login to the Remote GUI and navigate to the Operating Mode Setup Screen. See Section 5.6.
2. Select the primary carrier configuration mode by using the mouse to select the desired radio button. This setting is saved upon change.
3. Restart the system.



## 4.20 Remote Station Interface

The inputs and outputs behave as expected based on the description and based on how these commands function in the system through the Remote GUI. Inputs are active low, i.e. triggered on a falling edge unless otherwise specified with the hold duration in the notes column of Table 4. Outputs are all latching, and the high and low states depend on the system behavior associated with the output, see Table 5.

**Table 4 – Inputs Remote Station Interface**

No.	Input Description	Section	Page	Notes
1.	Ramp Audio Delay Up	4.9	8	Hold for 4s
2.	Ramp Audio Delay Down	4.9	8	Hold for 4s
3.	Increase Audio Delay	4.8	7	
4.	Decrease Audio Delay	4.8	7	
5.	Enable Audio Blending	4.13	9	
6.	Disable Audio Blending	4.13	9	
7.	Enable Audio Blending When Alignment is Complete	4.13	9	
8.	Audio Bypass On	4.12	9	
9.	Audio Bypass Off	4.12	9	
10.	Fault Reset	4.16	10	
11.	Reset Exporter	-	-	

**Table 5 – Outputs Remote Station Interface**

No.	Output Description	Section	Page	Low	High
1.	Ramp Audio Delay Up Status	4.9	8	Working	Done
2.	Ramp Audio Delay Down Status	4.9	8	Working	Done
3.	Increase Audio Delay Status	4.8	7	Working	Done
4.	Decrease Audio Delay Status	4.8	7	Working	Done
5.	Audio Bypass On Status	4.12	9	Normal	Bypass
6.	Audio Bypass Off Status	4.12	9	Bypass	Normal
7.	Importer Link Fault			Ok	Fault
8.	Exgine Link Fault			Ok	Fault
9.	General Fault			Ok	Fault
10.	GPS Lock Status			No Lock	Locked
11.	Aux AES Audio Input Status			Active	Silent
12.	Main/Bypass Audio AES Input Status			Active	Silent
13.	HD AES Audio Output Status			Active	Silent
14.	HD AES Audio Input Status			Active	Silent
15.	Delayed FM AES Audio Output Status			Active	Silent



## 5 XPi 10esp Remote Graphical User Interface (GUI)

The XPi10esp requires a Java based executable jar remote graphical interface in order to utilize the majority of system settings. This program can be used on Java supported personal computing platforms, such as PC and Mac, that are connected to the Ethernet network of the broadcast system. Care should be taken when operating the Remote GUI as many graphics controls instantly alter the system when a user interacts with those controls. For system interrupting/disrupting settings changes, additional warnings and/or confirmations are displayed through a standard dialog box popup.

### 5.1 Common View Elements

The XPi 10esp Remote Graphical User Interface has standard objects that are present on all screens; see Figure 4 below for more details regarding what these objects are and how they behave.

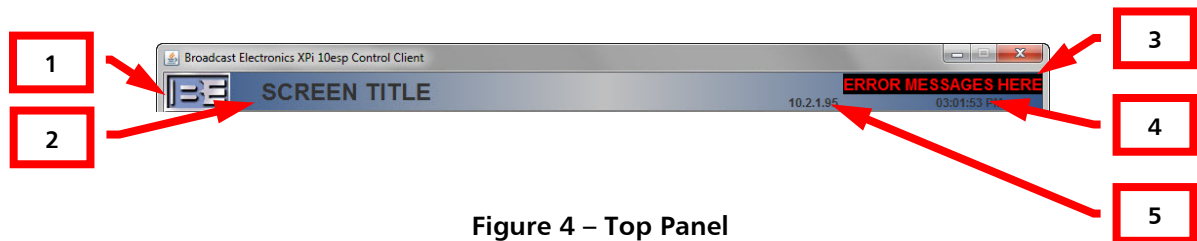
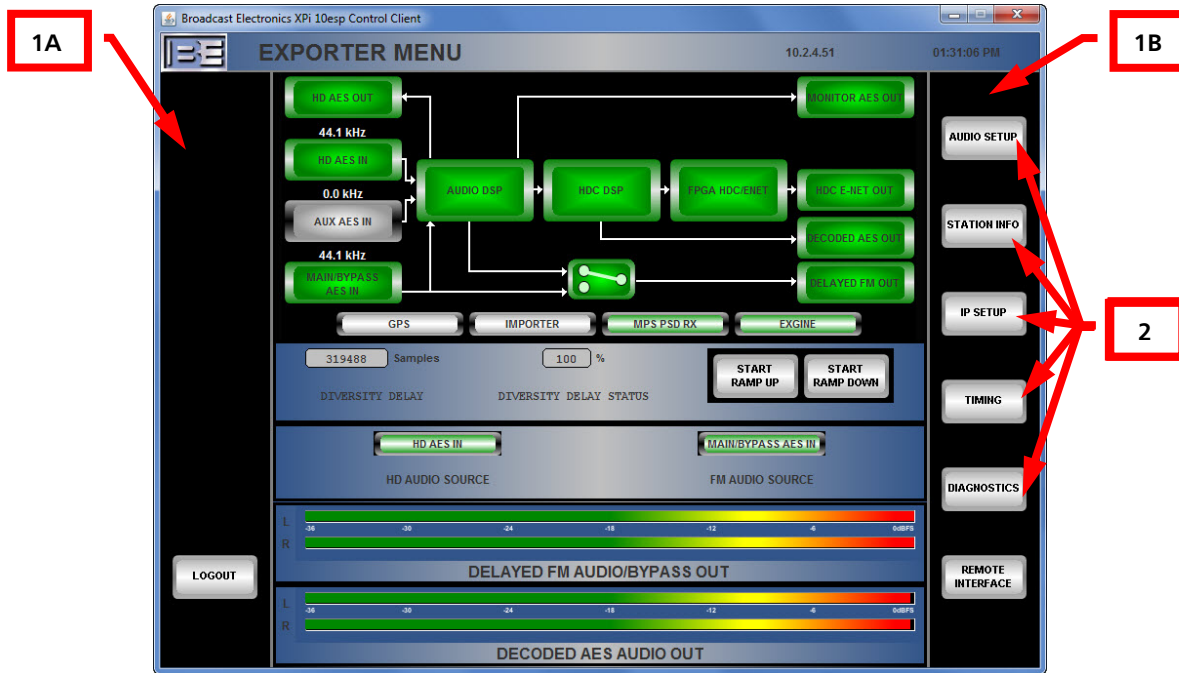


Figure 4 – Top Panel

No.	Feature	Description
1.	Logo	Contains the BE Logo. When a system fault is detected, this icon flashes with inverted colors.
2.	Screen Title	Displays the title of the currently loaded screen.
3.	Message Prompt	Displays prompt and/or error messages to allow the XPi 10esp Remote GUI to communicate with the user.
4.	Current Time	Displays the system's local time as expected at a receiver. This time is synchronized to the XPi 10esp once and then tracks independently of the data stream. Therefore, this time is not a valid indicator of connectivity.
5.	Identification	This IP address corresponds to the Remote GUI IP that is logged into and is unique to each XPi10esp in a network.

## 5.2 Navigation

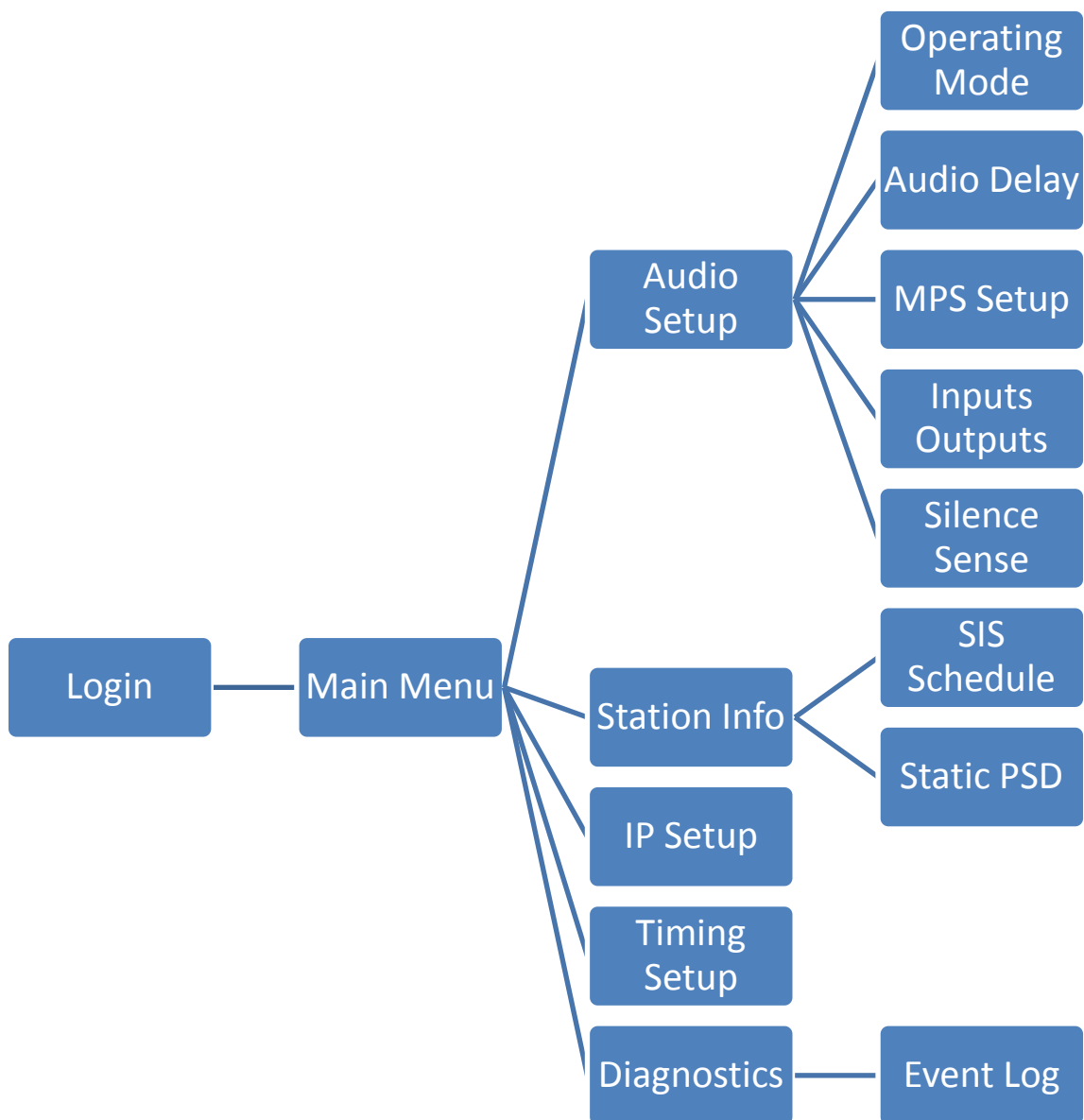
All screens listed in their individual sections below can be navigated to once logged-in by pressing the appropriately labeled buttons to the right and/or left of the currently viewed screen. The main screen provides access to major screens and sub-menu screens. Also, see Figure 6 for a tree of screen navigation paths.



**Figure 5 – Navigation**

No.	Feature	Description
1.	Menu Buttons Panels	All Screens have buttons in these side panel locations to allow the user to navigate between screens, save data fields, issue commands, etc. by utilizing a mouse.
2.	Screen Navigation Buttons	These are typical buttons that load screens such as the Audio Setup Menu, Station Information Setup Screen, IP Setup Screen, Timing Setup Screen, and Diagnostics Screen.
(not pictured)	Back, Save, (other commands)	Clicking the back button loads the previously loaded screen. The save sends any modifications in text fields to through the system. Note that any other control, such as checkboxes and radio buttons save when changed unless otherwise noted. Any other buttons issue screen-specific system commands.



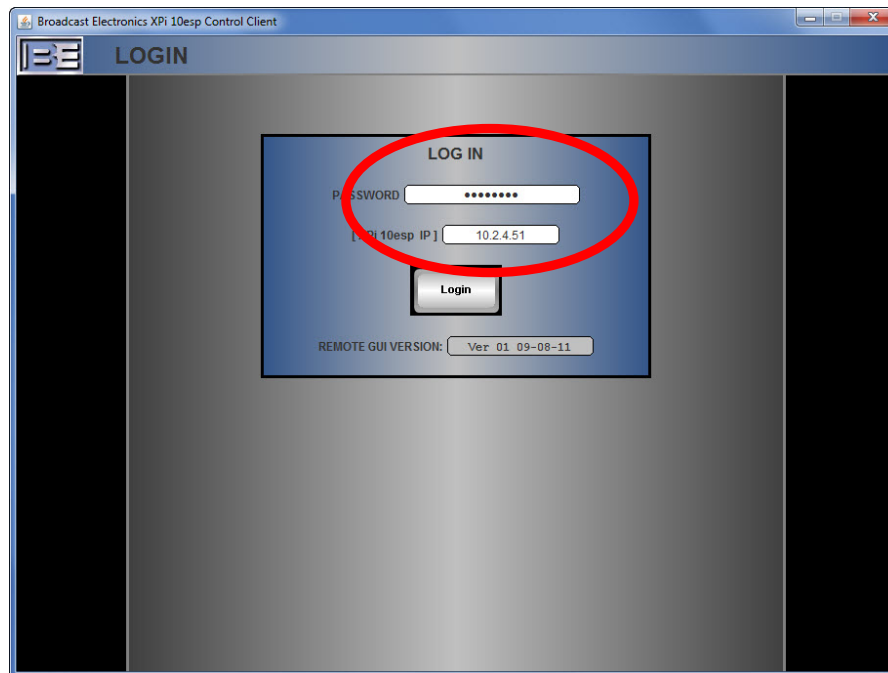


**Figure 6 – Screen Navigation Tree**

### 5.3 Login Screen

The XPi 10esp is equipped with a login system. This screen is the first that displays after the jar is executed. The system allows one single login at any time. To login:

1. Start the remote Java GUI program.



**Figure 7 – Login Screen**

2. Enter the static IP for the GUI module.

Note: See section 2 for factory default IP setting. If this IP has been changed (via the serial command-line interface) and the correct IP has been lost or forgotten, you must use the serial port to either acquire or set to a known configuration. See Section 4.2 for more details on how to find and/or update this setting.

3. If password protection is enabled, enter the password.
4. Click the login button (alternatively press the enter key with the cursor in either of the text fields).

If the login is valid, the main menu screen will load.

## 5.4 Main Menu Screen

The XPi 10esp Main Menu screen provides views of all major Exporter controls and indicators.

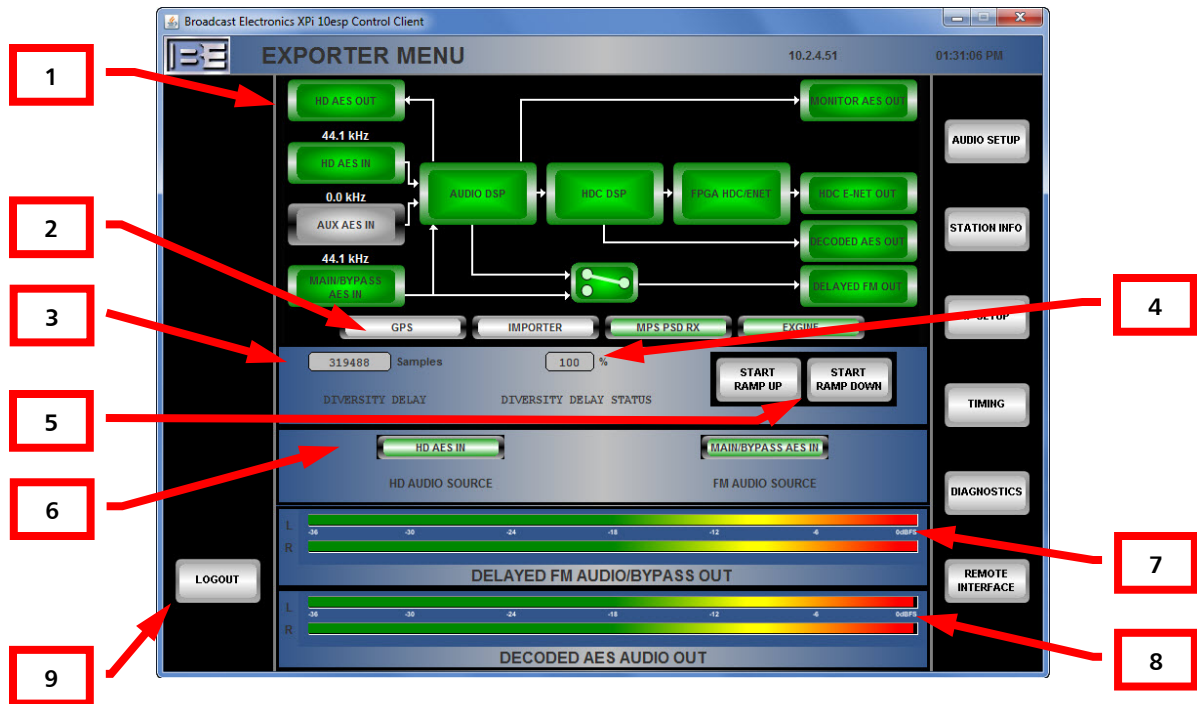


Figure 8 – Main Menu Screen

No.	Feature	Description
1.	Diagnostics Panel	Displays the current status of major components of the Exporter audio signal flow in a simple block diagram.
2.	Connection Indicators	These indicators show the status of the various connections between major system components such as the Exigine. MPS PSD Receiver indicates green if data has been received in the last 5 minutes.
3.	Current Delay	This box displays the current diversity delay target in samples.
4.	Delay Progress	This box displays the status of the current audio diversity delay relative to the current diversity delay target set point.
5.	Start Ramp Up/Down Buttons	Pressing these buttons initiates a diversity delay ramp up or ramp down command. See section 4.9 for more details.
6.	MPS Audio Source Indicators	These indicators show the audio input source used for the analog (FM) and digital (HD) MPS audio channels (normal or Aux. In).
7.	Delayed FM Audio/Bypass Out Meter	Presents the delayed FM AES output audio peak hold levels in dBfs for left and right channels of this audio output.
8.	Decoded AES Audio Out Meter	Presents the decoded AES output audio peak hold levels in dBfs for left and right channels of this audio output.
9.	Logout Button	Logs out the remote gui, closing the connection to the Exporter.

## 5.5 Audio Setup Menu Screen

The XPi 10esp Audio Setup Screen allows the monitoring of FM and HD input and output audio. This screen is the method for accessing sub-screens that relate to audio settings and controls.

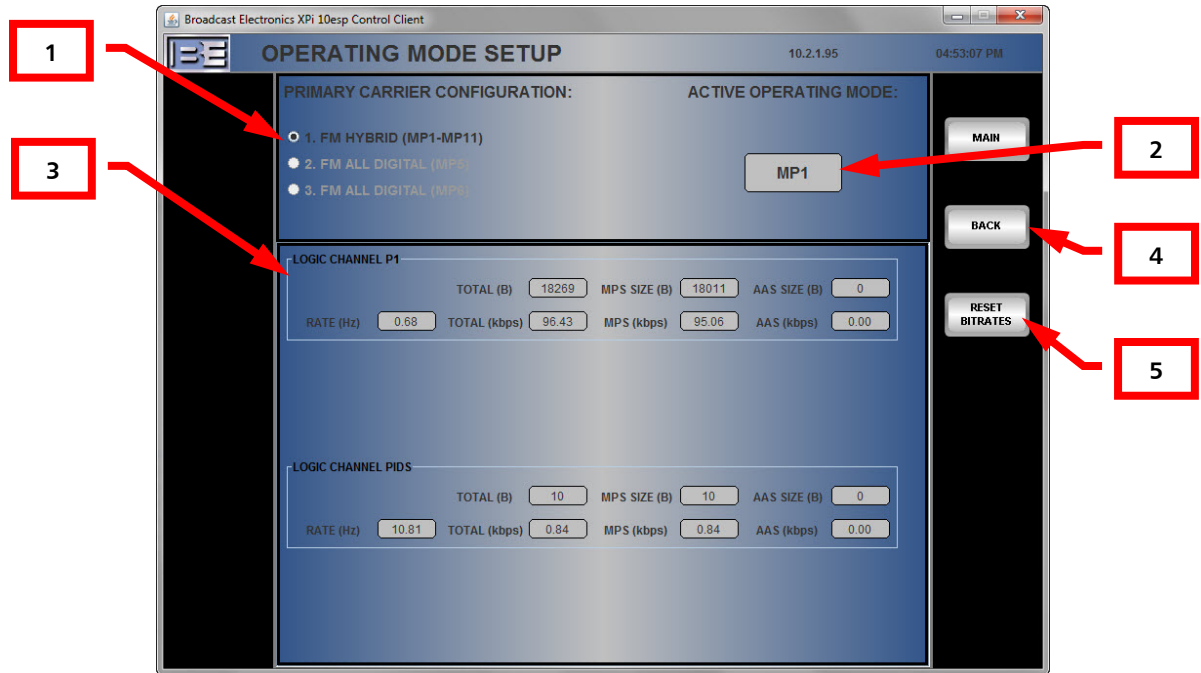


Figure 9 – Audio Setup Menu Screen

No.	Feature	Description
1.	Typical Panel	Each audio channel panel contains peak holds metering. Input channel panels have phase invert control.
2.	Peak Holds Meter	Presents the peak hold levels in dBfs for left and right AES audio for the channel.
3.	Phase Invert Checkbox	When checked, the system Inverts the phase of the incoming audio for this input.

## 5.6 Operating Mode Setup Screen

The XPi 10esp Operating Mode Setup Screen allows the user to set the default primary carrier configuration.



**Figure 10 – Operating Mode Setup Screen**

No.	Feature	Description
1.	Primary Carrier Configuration Radio Buttons	Allows selection of the primary carrier mode. Currently, Hybrid MPS mode is the only supported configuration.
2.	Active Operating Mode Box	Displays the current active operating mode.
3.	Bitrate Allocation Fields	Shows raw data regarding bitrate allocation for each HD logic channel.
4.	Back Button	When clicked, the Audio Setup Menu is loaded.
5.	Reset Bitrates Button	When clicked, the command is sent throughout the system to reset bitrate allocations to the default values based on the current primary carrier configuration, and (if an Importer is connected) operating mode.

## 5.7 Audio Delay Setup Screen

The XPi 10esp Audio Setup Screen allows control of the audio diversity delay. This delay is between the Main/Bypass Input and the Delayed FM Audio/Bypass Output. A delay of zero means that no delay is added. Note: this does not negate any baseline system delays.

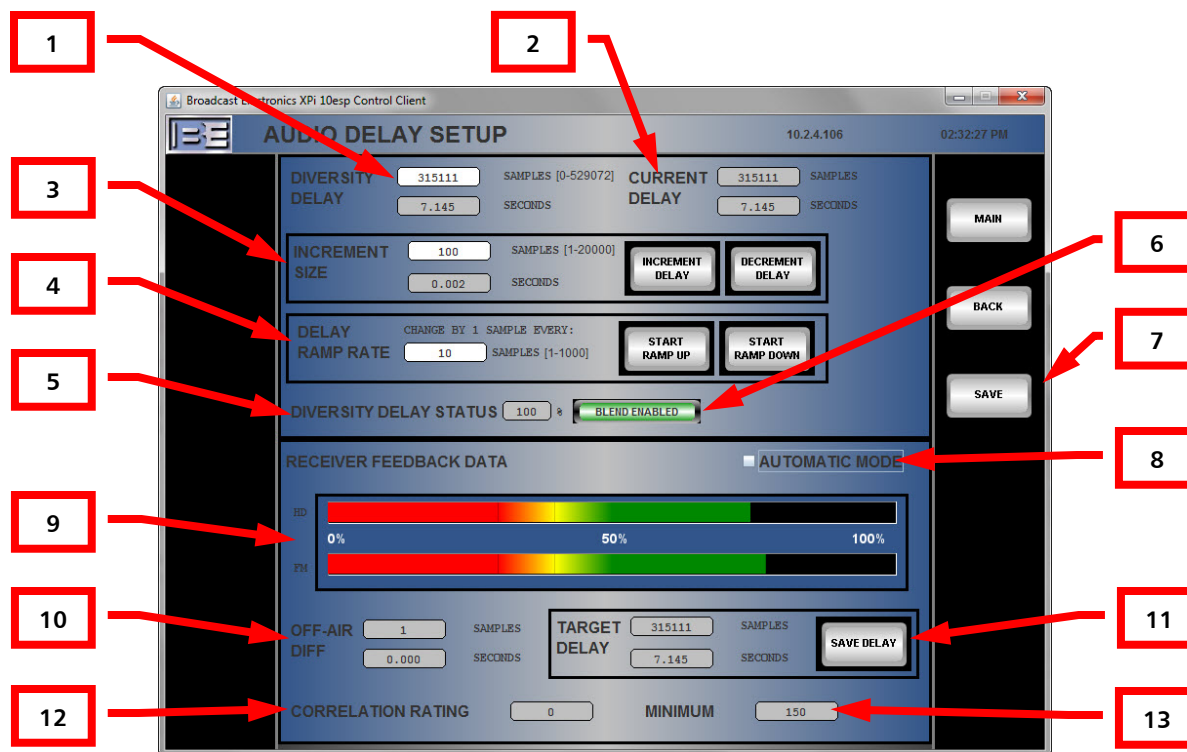


Figure 11 – Audio Delay Setup Screen

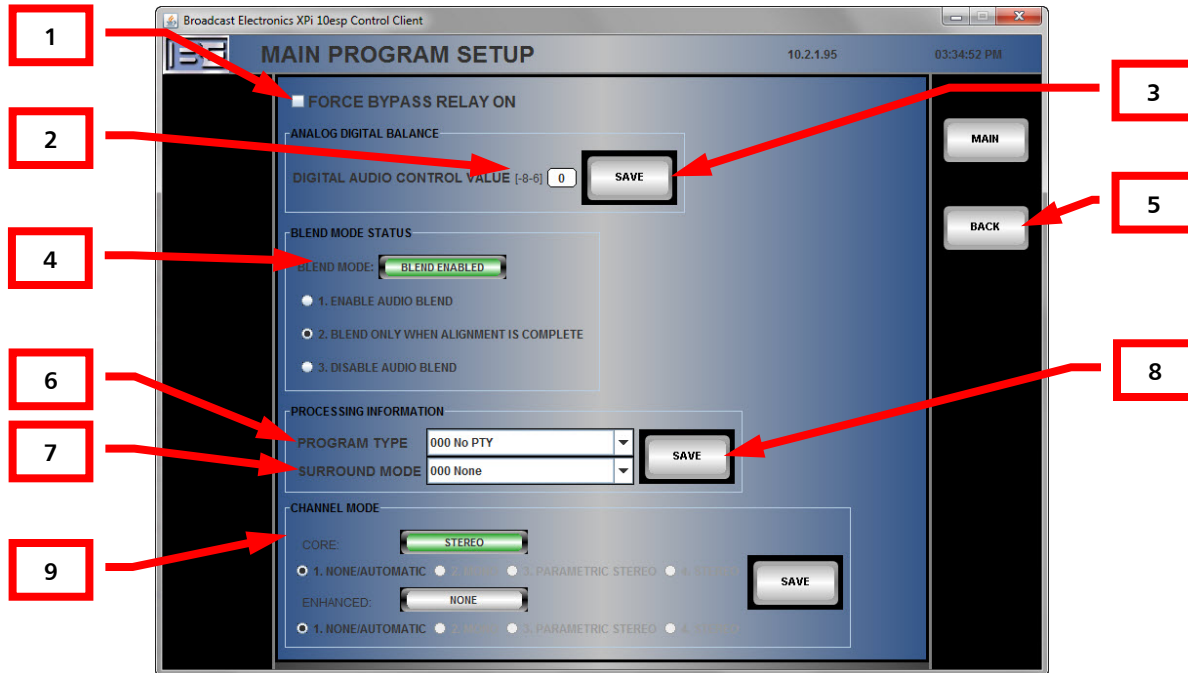
No.	Feature	Description
1.	Manually Controlled Target Delay Text Field	Allows the entry of the exact audio delay in samples. The display in seconds corresponds to the 44.1kHz conversion from samples.
2.	Actual Delay Display Text Field	Shows the actual current delay of the main FM signal in both samples and seconds.
3.	Increment Text Field and Increment/Decrement Command Buttons	This box allows control of the Increment Size variable. This is used to determine the change in delay when an increment delay or decrement delay button is clicked.
4.	Delay Ramp Rate Text Field and Start Ramp Up/Start Ramp Down Buttons	This box allows control of the delay ramp rate. The actual value here determines the time period over which 1 delay sample is added. The larger this value is, the slower the change of delay, and less likely it is that a listener will notice the change. See section 4.9 for more details regarding ramp commands.
5.	Delay Status Display	Displays the current delay's status in terms of the ratio of the target delay compared to the actual current delay.
6.	Blend Status Indicator	The control indicates the status of a hybrid MPS audio blending. Behavior of this feature depends on the blend mode setting in the MPS Setup screen, and blend may change when delay changes.
7.	Save Button	Saves the manually controlled target delay, the increment size, and the ramp rate control.



8.	Automatic Mode Checkbox	When checked automatic delay mode is engaged, and user modifications of the diversity delay have no effect. The rate control, however, is still used to determine how fast the delay changes when/if the system calculates a reliable time-based difference in the receiver feedback signals.
9.	Receiver Feedback Peak Holds Meter	Displays the peak hold data for the FM (Analog) and HD (Digital) feedback Inputs audio signals. The level is arbitrary and is controlled by the potentiometers in the back. For the best automated system performance, these potentiometers should be set so that the peak holds are in the green as much as possible with no clipping.
10.	Measured Difference Display Text Field	This box displays the difference at the alignment with the best correlation alignment between the two feedback signals. If signals are time-aligned, a small number should be displayed here.
11.	Target Delay Display Text Field and Save Delay Command Button	This is similar to the user Target Delay above, but is generated by the automatic control system. When the Save Delay button is pressed, the current automatic delay is saved in the User-Controlled Target Delay above.
12.	Correlation Rating Display Text Field	Shows the maximum correlation rating calculated by the system.
13.	Minimum Correlation Display Text Field	Displays the minimum correlation rating that is required for the automatic delay control system to modify and use the corresponding target delay.

## 5.8 Main Program Service Setup

The XPi 10esp Main Program Setup Screen allows control of several settings and status displays relating to the Main Program Audio channel(s). Some settings, such as processing information, may only need to be utilized in an HD system that does not include an Importer.



**Figure 12 – Audio Inputs and Outputs Setup Screen**

No.	Feature	Description
1.	Bypass On Checkbox	When checked, the bypass relay is forced on. See section 4.12 for more details.
2.	Digital Audio Control Value Text Field	This setting dictates the db gain on the digital MPS audio channel used to balance the level to the analog MPS signal.
3.	Save Button	If the digital audio control value is changed, this button saves the setting in the textbox.
4.	Blend Mode	This display shows the current blending logic used to flag audio data for blend, independent selection, or digital only. See section 4.13 for more details.
5.	Back Button	Loads the Audio Setup Menu when clicked.
6.	Program Type Box	This dropdown menu allows selection of the audio programming type that is primarily used in the channel.
7.	Surround Sound Box	This dropdown menu determines how the audio is flagged for surround sound processing.
8.	Save Button	Saves both the Program Type and Surround Sound settings.
9.	Channel Mode	These settings determine the quality of the MPS audio, which is used to determine bit rate allocation in the HD system.



## 5.9 Audio Inputs and Outputs Setup Screen

The XPi 10esp Audio Inputs and Outputs Setup Screen allows control of several audio channel routes and properties. Note that these routing settings are in the audio dsp and in certain situations may not reflect actual hardware routing. If the audio dsp is bypassed, monitoring devices routed to the delayed output will not reflect actual audio fed out because this device processing the digital signals has been bypassed in hardware.

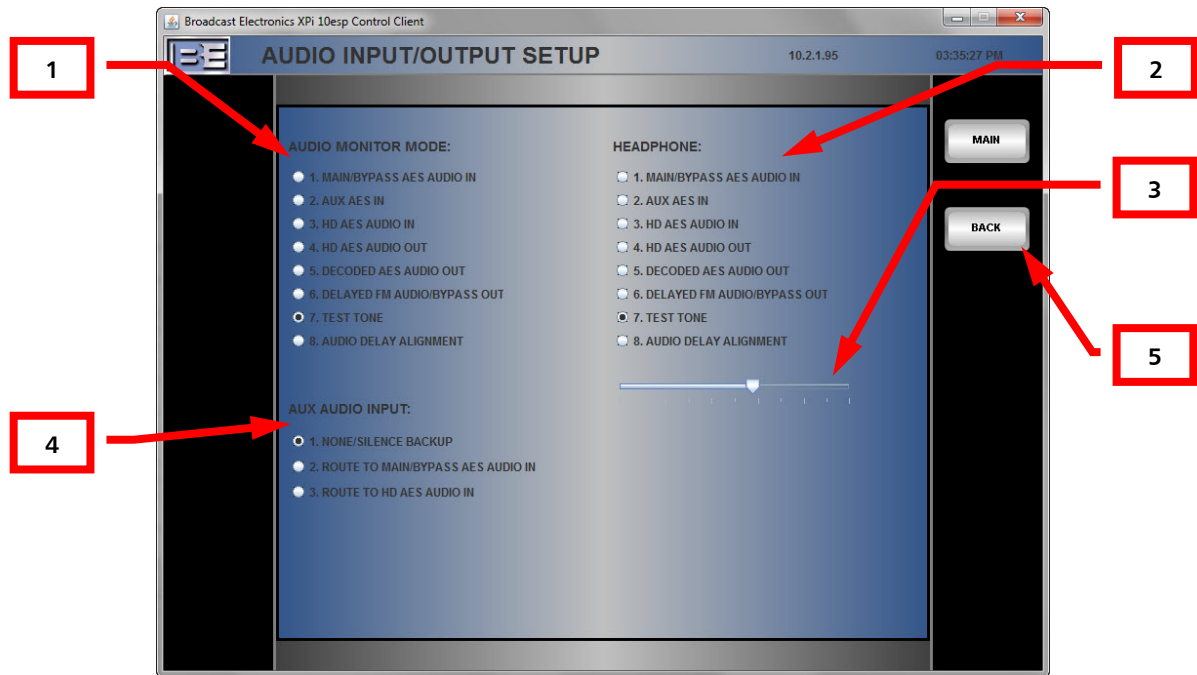
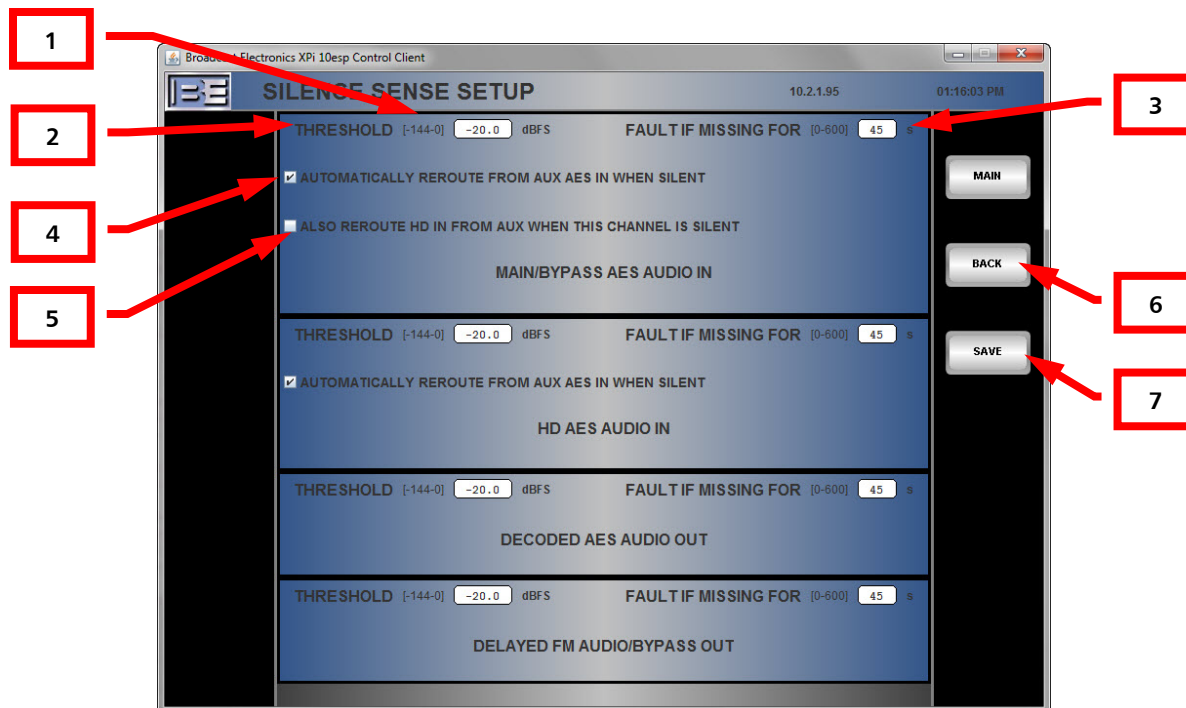


Figure 13 – Audio Inputs and Outputs Setup Screen

No.	Feature	Description
1.	Audio Monitor Button Group	Allows instant selection of the audio source for the audio monitor AES output channel.
2.	Headphone Button Group	Allows instant selection of the audio source for the headphone output channel.
3.	Headphone Volume Level Slider	Allows instant setting of the headphone output volume.
4.	Aux Audio Input Button Group	Allows for direct control of auxiliary input routing.
5.	Back Button	Loads the Audio Setup Menu when clicked.

## 5.10 Silence Sense Setup Screen

The XPi 10esp Silence Sense Setup Screen allows control of the silence sense feature. The variables determine when a silence fault is triggered, and how the system is to respond to a silence fault.



**Figure 14 – Silence Sense Setup Screen**

No.	Feature	Description
1.	Audio Input/Output Channel	This is a typical panel and corresponds to settings for the Main/Bypass audio input channel. Other channel controls behave in the same manner.
2.	Threshold Text Field	The silence threshold determines the minimum peak hold level in dBFS that the audio channel is required to be above in order to prevent a silence fault.
3.	Fault Time Text Field	This parameter is the period of time over which the channel must stay below the threshold (above) for a silence fault to occur.
4.	Reroute Control Check Box	When checked, the auxiliary audio input will automatically be rerouted to this input if a silence fault occurs in the channel. This is possible for the two input channels.
5.	Also Reroute HD Check Box	If checked, the system also reroutes HD In to AUX when there is a silence fault on Main In, see section 4.15 for more details.
6.	Back Button	Loads the Audio Setup Menu when clicked.
7.	Save Button	Saves the threshold and fault settings for the four channels (if a change has been made) when clicked.

## 5.11 Station Info Setup Screen

The XPi 10esp Station Info Setup Screen allows control of the station information service text system such as the Call Sign, Slogan, etc. To save any altered controls, the save button must be pressed. Alterations are not saved until this happens, and when Save is pressed, every modification is saved. The data is then inserted into the HD data stream and shows up on text displays at receivers that utilized this system option.

For “Universal” station information options, the currently supported character set options are 1) Latin1/Western European (ISO8859 standard) or 2) Unicode. When using Unicode, more complex/obscure characters take up more binary space and thus fewer characters are allowed.

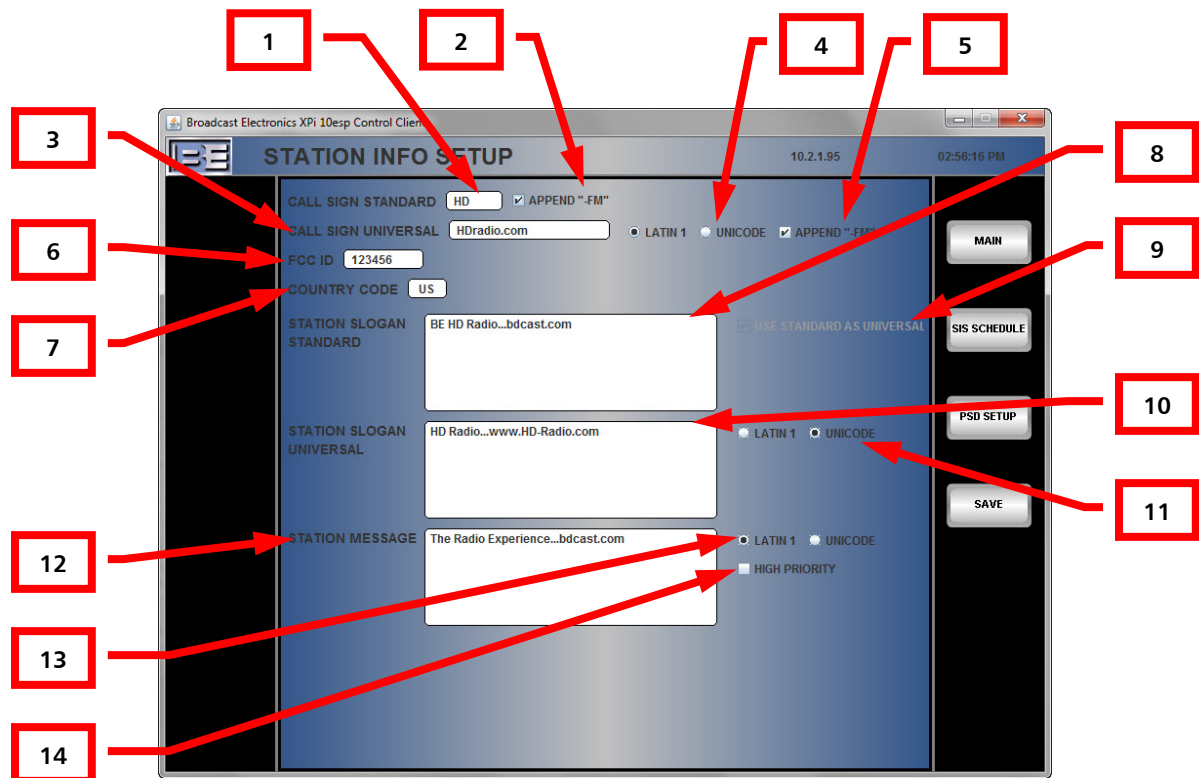


Figure 15 – Station Info Setup Screen

No.	Feature	Description
1.	Standard Call Sign Entry Text Field	Allows a user to enter up to 4 (capital ASCII only) text characters to be used as the Standard Station Call Sign.
2.	Call Sign Standard Append Check Box	Checking this box instructs the receiver to also display “-FM” whenever the Standard Call Sign is displayed.
3.	Call Sign Universal Text Field	Allows a user to enter text characters to be used as the Universal Station Call Sign. The number of characters allowed is determined by the characters entered and the encoding used. The most basic Latin-1 characters have the highest limit, 12 characters.
4.	Call Sign Encoding Radio Buttons	Determine the character set to be used by the Universal Call Sign.
5.	Call Sign Universal Append Check Box	Checking this box instructs the receiver to also display “-FM” whenever the Universal Call Sign is displayed.

6.	FCC ID Text Field	Allows a user to enter the station's FCC identification number.
7.	Country Code Text Field	Allows a user to enter the ISO 3166-1-alpha-2 country code, such as "US" (United States).
8.	Station Slogan Standard Text Field	Allows a user to enter the Standard Station Slogan. The field can be up to 56 ASCII characters.
9.	Use Standard Slogan as Universal Slogan Checkbox	Displays the setting for use of the universal slogan data, see section 5.12.
10.	Station Slogan Universal Text Field	Allows entry of text that is used as the Universal Station Slogan. The number of characters allowed is determined by the characters entered and the encoding used. Latin-1 characters have the highest limit, 95 characters.
11.	Station Slogan Universal Encoding Radio Buttons	Determine the character set to be used by the Universal Station Slogan.
12.	Station Message Text Field	Allows entry of text that is used as the Station Message. The number of characters allowed is determined by the characters entered and the encoding used. Latin-1 characters have the highest limit, 190 characters.
13.	Station Message Encoding Radio Buttons	Determine the character set to be used by the Station Message.
14.	High Priority Message Checkbox	When checked, this flags the message as a high priority, which may be utilized for prioritization at the receiver.



## 5.12 Station Information Service Schedule Setup Screen

The SIS Schedule determines how data is sent to HD receivers. Blocks determine the order of display with block 1 displayed first, block 2 second, etc. Payloads are the messages that populate these blocks. Depending on what message is selected for the first payload, there may or may not be a message in the second payload. The handling of 2-payload blocks depends on the implementation at the receiver.

This screen is dedicated to modification of the message display order that is specified over the air interface. Note that there cannot be Call Sign or Slogan Standard and Universal selected at the same time. An exception is made for Slogan Standard/Universal when the checkbox is checked.

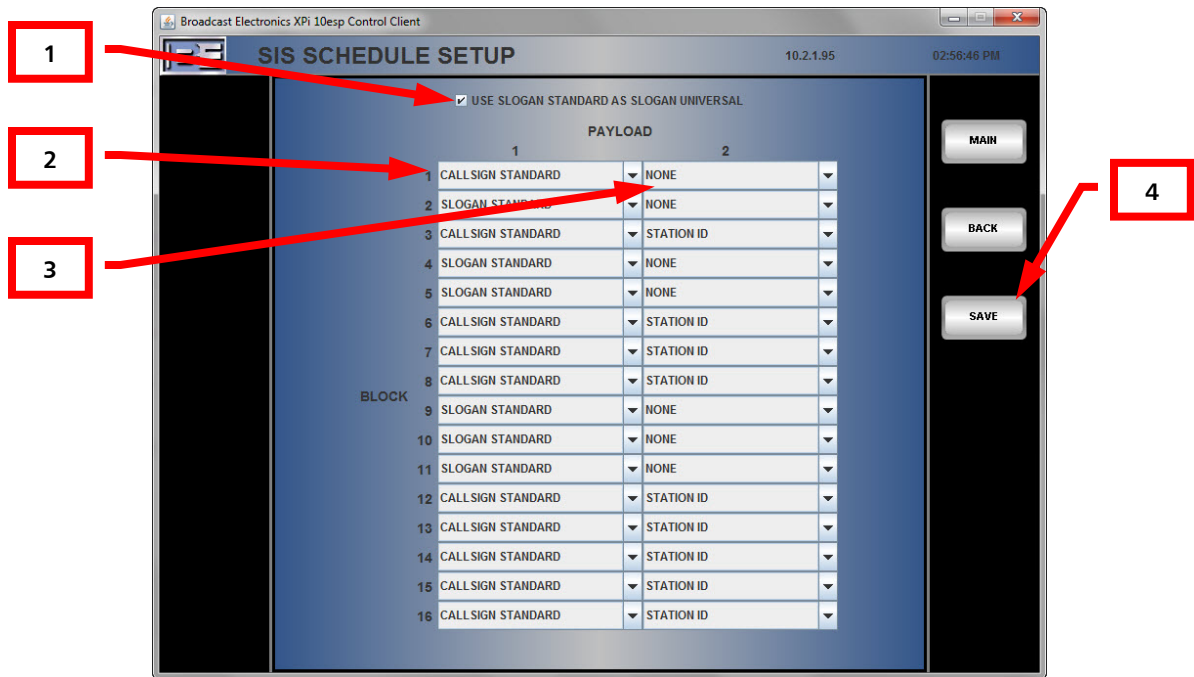
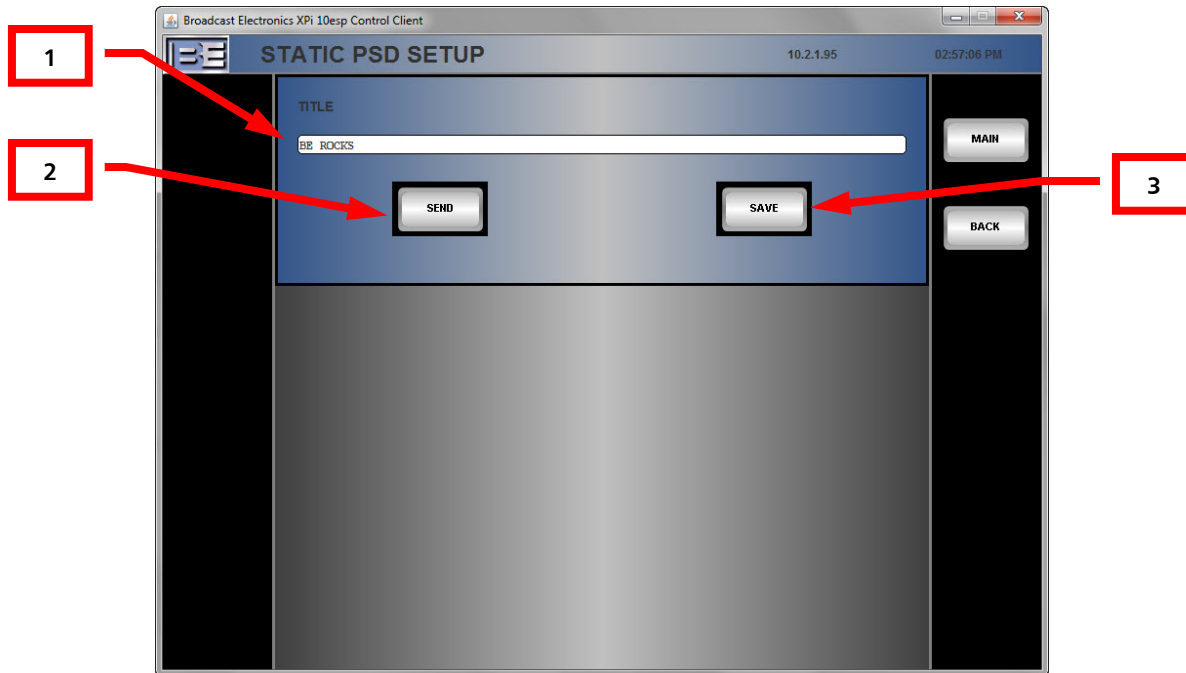


Figure 16 – SIS Schedule Setup Screen

No.	Feature	Description
1.	Use Standard As Universal Check Box	When checked, the universal slogan utilizes the string associated with slogan standard.
2.	Payload 1 Dropdown Menu	This typical dropdown menu always has the same set of message options for the first/primary message to be displayed when it is time for the block to be displayed.
3.	Payload 2 Dropdown Menu	The second typical dropdown menu has message options that depend on the payload 1 selection. Whenever the first payload selection in the corresponding block changes, the options in this list are updated. If the current selection becomes invalid, NONE becomes the new selection and a new valid message option must be used (if any are valid at all).
4.	SAVE Button	When clicked, the Remote GUI attempts to save the schedule in its entirety.

### 5.13 Static PSD Setup Screen

The XPi 10esp Static Program Service Data Setup Screen allows the Remote GUI user to modify and utilize a message that mimics a Song Title displayed at a receiver. The intended use of this is for a system that does not utilize a TRE system component.

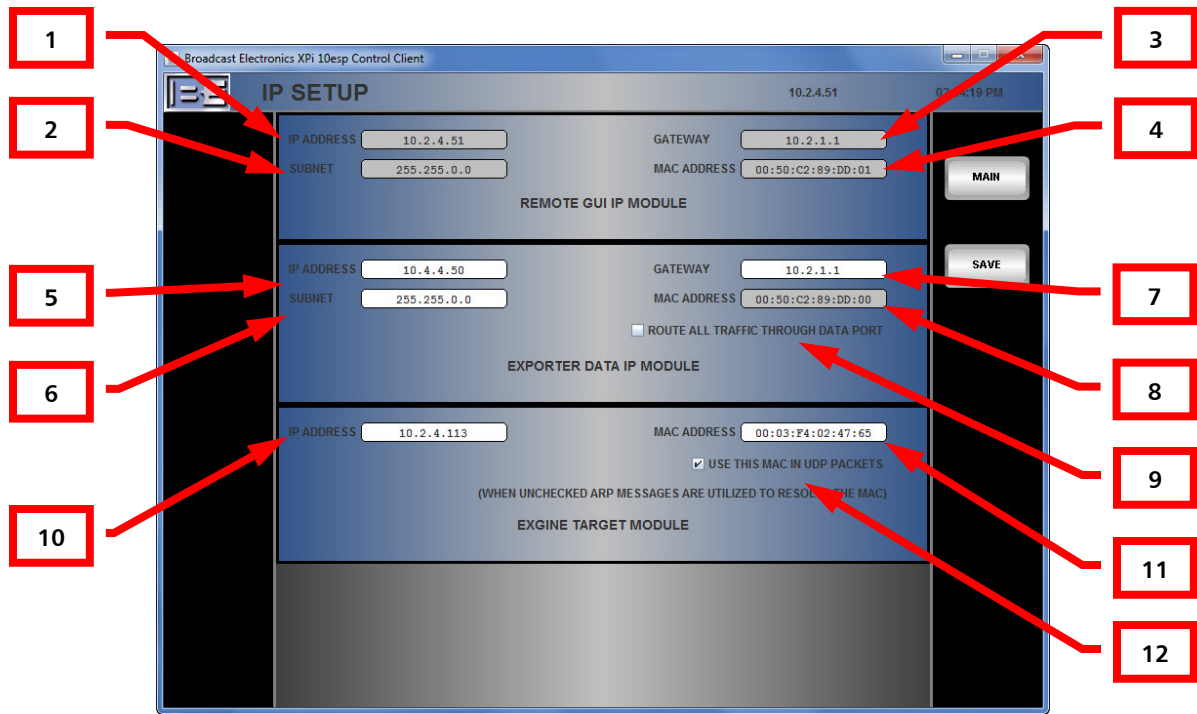


**Figure 17 – Static PSD Setup Screen**

No.	Feature	Description
1.	Song Title Text Field	Allows input and modification of the static title.
2.	SEND Button	When clicked, the currently saved message is sent through the broadcast system as though a song had changed and triggered a title message to be sent by the TRE during normal operation. This does not send what is in the text field, and any changes must be saved using the SAVE button first.
3.	SAVE Button	Saves any modifications made in the Title Text Field. Clicking this button does not send the modified message through the system and/or to receivers.

## 5.14 IP Setup Screen

The XPi 10esp IP Setup Screen allows the user to view details of the GUI port, specify the data IP port, and modify the target Exgine network settings.

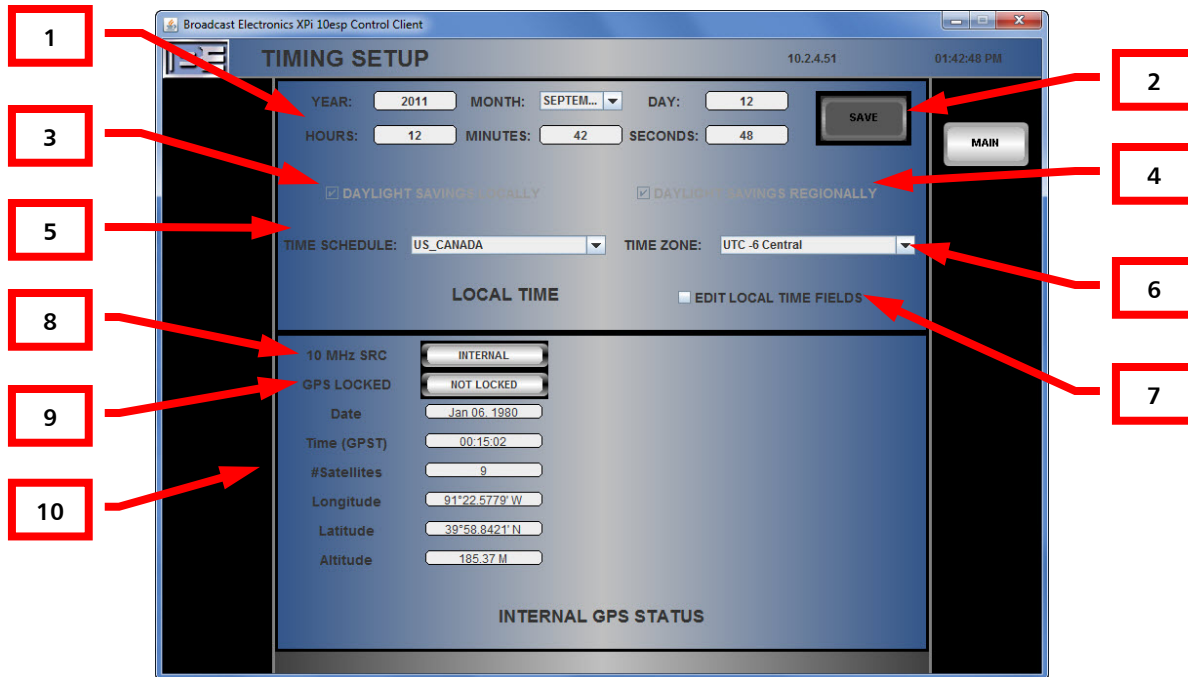


**Figure 18 – IP Setup Screen**

No.	Feature	Description
1.	Remote GUI IP Module IP Address Text Field	Displays the XPi 10esp GUI port IP address.
2.	Remote GUI IP Module Subnet Mask Text Field	Displays the XPi 10esp GUI port subnet mask.
3.	Remote GUI IP Module Gateway Text Field	Displays the XPi 10esp GUI port gateway address.
4.	Remote GUI IP Module MAC Address Text Field	Displays the XPi 10esp GUI port MAC address.
5.	Exporter Data Module IP Address Text Field	Displays and allows control of the XPi 10esp data port IP address.
6.	Exporter Data Module Subnet Mask Text Field	Displays and allows control of the XPi 10esp data port subnet mask.
7.	Exporter Data Module Gateway Text Field	Displays and allows control of the XPi 10esp data port gateway address.
8.	Exporter Data Module MAC Address Text Field	Displays the XPi 10esp data port MAC address.
9.	Ethernet Port Usage Checkbox	When checked, only one of the two Ethernet ports are used. Otherwise, the RGUI connection on the other port.
10.	Exgine Target Module IP Address Text Field	Displays and allows control of a single Exgine target's IP address.
11.	Exgine Target Module MAC Address Text Field	Displays and allows control of the Exgine target's MAC address. See section 4.5 for more details.
12.	Exgine MAC Control Checkbox	When checked, the MAC in the field above this control is used in UDP messages, otherwise ARP messages are utilized.

## 5.15 Timing Screen

The XPi 10esp Timing Screen allows the selection of the 10 MHz source and view GPS unit parameters. Note that the local time fields track real time and therefore are not editable until the edit checkbox has been checked.



**Figure 19 – Timing Screen**

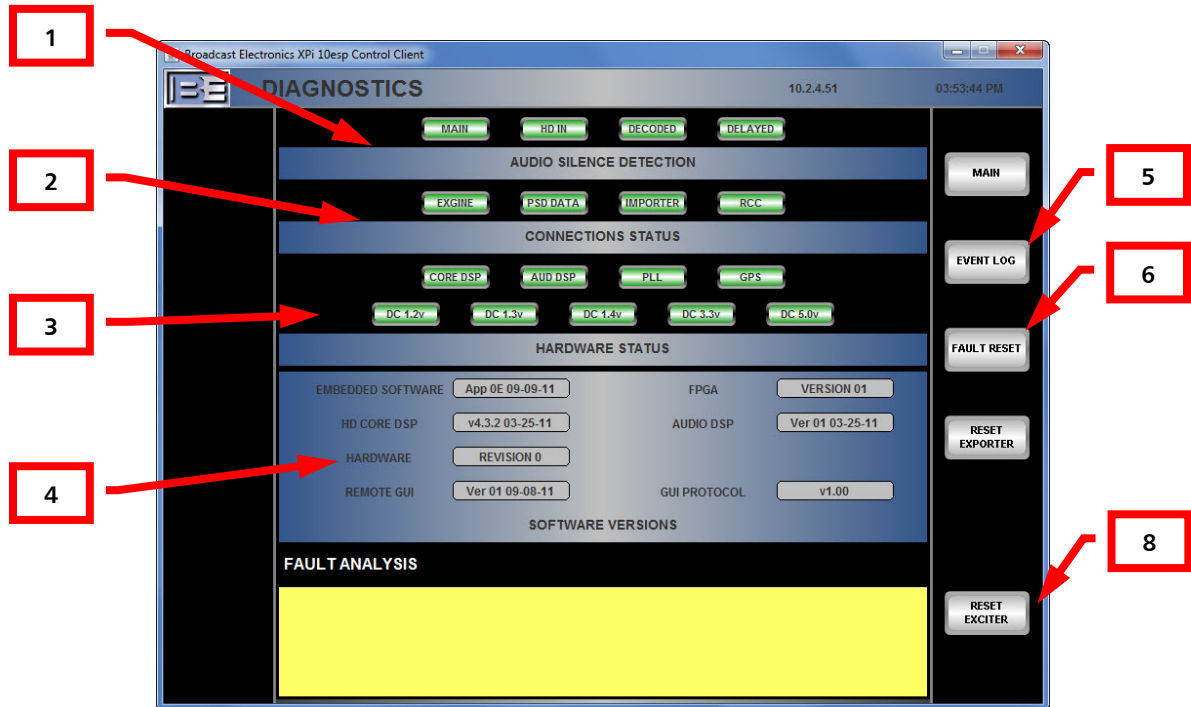
No.	Feature	Description
1.	Time Boxes	The boxes are used to set the local time in the XPi10esp internal real time clock.
2.	Save Button	This button saves the current local time information contained in the controls on this panel.
3.	Daylight Savings Enabled Locally Checkbox	When checked, daylight savings time is in session (daylight savings is enabled in the summer).
4.	Daylight Savings Enabled Regionally Checkbox	This setting dictates whether or not daylight savings time is utilized at all in the region.
5.	Time Schedule Box	The time schedule informs receivers of the set of starting and ending times for daylight savings.
6.	Time Zone Box	The dropdown menu here allows control of the hour offset from UTC time (local time zone).
7.	Edit Checkbox	When checked, local time fields stop incrementing and the local time can be edited and saved.
8.	10MHz Clock Source Status Indicator	Displays the current 10 MHz source that is used in the system. The active source can be either the internal source or external source. The source is controlled automatically, so if a working 10MHz clock is connected on the rear panel it is always used.
9.	GPS Status Indicator	Indicator displays green if the internal GPS unit is locked and red if the internal GPS unit is not locked. A nonfunctioning unit or a unit that has no antenna attached shows as grey.
10.	GPS Data Fields	Fields displaying information outputted by the GPS receiver.





## 5.16 Diagnostics Screen

The XPi 10esp Diagnostics Screen presents faults and allows a user to access the event log screen. The fault indicators are green when the system component is clear of faults. When a fault is detected, the appropriate indicator turns red.

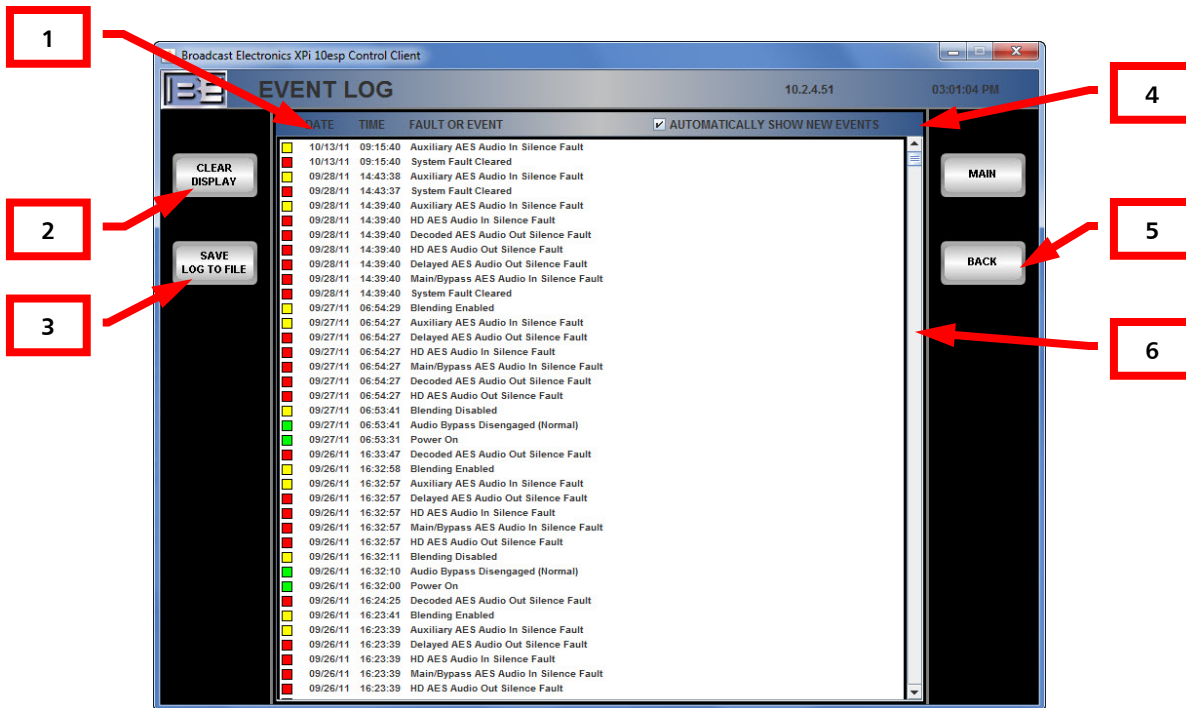


**Figure 20 – Diagnostics Screen**

No.	Feature	Description
1.	Audio Silence Panel	Audio Silence faults are triggered when the channel has peak holds below the user-specified threshold for the specified length of time. See section 5.10 Silence Setup Screen for control of these thresholds and time periods.
2.	Connections Panel	The Connections Status window presents the XPi 10esp connection status indicators. These faults are triggered when a connection to this part of the system is disrupted.
3.	Hardware Panel	Indicators in the panel reflect the status of various pieces of hardware in the system. If these faults are occurring regularly or will not clear, Broadcast Electronics Technical Service should be contacted.
4.	Software Versions Panel	The software versions panel presents the version numbers of all the software used with the XPi10esp.
5.	Event Log Button	Loads the Event Log Screen when clicked.
6.	Fault Reset Button	Attempts to reset any displayed XPi 10esp faults when clicked.
7.	Reset Exciter Button	Triggers an Exciter reset message to be sent through the broadcast system. This reset interrupts the HD broadcast.

## 5.17 Event Log Screen

The XPi 10esp Event Log Screen displays a log of all events tracked by the XPi10esp.



**Figure 21 – Event Log Screen**

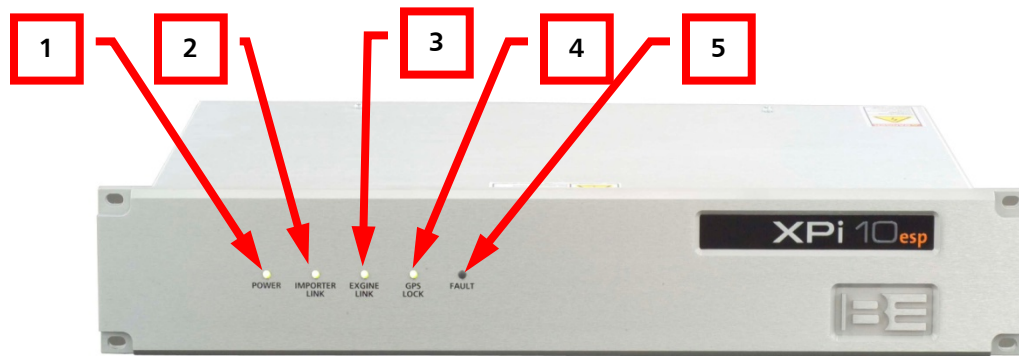
No.	Feature	Description
1.	Event Log	The Event Log consists of up to 300 events. Each event consists of; 1) an indicator displaying the event severity (green – normal event, red – fault event) 2) time and date of the event, and 3) an event description.
2.	Clear Display Button	Erases all events currently displayed in the event log. This does not erase events that have been accumulating locally when stop mode is active.
3.	Save Log To File Button	This save button saves the currently displayed log to a .txt file in the same directory as the XPi.jar program file titled as the current time stamp.
4.	Automatically Show New Events Check Box	When checked, the Remote GUI automatically polls the XPi10esp for new events. Uncheck this to stop the scrolling effect that occurs when a new event is added at the top of the list.
5.	Back Button	Loads the Diagnostics Menu when clicked.
6.	Scroll Bar	Use the mouse here to scroll down the list in order to view older events.

## 6 Maintenance

The XPi 10esp has built in fault detection mechanisms to allow a user to isolate and troubleshoot system problems. The fault detection mechanisms trigger displays and warnings on the front panel LEDs, all Remote GUI screens in the form of a blinking BE icon in the top left corner, the MAIN menu status displays, and the DIAGNOSTICS menu.

### 6.1 Front Panel LEDs

The XPi 10esp front panel LEDs provide some fundamental connection status and system fault information.



**Figure 22 – XPi 10esp Front Panel Features**

No.	Description	Troubleshooting
1.	POWER Indicator - Illuminates green to indicate ac power is applied to the unit.	Apply the specified power to the unit.
2.	IMPORTER LINK Indicator - Illuminates green to indicate data is being received from the Importer. Illuminates red to indicate an Importer has lost connectivity. If no Importer has been connected to the system since startup, this LED is off. Illuminates amber when a connection is being established, ie after a fault reset.	Check IP configuration and the Ethernet data path from Importer to the Exporter. Check the Importer for faults.
3.	EXGINE LINK Indicator - Illuminates green to indicate audio data packets are being sent to the Exgine. Illuminates red to indicate no packets are being sent over the network. Illuminates amber when a connection is being established.	Check IP configuration and data path.
4.	GPS Indicator – When not locked, this LED is off. Illuminates green to indicate the internal GPS is locked to GPS signals.	Check the GPS antenna.
5.	FAULT Indicator - Illuminates red to indicate that a system fault has occurred.	Check the DIAGNOSTICS screen and follow the troubleshooting procedures listed.

## 6.2 Back Panel Link lights and Hardware Detection

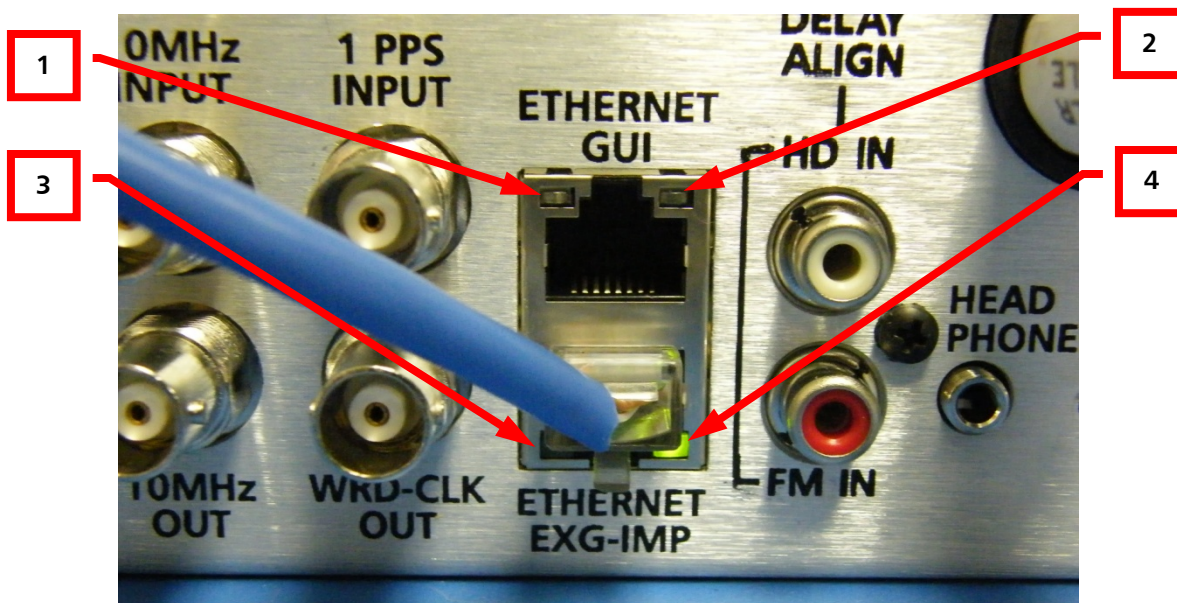


Figure 23 – Ethernet Port Lights

No.	Feature	Description
1.	GUI Port Activity LED	If there is activity in the network connected to this Ethernet port, this light blinks. Power must be on for this to be active. If this light is not active but there is a link light, there may be a network failure on the other side of the hub/switch connected to the XPi10esp.
2.	GUI Port Link LED	The link light indicates that a valid hardware connection between the XPi10esp and a network hub/switch has been made. Power must be on for this light to be on. If this light is not on, check the connection to the hub/switch.
3.	Data Port Activity LED	This behaves the same way as the GUI Port Activity LED.
4.	Data Port Link LED	This behaves the same way as the GUI Port Link LED.



**Figure 24 – Audio Hardware Detection Lights**

No.	Feature	Description
1.	AES Audio Hardware Detection Lights	When the XPi10esp detects a valid AES clock signal, these lights are green. The lights are only on when power is on. If these lights are not on, there is likely an issue with the audio cable connection or the system device that feeds audio to the XPi10esp.

### 6.3 Main Menu Screen

The XPi 10esp Main Menu provides the user with current status of audio inputs and outputs, operating status of key processing components and switches in the system, and all of the key system connections. See Section 5.4 for the main menu connection status indicator behavior.

### 6.4 Diagnostics Screen

The details of diagnosing system problems and troubleshooting are presented in the XPi 10esp DIAGNOSTICS menu. See Section 5.16 for a description of the behavior of this screen's controls.

If faults occur in the system, simply follow the steps displayed in the Fault Analysis panel and hit the FAULT RESET button to inform the system that actions have been taken to resolve the fault. If the fault does not clear, the problem was not resolved correctly. As a last resort, see Section 9 for technical service contact information.

### 6.5 Software Upgrades

The latest versions of software for the XPi 10esp Exporter are available from the Broadcast Electronics Technical Service website under the Registered User Login section:  
<http://www.bdcast.com/information-center/product-information/>

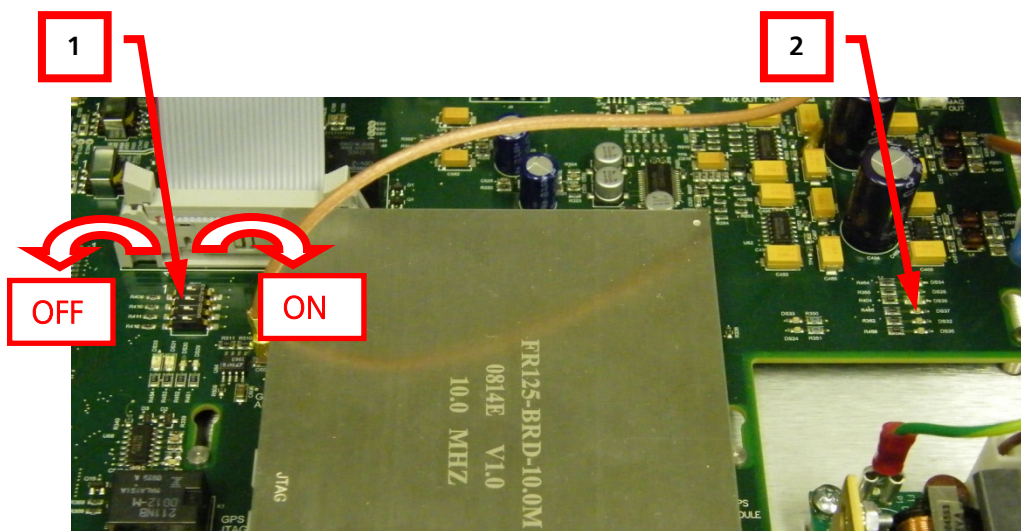


Detailed instructions for any software upgrades are included in the appropriate application guide:

<http://www.bdcast.com/information-center/application-guides/>

## 6.6 Restore System to Factory Defaults

1. Gain access to the interior by removing the top panel (this may require the XPi10esp be removed from the rack).
2. Discharge any static electricity that may be present by touching the chassis.
3. An array of four switches is located adjacent to the top left corner of the GPS unit, see Figure 25 item #1. Note that these switches may be covered by a thin film that is necessary for the manufacturing process. This film must be removed in order to operate the switches.



**Figure 25 – Factory Defaults Reset Components**

4. Move switch number 4 to the on position (if it's already in the on position, switch to off and switch on again), and wait for LED DS32 which is located in an array of LEDs all the way to the right of the circuit board on the other side of the GPS receiver, see Figure 25 item #2.
5. Once the LED is on, move switch 3 to the on position.
6. Replace the cover and restart the XPi10esp by turning the power switch off.
7. Move switches 3 and 4 to the off position.
8. Then move switches 3 and 4 to the on position. Follow the necessary steps in the Installation Guide to set up the XPi10esp for first-time system operation.

## 7 XPi 10esp Key Parts List

PART NUM	DESCRIPTION	QTY
919-6000	Assembly, PCB, DSP Circuit Board	1
809-0125	NAVSYNC 10 MHz GPS Based Clock	1
919-6001	Assembly, PCB LED Circuit Board	1
919-6002	Assembly, PCB Input/Output Circuit Board	1
540-1012-100	Power Supply, 12V 65W AC/DC Converter 2"X4"	1
510-231-001	Fan with Connector	1

## 8 Abbreviations and Acronyms

AES/EBU	Audio Engineers Society/European Broadcast Union Standard Audio
AM	Amplitude Modulation
ARP	Address Resolution Protocol (subset of Internet Protocol)
CUI	Command-line User Interface
FCC	Federal Communications Commission
FM	Frequency Modulation
FXi	Broadcast Electronics' Digital Exciter Product Line
GPS	Global Positioning System
GUI	Graphical User Interface
IDi	Broadcast Electronics' Importer Product Line
IP	Internet Protocol
L[#]	Layer # - OSI Model Conceptual Layer
MPS	Main Program Service
OFDM	Orthogonal Frequency-Division Multiplexing
PSD	Program Service Data
RF	Radio Frequency
SIS	Station Information Service
SPS	Supplemental Program Service
XPi	Broadcast Electronics' Digital Exporter Product Line
Vpp	Voltage Peak-to-Peak

## 9 RF Technical Services Contact Information

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 Telephone: (217) 224-9617  
 E-Mail: [rfservice@bdcast.com](mailto:rfservice@bdcast.com)  
 Fax: (217) 224-6258  
[www.bdcast.com](http://www.bdcast.com)

