



2: OPERATIONS & MAINTENANCE MANUAL

VX150 to VX2 TRANSMITTER

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RELEASE CONTROL RECORD

ISSUE	DATE	REASON
0.1	2020-12-01	Initial release for VX low power models. Supports hardware versions: VX150, VX300, VX600 (NARF81) VX1 (NARF79) VX1.5. VX2 (NARF80) Supports software version VX SW 1.0 and later.
0.2	2021-01-14	Implemented Engineering review changes in sections

SECTION 2.1: DESCRIPTION

This section provides a high-level description of the transmitter's key sections. The transmitter circuitry is subdivided into four basic stages:

- [Ac-Dc Power Stage](#)
- [Control/Excitation Stage - see page 2.1.4](#)
- [RF Stage - see page 2.1.5](#)

Refer to the functional block diagram, [Figure 3.1.1 on page 3.1.9](#).

VX150 to VX2 Electrical Schematics

Some descriptions in this section refer to electrical schematics (SD-#s). These are located in Section 4 of the VX150 to VX2 Troubleshooting Manual.

Ac-Dc Power Stage

See electrical schematic Figure SD-1. The ac-dc power stage provides power to operate the low voltage power supply, which generates the +12 dc voltage that is used throughout the transmitter. This supplies the voltage to operate cooling fans, IPA and power the PWBs. The ac-dc power stage also contains a dc power supply that provides positive dc voltage (PA volts) for the transmitter's RF power amplifier. The output voltage range of the dc power supply varies with the model. For VX150 to VX600 transmitters, the output voltage range is between +18 and 53 V dc. For VX1 to VX2 transmitters, the output voltage range is between +23 and 65 V dc.

For normal operation, VX150 to VX600 transmitters accept a single-phase, 90 - 265 V ac (220 V ac nominal) ac input voltage.

For normal operation, VX1 to VX2 transmitters accept a single-phase, 185 - 265 V ac (220 V ac nominal) ac input voltage.

NOTE: *VX1 to VX2 transmitters can operate from a 90-185 V ac input, but will have reduced output power.*

The ac-dc power stage consists of Power Supply Interface PWB (A4), low voltage power supply (LVPS) (U2) and power supply (U3).

Power Supply Interface PWB

See electrical schematic Figure SD-1. The Power Supply (PS) Interface PWB (A4):

- ❖ interfaces between the ac input and the LVPS and the power supply.
- ❖ distributes LVPS voltage to the RF drive (exciter) stage and the control/monitor stage.
- ❖ distributes PA voltage to the RF power stage and the control/monitor stage.
- ❖ controls, with the controller module, the LVPS output voltage.
- ❖ provides RS485 serial communication between the system interface PWB and the power supply.
- ❖ provides status and alarm outputs from the LVPS and power supply, consisting of Module Present, Power Fail Warning, Rectifier Fault and Overtemp Warning (provided to the Module Control/Interface PWB over a serial bus).

Low Voltage Power Supply

See electrical schematic Figure SD-1. LVPS module (U2) converts the ac input voltage to the regulated output (+12 V dc). This voltage is used to power all the PWBs, the cooling fans and the IPA.

Power Supply Modules

See electrical schematic Figure SD-1. Power supply module U3 converts the ac input voltage to a regulated dc supply (PA volts) for the RF amplifier and provides an output voltage between 18 V and 53 V for the VX150 to VX600, and between 23 and 65 V dc for VX1 to VX2). The modules regulate the output voltage based on a serial control input from the Power Supply Interface PWB (A4). The supply also senses out-of-regulation on the ac input and dc output, and applies a Power Fail Warning signal to the Exciter PWB. Both conditions cause the power supply to shut itself down, thus shutting down the transmitter's RF output. All power supply module signals are applied to the exciter for system level monitoring.

Control/Excitation Stage

See electrical schematics SD-1 and SD-3. The control/excitation stage performs many critical functions for the transmitter. The primary components of the control/monitor stage are the Exciter PWB (A1) and the System Interface PWB (A3).

The display module (U1) uses a rotary button to navigate through the various menus. On the front panel there is a pushbutton switch (BACK) to allow the user to return to the previous menu. There are two front panel LEDs that monitor the status (local/remote and RF on/off).

The Exciter PWB (A1) provides a convenient method to remotely control and monitor of the transmitter. An SD card (A1U63) provides a storage medium that has the operating system (OS) for the transmitter and stores the presets and calibration data.

Exciter/Controller

The exciter PWB (A1) provides the RF drive source and performs all the necessary control and protection for the transmitter. It accepts the external audio program information (see the *VX150 to VX2 Installation Manual* for details on various program input types). The exciter output is applied to the Pre-Amp/IPA PWB (A6). The exciter PWB's final stage is a linear gain block with 20 dB gain and a maximum output of +39 dBm.

Other functions of the Exciter PWB are:

- ❖ generates RF signal with modulation
- ❖ accepts analog modulation from analog audio PWB
- ❖ accepts digital modulation
- ❖ hosts Ethernet server and remote control I/O
- ❖ accepts forward power sample from directional coupler
- ❖ accepts interlock input
- ❖ accepts SWR shutdown from system interface PWB

System Interface

The System Interface PWB (A3) interfaces with the Exciter PWB to perform the following functions:

- ❖ contains monitoring and protection circuits to prevent transmitter damage under adverse or fault conditions, including high speed SWR protection and interlock/muting.
- ❖ monitors the current value of various parameters including cooling fan tachometer outputs, transmitter output forward and reflected power, heatsink and intake temperature, PA current levels, and PA power supply status signals.
- ❖ measures and monitors the output voltage from the power supply modules as well as the low voltage power supplies.
- ❖ generates the signals that enable the power supply modules and control their output voltage.
- ❖ provides the status of any controller fault conditions.
- ❖ interfaces with the RF and power supply sections of the transmitter to perform control and monitoring functions.
- ❖ provides local and remote interfacing for the transmitter. Local interfacing is performed via the local FPUI on the transmitter and the front panel TFT LCD display (320 x 240 pixels). The AUI and front panel UI each contain a menu-based series of pages that serve specific functions. The AUI is available via remote access.

RF Stage

See electrical schematics SD-2 and SD-4. The RF power stage accepts the RF drive input and generates the final RF output. It consists of a Pre-amp/IPA (A6), Power Amplifier (A7), Exciter PWB (A1), a Low Pass Filter assembly (A9) and a Directional Coupler (A11). The Pre-amp/IPA amplifies the exciter's RF output to the proper level required to drive the power amplifier(s).

IPA/RF Power Amplifier

See electrical schematics SD-12 and SD-13. The intermediate RF drive outputs from the RF drive stage are applied to the RF power amplifier via the system interface PWB (A3). The PA volts inputs from the associated power supply module controls the RF output of the PA.

Low Pass Filter Assembly

The low pass filter assembly (A9) is applied to the output of the power amplifier to reject harmonics prior to the directional coupler (A11).

Directional Coupler

See electrical schematic Figure SD-15. The directional coupler (A11) samples the transmitter's forward and reflected power and generates the Fwd Pwr Sample (A11J2) and Refld Pwr Sample (A11J3) signals applied to the exciter PWB and system interface PWBs for protection and monitoring. RF monitor provides -35 dB coupling (1 V at 75 W) at A11J1, which is applied to the panel mount BNC connector on the rear panel. This can be used with a modulation monitor or spectrum analyzer.

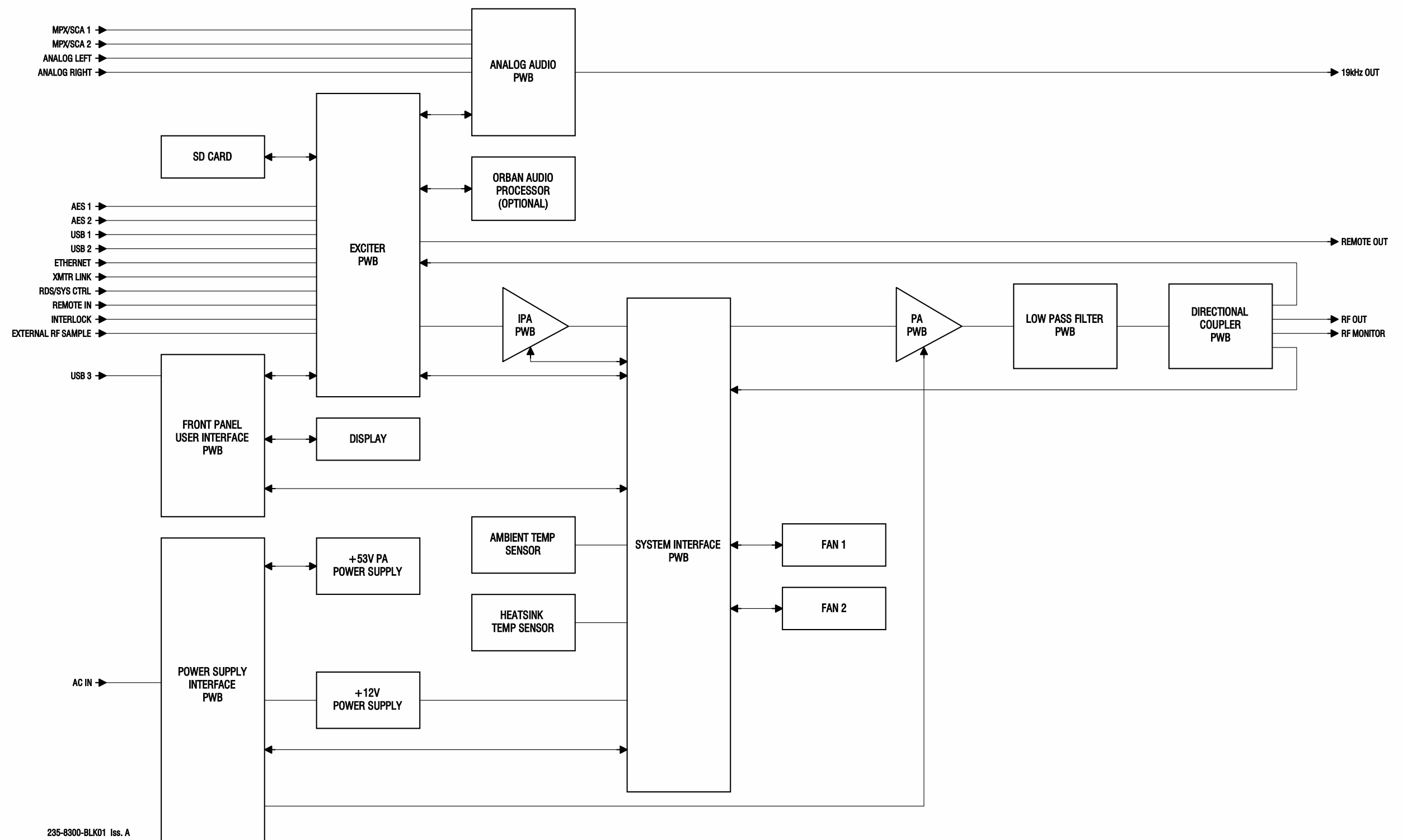


Figure 2.1.1: VX150/VX300/VX600 Transmitter Block Diagram

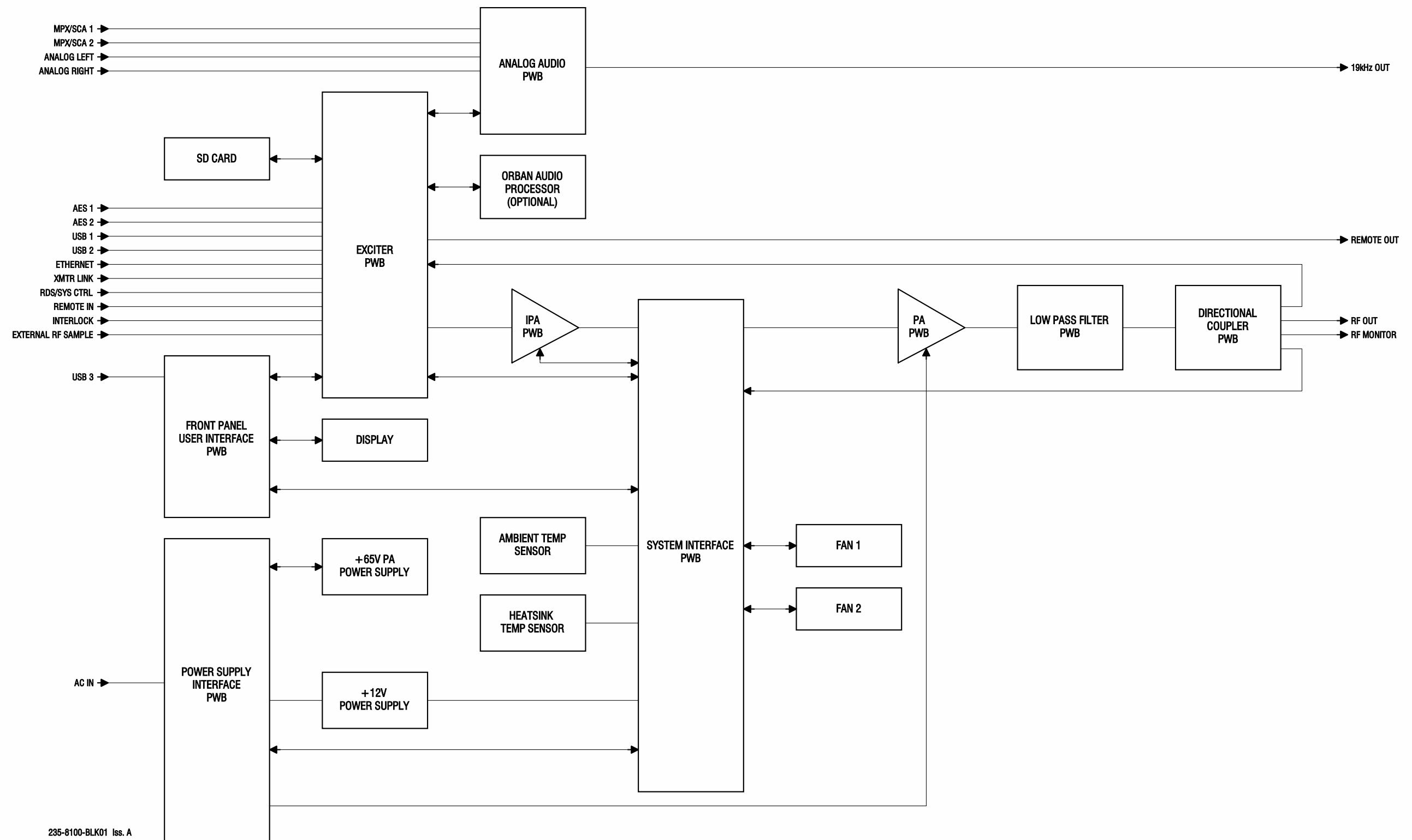


Figure 2.1.2: VX1 Transmitter Block Diagram

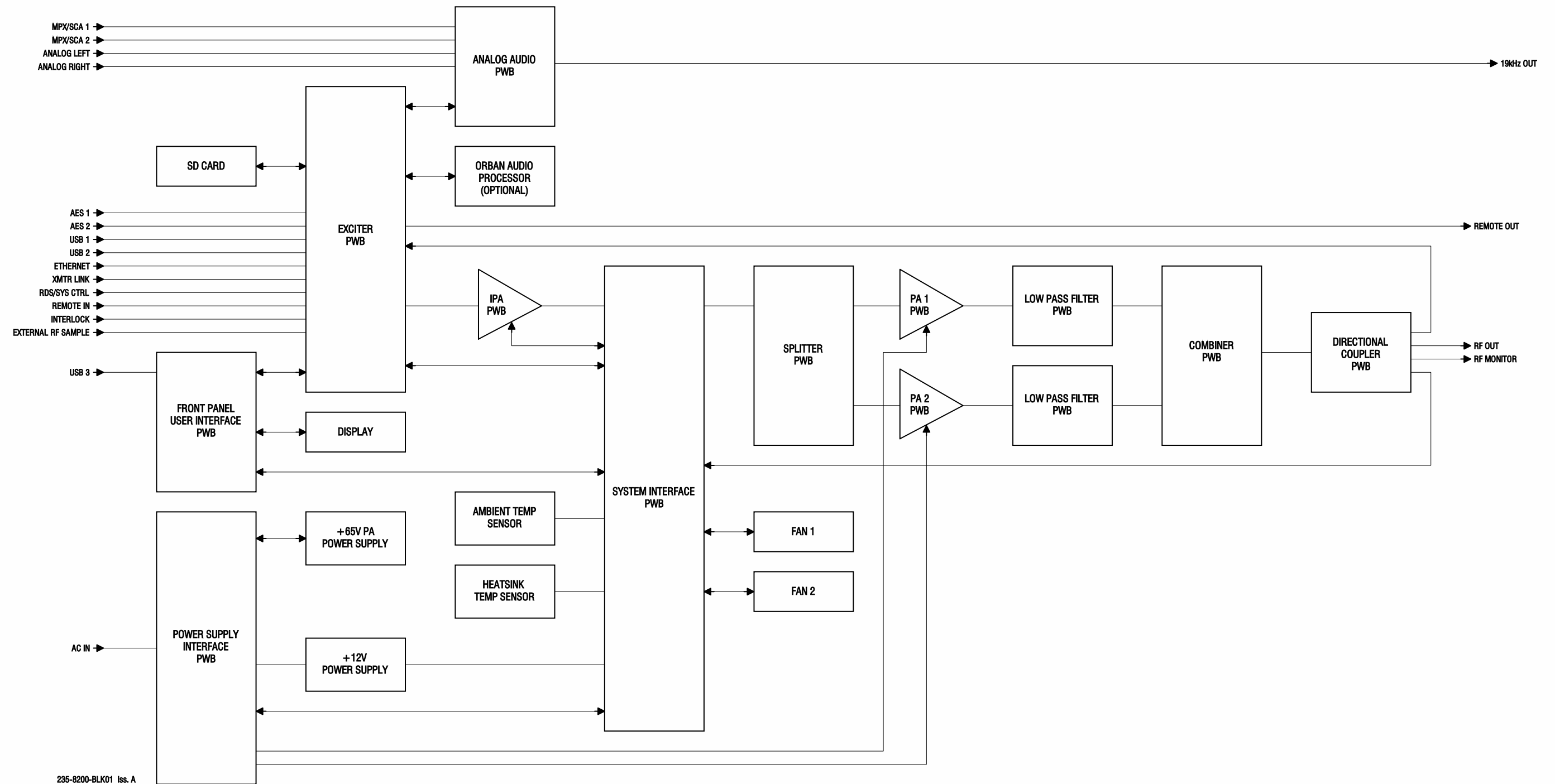


Figure 2.1.3: VX1.5/VX2 Transmitter Block Diagram

SECTION 2.2: OPERATING THE TRANSMITTER

This section provides information about operating the VX150 to VX2 transmitter:

- [User Interface Options - see page 2.2.3](#)
 - [Front Panel User Interface \(FPUI\) - see page 2.2.4](#)
 - [Advanced User Interface \(AUI\) - see page 2.2.7](#)
 - [Logging into the AUI - see page 2.2.8](#)
 - [Describing the AUI Layout - see page 2.2.9](#)
 - [List of AUI Pages - see page 2.2.10](#)
- [Managing and Displaying Widgets - see page 2.2.13](#)
 - [Alarms & Warnings - see page 2.2.17](#)
 - [Audio Inputs - see page 2.2.17](#)
 - [FPUI Alarms - see page 2.2.18](#)
 - [Modulation - see page 2.2.19](#)
 - [Dashboard Meters - see page 2.2.20](#)
 - [FPUI Meters - see page 2.2.22](#)
 - [Spectrum Analyzer - see page 2.2.23](#)
- [AUI Menu Page - see page 2.2.25](#)
- [Viewing Transmitter Alarms - see page 2.2.28](#)
 - [Alarm History - Using the AUI - see page 2.2.28](#)
 - [Viewing Transmitter Status - using the AUI - see page 2.2.30](#)
- [Meters - see page 2.2.31](#)
- [Presets - see page 2.2.32](#)
- [Preset Scheduler - see page 2.2.50](#)
- [Audio Player - see page 2.2.53](#)

- [System Settings - see page 2.2.57](#)
 - [Users - see page 2.2.58](#)
 - [Notifications - see page 2.2.64](#)
 - [Network - see page 2.2.65](#)
 - [Exgine - see page 2.2.69](#)
 - [Email Server - see page 2.2.69](#)
 - [Time - see page 2.2.71](#)
 - [SNMP - see page 2.2.75](#)
 - [Login - see page 2.2.76](#)
 - [Orban Audio Processing - see page 2.2.76](#)
 - [Exciter Reboot - see page 2.2.94](#)
 - [Call Sign - see page 2.2.95](#)
 - [Software Upgrade - see page 2.2.95](#)
 - [Audio Calibration - see page 2.2.97](#)
 - [Exciter TXCO Calibration - see page 2.2.98](#)
 - [Power Thresholds - see page 2.2.98](#)
 - [Capturing Critical Parameters - see page 2.2.100](#)
- [Configuring Remote Inputs and Outputs - see page 2.2.101](#)
 - [Remote I/O Settings - using the AUI - see page 2.2.101](#)
 - [Monitoring Analog Outputs - see page 2.2.105](#)

User Interface Options

The user can interface with the VX150 to VX2 using one of three methods:

- Locally, using the transmitter's front panel UI and its rotary button (see [Front Panel User Interface \(FPUi\)](#), on page 2.2.4).
- Remotely, via a LAN connection, using the advanced user interface (AUI) pages (see [Advanced User Interface \(AUI\)](#), on page 2.2.7).
- Remotely, via remote input/output (I/O) wiring connected to the rear of the transmitter to the remote I/O D-sub connectors on the rear panel (see [Configuring Remote Inputs and Outputs](#), on page 2.2.101). Refer to the VX150 to VX2 Installation Manual for I/O details).

See the complete menu hierarchy illustrated in Figure 2.2.1 (for the remote AUI menu) and Figure 2.2.2 (for the Front Panel UI menu). When a user interfacing function can be performed from both the AUI and the Front Panel UI, both are described in this section.

Front Panel User Interface (FPUI)

The VX150 to VX2 uses a Front Panel User Interface (FPUI) to control the transmitter locally.

See [Figure 2.2.3](#) for the Dashboard display. The menus are navigated using the rotary knob on the front panel. Pressing the rotary knob selects the highlighted menu (see [Figure 2.2.4](#)).

Figure 2.2.3: FPUI Dashboard

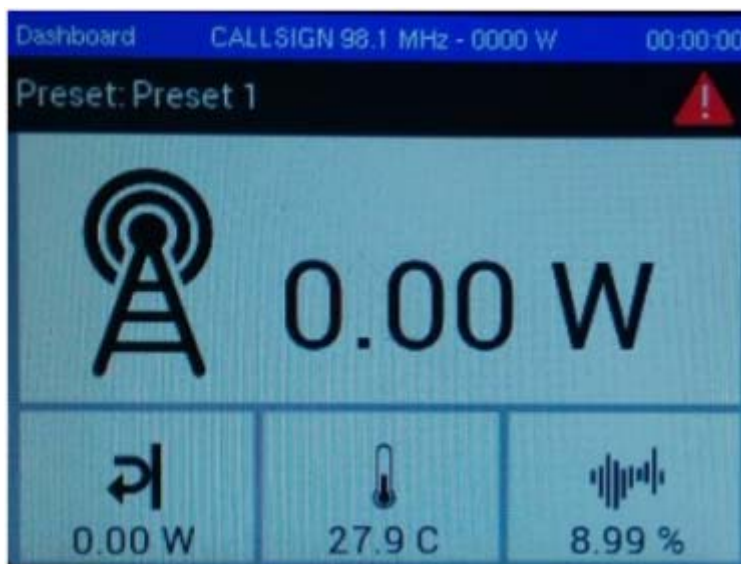
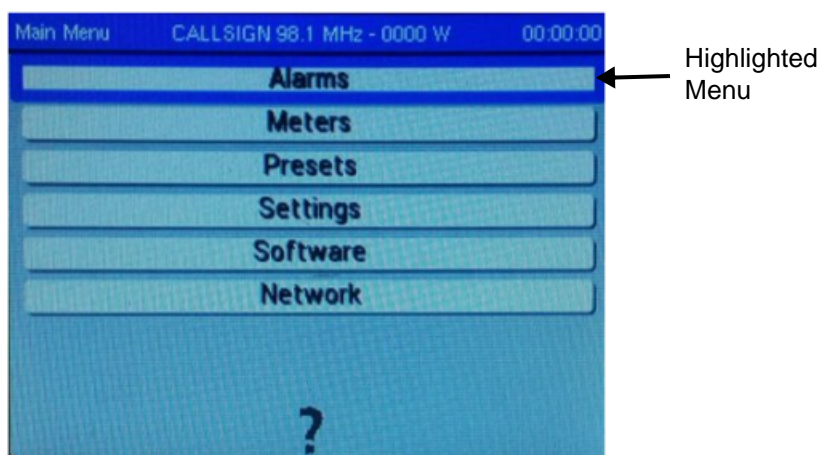


Figure 2.2.4: FPUI Main Menu

Main Menu



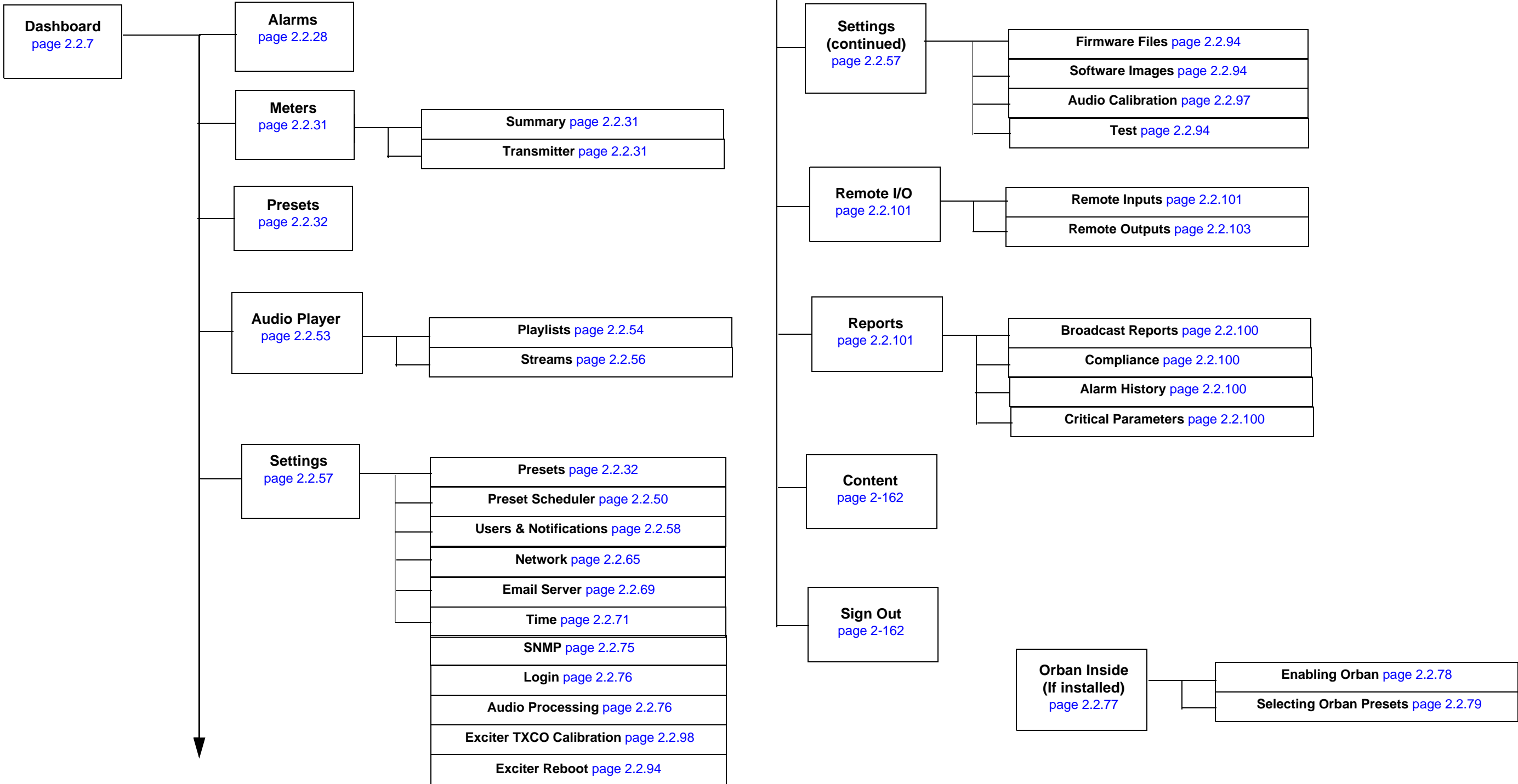


Figure 2.2.1: VX Transmitter - Remote AUI Menu Tree

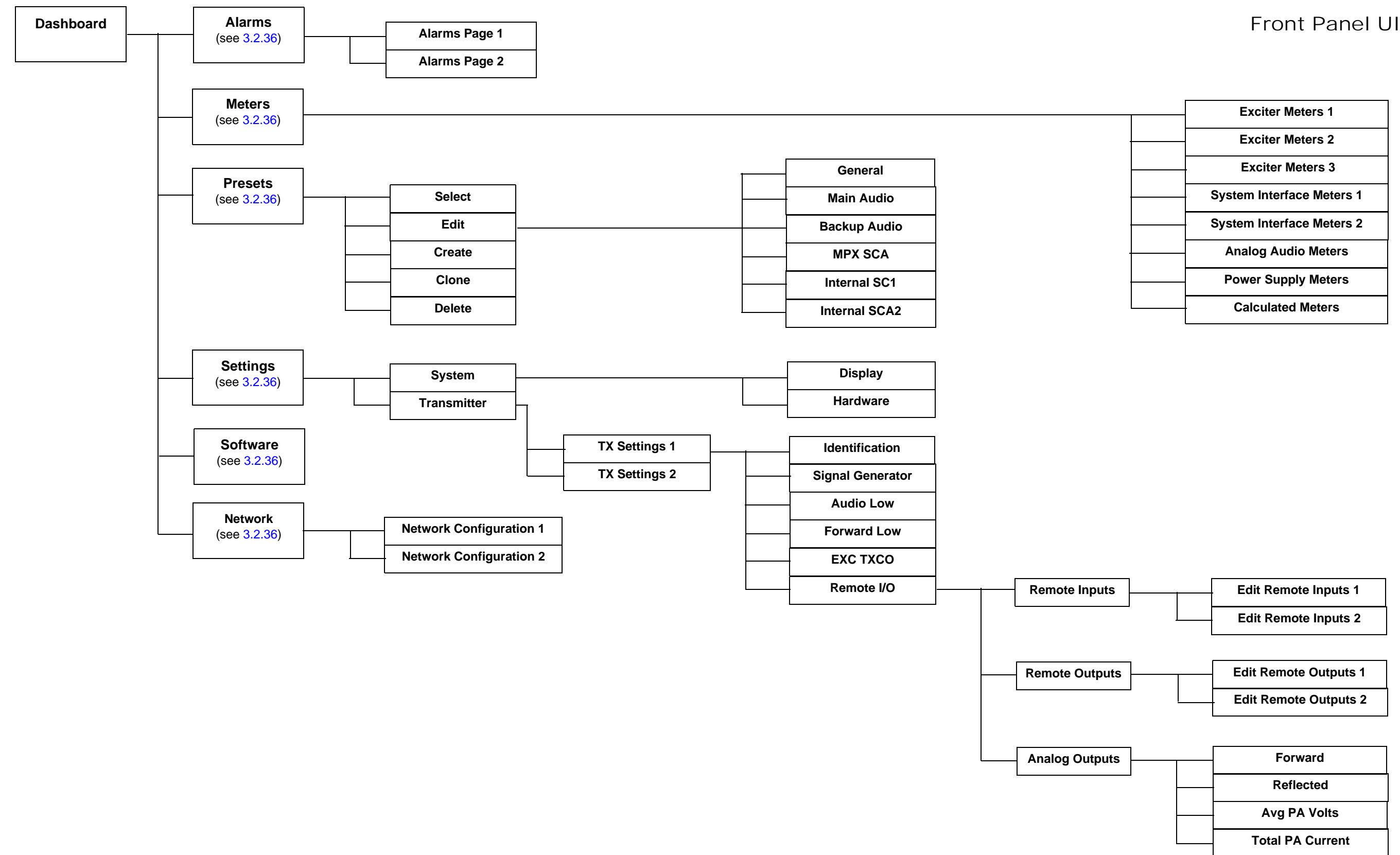


Figure 2.2.2: VX150 to VX2 Transmitter - Front Panel UI Menu Tree

Advanced User Interface (AUI)

The VX150 to VX2 used an advanced user interface (AUI). You can access the AUI remotely using a PC and a web browser, directly or through a switch or network - via the LAN connection on the rear panel of the transmitter.

NOTE: *Nautel recommends you clear your browser's history before viewing the remote AUI.*

This section includes the following topics:

- [Logging into the AUI, on page 2.2.8](#)
- [Describing the AUI Layout, on page 2.2.9](#)
- [List of AUI Pages, on page 2.2.10](#)
- [Managing and Displaying Widgets, on page 2.2.13](#)

Logging into the AUI

The transmitter's AUI provides a means to restrict remote access to transmitter control functions to authorized users only. Users can create accounts that can be pre-defined to set access restriction from view-only (no control), full control (all permissions), custom (select permissions) and administrative control.

Remote Access

To access the transmitter's AUI remotely, perform the following steps:

1. Configure your network settings (see [Network](#), on page 2.2.65).
2. On your router or firewall software, open ports 3501 (3501 is factory default; use corresponding other port if changed) and 80 and close (restrict access to) all other ports. If you are using RDS data, open port 7005. If you are using SNMP, open ports 161 (Agent) or 162 (Traps).
3. When properly configured as noted above, the login menu (see [Figure 2.2.5](#)) will appear in your web browser when the IP address is accessed. Your IP address and any login messages appear in a box at the top, beside the logo.

Figure 2.2.5: AUI Login Menu

Settings	
Presets	
Preset Scheduler	
Users and Notifications	
Network	
Email Server	
Time	
SNMP	
Login	
Audio Processing	

Login	
Language	English
Email	Email
Password	Password
Login	

4. Log in to the AUI by entering the appropriate parameters in the login window.
 - In the Language field, press the down-arrow to review a drop-down menu displaying the available language options, and select one.
 - In the User field, enter the username. Default is "Nautel".
 - In the Password field, enter the password. Default is blank.

NOTE: *The Nautel AUI is factory configured with a default login username and password. Nautel recommends that you change the password to improve overall system security (see [Set or Change the Password](#), on page 2.2.61).*

Also, you should change the OS (operating system) password. This is a unique, factory set password that is referenced in your Proof of Performance documents. See the Installation Manual for instructions to change the password.

- Press Submit to accept your login parameters and display the AUI Dashboard. Note: The opening screen (the Dashboard) will have the layout from the previous login session.

NOTE: *If you do not have a user account, it must be set up by an existing user with proper permissions. See [Adding an Account](#), on page 2.2.60.*

NOTE: *If no login attempt is made after 60 seconds, a timeout feature will be activated and the web browser will be need to be refreshed or the Retry button pressed (appears on AUI window after timeout) in order to attempt another login.*

Describing the AUI Layout

The AUI begins with the Dashboard page and all further navigation will start from this screen (see [Figure 2.2.6 on page 2.2.11](#)).

Any user can view the AUI pages on the remotely, however, only users with the appropriate permission level can access functions that alter the transmitter control settings.

Users can access the login menu by pressing the Change User button located in the bottom banner of the AUI when logged in remotely. It should be noted that this same button is shown as Log Out if viewing the AUI remotely (see [Figure 2.2.6 on page 2.2.11](#)).

List of AUI Pages

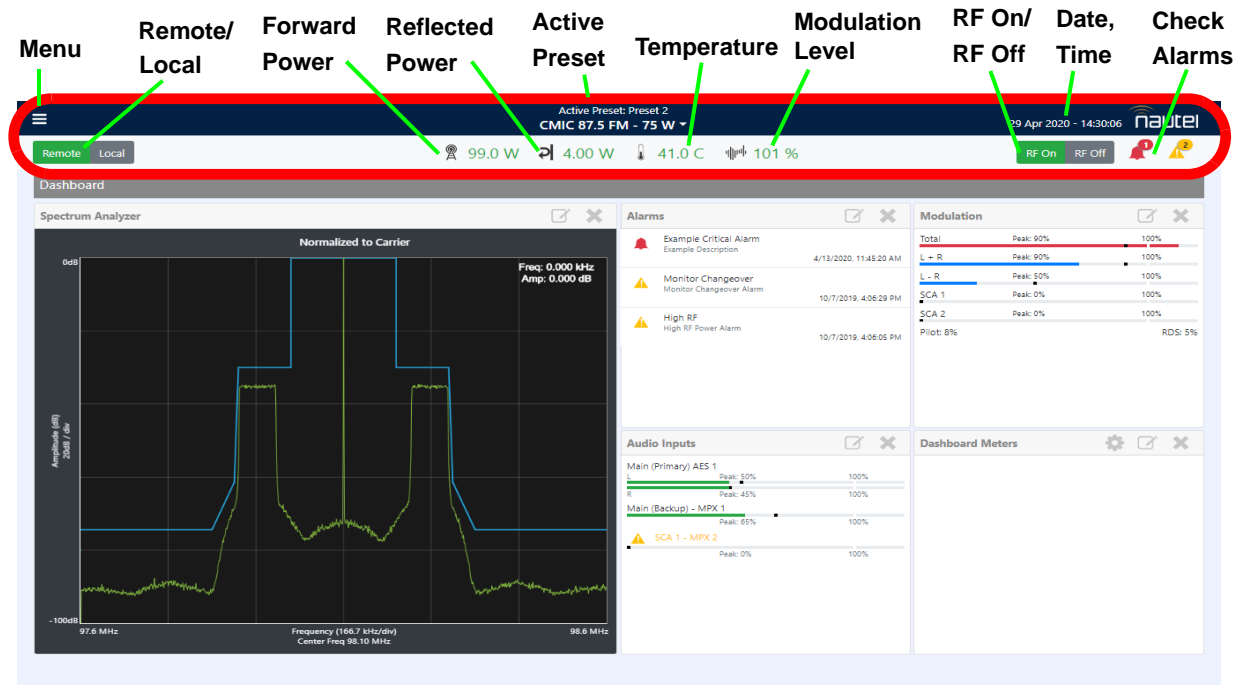
Table 2.2.1 defines the available AUI pages.

Table 2.2.1: AUI Pages

AUI Page	Function	See Page
Dashboard	View meters, tool menu panels, choose options and navigate to other pages.	page 2.2.7
Menu	Choose options and navigate to other pages.	page 2.2.25
Status	View transmitter's current active faults and operational status.	page 2.2.30
Logs	View transmitter event history.	page 2.2.28
Widgets	Choose widget panel options.	page 2.2.13
Dashboard Meters	Choose meters for display.	page 2.2.20
Presets	Edit user-defined presets.	page 2.2.32
System Settings	Set network information, configure email and alarm notification parameters, configure Engine interface information, configure SNMP information, capture critical parameters, set time and date, enable/configure NTP servers, set call sign/ID, set user thresholds (audio and forward power alarms), set turn-on behavior.	page 2.2.57
User Accounts	Set user permission rights and define user account information.	page 2.2.58
Remote I/O	Define remote digital inputs/outputs and configure analog outputs.	page 2.2.101
Scheduler	Define a preset schedule for daily/monthly operation.	page 2.2.50
Audio Player	Manage audio playlist and stream sources.	page 2.2.53
Audio Processor	Configure the transmitter for use with the Orban Inside option, if applicable. Icon displays only if Orban Inside is installed.	page 2.2.76

Each AUI page provides information about a specific transmitter function. All navigation through the AUI pages begins on the main screen shown in [Figure 2.2.6 on page 2.2.11](#).

Figure 2.2.6: Using the AUI



Widget Display Area - displays the Widget Manager selections, in one of two user-determined sizes.



- denotes top banner items; displayed on all AUI pages

The top banner is permanent on all AUI pages and includes:



- **Menu:** Click to display further operations options, which allows navigation to various other pages (see [AUI Menu Page on page 2.2.25](#)). Note: when Menu is selected, the three horizontal lines change to three vertical lines.
- **Active Preset:** Displays the name of the active preset (e.g., Preset 1), call sign, carrier frequency in MHz, mode (e.g., FM), and power set point. Click to see available presets and initiate a preset change (see [Activating Presets on page 2.2.35](#)).
- **Date & Time:** Displays day, month, year and current time. Click Settings -> Time to go to the Time Setup page (see [Time on page 2.2.71](#)).
- **Nautel Logo:** From any page, click the Nautel logo to return to the Dashboard page.

- Remote/Local: Buttons that determine the location of the operational control of the transmitter. If Local is selected, only local control of the transmitter is possible and is highlighted in red. Remote is highlighted green, when enabled.
- Forward Power: Displays the current forward power level of the transmitter.
- Reflected Power: Displays the current reflected power level of the transmitter.
- Temperature: Displays the current operating temperature of the transmitter.
- Modulation: Displays the current modulation percentage of the transmitter.
- RF On/Off: Buttons that determine the on/off status of the transmitter's RF power stage. The button that is highlighted green indicates the current setting. Click RF On to enable the transmitter's RF power stage. Click RF Off to disable the transmitter's RF power stage.
- Active Alarms: Displays the critical-level alarms (red bell, with number) and maintenance-level alarms (amber warning, with number) that are currently active on the transmitter. Click on either symbol to go to the Alarms page (see [Viewing Transmitter Alarms on page 2.2.28](#)), which provides details for current alarms as well as an option to view alarm history. When a critical-level alarm is being reported, the transmitter is in an 'off-air' state. When a maintenance-level alarm is being reported, the transmitter may still be 'on-air', but possibly at reduced power. When the transmitter is operating normally, no alarm symbols will display.
- Reset Latched Alarms: Resets protection circuits and power supplies that were inhibited, but are now alarm-free. Click Alarms from the Dashboard menu and select Reset Latched Alarms to clear. To initiate an alarm reset from the front panel UI, see [Resetting Alarms on page 3.2.98](#).

Managing and Displaying Widgets

This section includes the following topics:

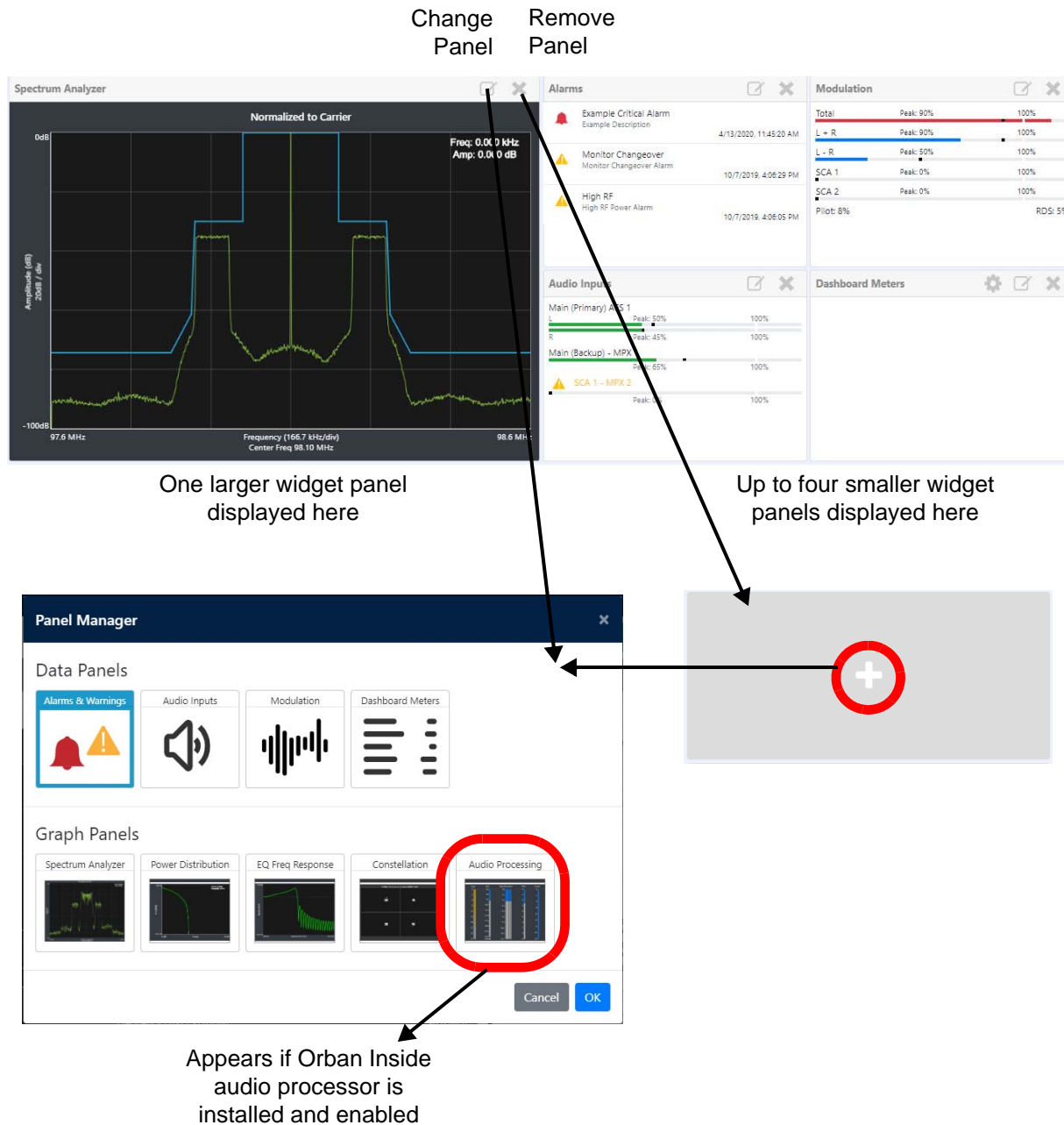
- [Describing Widget Panel Options - see page 2.2.15](#)
- [Alarms & Warnings - see page 2.2.17](#)
- [Audio Inputs - see page 2.2.17](#)
- [FPUI Alarms - see page 2.2.18](#)
- [Modulation - see page 2.2.19](#)
- [Dashboard Meters - see page 2.2.20](#)
- [FPUI Meters - see page 2.2.22](#)
- [Spectrum Analyzer - see page 2.2.23](#)

The VX150 to VX2 AUI provides measurement/status related tools, or widgets, that you can select to display on the AUI's Dashboard (see [Figure 2.2.6 on page 2.2.11](#)).

Up to five widgets can be displayed at one time, a larger widget on the left-hand side of the Dashboard and four smaller widgets on the right-hand side.

To view all the widget options, select the Change Panel (edit) icon in the top, right corner of any displayed widget. You can also remove a widget panel by clicking the Remove Panel (X) icon in its top, right corner, then replace it by clicking the + symbol to see the widget options. See [Figure 2.2.8 on page 2.2.15](#) for a more detailed view of the widget options.

Figure 2.2.7: Widgets displayed on Dashboard

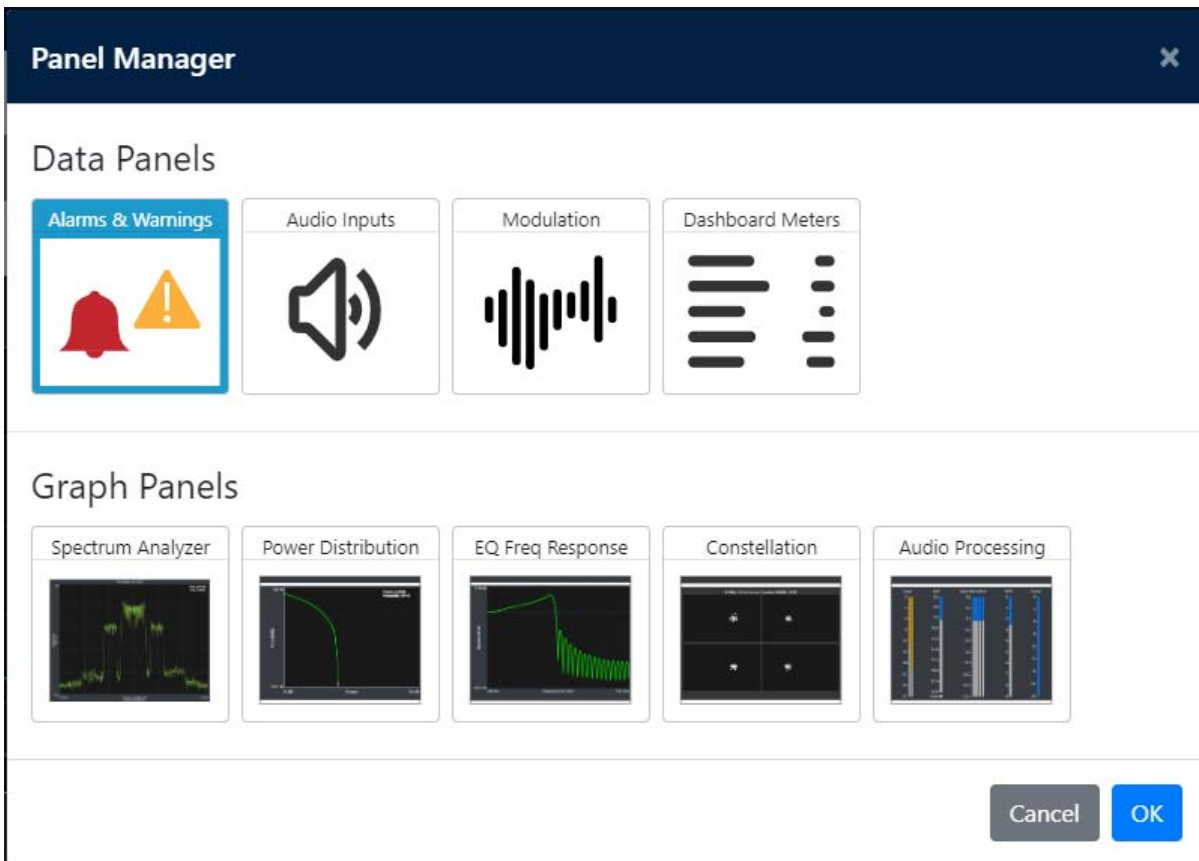


Describing Widget Panel Options

Click on the desired widget panel to display it. See [Table 2.2.2 on page 2.2.16](#) for a description of each widget, noting there are two types - Data Panels and Graph Panels. Data Panels display read-only measurement data. Graph Panels display graphical information with varying levels of cursor interactivity, depending on the widget panel.

The Reference column of [Table 2.2.2](#) includes a section to find more detail for each widget panel.

Figure 2.2.8: Widget Panel Options



The Audio Processing icon only appears when the Orban Inside audio processor is installed and enabled.

Table 2.2.2: Widget Panels

Widget Panel	Description	Reference
Alarms & Warnings	Data panel that allows the user to quickly see alarms that are active on their transmitter, from the Dashboard.	See page 2.2.17
Audio Inputs	Data panel that allows the user to display the pre-selected audio inputs and monitor the levels relative to the input level defined in the active preset.	See page 2.2.17
Modulation	Data panel that allows the user a second view of modulation levels, and a more complete set of meters than the basic default meter at the top. These meters include the L/R modulation, Magnitude, I Levels and Q Levels.	See page 2.2.19
Dashboard Meters	Data panel that allows the user to view a customized list of the transmitter's meters from the Dashboard.	See page 2.2.20
Spectrum Analyzer	Graph panel that displays a spectrum analyzer, capable of monitoring various RF sections of the transmitter, including the RF output.	See page 2.2.23
Audio Processing (optional)	Appears only when Orban Inside audio processor is installed and enabled. Displays various audio processor meters that indicate levels for inputs, AGC, gain reduction, multiplex (MPX) power and composite. Refer to Orban Audio Processing on page 2.2.76 and the Orban Optimod 5500 manual for detailed information on these meters.	See page 2.2.76

Alarms & Warnings

See [Figure 2.2.9](#). Displays active transmitter alarms, including critical-level alarms (red bell) and maintenance-level alarms (amber warning). A scroll bar will display, as required. The alarms listed in this panel should match the number of critical and warning alarms shown in the top banner of the AUI. Go to the Menu - Alarms page for alarm details (see [Viewing Transmitter Alarms on page 2.2.28](#)).

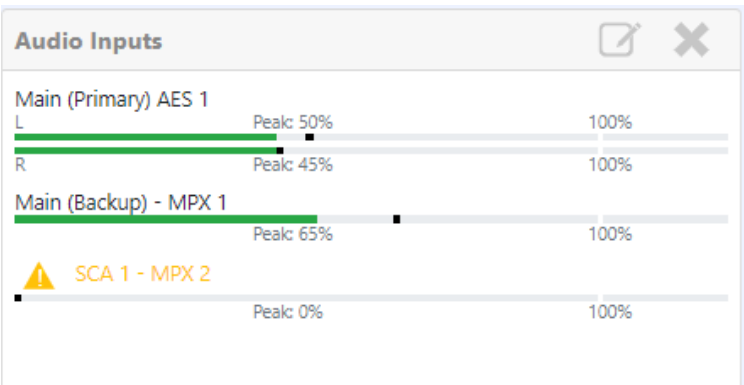
Figure 2.2.9: Alarms & Warnings Widget Panel



Audio Inputs

See [Figure 2.2.10](#). Displays preset audio inputs and monitor the levels relative to the input level defined in the active preset. Each audio input has a line that displays the current level (green bar), its peak level (black dot and shown numerically) and its full-scale value. If the input's level exceeds the full-scale value, the current level bar colour changes to red. Refer to ??? for selection of the displayed inputs.

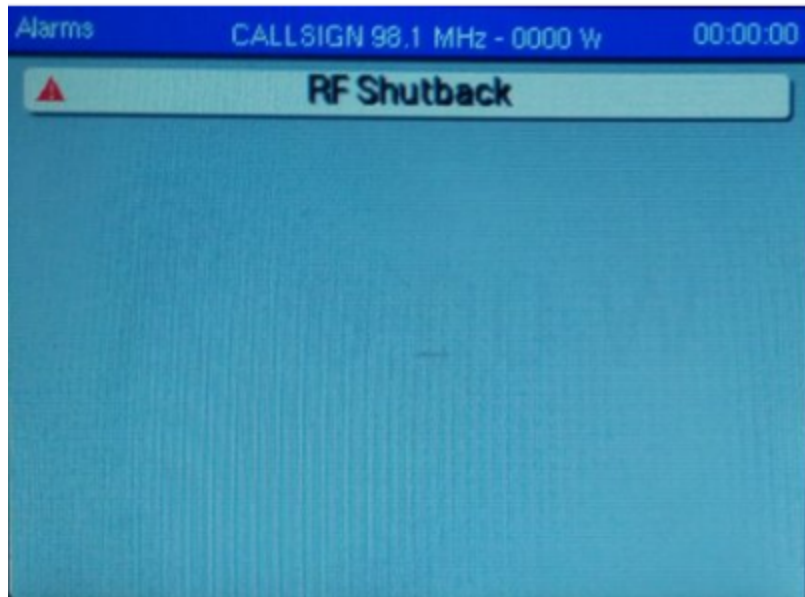
Figure 2.2.10: Audio Inputs Widget Panel



FPUI Alarms

Figure 2.2.11: FPUI Alarms Menu

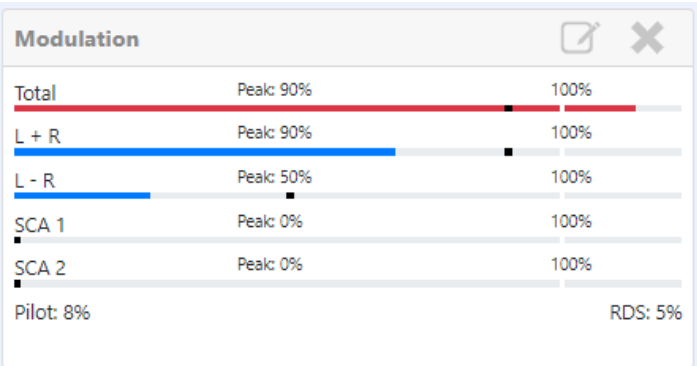
Alarms



Modulation

See [Figure 2.2.12](#). Displays modulation levels for audio inputs, and a more complete set of meters than the basic default modulation meter in the top banner. These meters include the L/R modulation, Magnitude, I Levels and Q Levels. (MAUI demo ? total, L+R, L-R, SCA 1, SCA 2, pilot, and RDS). Each audio input has a line that displays the current modulation level (green bar), its peak level (black dot and shown numerically) and its full-scale value (typically 100%). If the input's modulation exceeds the full-scale value, the bar colour changes to red.

Figure 2.2.12: Modulation Widget Panel



Dashboard Meters

See [Figure 2.2.13](#). Displays a customizable list of transmitter meters, including a scroll bar. Select a meter by clicking the box adjacent to the meter parameter, a blue check mark will indicate it is selected and click OK to display the parameters on the Dashboard. See [Figure 2.2.14](#) on [page 2.2.21](#).

Figure 2.2.13: Dashboard Meters Widget Panel

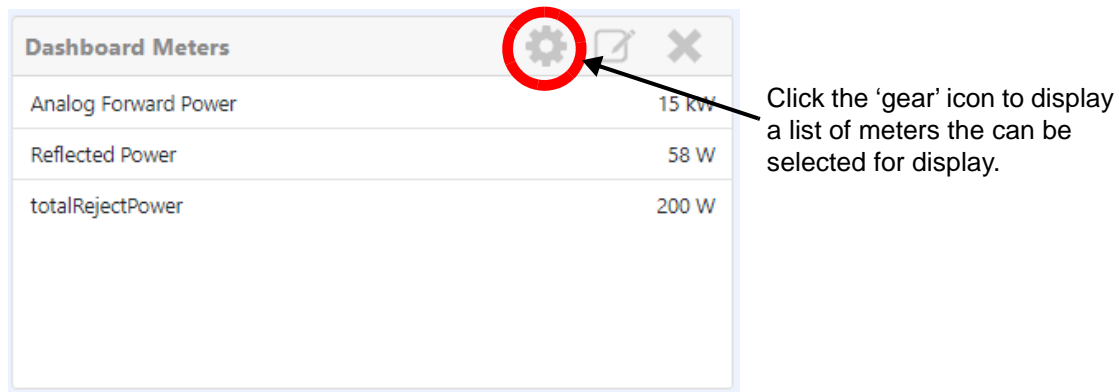
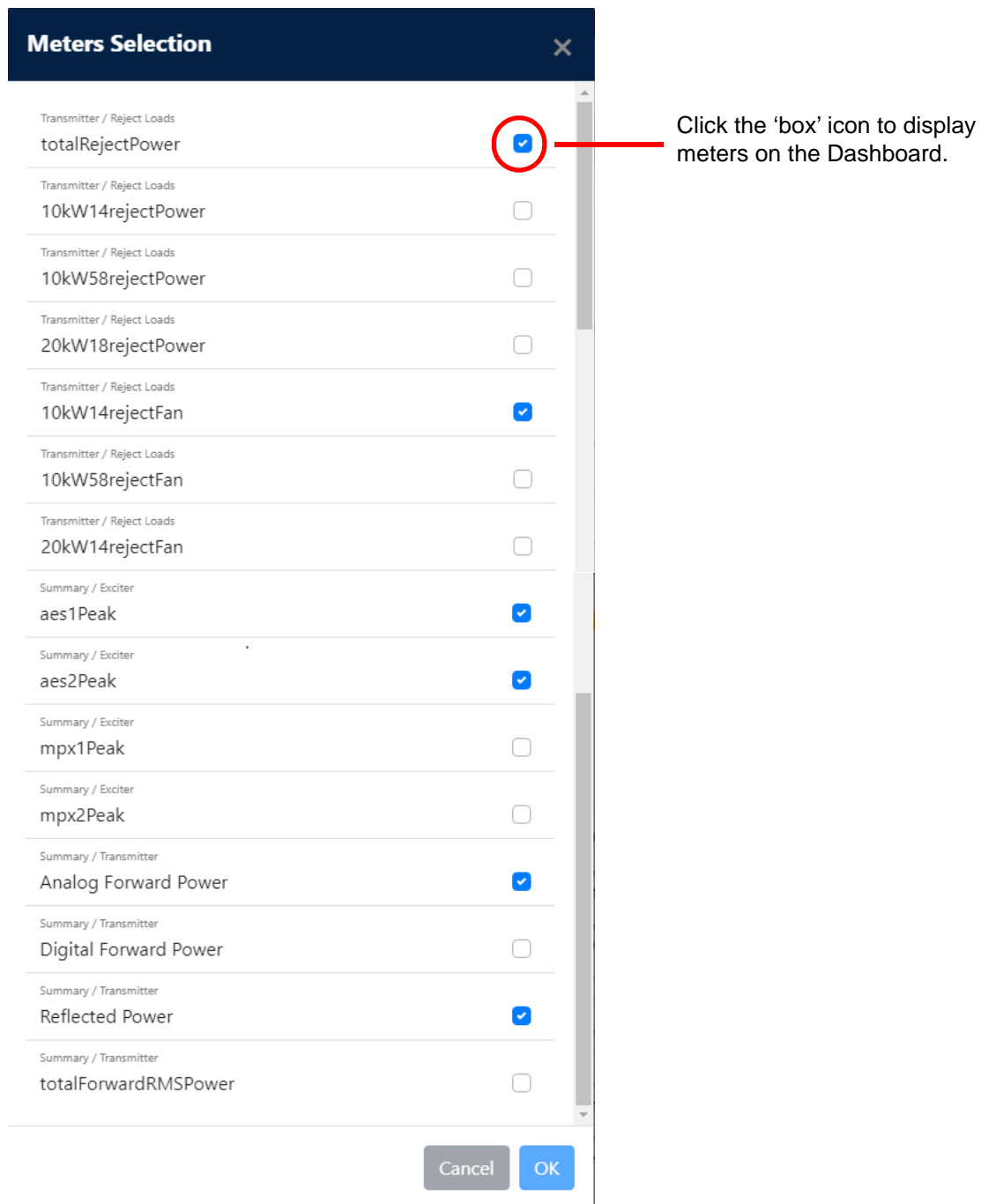


Figure 2.2.14: Widget Dashboard Meters



The screenshot shows a 'Meters Selection' dialog box with a list of meters. A red circle highlights the checkbox for 'totalRejectPower'. A red arrow points from the text 'Click the 'box' icon to display meters on the Dashboard.' to the highlighted checkbox.

Meter Name	Category	Selected
totalRejectPower	Transmitter / Reject Loads	<input checked="" type="checkbox"/>
10kW14rejectPower	Transmitter / Reject Loads	<input type="checkbox"/>
10kW58rejectPower	Transmitter / Reject Loads	<input type="checkbox"/>
20kW18rejectPower	Transmitter / Reject Loads	<input type="checkbox"/>
10kW14rejectFan	Transmitter / Reject Loads	<input checked="" type="checkbox"/>
10kW58rejectFan	Transmitter / Reject Loads	<input type="checkbox"/>
20kW14rejectFan	Transmitter / Reject Loads	<input type="checkbox"/>
aes1Peak	Summary / Exciter	<input checked="" type="checkbox"/>
aes2Peak	Summary / Exciter	<input checked="" type="checkbox"/>
mpx1Peak	Summary / Exciter	<input type="checkbox"/>
mpx2Peak	Summary / Exciter	<input type="checkbox"/>
Analog Forward Power	Summary / Transmitter	<input checked="" type="checkbox"/>
Digital Forward Power	Summary / Transmitter	<input type="checkbox"/>
Reflected Power	Summary / Transmitter	<input checked="" type="checkbox"/>
totalForwardRMSPower	Summary / Transmitter	<input type="checkbox"/>

Buttons: Cancel, OK

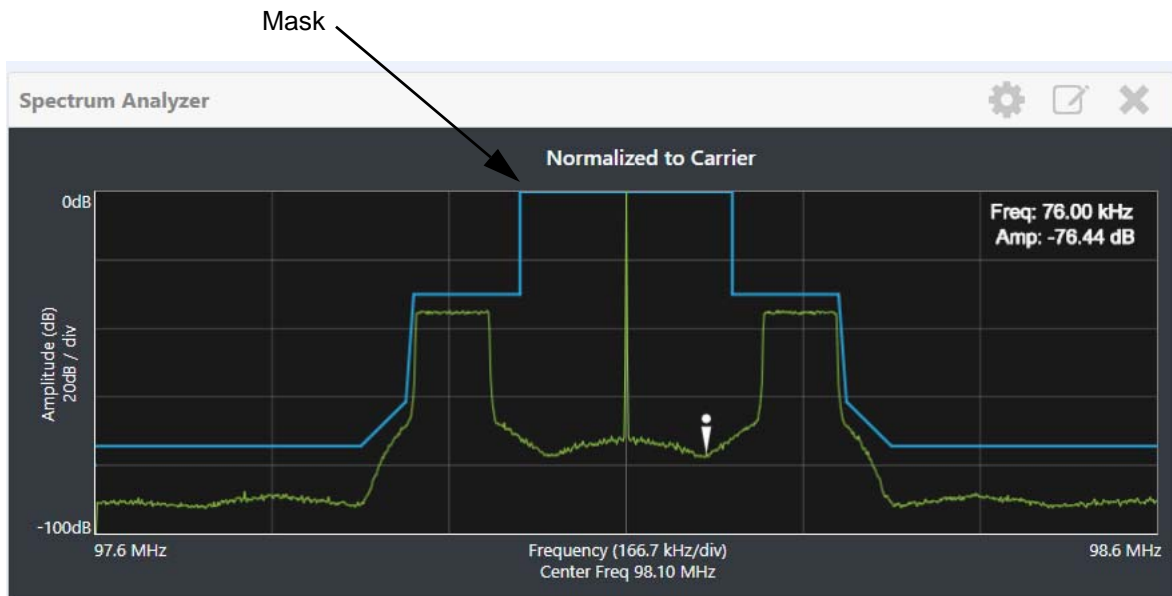
FPUI Meters

Figure 2.2.15: FPUI Meters Menu

Spectrum Analyzer

See Figure 2.2.16. The carrier level is normalized to its unmodulated carrier level at 0 dB. The graph center is always at the carrier frequency, as defined by the active preset's frequency.

Figure 2.2.16: Spectrum Analyzer Widget Panel



Masks are shown based on transmission mode and are defined by the latest versions of the following standards:

- IBOC: NRSC-5
- European Standard: ETSI EN 302 018-2
- FCC CFR 47, Part 73.317 and IC BETS-6e

NOTE: While very accurate, the spectrum analyzer may display artifacts (spurs) as some operating carrier frequencies that are a function of the analyzer and are not actually present on the output of the transmitter. If these spurious emissions are observed on the spectrum analyzer, Nautel recommends that a calibrated, external spectrum analyzer be used to verify the presence of spurs.

Click the panel to display a cursor on the nearest peak on the spectrum. The cursor position (frequency and amplitude) is noted in the upper, right-hand corner of the panel.

Click the "Settings" button to gain access to spectrum settings (see [Figure 2.2.17](#)) such as:

- Resolution Bandwidth: determines the FFT bin size or the smallest frequency that can be resolved. Allowable range is 75 - 10,000 Hz. Default setting is 1000 Hz.
- Averages: determines the number of averages that the analyzer performs per sweep. Press the Clear Averaging button to restart the averaging process. Allowable range is 0 - 100 kHz. Default setting is 19.
- Span: determines the start and stop frequencies of the analyzer with the carrier frequency always at the center. Allowable range is 10 - 1200 kHz. Default setting is 1000 kHz.
- Measurement Options: determines the source of the spectrum plot that is being displayed. Selecting Internal (FM) *uses the exciter's RF signal, before being equalized (if applicable)*. Select Option 1, 2 or 3.
- Clear Averaging: *Press the Clear Averaging button to*

Figure 2.2.17: Spectrum Settings



Spectrum Settings	
Resolution Bandwidth	100
Averages	10
Span	1
Measurement Options	Option 2 ▾
<div>Clear Averaging Submit</div>	

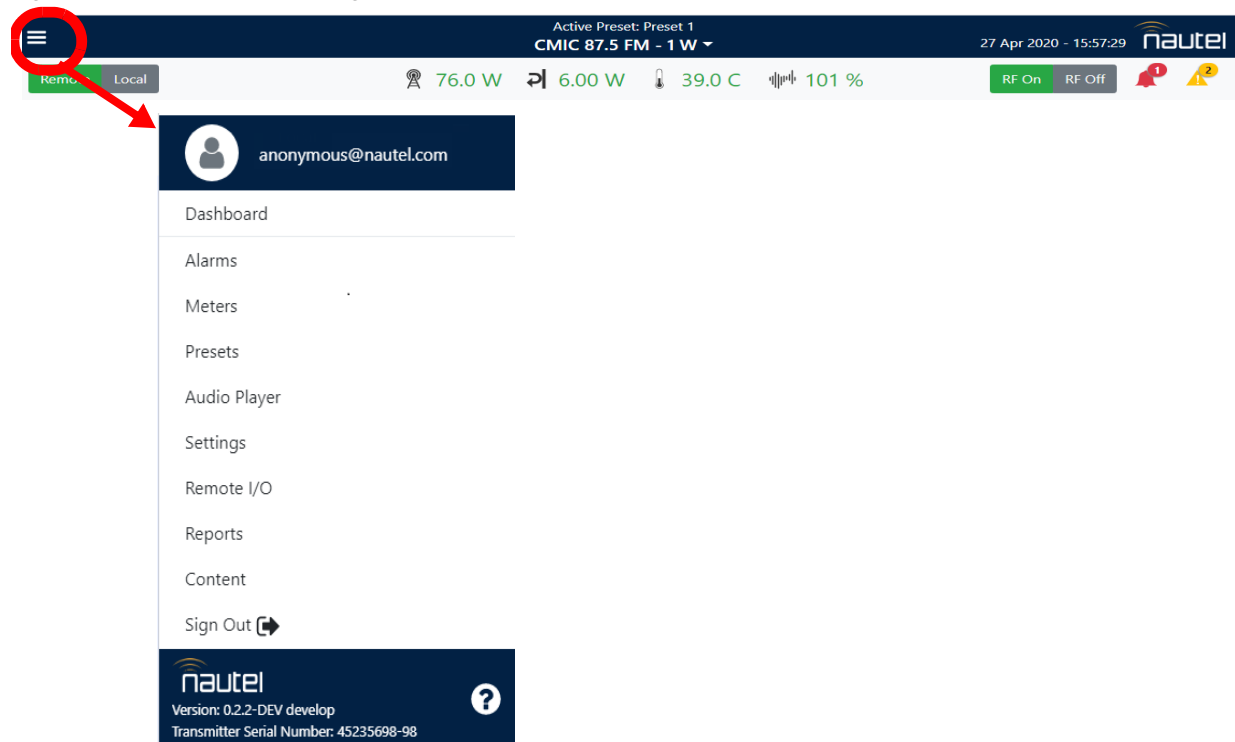
NOTE: The FM spectrum analyzer displays the ideal spectrum generated by the DSP. It is not necessarily the same as the spectrum seen at the RF output.

AUI Menu Page

You can easily navigate through the AUI from the Dashboard menu. At any time during navigation, press the Nautel logo in the top right corner of the top banner to exit and return to the Dashboard page.

From the AUI's top banner, click the Menu button to view the Menu page (see [Figure 2.2.18](#)). From this page, you can select one of the following sub-menus:

Figure 2.2.18: Main Menu Page



- Select Dashboard to return to the dashboard (see [Figure 2.2.6](#) on page 2.2.11).
- Select Alarms to view active alarms and applicable details (see [Viewing Transmitter Alarms](#) on page 2.2.28).
- Select Meters to view Summary or Transmitter meter levels (see [Meters](#) on page 2.2.31).
- Select Presets to view, load or edit available presets, create new presets, or view or create or edit a preset schedule (see [Presets](#) on page 2.2.32).
- Select Audio Player to access a sub-menu of playlist management options, including playlists and streams (see [Audio Player](#) on page 2.2.53).

- Select Settings (see [System Settings on page 2.2.57](#)) to access a sub-menu of settings options, including:
 - Users (see [page 2.2.58](#))
 - Notifications (see [page 2.2.64](#))
 - Network (see [page 2.2.65](#))
 - Engine (see [page 2.2.69](#))
 - Email Server (see [page 2.2.69](#))
 - Time (see [page 2.2.71](#))
 - SNMP (see [page 2.2.75](#))
 - Login (see [page 2.2.76](#))
 - Orban Audio Processing (see [page 2.2.76](#))
 - Exciter Reboot (see [page 2.2.94](#))
 - Call Sign (see [page 2.2.95](#))
 - Software Upgrade (see [page 2.2.95](#))
 - Audio Calibration (see [page 2.2.97](#))
 - Exciter TXCO Calibration (see [page 2.2.98](#))
 - Power Thresholds (see [page 2.2.98](#))
- Select Remote I/O to access a page that allows assignation of remote inputs and remote outputs. (see [Remote I/O Settings - using the AUI on page 2.2.101](#)).
- Select Reports to access the Alarm History (see [Capturing Critical Parameters on page 2.2.100](#))
- Select Sign Out to log out of the AUI session and return to the login menu. To log in again, use your remote PC's keyboard to enter your Username and Password, then click the Submit button. If you do not have a user account, see [Login - see page 2.2.76](#).

- ❖ Select Home to return to the home page (see [AUI Menu Page, on page 2.2.25](#)).
- ❖ Select Presets to load, edit, or save presets (see [Presets, on page 2.2.32](#)).
- ❖ Select System Settings to access a page that provides help with performing network configuration, email configuration, alarm notifications, SNMP configuration, capturing critical transmitter data, using and external 10 MHz source, setting the system date and time, and configuring NTP servers (see [System Settings, on page 2.2.57](#)).
- ❖ Select User Accounts to access a page that displays a list of users with access to the AUI. Depending on the user's permission level, allows editing of user accounts (see [Login, on page 2.2.76](#)).
- ❖ Select Remote I/O to access a page that allows assignation of remote digital inputs, digital outputs and analog outputs (see [Configuring Remote Inputs and Outputs, on page 2.2.101](#)).
- ❖ Select Scheduler to access a page that allows setting of daily preset schedules (see [Preset Scheduler, on page 2.2.50](#)).
- ❖ Select Audio Player to access a page that allows managing of program playlists and streams (see [Audio Player, on page 2.2.53](#)).
- ❖ Select Audio Processor, if the Orban Inside card has been installed and enabled, to access pages that allow creation and management of Orban audio processor presets (see [Selecting an Orban Preset - using the AUI, on page 2.2.79](#)).

Viewing Transmitter Alarms

You can view transmitter alarm information using the AUI (see [Alarm History - Using the AUI](#)) or using the front panel UI (see [Viewing Transmitter Status - using the AUI, on page 2.2.30](#)).

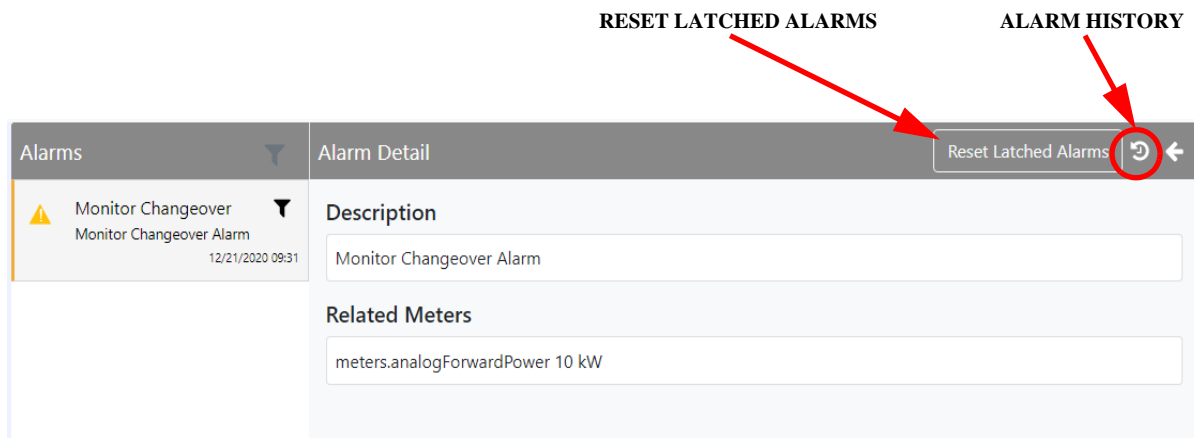
Alarm History - Using the AUI

The Alarms History page allows you to review the transmitter's history of alarms to check the operational status, historical alarms or aid in troubleshooting. Press Alarms from the Dashboard menu to open this page (see [Figure 2.2.19](#)). A downloadable version is available that can be exported to a computer for printing, viewing, etc. by clicking the Download Report button. See [Figure 2.2.20 on page 2.2.29](#).

This section includes the following topics:

- [Viewing Alarms History](#)

Figure 2.2.19: Main Alarms Page



Viewing Alarms History

The Alarms History page displays a chronological table of log events under the following column headings. A downloadable version of the Alarm History is available by clicking the "Download Report" icon. The table of log information can span over more than one page. The current page number is identified above the table. When there are more than **100 matches** in the list, a Page #/# tab will appear to allow viewing of further listings. For example, Page 1/4 means that the displayed page is one out of a possible 4 pages. Use the < or > button to scroll to the next page or the << or >> to scroll to the first or last page. See [Figure 2.2.20 on page 2.2.29](#).




Figure 2.2.20: Alarms History Page

PAGE NUMBER **DOWNLOAD REPORT**

Event	Name	Severity	Time
Cleared	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:45:15 AM
Activated	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:44:50 AM
Cleared	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:44:25 AM
Activated	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:44:00 AM
Cleared	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:43:35 AM
Activated	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:43:11 AM
Cleared	Monitor Changeover	UNSPECIFIED_SEVERITY	12/21/2020, 11:42:45 AM

- Event - identifies the status of the alarm (activated or cleared).
- Name - identifies the name of the alarm (e.g., Monitor Changeover).
- Severity - indicates how seriously the alarm affects transmitter operation.
- Time - indicates the time and date that the event occurred.

Figure 2.2.21: Alarm Severity Legend

-  = low (RF output not affected)
-  = medium (RF output may be reduced)
-  = high (RF output may be inhibited)

Refer to the VX150 to VX2 Troubleshooting Manual to cross-reference the alarm name to possible causes and troubleshooting tips.

Viewing Transmitter Status - using the AUI

You can view the VX150 to VX2's operational status using the [Transmitter Status page](#) - see [Figure 2.2.22](#). This page shows current active alarms and status to aid in fault diagnosis. To view the [Transmitter Status page](#), select Status from the AUI bottom banner. Click X to return to the home page.

You can also use the controller UI to view active alarms (see [Viewing Transmitter Status - using the AUI, on page 2.2.30](#)).

This section includes the following topics:

- [Status Button Colour Indications, on page 2.2.30](#)
- [Meters, on page 2.2.31](#)

Figure 2.2.22: Transmitter Status page

Status Button Colour Indications

- When the Status button is red, one or more active alarms are indicating that the transmitter may be in an 'off-air' state.
- When the Status button is amber, one or more active alarms are indicating that the transmitter is still 'on-air', but may be at reduced power.
- When the Status button is green, no alarms are being reported and the transmitter is operating normally.

Meters

From the main Dashboard menu, select Meters to display a list of transmitter meters. See [Figure 2.2.23](#) and [Figure 2.2.24 on page 2.2.32](#). There are two meter lists available:

- Summary (displays a list of exciter and transmitter meters)
- Transmitter (displays a list of reject powers and fan speeds)

Figure 2.2.23: Meters - Summary


Meters		Meter Detail
Summary		Exciter
		AES 1 Peak 16 dBFS
		AES 2 Peak 17 dBFS
		MPX 1 Peak 2 Vpp
		 MPX 2 Peak -2 Vpp
Transmitter		Transmitter
		Analog Forward Power 19 kW
		Digital Forward Power 3 kW
		Reflected Power 68 W
		Total Forward RMS Power 15 kW

Figure 2.2.24: Meters - Transmitter

Meters	Meter Detail														
Summary	rejectLoads														
Transmitter	<table> <tr> <td>Total Reject Power</td><td>192 W</td></tr> <tr> <td>10 kW 1-4 Reject Power</td><td>24 W</td></tr> <tr> <td>10 kW 5-8 Reject Power</td><td>25 W</td></tr> <tr> <td>20 kW 1-4 Reject Power</td><td>27 W</td></tr> <tr> <td>10 kw 1-4 Reject Fan</td><td>5 kRPM</td></tr> <tr> <td>10 kw 5-8 Reject Fan</td><td>5 kRPM</td></tr> <tr> <td>20 kw 1-4 Reject Fan</td><td>5 kRPM</td></tr> </table>	Total Reject Power	192 W	10 kW 1-4 Reject Power	24 W	10 kW 5-8 Reject Power	25 W	20 kW 1-4 Reject Power	27 W	10 kw 1-4 Reject Fan	5 kRPM	10 kw 5-8 Reject Fan	5 kRPM	20 kw 1-4 Reject Fan	5 kRPM
Total Reject Power	192 W														
10 kW 1-4 Reject Power	24 W														
10 kW 5-8 Reject Power	25 W														
20 kW 1-4 Reject Power	27 W														
10 kw 1-4 Reject Fan	5 kRPM														
10 kw 5-8 Reject Fan	5 kRPM														
20 kw 1-4 Reject Fan	5 kRPM														

Presets

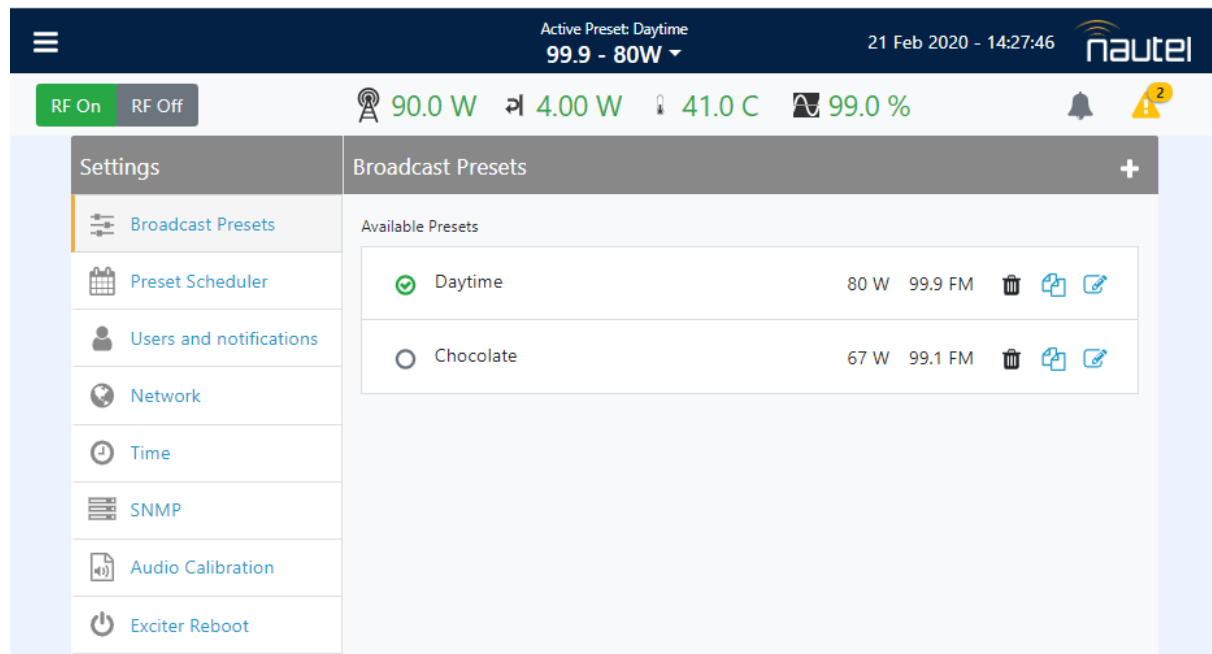
You can manage presets using the AUI (see [Managing Presets - using the AUI](#)) or using the controller UI (see [Managing Presets - using the Controller UI](#), on page 3.2.72).

Managing Presets - using the AUI

The Broadcast Presets page (see [Figure 2.2.25 on page 2.2.33](#)) allows you to create up to 63 operating presets or edit existing presets. To view the Presets page, select Presets in the Menu page. To view the Broadcast Presets page, select Broadcast Presets from the Settings options. Many preset settings available on the remote AUI are also available on the front panel UI. In this case, if you change a preset setting on the remote AUI, it will also be reflected on the front panel UI, and vice versa. This section includes the following topics:

- [Editing or Creating Presets, on page 2.2.33](#)
- [Loading Presets, on page 2.2.35](#)
- [Understanding the Preset Tabs, on page 2.2.35](#)

Figure 2.2.25: Broadcast Presets page



NOTE: When asked to enter a value in a field, an error message may appear (red text at the bottom of the screen) showing the limits of the requested value. Re-enter the desired value, ensuring it falls within the limits shown.

For example: **Output Power - Valid values: 0.15kW to 5.5kW**

Editing or Creating Presets

When a presets page is opened from the menu, (for example see [Figure 2.2.25 on page 2.2.33](#)), the Current Settings of the transmitter are displayed. They define the current operational state of the transmitter. Current Settings can be edited and then immediately activated by pressing the Save button.

To edit a saved preset, you must load that preset from the Presets page (see [Loading Presets, on page 2.2.35](#)). If the edited preset was active before it was edited, saving the preset will update the preset, but the Current Settings will not change. To update the operation of the transmitter, re-activate the preset through the top banner (see [Activating Presets, on page 2.2.35](#)).

In the top banner (see [Activating Presets, on page 2.2.35](#)), an asterisk (*) appears next to the preset name when the Current Settings have changed since the last preset was loaded. Current Settings are not saved through an ac power cycle; when the transmitter recovers from an ac power loss, it loads the preset that was last activated.

On the Presets page, an asterisk (*) appears next to the preset name in the header when there are unsaved changes to the preset.

When changes are complete, press the Save button and then press the Save Preset window's Save button to enable the changes. If you are creating a new preset, you can also enter a new name (e.g., Preset 4 - Nighttime) in the preset window before clicking the Save or Save New button.

Parameters that can be edited are discussed in detail in [Understanding the Preset Tabs, on page 2.2.35](#).

To remove a preset, select it and press the Delete button.

To ignore any changes, press Cancel to return to the Presets page.

Loading Presets

When first entering the Presets page, the current "active" preset is displayed (see [Figure 2.2.25 on page 2.2.33](#)). If the current preset is not the desired one, use the Load button on the left-side of the AUI to call up a window containing a list of available presets.

Select the desired preset and press the Load button to view or enable editing of the preset. Press the Delete button to delete the selected preset. Users cannot delete the current "active" (operational) preset or any preset that is referenced in the Remote I/O menu as either a remote input or output. Those links in the Remote I/O menu must be deleted before the associated preset can be deleted. Press Cancel to return to the Presets page.

Activating Presets

There are two ways to activate a preset using the AUI:

- Click the Active Preset section in the top banner of any AUI page
- Enter the Menu -> Settings -> Broadcast Presets page

Both methods will indicate the current active preset, by a green check mark next to its radio button (e.g., Daytime, see [Figure 3.2.33](#)). If the current preset is not the desired one, click the radio button of the desired preset in the Available Presets list, or create a new preset by clicking the + sign (see [????](#)).

If you select an alternate active preset, a confirmation prompt will appear. Select Close to cancel or Continue to activate the selected preset. Press the Delete button to delete the selected preset. Users cannot delete the current "active" (operational) preset or any preset that is referenced in the Remote I/O menu as either a remote input or output. Those links in the Remote I/O menu must be deleted before the associated preset can be deleted. Press Cancel to return to the Presets page.

Understanding the Preset Tabs

The Presets page consists of tabs across the top with functions on the left-side and parameters displayed in the center and right-side of the window. A separate display appears for each of the following tabs:

General - (see [Figure 2.2.25 on page 2.2.33](#))

- Preset Name: This field identifies the current preset settings. Users must load a preset to directly edit this field (see [Understanding the Preset Tabs, on page 2.2.35](#)).
- Output Power: Set the output power level (in kW).
- Frequency: Set value. Valid frequencies are between 87.00 and 108.00 MHz.

NOTE: *Settings on the Presets tabs are shown/hidden based on the chosen settings. Not all settings are available in all modes.*

Figure 2.2.26: Presets - Main Audio (*needs DWG*)

Main Audio - (see [Figure 2.2.26](#)):

- Audio Source: Connects the appropriate exciter input for use. Available options are:
 - ❖ Analog Left/Right: this source allows for further configuration via Analog Level, Audio Mode (Mono L+R, Mono L, Mono R, Stereo), 15kHz Lowpass, Preemphasis, Main Audio Gain Adjust settings (see below).
 - ❖ MPX/SCA1 and 2: this source allows for further configuration via the MPX Level setting (see below).
 - ❖ AES/EBU 1 or 2: this source allows for further configuration via Digital Level, Audio Mode (Mono L+R, Mono L, Mono R, Stereo), 15kHz Lowpass, Preemphasis, Main Audio Gain Adjust settings (see below).

- ❖ Audio Player -> AES 1 or AES 2: this source allows for further configuration via Digital Level, Audio Mode (Mono L+R, Mono L, Mono R, Stereo), 15kHz Lowpass, Preemphasis, Main Audio Gain Adjust settings (see below).

NOTE: *The Audio Player -> AES1 or AES 2 source can be used to accept an external audio playlist on a USB drive that is connected to the USB 3 or USB 4 connector on the rear of the controller (A4). When the audio breakout cable (provided by Nautel) is properly connected, the external playlist is applied to each exciter's AES/EBU IN 1 (A1J5) connector or AES/EBU IN 2 (A1J5) connector via the AUDIO PLAYER AES OUT (A2J6A) connector on the rear of the controller. See the "Planning Program Inputs" section of the Installation Manual for connection details.*

- ❖ Analog Level: applies to Analog Left/Right source only; enter value between -12 and +12 dBm, which represents the input voltage level that yields 100% modulation (typically 0 dBm).
- ❖ Digital Level: applies to AES/EBU 1 and AESEBU 2 sources only; enter value between -25 and 0 dBFS (typically -4 dBFS for 100% modulation value).
- ❖ Audio Mode: select Mono L, Mono R, Mono L+R or Stereo (applies to Left/Right/Mono, AES/EBU 1 or Audio Player -> AES 2 sources; selecting Stereo applies a 19 kHz pilot).
- ❖ 15kHz Lowpass Filter: applies to Left/Right/Mono, AES/EBU 1 and Audio Player -> AES 2 audio modes; select On (applies 15 kHz low-pass filter to audio input) or Off.
- ❖ Preemphasis: select 0 us, 25 us, 50 us or 75 us. This setting applies to all sources except MPX and MPX over AES sources.
- ❖ Main Audio Gain Adjust: applies to Analog Left/Right, AES/EBU 1 or Audio Player -> AES audio sources only; allowable range is -20 to 10 dB. This configuration setting will increase the incoming signal level and yield a proportional increase in % modulation.
- ❖ MPX/SCA Level: applies to MPX /SCA source only. Set this parameter level in Vpp (typically 3.5 Vpp - 100% modulation value). The allowable range for this setting is between 0.5-5 Vpp.
- ❖ Audio Backup: When you set Audio Backup to Enable, you can select a backup Audio Source and edit various parameters for the backup audio similarly to the main audio described above. The backup audio source, if enabled and present, will replace the main audio source if the main audio level is less than its user-determined trip threshold (see [Power Thresholds, on page 2.2.98](#)). The main audio source will be restored as the active source if it returns and is present for at least one second.

NOTE: *See [Configuring a Mod Loss Backup Preset, on page 3.4.6](#) for limitations on audio backup settings.*

Figure 2.2.27: Presets - SCA

SCA - (see [Figure 2.2.27](#)):

- MPX/SCA 1 & 2: Connectors for use with an externally generated SCA; select Enabled or Disabled. When enabled, all the selections listed below are active.
 - ❖ Input Level: signal level that represents 10% modulation. Enter a value between 1 and 5 V p-p (typically 2.83 V p-p).
- SCA Reduction: Attenuation applied to the SCA input; set between 0 and 20% (used to reduce the modulation level of the main audio when SCAs are enabled; typically, for every 2% of SCA modulation, the main audio modulation must be reduced by 1%).

RDS - (see [Figure](#)):

Figure 2.2.28: Presets page - RDS tab

The screenshot shows a web interface for updating a preset. At the top is a grey bar with the text 'Update Preset' and a back arrow. Below this are two tabs: 'General' (highlighted in blue) and 'RDS'. The 'RDS' tab is selected. The main content area is a light grey box containing three settings: 'RDS' with a toggle switch (currently off), 'Data Source' with a dropdown menu (currently set to 'Internal'), and 'RDS Local Echo' with a toggle switch (currently on). A green 'Save' button is located at the bottom right of the settings area.

For RDS operation, an external unit or software can send data to the exciter, serially or over IP. The exciter generates the RBDS/RDS carrier and injects the data; externally generated, or alternatively, the Presets page offer a means to configure internally generated data.

Refer to [RDS Remote Protocol](#), on page 2.2.43 for information on using the ASCII protocol to remotely configure RDS settings and to observe the strings supported by Nautel.

NOTE: *The UECP protocol is fully supported.*

NOTE: *The differences between RDS (European) and RBDS (North American) are not outlined in this manual. Presets created using the VX150 to VX2 are compatible with either type.*

- RDS: select Enabled or Disabled (default is Disabled). When enabled, all of the selections below are active:

NOTE: *When using the internal data source, you must correctly enter all RDS fields - specifically PI Code or PS Name - to ensure proper reception of RDS information.*

- ❖ Data Source: select Internal, ASCII over Serial, UECP over Serial, ASCII over IP, or UECP over IP.

NOTE: For ASCII over IP data or UECF over IP data, send RDS information to the IP address of the VX150 to VX2, port 7005.

- ❖ RDS Local Echo (displayed only when Data Source is ASCII over Serial). Select Enabled or Disabled (default is Disabled). When Enabled, the exciter RDS port transceiver will echo all inputs and controls received back to the terminal.
- ❖ Injection Level: enter value between 0 and 10% (typically 5%, default is 0%). This level is added to the composite baseband signal.

NOTE: Check your local broadcast regulatory body's guidelines for allowable modulation depth with SCAs or RDS enabled.

- ❖ Phase: enter value in degrees between 0 and 360 (default is 0.0 degrees).
- ❖ Baud Rate (displayed only when Data Source is ASCII over Serial or UECF over Serial): select 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115,200 bps (default is 19200). Does not apply to the Internal data source.

The Presets -> RDS page selections below Baud Rate apply only to the Internal data source.

- ❖ PI Code (hex) (Program Identification code): enter four hex digits that represent the station call sign (e.g., PI=1AE5); this unique code is used to identify a broadcast station. Every station gets assigned a specific code with a country identifying prefix. In the USA this code is determined by applying a formula to the station's call sign. More information can be found at www.nrcstandards.org. In Canada this code is determined using the Spectrum Management and Telecommunications tool found at www.ic.gc.ca. Contact your local broadcast regulatory body for details on determining your unique PI Code.
- ❖ PS Name (programme service name): this is simply a maximum 8-character "tagline" static display that represents the call letters or station identity name. Most RDS capable receivers display this information and, if the station is stored in the receiver's presets, will cache this information with the frequency and other details associated with that preset. Default is blank.
- ❖ Scrolling Enable/Speed: determines the scrolling speed of the Scrolling PS Name. Select Off (disabled), Slow (transitions every 10 s) or Fast (transitions every 3 s). Default is Off.
- ❖ Scrolling PS Name: if used, enter up to 64 characters for the PS name that will scroll (if enabled) at the speed selected in the Scrolling Enable/Speed field. Information is displayed on the receiver based on transmitter configuration; however, is limited to 8 characters maximum. Default is blank.
- ❖ Scrolling Type: select the type of scrolling to be used by the receiver - Word or Character. Word scrolling displays and transitions a maximum of 8 characters of the Scrolling PS Name at a time. Character scrolling still displays a maximum of 8 characters; however, transitions by one character of the Scrolling PS Name at a time. In both cases, transitions occur at the speed defined by the Scrolling Enable/Speed selection (Slow or Fast). The default selection is Word.

NOTE: Words are defined by the location of spaces in the Scrolling PS Name. Words that are longer than 8 characters will scroll by character until the entire word is displayed and then continue with the next word.

- ❖ Radio Text: Most RDS radios can receive short messages that may include information about the presenter, station or program you are listening to (e.g., a web address for the station). You can enter radio text up to 64 characters in length. Information is displayed on the receiver based on the receiver configuration and capability (e.g., maximum number of characters on the screen). Default is blank.
- ❖ PTY: this coding of up to 32 (0 to 31) pre-defined programme types allows users to find similar programming by genre. Default is 0: NONE/NONE.
- ❖ PTYN (programme type name): this field can be used for detailed description of the PTY by 8 digits. Example: if the PTY is 4 (Sport) a PTYN like "Football" could be transmitted. The PTYN is intended for displaying additional information only and cannot be used for automatic station tuning like the PTY. The PTYN is optional. Default is blank.
- ❖ Music/Speech: select Music or Speech. Default is Speech.
- ❖ Traffic Info: select None, TA (Traffic Announcement), TP (Traffic Programme) or TA+TP. The receiver can often be set to pay special attention to this flag and, for example, stop the tape/ pause the CD or retune to receive a traffic bulletin. The TP flag is used (set to 1) to allow the user to find only those stations that regularly broadcast traffic bulletins whereas the TA flag is used (set to 1) to signal an actual traffic bulletin in progress. These flags are set to 0 if they are not being used for traffic information. Default is None.
- ❖ Alt. Frequencies: select None or 1 through 25. This allows a receiver to re-tune to a different frequency providing the same station information (i.e., using translators or repeaters) when the first signal becomes too weak. This is often utilized in car stereo systems. Default is None.
- ❖ Artificial Head (bit 1 of DI, see NOTE below): select Enabled or Disabled. This selection is a decoder identification operating mode flag. Default is Disabled.
- ❖ Compression Flag (bit 2 of DI, see NOTE below): select Enabled or Disabled. This selection is a decoder identification operating mode flag. Default is Disabled.
- ❖ Dynamic PTY (bit 3 of DI, see NOTE below): select Dynamic or Static. This selection is a decoder identification operating mode flag. Default is Static.
- ❖ Stereo (bit 0 of DI, see NOTE below): select Stereo or Mono. This selection is a decoder identification operating mode flag. Default is Mono.

NOTE: Artificial Head, Compression Flag, Dynamic PTY and Stereo are part of the DI (Decoder Information) data (see controller UI editing screens on [Figure 3.2.56 on page 3.2.89](#)). RDS Data is provided as a single-digit hex input between 0 and F, that encodes the flags for the four settings as a 4-bit code. For example: hex number 3 is bit-represented by 0011, from bit 3 on the left to bit 0 on the right. This number is decoded to mean Stereo = Yes/Stereo (bit 0=1), Artificial Head = Yes/Enabled (bit 1=1), Compression = No/Disabled (bit 2=0) and Dynamic PTY = No/Static (bit 3=0).

RDS REMOTE PROTOCOL. The following information is intended to assist users with remote RDS settings using the ASCII protocol.

Assigning Settings: To assign a value to a setting, send the setting name, the equal sign (=) and the desired value. If the setting is valid, the exciter responds "OK". If the setting is invalid, the exciter responds "NO".

```
Examples: PI=1248 // set the PI code to 0x1248
          OK      // exciter responds with OK
          TA=2    // set the traffic announcement to 2 (bad command; only values 0 or 1 allowed)
          NO      // exciter responds with NO
```

Querying Settings: To determine the current value of a setting, type the setting name with a question mark (?) instead of an equal sign (=).

```
Examples: PI?      // query the current PI code
          1248     // exciter responds with "1248", the current PI code
```

Other Considerations:

■ Initial Values and Preset Changes

On startup, or when the RDS settings in the active preset differ from the last ones loaded, the preset's initial RDS settings (PS, PI, PTY, PTYN, RT, AF, etc.) will be loaded. If there is an active data source (UECP or ASCII via serial or IP), these settings may be updated externally.

The RDS settings from the preset will only be loaded again if they change, otherwise the working set from the external data source will continue to be used. This allows unrelated preset changes to adjust other settings without affecting RDS functionality.

■ TCP Usage

Use TCP port 7005. This is not user configurable. To use RDS over IP, the connection must be opened before each command.

List of Settings: [Table 2.2.3](#) lists the RDS settings supported by Nautel, including descriptions and examples.

NOTE: Remote setting of the RDS baud rate is not supported.

Table 2.2.3: Supported ASCII Settings for RDS

Setting	Name	Description/Example
PI=	Program Identification	Four hex digits representing the station call sign. Consult the RDS/RBDS specification for more information. Example: PI=1AE5
PS=	Program Service	Maximum 8-character ASCII "tagline" string describing the radio station. Example: PS=Q104-FM
PTY=	Program TYPe	Number, from 0 to 31, describing the station format. Example: PTY=24
PTYN=	Program TYPe Name	8-character ASCII string, also describing the station format. Example: PTYN=JAZZ24-7
TP=	Traffic Program	Set to 1 if the current program sometimes carries traffic information, otherwise set to 0. Example: TP=1
TA=	Traffic Announcement	Set to 1 if the current program is currently broadcasting a traffic announcement, otherwise set to 0. Example: TA=0 NOTE: Timeout of the TA flag is not implemented, so the RDS data source should ensure this flag is properly cleared.
AF1= ... AF25=	Alternative Frequency	If the station broadcasts on more than one frequency using translators or repeaters, these are typically set to each of the frequencies used in the broadcast network. Sample calculation for 98.5 MHz: $(98.5 - 87.8) \times 10 = 107$ Example: AF1=107 NOTE: there is no method to disable AFs in this protocol.

Table 2.2.3: Supported ASCII Settings for RDS

Setting	Name	Description/Example
DI=	Decoder Information	Single hex digit, range 0-9 and A-F (case insensitive) that encodes the flags Stereo(1)/Mono(0) - bit 0; Artificial Head (Yes=1, No=0) - Bit 1; Compression (Yes=1, No=0) - Bit 2; and Dynamic (Yes=1, No=0) - Bit 3 Example: DI=3 (Stereo, Artificial Head=Yes, Compression=No, Dynamic=No)
MS=	Music/Speech	Typically set to 1 if the station broadcasts music, otherwise set to 0. Example: MS=1
TEXT=	Radio Text	Accepts a 1 through 64 character ASCII string, displayed on receivers that support RDS radio text. Example: TEXT=Tears for Fears - Shout (1985)
ECHO=	Echo on/off	If set to 1, the RDS encoder will echo back characters that are sent to it. If set to 0, the encoder will only send responses. Example: ECHO=1
DATE=	Current UTC date	Format is strictly YYYY-MM-DD. Sets the current UTC date for 4A date/time broadcasts. This is a non-volatile setting. Example: DATE=2016-04-04
TIME=	Current UTC time	Format is strictly HH:MM:SS, 24-hour format. Sets the current UTC time for 4A date/time broadcasts. This is a non-volatile setting. Example: TIME=17:23:05
UTC=	UTC time zone offset	Range is 0 to 24, 32 to 56. Sets the current time zone. To calculate this value, multiply the time offset by 2 and add 32 if the time offset is negative. For Newfoundland (UTC-3.5), $3.5 \times 2 = 7$, and add 32 (since the time zone is negative) to yield 39. This is a non-volatile setting. Example: UTC=39

Table 2.2.3: Supported ASCII Settings for RDS

Setting	Name	Description/Example
CT=	4A date/time enable	If set to 1, the exciter will broadcast a 4A RDS packet on the edge of every minute with the currently set UTC time/date. This is a volatile setting. Example: CT=1
DPS=	Dynamic Program Service (scrolling command)	64-character ASCII string typically describing the radio station. Example: DPS=Q104-FM The Home of Rock N Roll
DPSR=	Dynamic Program Service Rate (scrolling command)	Number, from 0 to 2, describing the scrolling rate. 0 is off (default); the PS= command is displayed when DPSR=0 is used. 1 is slow; the DPS string will scroll at a rate of approximately 10 s. 2 is fast; the DPS string will scroll at a rate of approximately 3 s. Example: DPSR=2
DPSM=	Dynamic Program Service Mode (scrolling command)	Number, 0 or 1, describing the scrolling mode. 0 is word-scrolling; the DPS string will scroll word by word, or multiple words when they fit. 1 is character-scrolling; the DPS string will scroll character by character. Example: DPSM=0
REV	Software Version (special command)	Typing this command (no = or ?) returns the current RDS encoder software version. Example: REV // issue version command Nautel NVE RDS Encoder V1.0 // exciter response

Figure 2.2.29: Presets page - Other Settings tab (upper, middle and lower sections)

Other Settings - (see [Figure 2.2.29](#)):

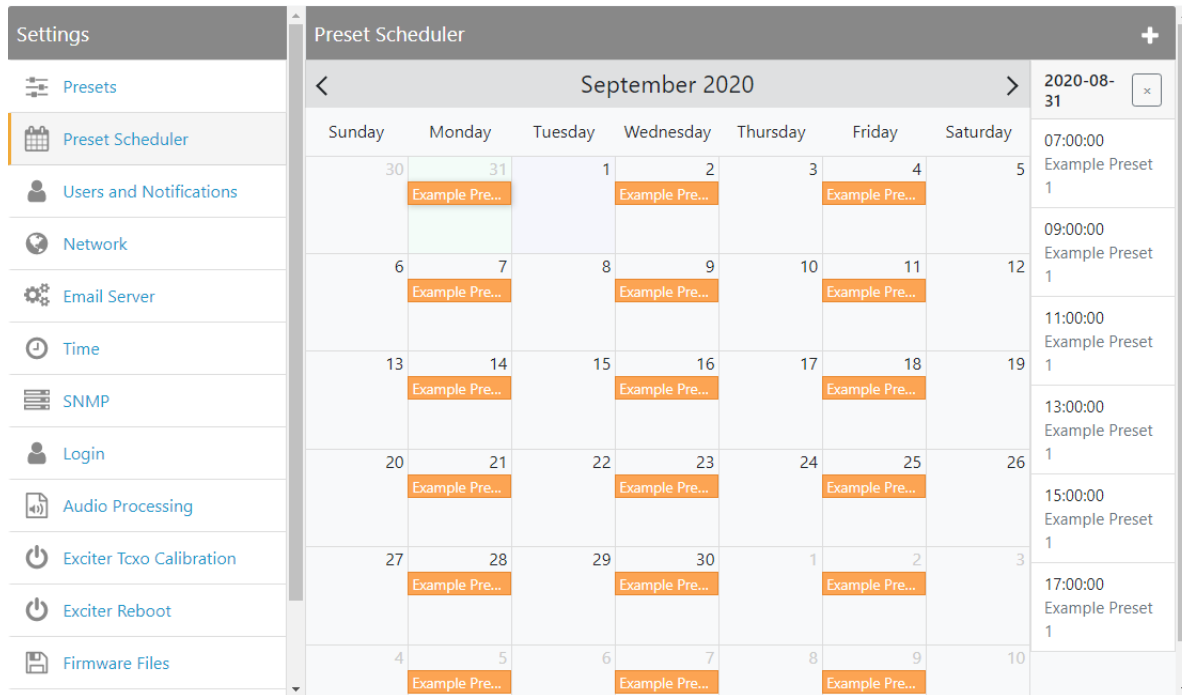
- Other Settings: Provides the following sub-functionality:
 - ❖ Pilot Level: enter value between 6 and 12% (typically 9%). This level is added to the composite baseband signal.
 - ❖ Pilot 1 PPS Sync: select Enabled or Disabled.
 - ❖ Pilot Sync Phase: if Pilot 1 PPS Sync is enabled, enter value between 0 and 360 degrees (typically 0 degrees).
 - ❖ Sample Output: determines which sample signal will be present on exciter's rear panel PILOT/MPX SAMPLE OUT BNC connector. Select Pilot (default setting, pilot sample present) or MPX (Composite) (composite baseband signal present).
 - ❖ Audio Delay: select Enabled, then enter value in the allowable range of 0 to 12000 ms. Default is 0. Audio Delay is used to time align the receiver output of decoded analog and digital audio signals.
 - ❖ Mod Loss Timeout: select Enabled or Disabled, as required. If Enabled is selected, the following sub-fields will appear:
 - Action: Alarm only (no resulting action), RF Inhibit (inhibits the RF output and fans until the audio returns) or Change Preset (changes the active preset).
 - Mod Loss Preset: displayed only if Action is set to Change Preset. Select the preset from the drop down list that will activate upon the loss of a modulating signal, post the timeout period.
 - Timeout Minutes: sets the delay, in minutes, between modulation loss detection and the resulting action. Enter a value in the allowable range of 0 and 255 minutes.
 - Timeout Seconds: sets the delay, in seconds, between modulation loss detection and the resulting action. Enter a value in the allowable range of 0 and 59.9 seconds.
 - Threshold: sets the threshold for modulation loss detection. Enter a value in the allowable range of 0 and 100%.
 - ❖ Hard Limiter: select Enabled, then enter the hard limit threshold percentage (allowable range is 0-160%, defaulted to 140%). If enabled, the modulation level will be limited (audio signal clipped or distorted) if it exceeds the hard limit threshold.

-
- ❖ AGC Limiter: select Enabled, then enter AGC Limit percentage (allowable range is 0-160%, defaulted to 120%) and Time Constant (allowable range is 0-1000 ms, defaulted to 0 ms). If Enabled, when the modulation level exceeds the AGC Limit, the gain of the audio input will instantly decrease in order to reduce the modulation level below the AGC limit threshold. Recovery from this audio gain reduction is dependent on the Time Constant delay (fast attack, slow recovery). The input signal is briefly distorted by the audio gain reduction when the threshold is exceeded.
 - ❖ Two Slope Limiter: if Enabled, when the modulation level exceeds the Threshold, the gain of the audio input will instantly change according to the gain percentage setting (percentage of the initial gain, that which is below the threshold). The input signal is distorted by the audio gain change.
 - Threshold: allowable range is 0-160%, defaulted to 120%.
 - Gain: allowable range is 0-100%, defaulted to 56.2%.
 - ❖ L/R Limiter: this look-ahead limiter can be applied to the signal immediately before the stereo generator in the exciter. It has a fixed attack time (and corresponding delay) of approximately 1 ms. It can be configured to reduce the signal, if the gain setting is 0 dB or less, or can be used to perform an AGC function and boost quiet sections of the audio if a positive gain setting is used. If Enabled, enter the following parameters:
 - Max Gain: allowable range is -20 to 20 dB, defaulted to 0 dB.
 - Decay Time: allowable range is 0 to 60 s, defaulted to 0 s.
 - Hold Time: allowable range is 0 to 60 s, defaulted to 0 s.
 - ❖ MPX Power Limiter: if Enabled, enter MPX RMS Limit. This limit allows the broadcast signal to remain in compliance with the MPX power limits as suggested in ITU-R BS.412-9. While the limiter will keep the transmitter in compliance, it is recommended that adjustment to the processing be made in such a way as to minimize the reductions performed by the limiter. Otherwise, the signal will not take advantage of the peak modulation capability available.
 - MPX RMS Limit (allowable range is -12 to 12 dBr, defaulted to 0 s).

Preset Scheduler

If the scheduler is enabled (see [When Scheduler: ON appears, the transmitter will follow the Scheduler settings. on page 2.2.52](#)), you can program a preset schedule for the transmitter. Select **Preset Scheduler** from the Settings page in the Dashboard menu (see [Figure 2.2.30](#)) to set the dates and times at which presets take effect. You can define up to **63** different schedule rules.

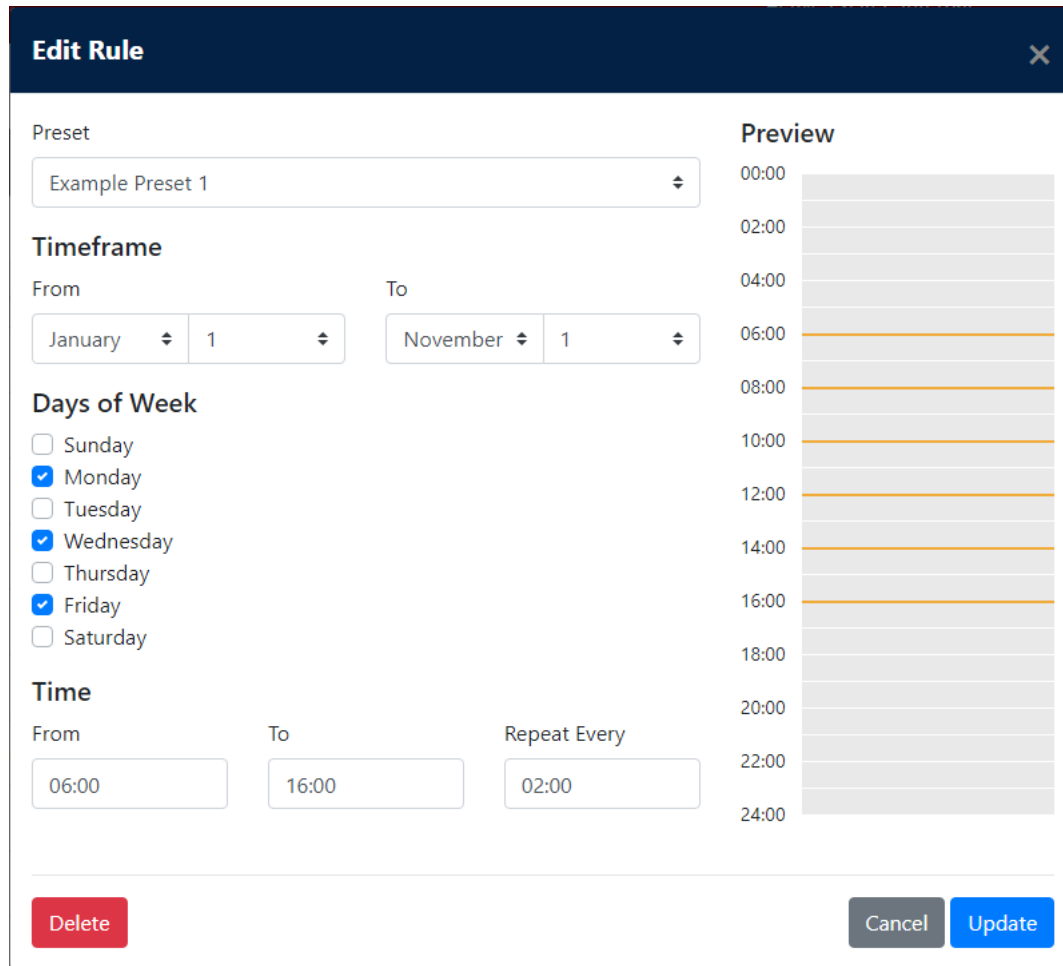
Figure 2.2.30: Scheduler page



The Scheduler page displays a monthly calendar (e.g., September 2020). Use the < and > buttons to navigate between months. Use the < and > buttons to navigate to the beginning and the end of the schedule.

By clicking on a specific date in the monthly calendar displays the Edit Rule page which contains the Timeframe, Days of the Week, and Time parameters, as applicable, for that day.

Figure 2.2.31: Edit Rule Page



Edit Rule

Preset
Example Preset 1

Timeframe
From: January 1 To: November 1

Days of Week
☐ Sunday
☒ Monday
☐ Tuesday
☒ Wednesday
☐ Thursday
☒ Friday
☐ Saturday

Time
From: 06:00 To: 16:00 Repeat Every: 02:00

Preview
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
24:00

Delete Cancel Update

When in the Edit Rule list, you have the option to edit or delete an existing rule, or to create a new rule. Click the New or Edit button to display the Rule Explorer window (see [Figure 2.2.31 on page 2.2.51](#)). Click Delete to remove a rule from the list.

Use the Edit Rule window as follows:

- ❖ In the Time of Year section, set the start (From:) and end (To:) dates for the rule. Start to end dates must be less than one year apart.
- ❖ In the Days section, select the days of the week on which the rule will apply.
- ❖ In the Time of Day section, set the start (From:) and end (To:) times (hours, minutes and seconds) for the rule. Use the Repeat: field to establish a repeating cycle for the rule (e.g., every 24 hours).
- ❖ Use the drop-down menu to select the preset (e.g., Current Settings) for the rule. The preset's power, mode and frequency are displayed below the preset.
- ❖ Unless you edit other rules first, you cannot select a date that occurs before the start of the previous rule or after the start of the following rule.
- ❖ Click the Update button to store the rule in the scheduler or the Cancel button to return to the Scheduler page.

When Scheduler: ON appears, the transmitter will follow the Scheduler settings.

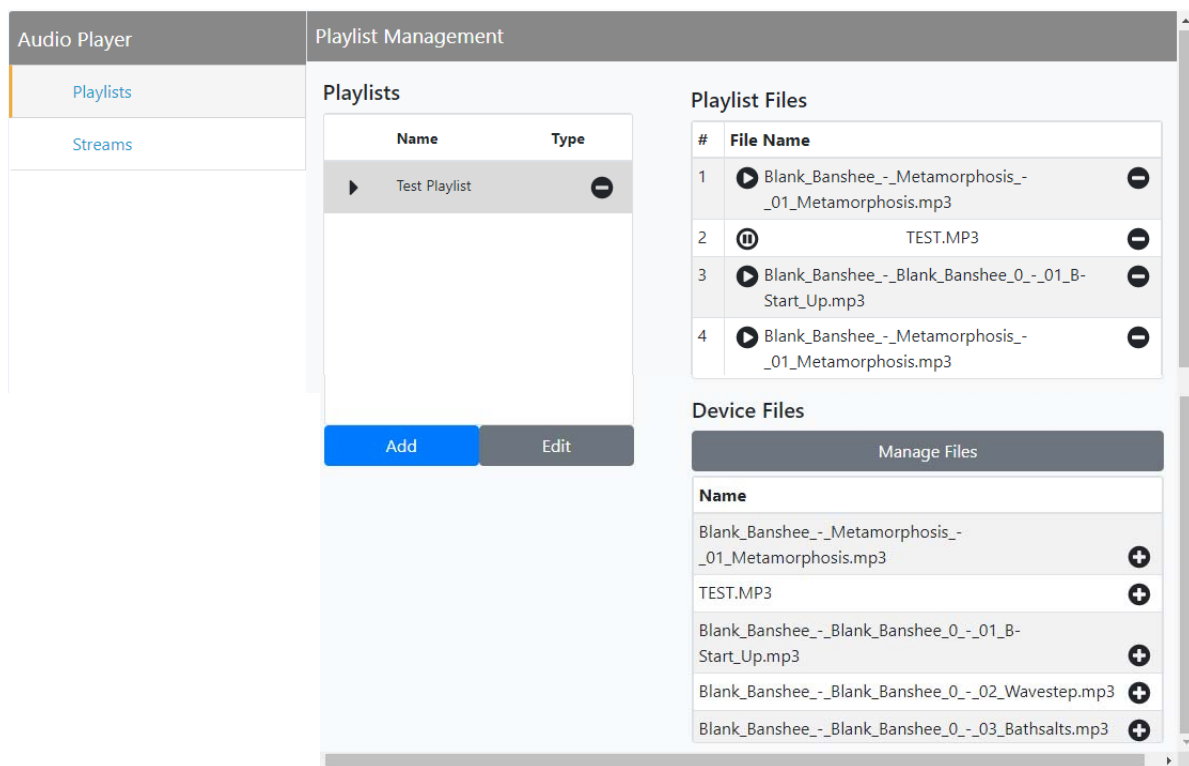
When Scheduler: OFF appears, the transmitter will stop following the schedule and the active preset will be the preset that was operating when the scheduler was disabled.

Audio Player

The built-in audio player (see [Figure 2.2.32](#)) can use a file playlist or Icecast/Shoutcast as an audio source. These sources must be configured before they can be used. This section describes how to configure audio player sources. To view the Audio Player page, select Audio Player from the Menu options. The Audio Player page has two selectable tabs:

- [Playlist](#) - see page 2.2.54
- [Streams](#) - see page 2.2.56

Figure 2.2.32: Audio Player page - Playlist tab shown



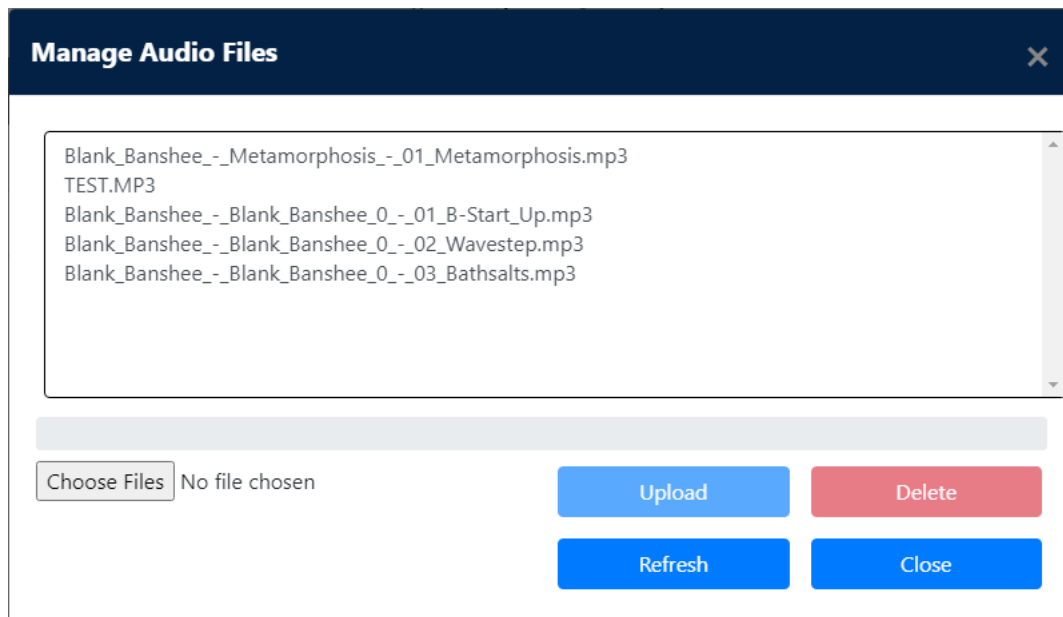
The playlist (or Shoutcast/Livewire stream) is typically used as an audio loss backup. For example, the user may operate with Preset 1 using one of the standard audio sources. Preset 1 can be configured to switch to another preset (e.g., Preset 2), which uses a playlist or stream, if Preset 1 loses its audio. See [Configuring a Mod Loss Backup Preset, on page 3.4.6](#) for more information.

Playlist/stream presets can also be activated by the Scheduler (see [Preset Scheduler, on page 2.2.50](#)).

Playlist

The Playlist tab (see [Figure 2.2.33](#)) displays the audio files and sequence that currently make up the playlist. Only audio files that are supported (e.g., .wav or .mp3 files) will be played. For .mp3 files, using files with bit rates equal to or less than 96 kbps achieves best audio results. Also, you must activate a preset that has Playlist selected in the Main Audio -> Secondary Digital -> Secondary Source in the Presets menu. There are three sections in the Playlist tab - Playlists, Playlist Contents and Available Files on USB.

Figure 2.2.33: Managing Playlist files



NOTE: You should not change an active (playing) playlist nor should you attempt to delete or move a song that is currently playing. To make changes to the playlist, the audio player must be off (inactive) - or at least not being used as the active preset's source.

The Playlists section is used for adding (Add button) and deleting (Delete button) playlists.

The Playlist Contents section is used for inserting jumps (Insert JMP button) and deleting playlist contents (Delete button). The Insert JMP button allows the user to set up a playlist that can jump to an item in another playlist. You can drag files up and down the Playlist Contents list and you can drag files from the Available Files on USB list to the Playlist Contents list.

The Available Files on USB section is used for adding audio files to the playlist (Add Files button) or refreshing the playlist (Refresh button) . Audio files must be stored on an external USB device plugged into the USB 3 or USB 4 connector on the rear of the controller; they are not stored in the transmitter. Only the audio files stored in the root directory of the most recently connected USB device appear on the playlist. The list will be empty if no USB device is connected. The USB drive must be formatted with a FAT32 file system. Click the Refresh button to force an update of the list of files on the mounted USB.

The length of the file name in the Audio Player USB Playlist must not exceed 255 characters and be no larger than 1 GB in size. The playlist should not exceed 700 files (based on an average file character length of 30, including the extension). If the average file character length is more than 30, the playlist file limit will be reduced.

NOTE: MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and Thomson.

The audio player supports only one USB device at a time. If multiple USB devices are connected, only the most recently connected USB is recognized as the active USB drive. If multiple USB devices are connected and one is removed, both devices are unmounted.

The Manage Files button displays a pop-up window that allows the user to Browse for files and Upload them to the USB or Delete them from the USB. You should not delete files that are part of more than one playlist.

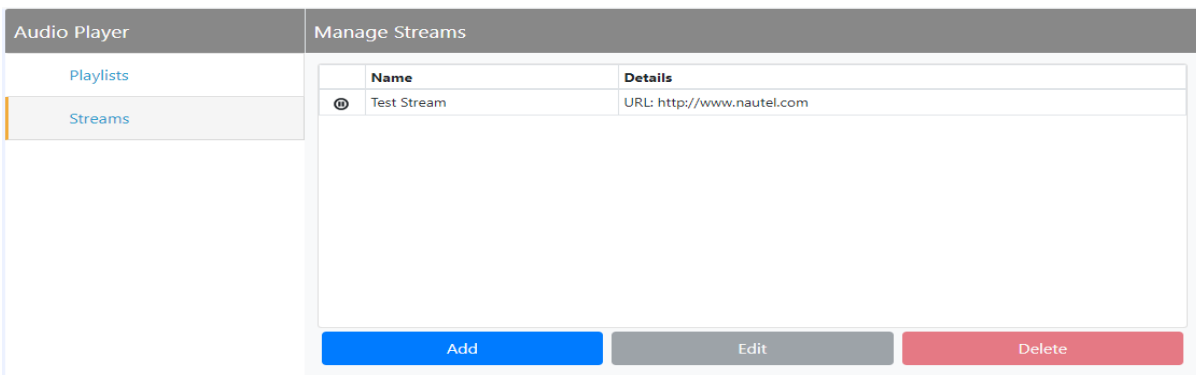
Streams

The VX150 to VX2 is capable of playing audio streams in Icecast/Shoutcast format.

The audio player supports Icecast/Shoutcast playlists and IP addresses for audio streams. For an Icecast/Shoutcast playlist enter the URL for the station. For an audio stream, enter the URL for that stream.

NOTE: If your Icecast/Shoutcast stream drops out, the transmitter will continuously attempt to reconnect to the server, several times per second.

Figure 2.2.34: Audio Player page - Streams tab



Audio Player		Manage Streams	
		Name	Details
Playlists		Ⓢ Test Stream	URL: http://www.nautel.com
Streams			

Add Edit Delete

ADDING AN AUDIO STREAM

1. From the Audio Player -> Streams tab (see [Figure 2.2.34 on page 2.2.56](#)), press the Add button.
2. Enter the appropriate information for the audio server (Name and URL for Icecast/Shoutcast) and click Save or Cancel to discard changes. Make sure the VX150 to VX2 can access the location.

EDITING OR DELETING AN AUDIO STREAM

1. From the Streams tab, select the desired audio stream from the list. Press the Edit button to modify the audio stream or the Delete button to remove the audio stream.
2. If you are editing an audio stream, enter the appropriate information for the audio server (Name and URL for Icecast/Shoutcast). Click Save or Cancel to discard changes. Make sure the VX150 to VX2 can access the location.

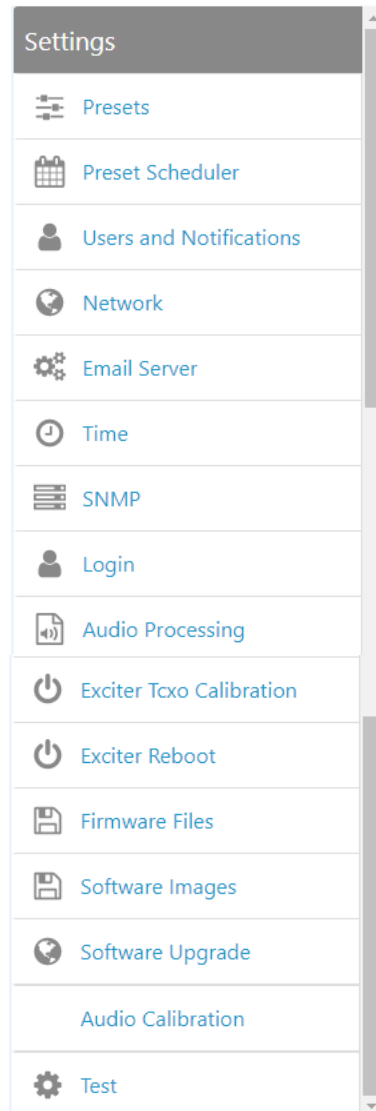
System Settings

Users can determine critical system configuration parameters using the remote AUI.

Settings - using the AUI

The AUI's Settings page (see [Figure 2.2.35 on page 2.2.58](#)) is accessible from the Main Menu options. It contains the following options:

- [Users, on page 2.2.58](#)
- [Notifications, on page 2.2.64](#)
- [Network, on page 2.2.65](#)
- [Exgine, on page 2.2.69](#)
- [Email Server, on page 2.2.69](#)
- [Time, on page 2.2.71](#)
- [SNMP, on page 2.2.75](#)
- [Login, on page 2.2.76](#)
- [Orban Audio Processing, on page 2.2.76](#)
- [Exciter Reboot, on page 2.2.94](#)
- [Call Sign, on page 2.2.95](#)
- [Software Upgrade, on page 2.2.95](#)
- [Audio Calibration, on page 2.2.97](#)
- [Exciter TXCO Calibration, on page 2.2.98](#)
- [Power Thresholds, on page 2.2.98](#)
- [Capturing Critical Parameters, on page 2.2.100](#)

Figure 2.2.35: System Settings Page

Users

NOTE: This function is only available via the AUI.

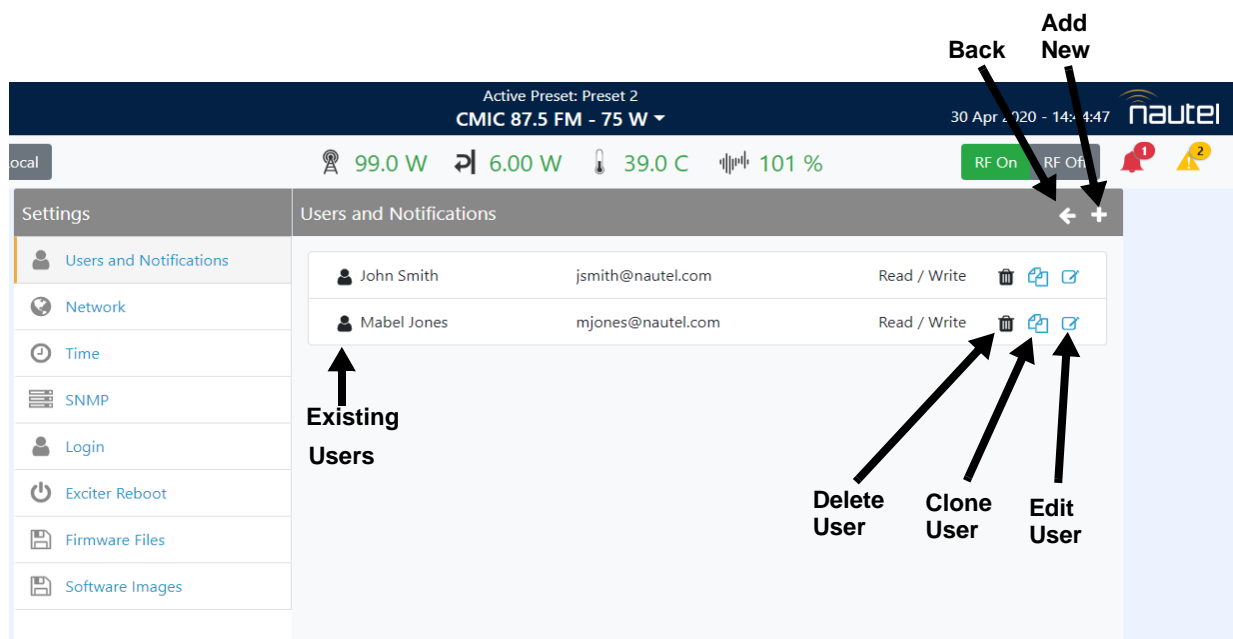
The Users menu (see [Figure 2.2.36](#)) allows a user with the proper permissions to create accounts to allow certain users to access and control features of the AUI, and receive notifications when critical-level or maintenance-level alarms occur. To view this menu, select Users from the Menu -> Settings options.

NOTE: Depending on the permission level assigned to a given user, some features shown in [Figure 2.2.36](#) may not be displayed or available.

This section includes the following topics:

- [Setting User Permission Level, on page 2.2.60](#)
- [Editing Account Information, on page 2.2.60](#)
- [Set or Change the Password, on page 2.2.61](#)

Figure 2.2.36: Users page



The VX150 to VX2 contains a default user account when it leaves the factory. This account appears as Nautel (Auto) in the List of Users and has Administrator permission level. The default Username is "Nautel". The default Password is blank (i.e., no password). Nautel recommends that you delete this account once you create the desired user account(s) (see [Login, on page 2.2.76](#)).

Setting User Permission Level

There are three user role options, each with their own specific functionality. All users have permission to change their own name, email and password, after their account has been created, but are otherwise limited to the following functions:

- Read Only: Pre-defined user type. Can monitor equipment data only. No administrative or control functions.
- Read/Write: Pre-defined user type. Can monitor and control equipment. No administrative functions.
- Admin: Pre-defined user type. Can perform all functions. Administrator is the only permission level that allows addition, deletion or editing of users.

Editing Account Information

Adding an Account

You must be an Administrator to use this function.

To add a user account, click the + symbol in [Figure 2.2.36 on page 2.2.59](#). Enter the User Form (see [Figure 2.2.37](#)) with user account information, including First Name, Last Name, Email, Role and Notifications. Click Submit to accept.

Figure 2.2.37: Adding a User Account

Settings	User Form
Broadcast Presets	<div>User Information</div> <div>First Name</div> <div>Last Name</div> <div>Email</div> <div>Role <input type="text"/></div> <div>Notifications</div> <div>Critical Notifications <input type="checkbox"/></div> <div>Maintenance Notifications <input type="checkbox"/></div> <div>No notifications <input type="checkbox"/></div> <div>Submit</div>
Preset Scheduler	
Users and notifications	
Network	
Time	
SNMP	
Audio Calibration	
Exciter Reboot	

Editing an Existing Account

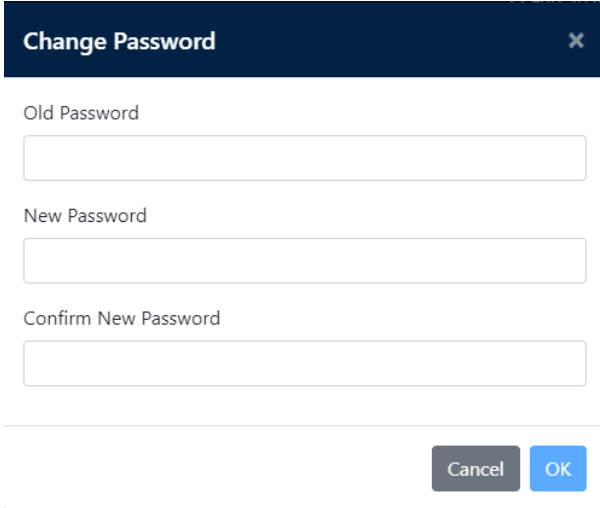
To edit an existing user account, click the Edit User icon of the desired user in the Users list (see [Figure 2.2.36 on page 2.2.59](#)). The User Form for that user will be displayed. You can edit the Name, Email, Role (see [Setting User Permission Level on page 2.2.60](#)), Notifications (see [Notifications on page 2.2.64](#)) and Password (see [Set or Change the Password on page 2.2.61](#)). Click Submit to accept.

Figure 2.2.38: Editing a User Account

Settings	User Form
Broadcast Presets Preset Scheduler Users and notifications Network Time SNMP Audio Calibration Exciter Reboot	<div> <div>User Information</div> <div> <div>First Name</div> <div>Banana</div> </div> <div> <div>Last Name</div> <div>Foster</div> </div> <div> <div>Email</div> <div>banana@foster.com</div> </div> <div> <div>Role</div> <div>Read / Write</div> </div> </div> <div> <div>Notifications</div> <div> <div>Critical Notifications</div> <div>Maintenance Notifications</div> <div>No notifications</div> </div> </div> <div> <div>Change Password</div> <div>Submit</div> </div>

Set or Change the Password

To set or change your password, click Change Password at the bottom, left of the User Form screen. A menu appears (see [Figure 2.2.39 on page 2.2.62](#)) that prompts you to enter the old password (as applicable), new password and confirmation of the new password. Click the OK button to accept changes or the Cancel button to discard changes and exit this menu.

Figure 2.2.39: Changing PasswordA screenshot of a 'Change Password' dialog box. The dialog has a dark blue header with the title 'Change Password' and a close button (X). Below the header, there are three text input fields labeled 'Old Password', 'New Password', and 'Confirm New Password'. At the bottom right of the dialog, there are two buttons: 'Cancel' (grey) and 'OK' (blue).

Change Password

Old Password

New Password

Confirm New Password

Cancel OK

Changing Permissions

You must be an Administrator to edit this function.

All users have permission to change their own username and password. You can customize the permissions assigned to a user or simply pick a predetermined set of permissions based on the user type.

Procedure to change user permissions (see [Figure 2.2.38 on page 2.2.61](#)):

1. Open the User Accounts page.
2. Select a user from the Users list to display the permissions for that user in the center of the Permissions window. The permissions associated with the selected user are identified with a checkmark (☑).
3. Press on User Type to reveal a drop-down menu and select a new type of user.
4. If the user type in step 3 is Custom, set individual permissions. Under Permissions, place a checkmark (☑) beside each permission that you want to associate with the user. The boxes work like a toggle - select the checkbox to place a checkmark and select again to remove the checkmark. Choose one or more of the following options:
 - ❖ Activate/Modify Preset - Allows the user to modify presets and change the active preset.
 - ❖ Power Control - Allows the user to change the power set point of the transmitter.
 - ❖ Delete Logs - Allows the user to remove log entries.

- ❖ RF On/Off - Allows the user to turn the RF output on and off.
- ❖ All Other Settings - Allows the user to adjust all settings not mentioned above, except for administrating user accounts.

5. Press Apply to assign the new permissions to the selected user.

Removing an Account

To delete a user account, click the Delete User icon of the desired user in the Users list (see [Figure 2.2.36 on page 2.2.59](#)). Click Continue in the confirmation window to delete the user account or click Close to keep the user account and return to the Users list.

NOTE: *Do not delete the SNMP_User account from the list of users.*

Notifications

The Notifications page (see [Figure 2.2.40](#)) provides a means for the transmitter to issue emails or texts (SMS messages) triggered by user defined alarm events. If you use this feature, you must also configure an email (see [Email Server, on page 2.2.69](#)). From the main Notifications screen, the user can Create a new Notification (+ icon), Delete (trash can icon) or Edit (square with line icon) an existing Notification.

Figure 2.2.40: Notifications page

Notification Form

Notification Name Test Notification 1

Recipient Emails Enter Email Add Email

Device Device1

Available Alarms

Selected Alarms

Alarm	Device
Monitor Changeover	Device1

Send Test Notification Cancel Save

To edit a Notifications feature, perform the following steps:

1. Pre-existing notifications are displayed in the Notifications list (e.g., "PS Failures". Press the "+" button to create a new notification, press the Edit icon to edit an existing item or press Delete to erase an item.
2. Enter or edit a Notification Name, Recipient Email, and define the alarm list by Device type. Add or remove alarms by moving them (using the > and < arrow buttons) from the Available Alarms list to the Selected Alarms list. An email is issued when any alarm in the Selected Alarms list is active.

3. SMS Messaging: In the Recipient Email field, you can enter a standard email address to initiate an email or you can enter a mobile phone number and SMS gateway to initiate a text (SMS message). The email-to-text format is mobilenumber@mobile_gateway (e.g., 5551234567@txt.bell.ca)
 - ❖ Check with your mobile carrier to determine the proper gateway address for your area.
 - ❖ Messages sent by the equipment should be less than 160 characters in length (standard SMS length).
4. When complete press the Save button to accept changes or the Cancel button to discard changes. Pressing the back arrow, returns to the main Notifications page.

Network

CAUTION!

When connecting to a Nautel transmitter, we support both HTTP and HTTPS protocols. If using HTTP, the data traffic is not encrypted, meaning your username/password could be compromised. For security reasons, Nautel recommends using HTTPS whenever possible.

You can configure network settings using the AUI (see [Network](#), on page 2.2.65) or the FPUI. If you change a network setting on the AUI, it will also be reflected on the controller UI, and vice versa.

NOTE: *Nautel recommends that the following network settings be entered/vetted by a qualified Network Administrator. If parameters are changed and the AUI is reset, record the new values (or see the local front panel UI) to ensure you can log in after changes have been made.*

By entering the VX150 to VX2's established IP address into an Internet browser's address bar, and then logging into the AUI, you can view and edit the network parameters (see [Figure 2.2.41 on page 2.2.66](#)). You must have remote control enabled to edit network settings using the remote AUI.

The MAC Address and Status fields are read-only; they cannot be edited.

You must disable DHCP (as shown in [Figure 2.2.41 on page 2.2.66](#)) to be able to edit the IP Address, Subnet Mask and Gateway fields. If DHCP is enabled, these fields will be assigned automatically.

The DNS1 and DNS2 nameserver fields can be edited regardless of the DHCP setting.

The Status field identifies the status of the network.

- ❖ **RUNNING:** transmitter is connected to a network and is functioning properly.
- ❖ **NOT RUNNING:** transmitter is not connected or is not functioning properly. When in this state, remote AUI access is not possible.

Figure 2.2.41: Network Settings Page

Settings	Network
Broadcast Presets	General
Preset Scheduler	Mac Address 00:14:22:01:23:45
Users and notifications	DHCP <input type="checkbox"/>
Network	IP Address 192.168.2.110
Time	Subnet Mask 255.255.255.18
SNMP	Gateway 192.168.2.1
Audio Calibration	Status RUNNING
Exciter Reboot	DNS Servers
	DNS 1 8.8.8.8
	DNS 2 8.8.4.4

All IP addresses shown are for reference purposes only

Determining DHCP Setting

One of the main decisions in configuring the network connection on your VX150 to VX2 transmitter is whether you set DHCP to ON or OFF. If you are connecting to a network, consult with a network administrator before connecting the transmitter to your network to determine whether to enable (turn ON) or disable (turn OFF) the DHCP setting.

When DHCP is set to ON (default from factory), IP addresses are assigned automatically by the network server. In order for this feature to function properly, you must have a network-viewable DHCP server on your network.

If a DHCP server is not present, you (or your network administrator) must provide static addresses for IP, netmask, gateway and nameservers (gateway and nameservers are optional). You must enter them manually using the AUI or controller UI. In this case, DHCP should be set to OFF.

Network Setup - Using the AUI

1. Open the System Settings page by pressing Menu on the Dashboard.
2. Select the Network option (left-side of the screen) to display related information and associated parameters on the right-side of the screen. (see [Figure 2.2.41](#) on [page 2.2.66](#)).

3. Enter the following parameters (where applicable):

- ❖ Mac Address - Displays a number that serves as unique network adapter identifier. This is set by the manufacturer and is displayed for informational purposes only (cannot be user set). It may be necessary to use this number to allow the AUI to access your network.
- ❖ DHCP or Static IP - Defines whether the IP Address, Subnet Mask, Default Gateway, Default Nameserver and Alternate Nameserver will be provided manually (Static IP) or automatically by the access point (i.e., a router) through DHCP. In either case, the access point must be configured with the correct settings, which match the settings on the AUI in order for the AUI to access the network. Your parameter selection affects other parameter entries. If Static IP was selected, enter the IP Address, Subnet Mask and Default Gateway.
- ❖ IP Address - displays unique numerical network identifier for the transmitter.
- ❖ Subnet Mask - Masks an IP address, and divides the IP address into network address and host address.
- ❖ Default Gateway - Defines the address of the network access point.
- ❖ Default Nameserver - Address that identifies the DNS host. The DNS (Domain Name System) translates internet domain and host names to IP addresses. DNS automatically converts the name in the web browser address bar to the IP addresses of web servers hosting those sites.
- ❖ Alternate Nameserver - Redirects the name server.
- ❖ Port Number - Used to identify the senders and receivers of messages. Also supports port forwarding (remapping) which allows the AUI of multiple NV Series transmitters to be accessed on the same network. See your network router documentation for additional remapping information and instructions.

NOTE: Changes to this port are reset to 3501 after a software upgrade. Reconfigure as required.

- ❖ Status - Identifies the status of the network.
 - Running: transmitter is connected to a network and is functioning properly.
 - Not Running: transmitter is not connected or is not functioning properly. When in this state, remote AUI access is not possible.

4. Press Apply to accept entries/changes made to the network parameters.

Connecting a Laptop Directly to the Transmitter

If connecting to the VX150 to VX2 directly with a laptop, you must set a static IP address on the VX150 to VX2 and your laptop.

1. From the controller UI's Main Menu, go to User Settings -> Network Settings and set the IP address as follows:
 - ❖ DHCP: OFF
 - ❖ IP Address: 10.10.10.2
 - ❖ Netmask: 255.255.255.0

2. Set the transmitter for Remote control.

NOTE: The following steps assume the operating system is Windows XP. Adapt as required for computers with different operating systems.

3. On the laptop, go to Start Menu/Control Panel/Network Connections/Local Area Network.
4. In the Local Area Network Status, open the General tab and choose Properties. Scroll down and highlight Internet Protocol (TCP/IP). Choose Properties.
5. In the Internet Protocol (TCP/IP) Properties window, select Use the following IP address.
6. Enter the following settings:
 - ❖ IP Address: 10.10.10.1
 - ❖ Subnet Mask: 255.255.255.0
 - ❖ Default Gateway: 192.168.1.2
7. In the Internet Protocol (TCP/IP) Properties window, select OK.
8. In the Local Area Connection Properties window, select OK.
9. In the Local Area Connection Status window, select Close.
10. Close the Network Connections window.
11. Enter the IP address (10.10.10.2) into a web browser's address bar to connect to the transmitter's remote AUI.

Engine

Email Server

The Email Server (see [Figure 2.2.42](#)) allows you to configure email parameters (e.g., email server and port number), and is required if the notification feature is used (see [Notifications](#), on page 2.2.64).

NOTE: *Nautek recommends that the following settings be entered/vetted by a qualified Network Administrator.*

Figure 2.2.42: Email Configuration page

Email Server	
Settings	
Host	mail.mailserver.org
Port	25
Transmitter Name	TestVS
Sender Email	admin@mailserver.org
Authentication	<input checked="" type="checkbox"/>
Username	admin
Password	*****
<input type="button" value="Save and continue"/>	

Authenticity enabled for reference purposes only

All IP addresses shown are for reference purposes only

To configure the email feature, perform the following steps:

1. Open the User Settings page by pressing Menu/User Settings in the Home page.
2. Select the Email Configuration option (left-side of the screen) (see [Figure 2.2.42](#)) to display related information and associated parameters on the right-side of the screen.

3. Enter the following parameters:

- ❖ Email Server: The outgoing mail server. Enter the server name or IP address here. In order to enter a server name (e.g., mail.nautel.com), at least one nameserver IP address must be entered (see [Network, on page 2.2.65](#)).
- ❖ Port Number: This logical connection end point uses a number to identify the type of process to which an internet or other network message is to be forwarded to when it arrives at a server. Typically, this is set to 25 for unencrypted SMTP systems and 843 for encrypted email.
- ❖ Transmitter Name: Set to a name that associates to the transmitter such as station identification (e.g., GV10_WXYZ). This name will be included in notification emails.
- ❖ Sender Email Address: Enter as a standard email address (e.g., a@b.com). This will be the sender address that notification email recipients will see. Free web-based email service accounts (Gmail, Hotmail, Yahoo mail etc.) are acceptable here.
- ❖ Authentication Required: If your email server requires authentication to send emails, select the check box and enter the appropriate Username and Password to allow this. If the check box is not selected, the Username and Password fields do not appear.
- ❖ Username: Enter the username for your outgoing email server.
- ❖ Password: Enter the password for your outgoing email server.

NOTE: The transmitter will automatically handle encryption if the associated mail server requires it.

4. When complete, select Apply or Cancel to restore the previous setting. Use the Test button to enter an address to which an email will be sent to verify your settings. Enter the recipient address and press the OK button to send the test email or press the Cancel button to return to the Email Configuration page.
5. Use the Test button to enter an email address to test your settings. Click the OK button to run the test or the Cancel button to return to the Email Configuration page.

Time


The VX150 to VX2 controller module's internal clock uses an externally accessible backup battery, and therefore maintains an accurate date and time, even during power outages. The date and time needs to be set when the transmitter is first installed, or after a power outage if the backup battery has failed.

You can set the date and time using the AUI (see [Setting the Clock - using the AUI](#)). If you change the clock setting on the controller UI, it will also be reflected on the remote AUI, and vice versa. If the NTP feature is enabled (see [Enabling NTP, on page 2.2.73](#)), the clock will set automatically and cannot be manually adjusted.

Setting the Clock - using the AUI

You can remotely set the VX150 to VX2's time and date using the AUI's Time page (see [Figure 2.2.43](#)) by selecting Time from the Settings options or by clicking on the date or time, which is displayed in the upper, left corner of the AUI.

Figure 2.2.43: Settings - Time

Settings	Time
Broadcast Presets	<div> <div>NTP</div> <div> <div>NTP Enable/Disable Switch (shown disabled)</div> <div></div> </div> </div>
Preset Scheduler	<div> <div>NTP</div> <div> <div>NTP Server</div> <div>Debian.pool.ntp.org</div> </div> </div>
Users and notifications	<div> <div>Current Timezone : America/New_York</div> <div> <div>Country</div> <div>United States ▾</div> </div> <div> <div>Zone</div> <div>America/New_York Eastern ▾</div> </div> </div>
Network	<div> <div>Current Timezone : America/New_York</div> <div> <div>Country</div> <div>United States ▾</div> </div> <div> <div>Zone</div> <div>America/New_York Eastern ▾</div> </div> </div>
Time	<div> <div>Current Timezone : America/New_York</div> <div> <div>Country</div> <div>United States ▾</div> </div> <div> <div>Zone</div> <div>America/New_York Eastern ▾</div> </div> </div>
SNMP	
Audio Calibration	
Exciter Reboot	

The Time option allows users to set the exact time and date information as well as regional and timezone settings for a transmitter location.

Procedure to set up the time and date:

1. Select the Time Setup option from the left-side of the User Settings page to open a related window on the right-side of the page.
2. Enter Time and Date parameters and press Apply. Press Cancel to discard changes. Please note that Time and Date cannot be set via this menu if NTP is enabled (see [Setting the Clock - Using the Front Panel on page 2-152](#)).
 - ❖ Time - enter the hour (24-hour clock), minutes (up to 60), and seconds (up to 60).
 - ❖ Date - select values from the drop-down menus beside Day, Month, and Year.
3. Enter the following location parameters and press Apply. Press Cancel to discard changes:
 - ❖ Timezone - automatically set based on Region, Country and Zone selections.
 - ❖ Region - select the appropriate region from the drop-down menu.
 - ❖ Country - select the appropriate country from the drop-down menu.
 - ❖ Zone - select the appropriate zone from the drop-down menu

NOTE: *Changes cannot be made via this menu if NTP is enabled. Disable NTP, make required changes in the Time Setup menu then re-enable NTP (see [Enabling NTP, on page 2.2.73](#)).*

The Time Setup page contains editable fields for the time (hours, minutes and seconds), date (day, month and year) and time zone (region, country and zone). The clock is displayed in 24-hour format. Use the drop-down menus to select the desired value for a specific field. Press the appropriate Apply button to accept changes or Cancel to discard them.

NOTE: *Ensure the proper Zone is selected to observe Daylight Savings time (DST).*

Configuring NTP Servers










NOTE: The following function is only available via the AUI; however, the use of NTP can also be enabled/disabled from the controller UI (see [Enabling NTP, on page 2.2.73](#)).

You can configure one or more NTP (Network Time Protocol) servers to allow clock synchronization with all computers on the same network as the VX150 to VX2. To view the AUI's NTP Servers page (see [Figure 2.2.44 on page 2.2.73](#)), select NTP Servers from the User Settings options. There are several functions available on this page - enabling NTP, monitoring NTP server status and managing servers.

NOTE: *The accuracy of the NTP synchronization is related to the distance to the server. For this reason, Nautel recommends that you choose servers in the same country as the equipment. If this is not possible, attempt to connect to servers from the same continent.*

NOTE: The NTP clock synchronization polling interval varies between 64 and 1024 seconds. To minimize network traffic, the interval will change depending on how much error is accumulated between polling events and will be increased if the remote NTP server becomes unreachable. The polling interval is also randomized slightly to avoid the situation where a large number of requests are always arriving at the NTP server at the same time.

Figure 2.2.44: NTP Servers Page

Settings	Time
 Broadcast Presets	NTP
 Preset Scheduler	<div><div>NTP</div><div></div></div>
 Users and notifications	<div><div>NTP Server</div><div>Debian.pool.ntp.org</div></div>
 Network	Current Timezone : America/New_York
 Time	<div><div>Country</div><div>United States ▾</div></div>
 SNMP	<div><div>Zone</div><div>America/New_York Eastern ▾</div></div>
 Audio Calibration	Current Timezone : America/New_York
 Exciter Reboot	<div><div>Country</div><div>United States ▾</div></div>
	<div><div>Zone</div><div>America/New_York Eastern ▾</div></div>

Enabling NTP

Enable the NTP function by selecting the Enable NTP (icon will be green). Disable by de-selecting the Enable NTP.

Monitoring NTP Servers

The NTP Server Status section displays tabular information on the NTP servers connected to the network. The table includes remote name, IP address, delay, offset and jitter.

- ❖ Remote Name: Displays the host name of the referenced time source. An asterisk (*) in the first column marks the reference time source that is currently preferred by the NTP daemon. A '+' character in the first column marks high quality candidates for the reference time that could be used if the currently selected reference becomes unavailable.
- ❖ IP: Displays the IP address associated with the Remote Name. In some cases the Remote Name could be the IP address.
- ❖ Delay: Displays the round-trip delay (in ms) of the time queries.
- ❖ Offset: Displays the difference (in ms) between the reference time and the system clock.
- ❖ Jitter: Displays the magnitude of jitter (in ms) between several time queries.

Managing NTP Servers

The Manage Servers section displays the NTP server files that have been added. You can Add to the list of NTP servers (see [Figure 2.2.45](#)) or Delete a selected NTP server from the list.

Figure 2.2.45: Add NTP Server

SNMP

The SNMP page (see [Figure 2.2.46](#)) provides a means to configure the SNMP agent and associated traps.

Figure 2.2.46: SNMP page

SNMP	
SNMP Version	v1
Agent Port	161
Read Community
Read Community (Confirm)
Write Community
Write Community (Confirm)
Traps Enabled	<input checked="" type="checkbox"/>
Trap Receiver IP	192.168.2.100
Trap Receiver Port	162

Save and continue

Configure the SNMP agent as follows:

1. Enter the first five fields, noting the following:
 - ❖ **Agent Port:** Enter the UDP port where the SNMP agent checks for requests. The default setting is 161. If your transmitter is behind a firewall, you must open this port to use SNMP.
 - ❖ **Read Community:** Enter the password for the SNMP client application to allow acquisition of channel values. Provide confirmation of this password in the Confirm field.
 - ❖ **Write Community:** Enter the password for the SNMP client application to allow changing of channel values. Provide confirmation of this password in the Confirm field.
2. Select the Enable Traps to allow the SNMP agent to send trap notifications, and to display two additional fields associated with traps. Enter the two additional fields as follows:

- ❖ Trap Receiver IP: Enter the IP address of the computer to which the SNMP agent will send trap notifications. The computer must be running an SNMP application that is configured to receive traps. The SNMP agent will send trap notifications to one receiver only.
 - ❖ Trap Receiver Port: Enter the UDP port where the SNMP agent will send traps. The default setting is 162.
3. When complete press Save and Continue or press the Back arrow to restore the previous settings.

NOTE: *Check the Read Community and Write Community passwords after a software upgrade. Some upgrades will clear passwords and require them to be reset.*

Login

When you enter the User Accounts page for the first time, it is recommended you create an account and then delete the default Nautel account, as follows:

1. Login to the AUI using the default Username ("Nautel") and Password (blank).
2. Set up your own Administrator account, with your desired Username and Password.
3. Logout of the AUI, then login to your new Administrator account.
4. Delete the "Nautel" account.

Orban Audio Processing

This section describes how to configure, enable and operate the optional Orban audio processor after it is installed in your transmitter. You can interface with audio processor functionality using the transmitter's local (or remote) AUI or controller UI. The extent of the features available depends on which interface is used.

- [Configuring the Transmitter for the Orban Audio Processor - see page 2.2.77](#)
- [Enabling the Orban Audio Processor for Preset Selection - see page 2.2.78](#)
- [Selecting an Orban Audio Processor Preset - see page 2.2.79](#)

NOTE: *Using the Orban Inside option requires the installation of an Orban audio processor card in your transmitter. If you had a pre-existing transmitter when you received your Orban Inside kit, verify that the Orban card has been installed in the transmitter according to the Orban Inside Quick Guide (QG12001), provided with the Orban Inside kit. Refer to the Installation Manual for information on purchasing and installing this option.*

NOTE: *This section contains frequent reference to Orban's Optimod-FM 5500 Digital Audio Processor Operating Manual (see the link below). The equipment covered in the 5500 manual uses the same Orban audio processor as in your transmitter. The 5500 manual provides detailed information on the audio processor's functionality. If a discrepancy exists between the operational instructions in the Orban manual and this document, the latter shall prevail as this document is specific to operation with an VX150 to VX2 transmitter. View the Orban Optimod-FM 5500 Digital Audio Processor Operating Manual online at:*

<ftp://ftp.orban.com/5500/Documentation/>

(the version number referenced in this link is controlled by a third party and is subject to change without notice)

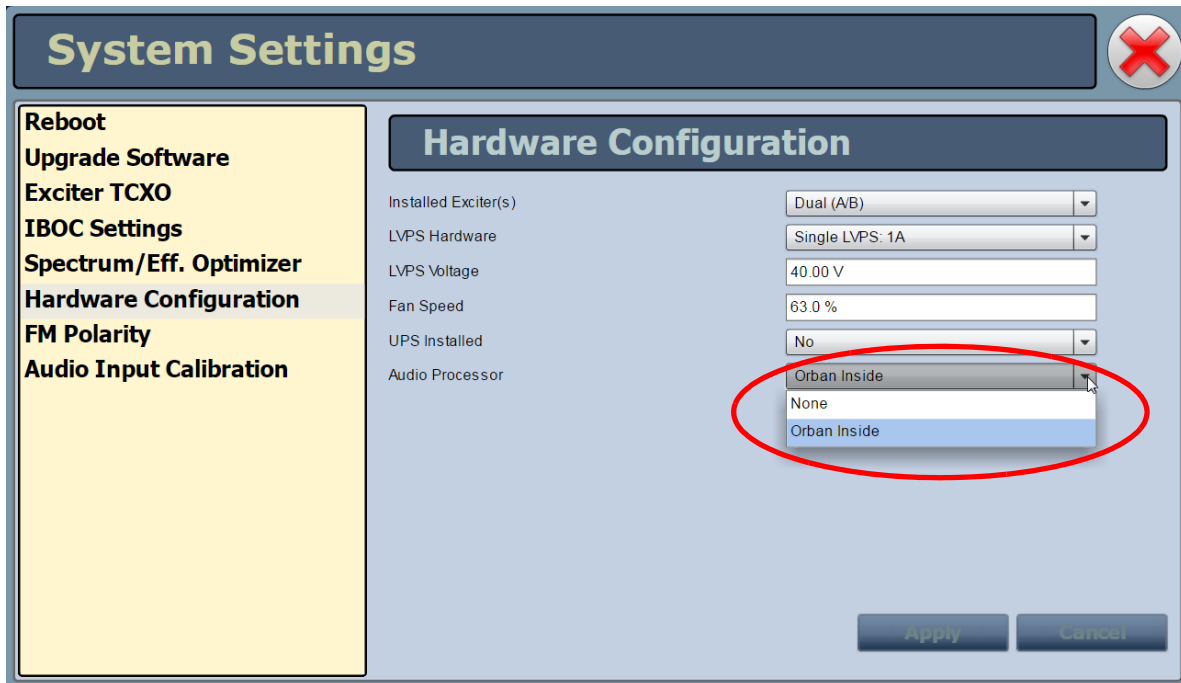
Configuring the Transmitter for the Orban Audio Processor

Configure the VX150 to VX2 to recognize the presence of the Orban card using the controller UI (see [Orban Enabling - using the AUI](#)) or the AUI (see [Orban Hardware Configuration - using the AUI](#) - see page 2.2.77) as follows:

NOTE: *Configuring the Orban audio processor locally will cause the AUI to display an Orban Inside setting. The same occurs on the controller UI when configuring via the AUI.*

Orban Hardware Configuration - using the AUI

1. Navigate to the AUI's System Settings -> Hardware Configuration page (see [Figure 2.2.47](#)).
2. Press or click on the drop arrow in the Audio Processor field. Select Orban Inside to enable the Orban audio processor for use (selecting None disables it). Press or click the Apply button to save the change. Press or click Cancel to discard changes.
3. Reboot the AUI in the System Settings -> Reboot page. This will ensure the transmitter properly detects the Orban Inside card upon recovery.

Figure 2.2.47: Configuring the Transmitter - AUI System Settings -> Hardware Configuration page

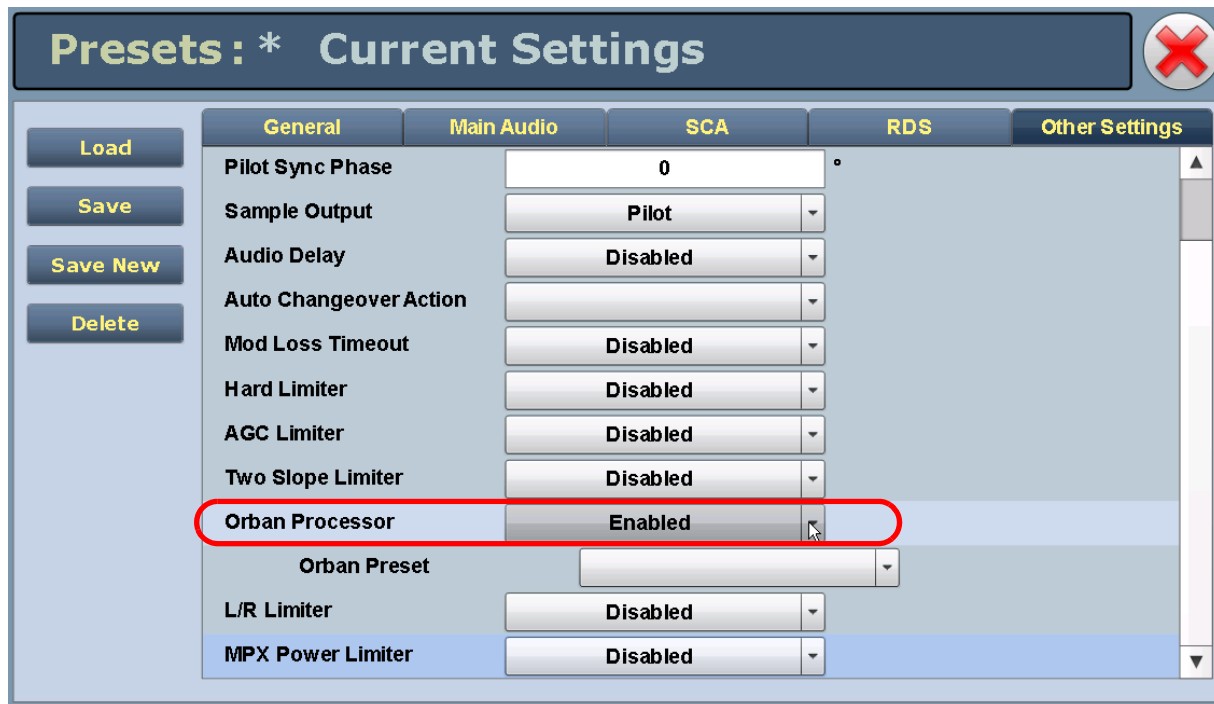
Enabling the Orban Audio Processor for Preset Selection

Enable the Orban audio processor to allow preset selection using either the controller UI (see [Orban Enabling - using the AUI](#)) or the AUI (see [Orban Enabling - using the AUI - see page 2.2.78](#)) as follows:

NOTE: Enabling the Orban audio processor locally will cause the AUI to display an enabled setting. The same occurs on the controller UI when enabling via the AUI.

Orban Enabling - using the AUI

1. With the transmitter turned on, navigate to the AUI's Main Menu -> Presets page.
2. For the applicable preset, press the Other Settings tab (see [Figure 2.2.48](#)).
3. In the Orban Processor drop-down list, select Enabled to enable the audio processor (selecting Disabled disables the audio processor). Press Save to store the change.

Figure 2.2.48: Enabling the Orban Audio Processor - Remote AUI

Selecting an Orban Audio Processor Preset

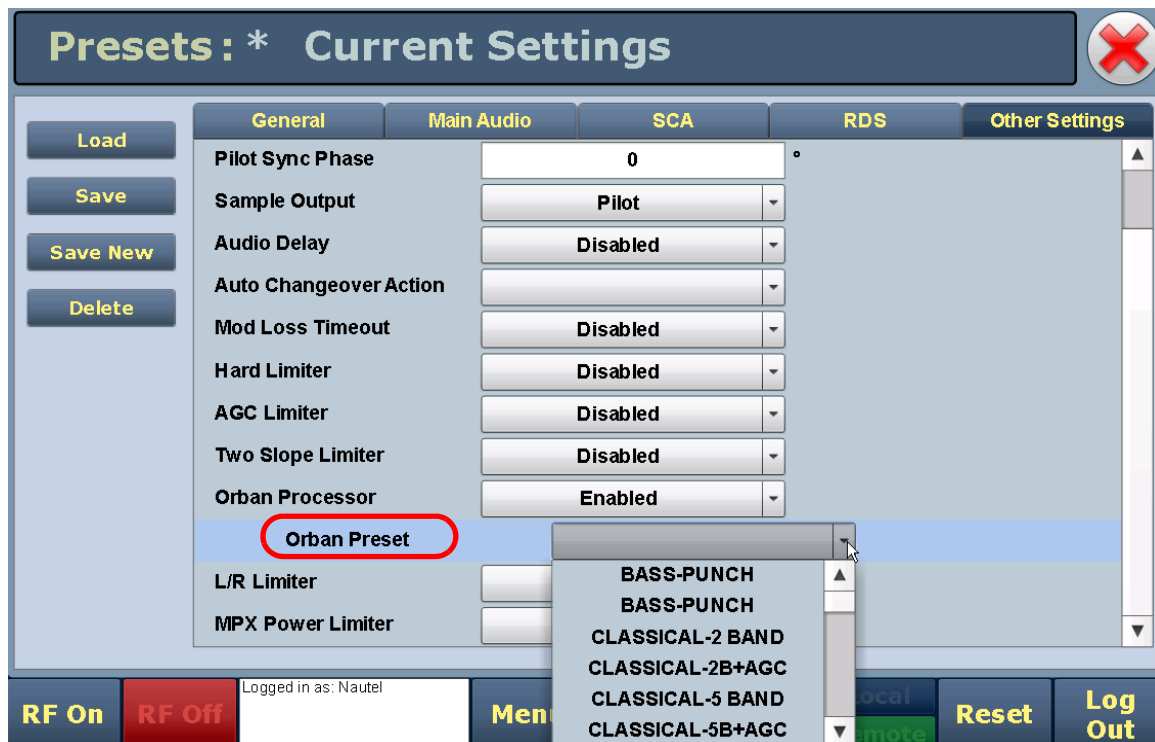
Select an Orban audio processor preset using either the AUI (see [Selecting an Orban Preset - using the AUI - see page 2.2.79](#)) or the controller UI (see [Managing an Orban Audio Processor Preset](#)) as follows:

NOTE: Selecting an Orban preset via the AUI will cause the controller UI to also reflect the change, and vice versa. To create a new Orban Audio Processor Preset, see [Managing an Orban Audio Processor Preset, on page 2.2.80](#).

Selecting an Orban Preset - using the AUI

1. From the AUI's Main Menu -> Presets page, press the Other Settings tab (see [Figure 2.2.49](#)).
2. From the Orban Preset drop-down list, select the desired Orban preset (e.g., ROCK-LOUD, etc). Refer to the Orban Optimod 5500 manual for detailed information on the factory programmed presets available. Press Save to store the change. To create a new Orban preset, see [Managing an Orban Audio Processor Preset, on page 2.2.80](#).

Figure 2.2.49: Selecting an Orban Preset - Remote AUI



Managing an Orban Audio Processor Preset

Orban presets contain many audio processing settings, including stereo enhancement, AGC, EQ, final clipping and distortion. From the remote AUI (not available from the front panel UI), you can create Orban presets, manage their various settings and save the preset settings to a text file.

When the Orban Inside feature is enabled (see [Enabling the Orban Audio Processor for Preset Selection - see page 2.2.78](#)), an Audio Processor icon appears on the AUI's Main Menu window (see [Figure](#)). Select Settings -> Orban Audio Processing in the Dashboard menu to enter the various Orban settings.

[Figure 2.2.50 on page 2.2.82](#) shows the Orban Meter window available as a Dashboard Widget panel.

WARNING! When you open the Audio Processor page while the transmitter is on and Orban is enabled, the active preset in the Orban audio processor is loaded by default. Loading another Orban preset causes that preset to become active, Make sure you understand the impact that a preset change will have on your broadcast.

NOTE: *The Audio Processor page contains tabbed sections that allow managing of Orban presets. These tabbed pages (see [Figure 2.2.50](#) on page 2.2.82 through [Figure 2.2.62](#) on page 2.2.94) illustrate the many parameters associated with an Orban preset. Detailed descriptions are not included in this document. Refer to the Orban Optimod 5500 manual for more information on setting these parameters.*

Loading and Saving Orban Presets

The left-hand side of the Audio Processor page has four buttons (see below).

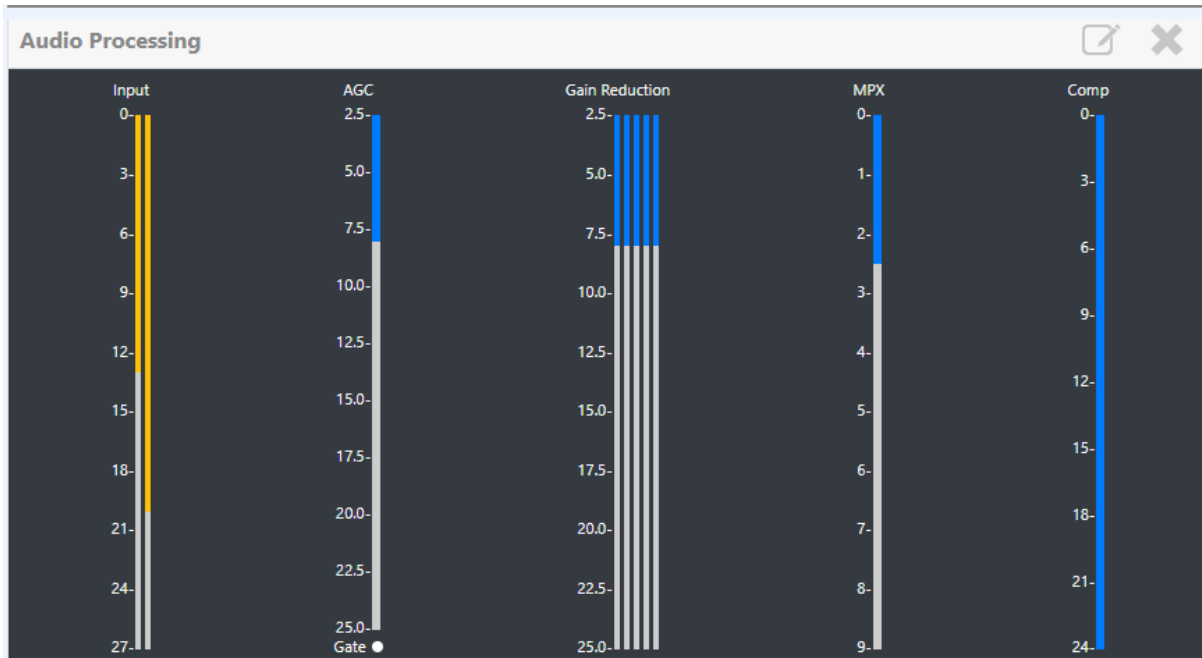


When you first enter the Audio Processor page, the current preset is displayed. If the current preset is not the preset you want to work with, press the Load button to call up a window containing a list of alternate presets. Presets that display an 'F' are factory presets that cannot be modified. Presets that display a 'U' are user presets that can be modified.

To activate any change in the Audio Processor page, press the Save button and then press the Save Preset window's Save As button [Save As and Delete buttons not available for factory (F) presets]. When creating a new preset, you can also enter a new name in the Save Preset window before pressing the Save As button. Press Cancel to discard changes and return to the Audio Processor page.

Pressing this button opens an Audio Processor meter window (see [Figure 2.2.50](#)) that displays various meters that indicate levels for inputs, AGC, gain reduction, multiplex (MPX) power and composite. Refer to the Operation section of the Orban Optimod 5500 manual for detailed information on these meters.

Pressing this button opens a window that allows downloading a text version of the preset to a folder on your PC or laptop.

Figure 2.2.50: Audio Processor meter window

There are two types of Orban audio processor presets: factory presets and user presets. Factory presets, designated by an 'F' in the Load or Save screens, cannot be modified. When a factory preset control is changed, a new preset is automatically created. This preset's default name will be the same as the Orban preset with an asterisk (*) prefix (e.g., * EXTREME). Modified presets should be saved to a new name, otherwise they will be overwritten by any edits made to subsequent presets. A saved preset will display as a User preset, designated by a 'U' in the Load or Save screens. User presets can be modified.

NOTE: *When editing saved "User Presets" it is the best practice to load a preset that is close to the desired configuration and then tweak the settings for exact configuration.*

Tab Sections

The following tabs (and referenced Figure numbers) are available on the Audio Processor page. Each provides specific control functions for the selected preset. Refer to the Orban Optimod 5500 manual for details on these settings.

- ❖ Less More - see [Figure 2 on page 2.2.56](#)
- ❖ Stereo Enhancer - see [Figure 2.2.52 on page 2.2.84](#)
- ❖ AGC - see [Figure 2.2.53 on page 2.2.85](#)
- ❖ EQ - see [Figure 2.2.54 on page 2.2.86](#)
- ❖ Final Clipping - see [Figure 2.2.55 on page 2.2.87](#)
- ❖ Multiband - see [Figure 2.2.58 on page 2.2.90](#)
- ❖ Compressors - see [Figure 2.2.59 on page 2.2.91](#)
- ❖ Bandmix - see [Figure 2.2.60 on page 2.2.92](#)
- ❖ Multiband Distortion - see [Figure 2.2.61 on page 2.2.93](#)
- ❖ UL Distortion - see [Figure 2.2.62 on page 2.2.94](#)

Each control shows the current setting (in the middle of the control) and the available range of settings. You can make adjustments either by pressing the << or >> buttons or by moving (press, hold and move accordingly) the green slider bar, which indicates the setting graphically.

Figure 2.2.51: Audio Processor Menu - Less More tab shown

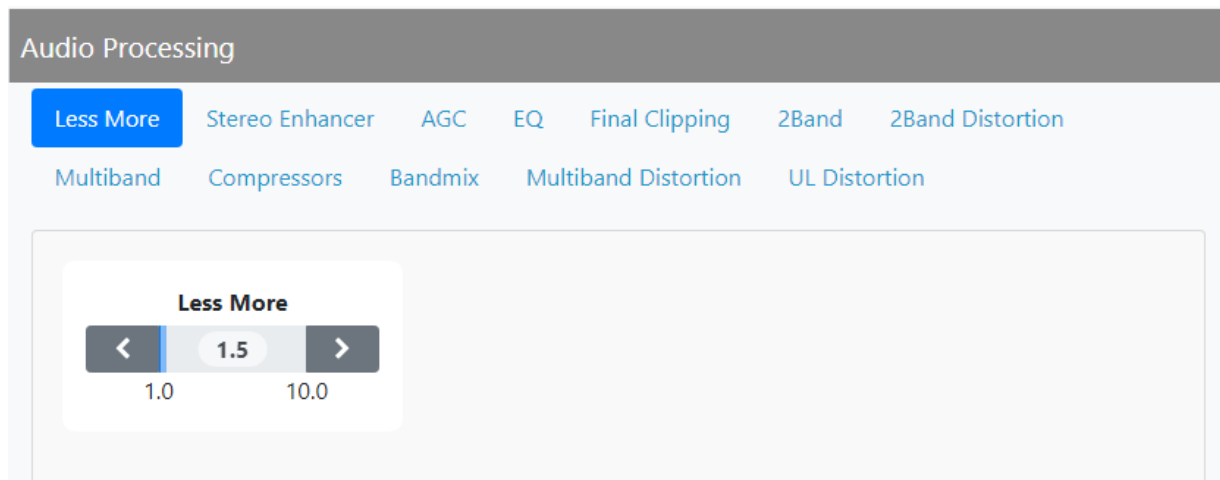


Figure 2.2.52: Audio Processor Menu - Stereo Enhancer tab

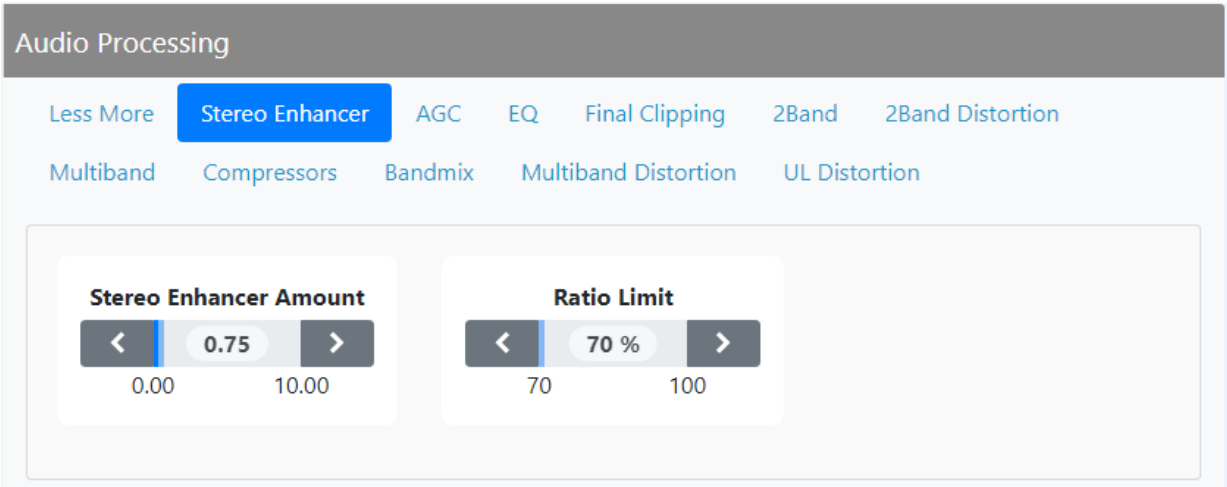
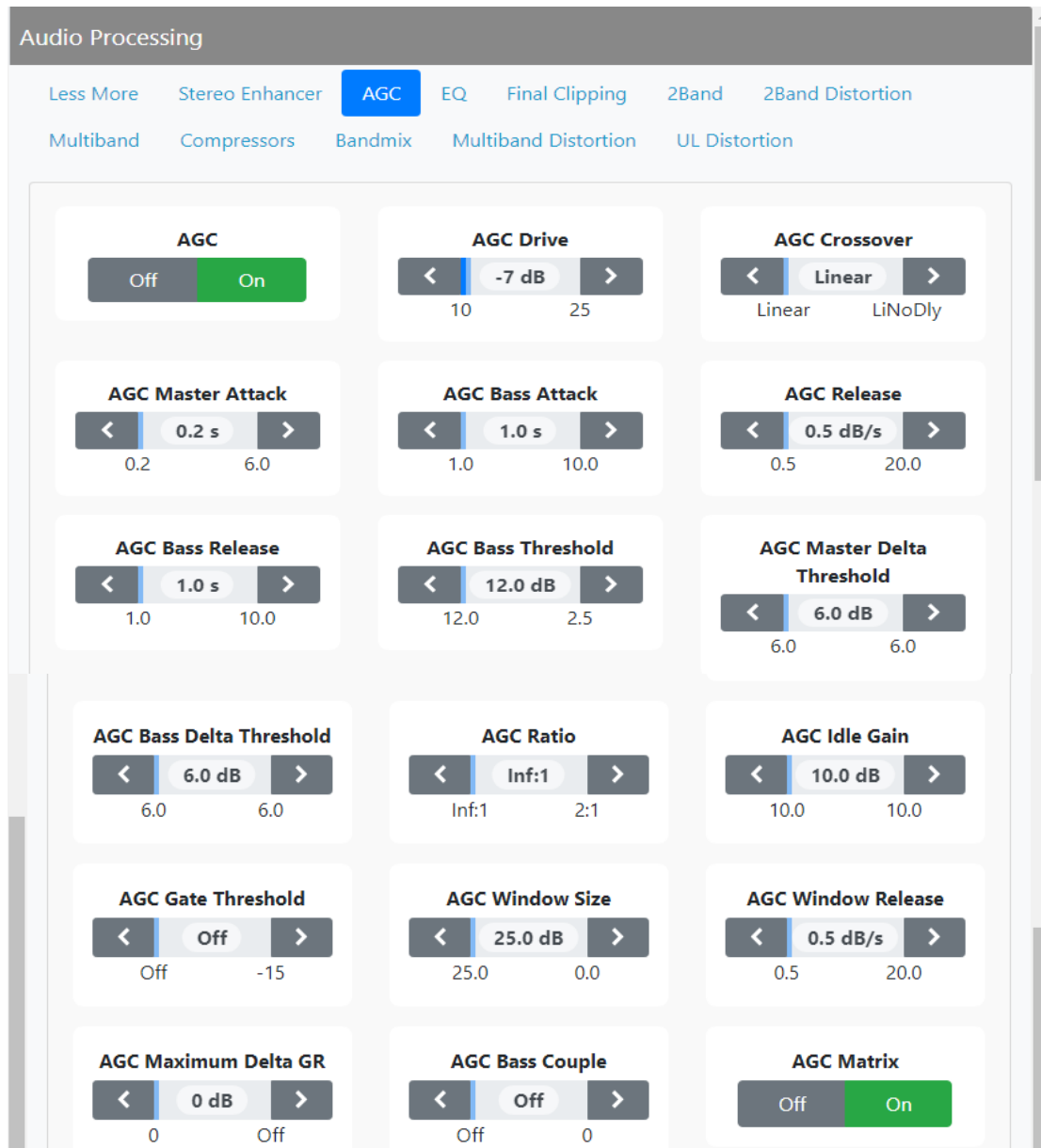


Figure 2.2.53: Audio Processor Menu - AGC tab



NOTE: The AGC Ratio range displays as Inf:1 to 2:1. Although you cannot set the AGC Ratio to Inf:1 (it will default to 4:1), some Orban presets are defaulted for an Inf:1 setting. Nautel recommends you edit the setting to an appropriate ratio (4:1, 3:1 or 2:1).

Figure 2.2.54: Audio Processor Menu - EQ tab

Audio Processing

Less More Stereo Enhancer AGC **EQ** Final Clipping 2Band 2Band Distortion

Multiband Compressors Bandmix Multiband Distortion UL Distortion

LF Shelf Equalizer

Bass Gain
< 0 dB >
0 12

Bass Frequency
< 80 Hz >
80 500

Bass Slope
< 6 dB/Oct >
6 18

Phase Rotator
Off On

30Hz High Pass Filter
Off On

DJ Bass Boost
< Off >
Off 10

Lowband EQ

Low Gain
< 10.0 dB >
10.0 10.0

Low Frequency
< 20.0 Hz >
20.0 500.0

Low Width
< 0.8 Oct >
0.8 4.0

Midband EQ

Mid Gain
< 10.0 dB >
10.0 10.0

Mid Frequency
< 250 Hz >
250 6000

Mid Width
< 0.8 Oct >
0.8 4.0

Highband EQ

High Gain
< 10.0 dB >
10.0 10.0

High Frequency
< 1.0 kHz >
1.0 15.0

High Width
< 0.8 Oct >
0.8 4.0

Brilliance
< 0.0 >
0.0 6.0

High Frequency Enhancer
< 0 >
0 15

Figure 2.2.55: Audio Processor Menu - Final Clipping tab

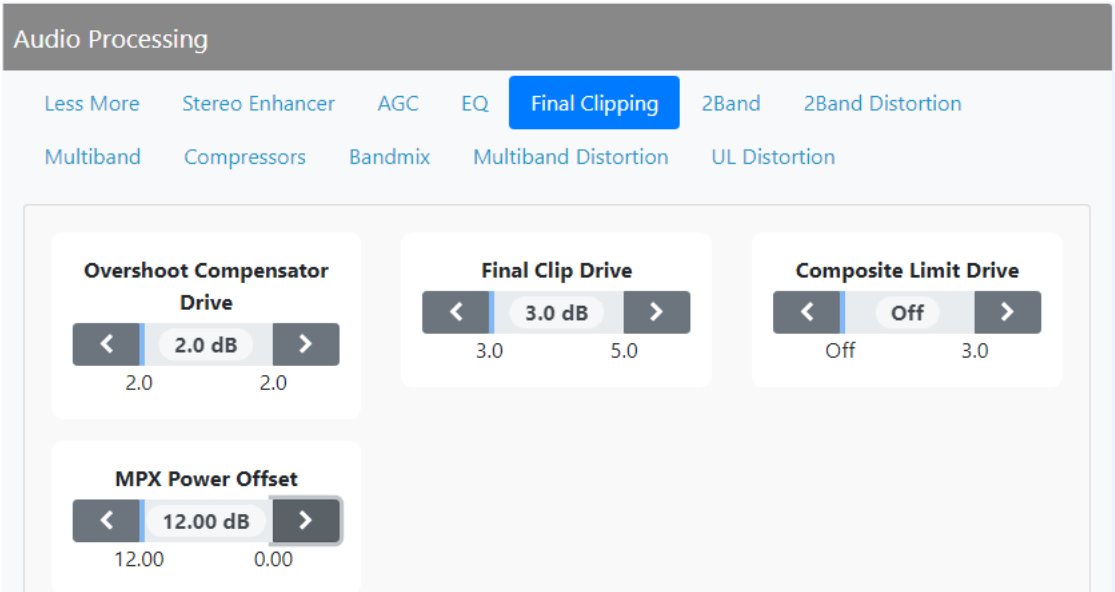


Figure 2.2.56: Audio Processing - 2Band tab

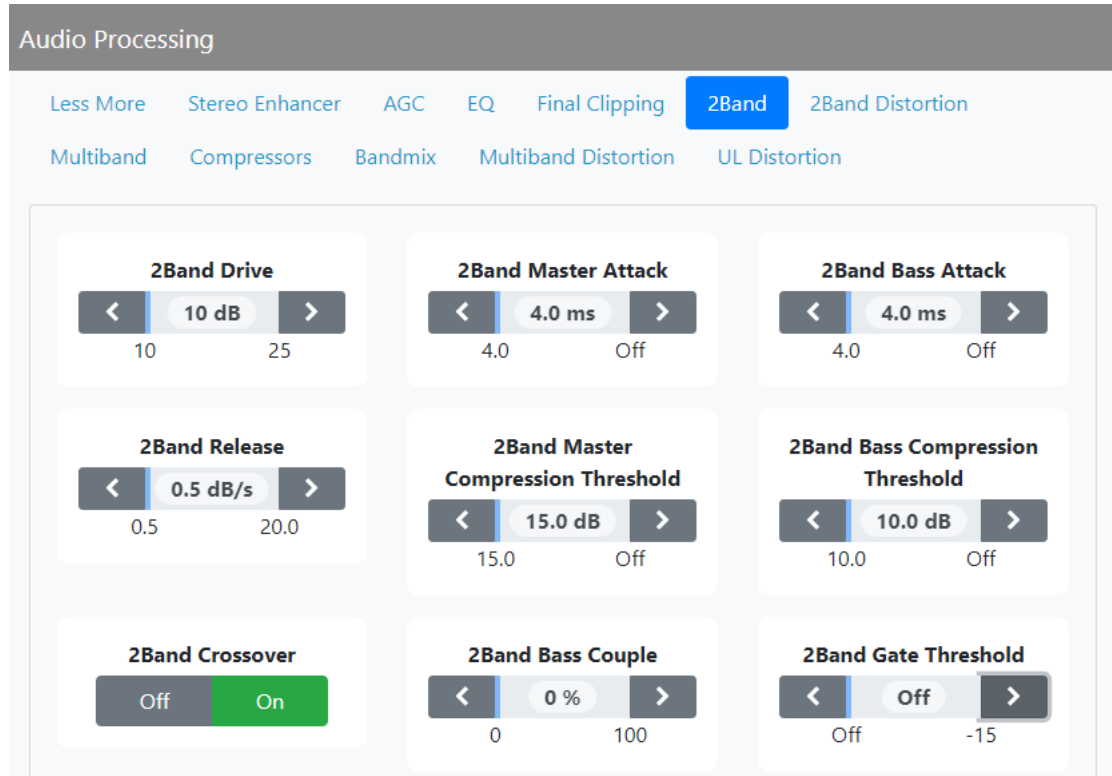


Figure 2.2.57: Audio Processing - 2Band Distortion tab

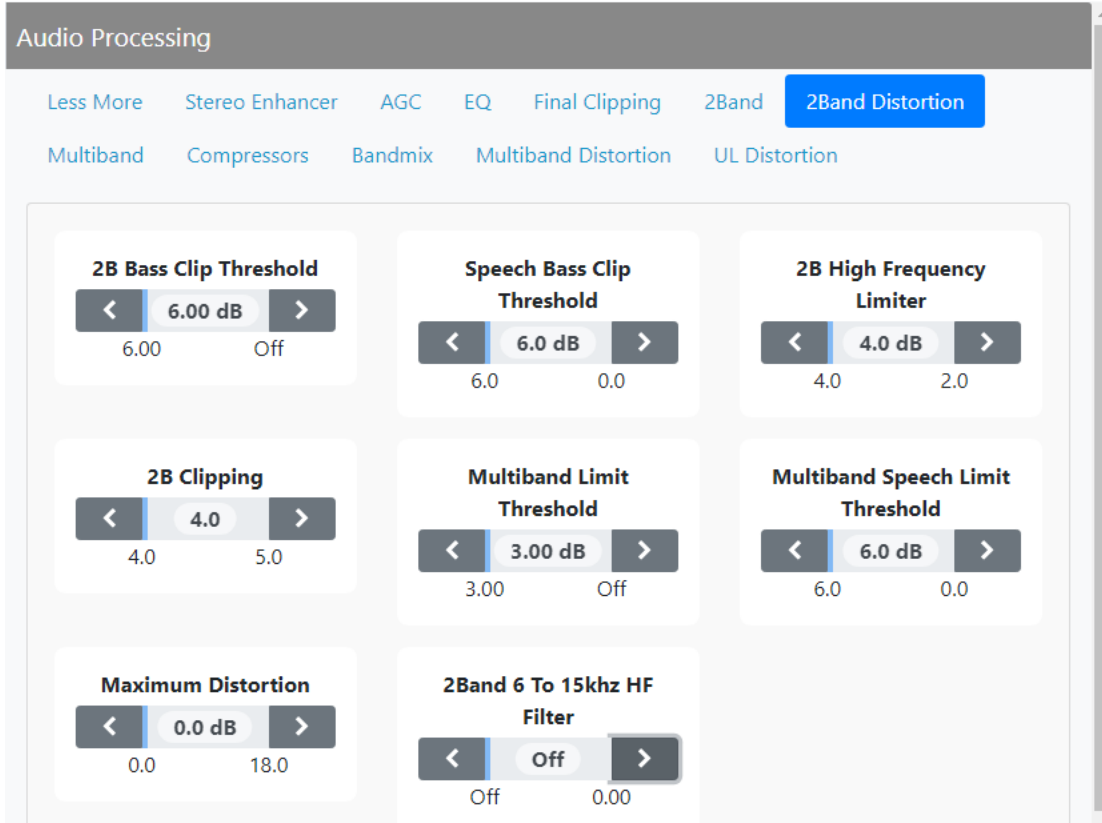


Figure 2.2.58: Audio Processing - Multiband tab

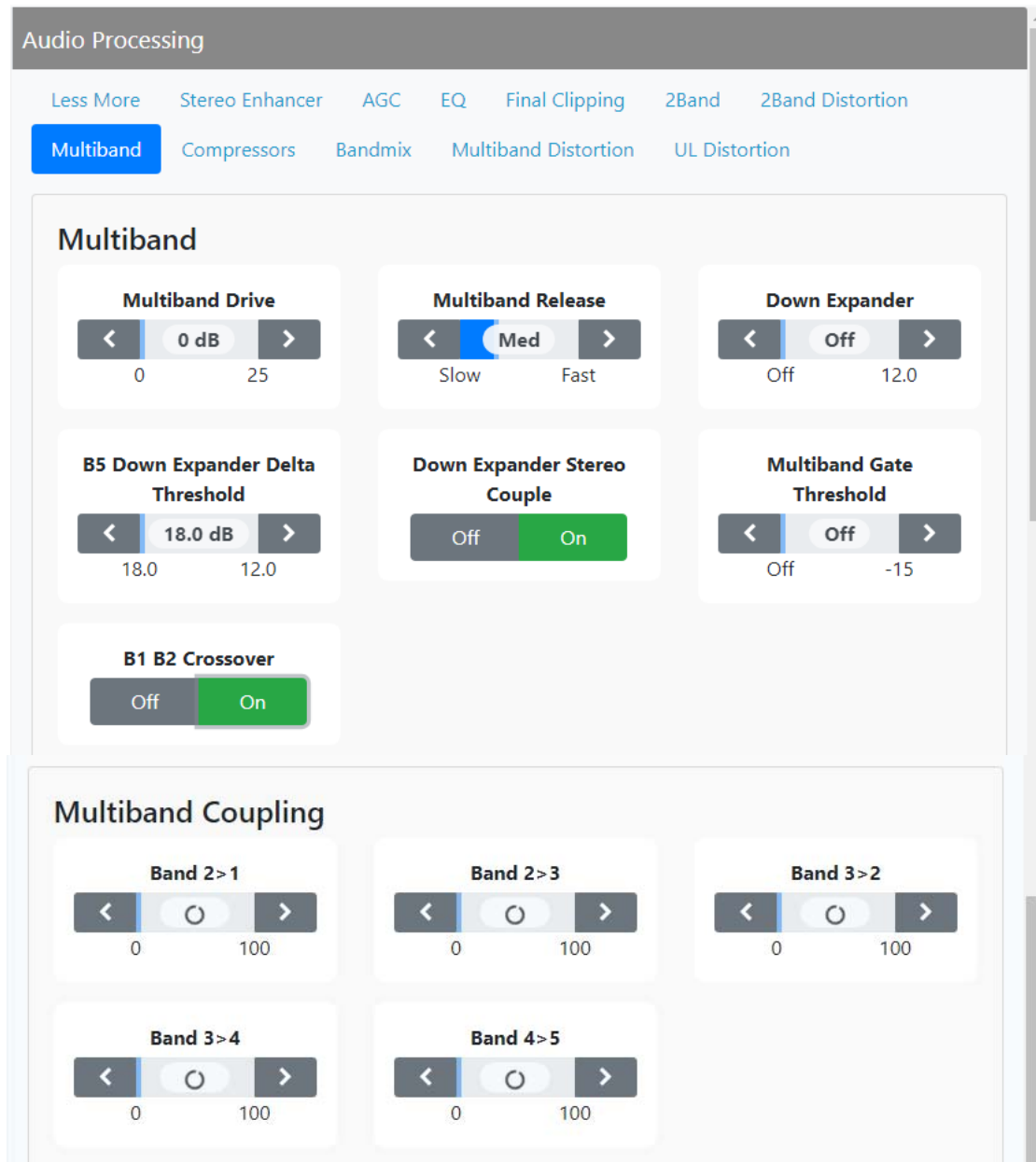


Figure 2.2.59: Audio Processing - Compressors Tab

Audio Processing

Less More Stereo Enhancer AGC EQ Final Clipping 2Band 2Band Distortion

Multiband **Compressors** Bandmix Multiband Distortion UL Distortion

Multiband Attack

B1 Attack

< 4 ms >

4 Off

B2 Attack

< 6 ms >

4 Off

B3 Attack

< 4 ms >

4 Off

B4 Attack

< 4 ms >

4 Off

Multiband Delta Release

B1 Delta Release

< 6 >

6 6

B2 Delta Release

< 6 >

6 6

B3 Delta Release

< 6 >

6 6

B4/5 Delta Release

< 6 >

6 6

Multiband Compressor Threshold

B1 Compression Threshold

< 16.00 dB >

16.00 Off

B2 Compression Threshold

< 16.00 dB >

16.00 Off

B3 Compression Threshold

< 16.00 dB >

16.00 Off

B4/5 Compression Threshold

< 16.00 dB >

16.00 Off

Multiband Limiter Attack

B1 Limiter Attack

< 0 % >

0 100

B2 Limiter Attack

< 0 % >

0 100

B3 Limiter Attack

< 0 % >

0 100

B4/5 Limiter Attack

< 0 % >

0 100

Figure 2.2.60: Audio Processing - Bandmix Tab

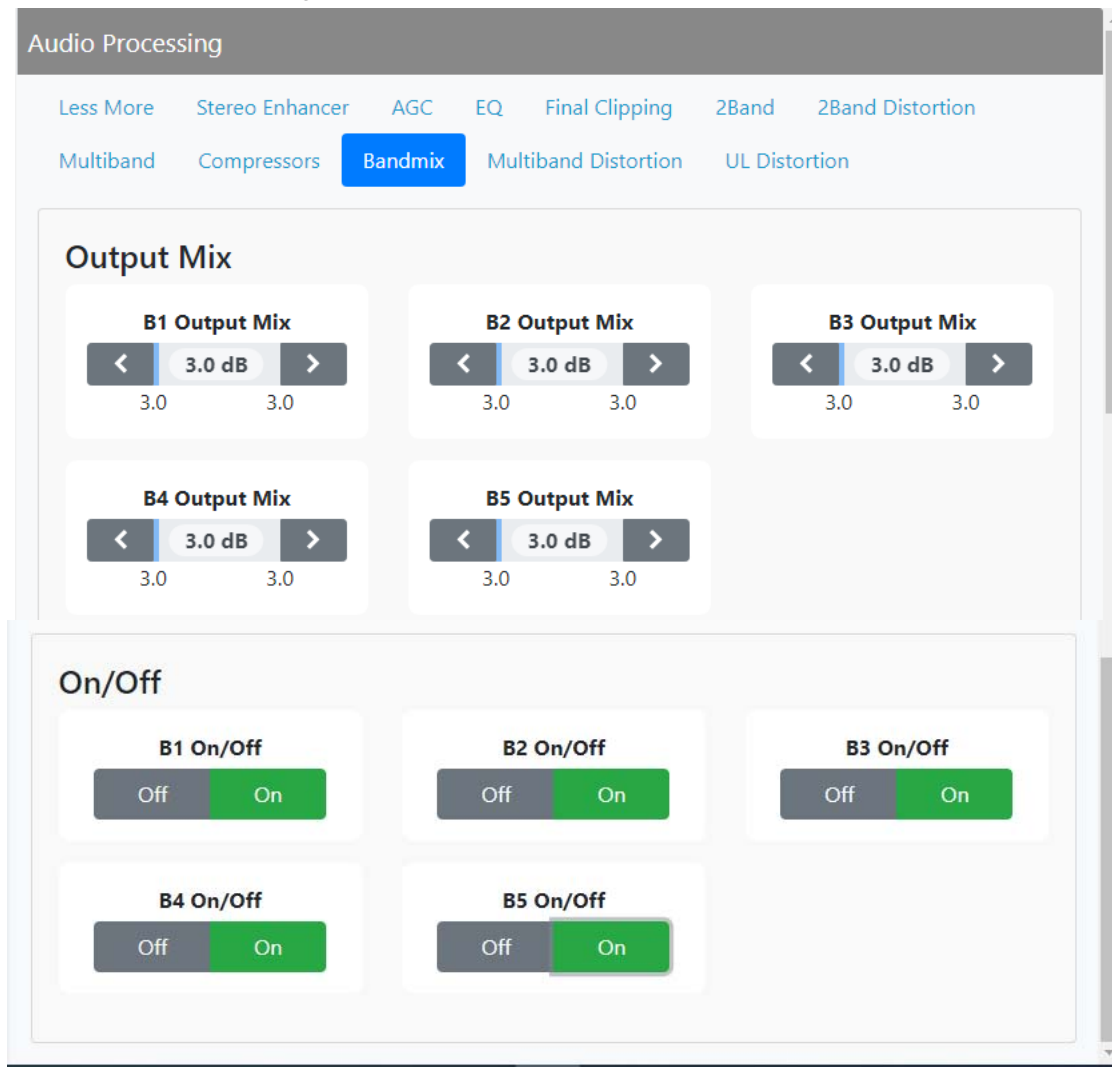
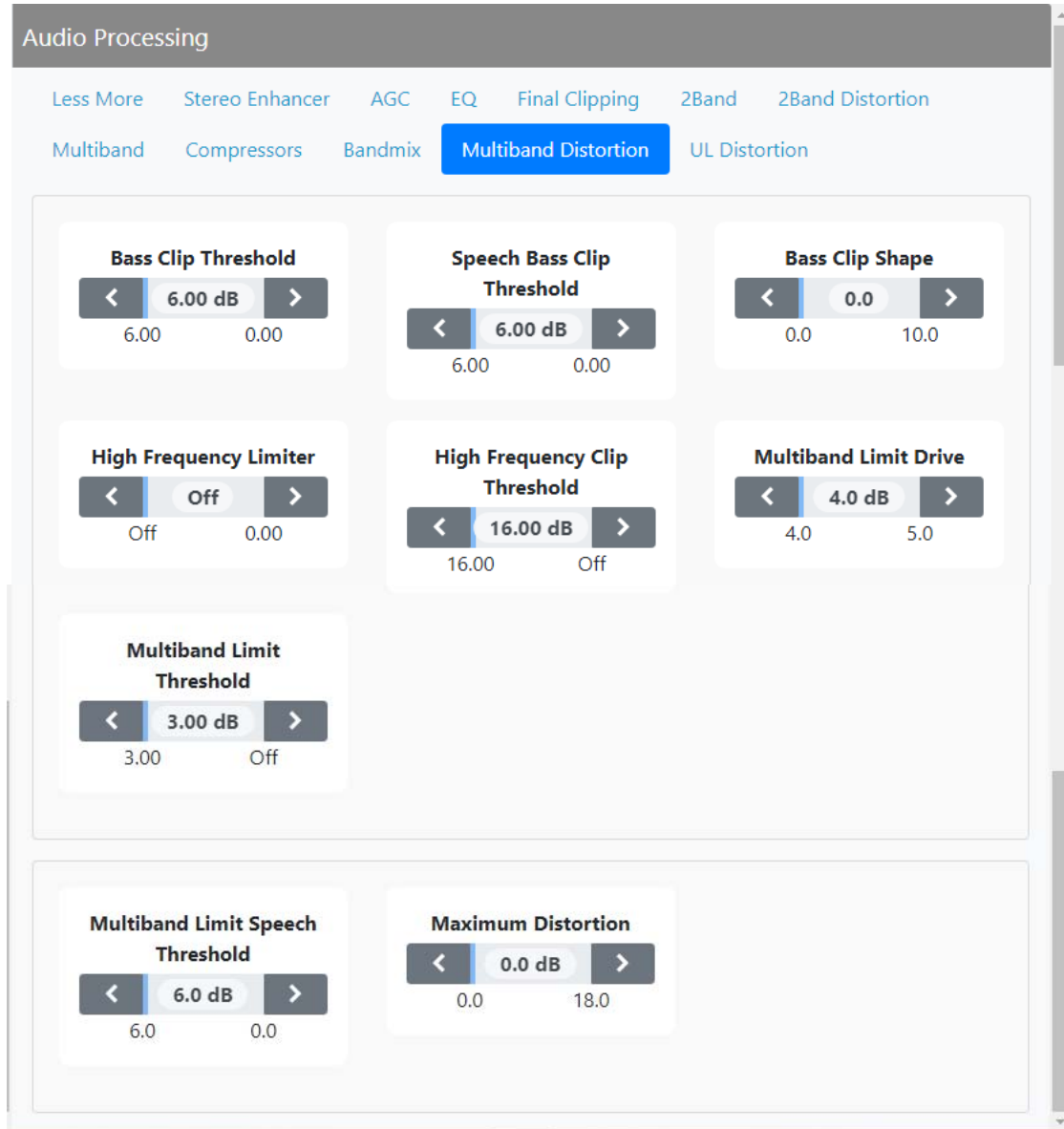
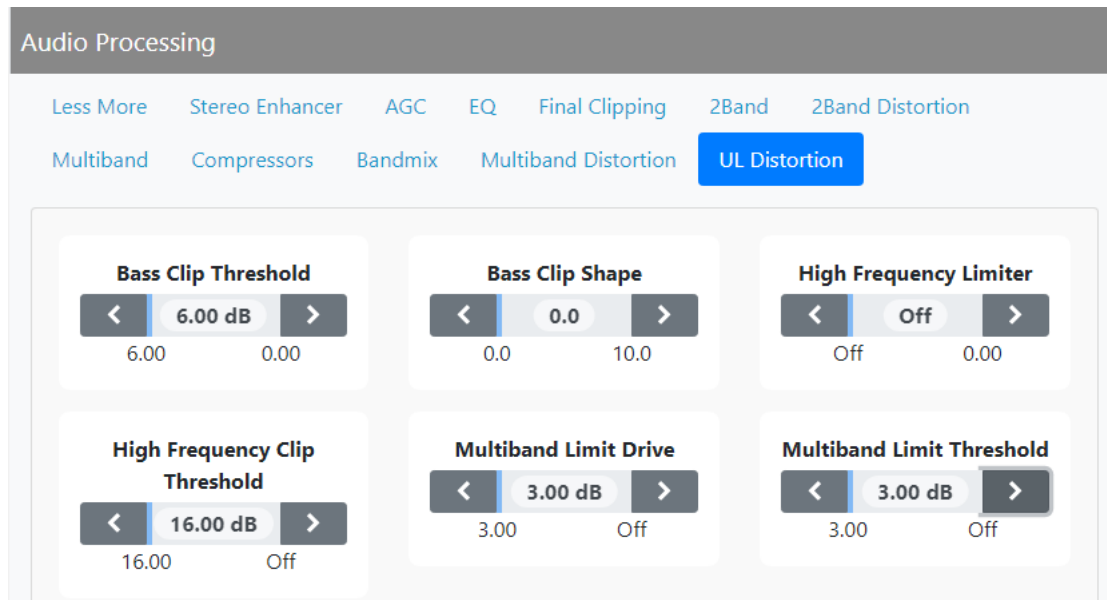


Figure 2.2.61: Audio Processing - Multiband Distortion Tab



NOTE: The number of adjustable controls may vary with the type of Orban Preset (e.g., ROCK-LOUD, COUNTRY UL, etc.)

Figure 2.2.62: Audio Processing - UL Distortion tab

Exciter Reboot

The Exciter Reboot page (see [Figure 2.2.63](#)) allows users to reboot the active exciter.

Figure 2.2.63: Settings - Exciter Reboot

- To reset the active exciter, select Exciter Reboot from the Settings menu. Press Restart Exciter to initiate a reboot of the Exciter. NOTE: If the active exciter is reset, a brief interruption in transmitter operation will occur.
- Press the back arrow X in the upper, right corner to close this page and return to the Home page.

Call Sign

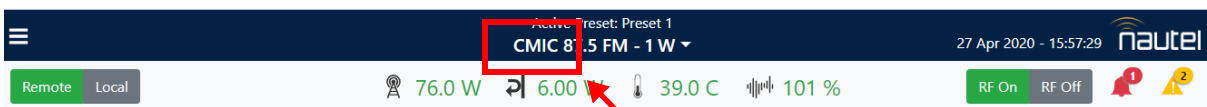
The Call Sign screen (see [Figure 2.2.64](#)) allows users to set a name that identifies the transmitter on the AUI. This identification will be displayed in brackets on the top transmitter banner of the AUI (see [Figure 2.124](#)).

From the Dashboard Presets menu (General tab), select Settings -> Call Sign and enter the call sign or ID in the field and press SAVE (maximum 15 characters in length).

Figure 2.2.64: Settings - Update Preset (Call Sign/ID)

Field	Value
Preset Name	Example Preset 3
Preset Frequency	99.1
Preset Mode	AM
Power Level	1
Set Point	1
Call Sign	GTS

Figure 2.2.65: Call Sign/ID - Top Banner



Call Sign/ID

Software Upgrade

The Upgrade Software page (see [Figure 2.2.66](#)) allows for uploading a suite of software upgrade files (.tgz files) via remote connection. Navigate the page as described below. For additional information on loading software, see [Upgrading Software, on page 3.4.1](#).

Figure 2.2.66: Software Upgrade page

Select the Software Upgrade option from the Settings menu to open a related window. The page consists of the following sections and buttons:

- **Current Version:** indicates the current software version.
- **Select Upgrade File:** displays the available upgrade files uploaded to the transmitter.
- **Details:** opens a window containing information about the installed software. If an upgrade file is selected, the screen shows a comparison between the installed version and the selected upgrade by component. Identical versions are shown in green; different versions are shown in red. You can also view the details of the previous upgrade by pressing the View Last Upgrade checkbox.
- **History:** displays a window containing a history of the upgrades to the software. Press the + button to maximize the details of the software. You can save this information to disk as a .txt file from the remote AUI.
- **Start Upgrade:** begins to upgrade the current software with the selected upgrade file.
- **Manage Files** (available through the remote AUI only): opens a window displaying the files you can upload to upgrade the software. You can add or delete files from this list using the Browse, Upload and Delete buttons in the window.

NOTE: Before performing a software upgrade, maximize the host's disk space by deleting the old .tgz files. Press the Manage Files button to display the Upload Files window, select the file(s) to delete, and press the Delete button.

Audio Calibration

NOTE: Audio inputs are factory set using a high accuracy source and do not typically require user adjustment. Changes to factory calibrations could cause low or excessive modulation and non-compliance to strict regulatory limits. If you need to re-calibrate an audio input, make sure you have a reliable calibrated audio source.

To view the AUI's Audio Input Calibration page (see [Figure 2.2.67](#)), select Audio Calibration from the Dashboard menu page. The peak meter value of each calibrated audio input (analog left, analog right, Int. SCA1 or Int. SCA2, MPX or MPX SCA) that is applied will be displayed. Enter a valid calibration value and click Update to save the changes.

Figure 2.2.67: Audio Input Calibration page

The screenshot shows the 'Audio Calibration' page with a title bar and a back arrow. It contains six sections, each with a label, a text input field, a value, a unit, and an 'Update' button. Below each input field is a small, faint number.

Input Type	Value	Unit
Analog Left	17	dBu
Analog Right	0	dBu
Int SCA 1	0	dBu
Int SCA 2	0	dBu
MPX	3	Vpp
MPX SCA	1	Vpp

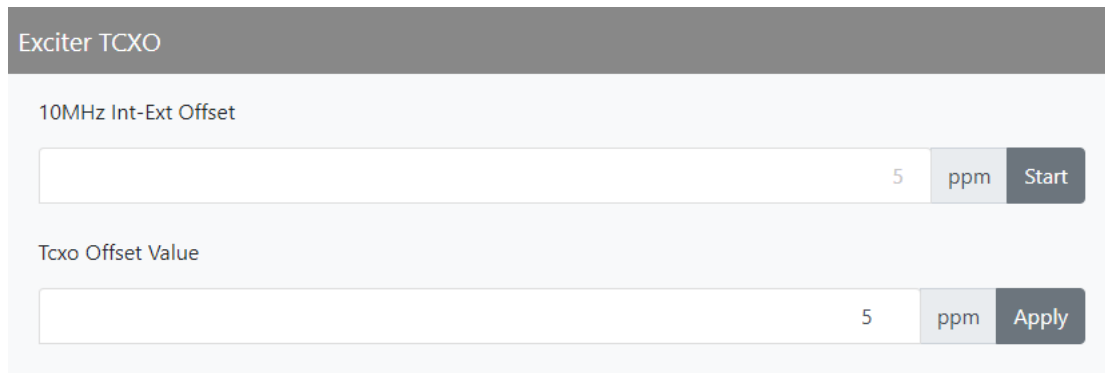
Exciter TCXO Calibration

The Exciter TCXO Calibration page (see [Figure 2.2.68](#)) allows users to calibrate the internal clock to a user supplied external high precision 10 MHz clock reference (e.g. GPS synchronized 10 MHz clock). Once this external 10 MHz clock reference is connected, the 10MHz Int-Ext Offset field will display the difference between the internal and external frequencies (in ppm). Users can press the Start button to automatically calibrate the internal TCXO to the external reference source; equally, they can manually enter the measured internal-external offset value into the TCXO Offset Value field and press Apply.

If no external high precision 10 MHz clock reference is connected, but the actual transmitter carrier frequency is being measured with a calibrated external frequency counter, operators can manually offset the internal TCXO by entering the appropriate ppm difference in the TCXO Offset Value field. For example, if the frequency of the transmitter is 1 ppm too high, then a positive 1 ppm should be entered in the TCXO Offset Value field in order to compensate. Similarly, if the transmitter frequency is too low, enter a negative ppm value. After an adjustment is made, press Apply.

To calibrate another exciter, switch to that exciter and repeat the calibration.

Figure 2.2.68: AUI - Exciter TCXO calibration page



Exciter TCXO

10MHz Int-Ext Offset

5 ppm Start

Tcxo Offset Value

5 ppm Apply

NOTE: You can also adjust the exciter TCXO offset value and run a TCXO calibration from the front panel UI.

Power Thresholds

You can set thresholds for the forward power level using the AUI (low and very lower power thresholds) (see [Setting Power Thresholds - using the AUI](#)). These thresholds determine the limit for a low forward power alarm to be activated.

If you change a user threshold on the controller UI, it will also be reflected on the AUI, and vice versa.

Setting Power Thresholds - using the AUI

The AUI's Power Thresholds page (see [Figure 2.2.69](#)) has two tab sections - Low Forward Power Threshold 1 and 2.

Figure 2.2.69: Settings - Power Thresholds Page

The screenshot shows a mobile application interface for setting power thresholds. At the top is a dark grey header with the text 'Power Thresholds' and a white back arrow on the right. Below the header, there are two distinct sections. The first section is titled 'Low Forward Power Threshold 1' and contains a white text input field, the number '52', a grey box with a white '%' symbol, and a blue 'Update' button. The second section is titled 'Low Forward Power Threshold 2' and contains a white text input field, the number '25', a grey box with a white '%' symbol, and a blue 'Update' button.

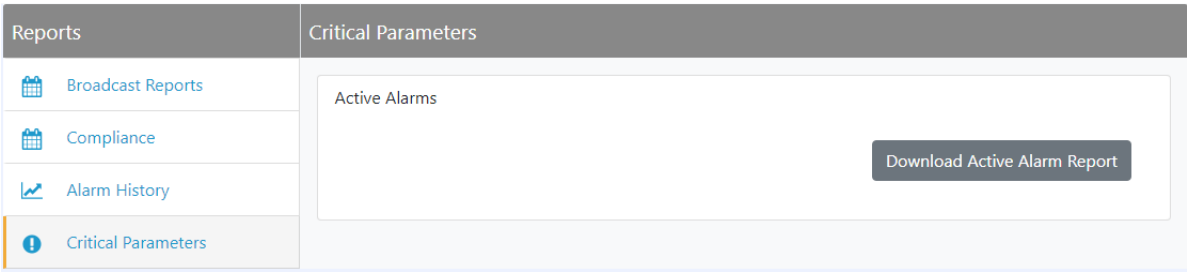
- Selecting the Low Forward Power tab displays a screen that allows for setting of the threshold for the low forward power and very low forward power alarms.
 - ❖ If the forward power falls below the low threshold setting (default is 52% of the setpoint) or below the very low threshold setting (default is 25% of the setpoint), the associated alarm will activate in the Alarm page. When the forward power level increases above a threshold, the alarm will clear. To disable the low forward power alarms, set the associated percentage to 0%. Press Update to save the change or press the back arrow to return to the previous menu.

Capturing Critical Parameters

NOTE: *This feature is available only through the remote AUI.*

You can capture critical parameter data for the transmitter’s current state using the AUI’s Critical Parameters page (see [Figure 2.2.70](#)). To view this page, select Critical Parameters from the Reports page. From this page, you can download the Active Report Alarm Reports to an Excel spreadsheet document. This will capture Capture Meters (reads all meter values), Capture Alarms (reads all active alarms), Capture Presets (reads current preset) and Capture Settings (reads current settings, e.g., active exciter, threshold settings, scale factors, etc.).

Figure 2.2.70: Critical Parameters page



Configuring Remote Inputs and Outputs

You can configure your remote input/output interface for the transmitter using the AUI (see [Remote I/O Settings - using the AUI](#)) or using the controller UI (see [Monitoring Analog Outputs, on page 2.2.105](#)).

Refer also to the VX150 to VX2 Installation Manual for information on remote inputs and outputs and their factory default settings.

Remote I/O Settings - using the AUI

To view the Remote I/O page (see [Figure 2.2.71 on page 2.2.102](#)), select Remote I/O from the Dashboard menu. Press the back arrow in the upper, right corner to close this page and return to the Home page.

Select the Remote Inputs tab (see [Remote Inputs - AUI, on page 2.2.101](#)) or Remote Outputs tab (see [Remote Outputs - AUI, on page 2.2.103](#)) to view or edit detail on the remote inputs or outputs.

Remote Inputs - AUI

Using the Remote Inputs tab (see [Figure 2.2.71 on page 2.2.102](#)), you can configure up to 9 remote inputs that allow you to remotely control various operational characteristics of the transmitter. Unless otherwise noted, these inputs are only accepted by the transmitter if the remote/local status is set to remote. That setting can only be made by a local user using the AUI's Local button. Nautel sets remote input defaults prior to shipping. See the Installation Manual for details.

Select the desired remote input (1 through 9) from the list. The Channel and Control settings for the selected input, as well as the current logic level (1 or 0), are displayed on the right-hand side of the page. You can define the Channel and Control settings as follows:

SELECT INPUT CHANNEL - AUI

You can configure remote inputs 1 through 9 for one of a variety of control inputs. Press the existing Action menu to display the various options (see [Figure 2.2.71 on page 2.2.102](#)). From this window select one of the following options by pressing OK:

- ❖ Not Assigned. No effect on transmitter operation, regardless of logic level.
- ❖ Preset: NAME. Selects the associated preset (from a list of all pre-defined presets) as active.
- ❖ RF On/Off. Same as pressing the RF On (telling the system to provide RF power, if possible) or the RF Off button on the local AUI. There are two inputs configured by default; one for Falling Edge, Turn On and one for Falling Edge, Turn Off.
- ❖ Reset. Causes a system reset. Same as pressing Reset button on the local AUI.
- ❖ Inc/Dec RF Power. Activating these inputs will increment/decrement the preset power level by 1% of the rated power. Holding the selection will increment/decrement the power level by 1% every 1/2 second. There are two inputs configured by default; one for Falling Edge, Increase and one for Falling Edge, Decrease. **NOTE:** If multiple power increase or decrease inputs are active, the lower number input takes precedence.

If you save a change to a remote input via the AUI, it will also be displayed on the controller UI.

Figure 2.2.71: Remote Input Page (Remote Input Tab 1 shown)

Remote I/O	
<div>Inputs Outputs</div> <div>Remote Input 1 Inc/Dec RF Power</div> <div>Remote Input 2 Preset: Example Preset 1</div> <div>Remote Input 3</div> <div>Remote Input 4</div> <div>Remote Input 5</div> <div>Remote Input 6</div> <div>Remote Input 7</div> <div>Remote Input 8</div> <div>Remote Input 9</div>	<div>Remote I/O</div> <div>Remote Input 1</div> <div>Action Inc/Dec RF Power</div> <div>Trigger Falling Edge, Increase</div> <div>Level 1</div> <div>Save and continue</div>

CONFIGURE INPUT CONTROL LOGIC - AUI

You can configure the active/inactive control logic for each of the 10 remote inputs. Press the existing Logic bar to display the applicable drop-down menu options, which may include:

- ❖ Rising Edge Turn On/Reset. Logic '1' (high or rising edge) activates the input (or causes a reset, as appropriate).
- ❖ Falling Edge Turn On/Reset. Logic '0' (low or trailing edge) activates the input (or causes a reset, as appropriate).
- ❖ Rising Edge Turn Off. Logic '1' (high or rising edge) de-activates the input.
- ❖ Falling Edge Turn Off. Logic '0' (low or trailing edge) de-activates the input.

Press Save to activate changes. Press Cancel to cancel changes.

Remote Outputs - AUI

Using the Remote Outputs tab (see [Figure 2.2.72 on page 2.2.103](#), you can configure up to 5 remote outputs that indicate either the presence of various alarms or the status of operator controlled circuits.

Nautel sets remote output defaults prior to shipping. See the VX150 to VX2 Installation Manual for details.

Figure 2.2.72: Remote Output Page (Remote Output tab 1 shown)

Remote I/O	
<div>Inputs Outputs</div> <div> <div>Remote Output 1</div> <div>RF On/Off</div> </div> <div> <div>Remote Output 2</div> <div>RF On/Off</div> </div> <div> <div>Remote Output 3</div> </div> <div> <div>Remote Output 4</div> </div> <div> <div>Remote Output 5</div> </div>	<div>Remote I/O</div> <div>←</div> <div>Remote Output 1</div> <div>Action</div> <div>RF On/Off</div> <div>Trigger</div> <div>Output Low When RF Off</div> <div>Level</div> <div>0</div> <div>Save and continue</div>

Select the desired remote output (1 through 5) from the list. The Channel and Control settings for the selected output, as well as the current logic level (1 or 0), are displayed on the right-hand side of the page. You can define the Channel and Control settings as follows:

SELECT OUTPUT CHANNEL - AUI

You can configure remote outputs 1 through 5 to monitor a variety of alarm and status outputs. Press the existing Action menu to display the various options (see [Figure 2.2.72 on page 2.2.103](#)). From this window select one of the following options by pressing OK:

- ❖ Not Assigned. No alarm or status parameter is monitored.
- ❖ RF On/Off. The active logic level indicates the transmitter's RF power stage is on (enabled). The inactive logic level indicates the transmitter's RF power stage is off.
- ❖ Remote Enabled. An active logic low level indicates remote control is enabled (i.e. local plus remote). The inactive logic level indicates remote control is disabled.

CONFIGURE OUTPUT LOGIC - AUI

You can configure the active/inactive logic for each of the 5 remote outputs. Press the existing Logic bar to display the applicable drop-down menu options. Some remote output default examples:

If the selected channel is RF On/Off, the drop-down options are:

- Output Low When RF On. Logic '0' (low) indicates the output is true (RF is on); Logic '1' (high) indicates the output is false (RF is off).
- Output Low When RF Off. Logic '0' (low) indicates the output is true (RF is off); Logic '1' (high) indicates the output is false (RF is on).

If the selected channel is Remote Enabled, the drop-down options are:

- Output Low When True. Logic '0' (low) indicates the remote access is enabled; Logic '1' (high) indicates the remote access is disabled.
- Output Low When False. Logic '0' (low) indicates the remote access is disabled; Logic '1' (high) indicates the remote access is enabled.

Press Apply to activate changes. Press Cancel to cancel changes.

Monitoring Analog Outputs

There are two analog outputs - forward power, reflected power, that can be remotely monitored using the AUI. These outputs are factory defined parameters (cannot be changed to other parameters), and their scaling reflects the output voltage that yields a full-scale deflection.

The values associated with each of these fixed meters are of a linear nature so that changes made to the Sample Full Scale field (allowable range is 1- 6 V, defaulted to 6 V) will be reflected in the other fields according to the following equation:

$$(\text{Meter Value}/\text{Meter Full Scale}) \times \text{Sample Full Scale} = \text{Sample Voltage}$$

NOTE: *The Sample Voltage reading reflects the value that can be measured at the associated remote analog output pin for the given Meter Value. See the VX150 to VX2 Installation Manual for actual remote analog output pin assignments.*

SECTION 2.3: ROUTINE MAINTENANCE

This section provides instructions for performing routine maintenance on the VX150 to VX2 transmitter. This section includes the following topics:

- [Scheduled Maintenance](#)
 - ❖ [Cleaning](#)
- [Replacing an Air Filter - see page 2.3.1](#)
- [Performing On-Air Checks - see page 2.3.3](#)

Scheduled Maintenance

Scheduled maintenance consists of performing a visual inspection of the VX150 to VX2 at scheduled intervals. The recommended minimum time between scheduled maintenance visits is three months. Local operating and environmental conditions may dictate more frequent visits, while in remote sites less frequent visits may be acceptable. Experience and system reliability will determine the most practical schedule for a specific installation.

Cleaning

At a minimum, follow the cleaning procedures listed below.

NOTE: *A site located in a dirty area using open-air cooling requires more extensive cleaning than a site located in a clean area using closed-air cooling.*

1. Check the air filter, noting it is behind the fan cover on the front of the transmitter. Remove the air filter, inspect it, then re-install the air filter if it is clean. If the air filter is dirty wash and dry it and if it damaged, replace it as soon as possible. See [“Replacing an Air Filter” on page 2.3.1](#).
2. Clean the VX150 to VX2 using a vacuum cleaner and a soft-bristle brush to remove loose dirt. Clean, damp rags should be used to remove dirt that cannot be removed with a vacuum cleaner. Never use compressed air to clean the VX150 to VX2.

Replacing an Air Filter

The transmitter contains one air filter in the front of the transmitter (see [Figure 2.3.1 on page 2.3.2](#)) If an air filter becomes dirty or damaged, replace it as follows:

Interval

As required.

Parts and tools

- Replacement air filter

Procedure

Take the following steps to replace an VX150 to VX2 air filter:

1. Order a new filter, as necessary. You can order from Nautel (Nautel Part # HAM95) or obtain one from any local supplier of HVAC supplies.
2. Unpack the new filter and inspect it for damage.
3. Remove and retain the four M3 Phillips screws securing the fan cover from the front of the transmitter and remove the filter.
4. Insert the new air filter and reinstall the fan cover using the screws retained in [Step 3](#).
5. Dispose of the dirty or damaged air filter.

Figure 2.3.1: Replacing Air Filter



Performing On-Air Checks

You should check the on-air quality of the transmitter's signal periodically. This check can be done locally at the transmitter site, or remotely from another location in the transmitter's coverage area.

Interval

Every 12 months, or as required by law.

Parts and Tools

- High-quality receiver compatible with the modulation scheme used on the transmitter.

Procedure

1. Monitor the transmitter signal to identify any problems:
 - ❖ Use a high quality receiver to monitor audio quality.
 - ❖ Check the spectral output of the transmitter. You can use the local or remote AUI's spectrum analyzer to accurately assess the transmitter's spectral output.
 - ❖ Take a portable receiver to different locations in your coverage areas to identify any problems with the antenna pattern or areas of localized interference.
2. Obtain the Critical Parameters sheet that was completed during factory testing and provided with the transmitter. Use the transmitter's AUI to compare current transmitter settings with those on the Critical Parameters sheet.

NOTE: *Nautel completes the Critical Parameters sheet with the transmitter terminated into a precision 50 ohm load. Measurements made on site into a dummy load or station antenna may not yield the same readings. Slight variances are acceptable. The data is provided as a troubleshooting aid.*

SECTION 2.4: NON-STANDARD MAINTENANCE

This section provides instructions for performing non-standard maintenance on the VX150 to VX2 transmitter. This section includes the following topics:

- [Upgrading Software](#)
- [OS Password Recovery - see page 2.4.4](#)
- [SD Card Replacement - see page 2.4.4](#)

Upgrading Software

Periodically, enhancements or improvements to the operating system are identified and made available. Perform a software upgrade, as required, as follows:

NOTES:

Nautel recommends you make a backup of the transmitter's SD card.

Nautel recommends you perform a software upgrade at the transmitter site.

For port-forwarded transmitters, uploading of the .tgz file must occur locally or on the transmitter side of the router.

Parts and Tools

- Laptop (i.e., local computer for direct connection) or network computer with Windows and Internet Explorer Web browser
- CAT5 Ethernet cable
- Upgrade software (*.tgz file), provided via email or web download

Preliminary Checks

1. Determine the current software revision installed. Via the advanced user interface (AUI) screen, go to Menu/Settings/Software Images. Select the *.tgz file in the Select Upgrade File list (should highlight in blue) and click Details. Note the current software revision for Audio Player, AUI, Controller, Orban Inside (if applicable), Rack, Server, SNMP Agent and Watchdog.
2. Contact Nautel for the most recent software revision and download *.tgz file to a laptop or network location.
3. Maximize the SBC's disk space by deleting the old .tgz files. Use the Manage Files button to display the Upload Files window, select the file(s) to delete, and click the Delete button

Transferring Upgrade File

The following steps assume either the laptop will be used to connect directly to the transmitter OR the transmitter and network computer are currently connected to the same network.

Transmitter IP Configuration

1. From the transmitter AUI, go to Menu/Settings/Network.
2. Record your current network settings (IP Address, Subnet Mask, Default Gateway).
3. If connecting to the transmitter directly with a laptop, you must set a static IP address. This can only be done via the front panel interface. From the front panel UI's Main Menu, go to User Settings/Network Settings and set the IP address as follows:
 - DHCP: OFF
 - IP Address: 10.10.10.2
 - Netmask: 255.255.255.0
4. Set the transmitter for Remote control.

Laptop IP Setup

The following steps assume the operating system is Windows XP. Adapt as required for computers with different operating systems.

1. On the laptop go to Start Menu/Control Panel/Network Connections/Local Area Network.
2. In the Local Area Network Status, open the General tab and choose Properties. Scroll down and highlight Internet Protocol (TCP/IP). Choose Properties.
3. In the Internet Protocol (TCP/IP) Properties window, select Use the following IP address.
4. Enter the following settings:
 - IP Address: 10.10.10.1
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 192.168.1.2
5. In the Internet Protocol (TCP/IP) Properties window, select OK.
6. In the Local Area Connection Properties window, select OK.
7. In the Local Area Connection Status window, select Close.
8. Close the Network Connections window.

Transfer Software Upgrade File to Transmitter

1. If using a laptop, connect the laptop network interface card to the transmitter LAN connector on the rear panel using a CAT5 Ethernet cable. Open Internet Explorer and search for 10.10.10.2. The transmitter login screen should appear.
2. If using a network computer, open Internet Explorer and search for the IP address recorded in [Step 2 of Transmitter IP Configuration, on page 2.4.2](#). The transmitter login screen should appear.
3. At the transmitter login screen enter:
 - User: "Nautel" or "****", where **** is the user assigned user name
 - Password: leave blank (default) or "****", where **** is the user assigned password
4. Navigate through the AUI to Menu/Software/Upload Files, select the upgrade files tab and press Browse. Locate the software update *.tgz file stored on the laptop or network computer, and press Upload to load the file into the transmitter upload file list. Allow this operation to complete.

Installing New Software

1. Set the transmitter to RF Off and for Remote control. If the transmitter is already in Remote control mode, turn off the transmitter using the AUI on the laptop. Perform the following steps remotely using the AUI on the laptop.
2. Go to the AUI Menu/Settings/Software Upgrade screen and select the update *.tgz file from the Select Upgrade File list (should highlight in blue) and press Start Upgrade.

CAUTION! Do not leave this page until the flash process is complete.

3. After a successful load (status is 100% complete and a message indicates a successful load), cycle the ac power (turn off, then on) on the VX150 to VX2.
4. This completes the software upgrade. Restore the former network settings on the transmitter and laptop as required (see [Step 2 of Transmitter IP Configuration, on page 2.4.2](#)).
5. Login and repeat [Step 1 of Preliminary Checks, on page 2.4.1](#) to determine if the current version is the same as the upgrade version - this confirms the upgrade was successful.
6. If the upgrade was not successful, repeat [Step 1](#) through [Step 5](#). If still unsuccessful, contact Nautel.

NOTE: If SNMP is configured, check the Read Community and Write Community passwords after a software upgrade. Some upgrades will clear passwords and require them to be reset.

OS Password Recovery

The OS (operating system) password is a unique, factory set password that is recorded in the **OS Password document** provided with the transmitter. It should not be necessary to change this password unless there has been a network security breach and access to the transmitter is compromised.

To recover the OS Password, you will need to remotely connect to a Linux computer using SSH. PuTTY is a common utility for Windows users (available at <ftp://www3.nautel.com/Utilities/putty/putty.exe>; if unable to open this link, use a search engine to find new URL), while Linux users can use 'ssh' from the command line. Change the OS password as follows:

1. Connect to the transmitter IP address using your selected SSH client.
2. Login with username root and the OS Password provided with your transmitter on the OS Password document.
3. At the prompt, type the command `passwd`. This is the Linux command to change your password.
4. Enter and confirm your new password.
5. Record your new password on the OS Password document provided with the transmitter. If you would like Nautel to track your password for support purposes, please email support@nautel.com with your new information.
6. Close the console window.

SD Card Replacement

The VX transmitter's OS (operating system) is stored on an external SD card. It contains the OS, preset information and the transmitter calibration data. It is recommended to make a back-up SD card in the event of a failure. Should the SD card become damaged or corrupt, replace the SD card as follows:

- Disconnect the ac power from the transmitter.
- Remove the damaged or corrupted SD card from the slot in the rear panel of the VX transmitter.
- Install a new SD card and connect the ac power to the transmitter.

SECTION 2.5: LIST OF TERMS

This section defines some of the terms that are used in Nautel documentation.

AES/EBU. Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type connector used in professional micros). One cable carries both left-channel and right-channel audio data to the receiving device.

AUI. The Advanced User Interface is the local touch screen on the front door and the advanced remote control/monitoring feature that allows for extensive remote control and monitoring of the transmitter.

CUTBACK. A reduction in RF output power, caused by the occurrence of multiple shutbacks within a pre-defined period.

DHCP. Dynamic Host Carrier Protocol.

DSP. Digital Signal Processing.

EEPROM. Electrically Erasable Programmable Read-Only Memory.

FOLDBACK. A reduction in RF output power, caused by adverse load conditions (high VSWR). No shutbacks or cutbacks have occurred.

LED. Light Emitting Diode (also referred to as lamp).

LVPS. Low Voltage Power Supply. A module or modules used in the ac-dc power stage that generates the low level dc supply voltage for the transmitter.

PRESET. A setting that controls power level, frequency and audio parameters. The VX150 to VX2 allows you to pre-program multiple presets.

PWB. Printed Wiring Board.

SHUTBACK. A complete, but temporary loss of RF output power, caused by any one of a variety of faults, including high VSWR, high reject load power, RF drive failure, or an open external interlock.

SHUTDOWN. A complete and permanent loss of RF output power. Typically follows repeated cutback, foldback or shutback events.

SURGE PROTECTION PANEL. An electrical panel that protects equipment from electrical surges in the ac power supply, antenna or site ground caused by lightning strikes.

UI. The User Interface is the controller module's front panel LCD screen that allows for extensive local control and monitoring of the transmitter.

VSWR. Voltage standing wave ratio. This is an expression of the ratio of reverse voltage to forward voltage on the feedline and antenna system. An ideal VSWR of 1:1 provides maximum transmitter-antenna efficiency.

VX-LP OPERATIONS & MAINTENANCE MANUAL

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