



3: OPERATION & MAINTENANCE MANUAL

NX5/NX3

AM TRANSMITTER

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Release Control Record

ISSUE	DATE	REASON
3.0	2019-06-01	Supports NX5/NX3 hardware NARA66B implementing NAP39C RF Power modules and a shielded arc detector assembly. Supports NX SW version 5.0 and higher, which includes configurable analog inputs.

SECTION 3.1: DESCRIPTION

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

- [Ac-Dc Power Stage](#)
- [Exciter Stage - see page 3.1.3](#)
- [Control/Monitor Stage - see page 3.1.5](#)
- [RF Power Stage - see page 3.1.7](#)
- [RF Output Network - see page 3.1.8](#) (includes combiner and filter)

Refer to the functional block diagram: [Figure 3.1.5 on page 3.1.13](#).

NX5/NX3 Electrical Schematics

Some descriptions in this section refer to electrical schematics (SD-#s). These are located at the end of the *NX5/NX3 Troubleshooting Manual*.

Redundancy

The NX5/NX3 features redundancy in the following key systems:

- Exciters (optional)
- RF power modules
- Cooling fans

Ac-Dc Power Stage

See [Figure 3.1.5 on page 3.1.13](#) and electrical schematic SD-1. The ac/dc power supply stage contains the input power transformer that receives the main ac input to the transmitter. It also contains the transmitter's low voltage power supplies and rack interface PWB. The ac/dc power supply stage also includes a three-phase SCR rectifier assembly, B+ current sensor, B+ distribution assembly and arc detector assembly.

Ac Power Transformer

The NX5/NX3's power transformer can be set to use a range of input voltages. See [Section 2.4, "Connecting Ac Power" on page 2.4.1](#) in the *NX5/NX3 Installation Manual*.

High Voltage B+ Supply

The secondary of the power transformer is applied to the SCR rectifier assembly to create the transmitter's B+ voltage. The output of the rectifier assembly is fed through the B+ current sensor, which supplies a B+ current sample to the rack interface PWB. The rectifier assembly output is applied to a choke input filter and the B+ distribution assembly, which then provides the B+ voltage to the RF power modules.

The B+ discharge relay, which is part of the B+ distribution assembly, opens when ac power is applied and closes and ac power is removed, applying a high power discharge resistor across the B+ bus to quickly discharge the voltage. When the discharge relay closes, a microswitch ensures the SCR rectifier is immediately inhibited.

Low Voltage Power Supplies

One phase of the power transformer's secondary is also used to provide a source for the low voltage dc power supplies and an ac sample for the rack interface PWB. The low voltage power supply outputs (+48 V and +15 V) are distributed throughout the transmitter via the rack interface PWB. The +48 V power supply sources the transmitter's cooling fans. An inhibit signal, controlled by the rack interface PWB, is applied to the +48 V power supply to turn the fans on and off. The +15 V power supply sources all of the low voltage control circuitry.

Rack Interface PWB

The rack interface PWB provides various functions for the ac-dc power stage, including:

- ❖ Monitors the B+ voltage and regulates the SCR rectifier's output via the B+ level control signal applied to the rectifier's SCR control board.
- ❖ Monitors the SCR rectifier's temperature and phase loss indication and provides this information, along with data received over a serial bus from the RF power modules, to the transmitter controller.
- ❖ Uses the Fast Shutback signal, if necessary, to request a transmitter shutback.
- ❖ Monitors the arc detector assembly.
- ❖ Generates the +30 V dc supply used by the SCR rectifier's controller and the -15 V dc supply used by the Hall Effect B+ current sensor
- ❖ Accepts the RF drive signals from the control/interface PWB and distributes them to the power module interface PWBs.

Exciter Stage

See [3.1.1 on page 3.1.4](#), [Figure 3.1.5 on page 3.1.13](#) and electrical schematic SD-2. The exciter stage consists of digital AM exciter PWBs A (A5) and B (A6, optional) and control/interface PWB (A4). The dual digital AM exciter PWBs provide two independent exciter sections (A and B), which can be selected automatically or by local or remote control. The control/interface PWB acts as an interface point for audio inputs and RF drive and PDM outputs.

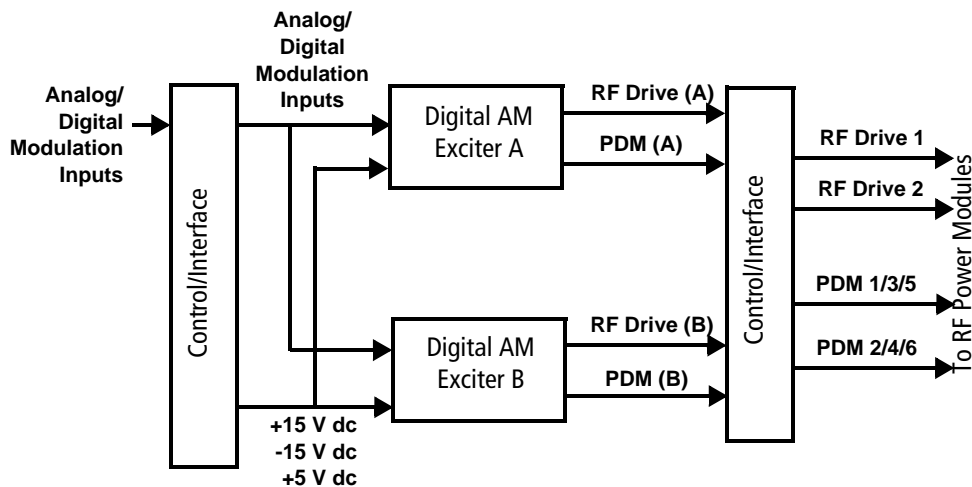
Digital AM Exciter PWB(s)

The digital AM exciter PWBs [A (A5) and B (A6, optional)] accept audio signals for analog modulation, I/Q over AES signals for DRM modulation, audio data over I²S from the audio player and IBOC signals over I²S from an integrated Exgine card, and generate fully digital RF drive and interphase PDM drive signals for the power amplifiers and modulators in the RF power modules.

Audio signals for analog AM modulation can be applied as balanced analog (600 ohm impedance) or digital (AES/EBU format). All audio inputs are digitized and sample rate converted. A DSP provides initial data conditioning, including the initial filtering and interpolation of incoming audio or digital radio data.

An FPGA generates the digital PDM signals and synthesizes the carrier frequency RF drive signal. It also performs digital up-conversion, reverse path demodulation and down conversion and B+ voltage compensation.

Figure 3.1.1: Exciter Stage



The digital PDM component consists of six phased PDM signals, each separated by 60 electrical degrees. These PDM drive signals determine the transmitter output power level as well as the output modulation level. Three of these phases, each separated by 120 electrical degrees (e.g., 1, 3 and 5), are applied to a given RF power module. To achieve optimal harmonic cancellation, three different phases (e.g., 2, 4 and 6) are applied to the adjacent module.

Samples of the RF output voltage, RF output current, SCR rectifier temperature and RF power module temperature are monitored. If a parameter exceeds an acceptable limit, the active exciter attempts to compensate by decreasing its output power to restore the parameter to an acceptable level.

A sample of the B+ supply voltage is monitored. A B+ compensation circuit adjusts the PDM duty cycle to compensate for variations in the B+ supply in order to maintain constant transmitter output power and minimize hum.

A PDM inhibit (A or B) input is applied from the control/interface PWB to inhibit the PDM drive for a specific exciter during certain alarm/fault conditions.

RF Drive Distribution

The control/interface PWB (A4) accepts the RF drive (+ and -) signals from the digital AM exciter PWBs (A and B) and buffers the individual RF drive 1 and 2 outputs that are provided to the rack interface PWB.

PDM Distribution

The control/interface PWB (A4) accepts the six PDM (1, 2, 4, 5, 7 and 8) signals from the digital AM exciter PWBs (A and B) and splits the active exciter PDM signals into two (+ and -) differential outputs that are provided to the RF power stage.

Other Functions

The exciter stage interfaces with the transmitter controller to perform various other functions, including:

- ❖ Provides an RF Drive Latch signal to the transmitter controller to inhibit the RF drive for a set period of time during specific alarm/fault conditions.
- ❖ Provides a PM Enable signal for the RF power modules to monitor the PDM cable status. This signal is held "low" (0 V) by the exciter.
- ❖ Provides real-time telemetry of exciter samples over a streaming bus to the transmitter controller for use by various instruments on the remote AUI such as the spectrum analyzer, Smith chart, signal constellation, audio levels, etc.
- ❖ Accepts 10 MHz, 1 PPS and 1 kHz synchronization signals from the selected source (Ext 10 MHz, GPS Sync PWB or Combiner) for synchronizing the RF carrier frequency and phase.

Control/Monitor Stage

See [Figure 3.1.5 on page 3.1.13](#) and electrical schematics SD-2 and SD-3.

The control/monitor stage monitors critical signal samples and status/alarm signals from the exciter stage, RF power stage, and ac/dc power stage. It also provides customer interfaces for monitoring transmitter status and accepts customer inputs for distribution to other system components. The control/interface PWB (A4) is the primary component of the control/monitor stage. It provides various functions, including:

- ❖ Accepts all analog and digital modulation inputs and synchronization signals (10 MHz, 1 PPS, 1 kHz) and distributes them, along with RF voltage and current samples, to the exciter stage.
- ❖ Accepts +15 V from the rack interface to generate on-board power supply requirements.
- ❖ Monitors the forward and reflected power samples from the directional coupler and initiates a shutback when the reflected power exceeds the factory set threshold.
- ❖ Amplifies the forward and reflected power samples for the RF monitor output.
- ❖ Monitors shutback requests from the rack interface for arc detector and low B+ shutdown events.

- ❖ Accepts customer D-sub connections for digital remote inputs, digital remote outputs and analog outputs.
- ❖ Accepts customer connections to complete the external interlock and transmitter (PDM) inhibit circuits.
- ❖ Accepts customer Ethernet connection to allow access to the transmitter's remote AUI feature.
- ❖ Accepts customer USB connections for audio playlist.
- ❖ Contains a microcontroller that: manages presets, scheduler and exciter changeover; controls RF on/off status, controls RF symmetry, controls RF monitor level, stores network settings; manages the transmitter's response to certain alarm/fault conditions.
- ❖ Contains a CPLD that: performs basic logic operations on logic inputs to produce logic outputs; latches off RF drive during certain alarm/fault conditions; routes program inputs and synchronization signal to the exciter(s); multiplexes exciter A and B's PDM outputs.
- ❖ Contains an ARM processor (host) that: runs the operating system and server that provides remote AUI functionality; accepts USB and Ethernet inputs.

Local and Remote Interfacing

The transmitter's local interface is provided via the front panel UI display (U3) - a 4 x 20 graphic LCD display - and its adjacent keypad. The front panel UI contains a menu-based series of pages that serve specific functions. Similar interfacing, as well as more advanced functionality, is available on a remotely accessed AUI. The AUI is a flash graphic that can be accessed via an Ethernet connection on any web-based PC or handheld device.

The UI interface PWB (A3) provides an interface between the front panel display (U3) and the control/interface PWB (A4). It also contains the pushbutton switches (RF ON, RF OFF and LOCAL/REMOTE) and associated status LEDs that protrude through the front panel, below the UI.

RF Power Stage

See [Figure 3.1.5 on page 3.1.13](#) and electrical schematic SD-4. The RF power stage contains two RF power modules (A12 and A13) two fan tray assemblies (A16 and A17), power module interface PWB (A10), rack interface PWB (A9) and RF combiner transformer (A21).

Each RF power module accepts RF drive from the rack interface PWB through the power module interface PWB and PDM from the exciter stage. B+ and +15 V dc voltages are applied to the RF power modules via the B+ distribution assembly, the rack interface PWB and power module interface PWB. +48 V dc voltage is applied to the fan trays via the rack interface PWB and the power module interface PWB. The output of each RF power module is applied to a primary winding of a series combining transformer. The resultant combined output is applied to the RF output network.

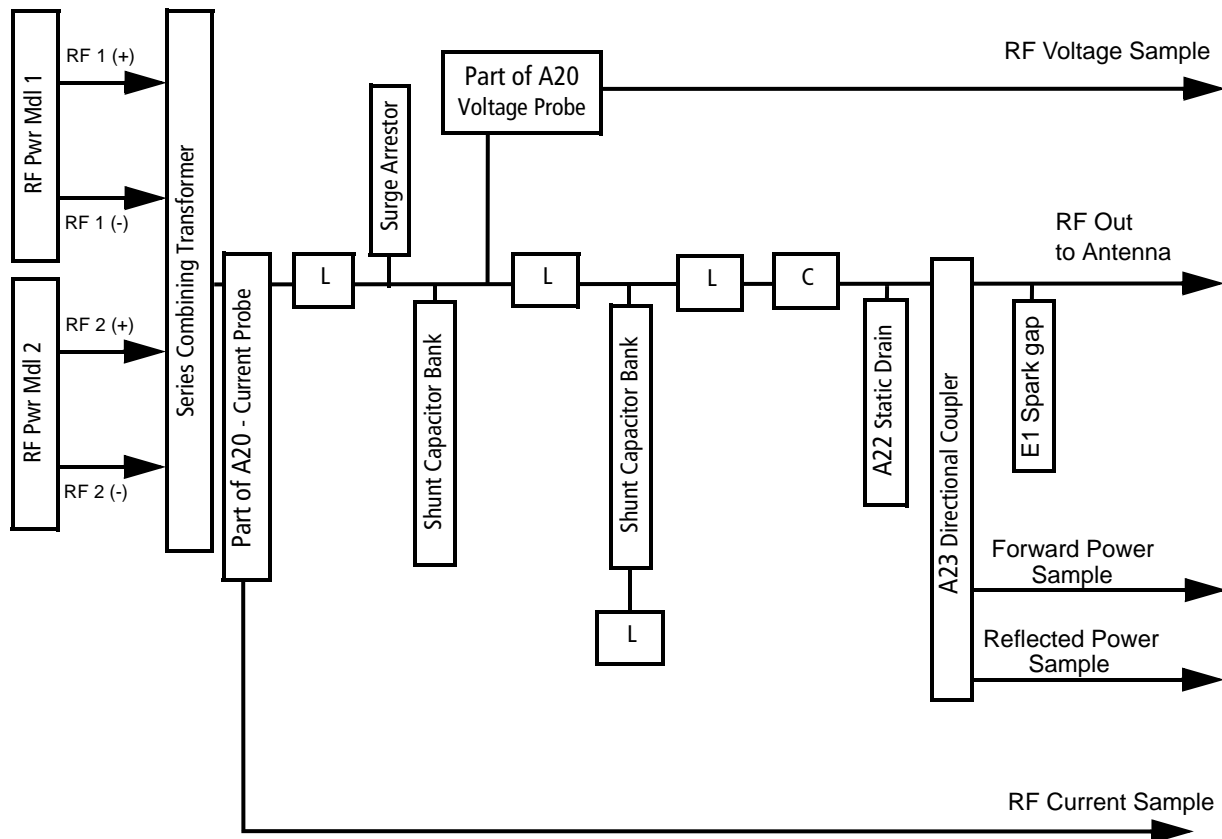
Each RF power module also:

- ❖ monitors the tachometer signals from the two fans on its associated fan tray - applied through the power module interface PWB - and will shut down if one of the fans fail.
- ❖ controls its associated RF relay on the power module interface PWB, ensuring the relay is closed when the RF power module is disabled, allowing combiner current to continue flowing in the primary of its associated combiner transformer.
- ❖ provides status information to the rack interface PWB over a serial bus connection.

RF Output Network

See [Figure 3.1.2](#), [Figure 3.1.5 on page 3.1.13](#) and electrical schematic SD-5. The combined RF output is filtered through an RF network consisting of two "T" networks with a shunt third harmonic trap, and then provided to the antenna system. The RF output is monitored by an RF current probe, RF voltage probe and directional coupler. Samples from these probes are provided for control and monitoring purposes (see "[VSWR Protection](#)" on [page 3.1.9](#)). A static drain choke provides a dc short to ground to dissipate static build-up on the antenna system, and an adjustable spark gap provides protection for the transmitter output from lightning events on the antenna.

Figure 3.1.2: RF Output Network



VSWR Protection

The transmitter uses an advanced DSP based VSWR protection system. Circuitry in the RF output network (see [3.1.2 on page 3.1.8](#)) samples the RF voltage and RF current at the input to the harmonic filter. These current (I) and voltage (V) samples are applied to ADCs on the digital AM exciter PWBs. The digitized I and V signals are used to calculate the impedance (Z) at the combiner output. An FPGA performs high-speed calculations, so there is minimal response delay.

There are several types of VSWR protection, which continuously operate:

Peak Reflected Power from Directional Coupler

Fast VSWR protection is used to detect transient faults when the reflected power quickly increases due to arcing, lightning or short circuits. The protection circuit is set at 1.5:1 at 10 kW plus 100% peak modulation using the reflected power sample from the directional coupler (see [3.1.2 on page 3.1.8](#)) and triggers the controller's Fast SWR Shutback alarm, designed to shutback PDM (reduce power to zero) and disable RF drive in less than 100 ns. This protection ensures that the RF drive to the RF power modules is disabled in less than one RF carrier period, preventing the amplifier from operating into a potentially harmful load.

Calculated Reflected Power from I and V Samples

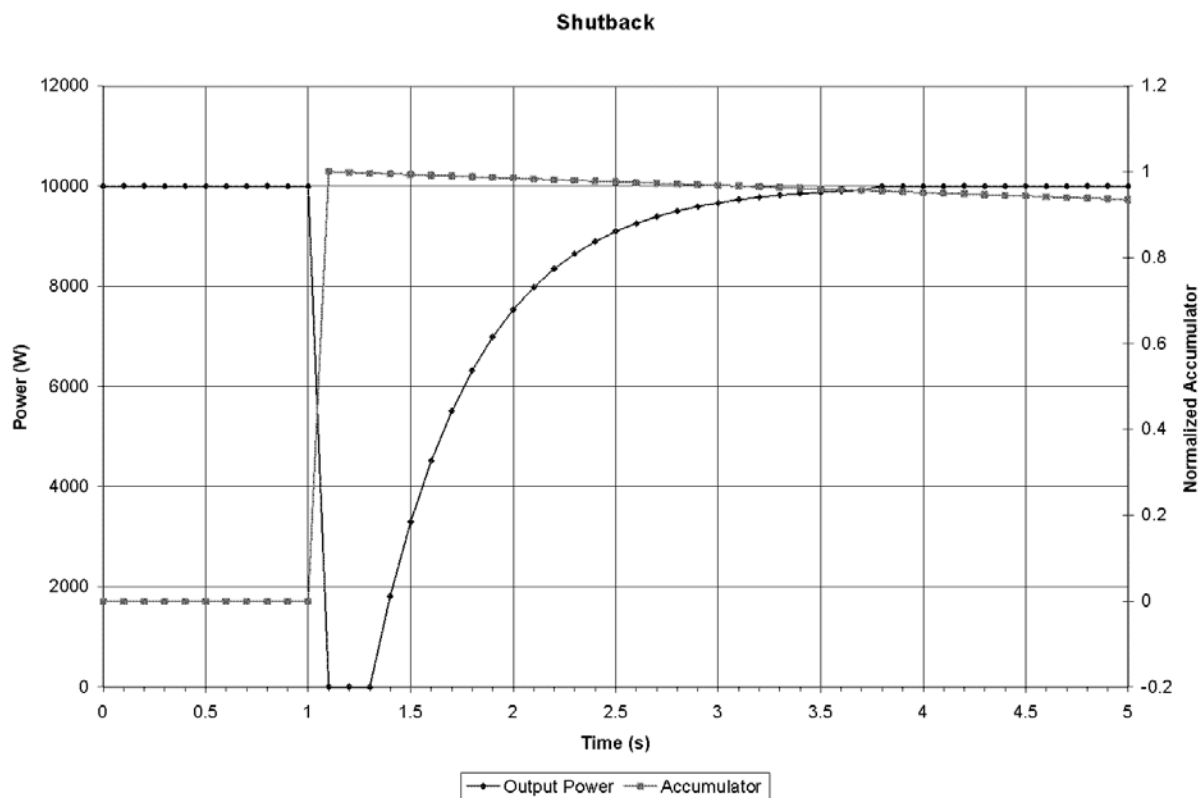
The peak reflected power calculated by the FPGA is supplementary to the fast SWR protection, allowing the exciter to detect and control the response to the event. The peak reflected power limit - based on a VSWR of 1.5:1 at rated power plus 100% peak modulation - is 16 % of the transmitter's rated power (i.e., 800 W). If this limit is exceeded, the transmitter's output power instantly reduces to 0 W. This triggers the exciter's *SWR Shutback* alarm.

Shutback:

Shutbacks can be caused by the following alarms: SWR Shutback (exciter), Fast SWR Shutback (controller), Over-Current Shutback (exciter), Over-Voltage Shutback (exciter) and Arc Shutback (controller).

- ❖ During a single shutback event (see [Figure 3.1.3](#)), the transmitter reduces the output power to 0 W, and remains in that state for 100 ms. This allows time for an arc or transient fault to clear. After 100 ms, the output power exponentially ramps up (to the power set point or the power limit set by the exciter, whichever is lower).
- ❖ After 30 s, the transmitter returns to full power under control of the normal ALC. When a shutback occurs, the cutback accumulator is set to a normalized value of 1. This value decays at a rate of 1/60 of a second (0.0167 s) so after 60 s, the accumulator value returns to 0 and the shutback event is no longer in memory.

Figure 3.1.3: Shutback Event

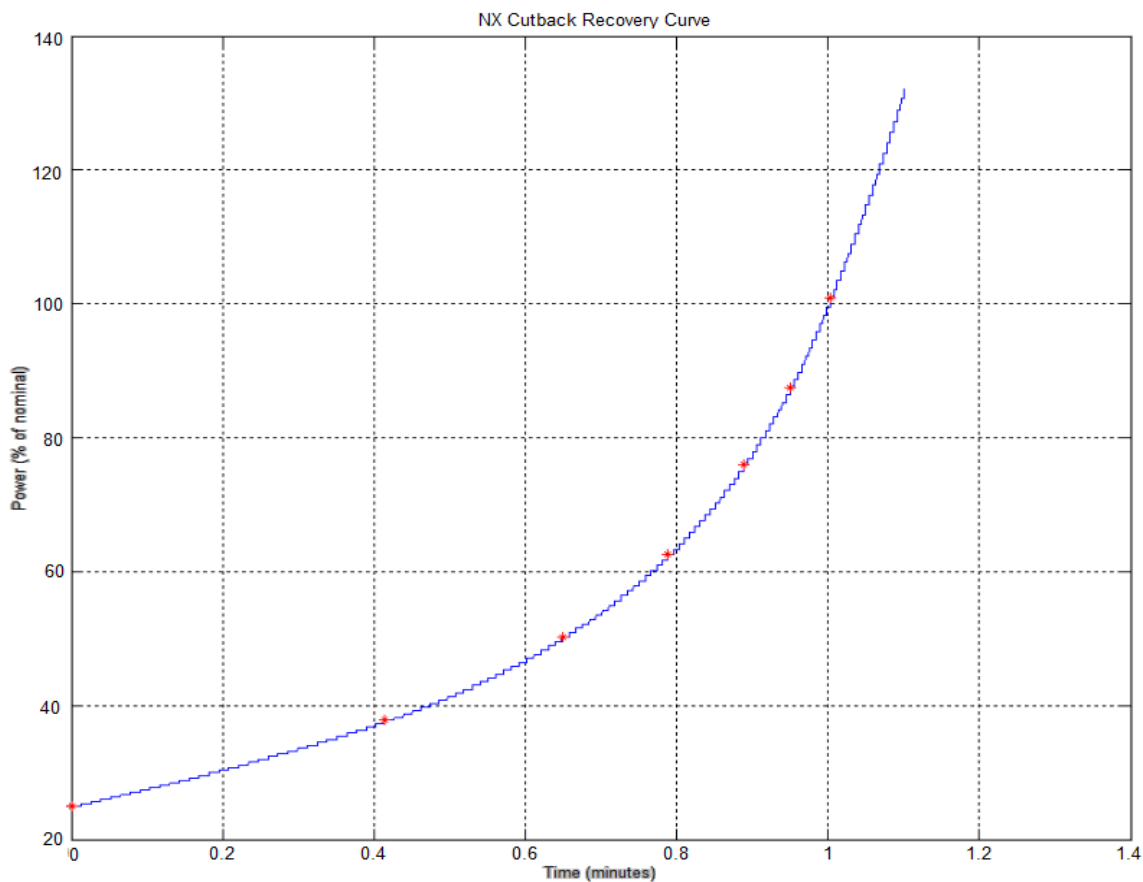


Cutback:

A cutback occurs after multiple shutback events. When three shutback events occur within a 15 s period, the cutback accumulator exceeds its threshold. The transmitter responds by limiting the output power to 85% of the previous power set point or the power at which the shutback event occurred, whichever is lower. When multiple cutback events occur, the output power is reduced by 85% of the current level after each event. The minimum cutback power level is 25% of full carrier power. Further cutbacks will not decrease the power beyond this point. When the transmitter is recovering from a cutback event, the accumulator must first reach 0, which takes 60 s. After that, transmitter power is gradually restored to full power according to the curve shown in [Figure 3.1.4](#).

Every SWR event that occurs is stressful to the RF amplifier; the more events that occur, the more chances there are for a power module to fail due to an SWR event. The purpose of the cutback routine is to decrease the voltage being applied to the RF amplifier when multiple SWR events are occurring. Doing so decreases the stress on the RF amplifier during each event, decreasing the probability of a power module failure.

Figure 3.1.4: Cutback Recovery Time



Average Reflected Power Foldback

If the average reflected power, calculated over a nominal 5 s period, exceeds a limit of 4% of rated power, the output power is gradually reduced in order to maintain a reflected power that is less than this limit. This gradual reduction in power into high VSWR allows the transmitter to continue to operate into VSWR levels as high as 1.5:1 at full carrier power and even higher VSWR levels when the carrier power is reduced. This VSWR protection is intended to protect against short or open circuits when the transmitter is turned on, as well as non-transient faults such as a poorly tuned antenna system.

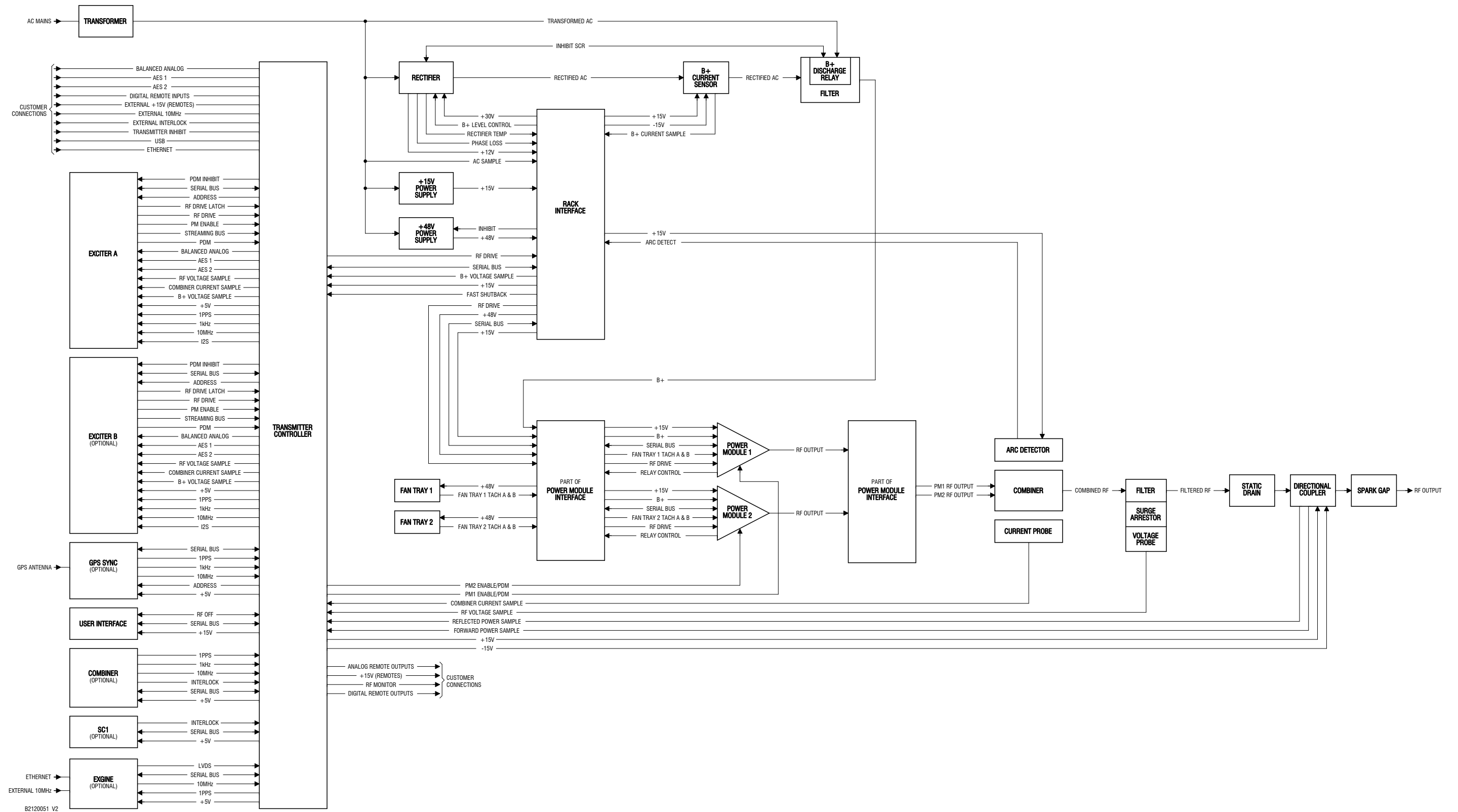


Figure 3.1.5: NX5/NX3 Transmitter Block Diagram

SECTION 3.2: OPERATING THE TRANSMITTER

This section provides information about operating the NX5/NX3 transmitter:

- [User Interface Options - see page 3.2.4](#)
 - [Front Panel Pushbuttons - see page 3.2.9](#)
 - [Front Panel UI Screens - see page 3.2.12](#)
 - [Advanced User Interface \(AUI\) - see page 3.2.15](#)
- [Logging in to the Remote AUI - see page 3.2.18](#)
- [Remote AUI pages - see page 3.2.20](#)
- [Main Menu - see page 3.2.21](#)
- [Viewing Transmitter Log - see page 3.2.22](#)
 - [Transmitter Log - Using the Remote AUI - see page 3.2.22](#)
 - [Transmitter Alarms and Log - Using the Front Panel UI - see page 3.2.30](#)
 - [Understanding the Log Manager Window - see page 3.2.24](#)
- [Viewing Instrument Panels - see page 3.2.33](#)
- [Viewing Real-Time Meters - see page 3.2.48](#)
 - [Viewing Real-Time Meters - using the Remote AUI - see page 3.2.48](#)
 - [Viewing Real-Time Meters - Front Panel UI - see page 3.2.54](#)
- [Presets - Editing Operational Settings - see page 3.2.58](#)
 - [Managing Presets - Using the Remote AUI - see page 3.2.58](#)
 - [Managing Presets - Using the Front Panel - see page 3.2.74](#)
 - [Preset Scheduler - see page 3.2.175](#)
- [Resetting Alarms - see page 3.2.84](#)
- [Viewing Transmitter Status - Remote AUI - see page 3.2.85](#)

- User Settings - see page 3.2.87, User Settings - Front Panel UI - see page 3.2.111
 - Network Setup - see page 3.2.88
 - Email Configuration - see page 3.2.93
 - Notifications - see page 3.2.95
 - Configuring Exgine Settings - see page 3.2.97
 - SNMP Configuration - see page 3.2.100
 - Capturing Critical Parameters - see page 3.2.102
 - Setting the Clock - see page 3.2.103
 - Configuring NTP Servers - see page 3.2.106
 - Nautel Phone Home - see page 3.2.109
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 - Configure Test Signal Generator - see page 3.2.112
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- User Accounts - see page 3.2.123
 - Setting User Permission Level - see page 3.2.124
 - Editing Account Information - see page 3.2.124
 - First-Time Login - see page 3.2.126
- System Settings - Remote AUI - see page 3.2.127
 - Reboot - see page 3.2.128
 - Upgrade Software - see page 3.2.129
 - Exciter Clock Calibration - see page 3.2.130
 - RF Monitor Level - see page 3.2.132
 - Power Lockout - see page 3.2.133
 - Power Thresholds - see page 3.2.134

- System Settings - Front Panel UI - see page 3.2.135
 - Host Reset - see page 3.2.136
 - Configuring Host Watchdog - see page 3.2.137
 - OS Recovery - see page 3.2.137
 - Updating Firmware - see page 3.2.138
 - Adjusting LCD Display Settings - see page 3.2.139
 - Run TCXO Calibration - see page 3.2.140
 - Exciter Synchronization - see page 3.2.141
 - RF Monitor Settings - see page 3.2.143
 - Power Lockout Settings - see page 3.2.144
 - Power Threshold Settings - see page 3.2.146
 - PM Inhibit - see page 3.2.147
- Factory Settings - see page 3.2.148
 - Audio Input Calibration - see page 3.2.150
 - B+ Voltage Calibration - see page 3.2.152
 - Forward/Reflected Power Calibration - see page 3.2.154
 - RF Symmetry Adjustment - see page 3.2.155
 - SWR Threshold Adjustment - see page 3.2.157
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 - Transmitter Frequency - see page 3.2.160
 - PDM Settings - see page 3.2.162
- Configuring Remote Inputs and Outputs - see page 3.2.164
 - Remote I/O Settings - Using the Remote AUI - see page 3.2.164
 - Remote I/O Settings - Using the Front Panel UI - see page 3.2.169
 - Monitoring Analog Outputs - see page 3.2.172
- Preset Scheduler - see page 3.2.175
 - Enabling the Scheduler - see page 3.2.179
- Audio Player - see page 3.2.180
 - Playlist - see page 3.2.181
 - Streams - see page 3.2.183
- Changing Exciter Transfer Settings - see page 3.2.186
 - Exciter Changeover Settings - Using the Remote AUI - see page 3.2.186
 - Exciter Changeover Settings - Using the Front Panel - see page 3.2.187

User Interface Options

The user can interface with the NX5/NX3 using one of four methods:

- Locally, using the front panel push-buttons (RF On, RF Off and Local/Remote, see [Front Panel Pushbuttons](#)) and the front panel UI and its navigational buttons (see [Front Panel UI, on page 3.2.9](#)).
- Remotely, via a LAN connection, using the advanced user interface (AUI) pages (see [Advanced User Interface \(AUI\), on page 3.2.15](#)).
- Remotely, via remote input/output (I/O) wiring connected to the control interface PWB (A4) (see the NX5/NX3 Pre-installation Manual for I/O details).
- SNMP, which is used to communicate transmitter control commands (e.g., RF on/off, main exciter, active preset, power adjustments, etc.) as well as monitor data such as alarm states and meter values. SNMP communication is configurable using the remote AUI (see [SNMP Configuration, on page 3.2.100](#) for more information).

See the complete menu hierarchy illustrated in [Figure 3.2.1](#) and [Figure 3.2.2](#) (for the local front panel menu) and [Figure 3.2.3](#) (for the remote AUI menu). When a user interfacing function can be performed from both the front panel display and the remote AUI, both are described in this section.

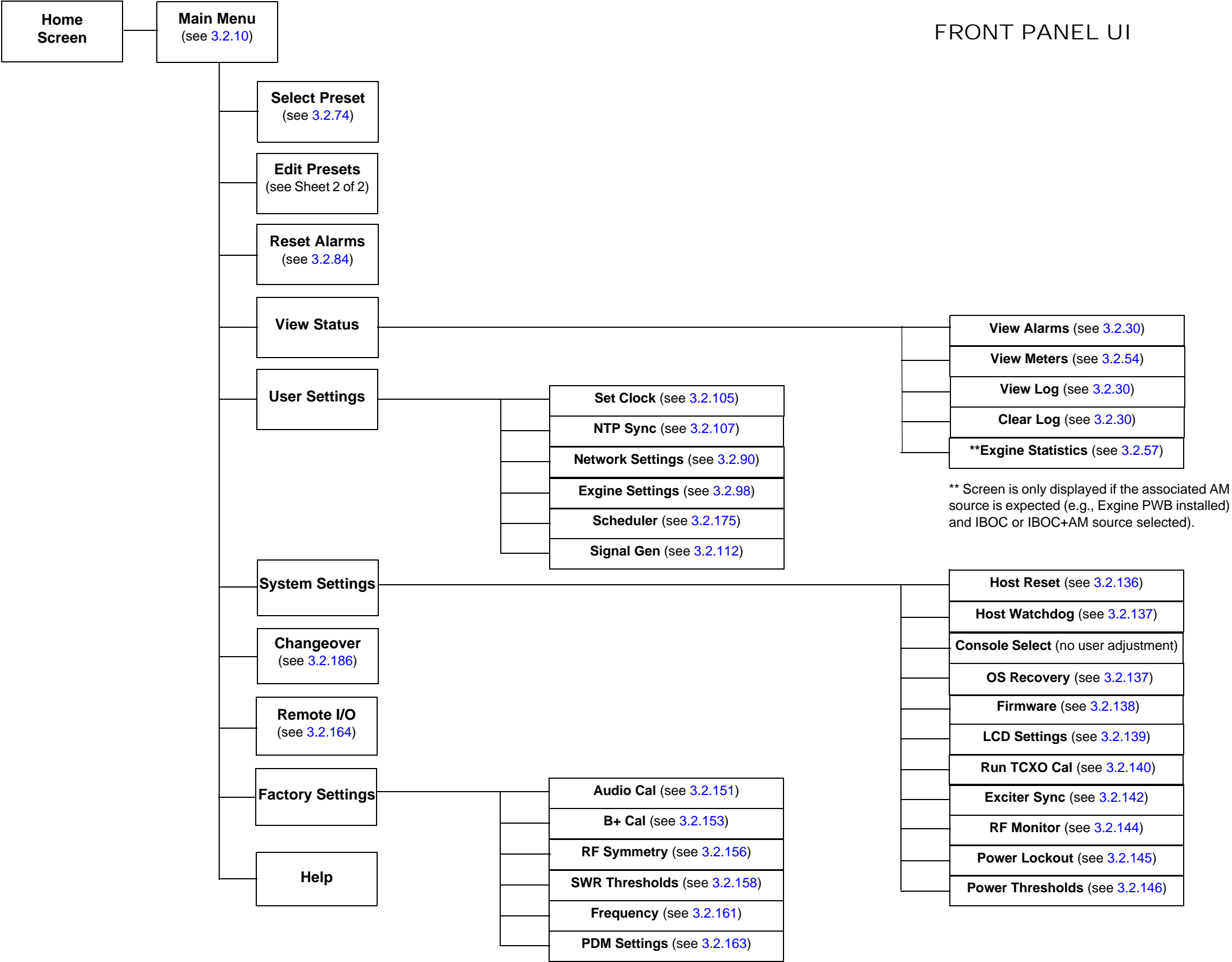
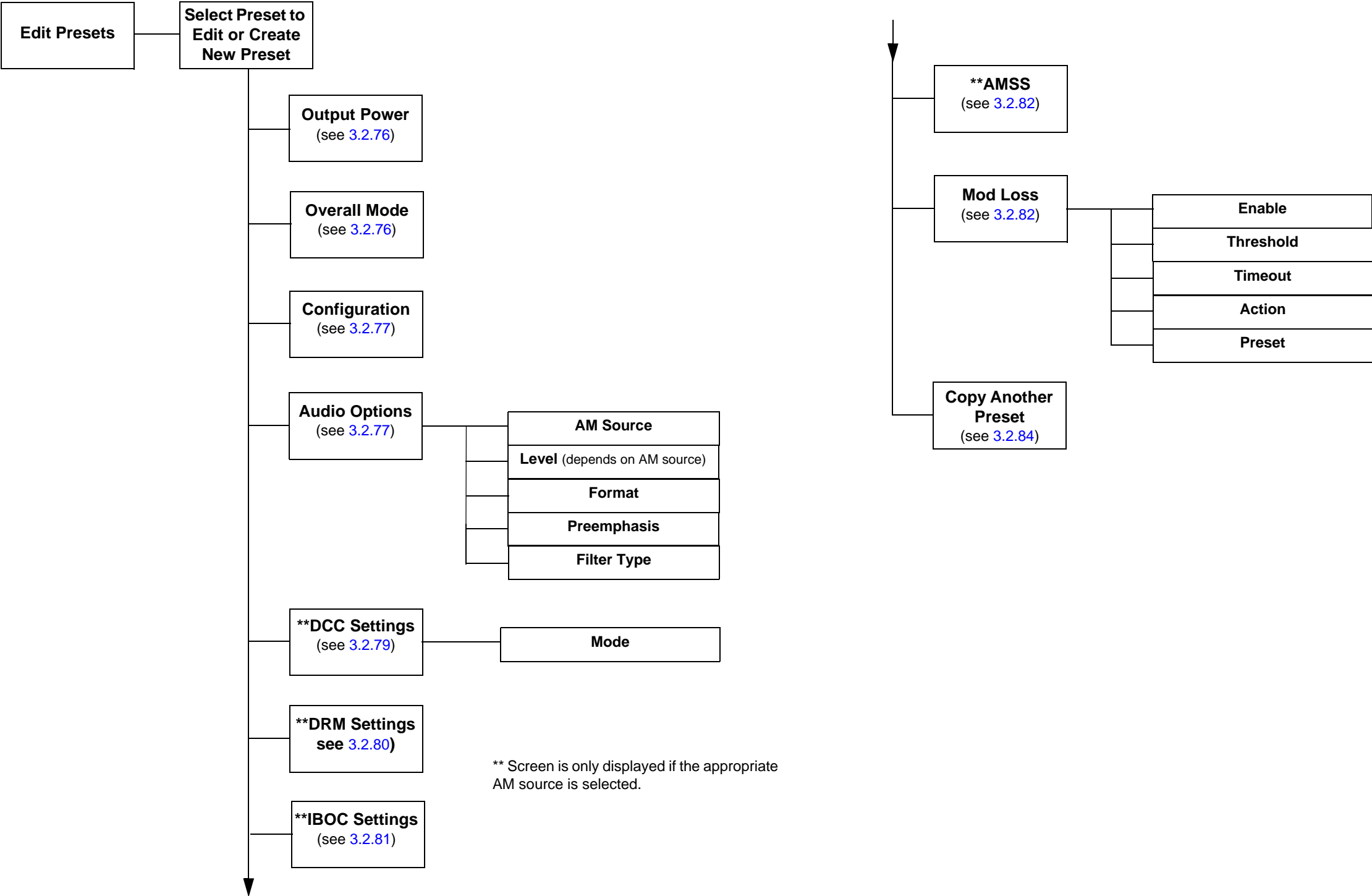


Figure 3.2.1: NX5/NX3 Transmitter Front Panel Display Menu Tree (Sheet 1 of 2)



** Screen is only displayed if the appropriate AM source is selected.

Figure 3.2.2: NX5/NX3 Transmitter Front Panel Display Menu Tree - Edit Presets (Sheet 2 of 2)

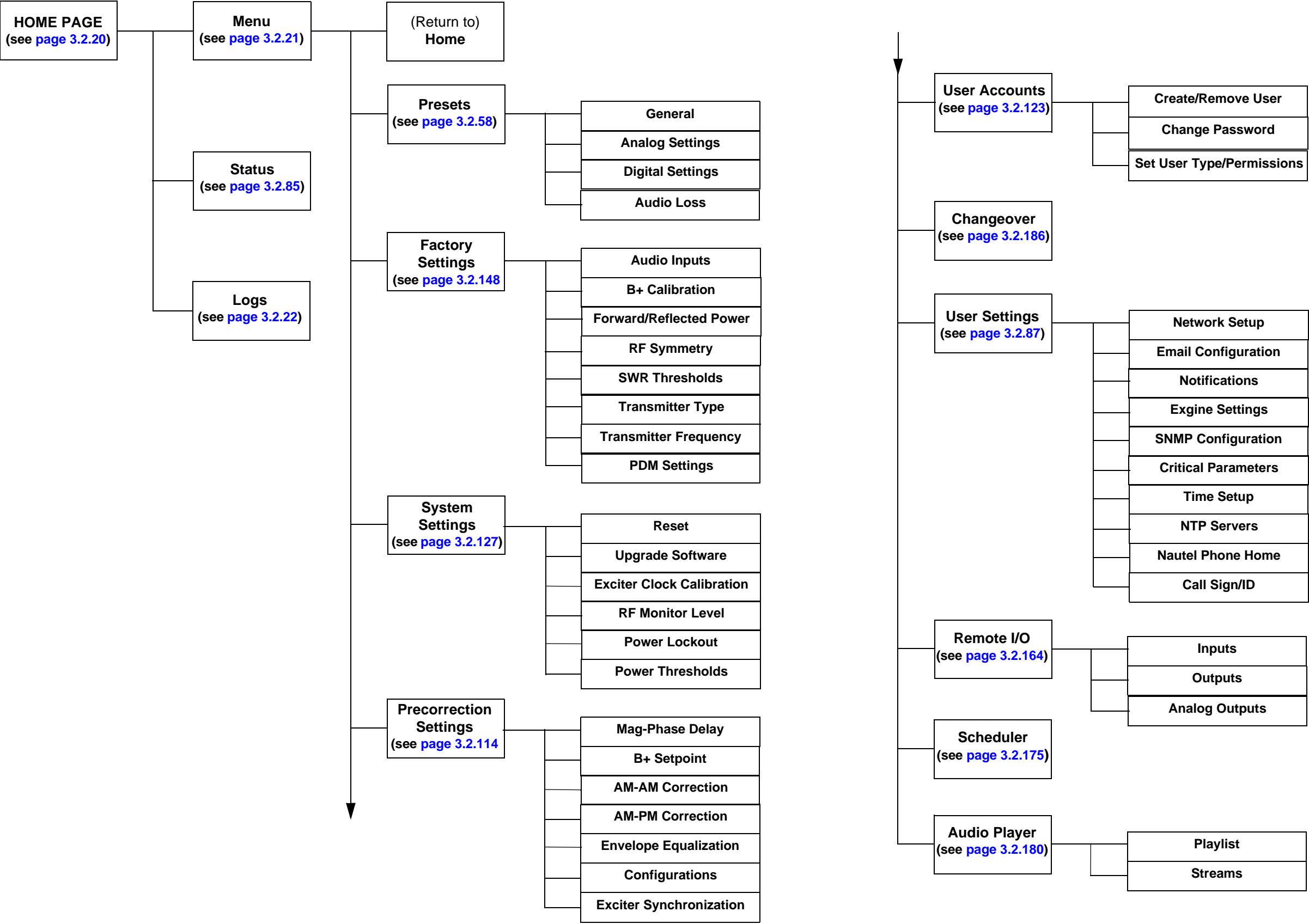
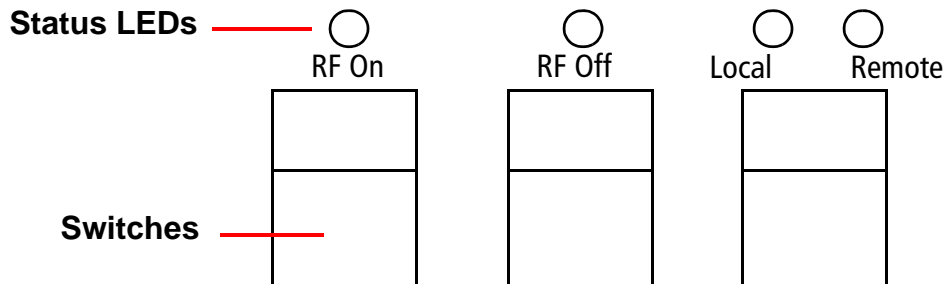


Figure 3.2.3: NX Transmitter AUI Flow Diagram

Front Panel Pushbuttons

The front panel contains three pushbutton switches that provide local control of the transmitter's RF on/off status and the local/remote operational control status (see [Figure 3.2.4](#)).

Figure 3.2.4: Front Panel Pushbutton Switches



- ❖ RF On - Press the pushbutton switch to turn on the RF power stage and cooling fans. The RF On LED will be on (amber) when the RF power stage is on and the external interlock circuit is intact. The transmitter will operate at the level stored in the selected preset.
- ❖ RF Off - Press the pushbutton switch to turn off the RF power stage. The RF Off LED will be on (amber) when the RF power stage is off.

NOTE: The RF On and RF Off LEDs may blink if there are alarms occurring that prevent the transmitter from enabling the RF power stage (e.g., interlock open, combiner matching, etc.)

- ❖ Local/Remote - Press the switch to toggle between "remote enabled" (Remote amber LED on; local and remote control) and "remote disabled" (Remote LED off; local control only). The transmitter's local controls are always enabled so the Local LED is always on. In Local only mode (Remote amber LED off), the front panel switches and UI control transmitter operation and all of the remote controls (except the external interlock) are disabled. In Remote enabled mode, control of transmitter functions is also provided to the remote (web-accessed) AUI or remote input/output control on the control/interface PWB. The bottom of the remote AUI home page will display the control status. When remote control is enabled, both the Local and Remote buttons are green. When remote control is disabled, only the Local button is green.

Front Panel UI

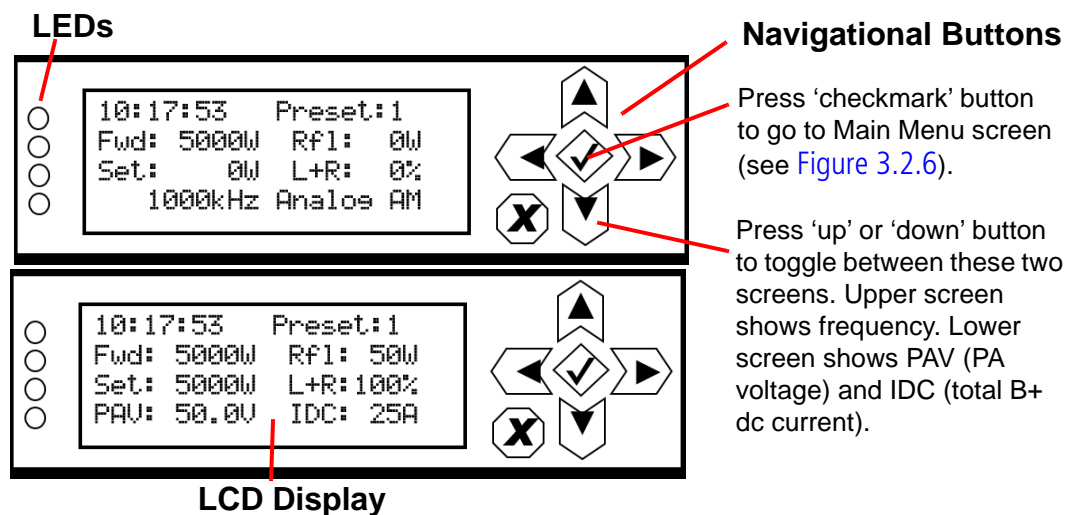
The front panel UI is 4 x 20 character graphic LCD display (see [Figure 3.2.5 on page 3.2.10](#)). The UI can be controlled by its adjacent keypad. The UI contains a menu-based series of pages that serve specific functions. Similar interfacing, as well as more advanced functionality, is available on the remote AUI (see [Front Panel UI Screens, on page 3.2.12](#)).

LCD Display

This display shows all the UI screens. The display's home screen, used for viewing purposes only, is shown in [Figure 3.2.5](#).

NOTE: NX5 screens shown for reference. Some NX3 values may differ slightly.

Figure 3.2.5: Home Screens



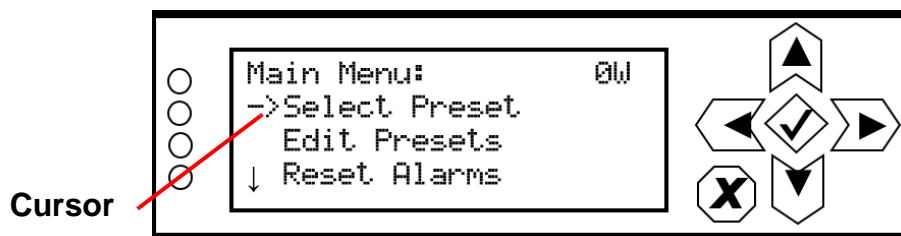
The top level screen displays the following information:

- ❖ Line 1: current time, and the active preset (e.g., Preset:1).
- ❖ Line 2: transmitter's measured forward power and reflected power levels.
- ❖ Line 3: desired power set point and modulation percentage.
- ❖ Line 4: Page 1 shows operating frequency and mode of operation (e.g., Analog AM). Page 2 shows the PA voltage and total dc current levels.

Main Menu

This main menu is the starting point for navigating through the UI screens. See [Table 3.2.1 on page 3.2.12](#) for a list of screens and their basic functions.

Figure 3.2.6: Main Menu



Navigational Buttons

There are six push-buttons on the right-hand side of the LCD display that allow navigation through the UI pages, as well as modifying selected settings.

- ❖ Up and down - on menu and list screens, moves cursor up and down through the associated page; on edit screens, increases and decreases the value of a parameter being modified.
- ❖ Left - on menu and list screens, exits to the next higher level screen; on edit screens, moves the editing cursor left, as applicable.
- ❖ Right - on menu and list screens, enters the next lower level screen; on edit screens, moves the editing cursor right, as applicable.
- ❖ Checkmark - on menu screens, goes to the next lower level screen; on edit screens, acts as an "accept" or "save" function; in some cases the display will prompt its use.
- ❖ X - on menu and list screens, exits to the next higher level screen; on edit screens, acts as a "cancel" function; in some cases the display will prompt its use.

Saving Settings

Many of the UI screens allow for modifying a selected setting. Use the checkmark button to save a change. Use the X button to cancel a change and revert back to the previously stored value.

LEDs

There are four LEDs on the left-hand side of the LCD display that provide the operational status of various sections of the transmitter - Controller/Exciter, Power Amplifier, Output Network and Power Supply (see [Figure 3.2.6 on page 3.2.10](#)). The LEDs can glow green, amber or red. Typically, green indicates normal operation, amber indicates a warning, and red indicates a fault or error. Refer to the Troubleshooting section for more detailed information on LED status.

Front Panel UI Screens

Table 3.2.1 defines the available front panel display screens.

Table 3.2.1: Front Panel UI Screens

UI Screen	Function	See Page
Home Screen	Displays basic transmitter parameters	page 3.2.10
Main Menu	Choose options and navigate to other screens.	page 3.2.10
Select Preset	Select and activate a user-defined preset.	page 3.2.74
Edit Presets	Edit various parameters for a user-defined preset (see the following rows for all Edit Presets options).	page 3.2.74
Edit Presets - Output Power	Edit the selected preset's output power.	page 3.2.76
Edit Presets - Overall Mode	Edit the selected preset's operating mode (Analog AM, IBOC, DRM, etc.).	page 3.2.76
Edit Presets - Configuration	Edit the selected preset's pre-correction configuration.	page 3.2.77
Edit Presets - Audio Options	Edit the selected preset's audio characteristics such as source, level, format, pre-emphasis and filtering.	page 3.2.77
Edit Presets - DCC Settings	Edit the selected preset's DCC mode and settings, if applicable.	page 3.2.79
Edit Presets - DRM Settings	Edit the selected preset's DRM settings, if applicable.	page 3.2.80
Edit Presets - IBOC Settings	Edit the selected preset's IBOC settings, if applicable.	page 3.2.81
Edit Presets - AMSS	Enable/disable AMSS operation in the selected preset.	page 3.2.82
Edit Presets - Mod Loss	Edit the selected preset's modulation loss functionality, such as enable/disable, setting threshold, setting timeout period, setting resulting action and selecting a backup preset.	page 3.2.82
Edit Presets - Copy Another Preset	Copy the selected preset's settings to another preset.	page 3.2.84
Reset Alarms	Initiate an attempt to reset all alarms controlled by latched protection circuits.	page 3.2.84
View Status	View various transmitter parameters (see other View Status options in this table).	-
View Status - View Alarms	View all active transmitter alarms.	page 3.2.30

Table 3.2.1: Front Panel UI Screens

UI Screen	Function	See Page
View Status - View Meters	View the levels of various transmitter parameters, including forward power, reflected power, PA voltage, PA current and low level dc supply voltages.	page 3.2.54
View Status - View Log	View the transmitter's events log, including alarms, commands, etc.	page 3.2.30
View Status - Clear Log	Clear the transmitter's events log.	page 3.2.30
View Status - Engine Statistics	View Engine-related statistics, if the optional Engine PWB is installed and the AM source is IBOC or IBOC+AM.	page 3.2.57
User Settings	Edit various transmitter user settings (see other User Settings options in this table).	-
User Settings - Set Clock	Set precise time and date.	page 3.2.105
User Settings - NTP Sync	Enable or disable NTP (Network Time Protocol) servers to allow clock synchronization with all computers on the same network as the NX5/NX3.	page 3.2.107
User Settings - Network Settings	View and/or set network information such as MAC address (view only), DHCP on/off status, IP address, netmask and gateway.	page 3.2.90
User Settings - Engine Settings	Set Engine parameters.	page 3.2.98
User Settings - Scheduler	Enable/disable the scheduler.	page 3.2.179
User Settings - Signal Gen	Enable/disable and setup the internal signal generator.	page 3.2.112
System Settings	Edit various transmitter system settings (see other System Settings options in this table).	-
System Settings - Host Reset	Initiate a reset of the exciter/control PWB's host processor.	page 3.2.136
System Settings - Host Watchdog	Enable, disable or force a reset of the host watchdog feature.	page 3.2.137
System Settings - Console Select	Factory set; no user adjustments required.	-
System Settings - OS Recovery	Initiate a recovery reset of the operating system in the event of a failed software upgrade.	page 3.2.137
System Settings - Firmware	Check firmware versions for various sections of the transmitter and perform a software upgrade on the transmitter.	page 3.2.138

Table 3.2.1: Front Panel UI Screens

UI Screen	Function	See Page
System Settings - LCD Settings	Set the front panel display's contrast, backlight and timeout.	page 3.2.139
System Settings - Run TCXO Cal	Calibrate the internal clock to a user supplied external high precision 10 MHz clock reference	page 3.2.140
System Settings - Exciter Sync	Set synchronization data for the active exciter.	page 3.2.141
System Settings - RF Monitor	Set the gain for the RF monitor sample and select the forward or reflected signal.	page 3.2.143
System Settings - Power Lockout	Edit power lockout settings and select the active power lockout.	page 3.2.144
System Settings - Power Thresholds	Set two distinct low forward power thresholds.	page 3.2.146
System Settings - PM Inhibit	Allows for local enabling or disabling of each RF power module.	page 3.2.147
Changeover	For dual exciters, controls the auto exciter transfer function.	page 3.2.187
Remote I/O	Configure the remote inputs, remote outputs and view analog outputs for the transmitter.	page 3.2.164
Factory Settings	Sets critical thresholds, calibration values and operating values for key transmitter parameters. These settings are established at the factory and do not normally require user adjustment (see other Factory Settings options in this table).	page 3.2.148
Factory Settings - Audio Calibration	Calibrate the analog audio input with a known source.	page 3.2.151
Factory Settings - B+ Settings	Set the B+ limit (for high voltage alarm) and calibrate the B+ level.	page 3.2.153
Factory Settings - RF Symmetry	Edit the RF symmetry value for exciter A or B to minimize 2nd harmonic content.	page 3.2.156
Factory Settings - SWR Thresholds	Enable/disable SWR protection and set protection thresholds for various parameters (e.g., peak and RMS reflected limits).	page 3.2.158
Factory Settings - Transmitter Freq.	Set the precise carrier frequency for the transmitter.	page 3.2.161
Factory Settings - PDM Settings	Edit the PDM phase offsets and initiate a PDM minimization routine.	page 3.2.163

Advanced User Interface (AUI)

The NX5/NX3's advanced user interface (AUI) (see [Figure 3.2.7 on page 3.2.16](#)) is available via remote connection only. To access the AUI, you need a PC (and a web browser) that is connected to the NX5/NX3 - directly or through a switch or network - via the control interface PWB's (A4) LAN connection (J3A). The remote AUI has a wide range of displays, including:

- ❖ Instrument panels (spectrum analyzer, Lissajous plot, etc.)
- ❖ Real-time meters
- ❖ Detailed transmitter status and events log
- ❖ Presets
- ❖ Factory Settings
- ❖ System Settings
- ❖ Precorrection Settings
- ❖ User Accounts
- ❖ Changeover (as applicable)
- ❖ User Settings
- ❖ Remote Input/Output Configuration
- ❖ Scheduler
- ❖ Audio Player

Each remote AUI page provides information about a specific transmitter function. All navigation through the remote AUI pages begins on the main screen (or Home page), shown in [Figure 3.2.7 on page 3.2.16](#).

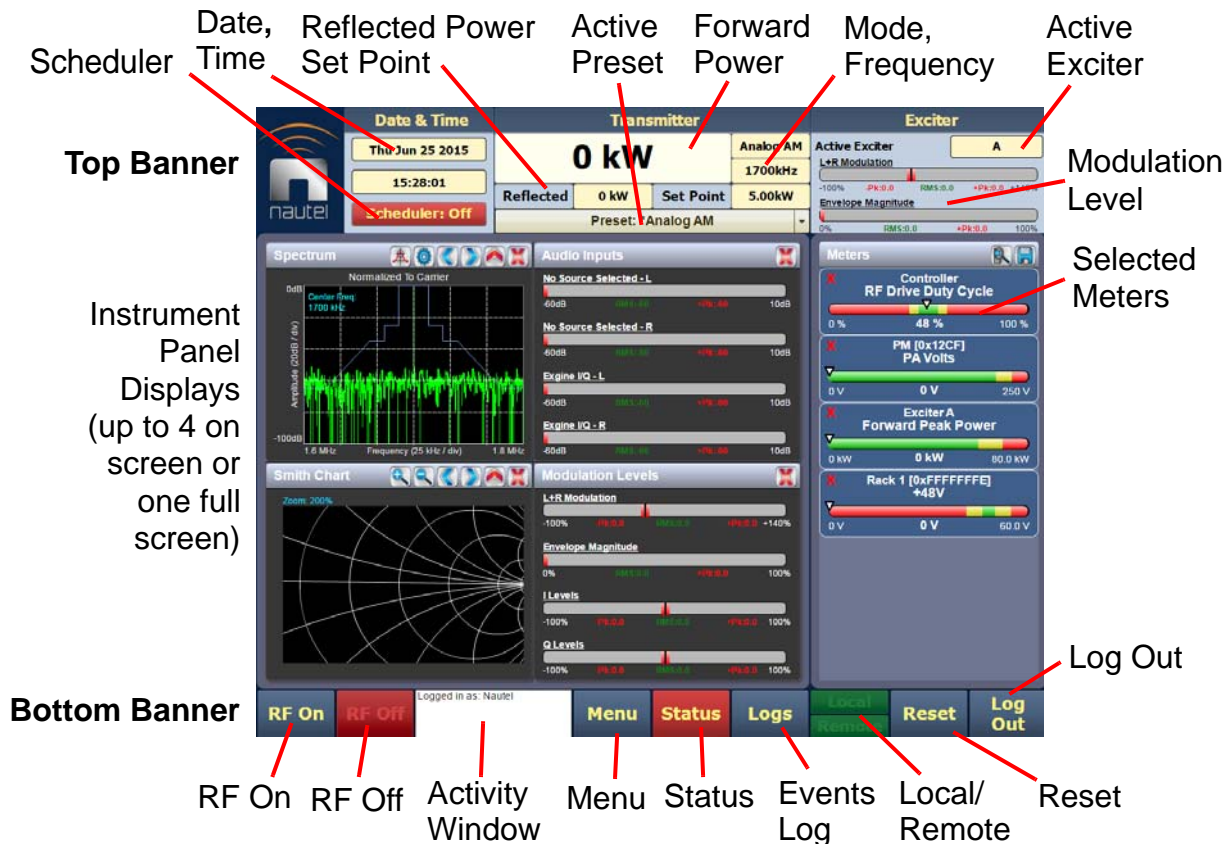
Access the remote AUI's login page by entering the IP address/port #. Any remote user can view the transmitter's remote AUI pages; however, only users with the appropriate permission level can access functions that alter the transmitter control settings.

To log out of the remote AUI, or to login as another user, access the login menu by clicking the Log Out button on the Home page.

NOTE: Depending on the connection speed, it may take some time to display the AUI login screen remotely using a PC and a web browser. The amount of data that has to be transmitted is approximately 14 MB. Therefore, if the connection speed to the transmitter is 1 Mb/s, it will take approximately 2 minutes for the login screen to load.

NOTE: NX5 screens shown for reference. Some NX3 values may differ slightly.

Figure 3.2.7: Using the Remote AUI (Home page shown)



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

- **Nautel Logo:** From any page, click the Nautel logo to log out and return to the login window.
- **Date & Time:** Displays day, month, year and current time (see [Setting the Clock](#), on page 3.2.103).
- **Scheduler:** Click to turn automatic schedule ON or OFF.
- **Active Preset:** Displays the name of the active preset. Click to see a list of available presets and change the active preset (see [Managing Presets - Using the Remote AUI](#), on page 3.2.58). Above this bar, the power set point based on the current forward and reflected power levels are shown, as well as the operating mode and carrier frequency.
- **Active Exciter:** Displays the active exciter (A or optional B). Click on the Active Exciter area to shortcut to the Changeover page (see [Changing Exciter Transfer Settings](#), on page 3.2.186).
- **Modulation Level:** Displays the L+R modulation levels as well as the Envelope Magnitude, which is PA V magnitude as a percentage of the B+ voltage. Each meter shows RMS (green), instantaneous peak (yellow) and peak-hold (red) values.

The bottom banner is also permanent on all remote AUI pages and includes:

- RF On: Click to enable the transmitter's RF power stage.
- RF Off: Click to disable the transmitter's RF power stage.
- Activity Window: Displays various messages to reflect specific user interface commands, such as RF on/off, local/remote control, or reset.
- Menu: Click to open the Menu page, which allows navigation to various other pages (see [Main Menu on page 3.2.21](#)).
- Status: Click to shortcut to the Transmitter Status page (see [Viewing Transmitter Status - Remote AUI on page 3.2.85](#)), which provides current alarm and status details for the transmitter. When the Status button is red, one or more alarms of "high" severity is currently being reported and the transmitter is in an 'off-air' state. When the Status button is amber, one or more alarms of "medium" severity is currently being reported, but the transmitter is still 'on-air', possibly at reduced power. When the Status button is green, the transmitter is operating normally. In this case, either there are no alarms being reported, or there is an alarm reported that is not affecting the transmitter's normal operation. This page is also available through the Menu page.
- Logs: Click to shortcut to the Transmitter Log page, which displays historical alarm and status records for the transmitter (see [Viewing Transmitter Log on page 3.2.22](#)).
- Local/Remote: Displays the operational control status of the transmitter. If Local is highlighted green, only local control of the transmitter - via the front panel UI - is possible. If both Local and Remote are highlighted green, both local and remote controls are enabled.
- Reset: Click to reset protection circuits and restore any RF power modules (and associated power supplies) that were inhibited, but are now alarm-free. Resets protection circuits that have latched off the transmitter. To initiate an alarm reset from the front panel display, see [Resetting Alarms, on page 3.2.84](#).
- Log Out: Click to log out of the remote 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 [User Accounts, on page 3.2.123](#).

The displays between the top and bottom menus, contains user selected pages. These pages provide access to a variety of remote AUI functions such as transmitter status and user settings, all described in this section (see [Remote AUI pages, on page 3.2.20](#)).

Logging in to the Remote AUI

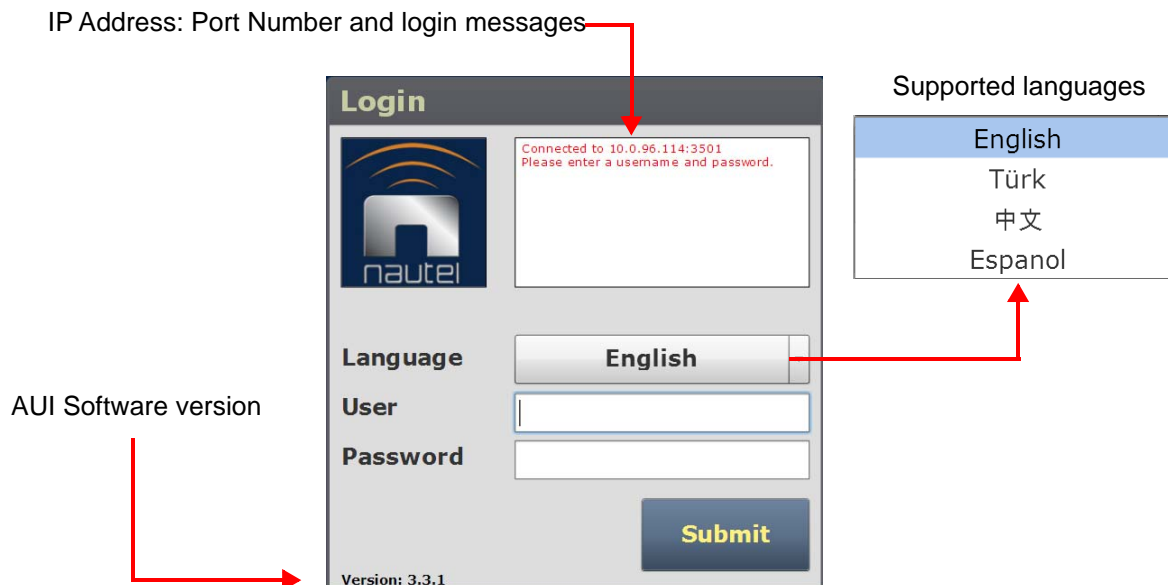
The transmitter's remote AUI provides a means to restrict access to transmitter control functions through the AUI to authorized users only. User accounts can be pre-defined to set access restriction between view only (no control) and full-administrative control (see ["User Accounts" on page 3.2.123](#)).

Access the remote AUI using a web browser as follows:

1. Configure your network settings (["Network Setup" on page 3.2.88](#)).
2. On your router or firewall software, open ports 3501 and 80 and close (restrict access to) port 22. If you are using SNMP, open ports 161 and 162.
3. Gain remote access to the transmitter by entering the IP address in a web browser's address field. Your login remains active until the browser is closed.
4. When properly configured, the login menu (see [Figure 3.2.8](#)) appears on the web browser. Your IP address and any login messages appear in a box at the top, beside the logo, and the current software version number appears along the bottom of the login window.

NOTE: Depending on the connection speed, it may take some time to display the AUI login screen remotely using a PC and a web browser. The amount of data that has to be transmitted is approximately 14 MB. Therefore, if the connection speed to the transmitter is 1 Mb/s, it will take approximately 2 minutes for the login screen to load.

Figure 3.2.8: Remote AUI Login Menu



5. Log in to the remote AUI by entering the appropriate parameters in the login window.

- In **Language** field, click 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 remote AUI is factory configured with a default login username and password. Nautel recommends that you change the password to improve overall system security. See ["Changing the Password" on page 3.2.125](#). Also, you should change the OS (operating system) password, which was a factory set, unique password that is referenced on page 2 of your Proof of Performance documents.

- Click **Submit** to accept your login parameters and display the remote AUI's Home page ([Figure 3.2.7 on page 3.2.16](#)). Note: The opening screen (the **Home** page) 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 3.2.124](#).

Remote AUI pages

Table 3.2.2 defines the available remote AUI pages.

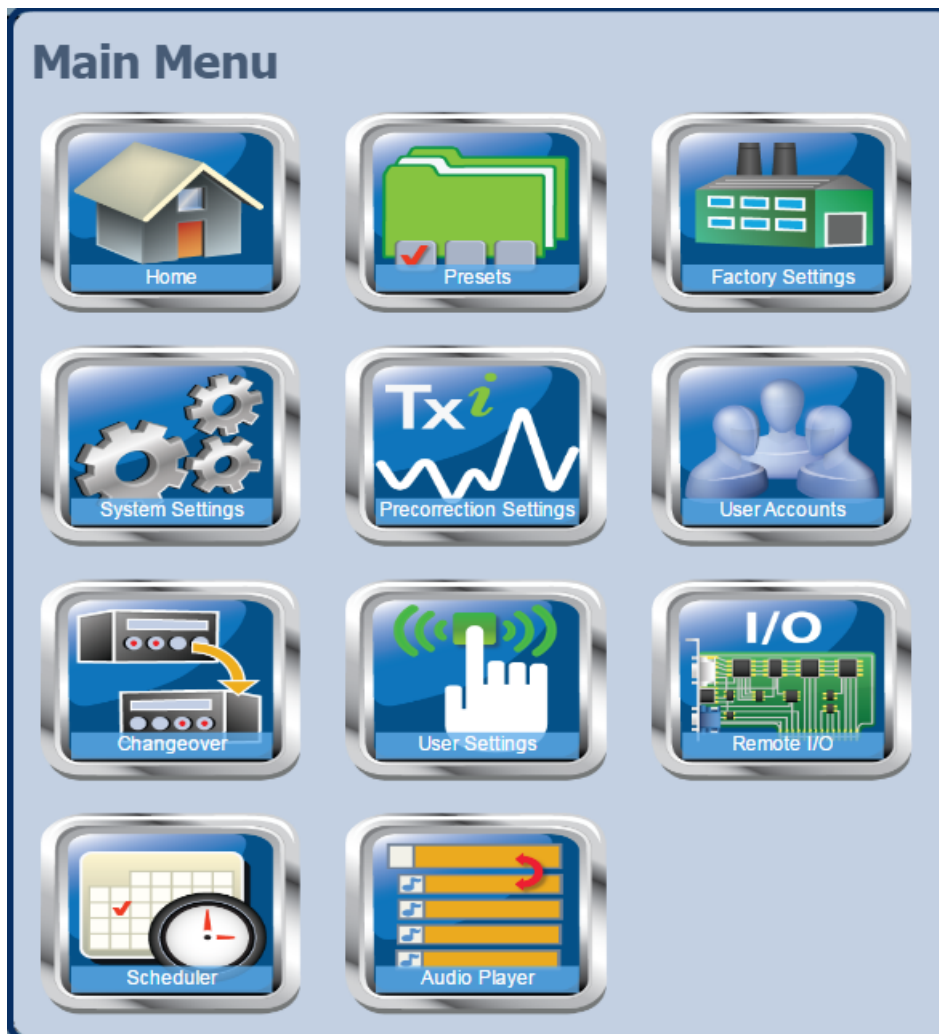
Table 3.2.2: Remote AUI Pages

Remote AUI Page	Function	See Page
Home	View meters, instrument panels, choose options and navigate to other pages.	page 3.2.16
Menu	Choose options and navigate to other pages.	page 3.2.21
Status	View transmitter's current active faults and operational status.	page 3.2.85
Logs	View and analyze transmitter historical events.	page 3.2.22
Tool Menu	Choose instrument panel options.	page 3.2.31
Meters	Choose meters for display.	page 3.2.48
Menu - Presets	Activate and edit user-defined presets.	page 3.2.58
Menu - Factory Settings	Sets critical thresholds, calibration values and operating values for key transmitter parameters. These settings are established at the factory and do not normally require user adjustment.	page 3.2.148
Menu - System Settings	Perform remote AUI and exciter reboots, calibrate the exciter TCXO, perform software upgrades, configure the RF monitor output, power lockout settings and power threshold settings.	page 3.2.127
Menu - Precorrection Settings	Set critical pre-correction settings such as mag-phase delay, B+ setpoint, as well as perform AM-AM correction, AM-PM correction, envelope equalization and exciter synchronization.	page 3.2.114
Menu - User Accounts	Set user permission rights and define user account information.	page 3.2.123
Menu - Changeover	For dual exciter installations only. Set the main exciter and enable the automatic changeover function.	page 3.2.186
Menu - User Settings	Set network information, configure email and alarm notification parameters, configure Exgine interface information, configure SNMP parameters, capture transmitter critical parameters, set the system clock, manage NTP servers, configure the Nautel Phone Home feature and set the station call sign/ID.	page 3.2.88
Menu - Remote I/O	Define remote inputs/outputs and configure analog outputs.	page 3.2.164
Menu - Scheduler	Define a preset schedule for daily/monthly operation.	page 3.2.175
Menu - Audio Player	Manage audio playlists and stream sources.	page 3.2.180

Main Menu

From the home page, click the Menu button to view the Main Menu (see [Figure 3.2.9](#)). From this page, you can select one of 11 sub-menus. See [Remote AUI Pages on page 3.2.20](#) for a summary of each sub-menu and to a cross-reference page for more detailed information.

Figure 3.2.9: Menu Page



Viewing Transmitter Log

You can view transmitter log information using the remote AUI (see [Transmitter Log - Using the Remote AUI](#)) or using the local front panel display (see [Transmitter Alarms and Log - Using the Front Panel UI](#), on page 3.2.30).

Transmitter Log - Using the Remote AUI

You can view the NX5/NX3's events log using the remote AUI's [Log page](#) - see Figure 3.2.10. This page shows a configurable log of all transmitter events. To view the [Log page](#), click the Log button in the bottom banner of any remote AUI screen.

Figure 3.2.10: Log page

Allows for displayed page

Page number of displayed page

Selects item at top of current page

Selects next lower page

Scrolls up one item

Scrolls down one item

Selects next higher page

Selects item at bottom of current page

Maximum 100 items per page

Maximum 20 pages per batch (2000 items)
(use filtering to view older batches)

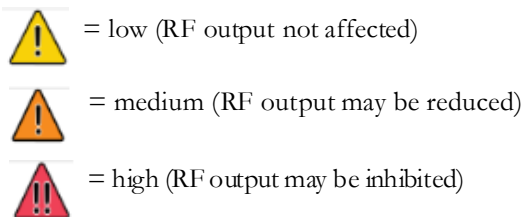
Device	Event	State	Severity	Time of Event
PM [0x1880]	External Disable Active	✓	⚠	Wed Feb 13 2013 09:44:41 740ms
Exciter A	Ext. Inhibit Active	⚠		Wed Feb 13 2013 09:44:34 880ms
Exciter B	B+ Compensation Inhibited	✓		Wed Feb 13 2013 09:44:34 880ms
Exciter B	Low Forward Power Threshold	✓	⚠	Wed Feb 13 2013 09:44:34 880ms
Exciter B	Ext. Inhibit Active	⚠		Wed Feb 13 2013 09:44:34 880ms
Exciter B	B+ Compensation Inhibited	⚠		Wed Feb 13 2013 09:44:33 080ms
Controller	RF On/Off	⚠	⚠	Wed Feb 13 2013 09:44:32 860ms
Exciter B	Low Forward Power Threshold	✓	⚠	Wed Feb 13 2013 09:44:13 100ms
Exciter B	Power Below Setpoint	✓	⚠	Wed Feb 13 2013 09:43:00 980ms
Exciter B	Power Below Setpoint	✓	⚠	Wed Feb 13 2013 09:42:46 020ms
Exciter B	Low Forward Power Threshold	⚠	⚠	Wed Feb 13 2013 09:42:34 960ms
Exciter B	Low Forward Power Threshold	⚠	⚠	Wed Feb 13 2013 09:42:34 960ms

Viewing Event Logs

The **Logs** page displays a “read only” chronological table of log events under the following column headings (see [Figure 3.2.10](#)):

- **Device** - identifies the origin device of the alarm (e.g., Controller, Exciter, or RF Module).
- **Event** - identifies the alarm name.
- **State** - indicates whether the alarm state is active (red bell) or cleared (green checkmark) and in some cases, indicates whether the RF was turned on or off. This column will also display which control state (Local or Remote) the transmitter is in, which preset index was selected, and which high power lockout index was selected.
- **Severity** - indicates how seriously the alarm affects transmitter operation (see [Figure 3.2.11](#)).
- **Time of Event** indicates the time and date that the event occurred.

Figure 3.2.11: Alarm Severity Legend



The number of log matches displayed is shown below the Log Manager button (e.g., 157 Matches Sorted by Time of Event). The columns in the display indicate specific information about the event. Click a column heading to sort events by the values in that column. You can scroll through the list using the scroll bar (if displayed) or the up and down arrow buttons to the right of the page. Up to 100 events can be displayed per page. When there are more than 100 events, a Page #/# icon (e.g., Page 1/2) will appear to allow viewing of further listings. In this case, click on Page #/#, select the desired page from the Select a Page window, then click OK to view that page or Cancel to return to the Transmitter Log page. You can also scroll through the pages using the appropriate arrow button on the right-hand side of the display (see [Figure 3.2.10 on page 3.2.22](#)). Up to 20 pages (i.e., 2000 events, also called a ‘batch’) can be viewed on the **Logs** page. A maximum of five batches (i.e., 10,000 events) are stored in the AUI and can be viewed using the Log Manager. Older items are discarded.

You can manage the NX5/NX3 remote AUI’s events log by clicking on the Log Manager button (see [Figure 3.2.12 on page 3.2.24](#)). The resulting screen (see [Figure 3.2.12 on page 3.2.24](#)) provides options to perform various event monitoring operations such as filtering, copying, deletion and statistical analysis. Click X to close this window.

See the NX5/NX3 Troubleshooting Manual to locate detailed information on a specific alarm.

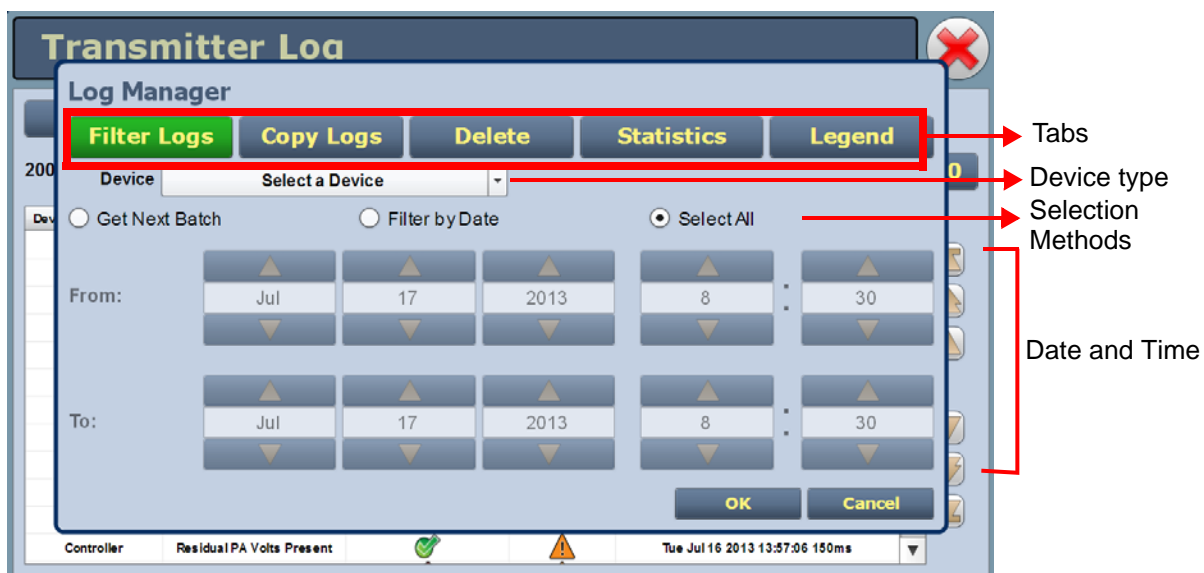
Understanding the Log Manager Window

The Log Manager window contains the functions that edit the logs listed in the Logs page. Click the Log Manager button to open a configurable window with the following display options identified by tabs across the top of the screen (see [Figure 3.2.12](#)):

- Filter Logs: Click to filter logs by date and frequency.
- Copy Logs: Click to copy the selected logs to the remote computer's clipboard.
- Delete: Click to remove all selected logged events.
- Statistics: Click to display statistical information about each event type present in the log.
- Legend: The Legend tab opens a "read only" display of alarm symbols to help you interpret the ones listed in the Logs page or in the Statistics window (see [Figure 3.2.16 on page 3.2.28](#)).

Each of these tabs changes the active window options to suit the tab function.

Figure 3.2.12: Log Manager Window



Filtering Logs

You can change which events are visible on the Logs screen based on the settings in the Filter Logs tab in the Log Manager (see [Figure 3.2.13](#)).

Click the Select a Device drop-down arrow, and select the desired device type to restrict events shown to only those originating from the selected device. Click the OK button or the Cancel button when done.

- ❖ No selection - displays all transmitter events (shown as Select a Device)
- ❖ Controller - displays controller events only
- ❖ Exciter A or B - displays applicable exciter events only
- ❖ Rack # - displays applicable Rack # events only
- ❖ RF Module # - displays applicable RF Module # events only

Click the Get Next Batch radio button to display the previously logged batch of events (up to 2000 items) for the device type selected. Click the OK button or the Cancel button when done.

Click the Filter by Date radio button to filter events based on a selected date and time range, and the device type selected. Click the OK button or the Cancel button when done.

Click the Select All radio button (default) to show all of the most recent events in the current 'batch' for the device type selected. A maximum of 2000 items (in 20 pages) can be displayed per 'batch'. Click the OK button or the Cancel button when done.

Click the Cancel button to close this window and discard changes.

Figure 3.2.13: Log Manager - Filter Logs

Log Manager

Filter Logs Copy Logs Delete Statistics Legend

Device Select a Device

☐ Get Next Batch
 ☒ Filter by Date
 ☐ Select All

From: Jan 15 2013 14 : 32

To: Jan 15 2013 14 : 32

OK Cancel

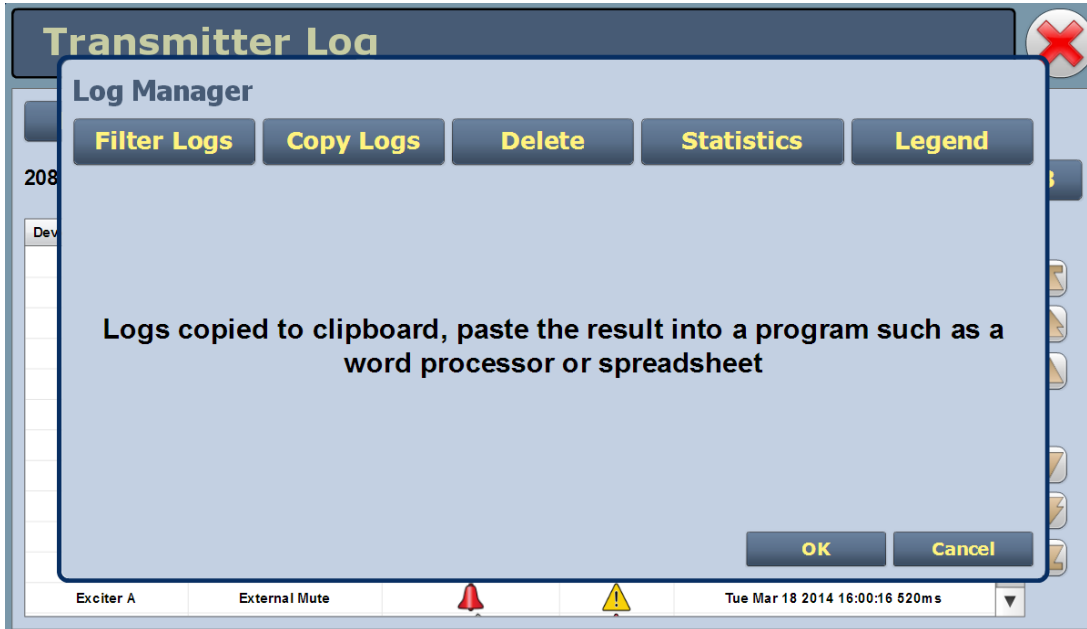
Controller
Exciter A
Exciter B
Rack #
RF Module #

By Date/Time Range

Copying Logs

You can create a copy of all the logs in the selected list (copied to the remote user's computer clipboard) by clicking the Copy Logs button in the Log Manager (see [Figure 3.2.14](#)). You can paste the tab-delimited text copy of the logs into a text editing program such as Word, Excel, Notepad, etc. Click OK or Cancel to close this window and return to the Transmitter Log.

Figure 3.2.14: Log Manager - Copy Logs

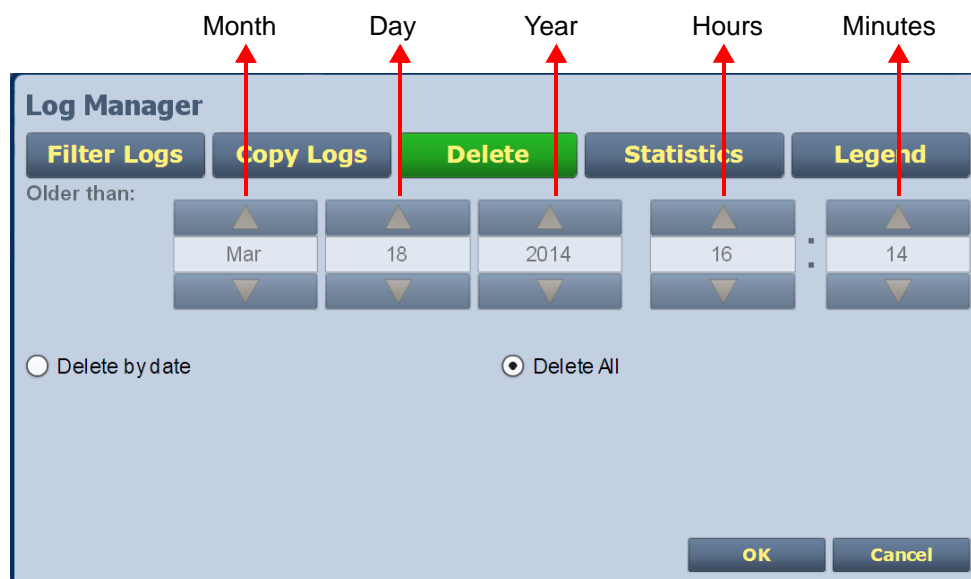


Deleting Logs

You can delete all events or a selection of events by clicking the Delete button in the Log Manager (see [Figure 3.2.15](#)).

- Delete by date - activates the date and time selection (24-hour clock) where users can click the arrows to establish a date and time. Log events older than this date will be removed from the events list.
- Delete All - removes all the logs in the list.
- Click OK to accept the configuration or click Cancel button to close this window and return to the Transmitter Log.

Figure 3.2.15: Log Manager - Delete Logs



Viewing Log Statistics

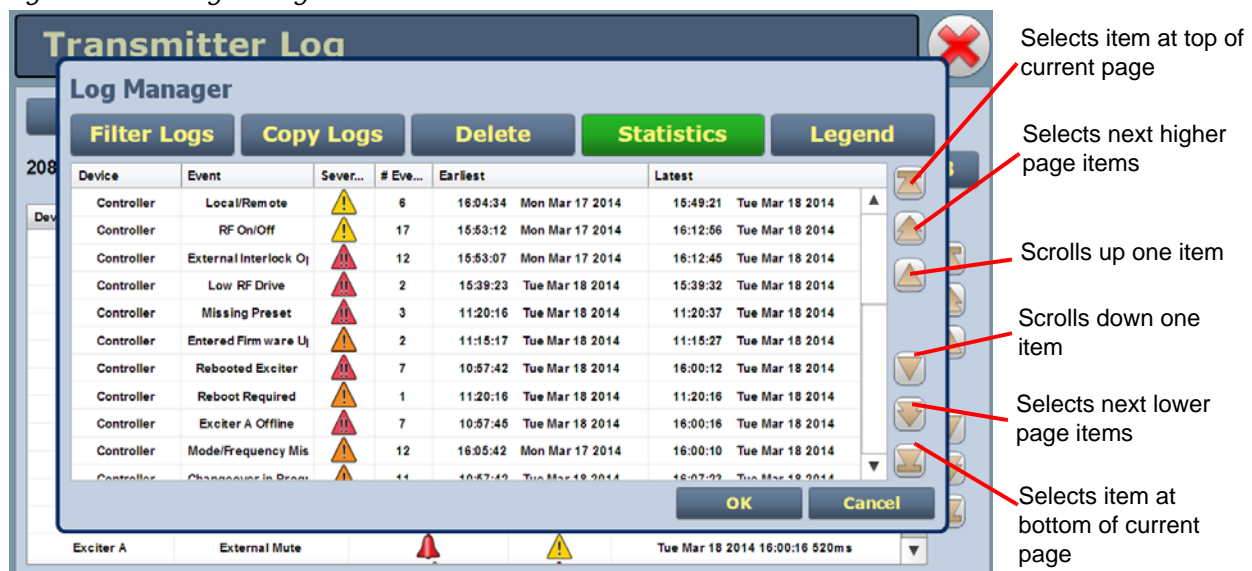
You can view statistical information on the events being displayed by clicking the Statistics button in the log manager (see [Figure 3.2.16](#)).

NOTE: Only events subject to the filtering parameters are displayed on the Statistics screen.

The Statistics screen displays the number of occurrences of each event type that is present within the filtered period as well as the time and date of the earliest and latest event occurrence for each. You can move through the list using the scroll bar (if applicable) or the up and down arrow buttons to the right of the scroll bar. Click OK or Cancel to close this window. The columns in the display indicate specific information about the events:

- Device - refers to the device (Controller, Exciter, Rack, RF Module) from which the event originated.
- Event - describes the event (e.g., Local/Remote switch)
- Severity - identifies the seriousness of the alarm (see [Viewing the Legend](#), on page 3.2.29).
- # Events - reveals the number of occurrences for that event during the filtered period.
- Earliest - refers to the first time of an event, within the filtered period.
- Latest - refers to the latest time of an event, within the filtered period. If an event has only one occurrence (i.e., # Events column is 1), then the time in the "Earliest" column will be the same as the time in the "Latest" column. If an event has more than one occurrence (e.g., # Events column is 4), then the "Earliest" column reveals the time of the first event (back in time), while the "Latest" column reveals the time of the last event (closest to the present).

Figure 3.2.16: Log Manager - Statistics



Viewing the Legend

Click the Legend button in the Log Manager (see [Figure 3.2.17](#)) to display a legend that describes the symbols shown in the State and Severity columns of the Logs page. Click OK or Cancel to close this window and return to the Transmitter Log page.

Figure 3.2.17: Log Manager - Legend

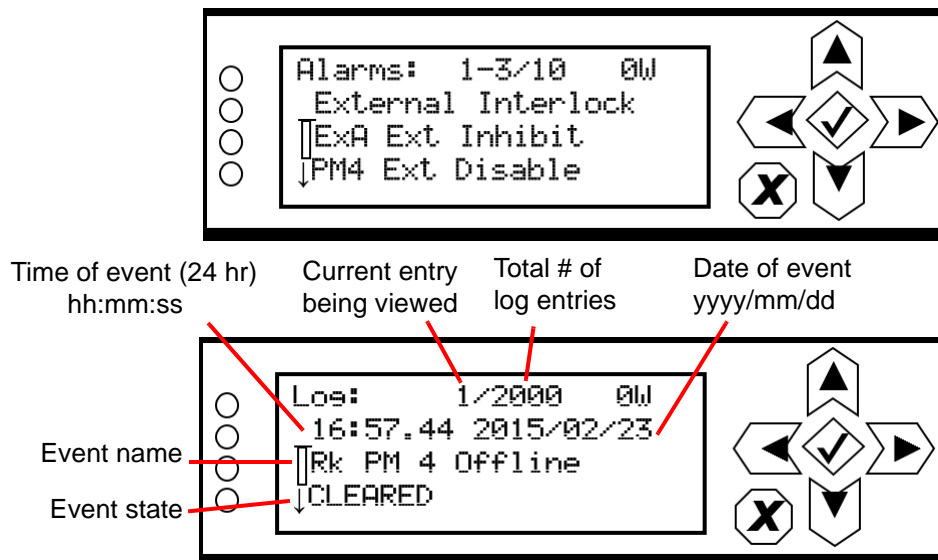


Transmitter Alarms and Log - Using the Front Panel UI

When you select View Status -> View Alarms or View Status -> View Log from the front panel UI's Main Menu (see [Figure 3.2.18](#)), you can view various active or logged events, respectively, of the NX5/NX3. These parameters are likely displayed on multiple pages and require that you scroll to view all of them.

NOTE: This screen is for viewing purposes only and does not offer the same level of analytical features as the remote AUI's Logs page (see [Figure 3.2.10 on page 3.2.22](#)).

Figure 3.2.18: View Alarms and View Logs Screens



The View Alarms screen displays only the names of alarms that are currently active. The View Logs screen shows a chronological list of all alarms (up to 2000) that have occurred since the last time the logs were cleared. Older events are discarded.

Use the up and down buttons to scroll through the list of alarms or logged events.

Refer to the NX5/NX3 Troubleshooting Manual to cross-reference the alarm name to possible causes and troubleshooting tips.

When you select and activate Clear Log from the View Status menu, you can delete all logged events.

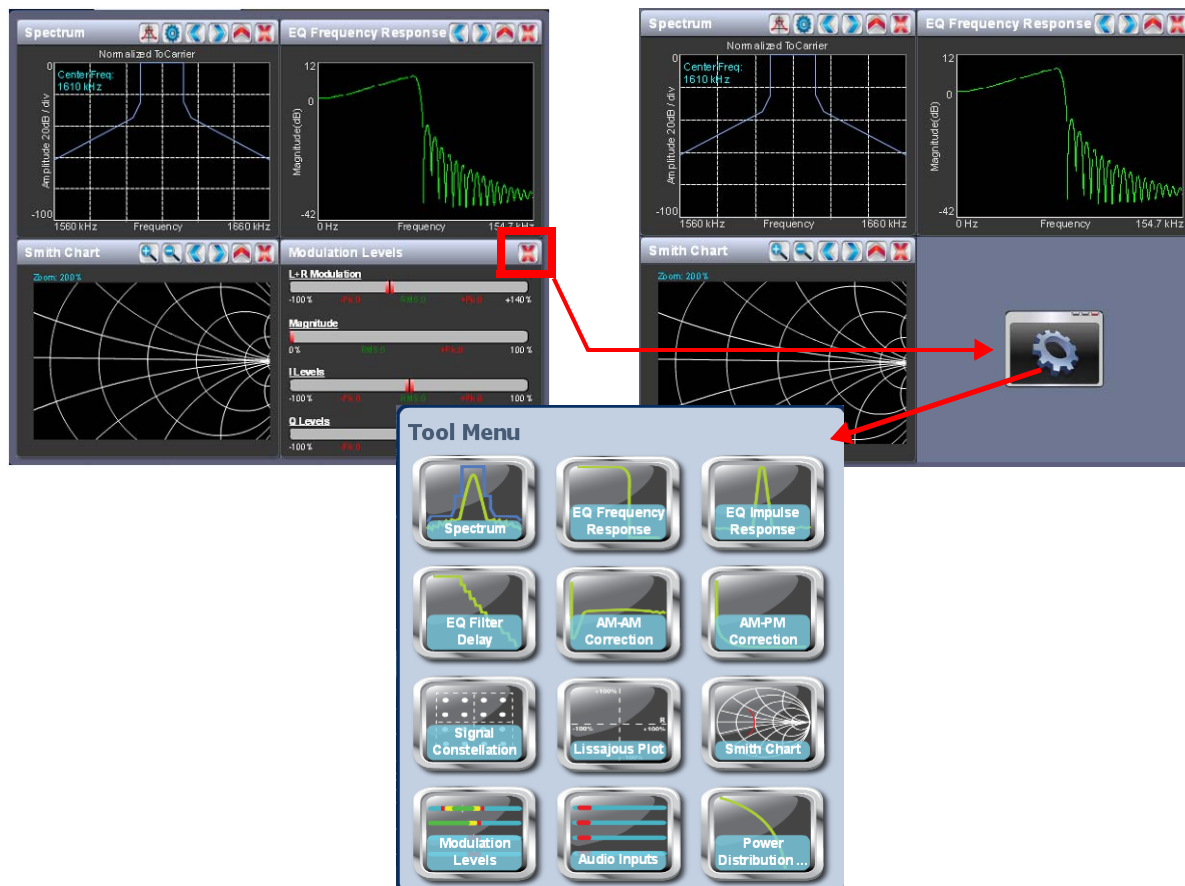
Use the Reset Alarms command in the front panel UI's Main Menu -> Reset Alarms screen to attempt to clear any latching alarms that are holding the transmitter in an "off-air" or reduced power state. If the offending alarm has cleared, the transmitter should resume operation. See [Resetting Alarms, on page 3.2.84](#).

Viewing Instrument Panels

The remote AUI provides up to 12 instrument panels (depending on purchased options) that you can choose to display on the remote AUI's Home page. Up to four instrument panels can be displayed at one time, including a spectrum analyzer. To view all the instrument options (see [Figure 3.2.19](#)), close one of the existing instrument panels on the Home page by clicking X in the top, right corner of the instrument panel, and then click anywhere in the blank space. This section includes the following topics:

- ❖ [Describing Instrument Panel Options, on page 3.2.32](#)
- ❖ [Viewing Instrument Panels, on page 3.2.33](#)
- ❖ [Instrument Panel Usage, on page 3.2.33](#)
- ❖ [Available Instrument Panels, on page 3.2.35](#)

Figure 3.2.19: Instrument Panels on Home page



Click on the desired instrument panel to display it. See [Table 3.2.3 on page 3.2.32](#) for a description of each instrument panel.

Describing Instrument Panel Options

Table 3.2.3 describes instrument panel options:

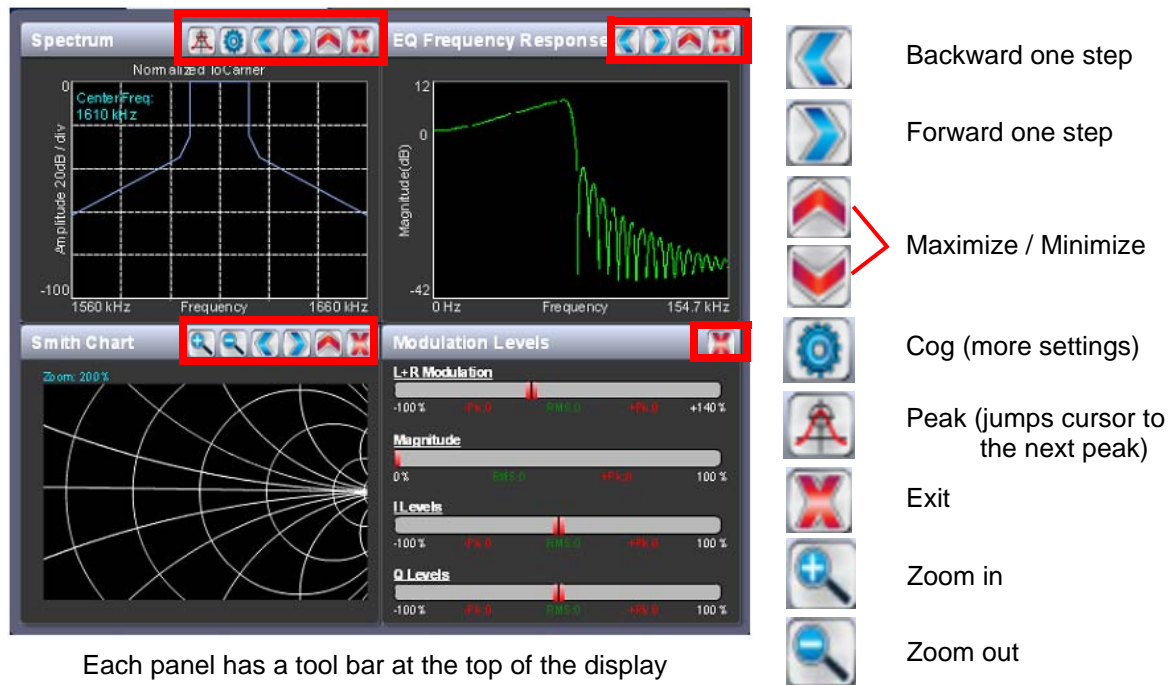
Table 3.2.3: Instrument Panels

INSTRUMENT	DESCRIPTION	REFERENCE
Spectrum	Displays a spectrum analyzer, capable of monitoring the transmitter's RF output spectrum and the spectrum of the signal generated by the exciter.	See page 3.2.35
EQ Frequency Response	Displays the frequency response of the exciter's EQ filter.	See page 3.2.37
EQ Impulse Response	Displays the impulse response of the exciter's EQ filter.	See page 3.2.38
EQ Filter Delay	Displays the group delay of the exciter's EQ filter across its bandwidth.	See page 3.2.39
AM-AM Correction	Displays the amplitude compensation being applied to the magnitude signal.	See page 3.2.40
AM-PM Correction	Displays the compensation being applied to the phase signal.	See page 3.2.41
Signal Constellation	For IBOC mode only. Displays the phase and amplitude of the symbols being modulated within an OFDM sub-carrier as dots on a cartesian graph. Also displays timing and data carrier information.	See page 3.2.42
Lissajous Plot	Displays a Lissajous figure that represents the resultant vector (magnitude and phase) for the applicable channels (either L and R or I and Q).	See page 3.2.43
Smith Chart	Displays the impedance of the load as seen at the input to the transmitter's combiner.	See page 3.2.44
Modulation Levels	Displays L+R modulation, Envelope Magnitude and I/Q modulation. I/Q bar graphs are relevant for DRM or IBOC mode only.	See page 3.2.45
Audio Inputs	Displays the program input levels. Bar graph labels indicate the source of each display.	See page 3.2.46
Power Distribution Plot	Displays a CCDF plot that indicates the probability of exceeding a given power level, based on the average power level. Aids in determining peak power capability.	See page 3.2.47

Viewing Instrument Panels

Each instrument panel has a unique tool bar that may be different from other panels (see [Figure 3.2.20](#)).

Figure 3.2.20: Instrument Panel Tool Bars



Instrument Panel Usage

Observe the following guidelines when using instrument panels:

- To enlarge/reduce the instrument panel, use the maximize/minimize buttons. Some instrument displays show more information when maximized (e.g., Signal Constellation, see [Figure 3.2.30 on page 3.2.42](#)).
- To display a cursor in the panel, which only applies to the Spectrum Analyzer, Smith Chart, EQ instruments, AM-AM Correction, AM-PM Correction and Power Distribution Plot, click on the instrument panel where you want the cursor (see [Figure 3.2.21 on page 3.2.34](#)). The cursor position and value are noted in the upper, right-hand corner of the panel (e.g., frequency and amplitude for the spectrum analyzer).
- To make fine adjustments, use the backward and forward buttons (see [Figure 3.2.20](#)).

Figure 3.2.21: Instrument Cursor Manipulation

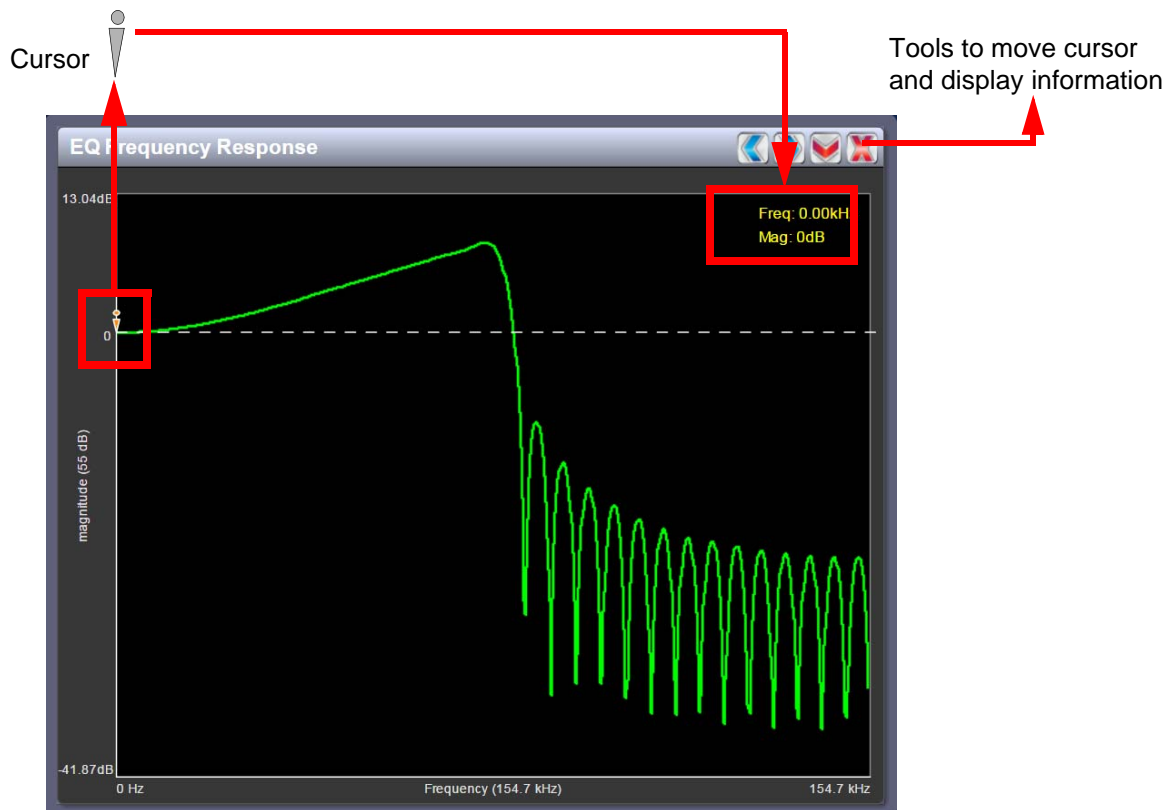
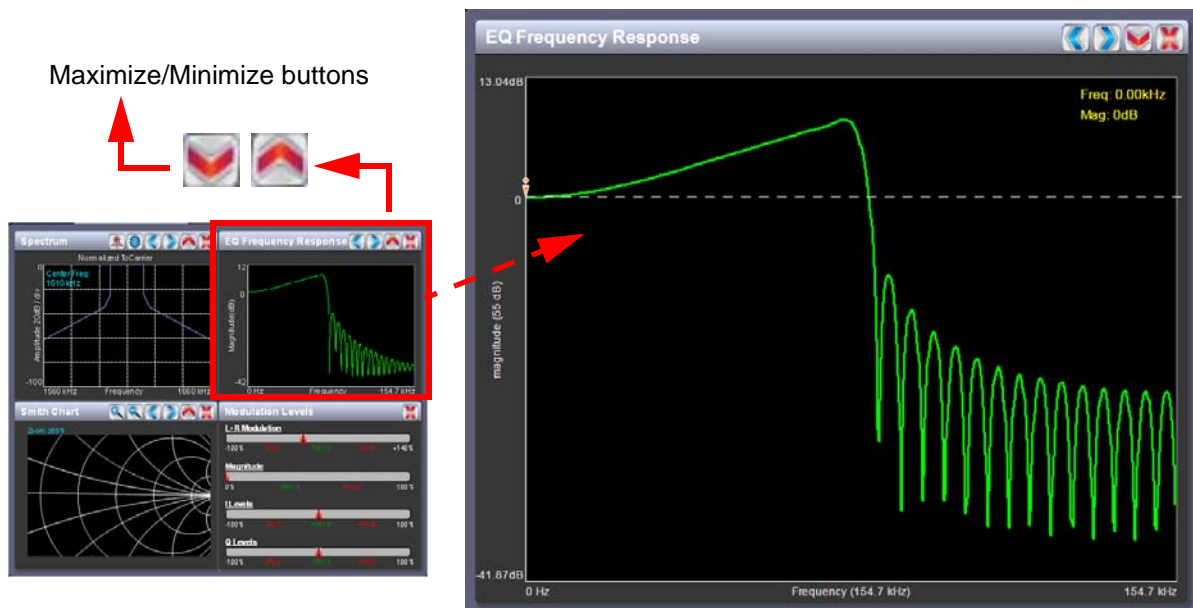


Figure 3.2.22: Instrument Panel - Expansion Example



Available Instrument Panels

Spectrum Analyzer

See [Figure 3.2.23](#). The carrier level is normalized to its unmodulated level at 0 dB. The graph center is always at the carrier frequency, as defined by the Exciter's set Frequency value.

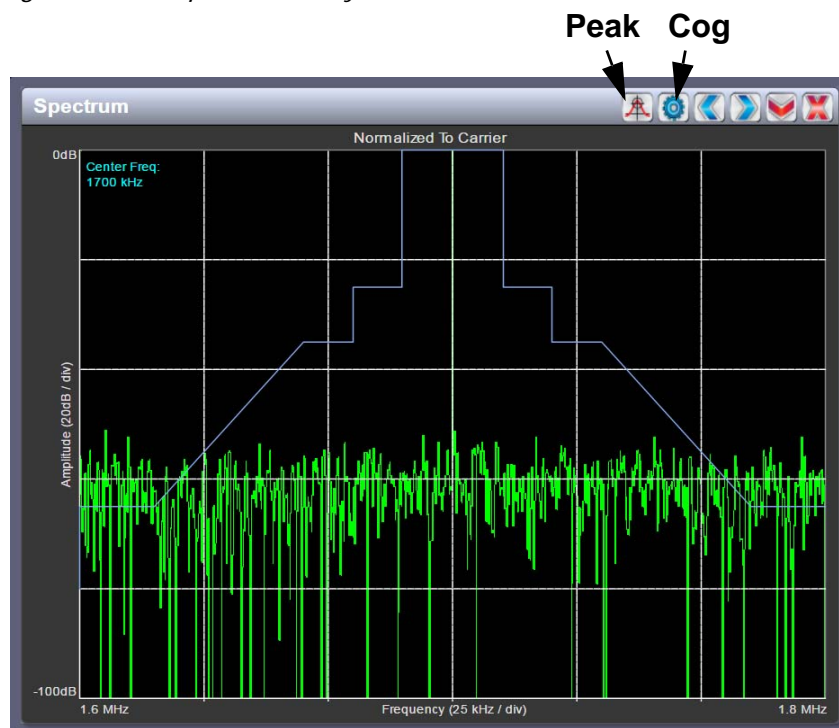
Masks are shown based on transmission mode and are defined by the following standards:

- Analog AM standard: NRSC-2-B
- DRM and DRM+AM standards: ITU-R SM.328-11 and ITU-R SM.1541-4
- IBOC and IBOC+AM: NRSC-5-C

NOTE: Any spurious emissions that are displayed are a product of the spectrum analyzer and are not actually present on the transmitter output.

Click on the panel to display a cursor on the trace in the approximate area. The cursor position (frequency and amplitude) is shown in the upper, right-hand corner of the panel. The center frequency is shown in the upper, left-hand corner of the panel. Click in other areas of the spectrum analyzer panel to provide a coarse adjustment of the cursor position.

Figure 3.2.23: Spectrum Analyzer



Use the left and right buttons to make fine adjustments to the cursor position.

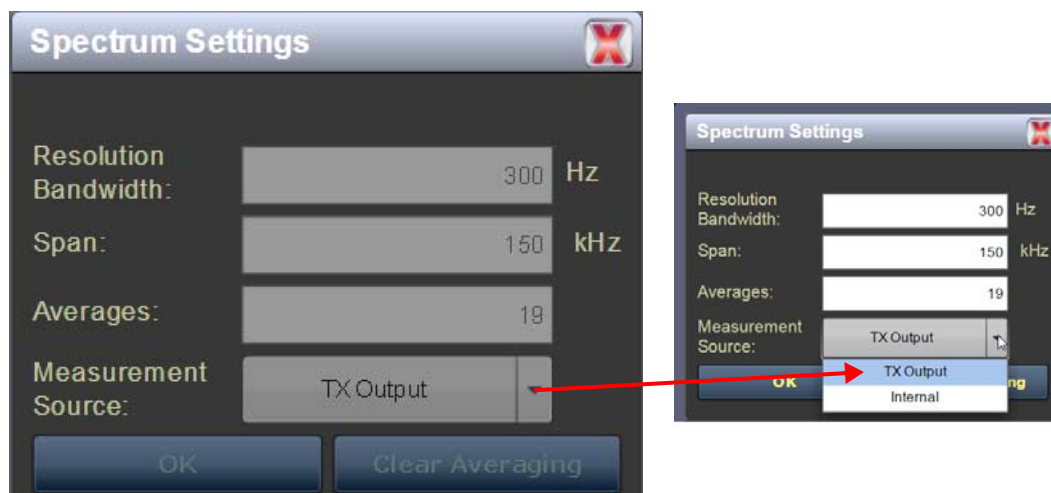
Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Use the "peak" button to place the cursor on the next successive peak (moving left to right) in the spectrum.

Use the "cog" button to gain access to spectrum settings (see [Figure 3.2.24](#)) such as:

- Resolution Bandwidth: determines the FFT bin size or the smallest frequency that can be resolved. Set between 90 Hz and 2500 Hz (default is 300 Hz). Decreasing this value provides better frequency resolution, but will increase the sweep time.
- Span: determines the start and stop frequencies of the analyzer with the carrier frequency always at the center. Set between 20 kHz and 300 kHz (default is 150 kHz).
- Averages: determines the number of averages that the analyzer performs per sweep. Set between 0 and 100 (default is 19).
- Measurement Source: determines the source of the spectrum plot (transmitter output or internal) that is being displayed. Selecting TX Output uses the exciter's RF sample feedback signal to display the RF output spectrum. Selecting Internal displays the exciter's internally generated signal.
- Clear Averaging: resets the averaged signal shown on the spectrum analyzer.

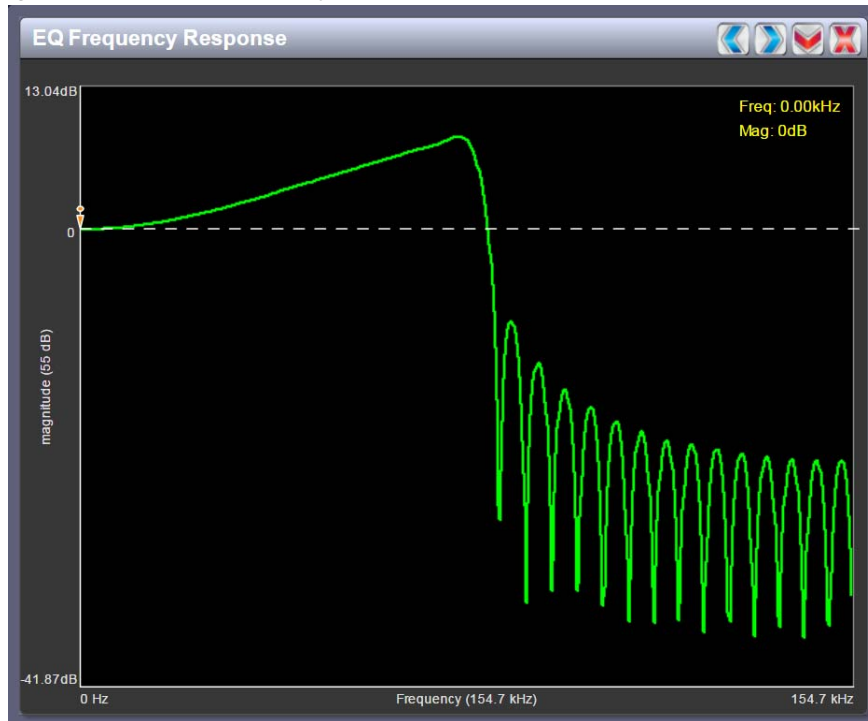
Figure 3.2.24: Spectrum Settings



Equalizer Screens

The NX5/NX3's exciter includes a fixed equalizer to optimize audio and digital performance. There are three menus available in the instrument panels - EQ Frequency (see [Figure 3.2.25](#)), EQ Impulse Response (see [Figure 3.2.26 on page 3.2.38](#)) and EQ Filter Delay (see [Figure 3.2.27 on page 3.2.39](#)). Coefficients are determined to compensate for the frequency response of the transmitter. All frequencies shown are relative to the channel frequency.

Figure 3.2.25: EQ Frequency Response



EQ Frequency Response

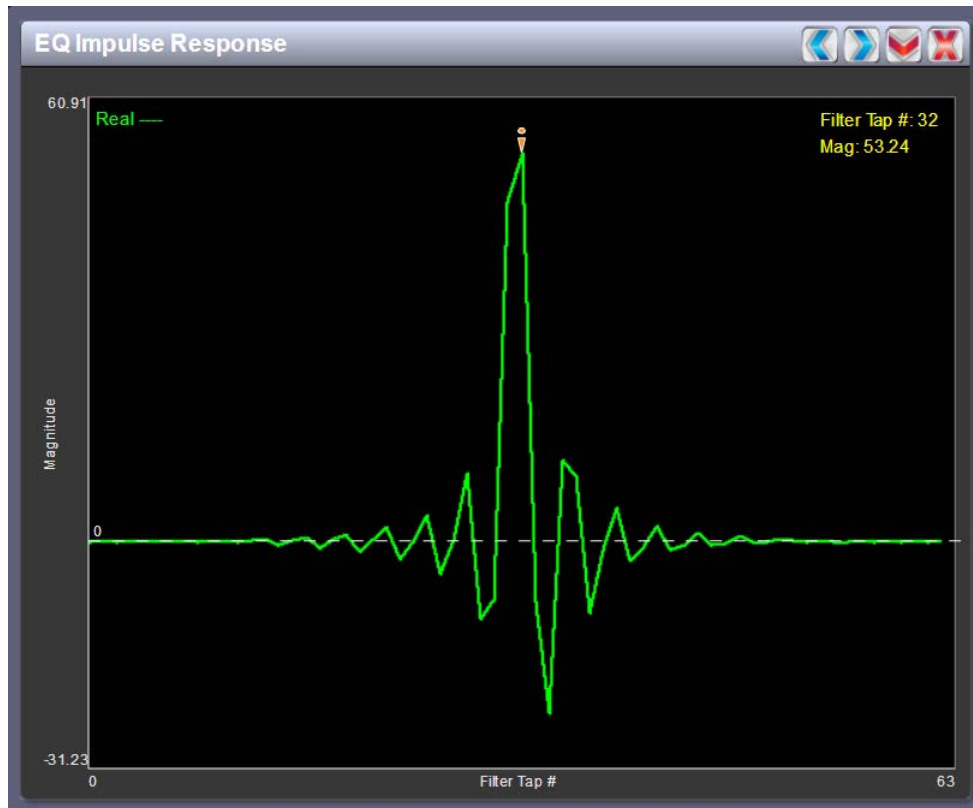
See [Figure 3.2.25](#). This panel displays the frequency response of the active exciter's equalization filter. It displays the gain of the filter versus frequency as it applies to the magnitude of the modulating signal. A dashed line is displayed at the 0 dB level.

Click on the panel to display a cursor in the approximate area on the trace. The cursor position (frequency and magnitude) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.26: EQ Impulse Response



EQ Impulse Response

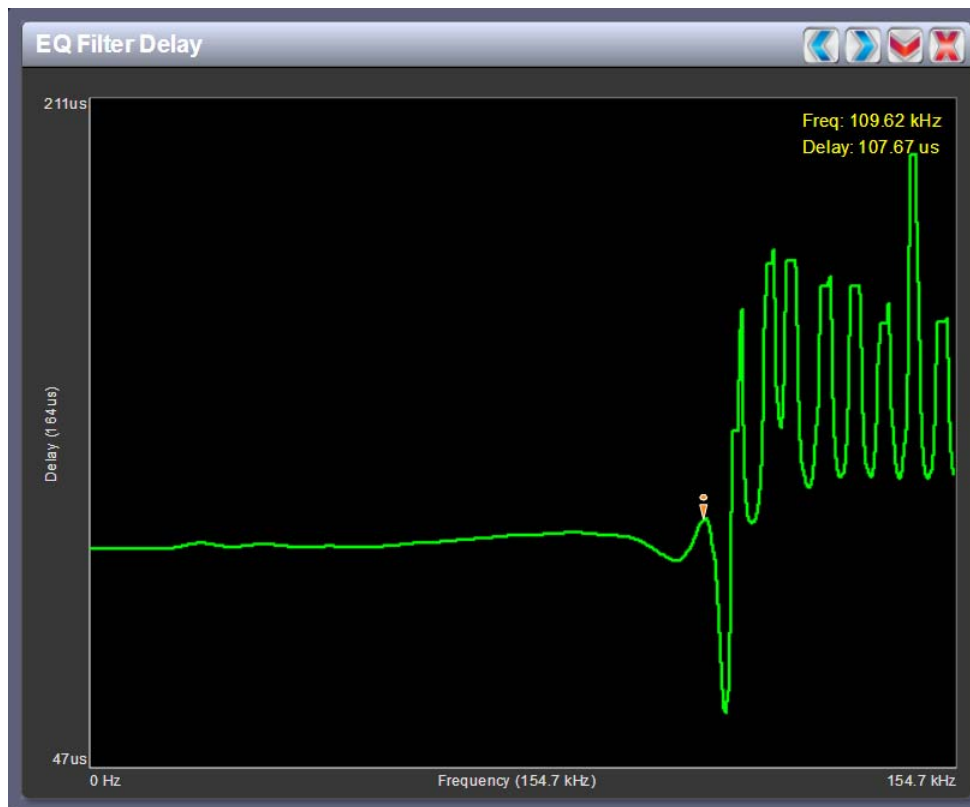
See [Figure 3.2.26](#). This panel displays the impulse response of the modulator's EQ filter.

Click on the panel to display a cursor in the approximate area. The cursor position (filter tap # and magnitude) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.27: EQ Filter Delay



EQ Filter Delay

See [Figure 3.2.27](#). This panel displays the group delay of the modulator's EQ filter across its bandwidth.

Click on the panel to display a cursor in the approximate area. The cursor position (frequency and delay) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

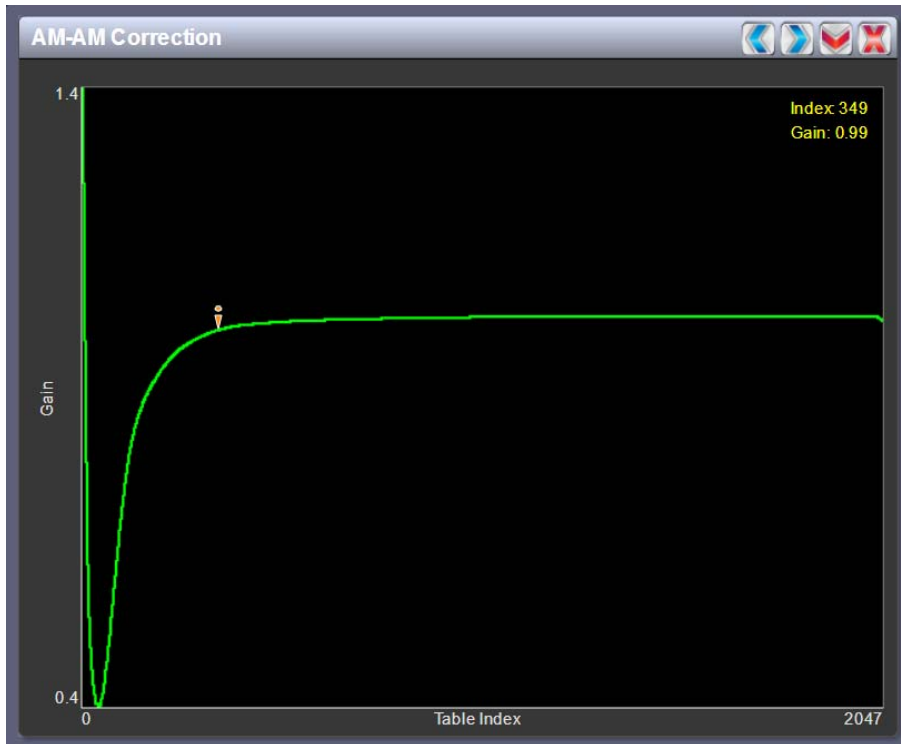
Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

AM-AM and AM-PM Correction Screens

The exciter linearizes the transmitter's magnitude (envelope) path and phase (RF drive) path by using two correction parameters - AM-AM Correction (see [Figure 3.2.28](#)) and AM-PM Correction (see [Figure 3.2.29 on page 3.2.41](#)), which can be viewed as instrument panels.

Figure 3.2.28: AM-AM Correction



AM-AM Correction

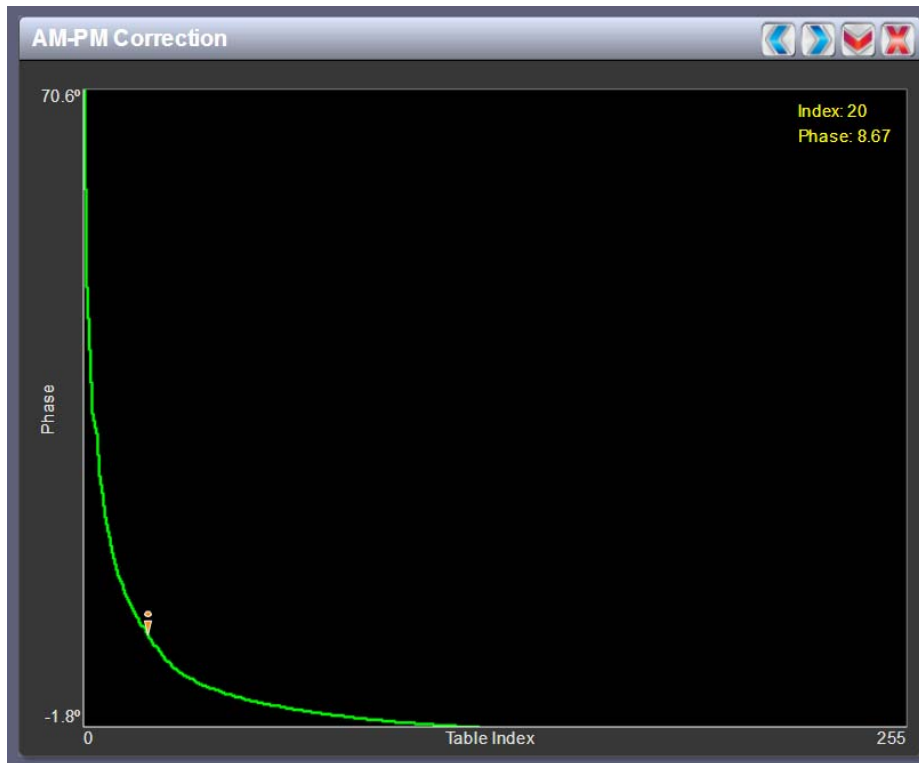
This panel displays the amplitude correction being applied to the magnitude signal. The x-axis represents the input signal amplitude and the y-axis represents the gain correction applied for a given amplitude value.

Click on the panel to display a cursor in the approximate area on the trace. The cursor position (LUT index and gain) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.29: AM-PM Correction



AM-PM Correction

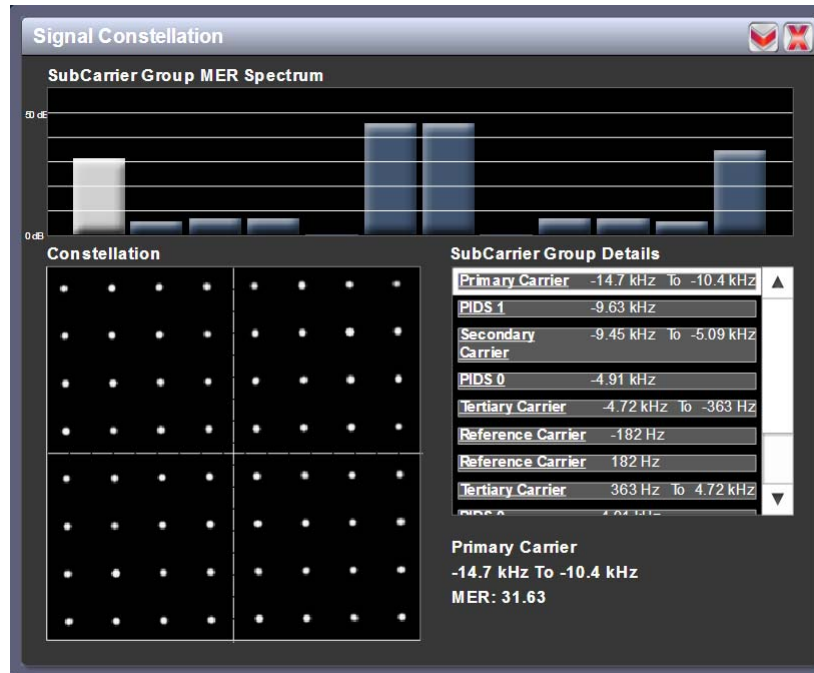
This panel displays the phase correction being applied to the RF drive signal. The x-axis represents the input signal amplitude and the y-axis represents the phase shift correction applied for a given amplitude value.

Click on the panel to display a cursor in the approximate area. The cursor position (LUT index and phase) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.30: Signal Constellation



Panel shown maximized

Signal Constellation

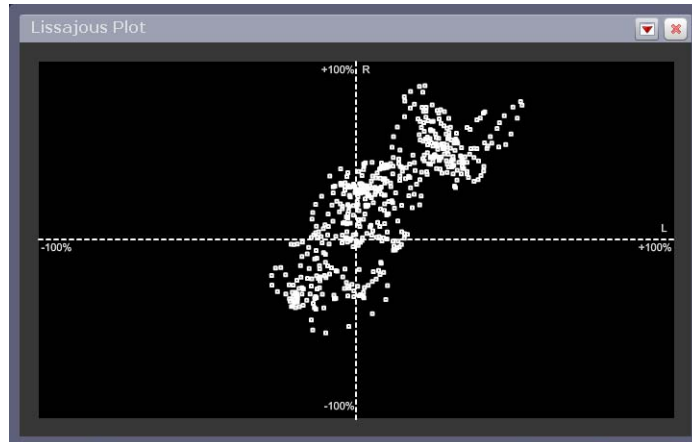
See [Figure 3.2.30](#). In IBOC mode only, the exciter continuously measures the transmitter's output signal and performs basic demodulation of the digital carriers. The Signal Constellation panel displays the phase and amplitude of the symbols being modulated within an OFDM sub-carrier group as dots on a cartesian graph. There are separate screens for each sub-carrier group. You can select sub-carrier groups by clicking on the carrier representation in the SubCarrier Group MER Spectrum chart, or by selecting the desired subcarrier group from the SubCarrier Group Details list. Typically, the dots will be grouped together around the ideal data points.

Sub-carrier group information is shown in the lower, right section of the screen. Displayed information includes the sub-carrier group name, the bandwidth that the selected carrier group occupies and the modulation error ratio (MER) for the selected carrier group. MER quantifies the performance of the transmitted digital signal as the ratio between the RMS power of the ideal signal and the RMS power of the received signal's error vector. A higher MER value is characteristic of a smaller error, and therefore a higher quality signal. The MER out of the transmitter is typically better than 20 dB, but can be significantly affected by external influences such as antenna impedance and bandwidth.

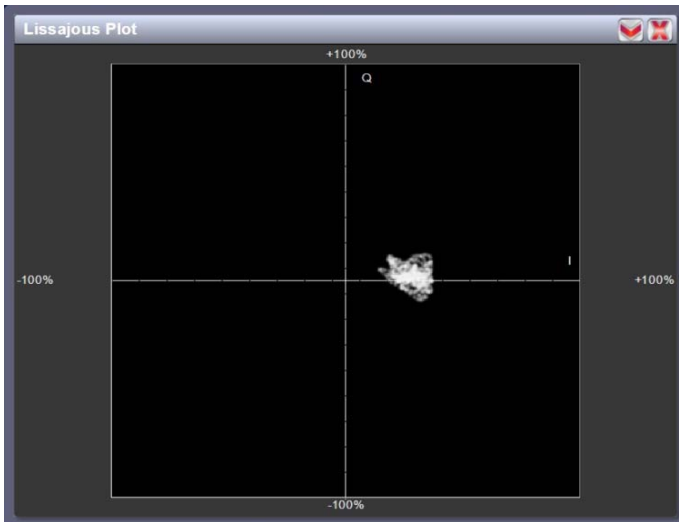
NOTE: When subcarriers are turned off in the Engine settings, they will still appear in this screen, but the MER will be very high (i.e., 0 to 10 dB).

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.31: Lissajous Plot



L and R mode



I and Q mode

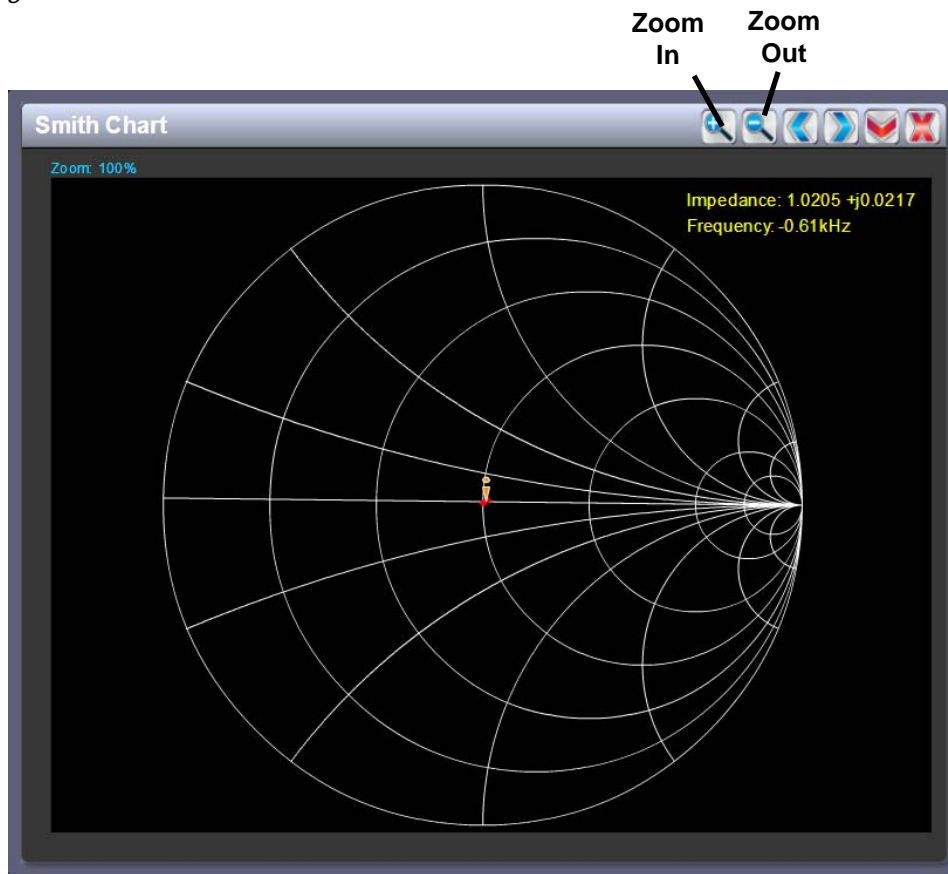
Lissajous Plot

See [Figure 3.2.31](#). This panel displays a Lissajous figure that represents either L (left) and R (right) audio content or a representation of the digital modulation signal [I (in-phase) and Q (quadrature)]. I and Q will be automatically selected unless you are operating in stereo mode or not operating digital. Left and right audio content is displayed for all other audio sources.

The plot consists of a group of sequential samples to allow signal analysis. In L and R mode, the L+R portion of the signal tends to dominate the plot, resulting in the majority of samples appearing in the lower, left and upper, right quadrants. In I and Q mode, signals that are of equal frequency and 90 degrees out-of-phase result in a circular display.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.32: Smith Chart



Smith Chart

See [Figure 3.2.32](#). The Smith Chart allows you to visualize the impedance of the transmitter's load as seen at the combiner, as a function of frequency. The impedance shown on the Smith Chart is normalized to the combiner input impedance. The ideal load is therefore $1 + j0$ ohms, which implies a perfect 50-ohm load is being applied to the output of the transmitter.

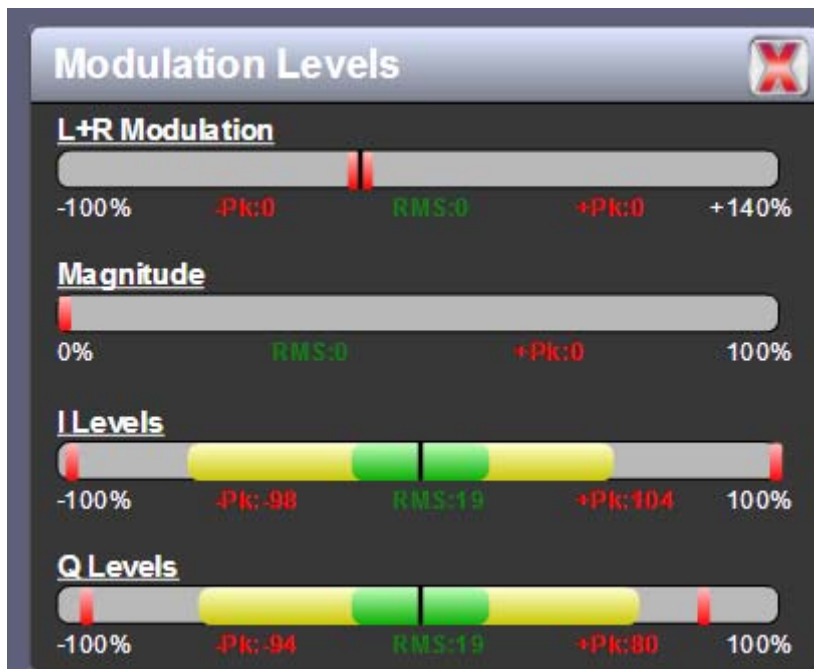
Click on the panel to display a cursor in the nearest area on the trace showing the normalized impedance plot line. The cursor position (impedance and frequency) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons as fine adjustments to the cursor position.

Use the zoom in (+) and zoom out (-) buttons to size the chart between 100% and 1000%.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Figure 3.2.33: Modulation Levels



Modulation Levels

See [Figure 3.2.33](#). Bar graphs display the percentage of L+R modulation, PDM (magnitude) and I/Q modulation for the transmitter. I/Q bar graphs will show levels in DRM or IBOC mode only.

The level shown in yellow represents the currently measured peak modulation level, with the RMS level shown in green. An actual RMS value is displayed below the meter.

The red markers represent the most recently recorded maximum peak level. The actual peak values are displayed in red below the meter. For L+R and I/Q modulation, both positive and negative peaks are shown.

There are no interactive tools (cursors, fine/coarse adjustments) for this display.

Figure 3.2.34: Audio Inputs



NOTE: NX5 screens shown for reference. Some NX3 values may differ slightly.

Audio Inputs

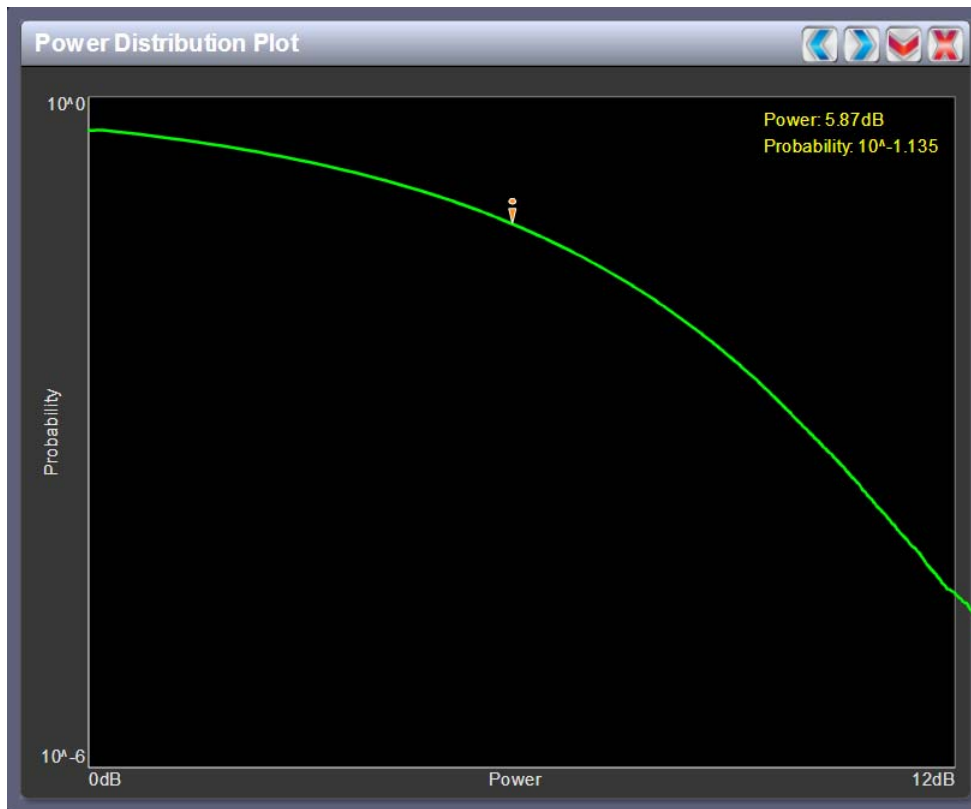
See [Figure 3.2.34](#). Bar graphs display the amplitude (in dB) of the audio inputs selected in the preset. bar graph levels are relative to the input level specified in the preset.

The level shown in yellow represents the currently measured peak amplitude, with the RMS level shown in green. An actual RMS value is displayed below the meter.

The red markers represent the most recently recorded peak level. The actual peak value is displayed in red below the meter.

There are no interactive tools (cursors, fine/coarse adjustments) for this display.

Figure 3.2.35: Power Distribution Graph



Power Distribution Graph

See [Figure 3.2.35](#). The exciter measures the relative power levels of the signal and determines the probability of exceeding a given power level, relative to the average power. The data is plotted in the Power Distribution Graph as a CCDF (complementary cumulative distribution function). The x-axis displays the relative power level in dB, with the reference representing the average power. The y-axis displays the probability of exceeding that power level. This graph can be used to assess the distribution of a given signal, and provides an indication of the amount of peak power capability required.

Click on the panel to display a cursor in the approximate area on the trace. The cursor position (power level and probability) is noted in the upper, right-hand corner of the panel. Click in other areas of the instrument panel to provide a coarse adjustment of the cursor position.

Use the left and right buttons to make fine adjustments to the cursor position.

Use the up or down button to maximize (if it was minimized) or minimize (if it was maximized) the panel size.

Viewing Real-Time Meters

You can view meters using the remote AUI (see [Viewing Real-Time Meters - using the Remote AUI](#)) or using the front panel UI (see [Viewing Real-Time Meters - Front Panel UI](#), on page 3.2.54).

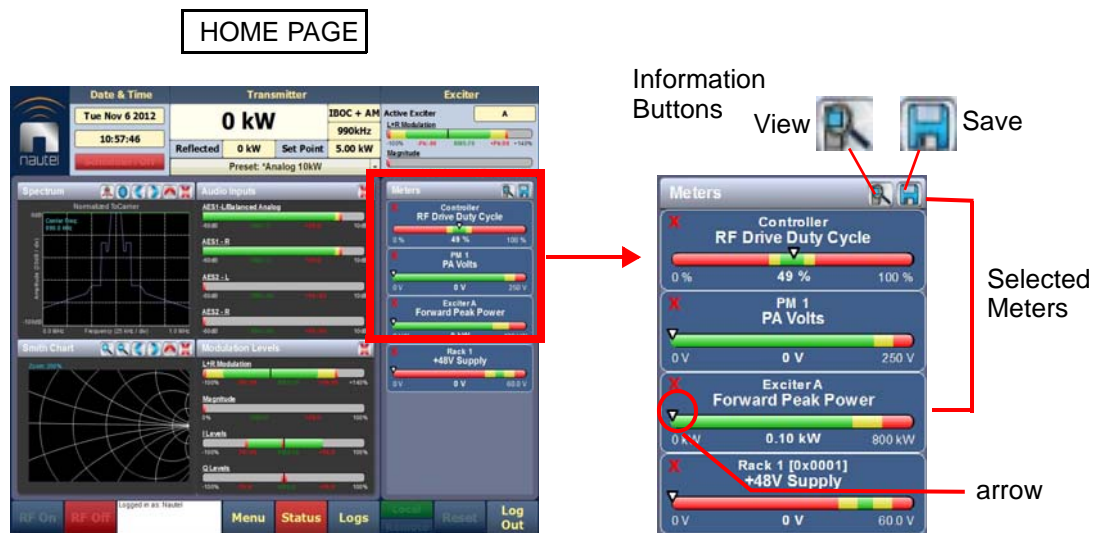
Viewing Real-Time Meters - using the Remote AUI

The remote AUI can be used to display metered parameters on the Home page (see [Figure 3.2.36](#)), if selected individually from the *Meters List View* page or saved in a meter list layout and set to default.

This section includes the following topics:

- [Describing the Meter Display, on page 3.2.49](#)
- [Accessing Meter Information, on page 3.2.49](#)
- [Identifying Meter Information on a Specific Sub-device, on page 3.2.50](#)
- [Managing Meter Lists, on page 3.2.53](#)

Figure 3.2.36: Meters Page



Describing the Meter Display

The meters displayed on the Home screen of the remote AUI are those selected for display. Each meter is a colour-coded bar with minimum and maximum values (see [Figure 3.2.36 on page 3.2.48](#)). The current value for a meter is indicated by an arrow on the colour-coded bar, as well as a numeric value below the meter.

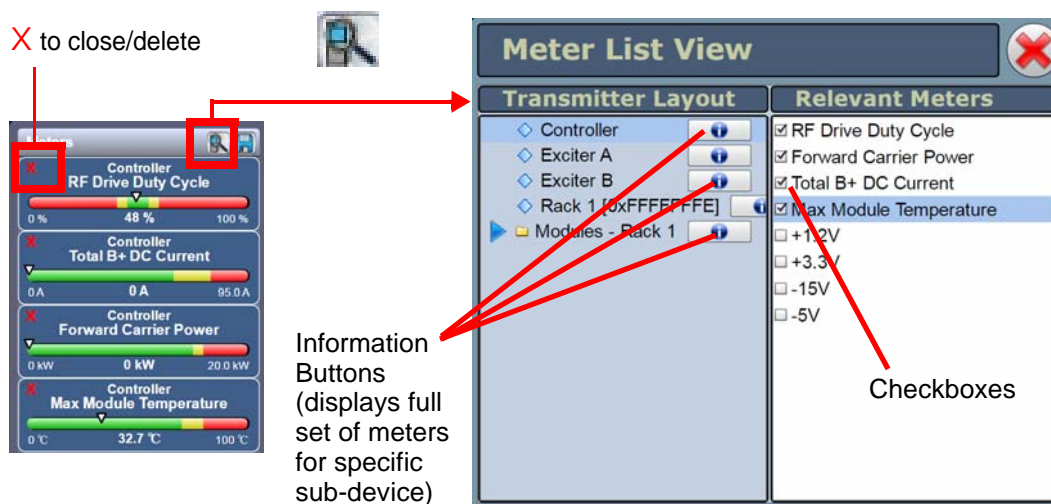
- A parameter value in the green section of a meter bar indicates the parameter is within the range for normal operation.
- A parameter value in the yellow section (as applicable) of a meter bar indicates the parameter is still within an operational range, but is approaching design limitations.
- A parameter value in the red section of a meter bar indicates the parameter is outside normal operating conditions.

Accessing Meter Information

Procedures for accessing and editing information in the Meters section of the remote AUI:

- To delete a meter from the Home page, click **X** in the upper, left corner of the meter to be deleted from the Meters window ([Figure 3.2.37](#)).
- To review all the meter options, click the meter list view shortcut button (magnifying glass) at the top of the meters panel (see [Figure 3.2.37](#)). This will open the Meter List View window.
- On the Meter List View screen users can see all relevant meters of a sub-device. Select the sub-device in question under the Transmitter Layout column and the Relevant Meters column will be populated. The desired Meters can now be selected by clicking the checkbox to the left of the meter name.

Figure 3.2.37: Meters List View Window (Exciter A shown)



Identifying Meter Information on a Specific Sub-device

- Open the "Meter List View" window, which organizes available meters by transmitter sub-system.
 - ❖ Controller - see [Figure 3.2.38](#))
 - ❖ Exciter A - see [Figure 3.2.39 on page 3.2.51](#)
 - ❖ Exciter B - see [Figure 3.2.39 on page 3.2.51](#)
 - ❖ Rack 1 - see [Figure 3.2.40 on page 3.2.51](#)). Additionally, the Rack includes a list of PM (power module) sub-systems, representing the RF power modules in each rack. Each power module can be selected to show its meters.
 - ❖ Modules - see [Figure 3.2.41 on page 3.2.52](#)
- To view the summary screen of each device type: Under "Transmitter Layout", click the information button (i) adjacent a device type ([Figure 3.2.38 on page 3.2.50](#), [Figure 3.2.39 on page 3.2.51](#), [Figure 3.2.40 on page 3.2.51](#), [Figure 3.2.41 on page 3.2.52](#) and [Figure 3.2.41 on page 3.2.52](#)). The summary screen shows all available meters in tabular format.

NOTE: When a meter value is updated, a blue box briefly appears around that value. Typically, updates occur every one or two seconds.
- To choose individual meters for display in the "Meters" section of the **Home** page: Select the device type name in the Transmitter Layout panel and select the checkbox next to the desired meters shown in the Relevant Meters panel. If the Relevant Meters panel contains more than one page of information, then use the scroll bar (right side) to find the desired meter.

Figure 3.2.38: Meters - Information Display for Controller

Controller

Firmware Version

4.7.0.15

Remote Enabled	Remote	Max Module DC Current	0 A	Avg Module PA Voltage	0 V	Min Module Fan Speed	0 rpm
RF On/Off	Off	Avg Module DC Current	0 A	Min Module Low Voltage PS	0 V	Max Module Fan Speed	0 rpm
Main Exciter	A	Min Module B+ Voltage	0 V	Max Module Low Voltage PS	0 V	Avg Module Fan Speed	0 rpm
Standby Exciter	No	Max Module B+ Voltage	0 V	Avg Module Low Voltage PS	0 V	+1.2V	1.20 V
Active Exciter	A	Avg Module B+ Voltage	0 V	Min Module RF Drive	0 %	+3.3V	3.38 V
Auto Changeover	No	Min Module Modulation	0 %	Max Module RF Drive	0 %	-15V	-15.6 V
Sync Enable	Enable	Max Module Modulation	0 %	Avg Module RF Drive	0 %	-5V	-5.03 V
Forward Carrier Power	0.26 kW	Avg Module Modulation	0 %	Min Module Temperature	0 °C		
Total B+ DC Current	0 A	Min Module PA Voltage	0 V	Max Module Temperature	0 °C		
Min Module DC Current	0 A	Max Module PA Voltage	0 V	Avg Module Temperature	0 °C		

Alarms

Interlock Open

Combiner Interlock Open

Figure 3.2.39: Meters - Information Display for the Exciter

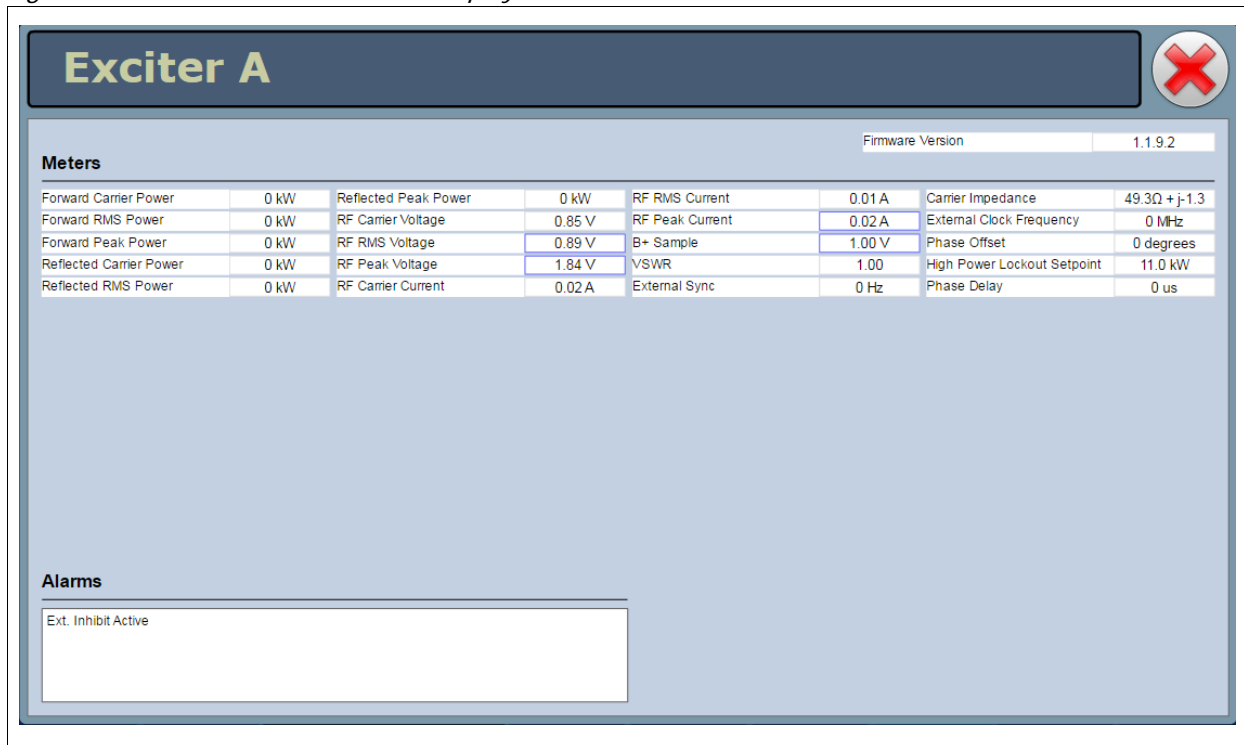


Figure 3.2.40: Meters - Information Display for Rack 1

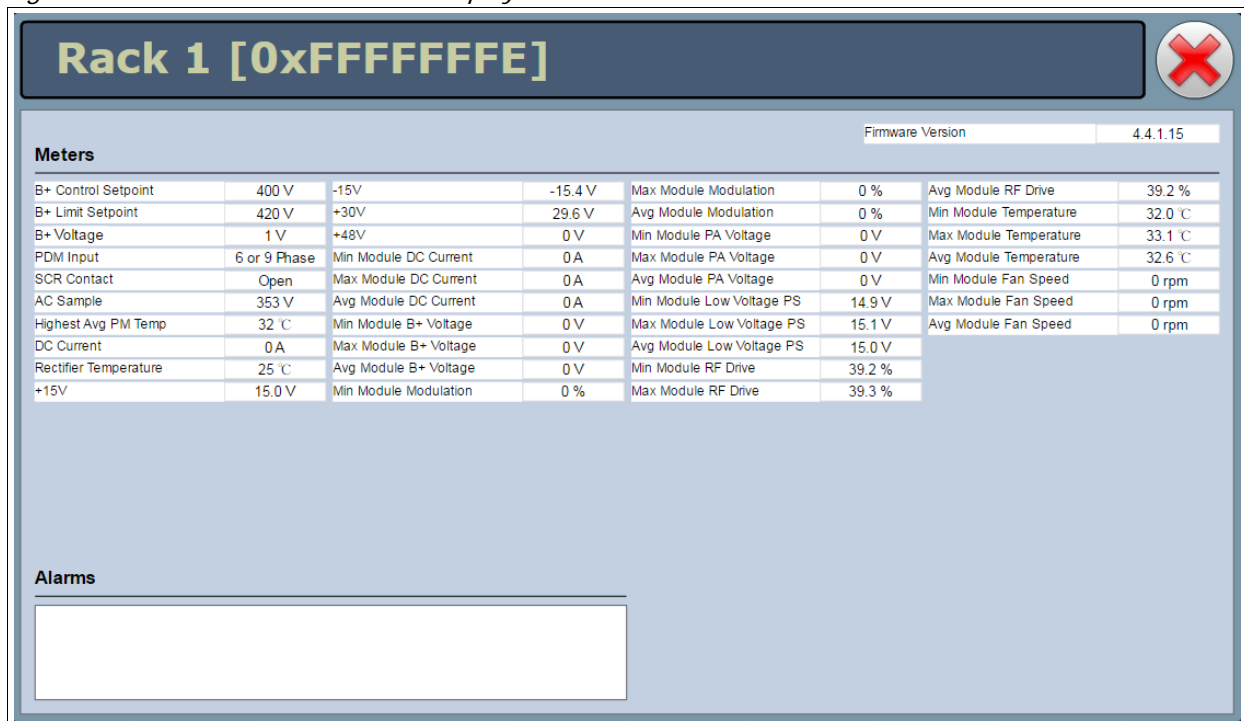


Figure 3.2.41: Meters - Information Display for Modules - Rack 1

Modules - Rack 1				
	PM 1	PM 2		
Front Panel Inhibit	Enabled	Enabled		
Serial Address	12CF	2B6D		
DC Current	0 A	0 A		
B+ Voltage	0 V	0 V		
PDM Duty Cycle	0 %	0 %		
PA Volts	0 V	0 V		
Low Voltage Supply	14.9 V	15.1 V		
RF Drive Duty Cycle	39.3 %	39.2 %		
Temperature	32.7 °C	33.1 °C		
Fan 1 Speed	0 rpm	0 rpm		
Fan 2 Speed	0 rpm	0 rpm		

On the modules summary screen (Figure 3.2.41), meters for both modules are shown on a page.

Individual power modules can be directly inhibited by pressing their **Front Panel Inhibit** button. this button also displays the status of each RF power module. The status is indicated by the displayed text and the colour of the button, which are controlled by three factors: the status of the software (enabled or disabled), the status of the PDM cable (plugged in or unplugged), and the status of the module (plugged in or unplugged), as follows:

- ❖ Enabled and green: software is enabled, PDM cable plugged in, module plugged in
- ❖ Enabled and red: software is enabled, PDM cable unplugged, module plugged in
- ❖ Disabled and red: software is disabled, possibly PDM cable unplugged, module plugged in
- ❖ N/A and red: software is enabled or disabled, possibly PDM cable unplugged, module unplugged

Figure 3.2.42: Meters - Information Display for Individual Module (PM)

PM [0x12CF]							
						Firmware Version	1.0.12.5
Meters							
DC Current	0 A	PA Volts	0 V	Temperature	32.4 °C		
B+ Voltage	0 V	Low Voltage Supply	15.0 V	Fan 1 Speed	0 rpm		
PDM Duty Cycle	0 %	RF Drive Duty Cycle	39.3 %	Fan 2 Speed	0 rpm		

Managing Meter Lists

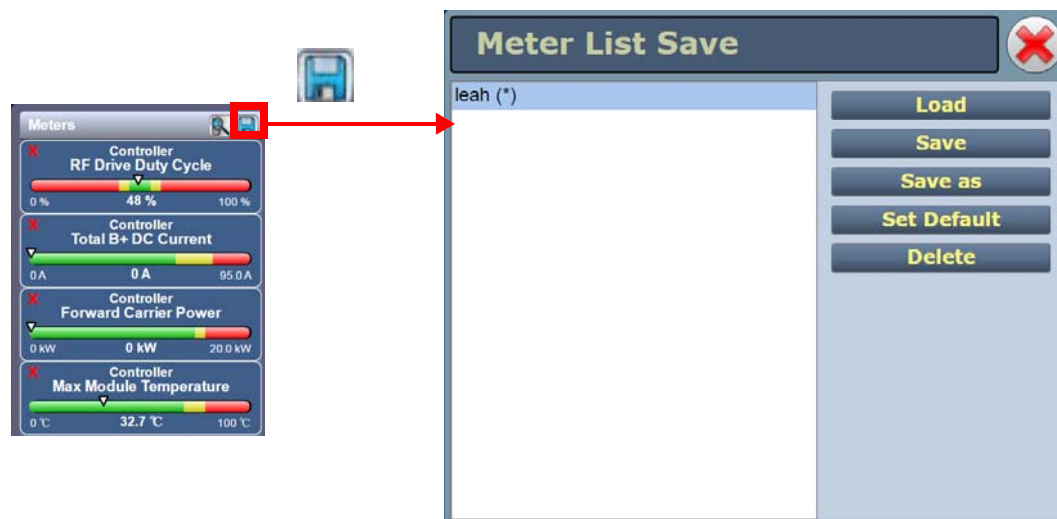
NOTE: Meter lists are associated with user accounts. Lists saved in this screen are only displayed in the current user account. Setting a list as default will define the meters that will appear when logging into the current account (or after an ac power interruption in the remote AUI if this is the default user account).

To save meter specifics for display on the Home page:

Open the Meter List Save window from the Home page using the floppy disk button (Figure 3.2.43).

- ❖ Click Save As to save the currently displayed meters. Enter a name in the Layout Name entry box and click OK.
- ❖ Click Delete to discard the selected meter list.
- ❖ Click Set Default to set the selected meter list as the default for the current user account. The * symbol shows the default.
- ❖ Click Save to overwrite the selected meter list with the currently displayed meters.
- ❖ Click Load to display the meters saved under the currently selected meter list in the Meters panel on the right-hand side of the Home page.

Figure 3.2.43: Meter List Save Window

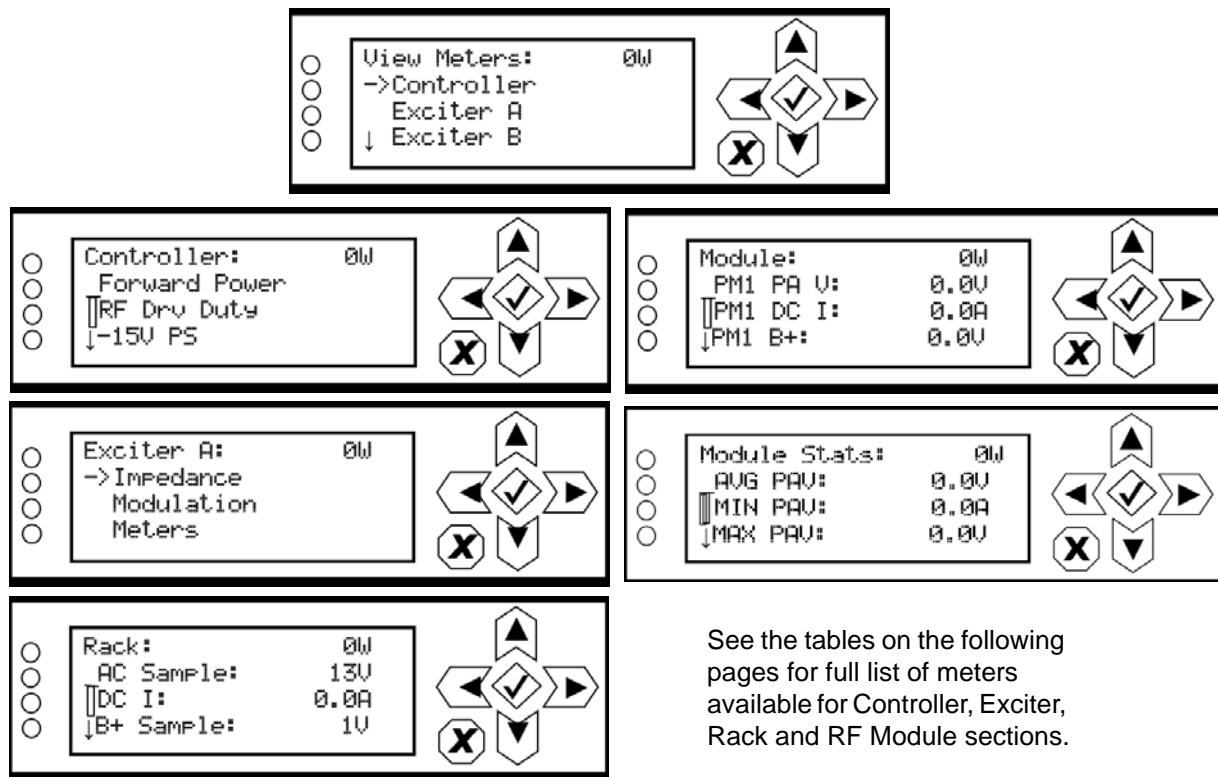


Viewing Real-Time Meters - Front Panel UI

When you select View Status -> View Meters from the Main Menu (see [Figure 3.2.44 on page 3.2.54](#)) you can view various metered parameters of the NX5/NX3. These parameters are divided into sections. When you select a particular section, the applicable meters are displayed as a list on the appropriate screen.

NOTE: The View Meters screens are for viewing purposes only and do not offer the same level of analytical features as the remote AUI's Meter List View page (see [Figure 3.2.37 on page 3.2.49](#)).

Figure 3.2.44: View Meters Screens



Use the up and down buttons to scroll through the meter sections. Press the accept (checkmark) button to enter the meters screen for that section (see [Figure 3.2.44 on page 3.2.54](#)). Use the up and down buttons to scroll through the list of metered parameters, noting that the following parameters are available for viewing:

Controller:

Forward Power
RF Drive Duty
-15 V PS
-5 V PS
+3.3 PS
+1.2 PS

Exciter (A/B, as applicable):

Forward Carrier Power	RF Carrier Current
Forward Avg Power	RF RMS Current
Forward Peak Power	RF Peak Current
Reflected Carrier Power	B+ Sample
Reflected Avg Power	External Clock Frequency
Reflected Peak Power	External Sync
RF Carrier Voltage	Phase Offset
RF RMS Voltage	Phase Delay
RF Peak Voltage	

Rack 1:

AC Sample	+15 V
DC Current	-15 V
B+ Sample	Combiner Fan 1 RPM
Rectifier Temperature	PM Fan 1 RPM
+48 V	PM Fan 2 RPM
+30 V	

RF Module (PM1, repeat for PM2):

PA Voltage
DC Current
B+ Voltage
Temperature
Fan 1 Speed
Fan 2 Speed
PDM Duty Cycle
RF Drive Duty Cycle
+15V Supply

Module Stats:

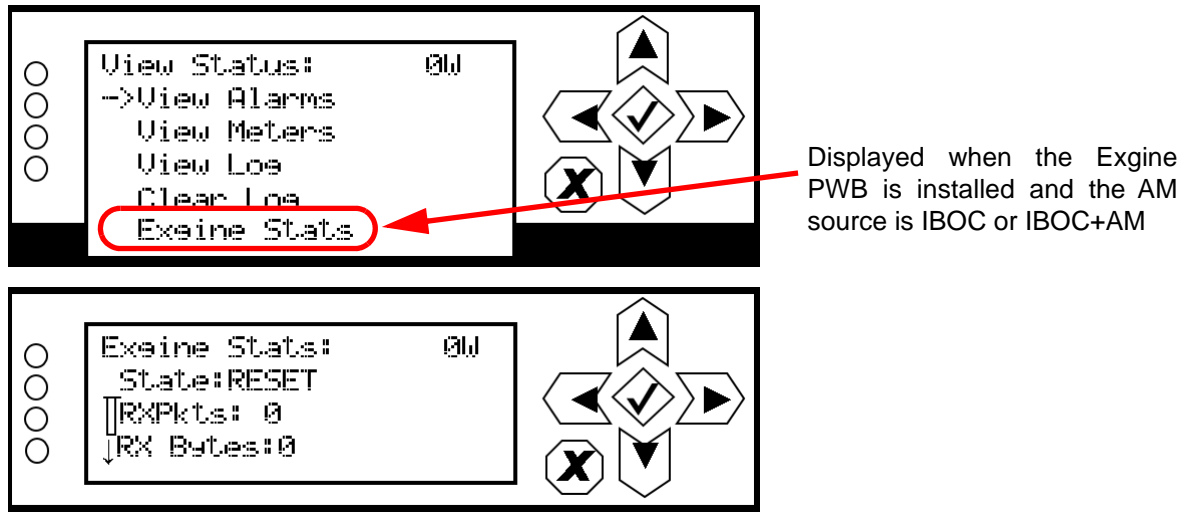
Average PA Voltage	Average B+ Voltage
Minimum PA Voltage	Minimum B+ Voltage
Maximum PA Voltage	Maximum B+ Voltage
Average DC Current	Average PDM Duty
Minimum DC Current	Minimum PDM Duty
Maximum DC Current	Maximum PDM Duty
Average Temperature	Average RF Drive (%)
Minimum Temperature	Minimum RF Drive(%)
Maximum Temperature	Maximum RF Drive (%)
Average Fan Speed	Average +15V PS
Minimum Fan Speed	Minimum +15V PS
Maximum Fan Speed	Maximum +15V PS

Viewing Engine Statistics - Front Panel UI

When you select View Status -> Engine Statistics from the Main Menu (see [Figure 3.2.44 on page 3.2.54](#)) - displayed only if the optional Engine PWB is installed - you can view various Engine parameters.

NOTE: The Engine Statistics screen is for viewing purposes only.

Figure 3.2.45: View Engine Statistics Screens



Use the up and down buttons to scroll through the list of parameters, noting that the following parameters are available for viewing:

State
RXPkts
RX Bytes
Discards
CRC Errors
Seq Errors
Clk Jitter
DPLL Error
PktBuffer
MAC Address

Presets - Editing Operational Settings

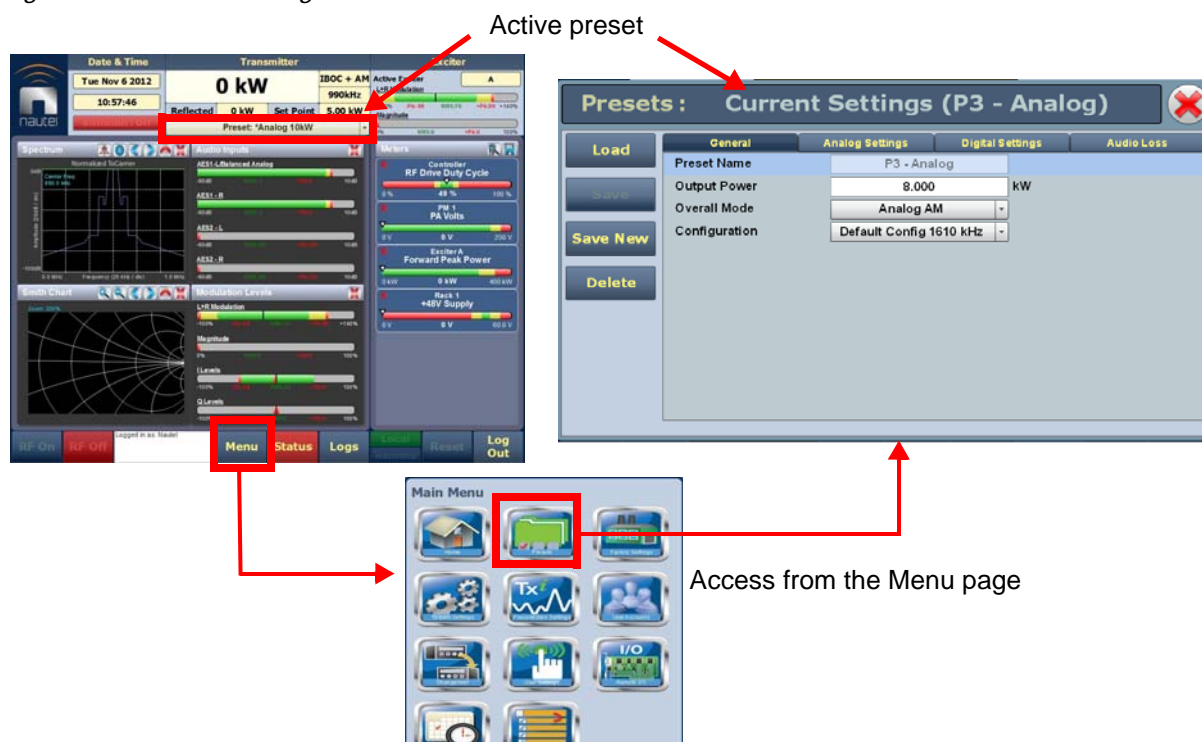
You can manage presets using the remote AUI (see [Managing Presets - Using the Remote AUI](#)) or using the local front panel display (see [Managing Presets - Using the Front Panel, on page 3.2.74](#)).

Managing Presets - Using the Remote AUI

The Presets page (see [Figure 3.2.46](#)) allows users with the appropriate permissions to view operational data (power level, mode, program input characteristics, etc.), plus create and control preset settings. Users can create up to 62 presets or edit existing presets. To view the Presets page, select Presets in the Menu page. This section includes the following topics:

- ❖ [Editing, Creating and Deleting Presets, on page 3.2.59](#)
- ❖ [Loading Presets, on page 3.2.60](#)
- ❖ [Activating Presets, on page 3.2.60](#)
- ❖ [Understanding the Preset Tabs, on page 3.2.61](#)

Figure 3.2.46: Presets Page - General Tab shown



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: 0.000kW to 11.000kW (NX10 shown)**

Editing, Creating and Deleting Presets

When the Presets page (see [Figure 3.2.48 on page 3.2.66](#), [Figure 3.2.49 on page 3.2.66](#) and [Figure 3.2.53 on page 3.2.67](#)) is opened from the menu, 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 clicking the **Save** button. In the top banner, an asterisk (*) appears next to the preset name when the Current Settings have changed since the last preset was loaded.

NOTE: 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.

To edit a saved preset, you must load that preset from the Presets page (see [Loading Presets, on page 3.2.60](#)). If the edited preset was active before it was edited, saving the preset will update the preset, but the Current Settings will not change. In this case, an asterisk appears next to the preset name in the top banner. To update the operation of the transmitter, re-activate the preset through the top banner (see [Activating Presets, on page 3.2.60](#)).

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, click the **Save** button or press X to discard. If you are creating a new preset, click the **Save New** button, enter a name for the new preset in the Save New prompt and click OK.

Parameters that can be edited are discussed in detail in [Understanding the Preset Tabs, on page 3.2.61](#).

To remove a preset, **Load** the preset and click the **Delete** button. 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, referenced in the Scheduler or used as an audio loss preset. Those links in the Remote I/O menu, Scheduler or audio loss preset must be deleted before the associated preset can be deleted. Click Cancel to return to the Presets page.

NOTE: See [Preset Examples - IBOC Preset, on page 3.2.68](#), [Preset Examples - Analog Preset, on page 3.2.68](#), [Preset Examples - IBOC Preset with Analog Backup, on page 3.2.69](#) and [Preset Examples - DRM Preset, on page 3.2.69](#) for sample presets for different transmission modes.

Loading Presets

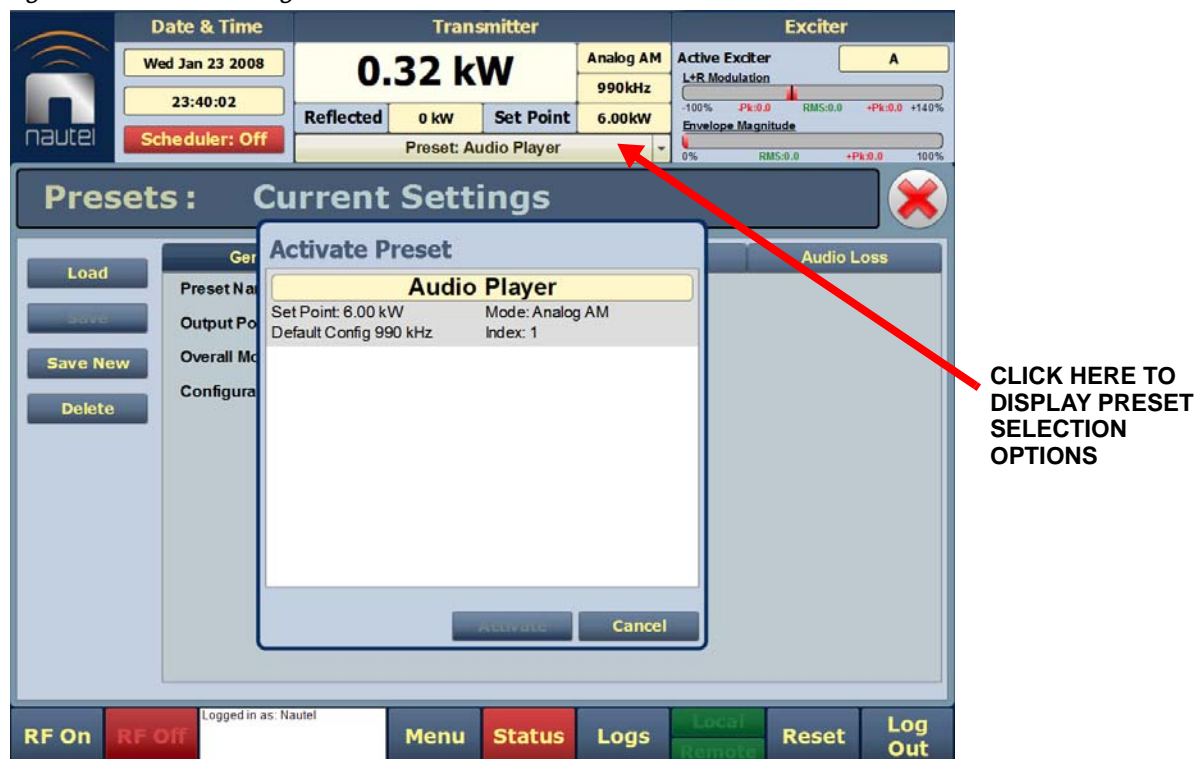
When you enter the Presets page, the Current Settings of the transmitter are displayed. See [Editing, Creating and Deleting Presets, on page 3.2.59](#) for more information on Current Settings. If you do not wish to change the current operational state of the transmitter, use the **Load** button on the left side of the Presets page to display a window containing a list of other presets. Select the desired preset and click the **Load** button to view or enable editing of the preset. Click the **Cancel** button to close this window.

Select the desired preset and click the **Load** button to view or enable editing of the preset.

Activating Presets

In the Transmitter block in the remote AUI's top banner, click the bar that contains the active preset name and the drop-down arrow (see [Figure 3.2.47](#)). The Activate Preset window will appear, which contains a list of all saved presets. Click and highlight the desired preset and click the **Activate** button to enable the preset as the transmitter's active preset. Click the **Cancel** button to close this window.

Figure 3.2.47: Activating Presets



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 3.2.46 on page 3.2.58](#))

- **Preset Name** - this identifies the current preset. You must load a preset to directly edit this field (see [Loading Presets, on page 3.2.60](#)).
- **Output Power** - set the output power level (in kW)
- **Overall Mode** - set the overall transmission mode. Options are:
 - ❖ **Analog AM**: transmits a carrier, amplitude modulated with audio. Audio settings are edited in the Analog Settings tab.
 - ❖ **DRM**: transmits a DRM OFDM signal using the I/Q stream from a DRM modulator connected to the desired AES input. Modulation settings are edited in the Digital Settings tab.
 - ❖ **DRM+AM**: Also known as simulcast, transmits a carrier, amplitude modulated with audio and a DRM OFDM signal in either an upper or lower channel. AM settings are edited in the Analog Settings tab and DRM settings are edited in the Digital Settings tab. In this case, if balanced analog audio input is used for AM modulation, AES2 input (Digital AES input) must be used for I/Q stream from the DRM modulator. If AES is used for AM modulation, either AES input may be used for either input (AM modulation and DRM I/Q stream).
 - ❖ **IBOC**: transmits an AM IBOC standard signal (carrier, amplitude modulated with audio and upper and lower sidebands of OFDM IBOC carriers). Requires an Exgine to be installed in the transmitter that is receiving modulation information from and Exporter. Both the AM signal and IBOC carriers are received in the I/Q stream from the Exgine. Modulation settings are edited in the Digital Settings tab.
 - ❖ **IBOC+AM**: The transmitted signal in this mode is identical to IBOC mode. In this mode, the information for the OFDM carriers is received from the Exgine and the AM information is received through an audio input in the transmitter. In this mode, the AM audio signal cannot be connected to AES2; it must be connected to Bal Anlg Audio or AES1. AM settings are edited in the Analog Settings tab. IBOC carrier modulation settings are edited in the Digital Settings tab.
- **Configuration** - select the pre-correction configuration (see [Precorrection Settings, on page 3.2.114](#))

NOTE: Available settings on the Analog Settings and Digital Settings tabs are shown/hidden based on the Overall Mode setting. Not all settings are available in all modes.

Analog Settings

(see [Figure 3.2.48 on page 3.2.66](#))

- **AM Source** - select the audio source for the AM signal. Options are:
 - ❖ Unused
 - ❖ Balanced Analog (connector J9 on A4)
 - ❖ AES1 (connector J7 on A4)
 - ❖ AES2 (connector J8 on A4)
 - ❖ Audio Player: Plays the selected audio player playlist or stream
- **AES Input Level** - Defines the AES input level (in dBFS) that will result in 100% modulation depth. Set between -30 dBFS and 0 dBFS, according to the input signal level.
- **Balanced Analog Input Level** - Defines the Bal Analog input level (in dBm) that will result in 100% modulation depth. Set between -20 dBm and +12 dBm, according to the input signal level.
- **Audio Player Source** - Selects the playlist or stream to be used by the audio player.
- **Audio Player Input Level** - Defines the signal level from the audio player (in dBFS) that will result in 100% modulation depth.
- **Format** - Options are:
 - ❖ AM Carrier: transmits carrier only; ignores audio inputs.
 - ❖ Mono L+R: adds L+R channels on AES signal.
 - ❖ Mono L: transmits L channel of AES signal or Bal Analog.
 - ❖ Mono R: transmits R channel of AES signal.
 - ❖ Stereo C-QUAM: uses AES L and R channels to generate amplitude and phase modulation and transmit a stereo AM signal.
- **Filter Type** - selects a filter to be applied to the input audio signal. Options are:
 - ❖ None: no filter is applied (default).
 - ❖ Brick Wall: applies a low pass filter with a very sharp cutoff and a 6 dB bandwidth defined by the Filter Bandwidth setting (between 1 kHz and 10 kHz).
 - ❖ Minimum Overshoot: applies a Gaussian low pass filter with a very gentle rolloff and a 3 dB bandwidth of 5.13 kHz. Used to minimize ringing of the modulator filter with extremely high rate of change input signals (e.g., square waves). Typically used only for testing purposes.
- **NRSC-1 Preemphasis** - applies a NRSC-1 pre-emphasis curve to the input audio signal. Default is OFF.

- Dynamic Carrier Control - selects the DCC mode, as applicable. Options are None, AMC, EAMC, DAM or DAM Full. Default is None. When a DCC mode is selected, a Max DCC Compression level can also be entered. In addition, when the DCC mode is set to EAMC, the EAMC gain sets the gain applied to the carrier power when no modulation is applied (maximum is 1.76 dB), and the Max Carrier Timeout will cause the carrier power to drop to the setpoint after two (2) minutes with no modulation applied. See [Selecting the DCC Mode, on page 3.2.70](#) for more information on each mode.
- AMSS - Amplitude Modulation Signalling System. Allows low-bit rate data to be transmitted with the Analog AM signal. Contact Nautel for assistance with using AMSS. Default is Disable.

NOTE: The AMSS field is displayed only when the Overall Mode is Analog AM or DRM+AM.

Digital Settings

(see [Figure 3.2.49 on page 3.2.66](#) through [Figure 3.2.52 on page 3.2.67](#))

For DRM and DRM+AM modes:

- **Data Source** - Select the source for the OFDM (digital) signal (AES1 or AES2).
- **AES input Level** - Defines the full-scale AES input level (in dBFS) for the I/Q stream. Set between -30 dBFS and 0 dBFS
- **DRM Bandwidth** - Selects the bandwidth of the DRM signal to be transmitted. This setting only sets the parameters of the mask shown on the spectrum analyzer. Transmitted signal bandwidth is set at the I/Q source (DRM modulator). Select 4.5 kHz, 5 kHz, 9 kHz, 10 kHz, 18 kHz or 20 kHz.
- **Frequency Offset** - Sets the frequency offset between the AM signal and the DRM carriers. Set between -10 kHz and +10 kHz. In DRM mode, allows adjustment of the location of the OFDM carriers with respect to the transmitter's carrier frequency.
- **Power Differential** - In DRM+AM mode only, sets the difference between the AM carrier power and the RMS power of the DRM carriers. The level is approximately based on the input signal to the exciter and may require adjustment to obtain the exact level. Set between 0 dB and 40 dB.
- **Envelope Conditioning** - In DRM mode only, applies a proprietary correction to the envelope to improve spectral performance, but will negatively affect MER.

For IBOC and IBOC+AM modes:

- **IBOC Service Mode** - In IBOC mode only, select the MA1(hybrid) or MA3 (all-digital) service mode
- **Enhanced Carriers** - select Low, High or Disabled
- **Upper Primary Level Adjust** - Adjusts the power level of the upper sideband within the range of -30 dB and +10 dB. Should be zero by default.
- **Lower Primary Level Adjust** - Adjusts the power level of the lower sideband within the range of -30 dB and +10 dB. Should be zero by default.
- **Analog Gain** - In IBOC mode only, selects a linear scale factor (between 0 and 4) that scales the analog modulation level with respect to the carrier level. Normally set to 1.0 with a 0 dBFS audio signal applied to the Exporter.
- **Digital Carriers** - select On or Off
- **Analog Bandwidth** - In IBOC mode only, select 5kHz, 8kHz or Bypassed
- **Analog Transmission** - In IBOC mode only, select On or Off

Audio Loss

(see [Figure 3.2.53](#) on page 3.2.67)

- **Mod Loss Timeout** - Determine if an action should be taken on the loss of a modulating signal. Select Enabled or Disabled. Default is Disabled. If Enabled, the following sub-fields appear:
 - ❖ **Action**: select the action to take on the loss of a modulating signal. Select Alarm Only (no resulting action, but will trigger the exciter's Audio Loss alarm), Inhibit (inhibits the RF output, fans and B+ voltage 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.
 - ❖ **Timeout Minutes**: sets the delay, in minutes, between audio loss detection and the resulting action. Enter a value between 0 and 255 minutes.
 - ❖ **Timeout Seconds** - sets the delay, in seconds, between audio loss detection and the resulting action. Enter a value between 0 and 59.9 seconds
 - ❖ **Threshold** - sets the threshold for audio loss detection. Enter a value between 0 and 100%

Figure 3.2.48: Presets - Analog Settings



Presets : * Current Settings

Load Save Save New Delete

General Analog Settings Digital Settings Audio Loss

AM Source: Balanced Analog

Bal Analog Input Level: 0 dBm

Format: Mono L + R

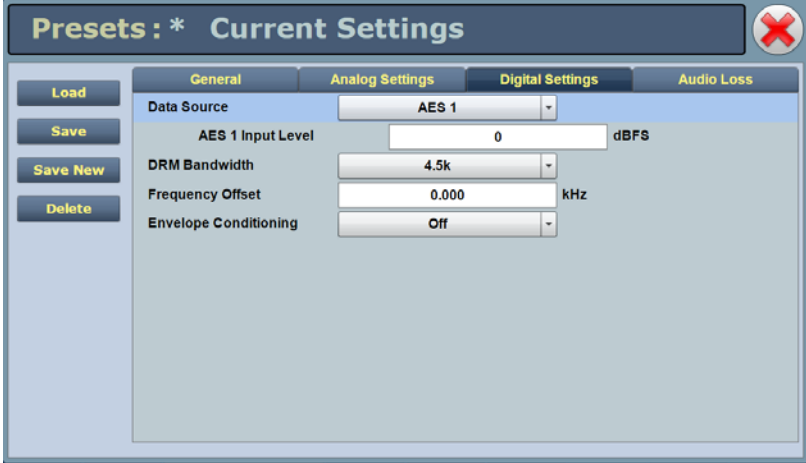
Filter Type: None

NRSC-1 Preemphasis: Off

Dynamic Carrier Control: None

AMSS: Disable

Figure 3.2.49: Presets - Digital Settings (Overall Mode = DRM)



Presets : * Current Settings

Load Save Save New Delete

General Analog Settings Digital Settings Audio Loss

Data Source: AES 1

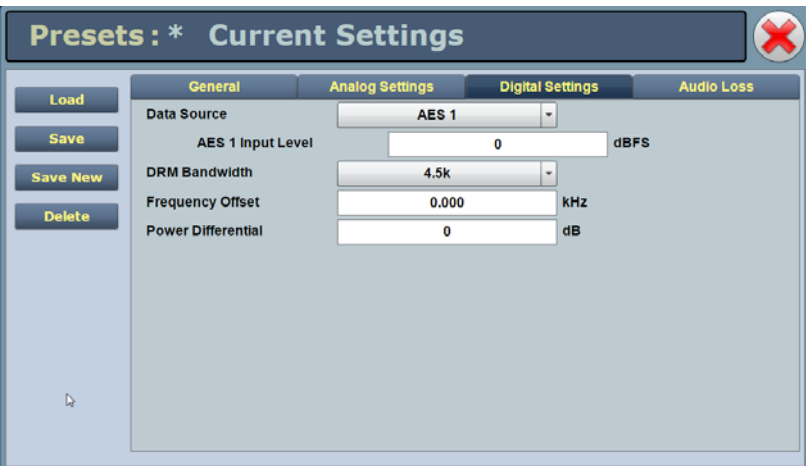
AES 1 Input Level: 0 dBFS

DRM Bandwidth: 4.5k

Frequency Offset: 0.000 kHz

Envelope Conditioning: Off

Figure 3.2.50: Presets - Digital Settings (Overall Mode = DRM+AM)



Presets : * Current Settings

Load Save Save New Delete

General Analog Settings Digital Settings Audio Loss

Data Source: AES 1

AES 1 Input Level: 0 dBFS

DRM Bandwidth: 4.5k

Frequency Offset: 0.000 kHz

Power Differential: 0 dB

Figure 3.2.51: Presets - Digital Settings (Overall Mode = IBOC)

Presets : * Current Settings

General | **Analog Settings** | **Digital Settings** | **Audio Loss**

IBOC Service Mode	MA-1 (Hybrid)	
Enhanced Carriers	Low	
Upper Primary Level Adjust	0.00	dB
Lower Primary Level Adjust	0.00	dB
Analog Gain	0.000	
Digital Carriers	Off	
Analog Bandwidth	8kHz	
Analog Transmission	Off	

Figure 3.2.52: Presets - Digital Settings (Overall Mode = IBOC+AM)

Presets : * Current Settings

General | **Analog Settings** | **Digital Settings** | **Audio Loss**

Enhanced Carriers	Low	
Upper Primary Level Adjust	0.00	dB
Lower Primary Level Adjust	0.00	dB
Digital Carriers	Off	

Figure 3.2.53: Presets Tabs - Audio Loss

Presets : * Current Settings

General | **Analog Settings** | **Digital Settings** | **Audio Loss**

Mod Loss Timeout	Enabled	
Action	Change Preset	
Mod Loss Preset		
Timeout Minutes	0	min
Timeout Seconds	0	sec
Threshold	0	%

Preset Examples - IBOC Preset

The following examples shows you how to set presets for the IBOC applications with typical values:

1. Enter Output Power field with desired power level.
2. Set Overall Mode to **IBOC**.
3. Under Digital Settings:
 - ❖ set IBOC Service Mode to MA-1 (Hybrid)
 - ❖ set Enhanced Carriers to Low
 - ❖ set Digital Carriers to On
 - ❖ set Analog Bandwidth to 5kHz
 - ❖ set Analog Transmission to On

Preset Examples - Analog Preset

1. Enter Output Power field with desired power level.
2. Set Overall Mode to Analog AM.
3. Under Analog Settings:
 - ❖ set AM Source as required (typically Analog AES).
 - ❖ set Format as required (typically Mono L + R).
 - ❖ enter Bandwidth field as required.
 - ❖ set Preemphasis to Off (typically).
 - ❖ set Dynamic Carrier Control to None (typically).

Preset Examples - IBOC Preset with Analog Backup

1. Set two presets similar to the two previous examples.
2. Under Audio Loss, set Mod Loss Timeout to Enabled. Several other selectable fields will appear.
3. In the Action field, select Change Preset from the drop-down list. The Mod Loss Preset field will appear.
4. In the Mod Loss Preset field, select the desired preset from the drop-down list. This is the preset that will activate upon a modulation loss.
5. Set the remaining mod loss timeout fields. See [Audio Loss, on page 3.2.65](#).
6. Save the preset with the desired name (new or existing). See [Editing, Creating and Deleting Presets, on page 3.2.59](#).

Preset Examples - DRM Preset

1. Enter Output Power field with desired power level.
2. Set Overall Mode to DRM.
3. Under Digital Settings:
 - ❖ set Data Source as required (AES 1or AES 2).
 - ❖ set DRM Bandwidth as required.
 - ❖ set the AES Input Level for the selected data source to the appropriate level for the DRM modulator.

Selecting the DCC Mode

The NX5/NX3 is capable of several DCC modes (see [Editing, Creating and Deleting Presets](#), on page 3.2.59), each with varying performance in terms of energy savings and effects on the reproduced signal. The selectable options are:

- AMC (see [Figure 3.2.54](#))
- EAMC (see [Figure 3.2.55 on page 3.2.71](#))
- DAM (basic) (see [Figure 3.2.56 on page 3.2.71](#))
- DAM Full (see [Figure 3.2.57 on page 3.2.72](#))
- DCC1 (see [Figure 3.2.58 on page 3.2.72](#))

Once a DCC curve has been selected, the desired Max DCC Compression level can be entered. This setting defines the maximum reduction in carrier (or carrier and sideband) power for a given curve. Standard compression settings are as follows:

- AMC and EAMC modes: 3 dB
- DAM, Full DAM and DCC1 modes: 4.44 dB

Figure 3.2.54: AMC

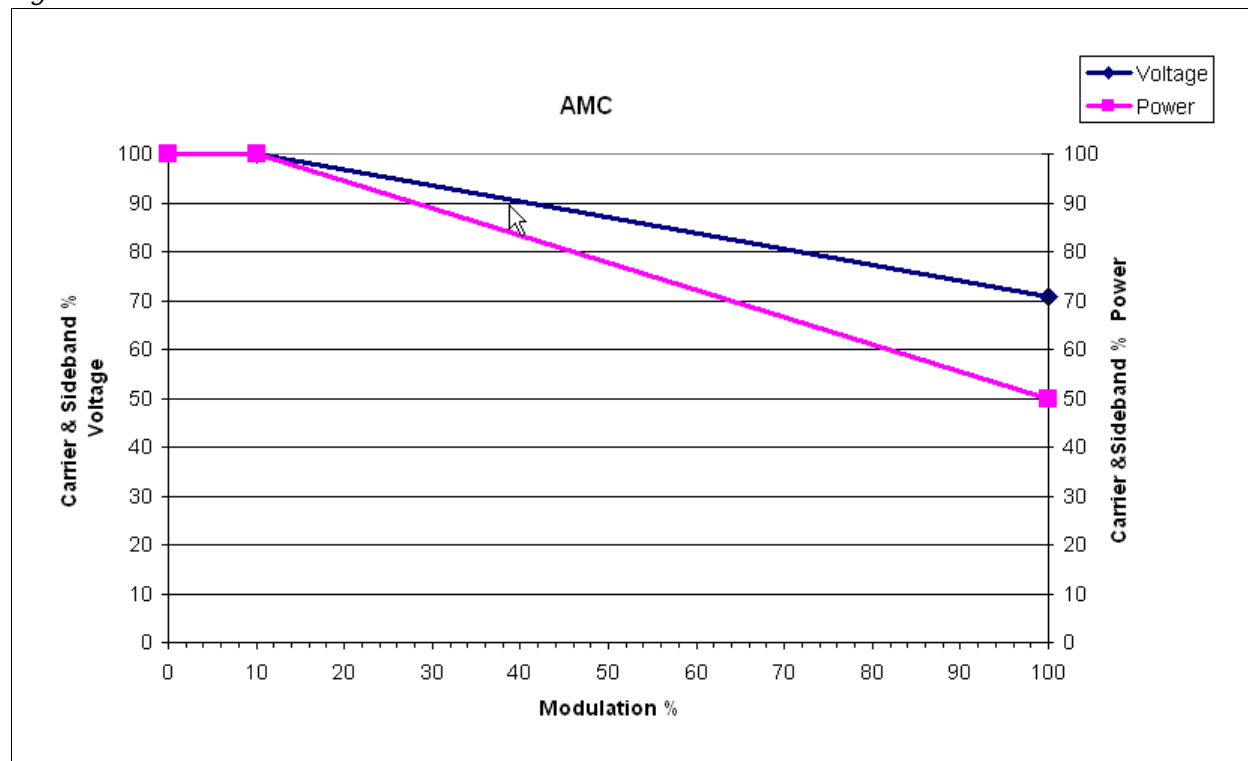


Figure 3.2.55: EAMC

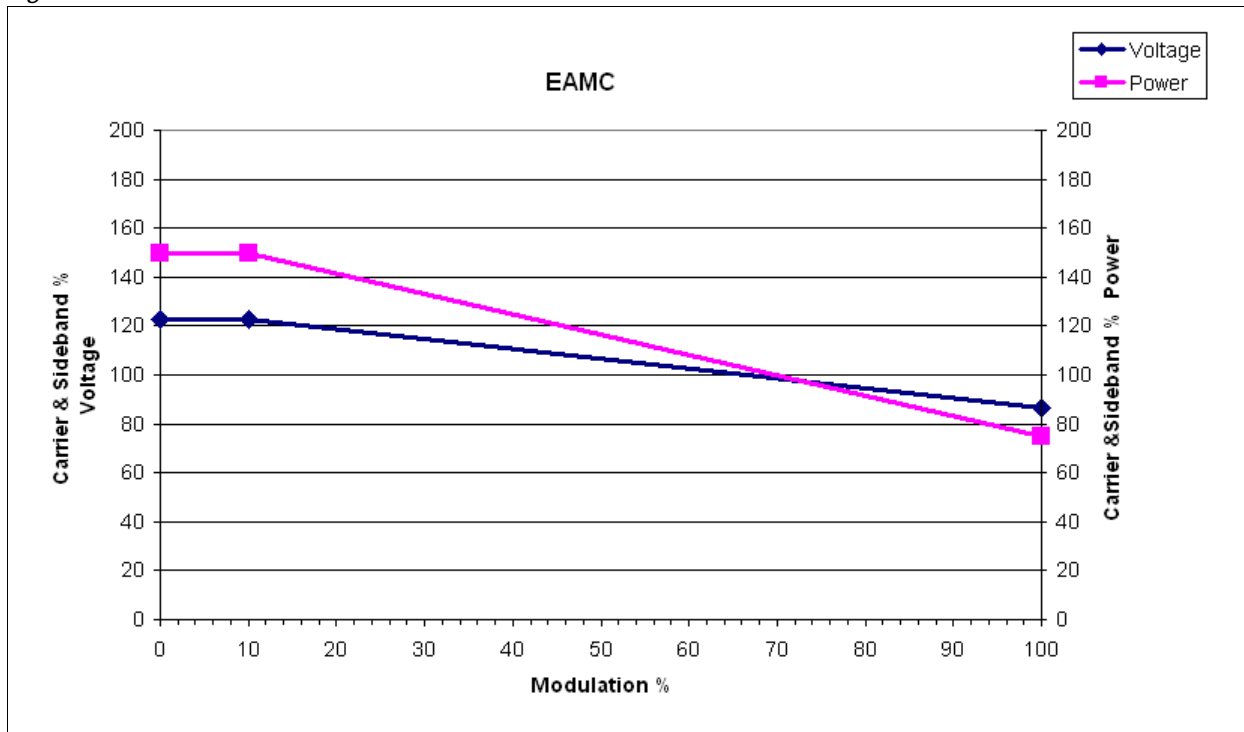


Figure 3.2.56: Basic DAM

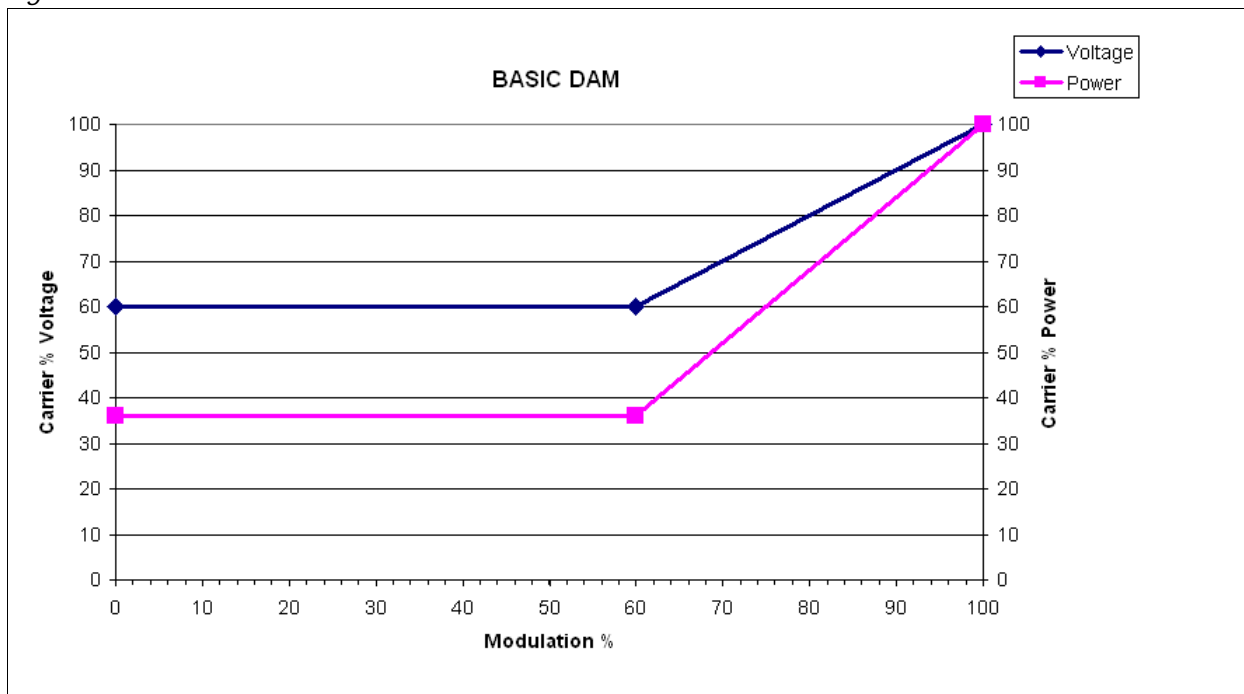


Figure 3.2.57: Full DAM

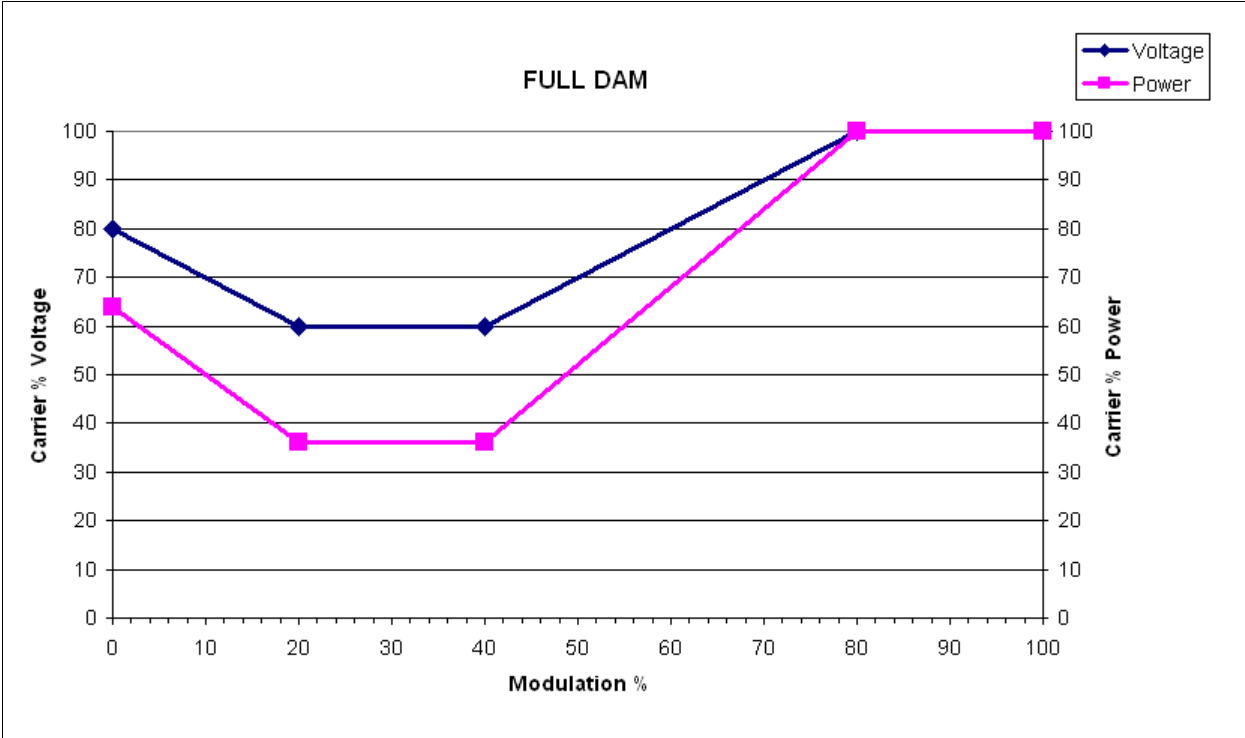
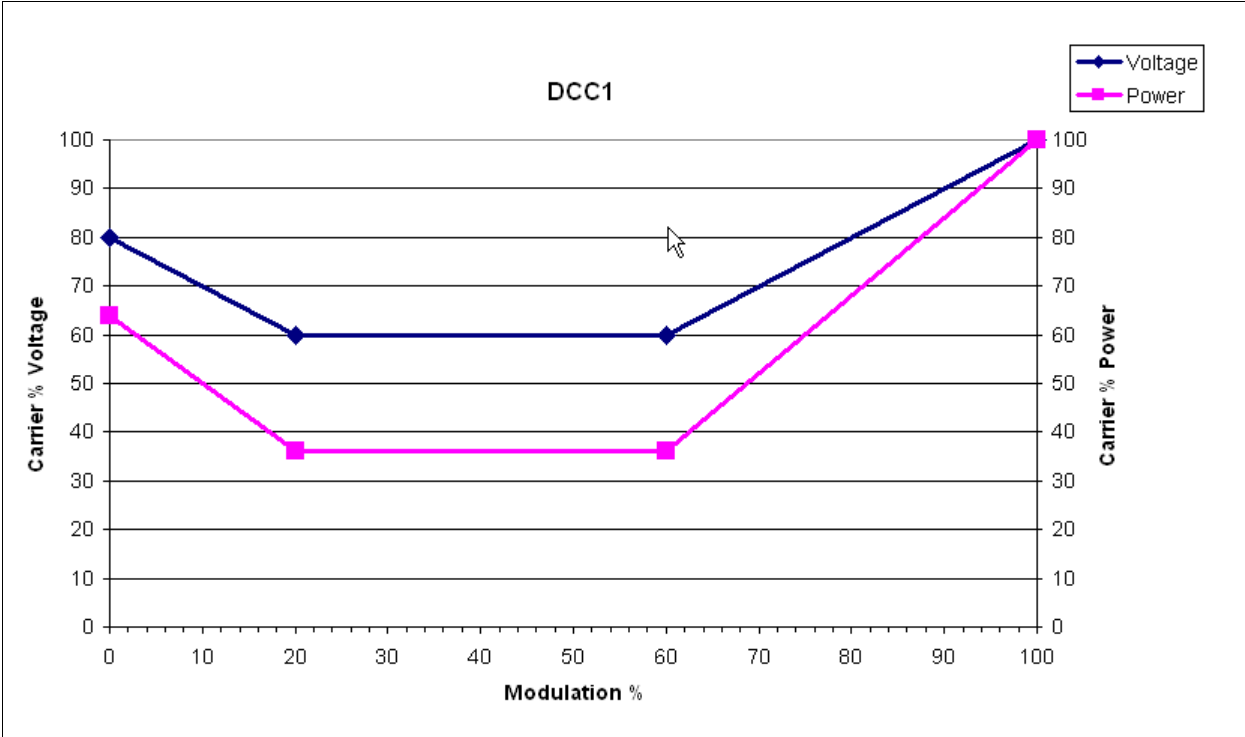


Figure 3.2.58: DCC1



Guidelines for Selecting the DCC Mode:

Observe the following guidelines when selecting the DCC mode for your application.

AMC mode (see [Figure 3.2.54 on page 3.2.70](#)) should work well for most broadcasters and is generally recommended if you have an IBOC transmission. It has several advantages over the other modes:

- ❖ It tends to save the most power when used with a heavily processed audio signal and asymmetrical modulation.
- ❖ It does not affect the modulation depths of the received signal, so the station's sound should not change.
- ❖ It performs the reduction in power in such a way that it tends to be masked by the audio.

If AMC is not being used, consider DAM mode as a second choice, although the power savings will be significantly less. If the station is operating with less audio processing, or has more silent periods, the DAM algorithms will tend to save more power. However, the basic DAM characteristic will impact the audio quality of the station. In IBOC mode, DAM will significantly reduce the audio quality of the station as it will increase the impact of the IBOC on the analog. It may also make it more difficult for the transmitter to meet the spectral mask, by making the transmitter operate at a much higher modulation depth and effectively increasing the level of the digital carriers relative to the analog.

Managing Presets - Using the Front Panel

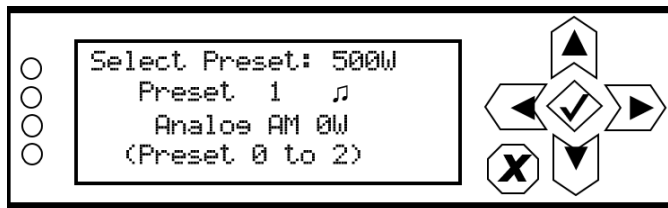
The Select Preset screen (see [Figure 3.2.59](#)) and Edit Presets screen (see [Figure 3.2.60](#)) allow users to view operational data (power level, frequency, mode, program input characteristics), plus create and control preset settings. Users can create up to 62 presets or edit existing presets. This section includes the following topics:

- [Selecting the Active Preset](#)
- [Editing or Creating Presets](#)

Selecting the Active Preset

When you choose Select Preset from the Main Menu (see [Figure 3.2.59](#)) you can select the active preset for transmitter operation.

Figure 3.2.59: Select Preset screen

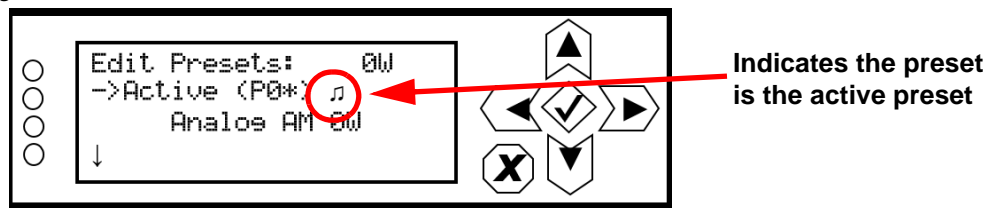


Use the up and down buttons to scroll through the existing presets. Press the accept (checkmark) button to enable the preset as the transmitter's active preset. Press the cancel (X) button to return to the previous menu.

Editing or Creating Presets

When you select User Settings -> Edit Presets from the Main Menu (see [Figure 3.2.60](#)) you can create up to 63 operating presets or edit existing presets.

Figure 3.2.60: Edit Presets screen



Use the up and down buttons to scroll through the existing presets, or scroll to the bottom of the list to Create New Preset (see [Figure 3.2.61](#)). Press the accept (checkmark) button to enter the editing menu for that preset (see [Figure 3.2.62 on page 3.2.75](#)). Press the cancel (X) button to return to the previous menu. When you create a new preset, the next available preset number is assigned (e.g., Preset 1).

Figure 3.2.61: Create New Preset screen

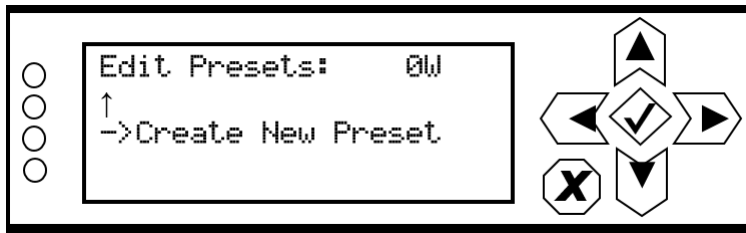
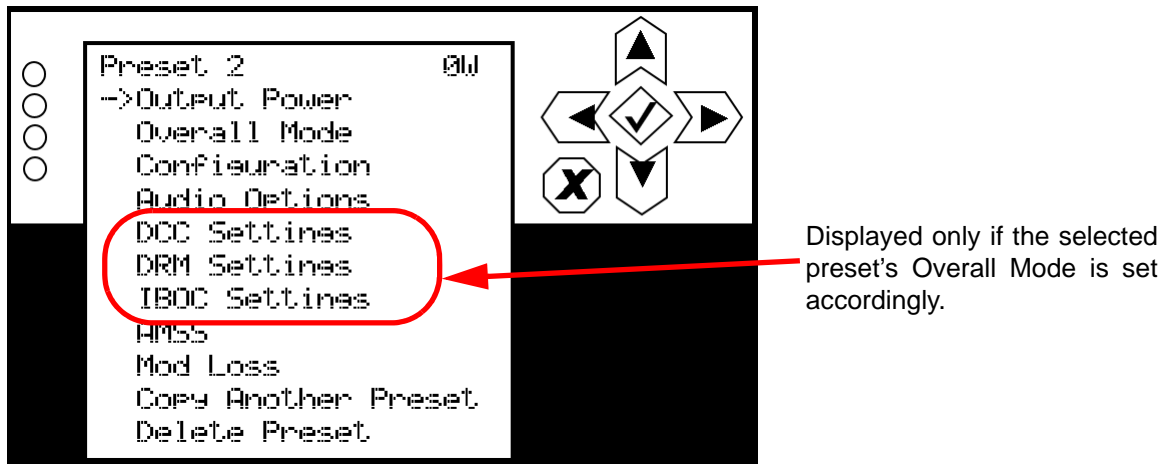


Figure 3.2.62: Preset Editing menu



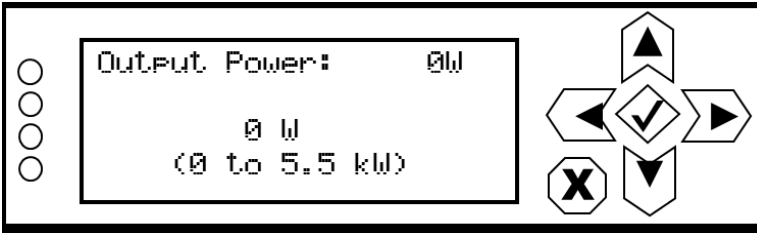
Within the Preset Editing menu, use the up and down buttons to scroll through the options and press the accept (checkmark) button to enter the selected editing menu/screen. Press the cancel (X) button to return to the previous menu.

NOTE: Parameters that can be edited using the front panel UI are detailed in the following paragraphs. These parameters can also be edited using the remote AUI, which are described in [Managing Presets - Using the Remote AUI, on page 3.2.58](#); see that section for more details on a specific parameter.

OUTPUT POWER

When you select Output Power from the Preset editing options screen, you change the transmitter's output power (see [Figure 3.2.63](#)).

Figure 3.2.63: Output Power screen

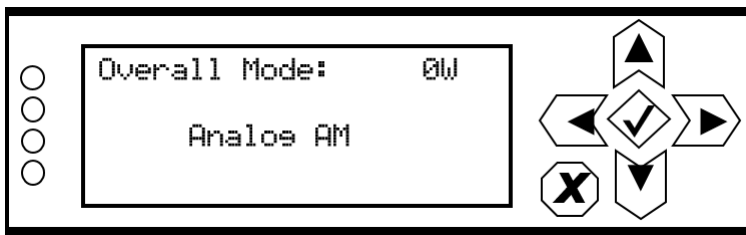


Use the up and down buttons to edit the output power (in 10 W increments, then press the accept (checkmark) button to save the change. For analog only transmitters [FM (analog) mode only], the maximum power setting is 5.5 kW. Press the cancel (X) button to discard changes and return to the previous menu.

OVERALL MODE

When you select Overall Mode from the Preset editing options screen, you can select the overall operating mode of the transmitter (see [Figure 3.2.64](#)).

Figure 3.2.64: Overall Mode screen

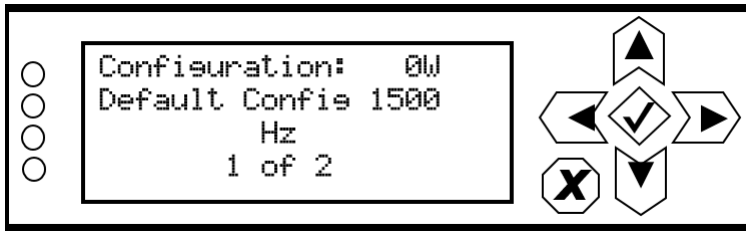


Use the up and down buttons to locate the desired overall mode - Analog AM, IBOC+AM, IBOC, DRM+AM, DRM, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

CONFIGURATION

When you select Configuration from the Preset editing options screen, you can select the desired pre-correction configuration (see [Figure 3.2.65](#)).

Figure 3.2.65: Configuration screen

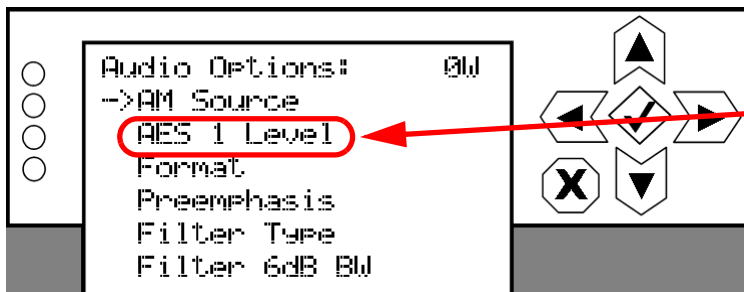


Use the up and down buttons to locate the desired configuration - e.g., Default Config (1 of 2), My New Settings (2 of 2), etc. - then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

AUDIO OPTIONS

When you select Audio Options from the Preset editing options screen, you can edit various main audio parameters (see [Figure 3.2.66](#)).

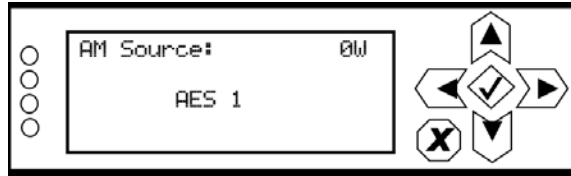
Figure 3.2.66: Audio Options menu



Displays the appropriate level selection option for the AM Source selected (AES 1, AES 2, Balanced Analog, Audio Player, etc.)

Use the up and down buttons to scroll through the audio options, then press the accept (checkmark) or right arrow button to enter the selected editing screen. [Figure 3.2.67 on page 3.2.78](#) shows the editing screens for the Audio Options menu. Press the cancel (X) button to discard changes and return to the previous menu.

Figure 3.2.67: Audio Options editing screens

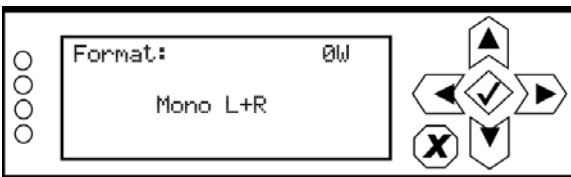


Use the up and down buttons to select the desired audio source - AES1, Balanced Analog, Unused, Audio Player or AES2, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.



Displays the appropriate level selection option for the AM Source selected (AES 1, AES 2, Balanced Analog, Audio Player, etc.)

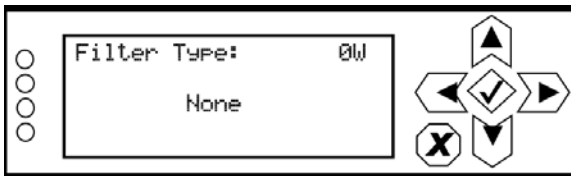
Use the up and down buttons to select the level for the appropriate AM source displayed (AES 1, AES 2, Balanced Analog, Audio Player. For AES 1, AES 2 and Audio Player, set the level between -30 and 0 dBFS (in 0.5 dBFS increments). For Balanced Analog, set the level between -20 and 12 dBm (in 0.5 dBm increments). When complete, press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.



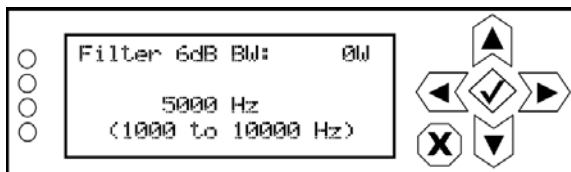
Use the up and down buttons to select the format for the audio source - Mono L+R, AM Carrier, Stereo C-QUAM, Mono R or Mono L, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.



Use the up and down buttons to toggle between ON or OFF, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default setting is OFF.



Use the up and down buttons to select the desired filter type - None, Minimum Overshoot or Brick Wall, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. NOTE: Minimum Overshoot visible only when Overall Mode = Analog AM.



Use the up and down buttons to set the desired 6 dB filter bandwidth rolloff (in 1 Hz increments) then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. NOTE: This screen displayed only when Filter Type = Brick Wall.

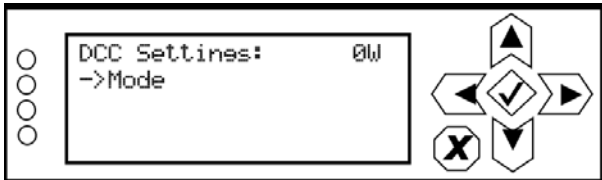
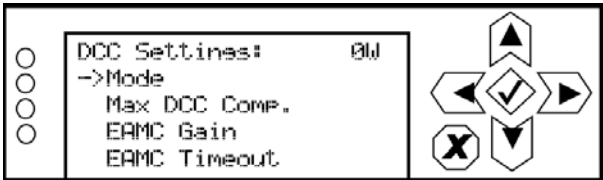
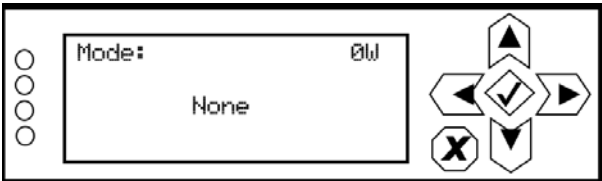
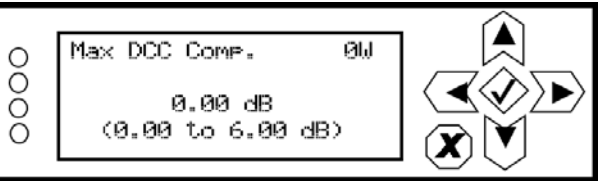

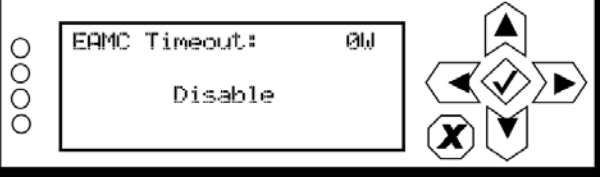
DCC SETTINGS

NOTE: This screen is displayed only when the Overall Mode is Analog AM, DRM+AM or IBOC+AM.

When you select DCC Settings from the Preset editing options screen, you can select the DCC mode, as applicable (see [Figure 3.2.68](#)). Enter the Mode sub-menu and use the up and down buttons to select the desired DCC mode - None, DCC1, DAM Full, DAM, EAMC or AMC - then press the accept (checkmark) button to save the change. When Mode is set to a DCC option, more DCC settings options appear. Press the cancel (X) button to discard changes and return to the previous menu.

See [Selecting the DCC Mode, on page 3.2.70](#) for more information.

Figure 3.2.68: DCC Settings screens

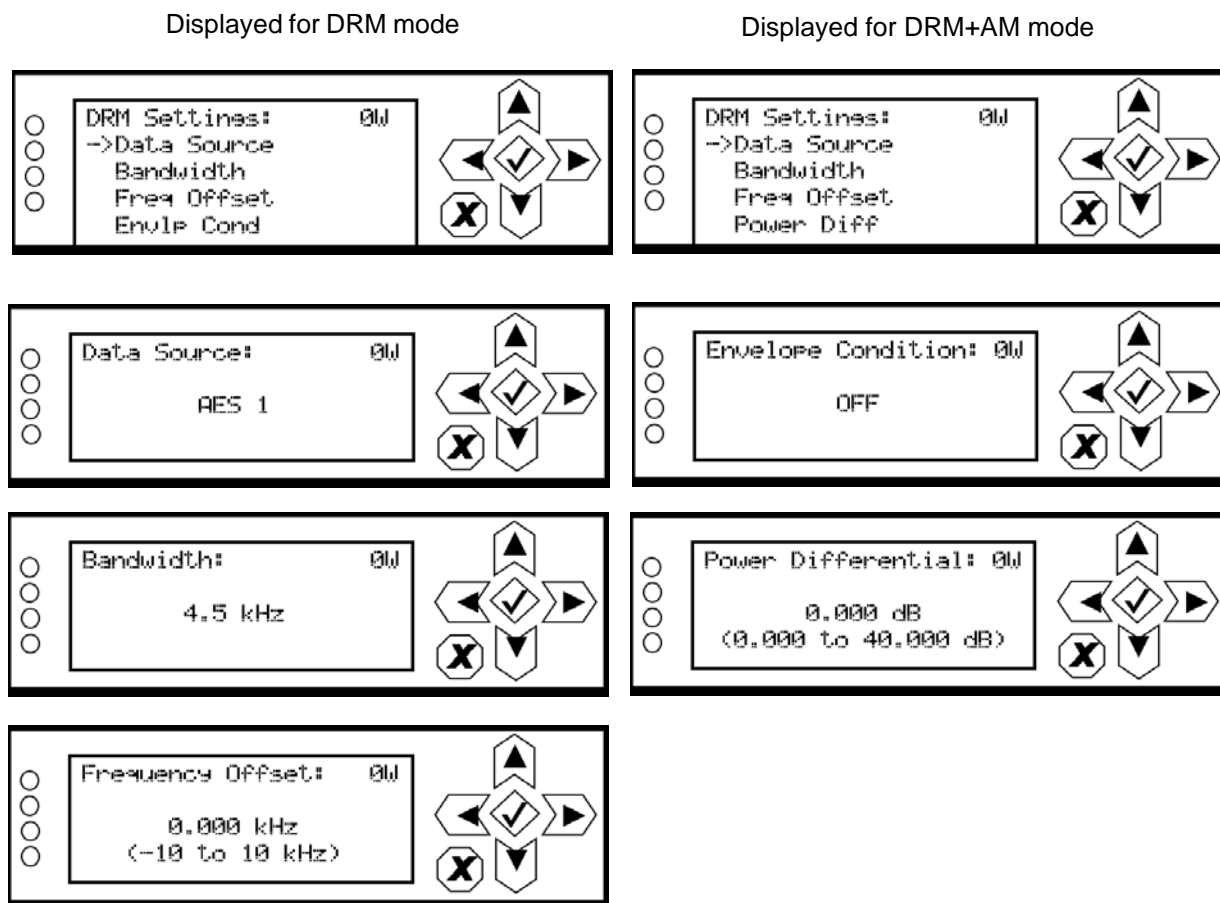
Displayed when Mode = None	Displayed when Mode = EAMC
	
	<p>Use the up and down buttons to select the desired mode - None, AMC, EAMC, DAM, DAM Full or DCC1, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.</p>
	<p>Use the up and down buttons to set the level for the maximum DCC compensation between 0 and 6 dB (in 0.01 dB increments). When complete, press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.</p>
	<p>Use the up and down buttons to set the level for the EAMC gain between 0 and 1.76 dB (in 0.01 dB increments). When complete, press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. This screen is only displayed when Mode = EAMC.</p>
	<p>Use the up and down buttons to toggle between Enable or Disable, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default setting is Disable. This screen is only displayed when Mode = EAMC.</p>

DRM SETTINGS

NOTE: This screen is displayed only when the Overall Mode is DRM or DRM+AM.

When you select DRM Settings from the Preset editing options screen, you can select various parameters for a DRM or DRM+AM preset (see [Figure 3.2.70](#)). Enter the desired sub-menu and use the up and down buttons to edit the parameter setting or value, then press the accept (checkmark) button to save the change. See [Digital Settings, on page 3.2.64](#) for details on each DRM setting. Press the cancel (X) button to discard changes and return to the previous menu.

Figure 3.2.69: DRM Settings screens

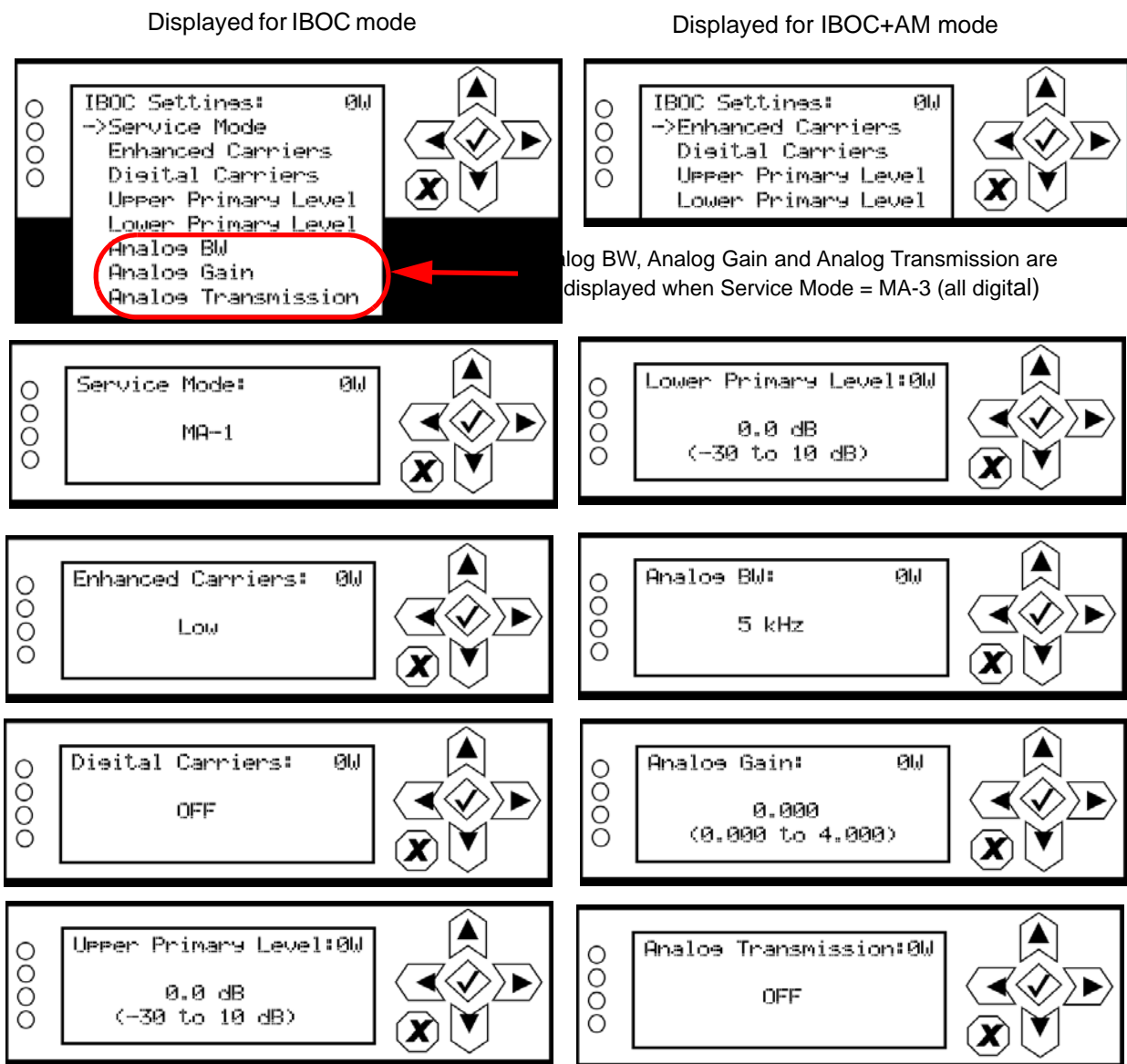


IBOC SETTINGS

NOTE: This screen is displayed only when the Overall Mode is IBOC or IBOC+AM.

When you select IBOC Settings from the Preset editing options screen, you can select various parameters for an IBOC or IBOC+AM preset (see [Figure 3.2.70](#)). Enter the desired sub-menu and use the up and down buttons to edit the parameter setting or value, then press the accept (checkmark) button to save the change. See [Digital Settings, on page 3.2.64](#) for details on each IBOC setting. Press the cancel (X) button to discard changes and return to the previous menu.

Figure 3.2.70: IBOC Settings screens



AMSS ENABLE/DISABLE

When you select AMSS from the Preset editing options screen, you can enable or disable the Amplitude Modulation Signalling System (see [Figure 3.2.71](#)).

NOTE: This screen is displayed only when the Overall Mode is Analog AM or DRM+AM.

Figure 3.2.71: AMSS menu

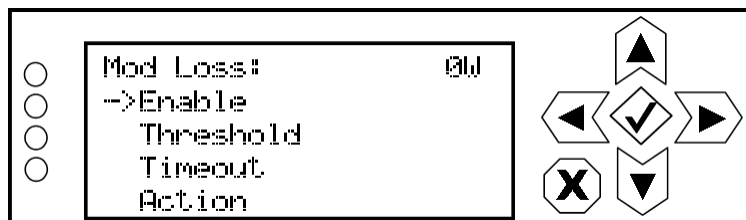


Use the up and down buttons to select Enable or Disable, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

Mod Loss

When you select Mod Loss (modulation loss) from the Preset editing options screen, you can edit the parameters related to a loss of modulation (see [Figure 3.2.72](#)).

Figure 3.2.72: Mod Loss menu

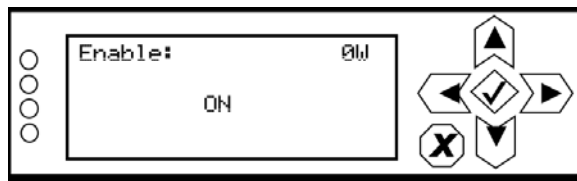


Threshold, Timeout, Action and Preset options are displayed only when Enable is set to ON

Use the up and down buttons to move the cursor to the desired mod (modulation) loss menu item and then press the right button to enable editing of the item. [Figure 3.2.73 on page 3.2.83](#) shows all the editing screens for the Mod Loss menu. Within any of the editing screens, use the up and down buttons to edit a parameter value, noting the minimum and maximum limitations indicated at the bottom of the display (as applicable). When complete, press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

See [Audio Loss, on page 3.2.65](#) for detailed instructions.

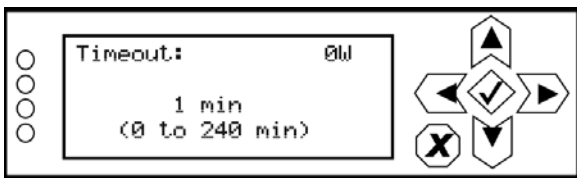
Figure 3.2.73: Mod Loss editing screens



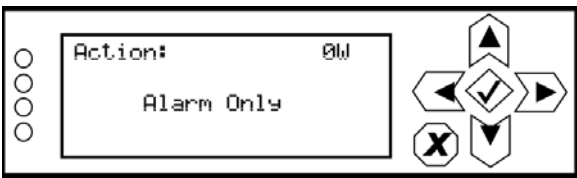
Determines whether the mod loss feature is used. Use the up and down arrows to select ON (enable) or OFF (disable), then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default selection is OFF.



Sets the modulation threshold below which the transmitter will take action. Use the up and down arrows to select a threshold between 0 and 100% (adjustable in 1% steps), then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default threshold is 0%.



Sets the time period of low modulation (based on the threshold setting) after which the transmitter will take action. Use the up and down arrows to select a value between 0 and 240 minutes (in 1 minute increments), then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default timeout is 0 s.

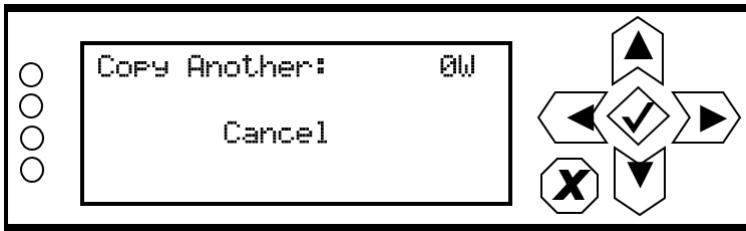


Determines the action taken by the transmitter when the modulation has been below the threshold for the timeout period. Use the up and down arrows to select Alarm Only, Switch Preset or RF Inhibit, then press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu. Default setting is Alarm Only.

COPY ANOTHER PRESET

When you select Copy Another Preset from the Preset editing options screen, you can copy the settings from another preset into the preset that is being edited (see [Figure 3.2.74](#)).

Figure 3.2.74: Copy Another Preset Screen



Use the up and down buttons to select the preset that you wish to copy to the selected preset for editing (e.g., Copy Active Preset, Copy Preset 2, etc.) or select Cancel. Press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

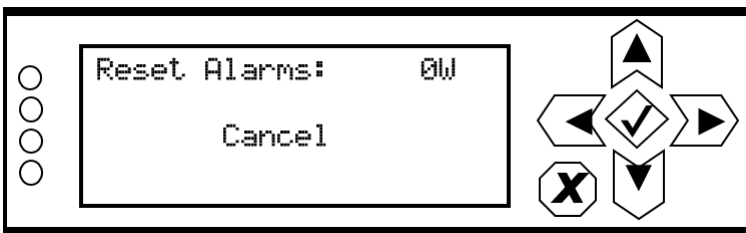
Resetting Alarms

You can attempt to reset any latching transmitter alarms that are holding the transmitter in an "off-air" state using the remote AUI's Reset button (see [page 3.2.17](#)) or using the local front panel display (see [Resetting Alarms - Using the Front Panel](#)).

Resetting Alarms - Using the Front Panel

When you select Reset Alarms from the Main Menu, you can attempt to reset latched protection circuits in the NX5/NX3 (see [Figure 3.2.75](#)). If the alarm condition has been cleared, the alarm indication on the View Alarms screen should disappear.

Figure 3.2.75: Reset Alarms Screen



Use the up and down buttons to toggle between Reset Alarms and Cancel. Press the accept (checkmark) button to save the change. Press the cancel (X) button to return to the previous menu.

Viewing Transmitter Status - Remote AUI

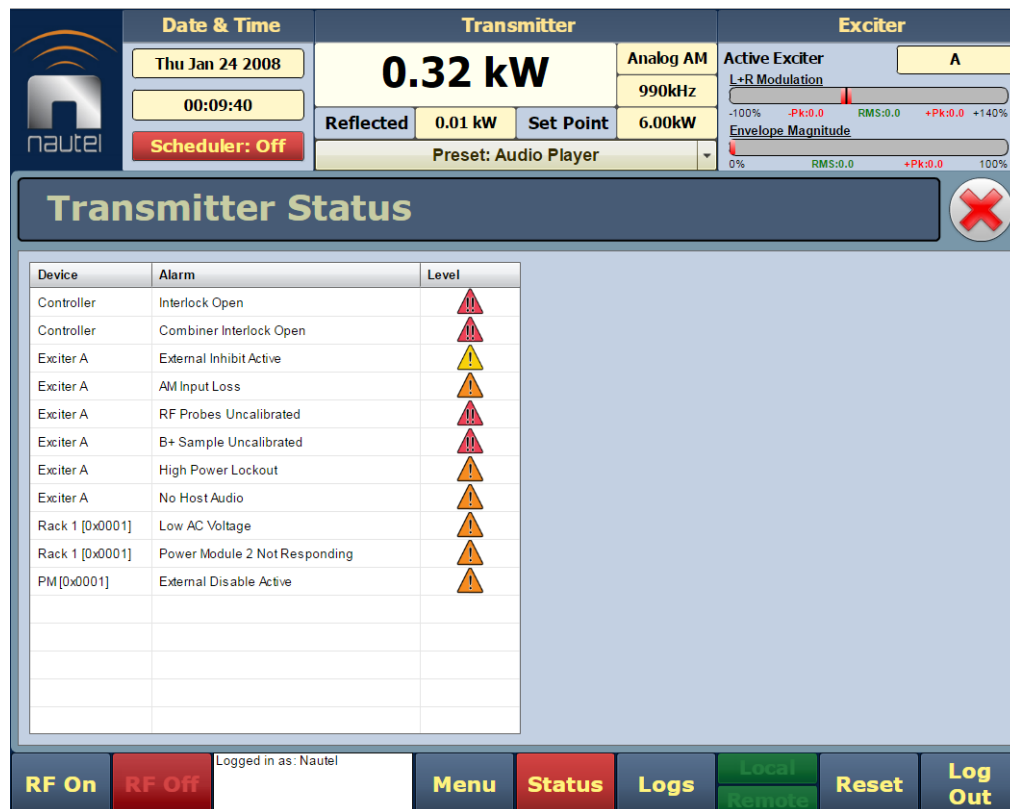
You can view the NX5/NX3's operational status using the remote AUI's [Transmitter Status](#) page - see [Figure 3.2.76](#). This page shows current active alarms to aid in fault diagnosis. To view the [Transmitter Status](#) page, click the Status button in the remote AUI's bottom banner. Click X to return to the home page.

You can also use the local front panel UI to view active alarms (see [Transmitter Alarms and Log - Using the Front Panel UI](#), on page 3.2.30).

This section includes the following topics:

- [Viewing Alarm Details](#), on page 3.2.86
- [Status Button Colour Indications](#), on page 3.2.86
- [Resetting Alarms](#), on page 3.2.86

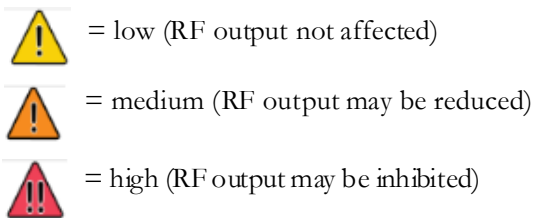
Figure 3.2.76: Transmitter Status page



Viewing Alarm Details

The [Transmitter Status](#) page - see [Figure 3.2.76](#) on [page 3.2.85](#) displays a table that lists the active alarm details under the following columns:

- Device - identifies the alarms by their originating device (e.g., Controller, Exciter A, Rack, etc.)
- Alarm - identifies the type of alarm (alarm name).
- Level - identifies the severity level of the alarm (see below).



NOTE: When viewing alarms, cross-reference the alarm name, (which appears in the Alarm column of the Transmitter Status page) with Table 4.1.1 of the Troubleshooting Manual.

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.

Resetting Alarms

When an alarm is present, use the Reset button, at the bottom of any remote AUI page, (see [Figure 3.2.77](#)) to clear any latching alarms that are holding the transmitter in an "off-air" state. If the offending alarm has cleared, then the transmitter should resume operation.

Figure 3.2.77: Reset Button



User Settings

You can adjust various user settings using the remote AUI or using the local front panel UI.

The remote AUI's User Settings page (see [Figure 3.2.78 on page 3.2.88](#)) allows operators to modify various custom user settings such as network and email notifications. To view the User Settings page, select User Settings from the Menu options. Click X in the upper, right corner to close this page and return to the Home page.

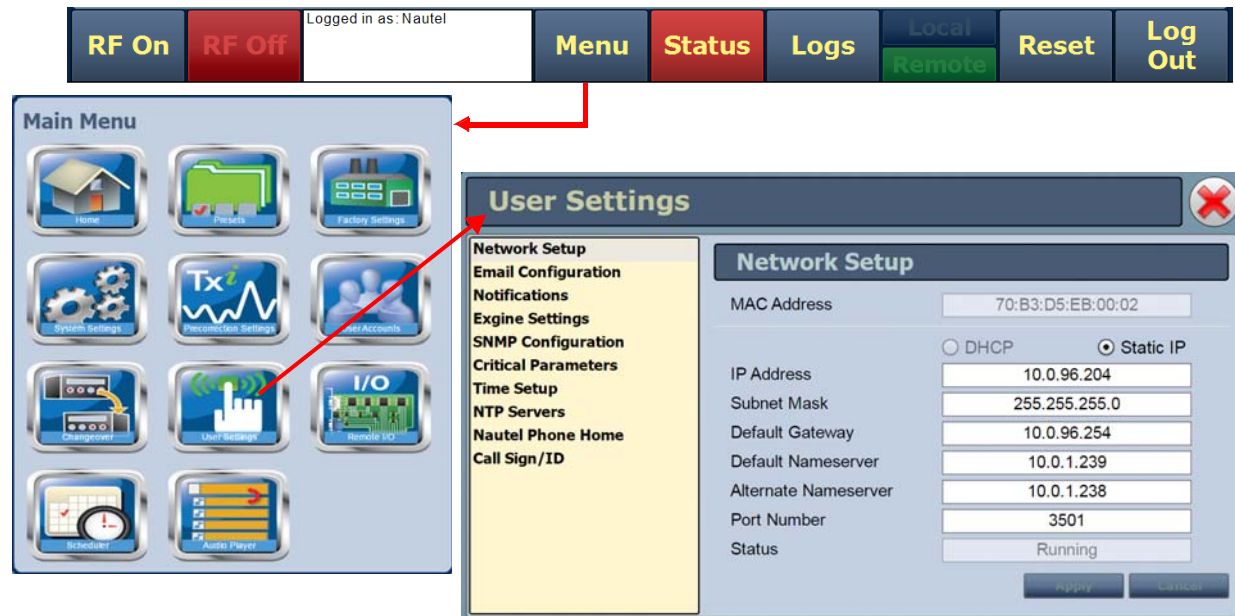
The User Settings options include:

- [Network Setup, on page 3.2.88](#) ***
- [Email Configuration, on page 3.2.93](#)
- [Notifications, on page 3.2.95](#)
- [Configuring Engine Settings, on page 3.2.97](#) ***
- [SNMP Configuration, on page 3.2.100](#)
- [Capturing Critical Parameters, on page 3.2.102](#)
- [Setting the Clock, on page 3.2.103](#) ***
- [Configuring NTP Servers, on page 3.2.106](#)
- [Configuring Engine Settings, on page 3.2.97](#)
- [Setting Call Sign/ID, on page 3.2.110](#)

*** **NOTE:** The front panel UI also has a User Settings menu, which contains similar functions to the remote AUI (e.g., network setup, Engine settings, setting the clock, etc.), which are also described in this section.

There are additional user settings that are available through the front panel UI (see [User Settings - Front Panel UI, on page 3.2.111](#)). In this section, unless otherwise noted, user settings are only available via a LAN connection to the remote AUI.

Figure 3.2.78: User Settings menu - Network Setup page shown



Network Setup

You can configure network settings using the local front panel UI (see [Network Setup - Using the Front Panel UI](#)) or the remote AUI (see [Network Setup - Using the Remote AUI, on page 3.2.92](#)). If you change a network setting on the front panel UI, it will also be reflected on the remote AUI, 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 remote 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.

Determining DHCP Setting

One of the main decisions in configuring the network connection on your NX5/NX3 transmitter is whether you enable or disable DHCP. If you are connecting to a network, consult with a network administrator before connecting the transmitter to your network to determine whether to enable or disable the DHCP setting.

When DHCP is enabled (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 transmitter's front panel. In this case, DHCP should be disabled.

Network Setup - Using the Front Panel UI

From the transmitter's front panel UI, you can set or change network settings. To view the Network Settings screen, select User Settings -> Network Settings from the Main Menu. See [Figure 3.2.79 on page 3.2.90](#) for details on setting each parameter.

Use the up and down buttons to move the cursor to the desired parameter and then press the right button to enable editing of the setting. Within any of the editing screens, use the left and right buttons to select a character for editing and then use the up and down buttons to edit a setting. Press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

NOTE: A nameserver (also called a DNS) translates a host name (e.g., mail.nautel.com) to an IP address such as in configuring email (see [Email Configuration, on page 3.2.93](#)).

If you are using a laptop to connect to the NX5/NX3, see [Connecting a Laptop Directly to the Transmitter, on page 3.2.91](#).

Figure 3.2.79: Network Settings screens

Network: 0W
 ->MAC Address
 DHCP
 ↓ IP Address

Navigation icons: Up, Down, Left, Right, Checkmark, X

All addresses shown are for reference purposes only

MAC Address: 0W
 00:50:C2:59:44:1B

Navigation icons: Up, Down, Left, Right, Checkmark, X

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 remote AUI to access your network.

DHCP: 0W
 Enable

Navigation icons: Up, Down, Left, Right, Checkmark, X

Set to ENABLE to automatically assign the IP Address, Netmask, Gateway, Nameserver 1 and Nameserver 2 by the access point (i.e., a router) or set to OFF to manually assign. In either case, the access point must be configured with the correct settings, which match the settings on the remote AUI in order for the remote AUI to access the network.

IP Address: 0W
 10. 0.128. 21
 ↑

Navigation icons: Up, Down, Left, Right, Checkmark, X

Displays a unique numerical network identifier for the transmitter. If DHCP was set to DISABLE, specify the IP address. Consult with your network administrator. If DHCP was set to ENABLE, this screen is for display purposes only.

Netmask: 0W
 255.255.255. 0
 ↑

Navigation icons: Up, Down, Left, Right, Checkmark, X

Masks an IP address, and divides the IP address into network address and host address. If DHCP was set to DISABLE, specify netmask. Typical netmask address shown. Consult with your network administrator. If DHCP was set to ENABLE, this screen is for display purposes only.

Gateway: 0W
 10. 0.128.254
 ↑

Navigation icons: Up, Down, Left, Right, Checkmark, X

Displays the address of the network access point. If DHCP was set to DISABLE, specify the gateway address. Consult with your network administrator. If DHCP was set to ENABLE, this screen is for display purposes only.

Nameserver 1: 0W
 0. 0. 0. 0
 ↑

Navigation icons: Up, Down, Left, Right, Checkmark, X

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 typed into a web browser address bar to the IP addresses of web servers hosting those sites. If DHCP is set to DISABLE, specify the address. If DHCP was set to ENABLE, this screen is for display purposes only.

Server Port: 0W
 Changes will reboot
 3501
 (1024 to 65535)

Navigation icons: Up, Down, Left, Right, Checkmark, X

Used to identify the senders and receivers of messages. Also supports port forwarding (remapping) which allows the remote AUI of multiple transmitters to be accessed on the same network. See your network router documentation for additional re-mapping information and instructions. NOTE: Changes to this port are reset to 3501 after a software upgrade; reconfigured the port, as required, after an upgrade.

IMPORTANT: Do not use ports 3601 or 7005 for this setting.

Connecting a Laptop Directly to the Transmitter

If connecting to the NX5/NX3 directly with a laptop, you must set a static IP address on the NX5/NX3 and your laptop.

1. 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

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.

Network Setup - Using the Remote AUI

NOTE: Nautel recommends that the following network settings be entered/vetted by a qualified Network Administrator. Refer to [Figure 3.2.79 on page 3.2.90](#) for detailed descriptions of each field.

By entering the NX5/NX3's established IP address into an Internet browser's address bar, and then logging into the remote AUI, you can view and edit the network parameters (see [Figure 3.2.78 on page 3.2.88](#)). 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 select Static IP to be able to edit the IP Address, Subnet Mask, Default Gateway and Nameserver fields. If you are in DHCP mode, these fields will be assigned automatically.

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 3.2.80: Network Setup page

The screenshot shows a web-based interface for 'User Settings'. On the left is a sidebar with a list of settings categories: Network Setup, Email Configuration, Notifications, Engine Settings, SNMP Configuration, Critical Parameters, Time Setup, NTP Servers, Nautel Phone Home, and Call Sign/ID. The 'Network Setup' category is selected and highlighted in yellow. The main content area is titled 'Network Setup' and contains the following fields:

- MAC Address:** 70:B3:D5:EB:00:02 (read-only)
- IP Configuration:** Radio buttons for DHCP and Static IP. 'Static IP' is selected.
- IP Address:** 10.0.96.204
- Subnet Mask:** 255.255.255.0
- Default Gateway:** 10.0.96.254
- Default Nameserver:** 10.0.1.239
- Alternate Nameserver:** 10.0.1.238
- Port Number:** 3501
- Status:** Running (read-only)

At the bottom right of the form are 'Apply' and 'Cancel' buttons.

All addresses shown are
for reference purposes only

Email Configuration

NOTE: This function is only available via the remote AUI.

The Email Configuration page (see [Figure 3.2.81](#)) 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 3.2.95](#)).

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

Figure 3.2.81: Email Configuration page

User Settings

Network Setup
Email Configuration
Notifications
Exgine Settings
SNMP Configuration
Critical Parameters
Time Setup
NTP Servers
Nautel Phone Home
Call Sign/ID

Email Configuration

Email Server: mail.nautel.com

Port Number: 25

Transmitter Name: Client

Sender Email Address: john.doe@nautel.com

☒ Authentication Required (AUTH LOGIN)

Username: test

Password: *****

Test **Apply** **Cancel**

To configure the email feature, perform the following steps:

1. Open the User Settings page by clicking Menu -> User Settings in the Home page.
2. Select the Email Configuration option (left-side of the screen) (see [Figure 3.2.81](#)) 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 Setup, on page 3.2.88](#)).

NOTE: The email server's domain (e.g., ".com", ".ca", ".info", etc.) must be two (2), three (3), four (4) or six (6) characters in length. Other character lengths are not accepted.

- ❖ 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., NX10_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.

NOTE: The sender email address' domain (e.g., ".com", ".ca", ".info", etc.) must be two (2), three (3), four (4) or six (6) characters in length. Other character lengths are not accepted.

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.

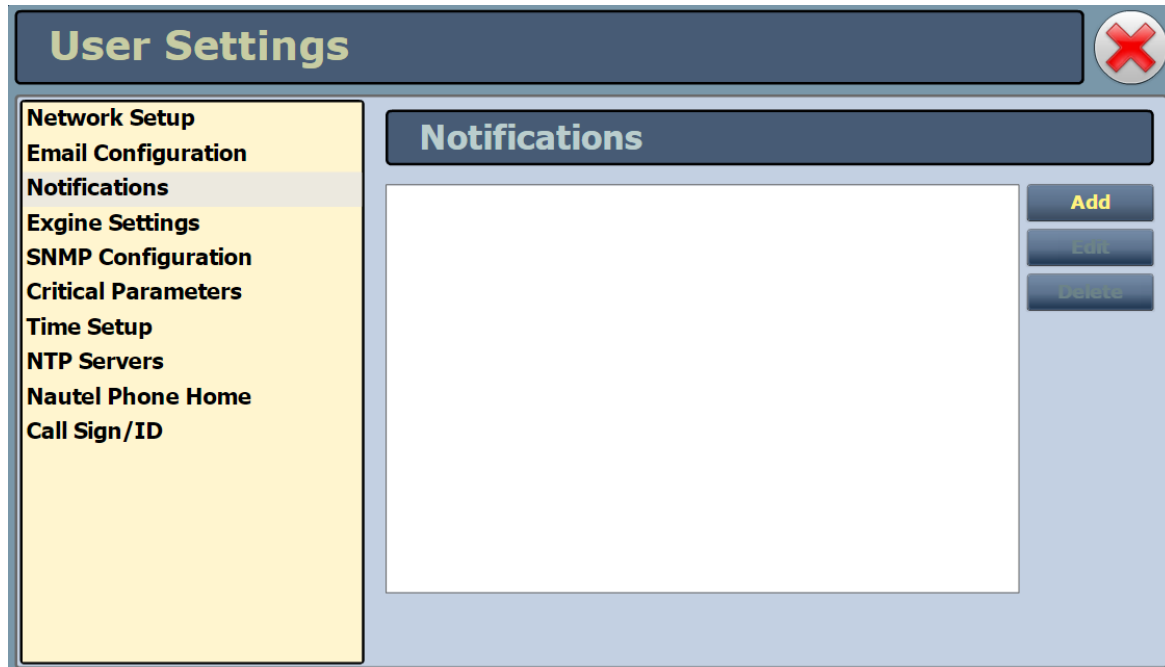
4. When complete, select Apply or Cancel to restore the previous setting. Use the Test button to enter an address to which an email will be sent to verify your settings. Enter the recipient address and click the OK button to send the test email or click the Cancel button to return to the Email Configuration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

Notifications

NOTE: This function is only available via the remote AUI.

The Notifications feature (see [Figure 3.2.82](#)) 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 Configuration](#), on page 3.2.93).

Figure 3.2.82: Notifications page



To configure the notifications feature, perform the following steps:

1. Pre-existing notifications are displayed in the Notifications list (e.g., "LVPS Failures". Click Add to create a new item for notification, click Edit (after highlighting an existing item) to edit an existing item or click Delete to erase an item.
2. When you click Add or Edit, the screen in [Figure 3.2.83](#) will appear. This screen allows you to add or edit a Notification Name, Recipient Email, and define the alarm list by Device type (Controller, Exciter A or B, Rack #or RF Module #). 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.

In the Recipient Email field, you can enter a standard email address to initiate an email or your can enter a mobile phone number and SMS gateway to initiate a text (SMS message). The email-to-

SMS 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.

- When complete click the OK button to accept changes or the Cancel button to discard changes and return to the Notifications page.

Figure 3.2.83: Notifications adding/updating page

Notification

Notification Name: LVPS Failures

Recipient Email(s): a@b.com

Device: Controller

Available Alarms

- 10kWReject Fan 1 Fail
- 10kWReject Fan 2 Fail
- 10kWReject Fan 3 Fail
- 5kWReject Fan 1 Fail
- 5kWReject Fan 2 Fail
- 5kWReject Fan 3 Fail
- 5kWReject Fan 4 Fail
- 5kWReject Fan 5 Fail
- 5kWReject Fan 6 Fail
- AC Summary
- ARM Network Down

Selected Alarms

- +1.2V Fail - Controller
- +1.8V Fail - Controller
- +12VA (AUI) Fail - Controller
- +12VB (SBC) Fail - Controller
- +15V Fail - Controller
- +3.3V Fail - Controller
- +5VA Fail - Controller
- +5VB Fail - Controller
- 15V Fail - Controller

OK Cancel

Configuring Exgine Settings

The Exgine Settings option allows you to configure IP information for use with the Exgine option. You can configure Exgine settings using the local front panel UI (see [Exgine Settings - Using the Front Panel UI](#) or the remote AUI (see [Exgine Settings - Using the Remote AUI, on page 3.2.99](#)). If you change a network setting on the front panel UI, it will also be reflected on the remote AUI, 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 remote 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.

Exgine Settings - Using the Front Panel UI

From the transmitter's front panel, in local mode, you can set or change Exgine settings. To view the Exgine Settings screen, select User Settings -> Exgine Settings from the Main Menu. See [Figure 3.2.84 on page 3.2.98](#) for details on setting each parameter.

Use the up and down buttons to move the cursor to the desired parameter and then press the right button to enable editing of the setting. Within any of the editing screens, use the left and right buttons to select a character for editing and then use the up and down buttons to edit a setting. Press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

Figure 3.2.84: Engine Settings screens

All addresses shown are for reference purposes only

Selects the E2X protocol to use UDP or TCP. Match this setting to the Exporter configuration

Configure the Engine's IP network parameters as assigned by the local network administrator.

Enter the Exporter's IP address of the interface where the data stream is originating. It is used to filter E2X traffic in case multiple exporters are used in broadcast mode on a single LAN. 0.0.0.0 is also a valid configuration.

Configure the Engine's IP network parameters as assigned by the local network administrator. If no gateway is used or assigned, enter 0.0.0.0.

Configure the Engine's IP network parameters as assigned by the local network administrator.

The Exgine expects E2X on port 9000. Some non-Nautel Exporters utilize port 11000 instead.

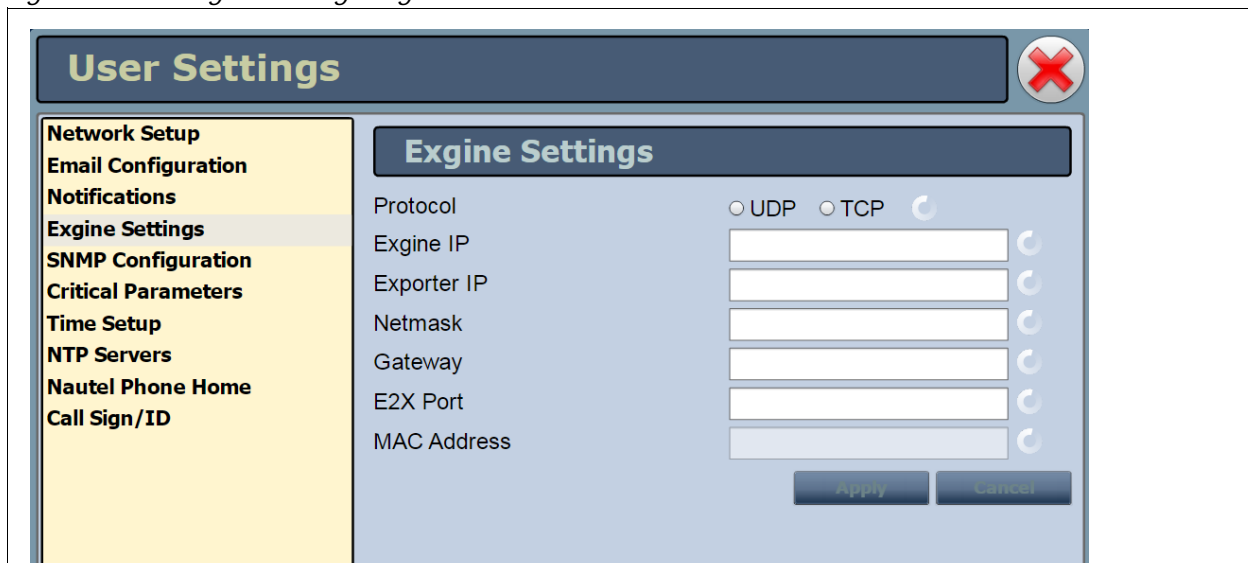
Exgine Settings - Using the Remote AUI

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

Configure Exgine settings using the remote AUI as follows:

1. Open the User Settings page by clicking Menu > User Settings in the **Home** page.
2. Select the Exgine Settings option (left-side of the screen) to display a list of pre-existing settings (see [Figure 3.2.85](#)).
3. Enter the following parameters and click **Apply**.
 - ❖ Protocol - Selects the E2X protocol to use UDP or TCP. Match this setting to the Exporter configuration.
 - ❖ Exgine IP, Netmask and Gateway - Configure the Exgine's IP network parameters as assigned by the local network administrator. If no gateway is used or assigned, enter 0.0.0.0.
 - ❖ Exporter IP - Enter the Exporter's IP address of the interface where the data stream is originating. It is used to filter E2X traffic in case multiple exporters are used in broadcast mode on a single LAN. 0.0.0.0 is also a valid configuration.
 - ❖ E2X Port - The Exgine expects E2X on port 9000. Some non-Nautel Exporters utilize port 11000 instead.
 - ❖ 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. It may be necessary to use this number to allow the remote AUI to access your network.

Figure 3.2.85: Exgine Settings Page



The screenshot shows a web interface titled "User Settings" with a sidebar menu on the left. The sidebar menu includes options like Network Setup, Email Configuration, Notifications, Exgine Settings (which is highlighted), SNMP Configuration, Critical Parameters, Time Setup, NTP Servers, Nautel Phone Home, and Call Sign/ID. The main content area is titled "Exgine Settings" and contains the following fields:

- Protocol: Radio buttons for UDP and TCP.
- Exgine IP: Text input field.
- Exporter IP: Text input field.
- Netmask: Text input field.
- Gateway: Text input field.
- E2X Port: Text input field.
- MAC Address: Text input field.

At the bottom of the Exgine Settings section, there are "Apply" and "Cancel" buttons.

SNMP Configuration

The SNMP configuration page (see [Figure 3.2.86](#)) provides a means to configure the SNMP agent and to enable and configure traps.

Figure 3.2.86: SNMP Configuration page

The screenshot shows a web-based configuration interface. At the top is a dark blue header bar with the text "User Settings" in yellow. To the right of the header is a red "X" icon in a circle. Below the header is a left sidebar with a yellow background, containing a list of menu items: "Network Setup", "Email Configuration", "Notifications", "Exgine Settings", "SNMP Configuration" (which is highlighted with a grey background), "Critical Parameters", "Time Setup", "NTP Servers", "Nautel Phone Home", and "Call Sign/ID". The main content area has a dark blue header bar with the text "SNMP Configuration" in white. Below this header, there are several input fields: "Agent Port" with the value "161", "Read Community" with "*****", "Confirm" with "*****", "Write Community" with "*****", and another "Confirm" with "*****". Below these is a checkbox labeled "Enable Traps" which is checked. At the bottom of the main area are two input fields: "Trap Receiver IP" with the value "0.0.0.0" and "Trap Receiver Port" with the value "162". At the bottom right of the main area are two buttons: "Apply" and "Cancel".

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.

NOTE: The passwords entered in the Read and Write Community fields must be identical with those used in your SNMP Client or MIB browser.

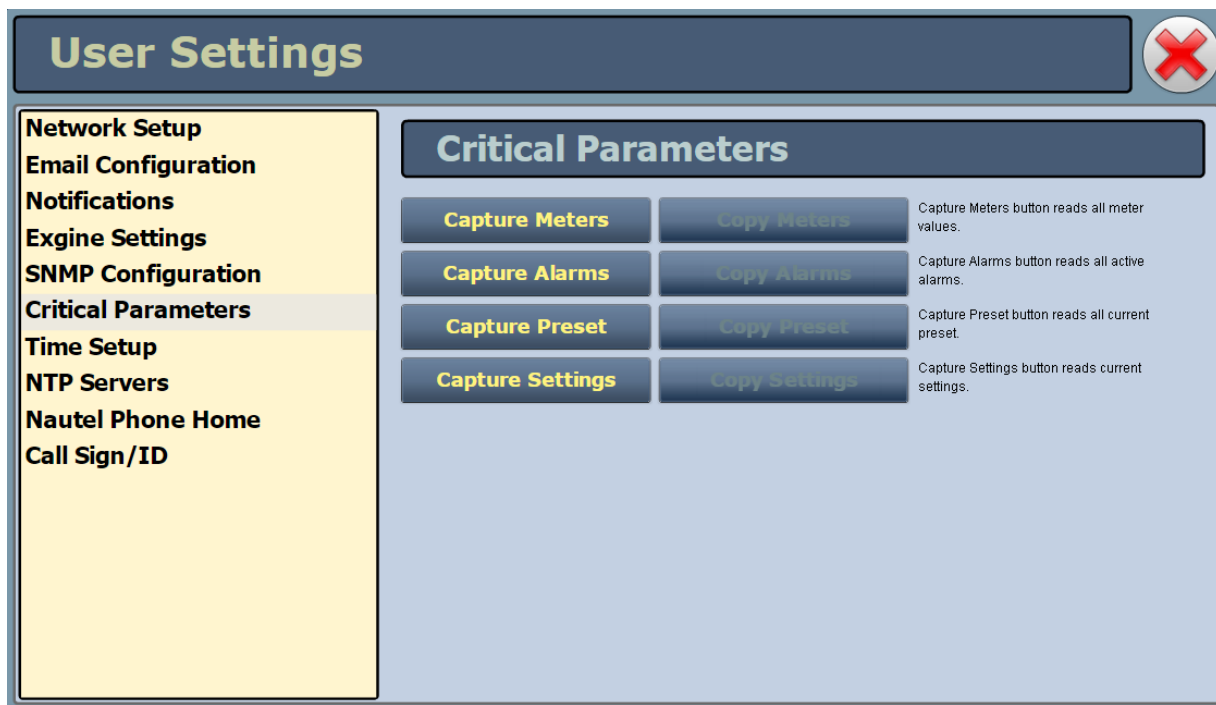
2. Click the Enable Traps check box to allow the SNMP agent to send trap notifications and to display two additional fields associated with traps. Enter the two additional fields as follows:
 - ❖ Trap Receiver IP: Enter the IP address of the computer to which the SNMP agent will send trap notifications. The computer must be running an SNMP application that is configured to receive traps. The SNMP agent will send trap notifications to at most one receiver.
 - ❖ Trap Receiver Port: Enter the UDP port where the SNMP agent will send traps. The default setting is 162.
3. When complete click Apply or click Undo to restore the previous settings.

Capturing Critical Parameters

NOTE: This function is only available via the remote AUI.

You can capture critical parameter data for the transmitter's current state using the remote AUI's Critical Parameters page (see [Figure 3.2.87](#)). To view this page, select Critical Parameters from the User Settings page. From this page, you can click 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.). Once you click the Capture button, you can click the associated Copy button to copy the data to your remote PC's clipboard. The data copies in a tab-delimited format and is ideally suited for pasting into a spreadsheet program. Click X in the upper, right corner to close this page and return to the home page.

Figure 3.2.87: Critical Parameters page



Setting the Clock

The NX5/NX3 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 remote AUI (see [Setting the Clock - Using the Remote AUI](#)) or using the local front panel UI (see [Setting the Clock - Using the Front Panel](#), on page 3.2.105). If you change the clock setting on the front panel UI, it will also be reflected on the remote AUI, and vice versa. If the NTP feature is enabled (see [Enabling NTP](#), on page 3.2.107), the clock will set automatically and cannot be manually adjusted.

Setting the Clock - Using the Remote AUI

You can remotely set the NX5/NX3's time and date using the remote AUI's Time Setup page (see [Figure 3.2.88](#)) by selecting Time Setup from the User Settings options. The date and time setting is displayed in the upper, left corner of the remote AUI.

Figure 3.2.88: Time Setup Page

User Settings

Time Setup

Time: Hour 9, Min 2, Sec 18

Date: Day 15, Month Apr, Year 2015

Timezone: America/Halifax UTC -3:00

Region: Select a region...

Country:

Zone:

Apply Cancel

Apply Cancel

The Time Setup option allows users to set the exact time and date information as well as regional and timezone settings for a transmitter location. All data received from the AUI server (i.e., logs) are time-stamped in UTC time. Setting the time zone information allows this timestamp to be adjusted for the user-specific time zone, and ensures the clock will adjust automatically for daylight savings time (if applicable). Set the time and date as follows:

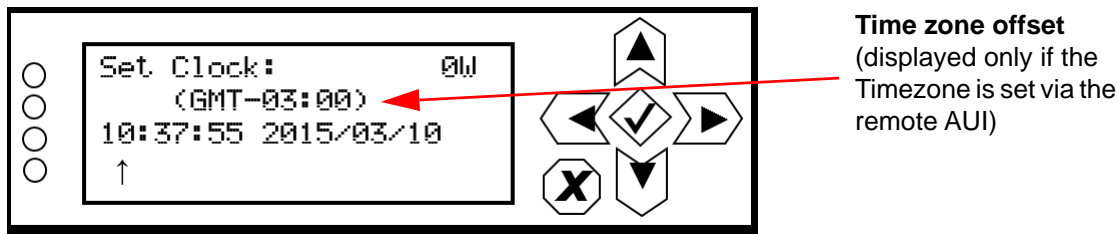
1. Select the Time Setup option from the left-side of the User Settings page to open a related window on the right-side of the page.
2. Enter Time and Date parameters and click Apply. Click Cancel to discard changes. Please note that Time and Date cannot be set via this menu if NTP is enabled (see [Enabling NTP, on page 3.2.107](#)).
 - ❖ 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 click Apply. Click 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.

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. Click the appropriate Apply button to accept changes or Cancel to discard them.

Setting the Clock - Using the Front Panel

When you select User Settings -> Set Clock from the Main Menu (see [Figure 3.2.89](#)) you can set the current time and date. The time appears on the top line of the top level screen (see [Figure 3.2.5 on page 3.2.10](#)).

Figure 3.2.89: Set Clock screen



To change the time or date, use the right and left arrow buttons to move the cursor to the desired field (hours, minutes, seconds, year, month, day), and use the up and down arrow buttons to increase or decrease the value of the selected field as desired. When complete, press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

The time zone offset line (e.g., GMT-03:00) appears only if the Timezone has been established in the remote AUI's Time Setup page.

Configuring NTP Servers

NOTE: The following function is only available via remote connection to the AUI; however, the use of NTP can also be enabled/disabled from the front panel UI (see [Enabling NTP, on page 3.2.107](#)).

You can configure one or more NTP (Network Time Protocol) servers to allow clock synchronization with all computers on the same network as the NX5/NX3. To view the remote AUI's NTP Servers page (see [Figure 3.2.90](#)), selecting 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 3.2.90: NTP Servers Page

The screenshot shows the 'User Settings' window with a sidebar menu on the left. The 'NTP Servers' option is selected and highlighted. The main content area is titled 'NTP Servers' and contains the following elements:

- An 'Enable NTP' checkbox, which is currently unchecked. An 'Apply' button is located to its right.
- An 'NTP Server Status' section containing a table with the following columns: *, Remote, IP, Delay(ms), Offset(ms), and Jitter(ms). The table is currently empty.
- A 'Manage Servers' section containing a text area with the following list of servers:

```
0.debian.pool.ntp.org
1.debian.pool.ntp.org
2.debian.pool.ntp.org
3.debian.pool.ntp.org
```

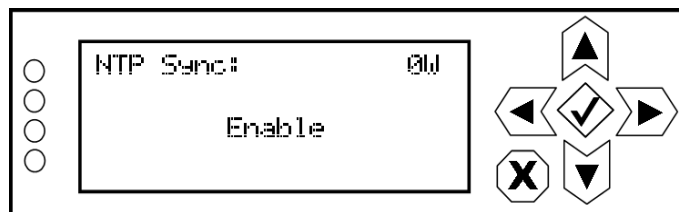
To the right of this text area are 'Add' and 'Delete' buttons.

Enabling NTP

From the remote AUI, verify that Timezone has been established under Time Setup page (see [Figure 3.2.88](#)) prior to enabling NTP. This ensures NTP time (which is always UTC) will properly offset for the region in which the transmitter is located and the clock will adjust automatically for daylight savings time (if applicable). Enable the NTP function by selecting the Enable NTP checkbox. Disable by de-selecting the Enable NTP checkbox. Click the Apply button to activate any change.

From the front panel UI's User Settings -> NTP Sync screen (see [Figure 3.2.91](#)), enable the NTP function by setting NTP Sync to ON. Disable by setting NTP Sync to OFF. To change the setting, use the up and down arrow buttons to toggle between ON and OF (default is OFF). Press the accept (checkmark) button to save the change. Press the cancel (X) button to discard changes and return to the previous menu.

Figure 3.2.91: NTP Sync screen



Monitoring NTP Servers

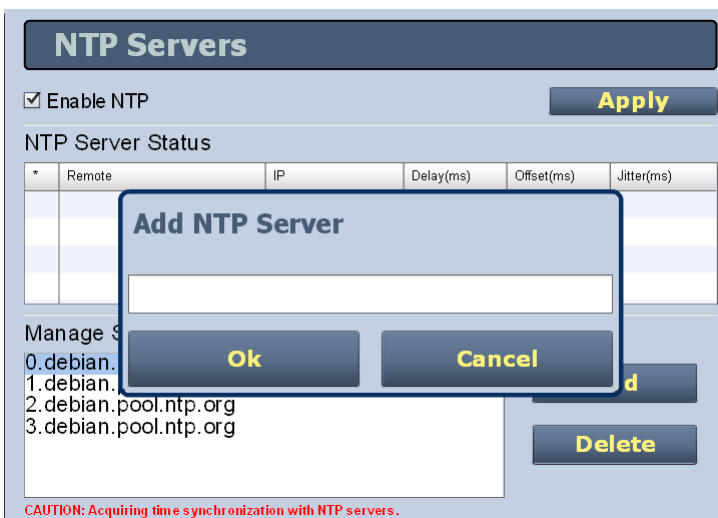
The NTP Server Status section displays tabular information on the NTP servers connected to the network. The table includes remote name, IP address, delay, offset and jitter.

- ❖ 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 3.2.92](#)) or Delete a selected NTP server from the list.

Figure 3.2.92: Add NTP Server



Nautel Phone Home

NOTE: This function is only available via the remote AUI. For more information on the Nautel Phone Home feature, see Section 1.8 of the Pre-Installation Manual.

If you are enabling the Phone Home feature, you can set your serial number/call sign and contact email (optional) to identify your transmitter to Nautel Customer Service. To view the remote AUI's Nautel Phone Home page (see [Figure 3.2.93](#)), select Nautel Phone Home from the User Settings options.

Figure 3.2.93: Nautel Phone Home Page

User Settings

Network Setup
Email Configuration
Notifications
Exgine Settings
SNMP Configuration
Critical Parameters
Time Setup
NTP Servers
Nautel Phone Home
Call Sign/ID

Nautel Phone Home

☒ Enable Participation in Phone Home

Transmitter ID: MAC:70:B3:D5:EB:00:00

Model: NX10

Serial Number/Call Sign: WXYZ

Contact Email (optional): abc@gmail.com

☐ Allow Remote Service
This feature should only be enabled at the request of Nautel Service Staff for the purpose of remote servicing.

Apply **Cancel**

- ❖ If desired, click the Enable Participation in Phone Home checkbox to enable participation. This will prompt you to enter two more fields - Serial Number/Call Sign (required field) and Contact Email (optional). Click Apply to save the changes. Click Cancel to return the fields to their previous setting. If you click Apply, Nautel will receive notification of your participation and begin to monitor your transmitter with read-only access.
- ❖ The Transmitter ID and Model fields are auto-filled and cannot be edited.
- ❖ **IMPORTANT!** Only click the Allow Remote Service checkbox if requested by a Nautel Customer Service representative. This increases the permission level and allows user to have Full Control (see [“Setting User Permission Level”](#) on page 3.2.124 for details on user permissions).

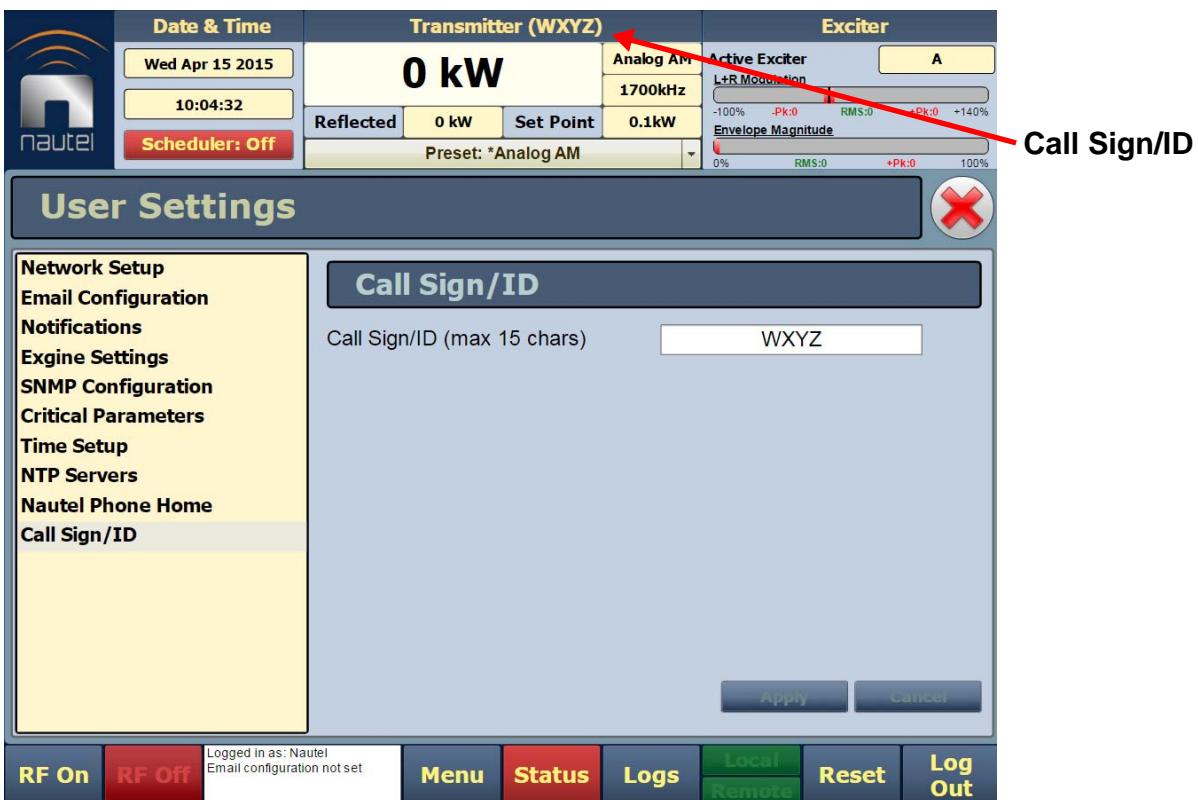
Setting Call Sign/ID

NOTE: This function is only available via the remote AUI.

You can set a name that identifies the transmitter on the remote AUI. To view the remote AUI's Call Sign/ID page (see [Figure 3.2.94](#)), select Call Sign/ID from the User Settings options. This identification will be displayed in brackets on the top transmitter banner of the remote AUI and also be included as a header in any Critical Parameter data copied and pasted to a spreadsheet program (see [Capturing Critical Parameters, on page 3.2.102](#)).

Enter the call sign or ID in the field (e.g., WXYZ) and click Apply (maximum 15 characters in length).

Figure 3.2.94: Setting Call Sign/ID



The screenshot displays the Nautel NX5/NX3 web interface. At the top, there's a banner with transmitter information: 'Date & Time' (Wed Apr 15 2015, 10:04:32), 'Transmitter (WXYZ)' (0 kW, 1700kHz), and 'Exciter' (Active Exciter A). Below this is a 'User Settings' sidebar with options like Network Setup, Email Configuration, and Call Sign/ID. The 'Call Sign/ID' section is active, showing a text input field with 'WXYZ' and 'Apply'/'Cancel' buttons. A red arrow points to the 'Call Sign/ID' label on the right side of the interface.

User Settings - Front Panel UI

You can establish various user settings for the NX5/NX3 using the local front panel display. The following options are available:

- Set Clock: see [Setting the Clock - Using the Front Panel](#), on page 3.2.105 ***
- NTP Sync: see [Enabling NTP](#), on page 3.2.107 ***
- Network Settings: see [Network Setup - Using the Front Panel UI](#), on page 3.2.89 ***
- Engine Settings: see [Engine Settings - Using the Front Panel UI](#), on page 3.2.97 ***
- Configure Test Signal Generator: see [Configure Test Signal Generator](#) - see page 3.2.112
- Scheduler: see [Enabling the Scheduler - Front Panel UI](#), on page 3.2.179 ***

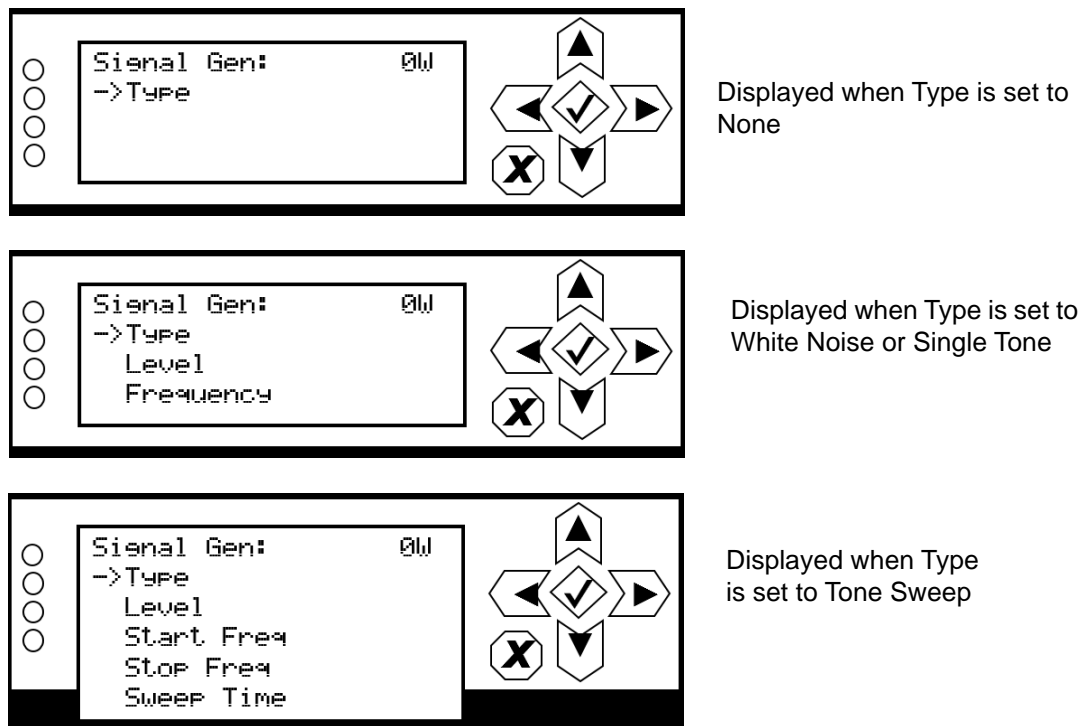
*** **NOTE:** The remote AUI also has a User Settings menu, which contains similar functions to the front panel UI (e.g., network setup, Engine settings, setting the clock, etc.). In this case, refer to [User Settings](#), on page 3.2.87 for information on the front panel UI settings. Additional user settings, available only through the front panel UI, are described in this section.

Configure Test Signal Generator

NOTE: The test signal generator function is only available using the front panel display.

From the front panel UI, you can configure the test signal generator output of the NX5/NX3. Note that a different menu will appear depending on the currently configured test signal type. To view the Signal Gen screen, select User Settings -> Signal Gen from the Main Menu (see [Figure 3.2.95](#)).

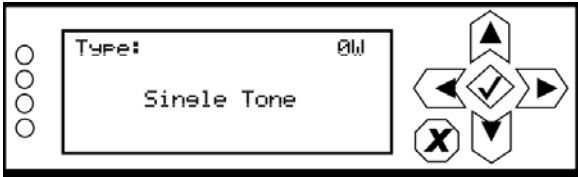




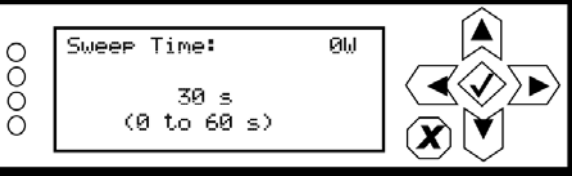
Figure 3.2.95: Signal Generator Menus



Use the up and down buttons to move the cursor to the desired line item and then press the right button to enable editing.

[Figure 3.2.96 on page 3.2.113](#) shows all possible editing screens for the Signal Gen menu. Within any of the editing screens, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.96: Signal Generator Editing Screens

	Select a type - None, White Noise, Tone Sweep or Single Tone. Press the cancel (X) button to discard changes and return to the previous menu.
	Select a level between 0 and 100%. Press the cancel (X) button to discard changes and return to the previous menu. Default is 100%.
	When Type is set to White Noise or Single Tone, select a frequency between 0 and 25 kHz. Press the cancel (X) button to discard changes and return to the previous menu. Default is 1 kHz.
	When Type is set to Tone Sweep, select a start frequency between 0 and 25 kHz. Press the cancel (X) button to discard changes and return to the previous menu. Default is 1 kHz.
	When Type is set to Tone Sweep, select a stop frequency between 1 and 25 kHz. Press the cancel (X) button to discard changes and return to the previous menu. Default is 1 kHz.
	When Type is set to Tone Sweep, select a time between 0 and 60 s. Press the cancel (X) button to discard changes and return to the previous menu. Default is 30 s.

Precorrection Settings

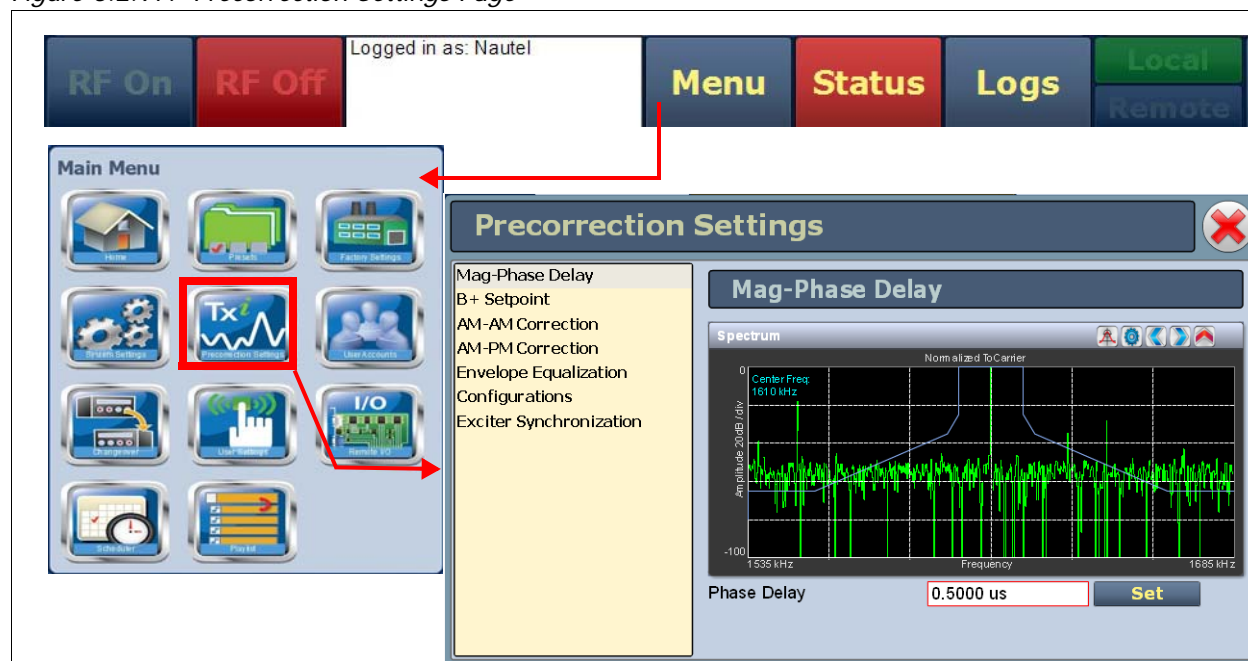
You can control various critical parameter functions using the remote AUI's Precorrection page (see [Figure 3.2.97](#)), which you access from the Menu page.

NOTE: These settings will normally be generated at the factory, based on the desired modes of operation, and should not require user adjustment.

This section includes the following topics:

- ❖ [Mag-Phase Delay](#), on page 3.2.115
- ❖ [B+ Setpoint](#), on page 3.2.116
- ❖ [AM-AM Correction](#), on page 3.2.117
- ❖ [AM-PM Correction](#), on page 3.2.118
- ❖ [Envelope Equalization](#), on page 3.2.119
- ❖ [Configurations](#), on page 3.2.120
- ❖ [Exciter Synchronization](#), on page 3.2.122

Figure 3.2.97: Precorrection Settings Page



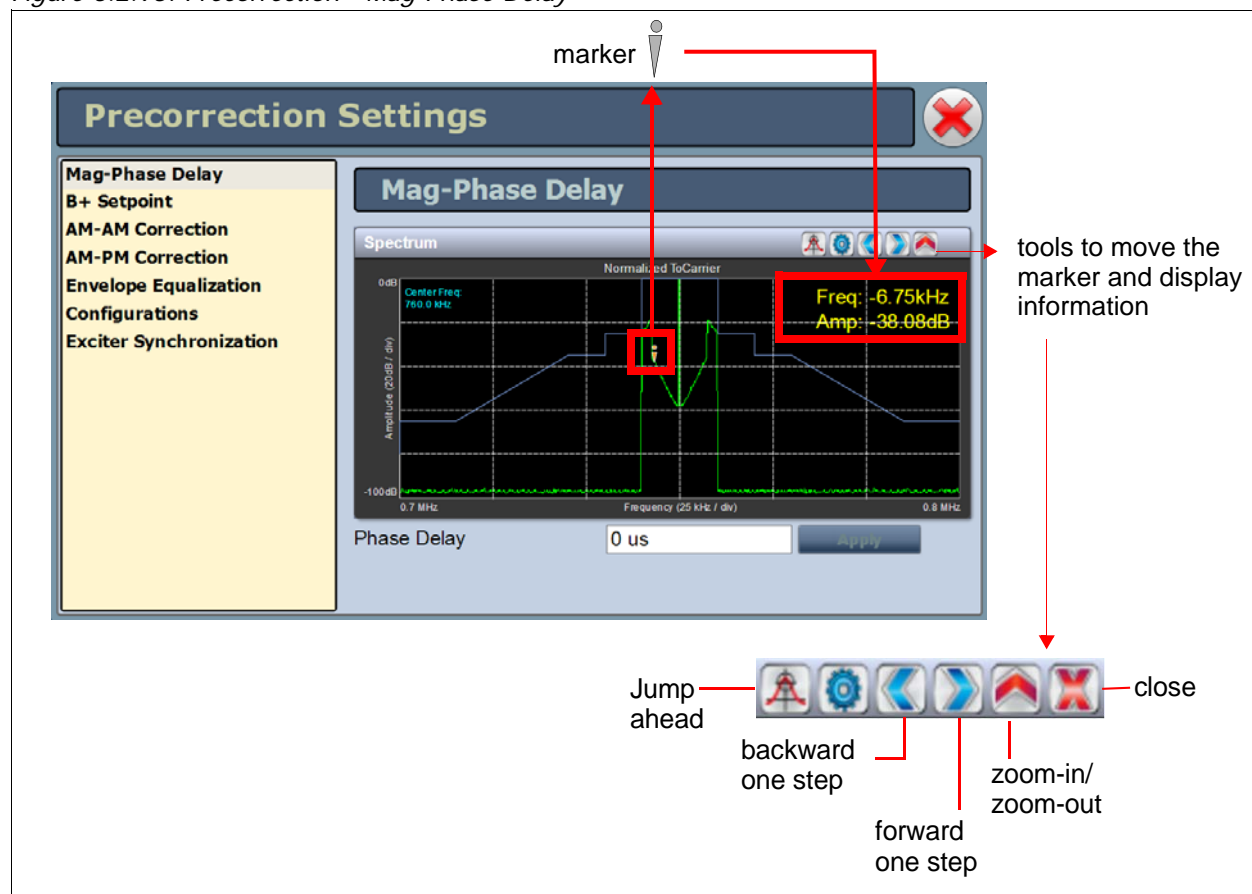
To use this page, select an item from the list on the left-side of the page to open related information on the right side of the page.

Mag-Phase Delay

The remote AUI's Mag-Phase Delay page (see [Figure 3.2.98](#)) allows for setting the difference in delay between the magnitude (PDM) path and phase (RF drive) path in the exciter. Changing this delay can help to level out and minimize spectral regrowth, providing improved spectral performance and increased margin under the mask. Typically, the delay is set between 0 and 1 us. Use the spectrum analyzer instrument panel displayed in this section to verify applied changes are satisfactory.

The value is factory set and changes are not typically required unless the antenna (load) network has changed. Minor adjustments may be required to optimize IBOC or DRM spectral performance. If so, enter the Phase Delay value (between -10 us and +10 us) and click Apply.

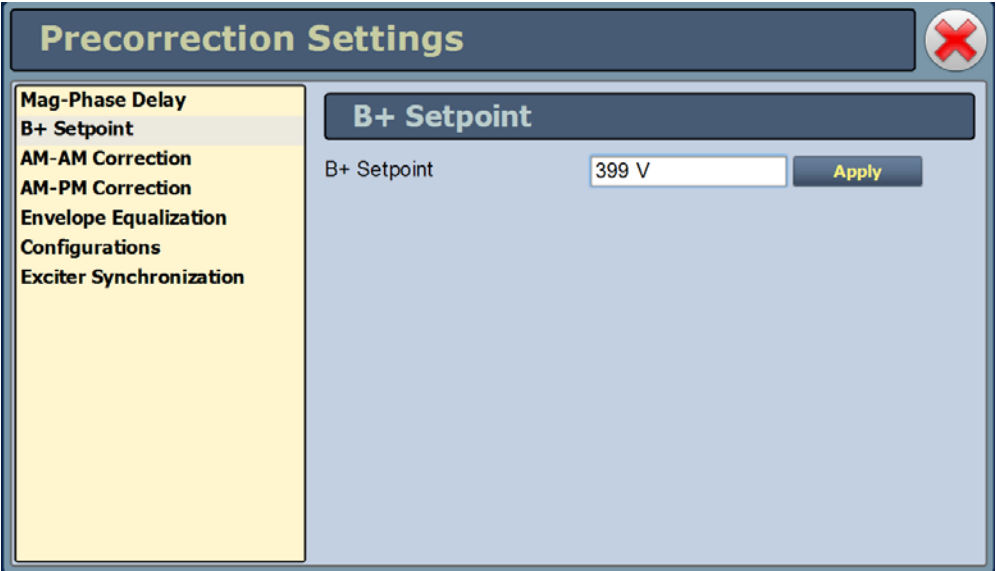
Figure 3.2.98: Precorrection - Mag-Phase Delay



B+ Setpoint

The remote AUI's B+ Setpoint page (see [Figure 3.2.99](#)) allows you to identify the B+ Setpoint (nominally 400 V). This value does not normally require user adjustment.

Figure 3.2.99: Precorrection - B+ Setpoint



The screenshot shows a software window titled "Precorrection Settings" with a red close button in the top right corner. On the left is a yellow sidebar menu with the following items: "Mag-Phase Delay", "B+ Setpoint" (which is highlighted), "AM-AM Correction", "AM-PM Correction", "Envelope Equalization", "Configurations", and "Exciter Synchronization". The main area of the window has a blue header "B+ Setpoint". Below this header, the text "B+ Setpoint" is followed by a text input field containing "399 V" and an "Apply" button.

Enter the value and click Apply.

AM-AM Correction

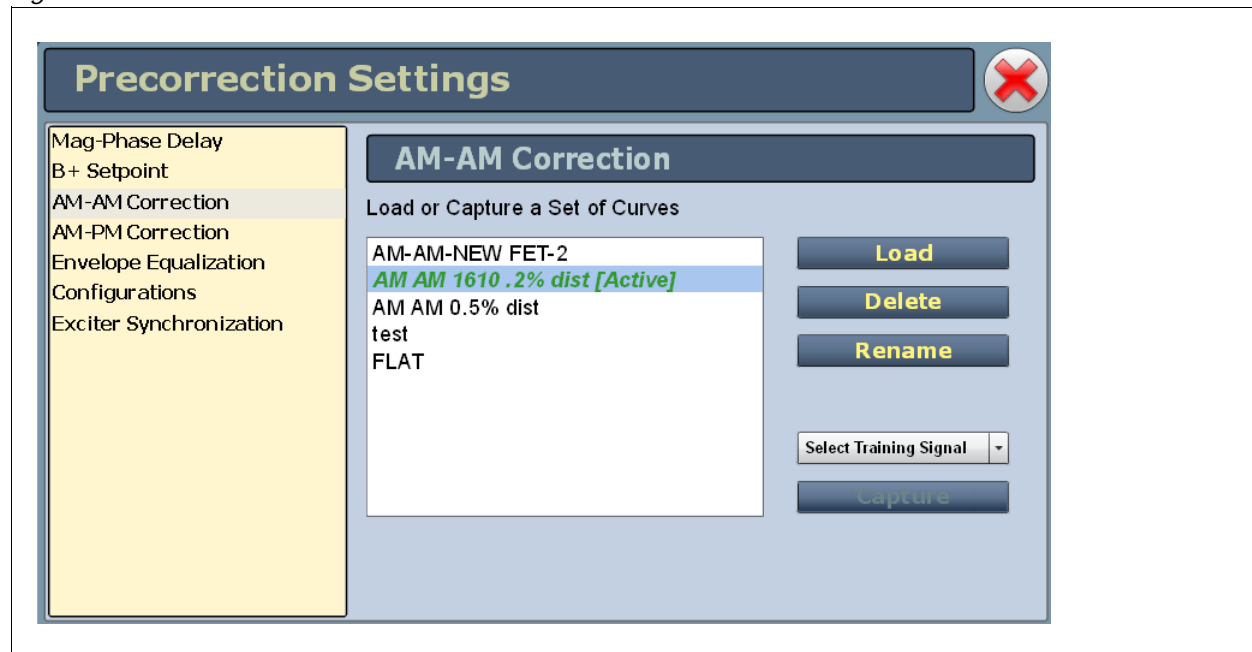
The AM-AM Correction page (see [Figure 3.2.100](#)) allows you to load or capture a set of AM-AM correction curves. You can Load or Delete curves in this list; you can also capture a curve. When you select Capture, the AM-AM Correction window is displayed. Click Done to capture the curve, type a name for the curve, then click Save (or Cancel).

CAUTION! Making changes to the AM-AM Correction curves automatically places the transmitter in analog AM mode, with full-scale sine-wave modulation. To avoid undesirable output or possible antenna damage, it is highly recommended that you perform these calibrations while operating the transmitter into a test load.

Value changes are not typically required. Up to three curves can be saved in memory.

AM-AM curves correct for a type of non-linearity where a change in input amplitude does not cause a linearly proportional change in output amplitude. By applying a test signal and monitoring the output of the transmitter, the exciter will generate a table of values describing the required gain versus input signal level in an attempt to find the inverse curve to the AM-AM non-linearity, and provide a more linear amplifier. Applying the proper AM-AM correction will result in lower audio distortion and better spectral performance in digital modes of operation.

Figure 3.2.100: Precorrection AM-AM



AM-PM Correction

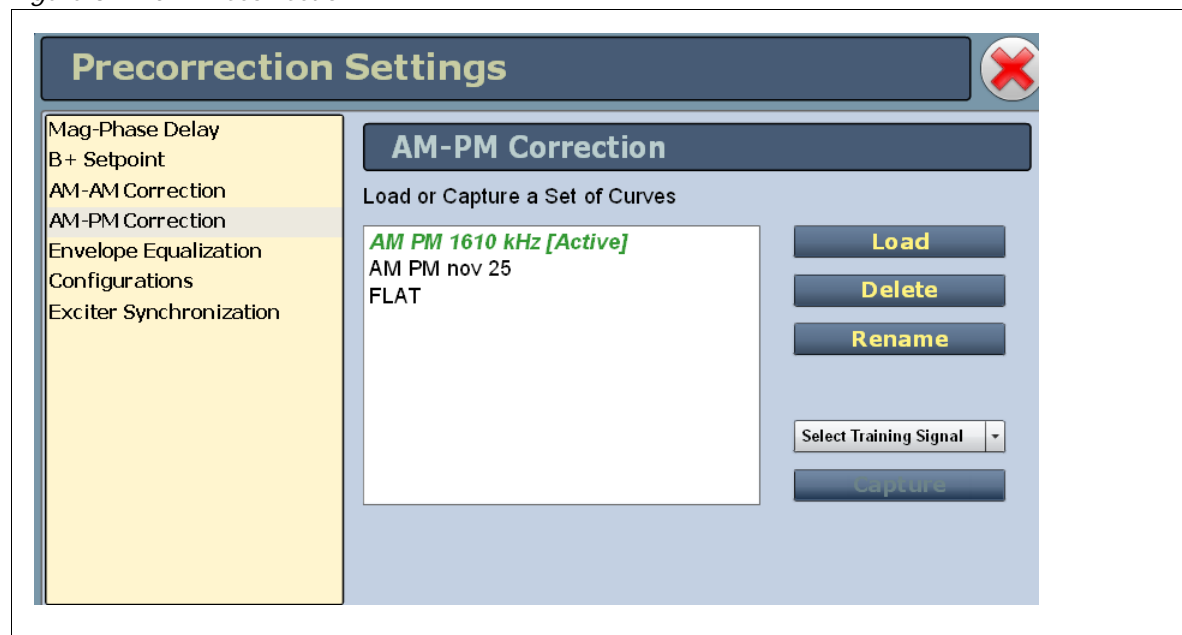
The AM-PM Correction page (see [Figure 3.2.101](#)) allows you to load or capture a set of AM-PM correction curves. You can Load or Delete curves in this list; you can also capture a curve. When you select Capture, the AM-PM Correction instrument panel is displayed. Click Done to capture the curve, type a name for the curve, then click Save (or Cancel).

CAUTION! Making changes to the AM-PM Correction curves automatically places the transmitter in analog AM mode, with full-scale sine-wave modulation. To avoid undesirable output or possible antenna damage, it is highly recommended that you perform these calibrations while operating the transmitter into a test load.

Value changes are not typically required.

AM-PM curves correct for a type of non-linearity where a change in input amplitude causes a change in phase. By applying a test signal and monitoring the output of the transmitter, the exciter will generate a table of values defining the required phase offset versus input signal level in an attempt to find the inverse curve to the AM-PM non-linearity, and provide a more linear amplifier. Applying the proper AM-PM correction will result in better spectral performance in digital modes of operation.

Figure 3.2.101: Precorrection AM-PM



Envelope Equalization

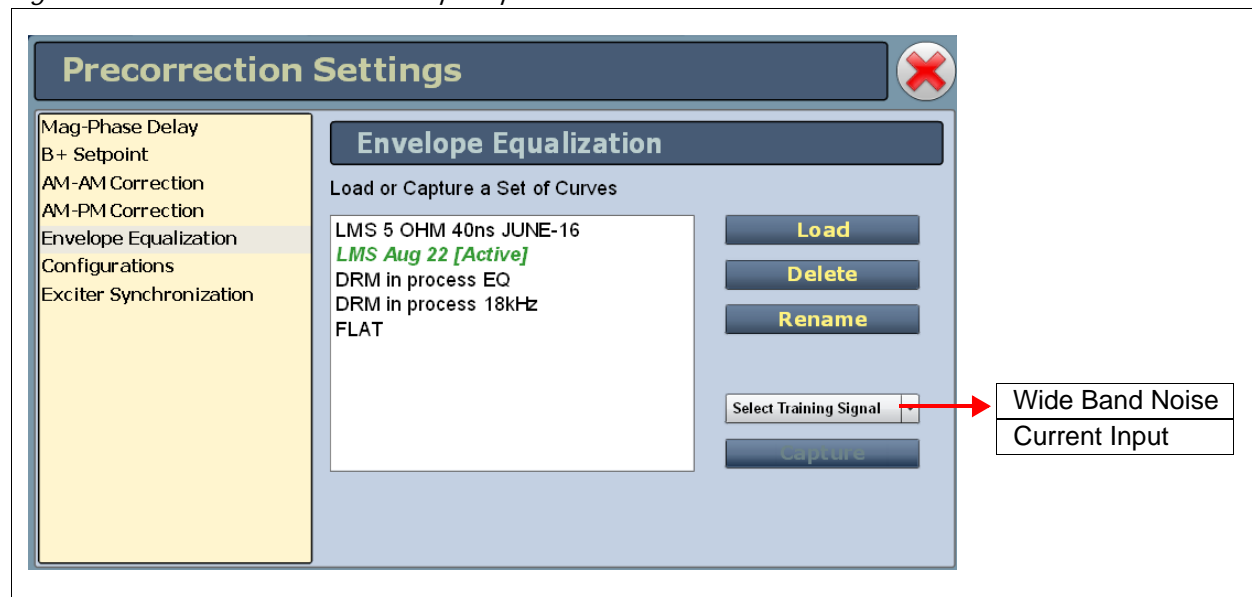
The Envelope Equalization page (see [Figure 3.2.102](#)) allows you to load or capture a set of envelope equalization curves. You can Load or Delete curves in the list; you can also capture a curve. When you select Capture, the EQ Frequency Response window is displayed. Click Done to capture the curve, type a name for the curve, then click Save (or Cancel).

CAUTION! Selecting the Wide Band Noise training signal (see [Figure 3.2.102](#)) applies full-scale white noise modulation. To avoid undesirable output or possible antenna damage, it is highly recommended that you perform these calibrations while operating the transmitter into a test load.

Value changes are not typically required.

Envelope equalization curves correct for the frequency response of the magnitude path, dominated by the response of the modulator filter. By applying a test signal and monitoring the output of the transmitter, the exciter will use an LMS (Least Mean Squares) algorithm to generate a filter in an attempt to find a complementary response to the frequency response of the magnitude path (out to approximately 70 kHz). Applying the proper equalization curve will result in a flatter frequency response, and improved spectral performance in digital modes of operation, where the frequency content of the magnitude signal can be significant, as far out as 100 kHz.

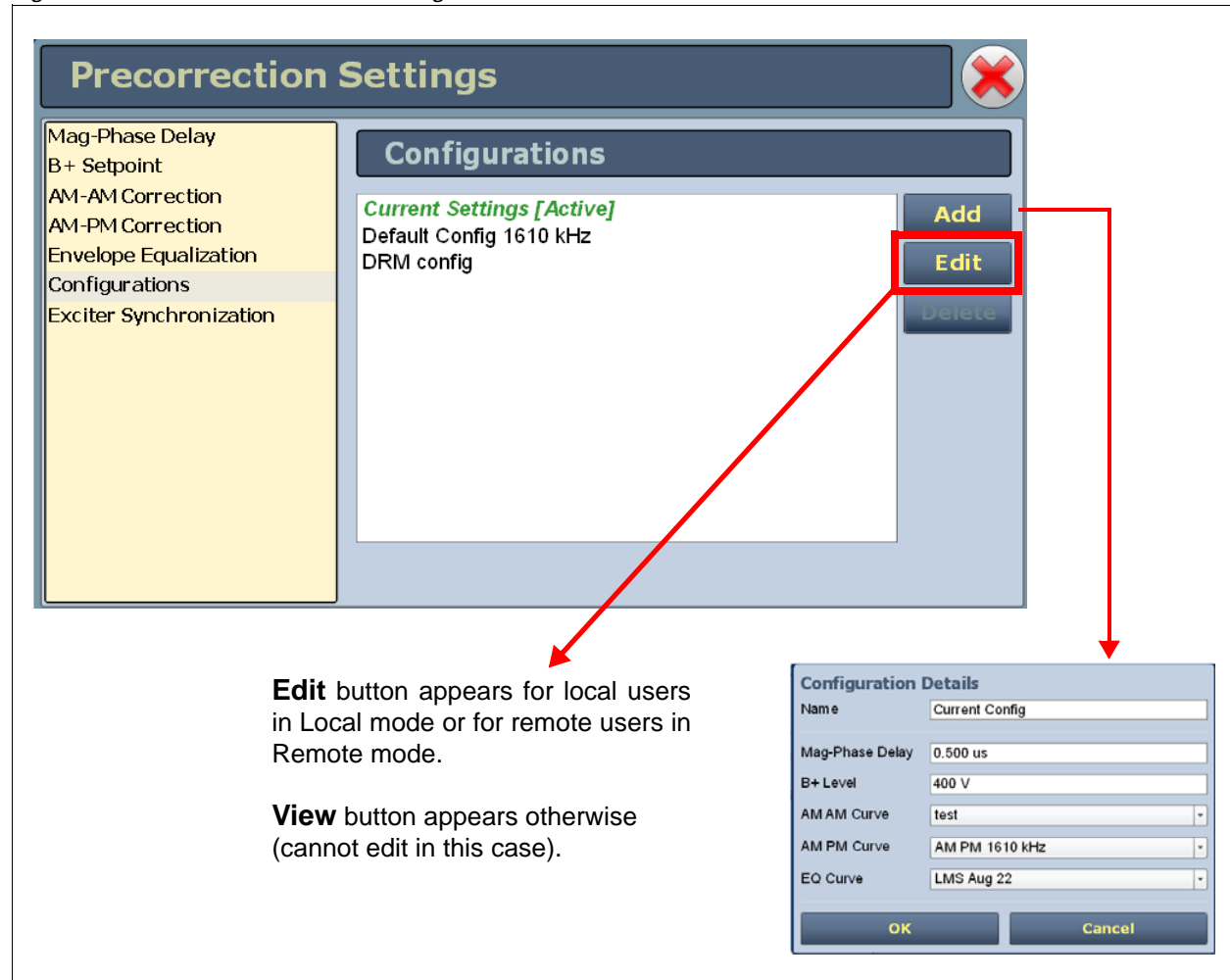
Figure 3.2.102: Precorrection Envelope Equalization



Configurations

The Configurations page (see [Figure 3.2.103](#)) allows users to group the parameters that appear within the Precorrection Settings menu.

Figure 3.2.103: Precorrection - Configurations



Once a configuration is created, it can be used in a preset. This allows the user to change the pre-correction settings based on the operating mode via the preset. Configurations are normally established at the factory, based on customer operating modes, and do not require adjustment.

Procedure to edit or create a configuration:

1. Select the **Configuration** option from the left side of the Precorrection Settings page to open a related window on the right side of the page.
2. Any existing configurations (e.g., Default Config 1610 kHz) will appear in the list. The active configuration, if applicable, is highlighted in green. You can view or edit existing configurations by clicking **Edit**, if available. You can also create a new configuration by clicking **Add** or remove a configuration by clicking **Delete**. You must have Administrator user account permission to edit, add or delete configurations.
3. If you click **Edit (View)** or **Add**, the Configuration Details window appears (see [Figure 3.2.103 on page 3.2.120](#)). In this screen you can enter or select the appropriate parameters for your desired configuration, including Name, Mag-Phase Delay, B+ Level, AM-AM Curve, AM-PM Curve and EQ Curve. When you are finished editing or creating the configuration, click **OK** to save the configuration or click **Cancel** to return to the Precorrection Settings page. Your new configuration should appear in the Configurations list.

Procedure to add a configuration to a preset:

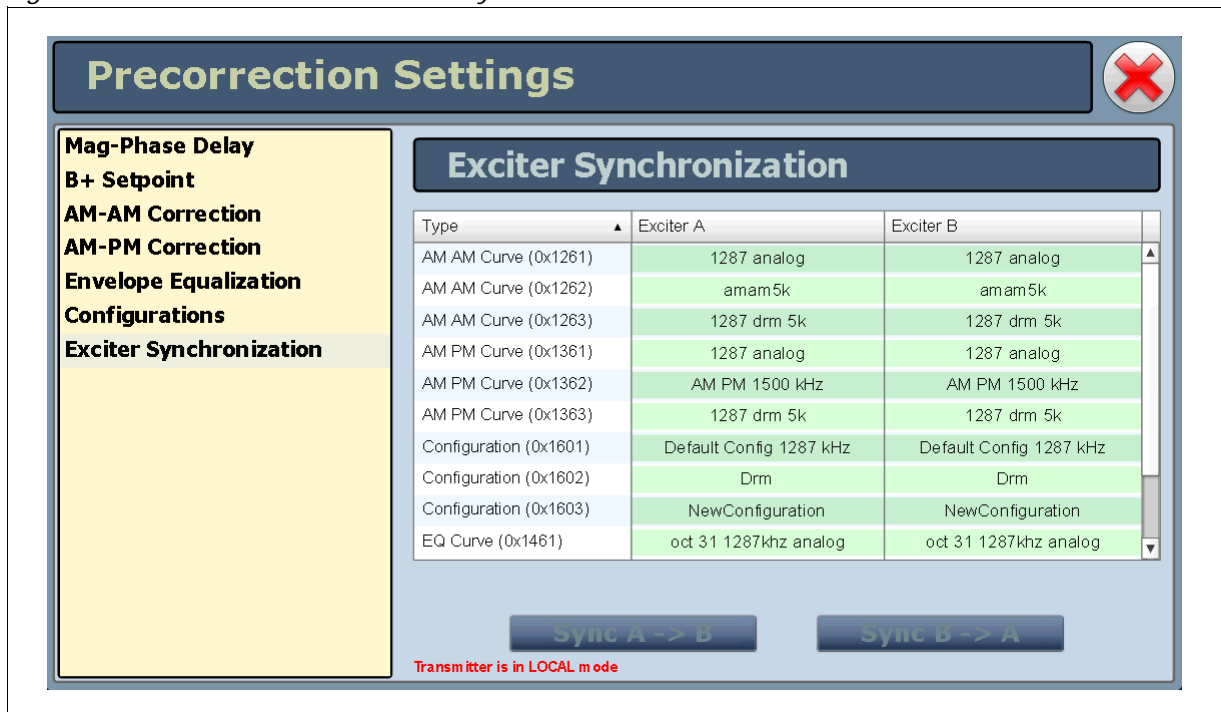
1. Select the **Presets** option from the Menu page to open the Presets page.
2. Click the **Load** button to select the preset that you want to edit.
3. In the General tab, select the Configuration field's drop-down menu and select the desired configuration for that preset. Click **Save** to overwrite the existing preset or **Save New** to create a new preset. **NOTE:** you can edit a preset without making it active (see [Editing, Creating and Deleting Presets, on page 3.2.59](#)).

Exciter Synchronization

The Exciter Synchronization page (see [Figure 3.2.104](#)) displays correction curve and configuration settings stored on each exciter and allows users to synchronize the settings between exciters A and B.

When AM-AM correction, AM-PM correction and EQ curves and configurations are created, they are stored in the active exciter. It may be necessary to copy these settings to the standby exciter, or in some cases to an exciter that has been replaced.

Figure 3.2.104: Precorrection - Exciter Synchronization



Items in green indicate the correction curve or configuration is identical for both exciters.

Items in red indicate a difference or a correction curve or configuration that is on one exciter only.

Click **Sync A -> B** to copy settings stored on exciter A to exciter B.

Click **Sync B -> A** to copy settings stored on exciter B to exciter A.

User Accounts

NOTE: This function is only available via the remote AUI.

Depending on user permission rights, you can set up accounts to allow certain users to access and control features of the remote AUI using the [User Accounts page](#) - see [Figure 3.2.105](#). To view the User Accounts page, select User Accounts from the Menu options.

NOTE: Depending on the permission level assigned to a given user, some features shown in [Figure 3.2.105](#) may not be displayed or available.

This section includes the following topics:

- [Setting User Permission Level, on page 3.2.124](#)
- [Editing Account Information, on page 3.2.124](#)
- [First-Time Login, on page 3.2.126](#)

Figure 3.2.105: User Accounts page

The NX5/NX3 contains a default user account when it leaves the factory. This account appears as Nautel (Auto) in the List of Users and has Super User 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 [First-Time Login, on page 3.2.126](#)).

Setting User Permission Level

There are four levels of permission that can be assigned to users, each with their own specific function. All users have permission to change their own username and password, but are otherwise limited to the following functions:

- View Only: Can monitor equipment data only. No administrative or control functions.
- Full Control: Can monitor and control equipment, with no administrative functions.
- Administrator: Can perform all functions. Administrator is the only permission level that allows addition, removal or modification of users.
- Custom: Administrator can customize the user permissions by manually selecting the permission levels.

Editing Account Information

Adding an Account

You must be an Administrator to use this function.

Procedure to add a user (see [Figure 3.2.106 on page 3.2.126](#)):

1. Open the User Accounts page.
2. Click Add (bottom of the screen) to open a small Add User window.
3. Beside Username, enter a name that identifies the new user, and click OK.
4. Select the new user to edit the settings.
5. Beside User Type, click the arrow to reveal a drop-down menu and select a type of user. If you select Custom as the type of user, then go to the Permissions section of the screen and mark individual permissions (see [Changing Permissions, on page 3.2.125](#)).
6. Click Apply to confirm your entries and create a new user or click Cancel to ignore your entries and exit the small window without creating a new user.

Editing an Existing Account

To edit an existing user account, click on the desired user in the Users list on the left-side of the remote AUI. The Settings for that user will be displayed on the right-hand side of the remote AUI. You can edit the Password, User Type (see [Setting User Permission Level](#) above), Auto Login status and Permissions.

Changing the Password

To change your password, click the Change Password button. A menu appears that prompts you to enter the old password, new password and confirmation of the new password. Click Apply to save or Cancel to exit this menu (see [Figure 3.2.106 on page 3.2.126](#)).

Setting Auto Login (Local Only) Status

When checked (☒) the selected user account will be automatically logged in to the transmitter with all the rights and privileges that have been assigned to that user. There may only be one auto login user at any given time; when the Auto Login check box is selected for one user account, it is automatically cleared on all other users. When not checked, the transmitter will not login automatically and will instead prompt for username and password when it boots up. It should be noted that only accounts with Administrator level permissions can set or remove Auto Login status.

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 3.2.106 on page 3.2.126](#)):

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. Click 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.

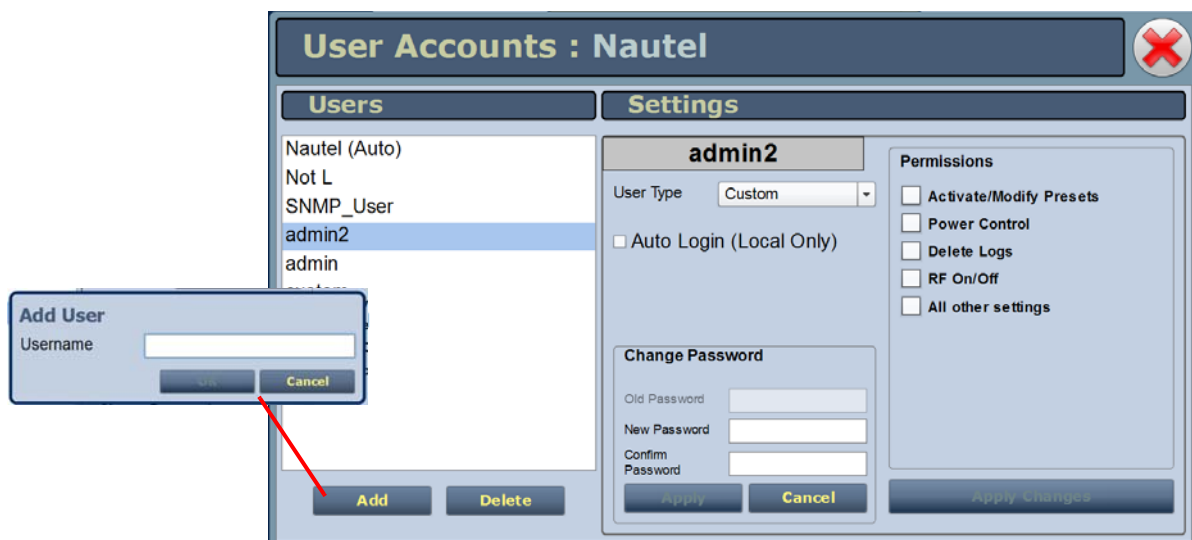
5. Click Apply to assign the new permissions to the selected user.

Removing an Account

To remove a user account, select the desired user from the Users list and click the Delete button. A verification prompt will appear. Click Yes to proceed or No to cancel the deletion.

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

Figure 3.2.106: User Accounts Page Layout



First-Time 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. Log in to the remote AUI using the default Username ("Nautel") and Password (blank).
2. Set up your own Administrator account, with your desired Username and Password.
3. Log out of the remote AUI, then login to your new Administrator account.
4. Delete the "Nautel" account.

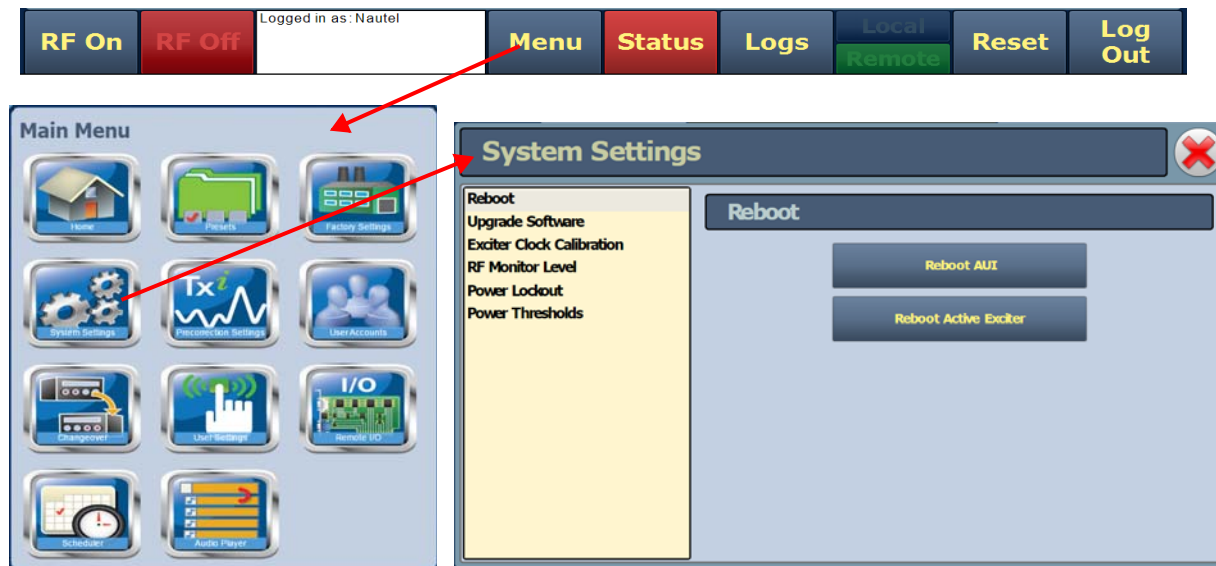
System Settings - Remote AUI

Users can determine critical system configuration parameters using the remote AUI or using the front panel UI. All system settings that can be performed on the remote AUI can also be performed on the front panel UI. The front panel UI's System Settings menu contains additional settings that are described in [System Settings - Front Panel UI, on page 3.2.135](#).

The remote AUI's System Settings page (see [Figure 3.2.107](#)) is accessible from the Main Menu options. It contains the following options:

- [Reboot, on page 3.2.128](#)
- [Upgrade Software, on page 3.2.129](#)
- [Exciter Clock Calibration, on page 3.2.130](#)
- [RF Monitor Level, on page 3.2.132](#)
- [Power Lockout, on page 3.2.133](#)
- [Power Thresholds, on page 3.2.134](#)

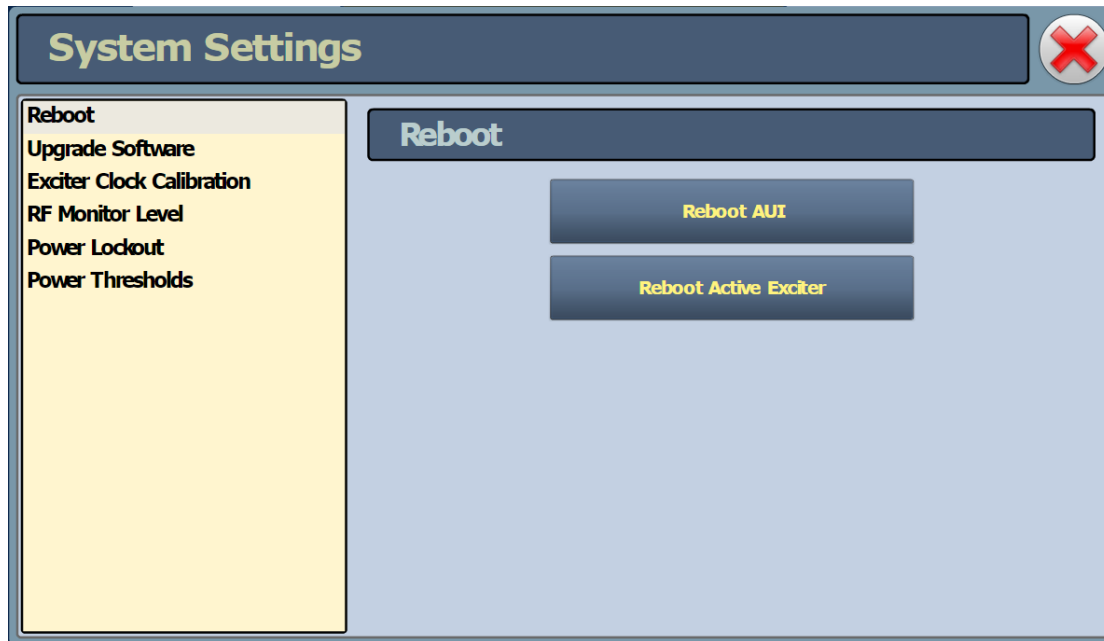
Figure 3.2.107: System Settings Page



Reboot

The Reboot page (see [Figure 3.2.108](#)) allows users to reboot two items - the remote AUI and the active exciter.

Figure 3.2.108: Reboot page

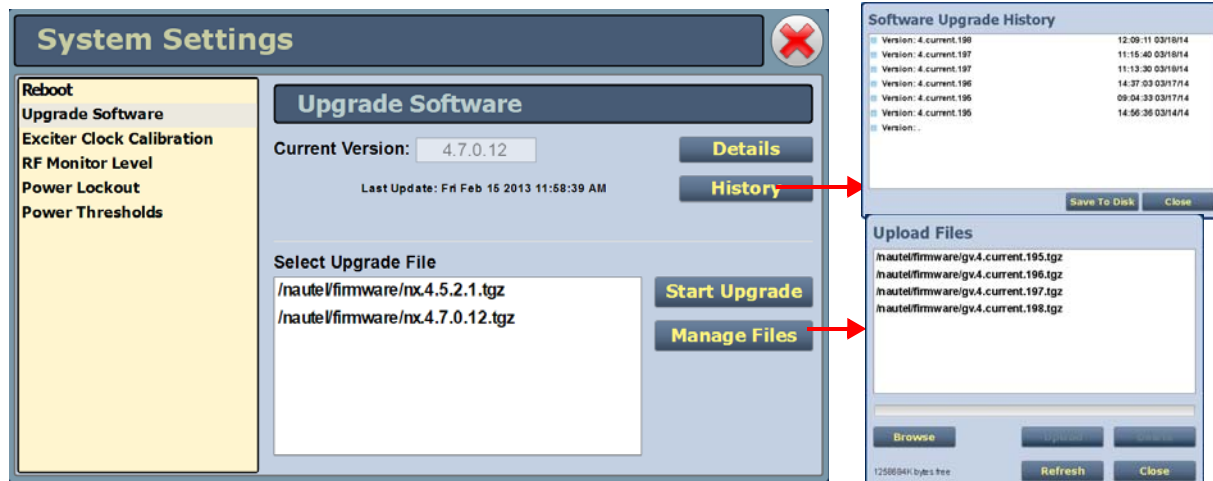


- To reboot the remote AUI, click the Reboot AUI button. This will function with remote control enabled or disabled. After the reboot delay, you must log in to the remote AUI again.
- To reboot the active exciter, click the Reboot Active Exciter button, if the button is available (highlighted). NOTE: If the active exciter reboots, a brief interruption in transmitter operation will occur.
- Click X in the upper, right corner to close this page and return to the Home page.

Upgrade Software

The Upgrade Software page (see [Figure 3.2.109](#)) 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 3.3.1](#).

Figure 3.2.109: Upgrade Software page



Select the Upgrade Software option from the left side of the System Settings page to open a related window on the right side of the page. 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 clicking the View Last Upgrade checkbox.
- **History:** displays a window containing a history of the upgrades to the software. Click 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:** 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.

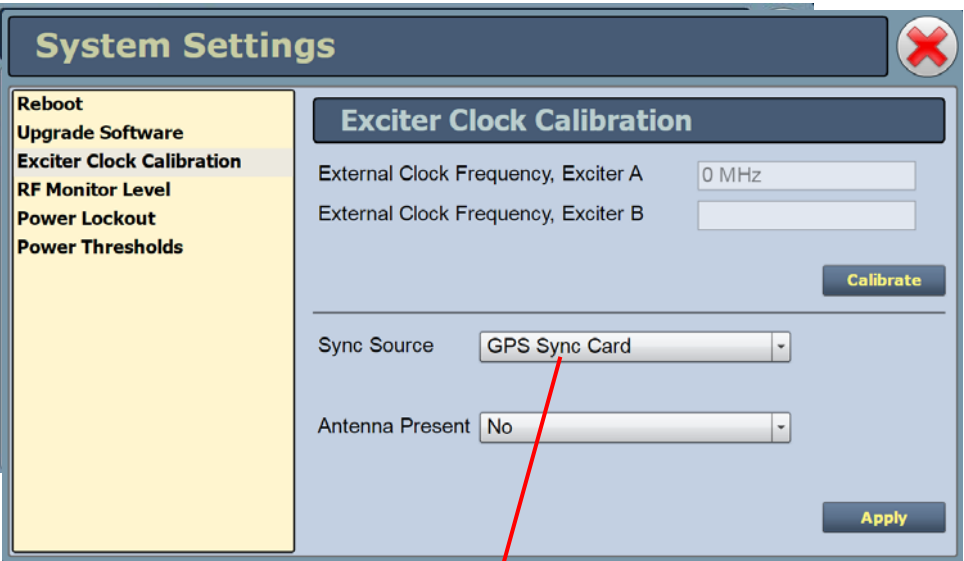
NOTE: Before performing a software upgrade, maximize the host's disk space by deleting the old .tgz files. Click the Manage Files button to display the Upload Files window, select the file(s) to delete, and click the Delete button.

Exciter Clock Calibration

The Exciter Clock Calibration page (see [Figure 3.2.110](#)) allows you to calibrate the internal clock reference to an external 10 MHz clock by clicking the **Calibrate** button. Both exciters are calibrated at the same time. Note: typically, a value change is not required.

The exciter clock may also be synchronized to a reference source, either an external 10 MHz reference connected to J1B of the control/interface PWB, a Nautel optional GPS sync PWB, or a combiner, as applicable. The exciter reference will lock to the external source frequency within 10 MHz (0.01 Hz) using the 10 MHz sync input, to within 2 MHz (0.002 Hz) using the GPS sync PWB without an antenna, and to within the quality of the GPS system when using the GPS sync PWB with an antenna.

Figure 3.2.110: System Settings - Exciter Clock Calibration



If None (default) or 10MHz Sync Source is selected, no other settings are required.

If GPS Sync Card is selected, the Antenna Present drop-down field is also displayed (select Yes or No)

If Combiner is selected (for combined systems only), the Phase Offset field is also displayed.

Procedure to calibrate the exciter clock:

1. Select the **Exciter Clock Calibration** option from the left side of the **System Settings** page to open a related window on the right side of the page.
2. Connect an external 10 MHz source to A4J1B, verify a value near 10 MHz displays in both External Clock Frequency fields, and click **Calibrate**.

Procedure to synchronize the exciter clock:

1. Select the **Exciter Clock Calibration** option from the left side of the *System Settings* page to open a related window on the right side of the page.
2. Connect a source (e.g., 10 MHz input or GPS sync).
3. Select a Sync Source from the drop-down list, noting the options are:
 - ❖ GPS Sync Card: the exciter will operate with external Frequency and Phase sync; it will automatically revert to Frequency sync if the 1 kHz signal is not reliable, or to its internal frequency reference if the 10 MHz signal is not reliable. An additional Antenna Present drop-down menu will appear with this selection. If there is no GPS antenna (select No), the GPS sync card's receiver alarms are inhibited.
 - ❖ 10 MHz Sync Input: the exciter will operate with Frequency sync, and it will automatically revert to its internal frequency reference if the external 10 MHz sync signal is not reliable.
 - ❖ Combiner: for transmitters configured as part of a combined system. The exciter will operate with external Frequency and Phase sync, and it will inhibit its output if any of the necessary signals are not reliable. An additional Phase Offset field will appear with this selection. The user can enter a phase offset in 0.001 degree increments.

NOTE: The remote AUI's Scheduler button will not display when the Sync Source is set to Combiner. Use the associated combiner cabinet's AUI Scheduler button to configure the system schedule.
 - ❖ None: the exciter will work entirely with its internal frequency reference.
4. Select Apply to activate the selection.

RF Monitor Level

The **RF Monitor Level** page allows you to set values for the Gain at Full Power (in dB) (see [Figure 3.2.111](#)) on the amplifier that drives the RF Monitor output as well as determine the RF monitor source (forward or reflected power). The RF monitor is factory set to provide a level of 5 V rms into 50 ohm (27 dBm).

The Current Gain value is shown for reference. Increase the gain to increase the RF monitor output level; decrease the gain to decrease the RF monitor output level. The transmitter will attempt to maintain this level at all power set points.

NOTE: You can achieve an RF monitor level of 5 V rms for power levels as low as 10% of rated power for NX5 or 17% of rated power for NX3. Below 10% (for NX5) or below 17% (for NX3) rated power, the maximum achievable RF monitor level may be lower than 5 V rms.

Figure 3.2.111: System Settings - RF Monitor Level

System Settings										
<ul style="list-style-type: none"> Reboot Upgrade Software Exciter Clock Calibration RF Monitor Level Power Lockout Power Thresholds 	<h3>RF Monitor Level</h3> <table> <tr> <td>Current Gain</td> <td>8.9 dB</td> <td></td> </tr> <tr> <td>Gain at Full Power</td> <td>8.9 dB</td> <td>Apply</td> </tr> <tr> <td>RF Monitor Source</td> <td>Forward Power</td> <td>Apply</td> </tr> </table>	Current Gain	8.9 dB		Gain at Full Power	8.9 dB	Apply	RF Monitor Source	Forward Power	Apply
Current Gain	8.9 dB									
Gain at Full Power	8.9 dB	Apply								
RF Monitor Source	Forward Power	Apply								

Procedure to set the RF monitor level:

1. Select the **RF Monitor Level** option from the left side of the **System Settings** page to open a related window on the right side of the page.
2. Select Forward Power as the RF Monitor Source.
3. Observe the Current Gain value and its corresponding RF monitor level (measured). Enter the new Gain at Full Power value to increase or decrease the RF monitor level.
4. Click **Apply**. Verify the measured RF monitor level is as desired. Readjust as necessary.

Power Lockout

The **Power Lockout** page (see [Figure 3.2.112](#)) allows you to set a high power limit for the transmitter. There is provision to set up to eight different limits (which can be used to accommodate daytime/night-time patterns or different antennae), but only the selected limit is active. You can also select a high power limit using a digital remote input (see [Remote Inputs - Remote AUI on page 3.2.165](#)).

The transmitter power cannot increase beyond the active limit. For analog and hybrid modes of operation the displayed power limits represent carrier power. For DRM mode, the displayed power limits represent RMS power. If the active preset set point is greater than the active lockout limit, a High Power Lockout alarm will appear on the Transmitter Status page.

For basic transmitter operation, you must configure and enable at least one of the eight high power limits. Max Power Lockout 1 is factory set for the transmitter's maximum output power. Set up a power lockout using the remote AUI as follows:

Figure 3.2.112: System Settings - Power Lockout

Levels	
Max Power Lockout 1	27500 W
Max Power Lockout 2	0 W
Max Power Lockout 3	0 W
Max Power Lockout 4	0 W
Max Power Lockout 5	0 W
Max Power Lockout 6	0 W
Max Power Lockout 7	0 W
Max Power Lockout 8	0 W

1. Select **Power Lockout** from the left side of the **System Settings** page to open a related window on the right side of the page.
2. Select the desired Active Power Lockout (Max Power Lockout 1 through 8) from the drop-down menu
3. Enter the desired **Power Lockout** level for each of the eight lockout options, noting it will represent the maximum allowable power level.
4. Click **Apply** to activate the change(s) or click **Cancel** to abort.

Power Thresholds

The **Power Thresholds** page (see [Figure 3.2.113](#)) allows you to set two distinct low forward power thresholds the transmitter. These thresholds are for monitoring purposes only. The transmitter will not shut back if these thresholds are crossed, but alarm notifications are generated for each of the two thresholds (Low Forward Power Threshold 1 and Low Forward Power Threshold 2) on the Transmitter Status page.

Figure 3.2.113: System Settings - Power Thresholds

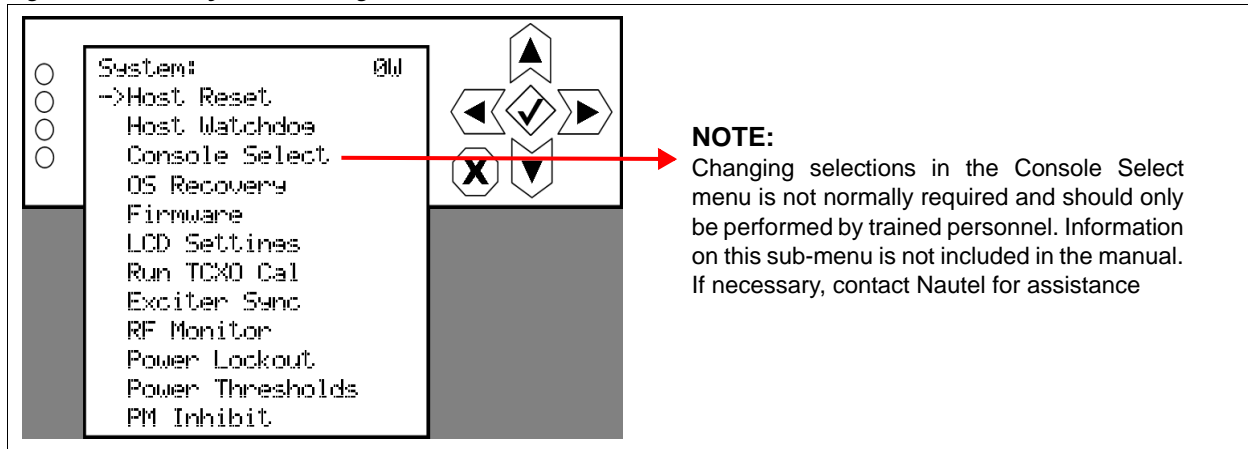
System Settings	
Reboot Upgrade Software Exciter Clock Calibration RF Monitor Level Power Lockout Power Thresholds	Power Thresholds Low Forward Power Threshold 1 <input type="text" value="85.0 %"/> Low Forward Power Threshold 2 <input type="text" value="80.0 %"/> <div>Apply Cancel</div>

1. Select **Power Thresholds** from the left side of the **System Settings** page to open a related window on the right side of the page.
2. Enter the desired low power threshold level for each of the two options, noting the level represents the percentage of the normal operating setpoint. The default settings for Low Forward Power Threshold 1 and 2 are 50% and 25%, respectively.
3. Click **Apply** to activate the change(s) or click **Cancel** to abort.

System Settings - Front Panel UI

You can establish various user settings for the NX5/NX3 using the local front panel UI's Main Menu -> System Settings menu (see [Figure 3.2.113](#)).

Figure 3.2.114: System Settings Menu



The following options are available:

- ❖ Host Reset: see [Host Reset](#), on page 3.2.136 ***
- ❖ Host Watchdog: see [Configuring Host Watchdog](#), on page 3.2.137
- ❖ Console Select: see NOTE in [Figure 3.2.113](#)
- ❖ OS Recovery: see [OS Recovery](#), on page 3.2.137
- ❖ Firmware Update: see [Updating Firmware](#), on page 3.2.138***
- ❖ LCD Settings: see [Adjusting LCD Display Settings](#), on page 3.2.139
- ❖ Run TCXO Cal: see [Run TCXO Calibration](#), on page 3.2.140***
- ❖ Exciter Sync: see [Exciter Synchronization](#), on page 3.2.141
- ❖ RF Monitor: see [RF Monitor Settings](#), on page 3.2.143***
- ❖ Power Lockout: see [Power Lockout Settings](#), on page 3.2.144***
- ❖ Power Thresholds: see [Power Threshold Settings](#), on page 3.2.146***
- ❖ PM Inhibit: see [PM Inhibit](#), on page 3.2.147

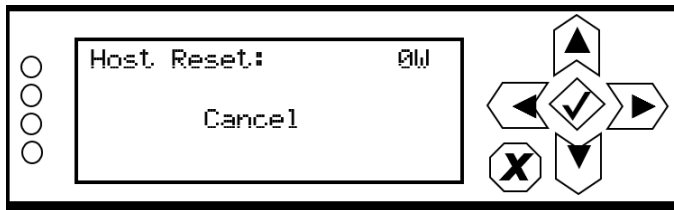
*** **NOTE:** The remote AUI also has a System Settings menu, which contains similar functions to the front panel UI (e.g., host reset, firmware update, RF monitor level, etc.). In this case, refer to [System Settings - Remote AUI](#), on page 3.2.127 for information on the front panel UI settings. Additional user settings, available only through the front panel UI, are described in this section.

Host Reset

NOTE: A host reset can also be performed from the remote AUI, using the Reboot AUI button on the Reset page (see [Reboot](#), on page 3.2.128). Once the host is reset, all users that were remotely connected (logged in) will be logged out.

From the front panel UI, you can reset the host on the control/interface PWB. To view the Host Reset screen, select System Settings -> Host Reset from the Main Menu (see [Figure 3.2.115](#)).

Figure 3.2.115: Host Reset Screen



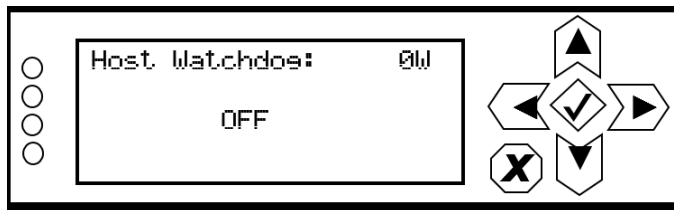
Use the up and down buttons to toggle between Force Host Reset and Cancel. Press the accept (checkmark) button to save the change. If a reset is selected, it will occur immediately. Select Cancel or press X to abort the reset and return to the previous menu.

Configuring Host Watchdog

NOTE: Host watchdog configuration is only available using the front panel UI.

From the front panel UI, you can enable or disable the host watchdog feature. This feature, when enabled, monitors communication between the host processor and the DSP processor on the control/interface PWB. If communication is lost for more than one minute, the transmitter will initiate an alarm and reboot the host. To view the Host Watchdog screen, select System Settings -> Host Watchdog from the Main Menu (see [Figure 3.2.116](#)).

Figure 3.2.116: Host Watchdog Screen



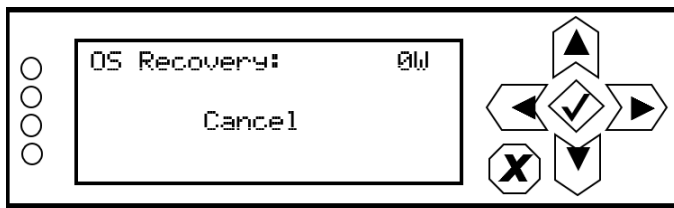
Use the up and down buttons to toggle between ON (enabled) and OFF (disabled). Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

OS Recovery

NOTE: An OS recovery reset can restore the transmitter's operating system. It should only be required if a problem occurs during a software upgrade. This feature is only available using the front panel UI.

From the front panel UI, you can perform a recovery reset of the operating system (OS). You will also need to install a flash drive, provided by Nautel, in one of the two USB ports (J3B and J3C) on control/interface PWB (A4). To view the OS Recovery screen, select System Settings -> OS Recovery from the Main Menu (see [Figure 3.2.117](#)).

Figure 3.2.117: OS Recovery Screen



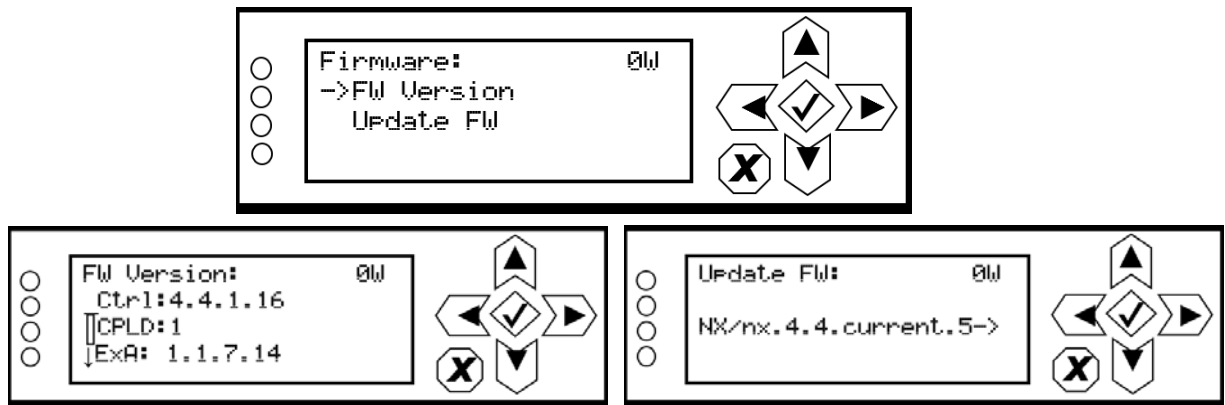
Use the up and down buttons to toggle between Force OS Recovery and Cancel. Press the accept (checkmark) button to save the change. Select Cancel or press X to abort the recovery and return to the previous menu.

Updating Firmware

NOTE: A firmware update can also be performed from the remote AUI, using the Upgrade Software page in the System Settings menu (see [Upgrade Software, on page 3.2.129](#)).

From the front panel UI, you can update firmware used in the transmitter. To perform a firmware update, select System Settings -> Firmware from the Main Menu (see [Figure 3.2.118](#)).

Figure 3.2.118: Firmware Update Menu Screens



In the FW Version screen, use the up and down buttons to scroll through the list of existing firmware versions installed in the transmitter (Ctrl, CPLD, ExA, etc). Press X to return to the Firmware menu.

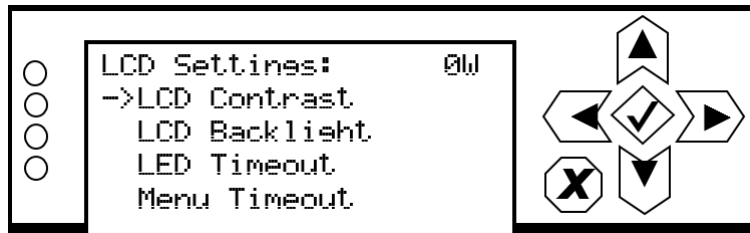
In the Update FW screen, use the up and down buttons to select the desired firmware for updating, and press the accept (checkmark) button to initiate the update. Press X to return to the Firmware menu.

Adjusting LCD Display Settings

NOTE: Front panel display settings are only available using the front panel UI.

From the front panel UI, you can configure the LCD display's contrast, brightness and backlight settings. To view the LCD Settings screen, select User Settings -> LCD Settings from the Main Menu (see [Figure 3.2.119](#)).

Figure 3.2.119: LCD Settings Menu



This menu has four sub-menu options:

- ❖ LCD Contrast - sets the display contrast.
- ❖ LCD Backlight - sets the brightness of the display's backlight during normal use.
- ❖ LED Timeout - sets a time delay, after a period of non-use, that the brightness of the display's backlight will dim. This feature can also be disabled.
- ❖ Menu Timeout - sets a time delay, after a period of non-use, that the front panel screen will revert back to the main menu.

Use the up and down buttons to move the cursor to the desired display setting and then press the right button to enable editing of the setting. [Figure 3.2.120 on page 3.2.140](#) shows the editing screens for the LCD Settings menu. Within any of the editing screens, use the up and down buttons to edit a setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.120: LCD Settings Editing Screens



Select a value between 50 (lighter contrast) and 200 (darker contrast) (in increments of 5). Press the cancel (X) button to discard changes and return to the previous menu. Default setting is 100.



Select a value between 0 and 100% (in 5% increments). Press the cancel (X) button to discard changes and return to the previous menu. Default setting is 100%.



Select disabled (i.e., no timeout) or select a time period between 0 and 1800 seconds (30 minutes) (in 5 s increments). Press the cancel (X) button to discard changes and return to the previous menu. Default setting is 900 s (15 minutes).



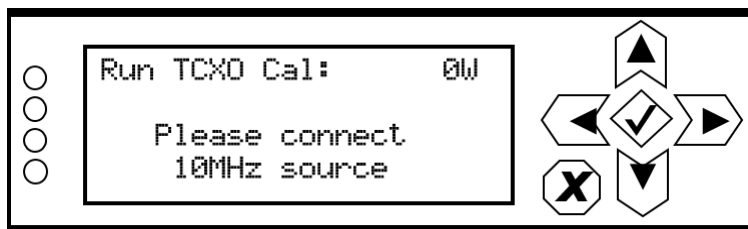
Select a time period between 1 and 60 minutes (in 1 minute increments). Press the cancel (X) button to discard changes and return to the previous menu. Default setting is 10 minutes.

Run TCXO Calibration

NOTE: You can also adjust the exciter TCXO offset value using the remote AUI (see [Exciter Clock Calibration](#), on page 3.2.130).

To view the front panel UI's Run TCXO Cal screen (see [Figure 3.2.121](#)), select System Settings -> Run TCXO Cal from the Main Menu. The calibration routine will begin when the external 10 MHz source is connected.

Figure 3.2.121: Run TCXO Cal screen

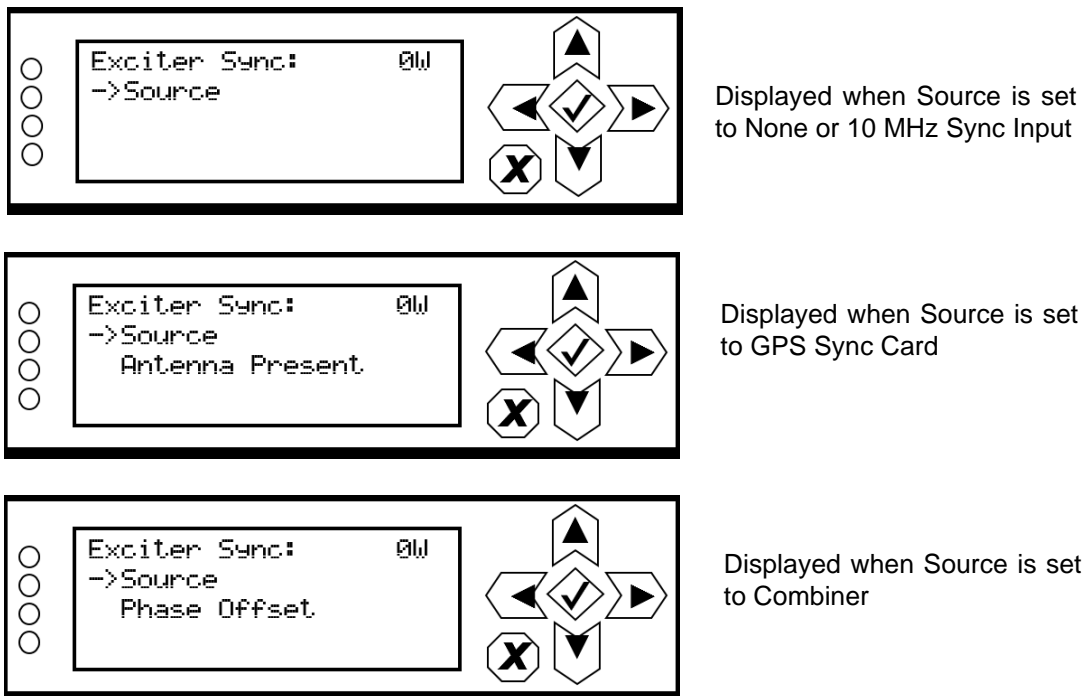


Exciter Synchronization

NOTE: Exciter synchronization settings are only available using the front panel UI.

From the front panel UI, you can configure synchronization settings for the active exciter. Note that a different menu will appear depending on the currently configured source type. To view the Exciter Sync screen, select User Settings -> Exciter Sync from the Main Menu (see [Figure 3.2.122](#)).

Figure 3.2.122: Exciter Sync Menu



Use the up and down buttons to move the cursor to the desired line item and then press the right button to enable editing.

[Figure 3.2.123 on page 3.2.142](#) shows all possible editing screens for the Exciter Sync menu. Within any of the editing screens, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.123: Exciter Sync Editing Screens

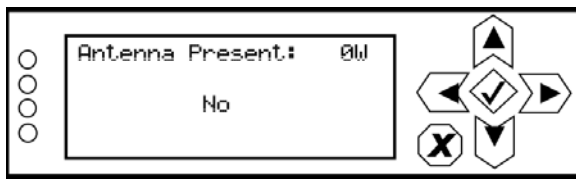


Source: 0W
10 MHz Sync Input

Navigation buttons: Up, Down, Left, Right, Checkmark, Cancel (X)

Four status indicator circles on the left.

Select a source type - None, 10 MHz Sync input, GPS Sync Card or Combiner. Press the cancel (X) button to discard changes and return to the previous menu.



Antenna Present: 0W
No

Navigation buttons: Up, Down, Left, Right, Checkmark, Cancel (X)

Four status indicator circles on the left.

Displayed only when the Source is set to GPS Sync Card. Select Yes (antenna present) or No (antenna not present). Press the cancel (X) button to discard changes and return to the previous menu.



Phase Offset: 0W
0.000°
(-180 to 180°)

Navigation buttons: Up, Down, Left, Right, Checkmark, Cancel (X)

Four status indicator circles on the left.

Displayed only when the Source is set to Combiner. Select a phase offset between -180 and 180 degrees, in 0.001 degree increments). Press the cancel (X) button to discard changes and return to the previous menu.

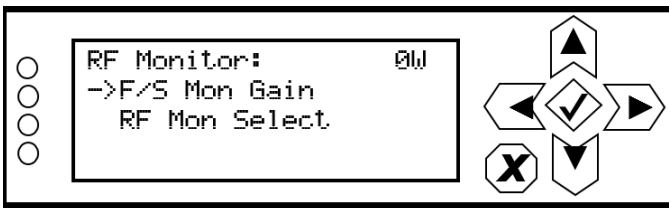
RF Monitor Settings

NOTE: You can also adjust the RF monitor gain using the remote AUI (see [RF Monitor Level](#), on page 3.2.132).

The RF Monitor menu allows you to set values for the Gain at Full Power (in dB) on the amplifier that drives the RF Monitor output. The RF monitor is factory set to provide a level of 5 V rms into 50 ohm (27 dBm). From the front panel UI, you can establish the full-scale monitor gain and the power parameter (forward or reflected power) for monitoring. To view the RF Monitor menu, select User Settings -> RF Monitor from the Main Menu (see [Figure 3.2.124](#)).

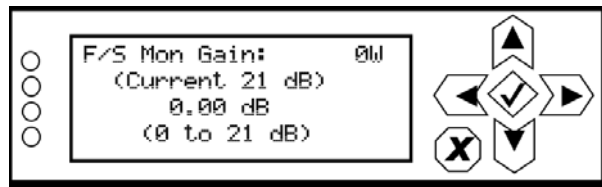
NOTE: You can achieve an RF monitor level of 5 V rms for power levels as low as 10% of rated power for NX5 or 17% of rated power for NX3. Below 10% (for NX5) or below 17% (for NX3) rated power, the maximum achievable RF monitor level may be lower than 5 V rms.

Figure 3.2.124: RF Monitor Menu



Use the up and down buttons to move the cursor to the desired line item and then press the right button to enable editing. [Figure 3.2.125](#) shows the two editing screens for the RF Monitor menu. Within either of the editing screens, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.125: RF Monitor Editing Screens



Select a gain between 0 and 21 dB, in 0.01 dB increments, that corresponds to a full-scale reading. Press the cancel (X) button to discard changes and return to the previous menu. The current gain value is shown in parentheses for reference. Increase the gain to increase the RF monitor output level; decrease the gain to decrease the RF monitor output level. The transmitter will attempt to maintain this level at all power set points.



Select the parameter for monitoring on the RF Monitor output - Forward Power or Reflected Power. Press the cancel (X) button to discard changes and return to the previous menu.

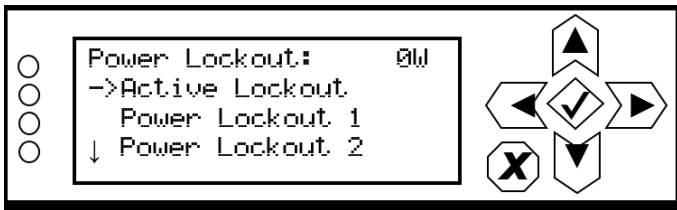
Power Lockout Settings

NOTE: You can also adjust the power lockout settings using the remote AUI (see [Power Lockout](#), on page 3.2.133).

The Power Lockout menu (see [Figure 3.2.126 on page 3.2.144](#)) allows you to set a high power limit for the transmitter. There is provision to set up to eight different limits (which can be used to accommodate daytime/night-time patterns or different antennae), but only the selected limit is active. You can also select a high power limit using a digital remote input (see [Remote Inputs - Remote AUI on page 3.2.165](#)).

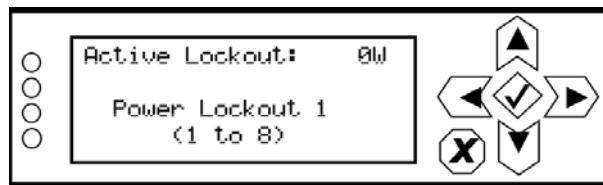
The transmitter power cannot increase beyond the active limit. For analog and hybrid modes of operation the displayed power limits represent carrier power. For DRM mode, the displayed power limits represent RMS power. If the active preset set point is greater than the active lockout limit, a High Power Lockout alarm will appear on the Transmitter Status page.

Figure 3.2.126: Power Lockout Menu



Use the up and down buttons to move the cursor to the desired line item and then press the right button to enable editing. Figure 3.2.127 shows the two editing screens for the Power Lockout menu. Within either of the editing screens, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.127: Power Lockout Editing Screens



Select the active power lockout (1 through 8). Press the cancel (X) button to discard changes and return to the previous menu.



For the selected active power lockout, select the high power limit for the transmitter between 0 and 3.3 kW (NX3) or 5.5 kW (NX5), in 0.01 kW increments. Press the cancel (X) button to discard changes and return to the previous menu.

For basic transmitter operation, you must configure and enable at least one of the eight high power limits. Max Power Lockout 1 is factory set for the transmitter's maximum output power. Set up a power lockout using the front panel UI as follows:

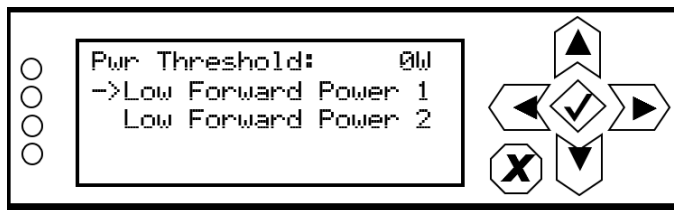
1. Select Active Lockout from the Main Menu -> System Settings -> Power Lockout screen.
2. Select the desired Active Lockout (Power Lockout 1 through 8). Press the accept (checkmark) button to save the change. Press X to return to the previous menu.
3. Enter the appropriate Power Lockout # screen for the active lockout selected in step 2. Select the desired high power limit for the active lockout, noting it will represent the maximum allowable power level. Press the accept (checkmark) button to save the change. Press X to return to the previous menu.
4. Repeat step 3 for the other power lockouts.

Power Threshold Settings

NOTE: You can also adjust the power threshold settings using the remote AUI (see [Power Thresholds](#), on page 3.2.134).

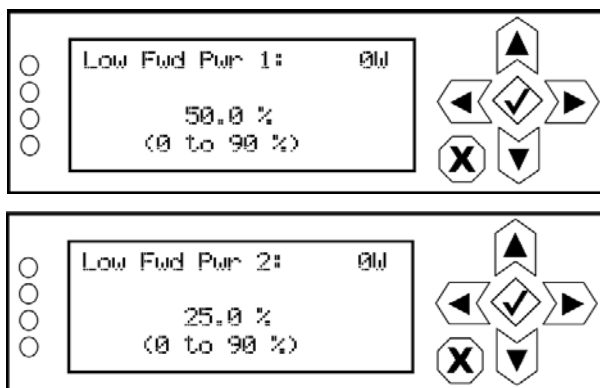
The Power Thresholds menu (see [Figure 3.2.128](#)) allows you to set two distinct low forward power thresholds the transmitter. These thresholds are for monitoring purposes only. The transmitter will not shut back if these thresholds are exceeded, but alarm notifications are generated for each of the two thresholds (Low Forward Power Threshold 1 and Low Forward Power Threshold 2) on the Transmitter Status page.

Figure 3.2.128: Power Thresholds Menu



Use the up and down buttons to move the cursor to the desired threshold and then press the right button to enable editing. [Figure 3.2.129](#) shows the two editing screens for the Power Thresholds menu. Within either of the editing screens, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.129: Power Thresholds Editing Screens



Select the low forward power 1 threshold for the transmitter between 0 and 90%, in 0.1% increments, noting the value represents the percentage of the normal operating power setpoint. Default setting is 50%. Press the cancel (X) button to discard changes and return to the previous menu.

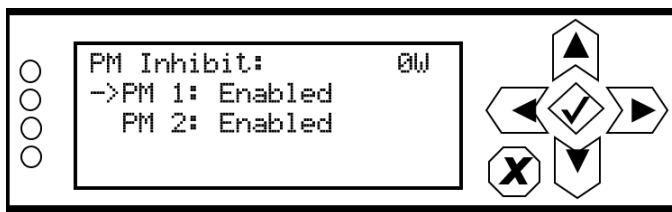
Select the low forward power 2 threshold for the transmitter between 0 and 90%, in 0.1% increments, noting the value represents the percentage of the normal operating power setpoint. Default setting is 25%. Press the cancel (X) button to discard changes and return to the previous menu.

PM Inhibit

NOTE: You can also enable and disable RF power modules using the remote AUI (see [Figure 3.2.41](#) on page 3.2.52).

The PM Inhibit menu allows the user to locally disable any of the four power modules in the transmitter. Use the up and down buttons to move the cursor to the desired power module and then press the right button to enable editing. See [Figure 3.2.130](#). Use the up and down buttons to select Enable or Disable. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.130: PM Inhibit Screen

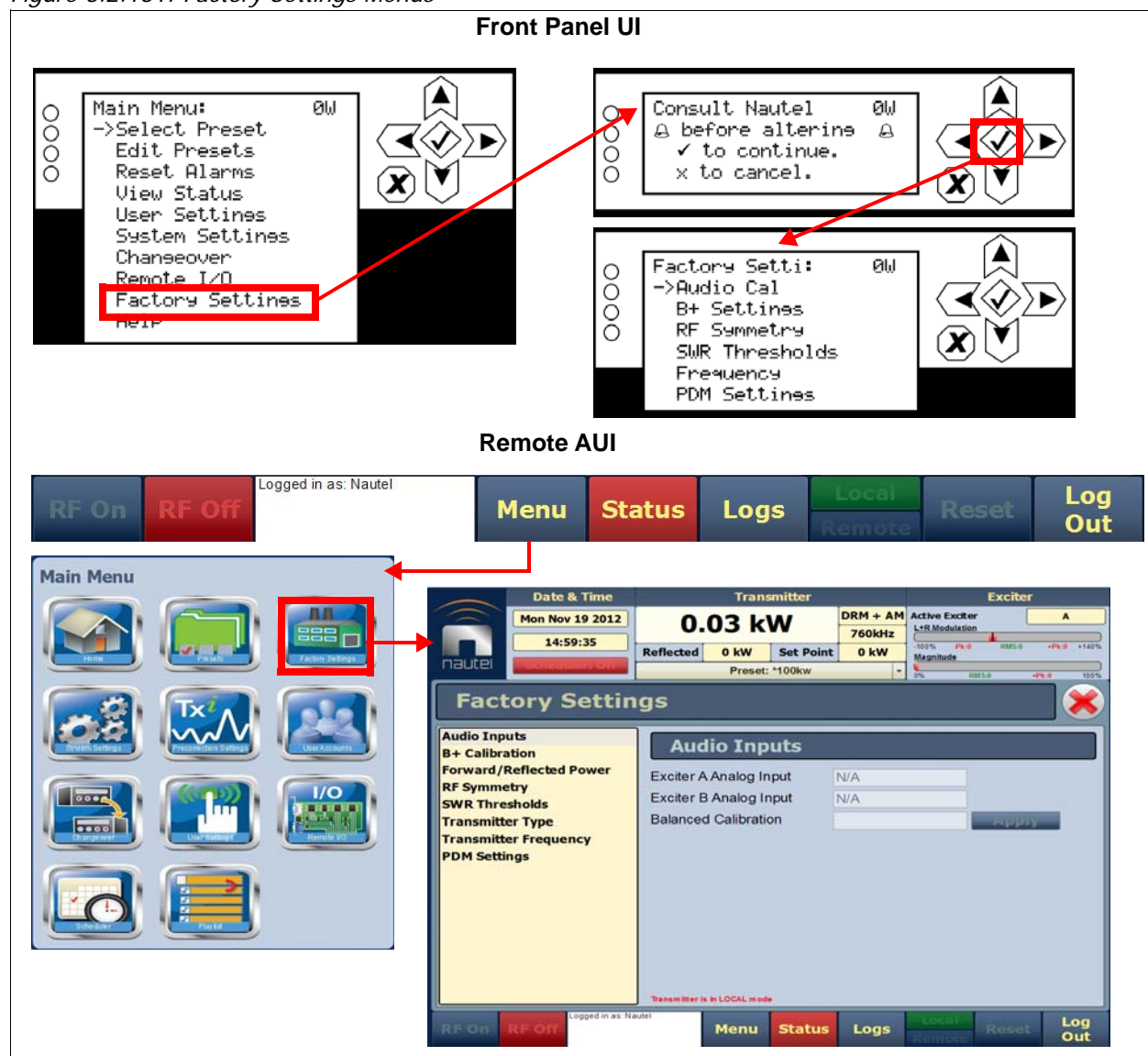


Factory Settings

Values for various critical parameters (audio input levels, B+ voltage settings, SWR thresholds, carrier frequency, PDM settings, etc.) can be set using the front panel UI's Factory Settings menu or the remote AUI's Factory Settings page (see [Figure 3.2.131](#)).

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Figure 3.2.131: Factory Settings Menus



This section includes the following topics:

- ❖ [Audio Input Calibration, on page 3.2.150](#)
- ❖ [B+ Voltage Calibration, on page 3.2.152](#)
- ❖ [Forward/Reflected Power Calibration, on page 3.2.154](#)
- ❖ [RF Symmetry Adjustment, on page 3.2.155](#)
- ❖ [SWR Threshold Adjustment, on page 3.2.157](#)
- ❖ [Transmitter Type, on page 3.2.159](#)
- ❖ [Transmitter Frequency, on page 3.2.160](#)
- ❖ [PDM Settings, on page 3.2.162](#)

NOTE: Most factory settings can be adjusted using either the front panel UI or the remote AUI. Where applicable, this section describes both methods. There are additional factory settings that are available only through the remote AUI.

Audio Input Calibration

You can calibrate analog audio inputs using the remote AUI (see [Calibrating Audio Inputs - Using the Remote AUI](#)) or the local front panel UI (see [Calibrating Audio Inputs - Using the Front Panel UI](#)). If you change a setting on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Calibrating Audio Inputs - Using the Remote AUI

The remote AUI's Audio Inputs page (see [Figure 3.2.132](#)) displays the measured level of the Balanced Analog source (in dBm). The Balanced Calibration field allows for establishing a reference from a known source. Once a calibration value has been determined and entered, click the Apply button to save the changes.

Figure 3.2.132: Factory Settings - Audio Inputs Page

Factory Settings

Audio Inputs

B+ Calibration
Forward/Reflected Power
RF Symmetry
SWR Thresholds
Transmitter Type
Transmitter Frequency
PDM Settings

Exciter A Analog Input N/A
Exciter B Analog Input N/A
Balanced Calibration **Apply**

Transmitter is in LOCAL mode

Calibrating Audio Inputs - Using the Front Panel UI

The front panel UI's Audio Cal screen (see [Figure 3.2.133](#)) displays the level of the analog audio source (in dBm).

Figure 3.2.133: Factory Settings - Audio Cal Screen



Use the up and down buttons to increase or decrease the audio calibration level between -10 and 12 dBm (in 0.01 dBm increments). Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

B+ Voltage Calibration

You can calibrate the B+ voltage using the remote AUI (see [Calibrating B+ Voltage - Using the Remote AUI](#)) or the local front panel UI (see [Calibrating Audio Inputs - Using the Front Panel UI](#)). If you change a setting on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Calibrating B+ Voltage - Using the Remote AUI

The remote AUI's B+ Calibration page (see [Figure 3.2.134](#)) displays the measured B+ levels, and a B+ Calibration Value field. The calibration field allows you to enter a measured B+ voltage to calibrate the B+ based on an externally measured B+ level. Save changes to the B+ Calibration Value by clicking the Apply button.

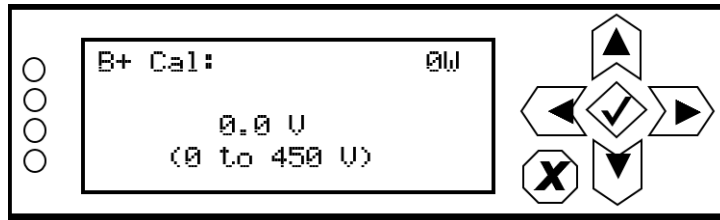
Figure 3.2.134: Factory Settings - B+ Calibration Page

Factory Settings	
Audio Inputs	B+ Calibration
B+ Calibration	
Forward/Reflected Power	
RF Symmetry	
SWR Thresholds	
Transmitter Type	
Transmitter Frequency	
PDM Settings	
B+ Sample, Exciter A	399 V
B+ Sample, Exciter B	
B+ Calibration Value	
Apply	

Calibrating B+ Voltage - Using the Front Panel UI

The front panel UI's B+ Cal menu (see [Figure 3.2.135](#)) allows for setting of the B+ calibration. The calibration field allows you to enter a measured B+ voltage to calibrate the B+ based on an externally measured B+ level.

Figure 3.2.135: Factory Settings - B+ Cal Menu



Use the up and down buttons to increase or decrease the B+ calibration value, from a known measured source, between 0 and 450 V in 0.1 V increments. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Forward/Reflected Power Calibration

NOTE: This setting is only available via the remote AUI.

The remote AUI's Forward/Reflected Power page (see [Figure 3.2.136](#)) allows the forward/reflected power to be calibrated based on the filter lag, the ideal PA impedance (magnitude and phase), the test load impedance and the measured RF current. Nautel sets these values at the factory. Value changes are not typically required unless you are performing a frequency change.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Figure 3.2.136: Factory Settings - Forward/Reflected Power Page

Factory Settings

Forward/Reflected Power

SWR Protection ☒ On ☐ Off

1st Inductor Value uH Apply

Filter Lag ° Apply

Ideal PA Impedance Ω ° Apply

Target PA Impedance Ω ° Load

Output Impedance Ω ° Calibrate

RF Current A

Transmitter is in LOCAL mode

Attempting to turn off (Disable) the SWR Protection will display the following WARNING, prompting you to confirm your selection.

WARNING

Proceeding will cause the SWR protection to be disabled. Ensure the transmitter is running into a properly rated test load and not into the antenna before proceeding.

Do you wish to proceed?

Yes No

RF Symmetry Adjustment

You can adjust RF symmetry values using the remote AUI (see [Adjusting RF Symmetry - Using the Remote AUI](#)) or the local front panel UI (see [Adjusting RF Symmetry - Using the Front Panel UI](#)). If you change a setting on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Adjusting RF Symmetry - Using the Remote AUI

The RF Symmetry page (see [Figure 3.2.137](#)) allows entering RF symmetry values for exciter A or B to attempt to minimize second harmonic content when operating on each exciter. Values are factory set and should not require adjustment.

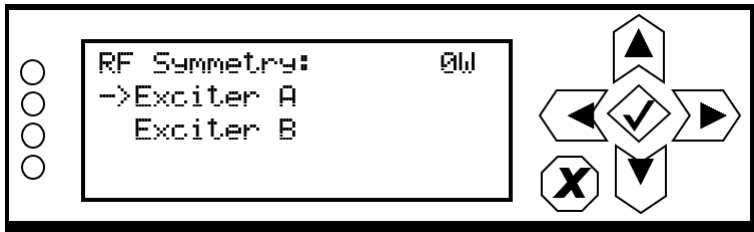
Figure 3.2.137: Factory Settings - RF Symmetry Page

Factory Settings							
<ul style="list-style-type: none"> Audio Inputs B+ Calibration Forward/Reflected Power RF Symmetry SWR Thresholds Transmitter Type Transmitter Frequency PDM Settings 	<h3>RF Symmetry</h3> <table> <tr> <td>Exciter A</td> <td>0</td> <td>Apply</td> </tr> <tr> <td>Exciter B</td> <td>0</td> <td>Apply</td> </tr> </table>	Exciter A	0	Apply	Exciter B	0	Apply
Exciter A	0	Apply					
Exciter B	0	Apply					

Adjusting RF Symmetry - Using the Front Panel UI

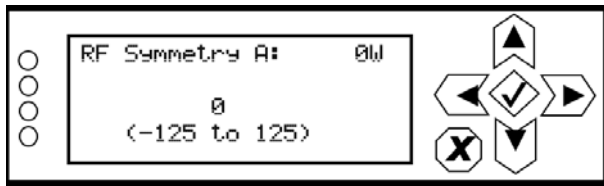
The front panel UI's RF Symmetry menu (see [Figure 3.2.138](#)) allows entering RF symmetry values for exciter A or B to attempt to minimize second harmonic content when operating on each exciter. Values are factory set and should not require adjustment.

Figure 3.2.138: Factory Settings - RF Symmetry Menu



Use the up and down buttons to select the desired exciter (A or B) for RF symmetry adjustment. [Figure 3.2.139](#) shows the editing screens for the Exciter A menu. Within this editing screen, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.139: RF Symmetry Editing Screen



Adjust the RF symmetry value between -125 and 125 (in 1-step increments). Press the cancel (X) button to discard changes and return to the previous menu.

NOTE: RF Symmetry B screen is identical

SWR Threshold Adjustment

You can adjust various SWR threshold levels using the remote AUI (see [Adjusting SWR Thresholds - Using the Remote AUI](#)) or the local front panel UI (see [Adjusting SWR Thresholds - Using the Front Panel UI](#)). If you change a setting on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Adjusting SWR Thresholds - Using the Remote AUI

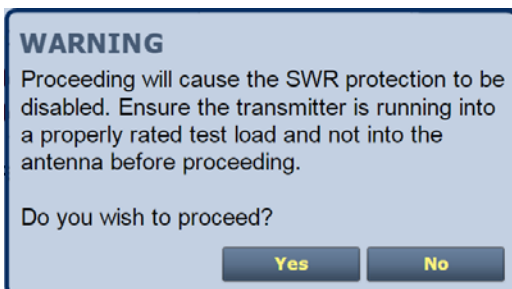
The remote AUI's SWR Thresholds page (see [Figure 3.2.140](#)) displays the threshold values for Peak Reflected Limit, RMS Reflected Limit, Peak RF Current Limit, Peak Reflected Scale and Fast SWR Shutback. The peak reflected scale value has an associated calibration routine, which is initiated using the Start button. Value changes and calibrations are not typically required.

Figure 3.2.140: Factory Settings - SWR Thresholds Page

Factory Settings		
Audio Inputs	SWR Thresholds	
B+ Calibration		
Forward/Reflected Power		
RF Symmetry		
SWR Thresholds		
Transmitter Type		
Transmitter Frequency		
PDM Settings		
Peak Reflected Limit	1600 W	Apply
RMS Reflected Limit	400 W	Apply
Peak RF Current Limit	39.0 A	Apply
Peak Reflected Scale	1.07	Apply
Peak Reflected Scale Calibration	Start	
Fast SWR Shutback	1.9 V	Apply

RF On RF Off Logged in as: Nautel Menu Status Logs Local Remote Reset Log Out

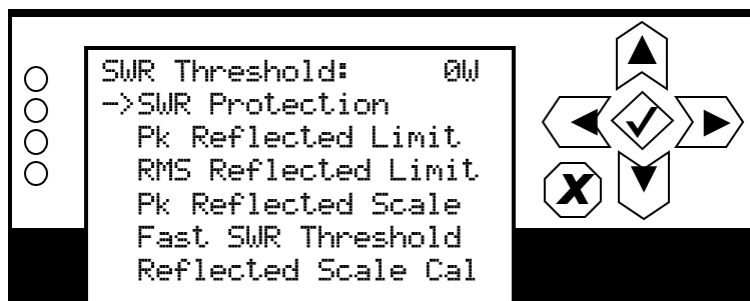
Attempting to Start the peak Reflected Scale Calibration routine will display the following WARNING, prompting you to confirm your selection.



Adjusting SWR Thresholds - Using the Front Panel UI

The front panel UI's SWR Thresholds menu (see [Figure 3.2.141](#)) allows the enabling/disabling of the SWR protection circuitry and the setting of various SWR threshold levels. Value changes are not typically required.

Figure 3.2.141: Factory Settings - SWR Thresholds Menu

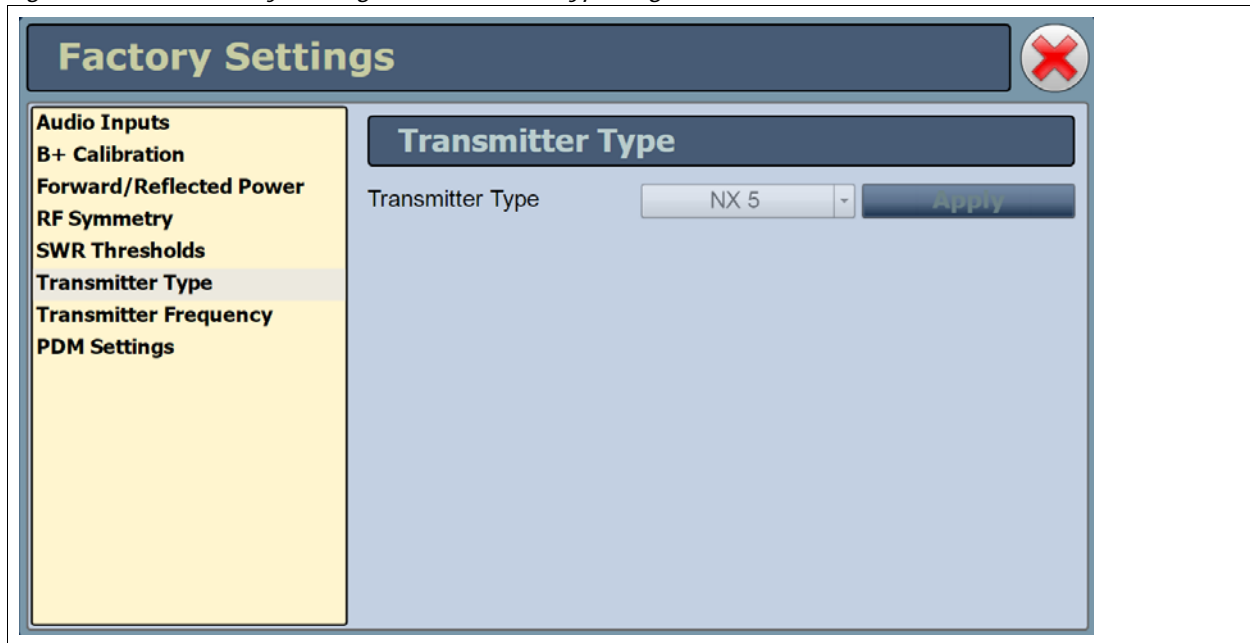


WARNING! Attempting to disable the SWR protection or start the reflected scale calibration routine will display a screen prompting you to confirm the selection.

Transmitter Type

NOTE: This setting is displayed on the NX5/NX3's remote AUI, but is not user adjustable. It is set at the factory during testing.

Figure 3.2.142: Factory Settings - Transmitter Type Page



NOTE: NX5 screen shown for reference.

Transmitter Frequency

You can adjust the transmitter's carrier frequency using the remote AUI (see [Adjusting Transmitter Frequency - Using the Remote AUI](#)) or the local front panel UI (see [Adjusting Transmitter Frequency - Using the Front Panel UI, on page 3.2.161](#)). If you change the frequency on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

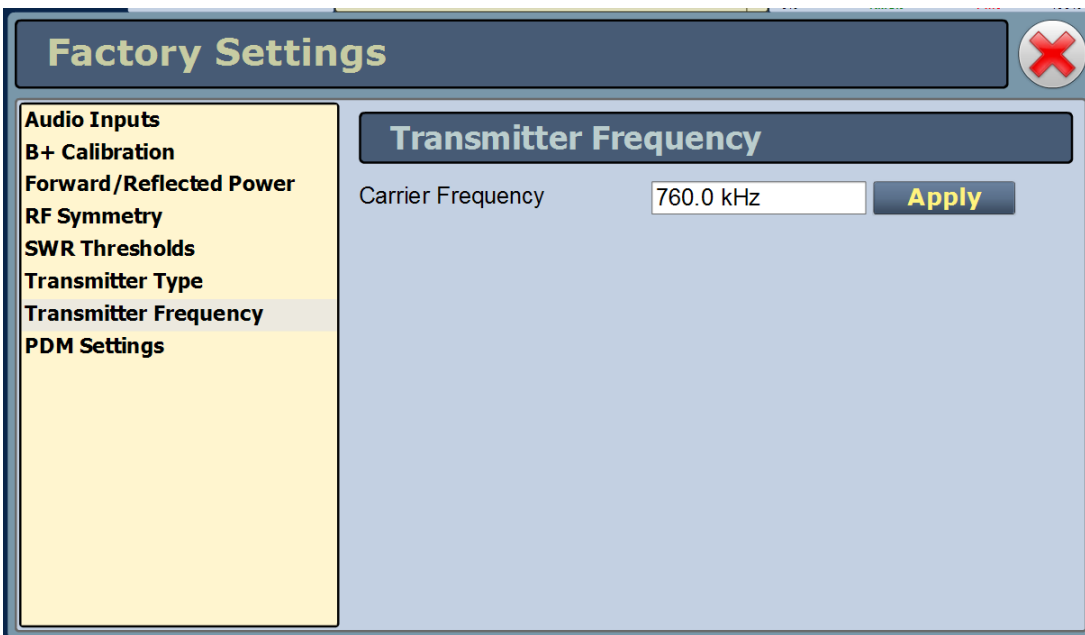
WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

Do not change the carrier frequency unless you are performing a frequency change procedure.

Adjusting Transmitter Frequency - Using the Remote AUI

The remote AUI's Transmitter Frequency page (see [Figure 3.2.143](#)) displays the precise carrier frequency of the transmitter. Click the Apply button to save changes.

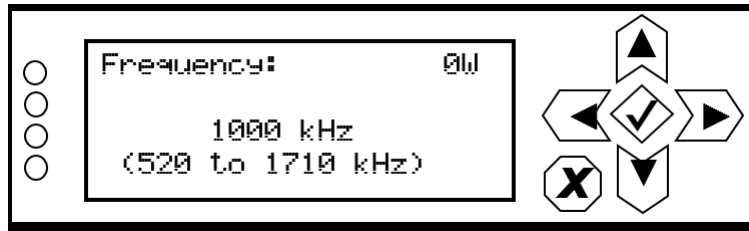
Figure 3.2.143: Factory Settings - Transmitter Frequency Page



Adjusting Transmitter Frequency - Using the Front Panel UI

The front panel UI's Frequency screen (see [Figure 3.2.144](#)) displays the precise carrier frequency of the transmitter.

Figure 3.2.144: Factory Settings - Frequency Screen



Use the up and down buttons to increase or decrease the carrier frequency between 520 and 1710 kHz (in 1 Hz increments). Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

PDM Settings

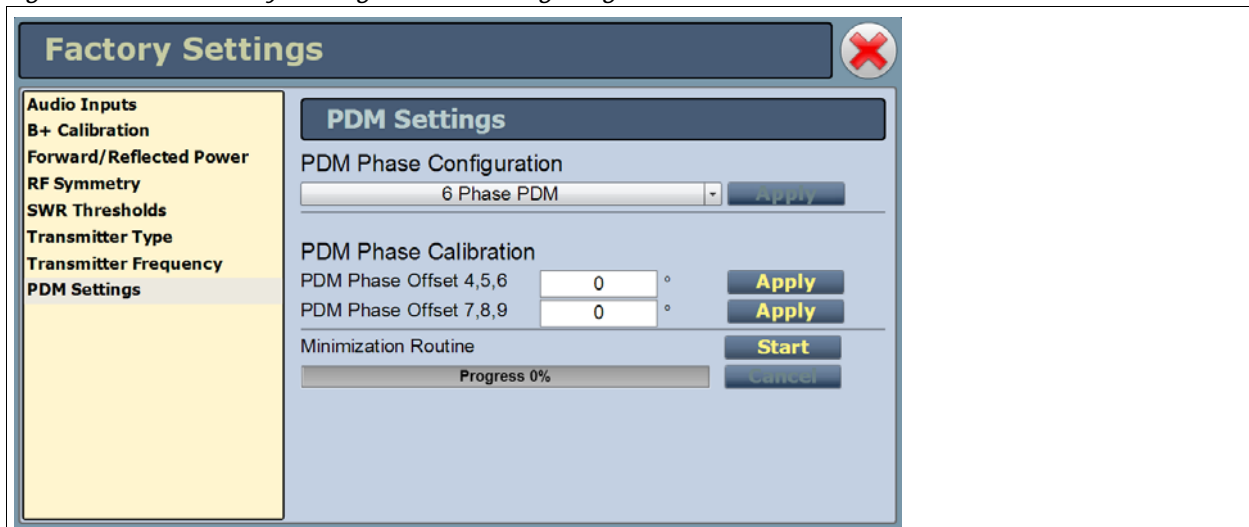
You can adjust the transmitter's PDM settings using the remote AUI (see [Adjusting PDM Settings - Using the Remote AUI](#)) or the local front panel UI (see [Adjusting PDM Settings - Using the Front Panel UI](#)). If you change the frequency on the front panel UI, it will also be reflected on the remote AUI, and vice versa.

WARNING! Factory settings are established at Nautel and should not require adjustment. These settings affect critical system protections. Making changes to these settings may void your warranty. Contact Nautel before making changes. For future reference, record a parameter value before and after making a change.

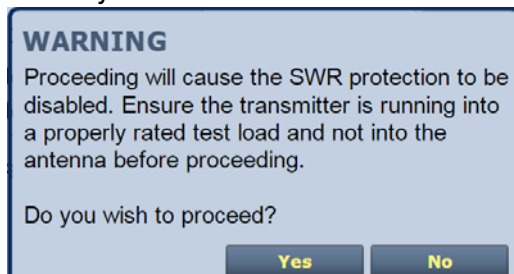
Adjusting PDM Settings - Using the Remote AUI

The remote AUI's PDM Settings page (see [Figure 3.2.145](#)) displays the selected PDM settings. The selection is based on the PDM configuration of the transmitter and is set at the factory during product testing. PDM Phase Calibration may be required after replacing or moving RF power modules. See the "Replacing a Power Module" section of the *NX5/NX3 Troubleshooting Manual* for more information.

Figure 3.2.145: Factory Settings - PDM Settings Page



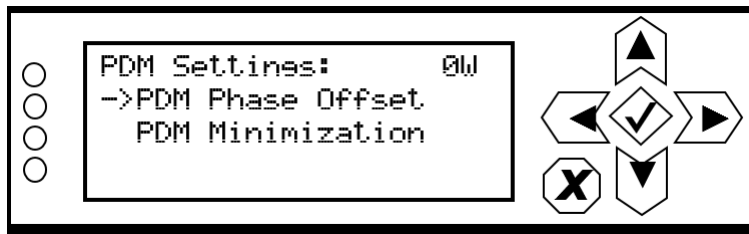
Attempting to Start the Minimization Routine will display the following WARNING, prompting you to confirm your selection.



Adjusting PDM Settings - Using the Front Panel UI

The front panel UI's PDM Settings menu (see [Figure 3.2.146](#)) displays the selected PDM settings. The settings are based on the PDM configuration of the transmitter and are set at the factory during product testing. PDM phase calibration may be required after replacing or moving RF power modules. See the "Replacing a Power Module" section of the *NX5/NX3 Troubleshooting Manual* for more information.

Figure 3.2.146: Factory Settings - PDM Settings Menu

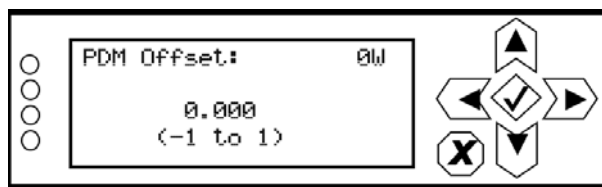


Use the up and down buttons to move the cursor to the desired item and then press the right button to enable editing. [Figure 3.2.147](#) shows the two editing screens for the PDM Settings menu.

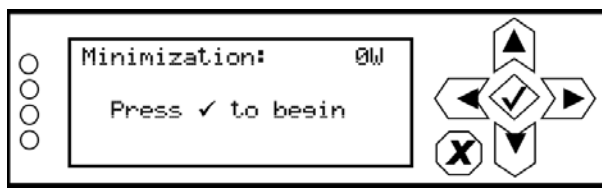
Within the PDM Offset screen, use the up and down buttons to edit the setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Within the Minimization screen, press the accept (checkmark) button to begin the minimization routine. Perform this routine after any PDM offset changes.

Figure 3.2.147: PDM Settings Editing Screens



Set the PDM phase offset between -1 and 1, in 0.001 degree increments. Press the cancel (X) button to discard changes and return to the previous menu.



Press the accept (checkmark) button to begin the minimization routine. Press the cancel (X) button to return to the previous menu.

WARNING! Attempting to begin the minimization routine will display a screen prompting you to confirm the selection.

Configuring Remote Inputs and Outputs

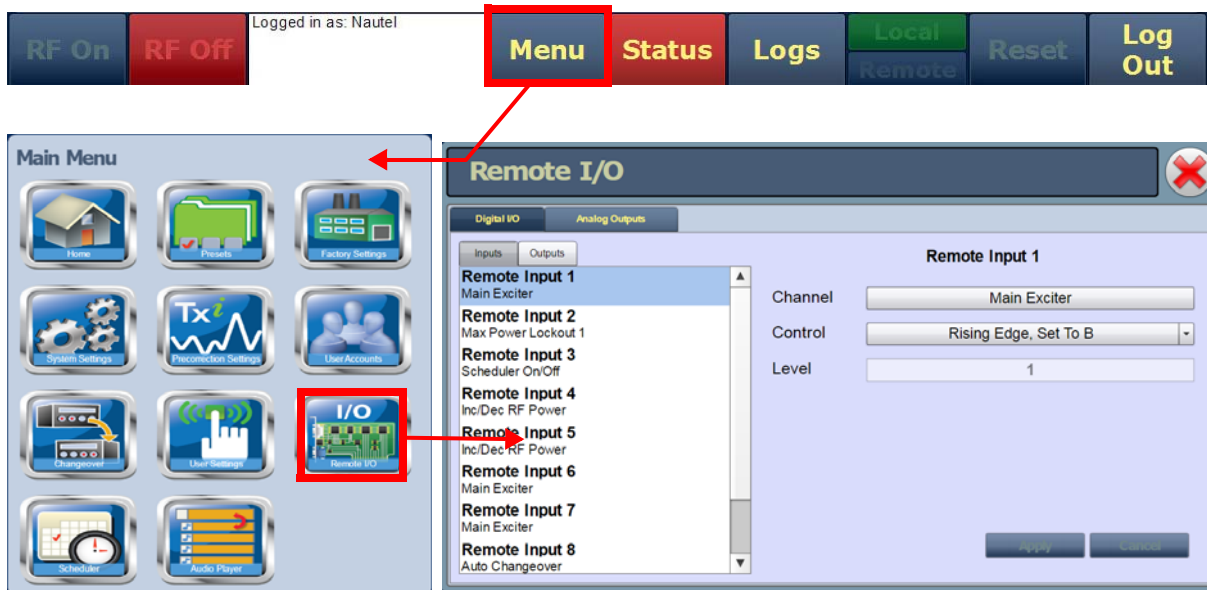
You can configure your remote input/output interface for the transmitter using the remote AUI (see [Remote I/O Settings - Using the Remote AUI](#)) or using the local front panel UI (see [Remote I/O Settings - Using the Front Panel UI](#), on page 3.2.169).

Refer also to the NX5/NX3 Pre-installation Manual for information on remote inputs and outputs and their factory default settings.

Remote I/O Settings - Using the Remote AUI

To view the Remote I/O page (see [Figure 3.2.148](#)), select Remote I/O from the Menu options. Click X in the upper, right corner to close this page and return to the home page.

Figure 3.2.148: Remote I/O Page (Inputs tab selected)



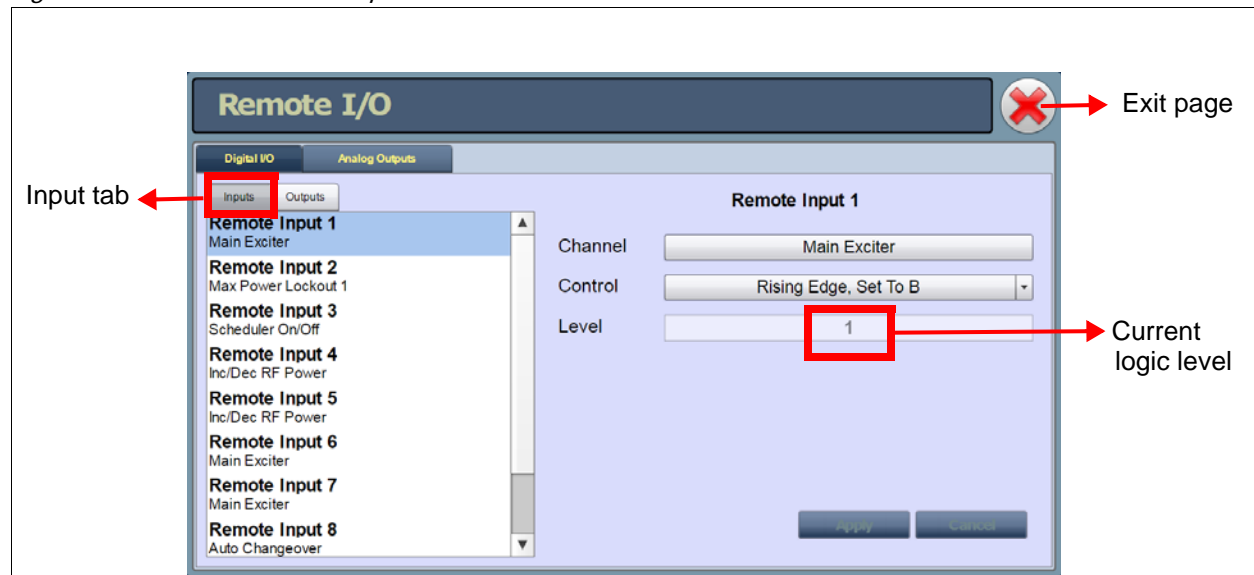
Click the Remote Inputs (see [Remote Inputs - Remote AUI](#), on page 3.2.165) or Outputs (see [Remote Outputs - Remote AUI](#), on page 3.2.167) tab to view or edit detail on the remote inputs or outputs.

Remote Inputs - Remote AUI

Using the Remote Inputs tab (see [Figure 3.2.148 on page 3.2.164](#)), you can configure up to 10 digital 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 enabled (i.e., local plus remote). That setting can only be made by a local user using the front panel pushbutton.

Nautel sets digital input defaults prior to shipping. See the *NX5/NX3 Pre-installation Manual* for details. If necessary, re-configure the digital inputs as follows:

Figure 3.2.149: Remote I/O Input Parameters



1. On the left side of the page, select the desired digital input (1 through 10) from the list. Note: you can configure digital inputs 1 through 10 for one of a variety of control inputs.
2. On the right side of the page, assign a name to the digital input by clicking the **Channel** bar and selecting one of the following options:
 - Not Assigned - has no effect on transmitter operation, regardless of logic level.
 - RF On/Off - tells the system to provide RF power, if possible (same as selecting **RF On** or **If Off** on the remote AUI).
 - Reset - causes a system reset.
 - Inc/Dec RF Power - tells the system to increase (if possible) or decrease output carrier power.
 - Main Exciter - selects the main exciter to operate the transmitter.
 - Auto Changeover - sets the exciter changeover function to operate automatically.

- Scheduler On/Off- enables/disables the automatic mode scheduler.
 - Max Power Lockout 1 - 8 - selects the associated power lockout limit (1 - 8) as active (functions regardless of local/remote mode).
 - Preset: (name) - selects the appropriate operating preset as active.
3. The **Level** bar displays the input's current logic level (1 or 0).
 4. Configure the active/inactive control for each of the 10 digital inputs. Click the arrow beside the **Control** bar to display the following drop-down menu options:
 - Rising Edge, Turn On/Reboot/Set To A/Set To B. Logic '1' (high or rising edge) activates the input (or causes a reset, as appropriate).
 - Falling Edge, Turn On/Reboot/Set To A/Set To B. 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.
 - Falling Edge, Toggle. Logic '0' (low or trailing edge) de-activates the input; next logic '0' (low or trailing edge) activates the input.
 - Rising Edge, Toggle. Logic '1' (high or rising edge) activates the input; next logic '1' (high or rising edge) de-activates the input.
 - Rising Edge, Turn On/Set To B. Falling Edge Turn Off/Set To A. Logic '1' (high or rising edge) activates the input; logic '0' (low or trailing edge) de-activates the input.
 - Falling Edge, Turn On/Set To B. Rising Edge Turn Off/Set to A. Logic '0' (low or trailing edge) activates the input; logic '1' (high or rising edge) de-activates the input.
 - Active High, Increase. Logic '1' (high) causes a power increase or turns on the feature.
 - Active Low, Increase. Logic '0' (low) causes a power increase.
 - Active High, Decrease. Logic '1' (high) causes a power decrease.
 - Active Low, Decrease. Logic '0' (low) causes a power decrease.
 - Active High, Turn On. Logic '1' (high) activates the input.
 - Active Low, Turn On. Logic '0' (low) activates the input.
 5. When the input settings are complete, click **Apply** to accept and activate these changes or click **Cancel** to cancel them and return to the previous settings.
 6. To exit the page, click **X** (top right).

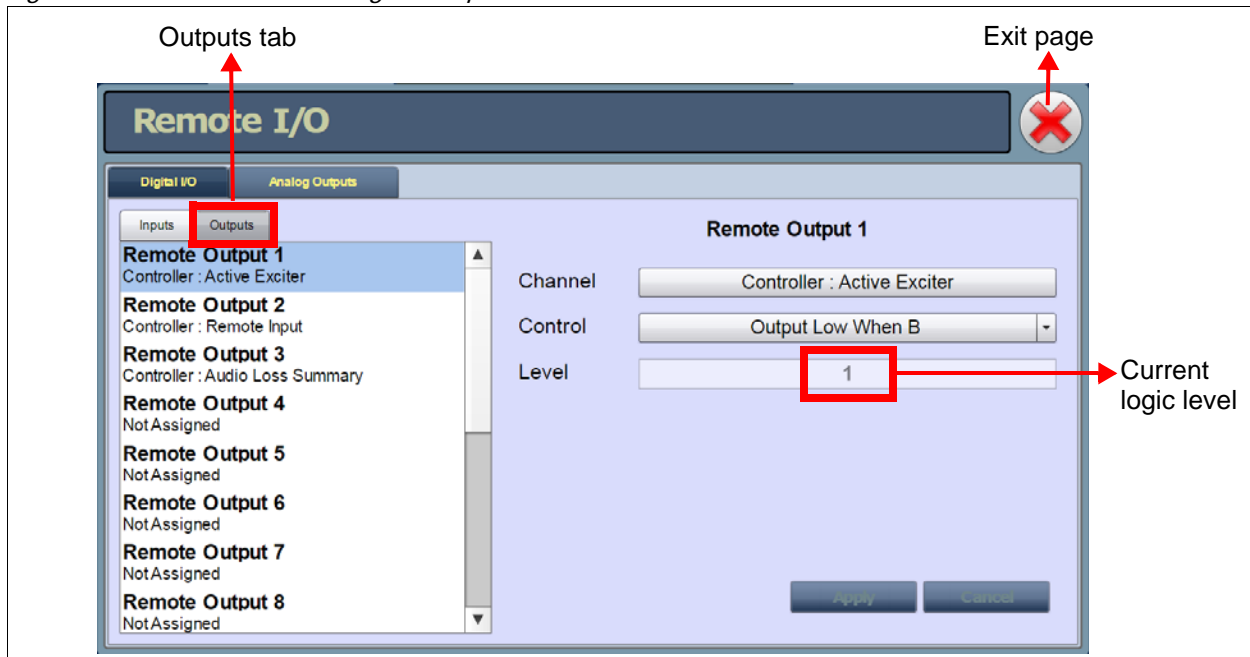
NOTE: If you save a change to a digital input via the remote AUI, it will also be displayed on the front panel UI.

Remote Outputs - Remote AUI

Using the Remote Outputs tab (see [Figure 3.2.150 on page 3.2.167](#), you can configure up to 16 outputs that indicate either the presence of various alarms or the status of operator controlled circuits.

Nautel sets digital output defaults prior to shipping. See the NX5/NX3 Pre-installation Manual for details. If necessary, re-configure the remote outputs as follows:

Figure 3.2.150: Remote I/O Page - Output Parameters



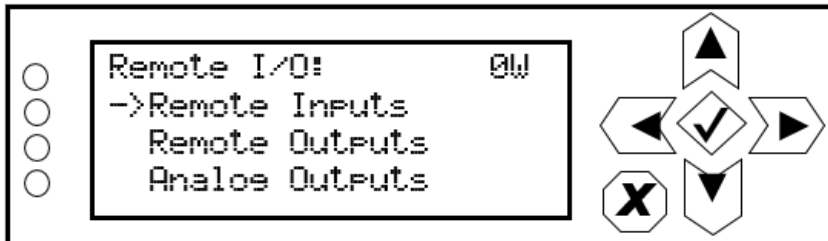
1. On the left side of the page, select the desired remote output (1 through 16) from the list. Note: you can configure remote outputs 1 through 16 for one of a variety of monitoring outputs.
2. On the right side of the page, assign a name to the remote output by clicking **Channel** and selecting one of the following options:
 - **Not Assigned** - No alarm or status parameter is monitored.
 - **Remote Enabled** - Active logic level indicates remote control is enabled (i.e., local plus remote). Inactive logic level indicates the transmitter is in local control.
 - **RF On/Off** - Active logic level indicates the transmitter's RF power stage is on (enabled). Inactive logic level indicates the transmitter's RF power stage is off.
 - **Active Exciter** - Active logic level indicates that exciter A is active. Inactive logic level indicates that exciter B is active.
 - **Auto Changeover** - Active logic level indicates that the automatic exciter changeover function is enabled. Inactive logic level indicates that the function is disabled.

- **Main Exciter** - Active logic level indicates that exciter A is selected as the main exciter. Inactive logic level indicates that exciter B is selected as the main exciter.
 - **Scheduler On/Off**- Active logic level indicates that the automatic mode scheduler is enabled or disabled.
 - **Various Alarms** - Active logic level indicates that the selected alarm is occurring. Any transmitter alarm can be selected as a digital output. Refer to the NX5/NX3 Troubleshooting Manual for a description of each alarm.
 - **AUI Watchdog** - Active logic level indicates that a watchdog reset is occurring, due to an error in communication between the host processor and the DSP processor on the control/interface PWB. The reset is configured using the front panel UI's **System Settings -> Host Watchdog** screen.
 - **Max Power Lockout 1 - 8** - Active logic level indicates that a power lockout has been enabled, either through the remote AUI's **System Settings** page or by a remote digital input.
 - **Remote Input** - Mimics the logic of the associated remote input selection. Example: If Remote Output 5 is set to Remote Input, it will mimic the logic received on remote input pin 5. This is typically used for debugging remote inputs.
 - **Invalid Preset** - Active logic level indicates the current active preset is not a saved preset.
 - **Preset: (name)** - Active logic level indicates that the associated preset is active.
3. The **Level** bar displays the input's current logic level (1 or 0).
 4. Configure the active/inactive control for each of the 16 digital outputs. Click the arrow beside the **Control** bar to display the drop-down menu options that are appropriate for the selected Channel.
Example: if the selected channel is RF On/Off, the drop-down options are:
 - **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).
 - **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).
 5. Click the **Level** bar and select 1 or 0 as the logic level.
 6. When the output settings are complete, click **Apply** to accept and activate these changes or click **Cancel** to cancel them and return to the previous settings.
 7. To exit the page, click **X** (top right).

Remote I/O Settings - Using the Front Panel UI

To view the Remote I/O screen (see [Figure 3.2.151](#)) on the front panel display, select Remote I/O from the Main Menu.

Figure 3.2.151: Remote I/O screen



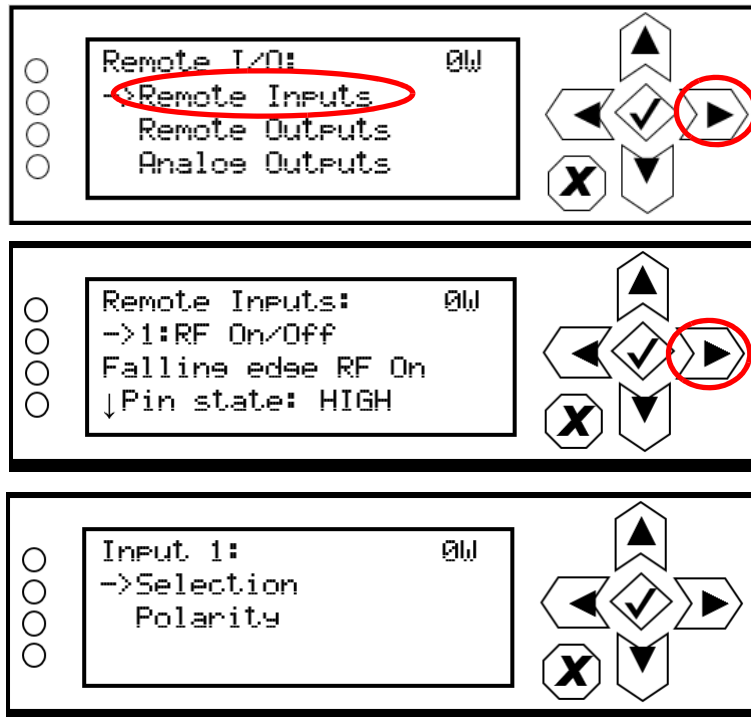
Use the up and down buttons to select Remote Inputs (see [Remote Inputs - Front Panel UI, on page 3.2.169](#)), or Remote Outputs (see [Remote Outputs - Front Panel UI, on page 3.2.171](#)) to view or edit detail on the selected inputs or outputs.

Remote Inputs - Front Panel UI

Using the Remote Inputs screens (see [Figure 3.2.152 on page 3.2.170](#)), you can configure up to 10 digital 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 remote control is enabled. That setting can only be made by a local user using the front panel UI.

Nautel sets digital input defaults prior to shipping. See the NX5/NX3 Pre-installation Manual for details.

Figure 3.2.152: Remote Inputs Screens (Input 1 shown)



Use the up and down buttons to select the desired digital input (1 through 10) from the list. Each screen shows the current digital input parameter (e.g., RF On/Off), as well as the polarity (e.g., Falling edge RF On) and current state (e.g., HIGH, LOW) of the corresponding input pin. Use the right-arrow button to enter the Selection/Polarity screen for the selected input to allow editing of the selection or the polarity. Press cancel (X) to return to the previous menu.

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

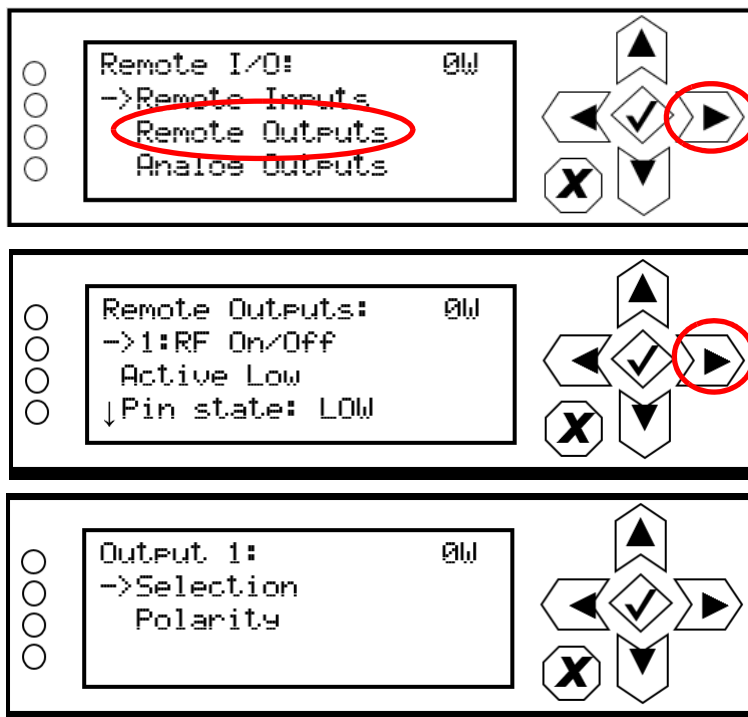
NOTE: The selection and polarity options for digital inputs are the same as described in [Remote Inputs - Remote AUI, on page 3.2.165](#).

Remote Outputs - Front Panel UI

Using the Remote Outputs screens (see [Figure 3.2.153 on page 3.2.171](#)), you can configure up to 16 digital outputs that indicate either the presence of various alarms or the status of operator controlled circuits.

Nautel sets digital output defaults prior to shipping. See the NX5/NX3 Pre-installation Manual for details.

Figure 3.2.153: Remote Outputs Screens (Output 1 shown)



Use the up and down buttons to select the desired digital output (1 through 16) from the list. Each screen shows the current digital output parameter (e.g., RF On/Off), as well as the polarity (e.g., RF On = Low) and current state (e.g., HIGH, LOW) of the corresponding output pin. Use the right-arrow button to enter the Selection/Polarity screen for the selected output to allow editing of the selection or the polarity. Press cancel (X) to return to the previous menu.

If you save a change to a digital output via the front panel UI, it will also be displayed on the remote AUI page.

NOTE: The selection and polarity options for digital outputs are the same as described in [Remote Outputs - Remote AUI, on page 3.2.167](#).

Monitoring Analog Outputs

There are four analog outputs - Forward Power, Reflected Power, B+ Voltage and Total B+ DC Current - that can be remotely monitored using the AUI (see [Analog Outputs - AUI](#)) or using the front panel UI (see [Analog Outputs - Front Panel, on page 3.2.174](#)). These outputs are factory defined parameters (cannot be changed to other parameters), however their scaling can be configured in the AUI to reflect the output voltage that yields a full-scale deflection.

Analog Outputs - AUI

Select the Analog Outputs tab to view the analog outputs (see [Figure 3.2.154 on page 3.2.172](#)) for the pre-determined parameters. There are columns that list the Sample Full Scale voltage and corresponding Meter Full Scale value as well as the current Sample Voltage and corresponding current Meter Value.

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 NX5/NX3 Pre-Installation Manual for actual remote analog pin assignments.

Figure 3.2.154: Remote I/O Page - Analog Outputs tab selected



	Name	Sample Full Scale	Meter Full Scale	Sample Voltage	Meter Value
1	Forward Power	10.000 V	10 kW	0.000 V	0 kW
2	Reflected Power	10.000 V	0.3 kW	0.000 V	0 kW
3	B+ Voltage	10.000 V	450 V	0.000 V	0.282 V
4	Total B+ DC Current	10.000 V	67 A	0.000 V	0 A

The values associated with Forward Power and Reflected Power are of a square law nature so that changes made to the Sample Full Scale field (allowable range is 1-10 V, default values shown in [Table 3.2.4](#)) will be reflected in the other fields according to the following equation:

$$\sqrt{\text{Meter Value} \div \text{Meter Full Scale}} \times \text{Sample Full Scale} = \text{Sample Voltage}$$

The values associated with B+ Voltage and Total B+ DC Current are of a linear nature so that changes made to the Sample Full Scale field (allowable range is 1-10 V, default values shown in [Table 3.2.4](#)) will be reflected in the other fields according to the following equation:

$$\text{Meter Value} \div \text{Meter Full Scale} \times \text{Sample Full Scale} = \text{Sample Voltage}$$

Table 3.2.4: Default Sample Full Scale Values

METER	DEFAULT SAMPLE FULL SCALE
Forward Power	8.49 V
Reflected Power	3.67 V
B+ Voltage	6.75 V
Total B+ DC Current	16.08 V

To change the scaling, select the applicable meter value from the Sample Full Scale column in the AUI (see [Figure 3.2.154](#)) and enter the new desired value noting the allowable range is 1-10 V. Press Apply to activate changes. Press Cancel to discard changes.

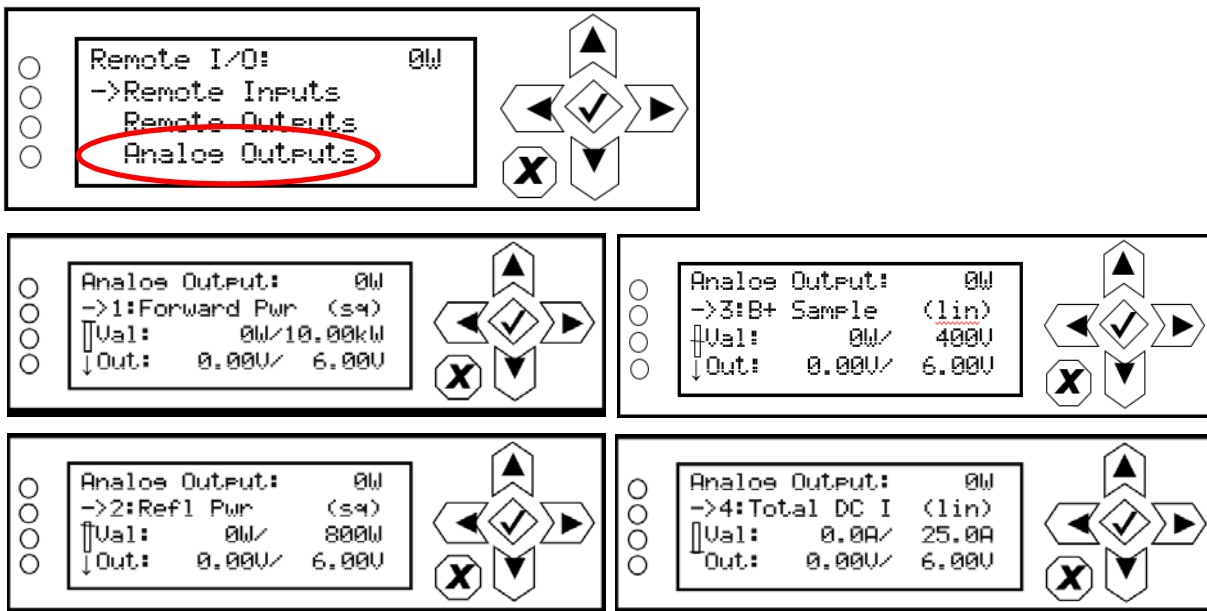
NOTE: The Total B+ DC Current default Sample Full Scale value exceeds 10 V and once changes are made the user cannot return to the original default value.

Analog Outputs - Front Panel

Using the Analog Outputs screens (see [Figure 3.2.155](#)), you can view the levels of four pre-defined analog outputs that are representative of critical transmitter parameters.

Nautel sets analog output defaults prior to shipping. There are no configuration options. In the front panel UI, they are for monitoring purposes only. If you wish to adjust the scaling, it must be done through the AUI (see [Analog Outputs - AUI](#), on page 3.2.172).

Figure 3.2.155: Analog Output Screens



Use the up and down buttons to select the desired analog output (1 through 4) from the list. Each screen shows the analog output parameter (e.g., Forward Power, Reflected Power, B+ Voltage or Total B+ DC Current), as well as the meter reading (actual and full-scale) and the output pin voltage (actual and full-scale). Press cancel (X) to return to the previous menu.

NOTE: The analog output's Output voltage reading reflects the value that can be measured at the associated remote analog output pin for the given Meter value. See the Pre-Installation Manual for actual remote analog pin assignments.

Preset Scheduler

If the scheduler is enabled (see [Enabling the Scheduler on page 3.2.179](#)), you can program a yearly preset schedule for the transmitter. Use the Scheduler page (see [Figure 3.2.156](#)) to set the dates and times at which presets take effect. You can define up to 63 scheduler rules. To view the Scheduler page, select Scheduler from the Menu options.

NOTE: The remote AUI's Scheduler button will not display when the System Settings -> Exciter Clock Calibration -> Sync Source is set to Combiner. Use the associated combiner cabinet's AUI Scheduler button to configure the system schedule.

Figure 3.2.156: Scheduler Page

The screenshot displays the Nautel Scheduler page. At the top, there's a header bar with the Nautel logo on the left. The main header area contains three sections: 'Date & Time' showing 'Tue Apr 21 2015' and '14:45:16' with a 'Scheduler: Off' indicator; 'Transmitter (WXYZ)' showing '0 kW' and '1700kHz' with 'Reflected 0 kW' and 'Set Point 10.0kW'; and 'Exciter' showing 'Active Exciter A' and 'L+R Modulation' with a scale from -100% to +140%. Below the header is the 'Scheduler' section, which includes a monthly calendar for April 2015. The calendar has navigation buttons (<, <<, >>, >) and shows dates from 19 to 23. To the right of the calendar is a 'Rules' section with a 'New' button and a 'Daily Events' section. At the bottom, there are buttons for 'RF On', 'RF Off', 'Menu', 'Status', 'Logs', 'Local', 'Remote', 'Reset', and 'Log Out'. The interface is branded with the Nautel logo.

The left-hand side of the Scheduler page displays a monthly calendar (e.g., April 2015). Use the << and >> buttons to navigate between months. Use the |< and >| buttons to navigate to the beginning and the end of the schedule.

The right-hand side of the Scheduler page contains a Rules section and a Daily Events section. All programmed rules are displayed in the Rules section. Clicking on a specific date in the monthly calendar displays the rules, as applicable for that day, in the Daily Events section.

NOTE: It is not possible to schedule an RF OFF state through the scheduler. However, it is possible to “simulate” an RF OFF condition by creating a preset with a 0W setpoint. Once the 0W preset has been activated, after 10 seconds, the transmitter will shut down the RF power modules, fans and B+ power supply, emulating an RF OFF state, but the transmitter will still indicate RF ON. When a new preset is later activated with a non-zero power setpoint, the transmitter will resume operation as specified in the active preset.

Figure 3.2.157: Rule Explorer window

Rule Explorer

Time Of Year
 From: Tuesday March 13, 2012 To: Friday April 13, 2012

Days
☒ Sunday ☒ Monday ☒ Tuesday ☒ Wednesday ☒ Thursday ☒ Friday ☒ Saturday

Time Of Day
 From: 00 : 00 : 00 To: 02 : 00 : 00 Repeat: 24 : 00 : 00

☐ Self Delete **Current Settings**

Power: 11.00 kW
Mode: FM
Frequency: 97.70 MHz

Save **Cancel**

When you click in the Rules 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 3.2.157](#)). Click Delete to remove a rule from the list.

Use the Rule Explorer 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. Rules are automatically repeated every 365 days (366 days in a leap year) such that schedules are the same year-to-year. Therefore, a single rule cannot span more than 365 days (366 days in a leap year).
- ❖ In the Days section, select the days of the week on which the rule will apply. Rules are automatically repeated for every day indicated in the Day section during the time frame outlined in the Time of Year section.
- ❖ In the Time of Day section, set the (From:) time (hours, minutes and seconds) for the rule. Rules take effect at the (From:) time on every day scheduled per the Day and Time of Year sections, and will remain effective until another rule is applied or the transmitter's settings are manually changed (remote or local).
- ❖ If the rule is to repeat during a single day, use the (Repeat:) field to indicate how often the rule should take effect each day of the schedule.
- ❖ The (To:) time in the Time of Day section is ONLY applicable when the (Repeat:) field is non-zero, and sets when the repeats will stop on the Time of Day schedule (see [Scheduler Rule Example 2, on page 3.2.178](#)). If you are trying to schedule a single event to occur at a particular time each day (or on a single day) and have left the Repeat field blank, the event will trigger at the (From:) time, and the (To:) time is irrelevant.
- ❖ If the Self Delete box is checked, the event will never repeat after the first time it occurs (specified by the (From:) in the Time of Year and Time of Day sections), regardless of whether the values in the Time of Year, Days and Time of Day sections outlined above indicate repetition.
- ❖ 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.
- ❖ Click the Save button to store the rule in the scheduler or the Cancel button to return to the Scheduler page.

The following examples illustrate how to interpret the programming of a rule:

Scheduler Rule Example 1

From Date:	March 3
To Date:	April 7
Days:	SUNDAY, TUESDAY, WEDNESDAY checked, all others unchecked.
From Time:	6:15:00
To Time:	00:00:00
Repeat:	00:00:00
Self Delete:	UNCHECKED
Preset:	Preset 1

Translation: Every Sunday, Tuesday, and Wednesday between March 3 and April 7 of any given year, this rule will take effect. On Mondays, Thursdays, Fridays and Saturdays, the rule will not take effect. At 6:15 in the morning, the preset will change to Preset 1.

Scheduler Rule Example 2

From Date:	March 3
To Date:	April 7
Days:	SUNDAY, TUESDAY, WEDNESDAY checked, all others unchecked.
From Time:	6:15:00
To Time:	15:12:00
Repeat:	00:12:34
Self Delete:	UNCHECKED
Preset:	Preset 1

Translation: Every Sunday, Tuesday, and Wednesday between March 3 and April 7 of any given year, this rule will take effect. On Mondays, Thursdays, Fridays and Saturdays, the rule will not take effect. At 6:15 in the morning, and every 12 minutes and 34 seconds thereafter, until 15:12 in the afternoon, the preset will change to Preset 1.

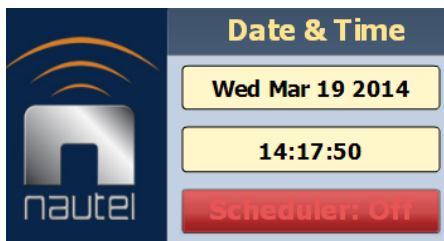
Enabling the Scheduler

You can enable or disable the scheduler using the remote AUI (see [Enabling the Scheduler - Remote AUI](#)) or using the local front panel UI (see [Enabling the Scheduler - Front Panel UI](#), on page 3.2.179).

Enabling the Scheduler - Remote AUI

Enable or disable the scheduler by clicking the Scheduler button in the Date & Time section (see [Figure 3.2.158](#)).

Figure 3.2.158: Enabling/disabling the scheduler - Remote AUI



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.

Enabling the Scheduler - Front Panel UI

To view the Scheduler enable/disable screen (see [Figure 3.2.159](#)) on the front panel display, select User Settings -> Scheduler from the Main Menu.

Figure 3.2.159: Enabling/disabling the scheduler - Front Panel



Use the up and down buttons to select ON (enable) or OFF (disable). The default setting is OFF. Press cancel (X) to return to the previous menu.

Audio Player

The built-in audio player (see [Figure 3.2.160](#)) can use a file playlist, Livewire or 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 3.2.181
- [Streams](#) - see page 3.2.183

Figure 3.2.160: 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 [Changing the OS Password, on page 3.4.4](#) for more information.

Playlist/stream presets can also be activated by the Scheduler (see [Preset Scheduler, on page 3.2.175](#)).

Playlist

The Playlist tab (see [Figure 3.2.161](#)) 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 Audio Player/AES1 or AES2 selected in the Analog Settings -> AM Source in the Presets page. There are three sections in the Playlist tab - Playlists, Playlist Contents and Available Files on USB.

Figure 3.2.161: Managing Playlist files

The main interface has two tabs: **Playlists** and **Streams**. The **Playlists** tab is active, showing three panels:

- Playlists**: A table with columns 'Type' and 'Name'.
- Playlist Contents**: A table with columns '#', 'Path', and 'Path'.
- Available Files on USB**: A table with a 'Path' column.

Below the tables are buttons: **Add**, **Delete**, **Insert JMP**, **Delete**, **Add File**, and **Refresh**. A **Manage Files** button is located above the 'Available Files on USB' panel.

A red arrow points from the **Manage Files** button to the **Upload Files** dialog box. The dialog box has a title bar 'Upload Files', a large empty area for file selection, a 'LOADING 0%' progress bar, and buttons: **Browse**, **Upload**, **Delete**, **Refresh**, and **Close**. A red error message 'USB not mounted' is displayed at the bottom. To the right of the dialog box, the text 'Remote mode only' is visible.

Below the main interface are two smaller dialog boxes:

- Add Playlist**: A dialog with a 'Name' input field and **Ok** and **Cancel** buttons.
- Insert Jump**: A dialog with 'Playlist' and 'Item' dropdown menus and **Ok** and **Cancel** buttons.

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.

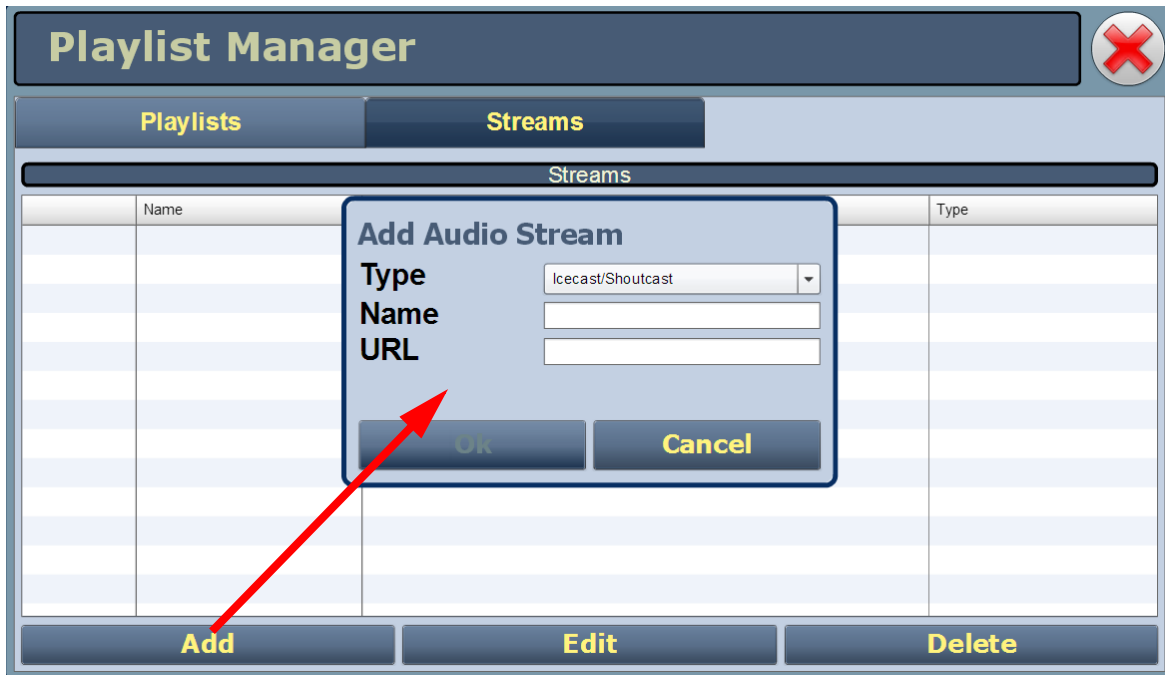
The Available Files on USB section is used for adding audio files to the playlist (Add Files button) or refreshing the playlist (Refresh button). Audio files must be stored on an external USB device plugged into the USB-A (A4J3B) or USB-B (A4J3C) connector on the rear of the controller; they are not 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.

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.

Figure 3.2.162: Audio Player page - Streams tab



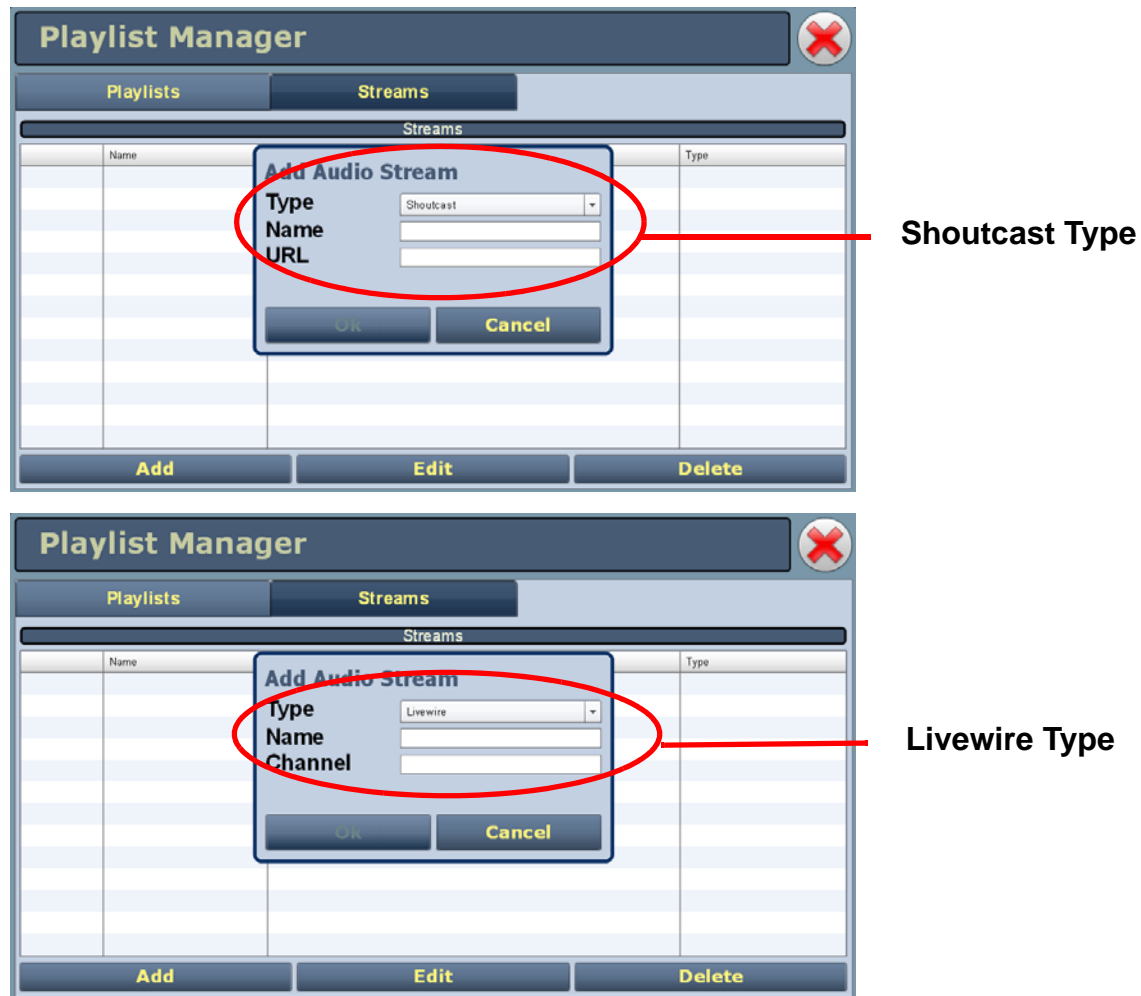
Streams

The NX5/NX3 is capable of playing audio streams in either Shoutcast or Livewire format.

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

For Livewire, enter the channel that contains the desired audio.

Figure 3.2.163: Adding Audio Streams



ADDING AN AUDIO STREAM

1. From the Streams tab (see [Figure 3.2.162 on page 3.2.183](#)), click the Add button.
2. Use the drop-down menu to select the desired Type of audio stream - Shoutcast or Livewire (see [Figure 3.2.163](#)).
3. Enter the appropriate information for the audio server (Name and URL for Shoutcast; Name and Channel for Livewire). Make sure the NX5/NX3 can access the location.
4. Click OK to add the audio stream or click Cancel to discard changes.

EDITING OR DELETING AN AUDIO STREAM

1. From the Streams tab (see [Figure 3.2.162 on page 3.2.183](#)), select the desired audio stream from the list. Click 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 Shoutcast; Name and Channel for Livewire). Make sure the NX5/NX3 can access the location.
3. Click OK to either edit or delete the audio stream, or click Cancel to discard changes.

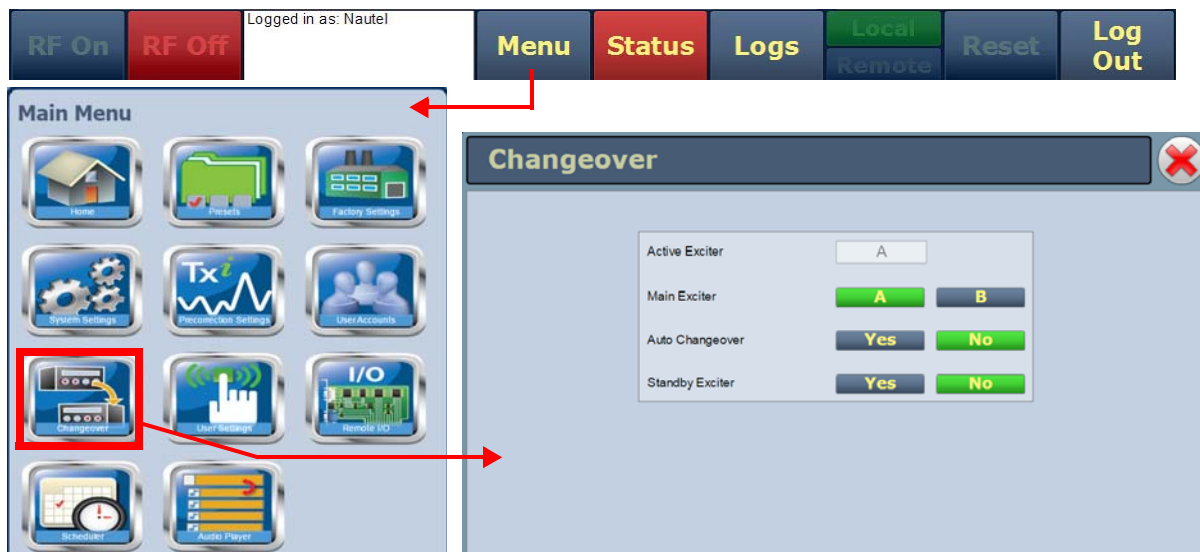
Changing Exciter Transfer Settings

If your transmitter contains dual exciters, you can control the auto exciter transfer function using the remote AUI (see [Exciter Changeover Settings - Using the Remote AUI](#)) or using the local front panel UI (see [Exciter Changeover Settings - Using the Front Panel](#), on page 3.2.187).

Exciter Changeover Settings - Using the Remote AUI

To view the Changeover page (see [Figure 3.2.164](#)), select Changeover from the Menu options or click on the Active Exciter area in the top, right-hand corner of the remote AUI. The Changeover page is only displayed on the Main Menu window and the Active Exciter click shortcut is only available when dual exciters are installed.

Figure 3.2.164: Changeover page

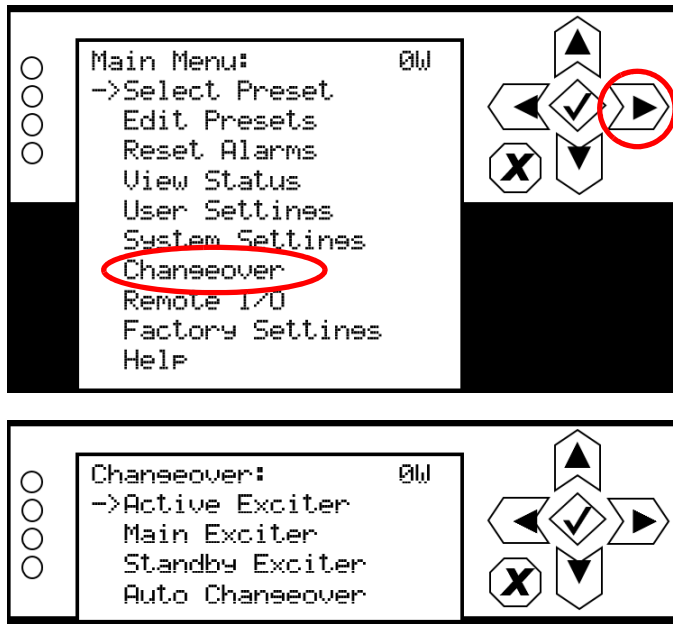


- ❖ **Active Exciter** - indicates the exciter that is currently active (also displayed in the top, right corner of the remote AUI).
- ❖ **Main Exciter** - indicates (in green) which exciter is considered to be the primary exciter. Select **A** or **B**. The default exciter is A if the **Standby Exciter** is set to **No**. **NOTE:** Changing the setting may change the active exciter.
- ❖ **Auto Changeover** - indicates (in green) if automatic exciter changeover is enabled. Select **Yes** if automatic changeover is desired or **No** if user selected changeover is desired. **NOTE:** you cannot change the setting if the **Standby Exciter** is set to **No**.
- ❖ **Standby Exciter** - identifies whether or not a standby exciter is available. This is factory set and only requires adjustment if an exciter is removed or not functional. Yes indicates that a standby operation is available or desired. No indicates that a standby operation is not available or desired.

Exciter Changeover Settings - Using the Front Panel

From the front panel UI, you can set the active exciter, main exciter and auto changeover status. To view the Changeover screen, select Changeover from the Main Menu (see [Figure 3.2.165](#)).

Figure 3.2.165: Changeover Menu



This menu has four sub-menu options. Use the up and down buttons to move the cursor to the desired display setting and then press the right button to enable editing of the setting. [Figure 3.2.166 on page 3.2.188](#) shows the editing screens for the Changeover menu. Within any of the editing screens, use the up and down buttons to edit a setting. Press the accept (checkmark) button to save the change. Press cancel (X) to discard changes and return to the previous menu.

Figure 3.2.166: Changeover Editing Screens

The figure displays four sequential screenshots of the transmitter's changeover editing menu. Each screen features a vertical column of four circles on the left, with the top circle highlighted. The main display area shows the current setting, and a set of navigation buttons (up, down, left, right, checkmark, and cancel/X) is on the right.

- Active Exctr:** The current setting is 'Exciter B'. The top circle is highlighted.
- Main Exciter:** The current setting is 'Exciter A'. The top circle is highlighted.
- Standby Exctr:** The current setting is 'Yes'. The top circle is highlighted.
- Auto Chnsover:** The current setting is 'OFF'. The top circle is highlighted.

Select the transmitter's active exciter - Exciter A or Exciter B. Press the cancel (X) button to return to the previous menu.

Select the transmitter's main exciter - Exciter A or Exciter B. Typically, the main exciter is the exciter that operates until an automatic changeover occurs. The default setting is Exciter A. Press the cancel (X) button to discard changes and return to the previous menu.

Selects whether or not a standby exciter is available. This is factory set and only requires adjustment if an exciter is removed or not functional. Yes indicates that standby operation is available or desired. No indicates that a standby operation is not available or desired. Press the cancel (X) button to discard changes and return to the previous menu.

Configures the transmitter to enable (ON) or disable (OFF) automatic exciter changeover. Changeover to the standby exciter occurs if the current/active exciter experiences a fault that inhibits its operation. Press the cancel (X) button to discard changes and return to the previous menu.

SECTION 3.3: ROUTINE MAINTENANCE

This section provides instructions for performing routine maintenance on the NX5/NX3 transmitter. This section includes the following topics:

- [Upgrading Software](#)
- [Scheduled Maintenance - see page 3.3.5](#)
- [Replacing the Air Filter - see page 3.3.6](#)
- [Performing On-Air Checks - see page 3.3.8](#)
- [Replacing the Control/Interface PWB Battery - see page 3.3.9](#)
- [Inspecting Lightning Protection Systems - see page 3.3.11](#)

Upgrading Software

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

Interval

As required.

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, web download or flash card

Preliminary Checks

1. Determine the current software revision installed using the front panel UI's Main Menu -> User Settings-> Firmware -> FW Version screen or the remote AUI's Menu -> System Settings -> Upgrade Software page. 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, Exciter, Rack and PM.
2. Using a web browser go to ftp://www3.nautel.com/NX_Series/ to make sure your software version is the latest available. Check the existing software version. Contact Nautel for the most recent software revision and download *.tgz file to a laptop or network location.

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. Go to the network settings page using the local front panel UI (Main Menu -> User Settings -> Network Settings) or the remote AUI (Menu -> User Settings -> Network Setup).
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. Set as follows:
 - ❖ Disable DHCP: From the remote AUI, press the Static IP radio button. From the front panel UI, enter the DHCP sub-menu and set to DISABLE.
 - ❖ Set the IP Address: 10.10.10.2
 - ❖ Set the Netmask: 255.255.255.0
4. Set the transmitter for Remote enabled control (i.e., local plus remote).

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 J3A of the control/interface PWB (A4) on the exciter 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 3.3.2](#). 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 remote AUI to Menu -> System Settings -> Upgrade Software, select the Manage Files button 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 enabled control (i.e., local plus remote). If the transmitter is already in Remote enabled mode, turn off the transmitter using the remote AUI on the laptop. Perform the following steps remotely using the AUI on the laptop.
2. Go to the AUI Menu -> System Settings -> Upgrade Software 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 NX5/NX3.
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 3.3.2](#)).

NOTE: Make sure to clear the cache of every web browser used to remotely connect to the transmitter's AUI to ensure that the remote AUI displays correctly after the software upgrade.

5. Login and repeat [Step 1](#) of "[Preliminary Checks](#)" on [page 3.3.2](#) 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.

Scheduled Maintenance

Scheduled maintenance consists of performing a visual inspection of the NX5/NX3 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 filters, noting there is one in the transmitter's rear door. Remove the air filter, inspect it. If the air filter is clean, re-install it. If an air filter is dirty or damaged, replace it as soon as possible. See ["Replacing the Air Filter" on page 3.3.6](#).
2. Clean the NX5/NX3 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 NX5/NX3.

Checking Hardware

Check all hardware at least once a year. Thermal cycling from turning the NX5/NX3 on and off will require more frequent checks.

- To prevent damaging the hardware, ensure that the proper sized tools are used. In most cases, hardware is metric.
- A mounting surface or terminal that has changed colour indicates a loose hardware connection.
- Multi-stranded cables installed on terminal strips must be retorqued.

Battery Replacement

The NX5/NX3's control/interface PWB contains a battery backup circuit that provides a memory of alarm occurrences during ac power failure. See ["Replacing the Control/Interface PWB Battery" on page 3.3.9](#).

Replacing the Air Filter

The transmitter contains a cotton air filter in the rear door of the transmitter. If an air filter becomes dirty or damaged, replace it as follows:

Interval

As required.

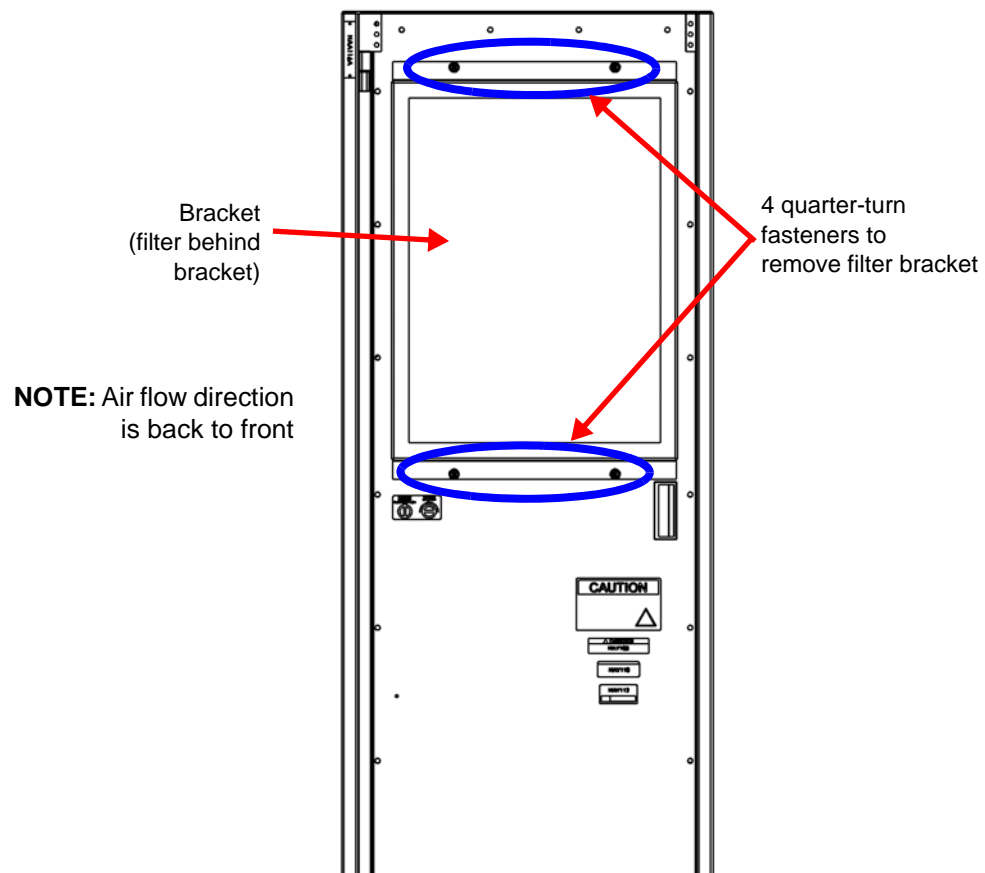
Parts and Tools

Replacement air filter.

Procedure

Take the following steps to replace an NX5/NX3 air filter:

1. Order a new filter, as necessary. You can order a standard sized filter from Nautel (Nautel Part # HR142) or from the manufacturer (18" x 24" x 2" American Air Filter PerfectPleat HC M8 MERV 8 or equivalent) or obtain one from any local supplier of HVAC supplies.
2. Unpack the new filter and inspect it for damage.
3. Remove the old or damaged filter by loosening the four (4) quarter-turn fasteners securing the filter bracket to the rear door (see [Figure 3.3.1 on page 3.3.7](#)). Remove the filter bracket and remove the air filter.
4. Insert the new air filter into the bracket, noting the air flow direction is from back to front. Reinstall the filter bracket by tightening the four (4) quarter-turn fasteners to secure the filter bracket to the rear door.
5. Dispose of the dirty or damaged air filter.

Figure 3.3.1: Replacing the 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 using the remote AUI's spectrum analyzer.
 - ❖ Take a portable receiver to different locations in your coverage areas to identify any problems with the antenna pattern or areas of localized interference.

Replacing the Control/Interface PWB Battery

Replace the battery on the control/interface PWB once a year, or whenever the Controller - Low Battery alarm appears (on the front panel UI, remote AUI or via digital output). Chemical leakage from an old battery can cause damage. Also, the control/interface PWB's microcontroller may not retain its settings if ac power is turned off while the backup battery power is low. The battery should be replaced while ac power is applied to the transmitter.

Interval

Every 12 months.

Parts and Tools

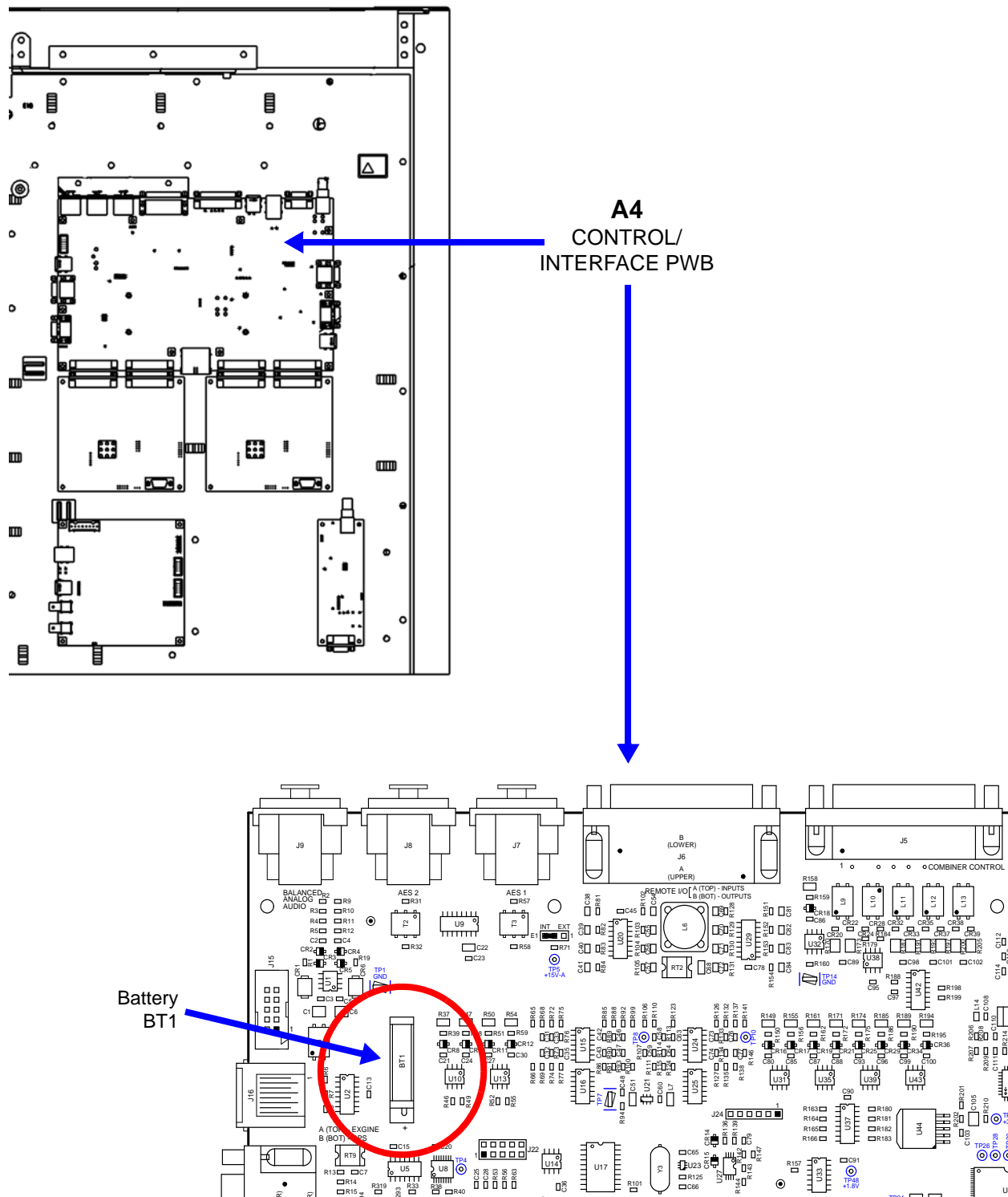
Replacement battery. 3 V lithium coin cell, 20 mm (Panasonic CR2032).

Procedure

Perform the following steps to replace the battery:

1. Ensure ac power is being applied to the transmitter.
2. Open the front door to access the control/interface PWB (A4), which is located on the exciter panel (see [Figure 3.3.2 on page 3.3.10](#)).
3. Replace the battery in XBT1 on the control/interface PWB (A4).
4. Close the front door.
5. Check for any alarms on the front panel UI or the remote AUI.

Figure 3.3.2: Replacing the Battery



Inspecting Lightning Protection Systems

You should inspect the lightning protection systems that are connected to your NX5/NX3 transmitter, ac power, RF feedline, antenna and tower periodically to ensure that your site, equipment and personnel are fully protected.

Interval

Every 6 months.

Parts and Tools

Depends on your site, but may include a DVM, ladder, binoculars, and continuity tester.

Procedure

Perform the following steps to test the lightning protection systems:

1. Test the continuity between ground available at your lightning arrestor and ground available on various pieces of equipment connected to the transmitter. Ensure that there is no resistance (0 ohms).
2. Physically inspect the lightning arrestor to ensure that all connections are tight. Also look for any sign of scoring or burning (indications of possible damage from earlier lightning strikes).
3. Using binoculars, visually inspect the hardware on the tower. Look for charred, broken or frayed connections and corrosion.

SECTION 3.4: LIST OF TERMS

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

ADC. Analog to Digital Converter.

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 microphones). One cable carries both left and right-channel audio data to the receiving device.

B+. The high voltage dc generated by the transmitter's ac power supply for use within the transmitter. The B+ voltage is used to supply the transmitter's modulators and other transmitter circuitry.

CUTBACK. A reduction in RF output power, caused by a total power limit fault or the occurrence of three shutbacks within a five second period.

DAC. Digital to Analog Converter.

DAM. Dynamic Amplitude Modulation.

DCC. Dynamic Carrier Control.

DRM. Digital Radio Mondiale. A set of digital audio broadcasting technologies designed to work existing AM radio channels.

DSP. Digital Signal Processing.

FPGA. Field Programmable Gate Array.

HD RADIO. HD Radio is another term for In Band On Channel (IBOC) technology. HD Radio is a trademark of iBiquity Digital Corporation.

IBOC. Nautel In-Band-On-Channel technology provides high quality digital audio over existing AM radio channels.

IPM. Incidental Phase Modulation

LATCHING ALARM. An alarm that, while active, keeps the transmitter in an 'RF inhibited' state. This type of alarm (e.g., High SWR Shutdown) require a reset - locally or remotely - to attempt to restore transmitter operation.

NE IBOC. Nautel's In-Band-On-Channel signal generator. See IBOC. Required for NX series IBOC installations.

PDM. Pulse Duration Modulation.

PRESET. A setting that controls power level, active exciter, and power scheduler status on a time-of-day and date basis. Exciters can be configured on a preset for a specific operating mode (for example, Exciter A - conventional AM, and Exciter B - IBOC). The NX5/NX3 allows you to pre-program multiple presets.

SHUTBACK. A complete loss of RF output power, caused by any one of a variety of faults, including high VSWR, low B+ voltage, high RF current, RF drive failure, external interlock or spark gap.

SNMP. Simple network management protocol. A method of communication via web browser between the transmitter and remote computer using specific agent software (in the transmitter) and client software.

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

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

NX5/NX3 OPERATION & MAINTENANCE MANUAL

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