Broadcast Electronics
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STXe 60 Watt FM Exciter

Technical Manual

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Broadcast Electronics Product Warranty (Two-Year Limited)

Broadcast Electronics hereby warrants all new products manufactured by Broadcast Electronics against any defects in material or workmanship at the time of delivery thereof, or that develop under normal use within a period of two (2) years from the date of shipment.

Broadcast Electronics reserves the right to repair equipment under warranty with new or refurbished equipment or parts. Broadcast Electronics' sole responsibility, with respect to any equipment or parts not conforming to this warranty, is to replace or repair such equipment upon the return thereof F.O.B. to Broadcast Electronics' factory in Quincy, Illinois, U.S.A. In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement.

This warranty shall exclude the following products, component parts and/or assemblies:

(a) Transmitter power output tubes shall only carry the original manufacturers' or suppliers' standard warranty in effect on their original shipment date.

(b) All computers, computer peripherals, cables, hard disk drives, etc., shall only carry the manufacturers' or suppliers' standard warranty in effect on their original shipment date.

(c) "Components", defined as separate and individual parts (e.g. transistors, integrated circuits, capacitors, resistors, inductors, fans, etc.), resold by Broadcast Electronics from another manufacturer or supplier, shall only carry a 90-day warranty, effective the date of shipment. Any such "Components" being returned for warranty claim must be (1) returned in their original packaging and (2) must be in new, unused condition. Broadcast Electronics is unable to process or resolve component defects or performance concerns on components that have been soldered, installed, wired or in any way altered from their new condition.

(d) "Resale Equipment", defined as equipment purchased from another manufacturer or supplier, then resold by Broadcast Electronics, shall only carry such manufacturer's or suppliers' standard warranty in effect as of the original shipment date. All warranty claims against any and all "resale equipment" sold by Broadcast Electronics must be filed directly with the original equipment manufacturer. Broadcast Electronics is unable to process or resolve equipment defects or performance concerns on products or services not manufactured by Broadcast Electronics.

This warranty shall not extend to claims resulting from any acts of God, terrorism, war, defects or failures caused by Purchaser or user abuse or misuse, operator error, or unauthorized attempts to repair or alter the equipment in any way.

Under no circumstances shall Broadcast Electronics be responsible for indirect, incidental or consequential damages, including, but not limited to transportation costs, non-authorized repair or service costs, downtime costs, costs for substituting equipment or loss of anticipated profits or revenue incurred by Purchaser, whether based in contract, tort or for negligence or breach of statutory duty or otherwise. The terms of the foregoing warranty shall be null and void if the equipment has been altered or repaired without specific written authorization from Broadcast Electronics, or if not installed according to Broadcast Electronics' instruction manuals, including, but not limited to, the absence of proper grounding, surge (TVSS) protection on the AC circuit panel or proper lightning protection/grounding on all output circuits, or if equipment is operated under environmental conditions or circumstances other than those specifically described in Broadcast Electronics' product literature or instruction manual which accompany the equipment. **The warranty shall be voided if the product or subassembly is equipped with a tamper seal and that tamper seal is broken.** Broadcast Electronics shall not be liable for any expense of any nature whatsoever incurred

this warranty. If the equipment is described as “used” equipment, it is sold as is and where is and no warranty applies unless authorized in writing.

EXCEPT AS SET FORTH HEREIN, AS TO TITLE AND AS SPECIFICALLY REQUIRED BY LAW, THERE ARE NO OTHER WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY BROADCAST ELECTRONICS, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INFRINGEMENT, OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carriers' agent will present a receipt for your signature. Do not sign it until you have:

1) Inspected the containers for visible signs of damage and 2) Counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

RF PRODUCT TECHNICAL ASSISTANCE, REPAIR SERVICE, PARTS -

Technical assistance is available from Broadcast Electronics by letter, prepaid telephone or E-mail. Do not return any merchandise without first contacting Broadcast Electronics and receiving prior written approval and a Return Authorization. We will provide special shipping instructions and a code number that will assure proper handling and prompt issuance of credit. Please furnish complete details as to the circumstances and reasons when requesting return of merchandise. Equipment requiring repair or overhaul should be sent by common carrier, prepaid, insured, and well protected. If proper shipping materials are not available, contact the RF Technical Services department for a shipping container. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. All returned merchandise must be sent freight prepaid and properly insured by the customer

Emergency and warranty replacement parts may be ordered from the following address. Be sure to include the equipment model number, serial number, part description, and part number. Non-emergency replacement parts may be ordered directly from the Broadcast Electronics stock room (see next page.)

RF TECHNICAL SERVICES

Telephone: +1 (217) 224-9617
E-Mail: rfservice@bdcast.com
Fax: +1 (217) 224-6258

FACILITY CONTACTS

Broadcast Electronics, - Quincy Facility
4100 N. 24th St. P.O. BOX 3606
Quincy, Illinois 62305
Telephone: +1 (217) 224-9600
Fax: +1 (217) 224-6258
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Web Site: www.bdcast.com

PARTS

Telephone: +1 (217) 224-9617
E-Mail: parts@bdcast.com

RETURN, REPAIR, AND EXCHANGES

Do not return any merchandise without our written approval and Return Authorization. We will provide special shipping instructions and a code number that will assure proper handling and prompt issuance of credit. Please furnish complete details as to circumstances and reasons when requesting return of merchandise. All returned merchandise must be sent freight prepaid and properly insured by the customer.

MODIFICATIONS

Broadcast Electronics reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

SAFETY PRECAUTIONS

PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS

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

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

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

A. HIGH VOLTAGE - Normal operating voltages can be deadly. Additional information follows.

B. RF RADIATION - Exposure to RF radiation may cause serious bodily injury possibly resulting in blindness or death. Cardiac pacemakers may be affected. Additional information follows.

C. HOT SURFACES - Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.

D. RF BURNS - Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

HIGH VOLTAGE

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

RADIO FREQUENCY RADIATION

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

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

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

HOT SURFACES

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

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1 Overview

The STXe FM Exciter series is designed to provide a cost effective solution for FM broadcast.

1.1 Instructions

Use this document as an all-inclusive technical resource for STXe 60 systems. Determine broadcast system scope and design. Follow the detailed installation instructions and interfacing descriptions to integrate the STXe 60 into your broadcast system. Refer to user interface detail sections for descriptions of front panel LED display dynamics, interfacing through the transmitter control center, web page, enhanced web page, SNMP, backup control, and system troubleshooting. Follow detailed maintenance directions and, after troubleshooting and diagnosing failures, follow complete sub-system replacement steps.

Select settings such as frequency, expected output power, Ethernet settings, etc. can be communicated at the time of purchase. After standard testing of all systems, technicians will use customer settings and verify full system operation under conditions closely resembling those of the final installation.

If the Ethernet capabilities of the STXe are to be utilized, an existing network must be present. This document presumes that such a network already exists at the customer's premises and only discusses items specific to setting up the STXe. If a network does not already exist, please consult a local Information Technology professional for assistance.

1.2 Other Documents

See the STX CPE Software Update Application Guide 597-4200 for software and firmware update details. For electronic copies of this and other Broadcast Electronics technical documentation please visit http://www.bdcast.com/information-center/.

1.3 Installation and Initial Setup Summary

All of the following steps are required to get a standard STXe 60 system running. This list reflects the headings under the installation and initial setup section:

1. Rack mount
2. Exciter PA RF drive
3. Transmitter RF
4. AC power
5. BE-Interface active stub
6. GPIO Exciter-Transmitter integration
7. Turn on AC
8. Time and date
9. Frequency
10. 100% peak modulation
11. Power set-point
12. Primary program services
13. Exciter-Transmitter Integration Setup

1.4 Product Specifications

Figure 1 – STXe 60

Table 1 - Specifications

Parameter	Specification
Physical	
Height	2 RU 3.5” (8.89 cm)
Width	19” (48.3 cm) EIA Rack Mount
Depth	20.5” (52.1 cm) w connectors, 19.5” chassis only. 25.5 rack
Weight	20 lbs (9.0kg) unpacked
Outlet Size	30 in^2 (194 cm^2), entire rear of unit
Environmental	
Temperature	-10°C to +50°C
Altitude	10,000ft (3048M) maximum
Humidity	95% maximum, non-condensing
Air Capacity	80 CFM (4.3 m^3/Min)
Heat Dissipation	90 W at Rated Output
BTU	300 BTU/H at Rated Output
AC Input	
Voltage	90 to 264 VAC Split Phase
Frequency	47-63 Hz
Power Factor	0.99 typical at 100V, 0.95 typical at 200V
Surge Protection	Tested to EN 301 489-1, including voltage dips and dropouts (Section 9.7B), voltage surges (Section 9.8) as well as conducted immunity and conducted radiation.
Power Consumption	150W (calculated) typical at rated output
RF Output	
Power Accuracy	+/-5% of Total Output Power Setting
Asynchronous AM S/N Ratio	75 dB below rated power reference carrier referenced to 100% peak AM
Synchronous AM S/N Ratio	60 dB below rated power reference carrier referenced to 100% peak AM, 75usec de-emphasis, 75 kHz deviation @ 400 Hz Sine
Impedance	50 Ohms nominal
VSWR	Rated Power into 1.5:1 VSWR. Open and short circuit protected at all phase angles.
FM Only Power	5W-70W
Power Control Precision	1W
Efficiency	40% typical AC to RF
RF Output Connector	Type N, Female
Frequency	
Range	87.5MHz to 108MHz; 10kHz increments
Stability	Internal TCXO: +/-100Hz factory calibration, +/-4ppm aging/temp, -10 degrees C to +50 degrees C; External Input: accuracy of reference source

Parameter	Specification
Modulation	
Type	300KF8E
	Direct-to-channel digitally generated FM (no analog up-conversion); FM only
Capability	300 kHz nominal
Maximum Over	150%
RF Harmonics Suppression	
FCC; DOC; ITU-R; CCIR	Meets all requirements/recommendations
	85dB or better typical, low pass filter standard
Composite Input	
Connector	BNC
Impedance	10k ohms, un-balanced
Level	3.5V p-p for 100% modulation
Amplitude Response	+/-0.03 dB 20 Hz to 53 kHz; +/-0.1 dB 53 kHz to 100 kHz
Phase Response	+/-0.1 degree 53kHz to 100kHz
THD + Noise	0.005% or less @ 400 Hz, 10-22Khz bandwidth, 75 uS de-emphasis
IMD	0.01% or less SMPTE 60/7000 Hz; 1:1 RATIO
	0.005% typical DIM-B (14 kHz)
SNR	88dB or better below 100% modulation @ 400Hz, 10Hz-22Khz bandwidth, unweighted
	95dB typical below 100% modulation @ 400Hz, 10Hz-22Khz bandwidth, A-weighted filter
	100dB typical below100% modulation @ 400 Hz, 10Hz-22Khz bandwidth, CCIR-468 filter
SCA1 SCA2 RDS Inputs	
Connectors(2)	BNC
Impedance	10k ohms, un-balanced
Level	3.5V p-p for 10% deviation
Response	+/-0.1 dB; 53 kHz to 100 kHz
AES Input	
Connector	XLR Female
Impedance	110 Ohms, balanced
Bits	16-24 bits
Rate	32, 44.1, 48, or 96 kHz
Level	-2 dBFS default for 100% modulation,
	Adjustable in 0.1 dBFS steps, -15 dBFS to 0 dBFS
Analog L/R Input	
Connectors	XLR Female
Impedance	600 Ohms or 10K Ohms selectable, balanced
Level	10dBm into 600 Ohms default for 100% modulation
	Adjustable in 0.25 dB steps, -10dBm to +10dBm

Parameter	Specification
Stereo Generation (AES and Analog L/R Inputs)	
Modes	Stereo, Mono L+R, Mono L, Mono R
Pre-emphasis	None, 50 usec, 75 usec selectable
Amplitude Response	+/-0.25dB; 20 Hz to 15 kHz
THD + Noise	0.03 or better @400Hz, measured 10 Hz-22Khz, 75 uS de-emphasis
Mono (L+R):	0.005 typical @400Hz, measured 10 Hz-22Khz, 75 uS de-emphasis
Stereo:	0.01 typical @400Hz, measured 10 Hz-22Khz, 75 uS de-emphasis
	86dB or better below 100% modulation @ 400Hz, 10 Hz-22Khz bandwidth, unweighted
	95dB typical below 100% modulation @ 400Hz, 10Hz-22Khz bandwidth, A-weighted filter
	100dB typical below 100% modulation @ 400 Hz, 10Hz-22Khz bandwidth, CCIR-468 filter
	90 dB, Stereo 80 dB or better below 100% modulation @ 400 Hz
IMD	
Mono (L or R)	0.01% or less SMPTE 60/7000Hz; 1:1 RATIO
	0.005% typical DIM-B (14kHz)
SNR	
Mono (L+R):	86dB or better below 100% modulation @ 400Hz, 10 Hz-22kHz bandwidth, unweighted
AES:	86dB or better below 100% modulation @ 400Hz, 10 Hz-22kHz bandwidth, unweighted
Analog:	93dB typical below 100% modulation @ 400Hz, 10Hz-22kHz bandwidth, A-weighted filter
	98dB typical below 100% modulation @ 400 Hz, 10Hz-22kHz bandwidth, CCIR-468 filter
Stereo:	80 dB or better below 100% modulation @ 400 Hz Unweighted
Stereo Separation	70dB or better, 20Hz to 15kHz
AES:	80dB typical, 20 Hz to 15 kHz
Analog	76dB typical, 20 Hz to 15 kHz
Crosstalk	
Linear	90dB below 100% typical; Main into Sub or Sub into Main
Nonlinear	80dB below 100% typical; Main into Sub or Sub into Main

Parameter	Specification
Pilot Output	
Connector	BNC, un-balanced
Level	1V p-p +/- 5% into high impedance
Stability	+/- 300Hz or better on internal reference.
	+/- 3.0° or better per ITU-R on internal reference.
	External reference dependent on accuracy of reference source
10 MHz Input	
Connector	SMA un-balanced
Level	1 to 3 V p-p, nominal 2.8 V p-p (13 dBm)
1 Pulse Per Second Input	
Connector	SMA un-balanced
Level	5V TTL Rising Edge
Regulatory	
FCC; IC; CE; BETS-6; IEC215	Meets or exceeds requirements

1.5 Default Operation

The following table shows the default values for the listed parameters. When the Exciter is commanded to factory defaults from the front panel, all of these parameters will be changed to the values shown below.

At the time the Exciter order is placed, the customer may provide operating parameters other than those shown below (e.g. operational frequency). In that case, factory personnel will assure that the Exciter is shipped with the customer-provided parameters. However, selecting "Factory Reset" from the front panel will always set the parameters as listed below.

1. Transmitter RF On/Off – Off
2. Frequency – 98.1 MHz
3. Operating Mode – FM Only
4. FM-only Power Set-point – Nominal system rating 60W
5. Digital-only Power Set-point – 30% of nominal 18W
6. FM + Digital Power Set-point – 70% of nominal 42W
7. Sideband power level – -20 dBc
8. Digital PAV – 28V
9. Emergency Output Power – 0 W (disabled)
10. 100% Modulation – 75 kHz
11. Pre-emphasis – None
12. Pilot Injection – On, 10%
13. Mono/Stereo Mode - Stereo
14. Audio Input – Composite
15. AES – -2dBFS input level
16. AES Stereo injection – 100%
17. Analog L – -2.5 dB input gain
18. Analog R – -2.5 dB input gain
19. Analog L/R Stereo injection – 100%
20. Composite – +8.0 dB input gain
21. SCA1
    - Off
    - -12.0 dB input gain
22. SCA2
    - Off
    - -12.0 dB input gain
23. RDS
    - Off
    - -12.0 dB input gain
24. Real Time Clock – shipped with Quincy, IL time, factory reset does not affect this

Note: The internal clock will continue to keep time when power is removed for a short period. However, if the system is unpowered for a few days, the clock will reset to 2000-01-01 00:00:00. This is likely to occur during shipping.

25. Controller Ethernet
    - DHCP - Disabled
    - I.P. – 10.2.4.110
    - Subnet Mask – 255.255.0.0
    - Gateway – 10.2.1.1
26. VPe Ethernet
    - DHCP - Disabled
    - I.P. – 10.2.4.111
    - Subnet Mask – 255.255.0.0
    - Gateway – 10.2.1.1
27. Exgine Ethernet
    - I.P. – 10.2.4.112
    - Subnet Mask – 255.255.0.0
    - Gateway – 10.2.1.1
28. All Passwords – 00000000 (invalid)
29. AFC Unlock Output Active Level – Low
30. Fault Output Active Level – High

2 Preparing to Install

The STXe comes with an installation kit. The standard kit provides miscellaneous items that are typically required to interface the STXe 60 as a stand-alone transmitter, or to interface it to a generic transmitter.

There are two other installation kits that can optionally be ordered – one for use with a Broadcast Electronics' S-series transmitter, and one for use with a C- or T-series transmitter. The contents of each installation kit are shown below.

The STXe can be used as an Exciter for non-Broadcast Electronics transmitters as well.

2.1 Verify Contents of Shipment

	BEI Part #	Quantity	Description
☐	909-4060-C	1	60W STXe
☐	979-4062	1	STXe 60 Manuals Binder Kit
☐	597-4061	1	STXe 60 Technical Manual
☐	598-0010-001	1	1" BLUE BINDER
☐	979-4160-200	1	Standalone STXe 60 Transmitter Standard Installation Kit
☐	417-0284	2	37PIN D-SUB SHELL
☐	417-3288	1	BNC-JACK TO N-PLUG ADAPTER
☐	418-0283	1	37PIN D-SUB SOLDERPOT
☐	420-0007	4	PHILLIPS SCREW 12-24X3/4"
☐	420-0710	4	PHILLIPS SCREW 10-32X5/8"
☐	421-0002	4	EIA RACK SCREW CLIPS 12-24
☐	423-1018	4	FIBER WASHER .500X.218X.030
☐	682-0001	1	AC LINE CORD, AMERICAN
☐	682-0003	1	AC LINE CORD, EUROPEAN
☐	949-0543	1	BNC COAX JUMPER
☐	949-4130	1	EXCITER ACTIVATION STUB

Optional alternate installation kit:

☐	979-4160	1	STXe 60 Exciter in FM-only 10S/20S
☐	All contents of 979-4160-200 kit (listed above)		
☐	949-4144	1	STXe TO FM10S CABLE

Optional alternate installation kit:

☐	979-4160-100	1	STXe 60 Exciter in FM-only C or T Series, or any FMi digital transmitter (S-, C- or T-series)
☐	All contents of 979-4160-200 kit (listed above)		
☐	949-4161	1	STXe/XMTR INTERFACE HARNESS

2.2 Items Sold Separately or Not Supplied

☐ Remote station interface controller and wiring for desired connections
☐ Networking cable(s) and switch(s) for Ethernet connectivity

2.3 Tools and Materials Needed for Setup and Maintenance

☐ Small flat blade screwdriver (5/32" blade or smaller)
☐ Large Phillips screwdriver
☐ Ty-wraps

For Remote Station Interface Connections:
☐ Wire - at least 2" (5cm), enough for unmute/failsafe jump
☐ Wire strippers
☐ Soldering iron and solder
☐ Heat shrink tubing - recommended to isolate any tightly packed wire connections

2.4 Estimated Time for Installation

Installation and initial setup should take approximately 30 minutes.

3 Installation and Initial Setup

This section covers installation requirements for a full featured system. Non-standard installations or optional equipment may be covered in other documents.

ENSURE ALL AC POWER INPUT IS COMPLETELY DISCONNECTED BEFORE ACCESSING ANY SYSTEM COMPONENTS

3.1 Installation into Rack

The STXe 60 fits in two EIA rack units. Rack mounting is highly recommended to maximize safety, quality, and the lifetime of the system; however rack mounting is not absolutely required for operation.

Non-threaded rails: Use provided clips in the lowest and highest holes of the two selected rack units.

Insert four screws (provided) in felt washers. Prop the STXe 60 up in place and secure the system in the rack with the screws as shown.in Figure 2

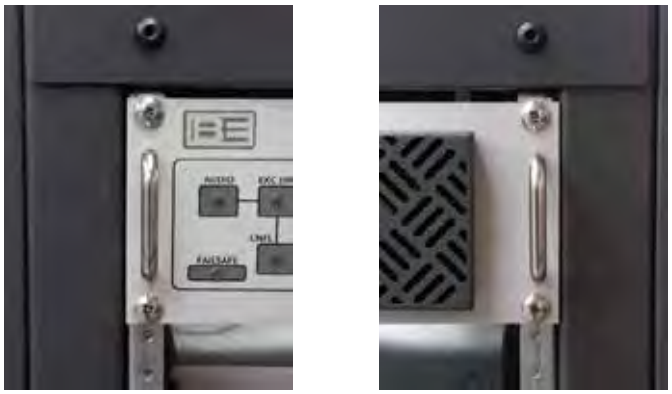


Figure 2 – Rack Mounting

3.2 Exciter PA RF Drive

Use the provided 949-0543 BNC coaxial jumper to connect EXC RF OUT to PA RF IN.)

Figure 3 – Exciter RF Jumper

Systems running with a FW switcher, VPe, or other signal source can skip this step.

3.3 Transmitter RF

Connect STXe 60 RF OUT to the Transmitter's RF input or for standalone installations connect RF out to the antenna transmission line. (See Figure 4Figure 4 – RF Output Connected to Transmitter.)

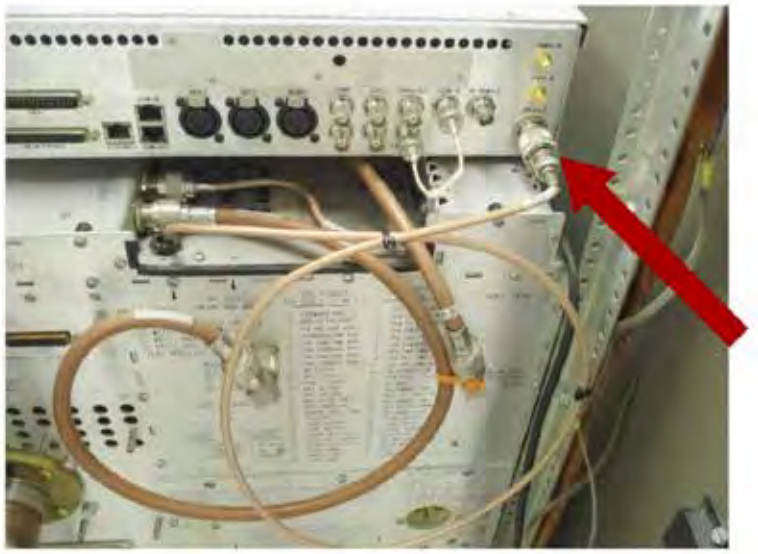


Figure 4 – RF Output Connected to Transmitter

3.4 AC Power

Connect AC power from the transmitter or use one of the provided AC power cables to plug into a power socket at the installation facility. (See Figure 5.)

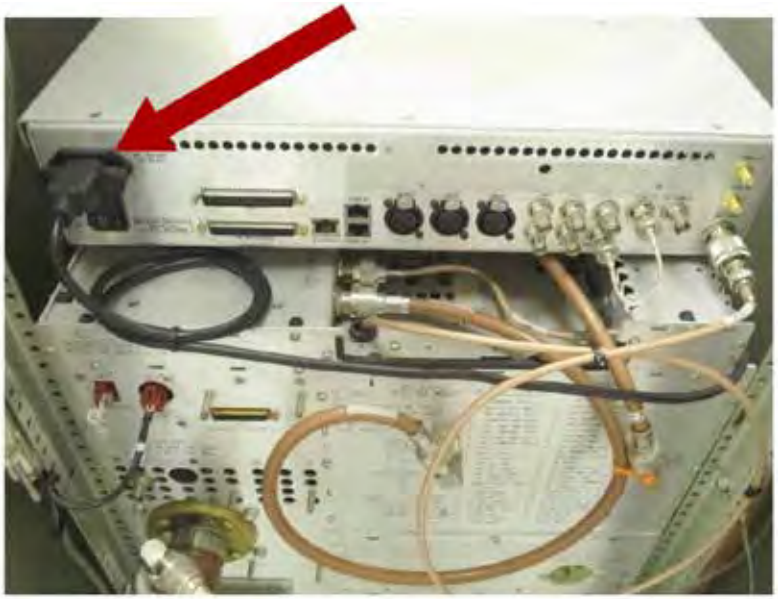


Figure 5 – AC Power Input

3.5 Broadcast Electronics-Interface Active Stub

Connect the provided Exciter activation stub. Secure the two jackscrews with a small flat screwdriver.

Figure 6 – Active Stub

This stub should be set aside and stored in a safe place when system options that utilize this input are included in the broadcast system, for example FW-LP1 switcher and VPe signal generator.

3.6 GPIO Exciter-Transmitter Integration

The STXe provides inputs and outputs that the customer can use to integrate the Exciter with a transmitter and/or a remote monitoring system. These are available on the rear connector labeled "GPIO".

To facilitate connection to the GPIO pins, all installation kits include a loose 37PIN female D-Subminiature solder-pot connector (BE #418-0283) and a shell (BE #417-0284) for the solder-pot connector.

Optional kits which include a wire harness are built with a similar solder-pot connector, to allow the customer to make additions and modifications.

Advanced setups require site engineering. This service is not supported as part of standard system packages. These setups include any physical remote station controller wire connections and transmitter interfacing. See section 5.1 for a detailed explanation of each input and output.

There are three installation types for the STXe 60: 1) Standalone, 2) Active Low/Ground logic, 3) Active High/+5V logic. Depending on which type of installation, follow the instructions in section 3.6.1, 3.6.2 or 3.6.3 below.

3.6.1 Basic / Standalone

All installations require the unmute/failsafe input to be grounded. Typically this input should be connected to antenna/load switch interlocks, etc. to assure that the transmitter will only operate when safe.

If operating in a standalone mode without external interlocks, the failsafe input can be wired to the ground pin on the GPIO connector as follows:

1. Connect unmute/failsafe pin 2 (left connection in Figure 7) to ground pin 19 (right connection in Figure 7) through a failsafe relay.

Figure 7 – Failsafe to Ground

2. Insert the connector in one of the shell halves.

Figure 8 – D-Sub Shell Half

3. Place the other shell half on top and set the nuts in place as indicated in the figure.

Figure 9 – D-Sub Shell Whole and Nuts

4. Thread the screws through the nuts by inserting up from the bottom.
5. Turn the assembly over and tighten with a small flat screwdriver.
6. Plug the assembly on the GPIO connection and secure the screws.

Figure 10 – GPIO Connector

3.6.2 Active Low/Ground Interfacing / FM-Only S-Series Transmitter

If interfacing the STXe 60 to a Broadcast Electronics S-series transmitter, the cable harness BE #949-4144 should be used. This harness provides a direct connection from the GPIO on the STXe 60 to the control interface on the S-series transmitter.

This harness can also be used for other manufacturers' transmitters that make use of active low/ground signals.

Table 2 – 949-4144 Standard Transmitter (BE S-Series) Cable Description

STXe 60 GPIO				Transmitter Main Exciter Interface			
37-Pin D	**Wire Color**	**Function**	**Dir.**	**9-Pin MR**	**Wire Color**	**Expected Function**	**Dir.**
33	GREEN	Forward Power	Out	1	GREEN	Forward Power	In
15	ORANGE	Reflected Power	Out	2	ORANGE	Reflected Power	In
2	WHITE	Failsafe/Un-mute	In	3	WHITE	Unmute	Out
25	YELLOW	AFC Lock	Out	4	YELLOW	AFC	In
20	RED	General Fault	Out	5	RED	Over-Temperature	In
19	BLACK	Ground	N/A	6	BLACK	Ground	N/A
31	BLUE	HD Pwr Cntrl	In	7	BLUE	HD Pwr Cntrl	Out
Other	N/A	No Connection		Other	N/A	No Connection	

3.6.3 Active High/+5V Interfacing through Extended I/O

For installations and transmitters that require active high control logic, such as Broadcast Electronics' C- and T-series transmitters, the extended I/O interface must be used.

The Extended I/O interface cable harness (BE #949-4161) provides a direct connection between the STXe 60 and a C- or T-series transmitter.

This cable harness also has a 9-pin MR connector for use with Broadcast Electronics VPe/XG systems. For FM-only operation, this connector can remain unconnected.

The extended I/O board, in conjunction with the 949-4144 transmitter-Exciter interface cable, allows the STXe to directly replace an FXi Exciter.

Figure 11 – 949-4161 Extended I/O Exciter-Transmitter Cable Harness

Table 3 – Extended I/O Exciter to Transmitter Cable Description

Pin	Direction	Name	Description
1	Out from STXe	AFC Lock	Active when 10MHz reference (internal or external) reports that it is locked. High/Low active behavior can be selected by jumper setting on the extended I/O board.
2	N/A	Ground	Chassis ground connection.
3	Out VPe	HD Status	Indicates missing status of digital carriers when digital carriers are turned off or missing due to a detected fault/failure.
4	Out VPe	Reserved	Reserved
7	In CPE VPe	Reset	Active low Causes a hardware reset in CPE and VPe systems.
8	Out CPE	Fault	Active when a fault is detected. High/Low active behavior can be selected by jumper on the extended I/O board.
9	Out CPE	Forward Power	Forward power out GPIO pin
10	Out CPE	Reflected Power	Reflected power out pass-through.
14	In CPE VPe	Failsafe/Unmute	Assert active low to enable the Transmitter/Exciter.
15	In CPE VPe	Mute	Assert active low to mute and disable the Transmitter/Exciter RF outputs.
23	In CPE	Power Control	Analog 4-state power control for use in FMi digital transmitter systems. 0-0.75V mute, 0.75V-2V lower power, 2-3V hold, 3-5V raise.power
24	N/A	Ground	Chassis ground connection.
25	N/A	Ground	Chassis ground connection.
Other	N/A	N/A	No Electrical Connection

1. Change jumper settings to match the intended setup. This requires access to the interior of the system. Refer to section 14.2 for steps to remove the top cover. Also see section 3.13 regarding outputs that can be set to active high/low via front panel configuration.

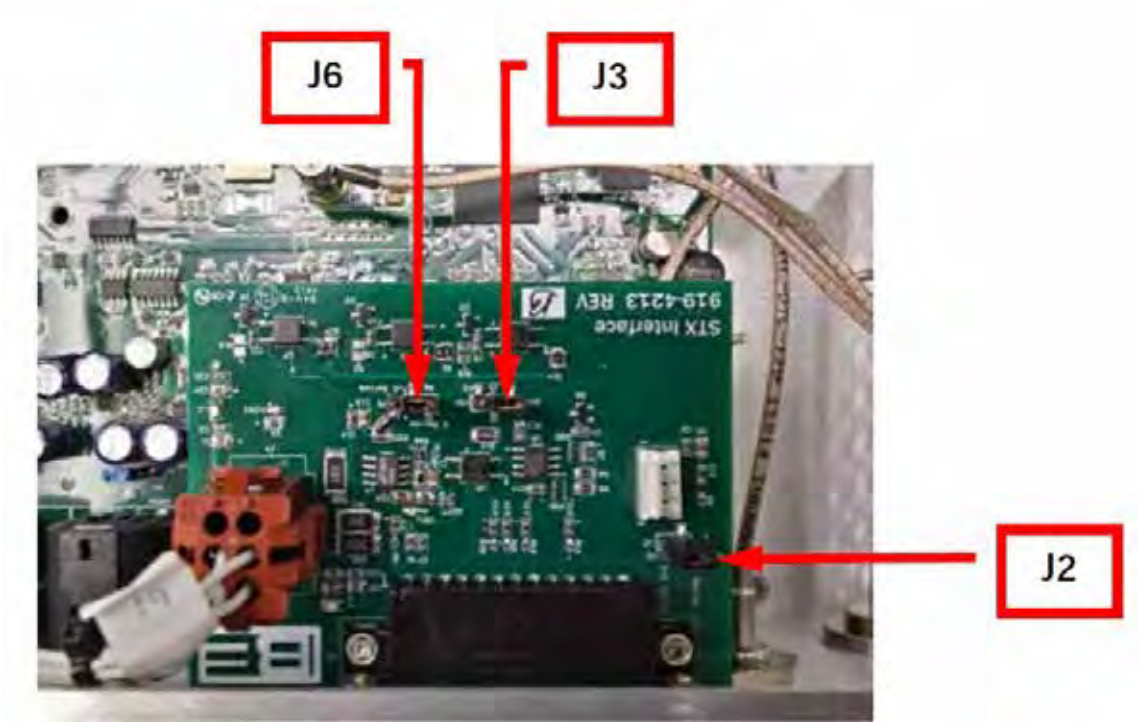


Figure 12 – Extended I/O Jumper Settings

Table 4 – Extended I/O Jumper Settings

Jumper	Position 1-2	Position 2-3
J2	DEFAULT and "T Series" configures failsafe/unmute, mute, and reset inputs to be active low logic.	"S/C Series" configures failsafe/unmute, mute, and reset inputs to be active high logic.
J3	DEFAULT "+5V" configures HD Status Output to be active low logic.	"GND" configures HD Status Output to be active high logic.
J6	"T Series configured for IBOC only", routes 4-state power control input to an optional internal voltage-controlled attenuator.	DEFAULT, "S/C Series" and "T Analog" routes 4-state power control input to CPE.

2. Connect the labeled 25-pin harness plug to the Extended I/O jack and secure it with a small flat screwdriver.

Figure 13 – Extended I/O Cable Harness

3. Connect the 37-pin plug to the GPIO jack and secure it with a small flat screwdriver.

7.

Figure 14 – Extended I/O Harness GPIO Connection

4. Connect the 25-pin transmitter control cable (previously connected to FXi remote J7 jack) to the 25-pin cable harness connection and secure the screws.

5. The cable harness also includes a 9-pin MR connection to integrate the optional VPe system with transmitters through a cable-to-cable connection. This connector is intended to remain disconnected in FM-only system installations.

3.7 Turn on AC Power

1. Unlock AC main breaker on the service line and turn AC service switches to the on position.

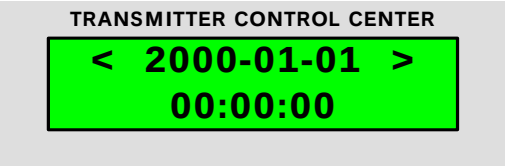
2. Turn on all transmitter circuit breakers.

3. Flip the Power Switch to the On position on the STXe 60 unit.

3.8 Time and Date

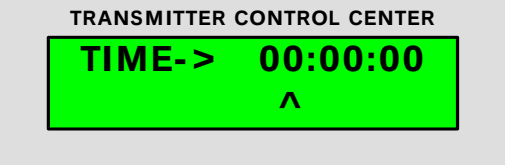
The internal real time clock holds the current time and date for use in the event log. This device supports 24-hour format and does not adjust for daylight savings time. If installing during summer in a daylight savings region, following standard time is recommended. Alternatively, the clock can be set to UTC.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the Date and Time menu. Press enter to continue.



2. Press up or down to select the time editing screen.

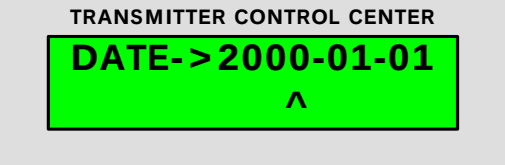
3. Set the local (24-hour non-daylight savings) time. Press left or right to move the cursor and press up or down to increment or decrement the number.



4. Press enter when finished editing for the setting to take effect in the system, save the setting, and start keeping time.

5. Enter the date and time menu again. Press up or down to navigate to the date editing screen.

6. Set the current date. Press left or right to move the cursor and press up or down to increment or decrement the number.



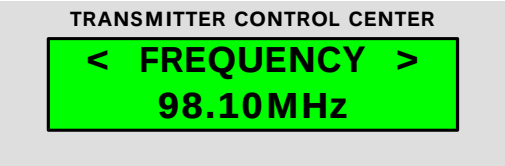
7. Press enter when finished editing for the setting to take effect in the system, save the setting, and keep the date.

3.9 Frequency

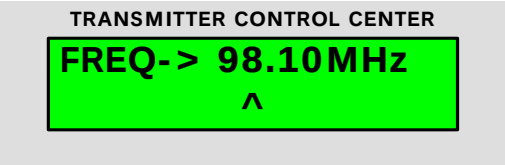
STXe systems are frequency-agile. The frequency can be changed directly from the front panel – no hardware modifications or tuning procedure is required when the carrier frequency is changed.

If the STXe RF output is on ("TX ON") when the frequency is changed, the system will momentarily turn the RF output off, change the frequency, and immediately turn RF back on again with the new frequency.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the FREQUENCY menu. Press enter to continue.



2. Press left or right to move the cursor between digits. Press the up or down button to increment or decrement the number.



3. Press enter when finished editing for the frequency change to take effect.

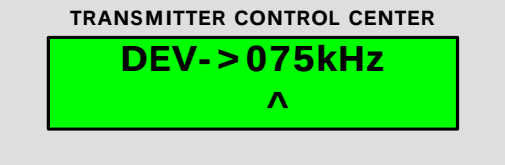
3.10 100% Peak Modulation

The STXe defaults to 100% modulation being +/- 75 kHz. This section only applies if the STXe is being used in an installation where 100% modulation is not +/- 75 kHz.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

2. Press up or down to select DEV (the FM deviation control setting).

3. Press left or right to move the cursor between digits. Press the up or down button for each digit to increment or decrement the number. This change takes effect while editing, allowing active tuning.

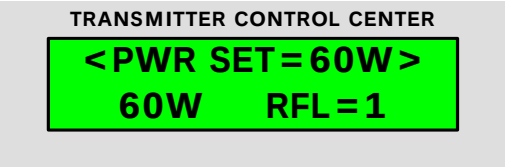


4. Press enter when finished editing to exit the sub-menu.

3.11 Power Set-point

This section applies to installations where the STXe 60 system is the transmitter or where a fixed-power output is required to drive a high-power transmitter. Setups where the STXe 60 is an integrated Exciter and/or IPA for a transmitter where the transmitter regulates STXe 60 power can skip this section.

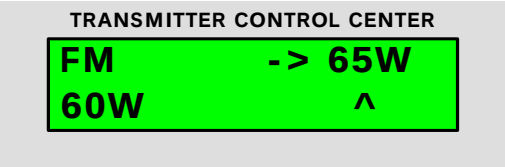
1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the PWR SET menu. Press enter to continue.



2.

3. Press up or down to select the power set-point for the FM operation mode which should display as active. Note that digital, FM + digital, and hybrid HD sideband settings require an optional VPe system. Press enter to continue.

4. Press left or right to move the cursor between digits. Press the up or down button for each digit to increment or decrement the number. Current output forward power measurements are displayed in the lower left of the screen



5. Press enter when finished editing for the new power set-point to take effect.

3.12 Primary Audio Source

The STXe 60 provides built-in injection of one primary audio source: AES, Analog Composite, AES Composite, or Analog L/R. Supplementary audio sources SCA1, SCA2, and RDS can be enabled and used in any on/off combination with these primary audio sources.

3.12.1 AES

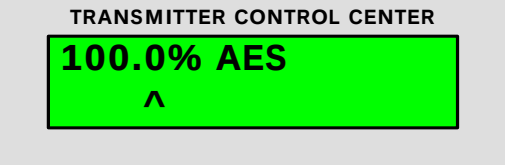
The STXe supports standard AES audio as well as 192 kHz Composite over AES. The 192 kHz Composite over AES operates with various brand name systems including Wheatstone, Omnia and Orban audio processors.

To operate Composite over AES, follow the steps below, but select “AES COMP” rather than “AES” as the input.

1. Connect an XLR cable from the desired AES audio source.
2. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO INPUT menu. Press enter to continue.

3. Press up or down to select AES as the primary audio source. Press enter to continue.

4. The screen will display the injection percentage allocated to AES. This setting allows the customer to budget the modulation when supplementary services are present. Leave this at 100% if there are no supplementary services in use. If supplementary services are present, set the total modulation percentage associated with AES. This can be adjusted from 70% to 100%. Use the left and right arrows to move the cursor. Press up or down buttons for each digit to increment or decrement the number.



5. Press enter when finished editing for the setting to take effect in the system and save.
6. AES audio levels are expressed in terms relative to Full Scale of the digital signal path selected.

7. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

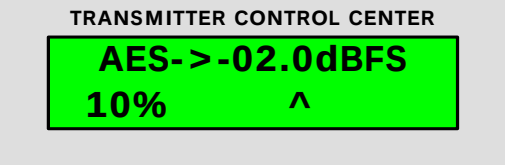
5.

8. Press up or down to select “AES”. Press enter to continue

9. The display will show the current peak modulation attributable to the AES input. The level can be adjusted by changing the associated dBFS setting. This has a range of -28.0 dBFS to +0.0 dBFS in 0.1 dB steps. This represents the AES level that will generate the percentage modulation shown on the screen.

6.

10. Press left or right to move the cursor. Press up or down on each digit to increment or decrement the number and take effect in the system. This has immediate effect. Do this until the displayed left channel peak hold is the desired value – typically 100%.

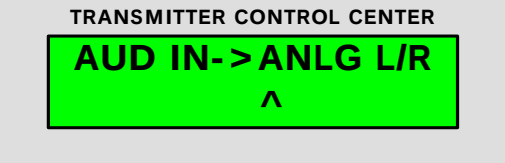


11. Press enter when finished editing to exit the sub-menu.

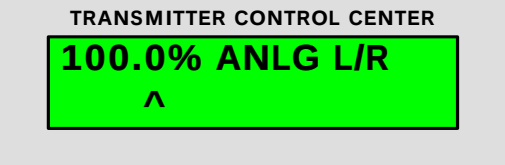
3.12.2 Analog L/R

1. Connect XLR cables from the desired analog left and right audio sources. Activate the source with constant level tones or typical level audio on each channel.
2. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO INPUT menu. Press enter to continue.

3. Press up or down to select ANLG L/R as the primary audio source. Press enter to continue.



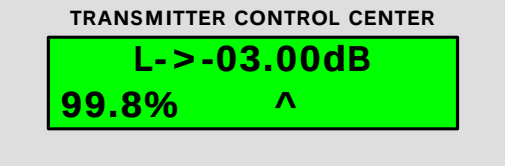
4. Set the stereo injection reduction to allocate injection budget for supplementary services. Leave this at 100% if there are no supplementary services. Press left or right to move the cursor. Press up or down for each digit to increment or decrement the number.



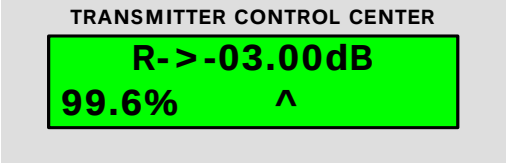
5. Press enter when finished editing for the setting to take effect in the system and save.
6. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

7. Press up or down to select L. Press enter to continue.

8. The display will show the current peak modulation attributable to the Left input. The level can be adjusted by changing the associated gain/attenuation. This has a range of -96.0 dB to +22.0 dB in 0.25 dB steps.
9.
10. Press left or right to move the cursor. Press up or down on each digit to increment or decrement the number and take effect in the system. This has immediate effect. Do this until the displayed left channel peak hold is the desired value – typically 100%.



11. Press enter when finished editing to save the L calibration setting.
12.
13.
14. Repeat steps 6 through 9 for R.
15.



3.12.3 Composite

1. Connect a BNC cable from the desired unbalanced composite audio source. Activate the source with a constant level tone or typical level audio.
2. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO INPUT menu. Press enter to continue.

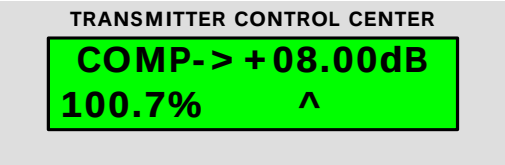
3. Press up or down to select COMPOSIT as the primary audio source. Press enter to continue.

4. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

5. Press up or down to select COMP. Press enter to continue.

6. The display will show the current peak modulation attributable to the Composite input. The level can be adjusted by changing the associated gain/attenuation. This has a range of -96.0 dB to +22.0 dB in 0.25 dB steps. Press left or right to move the cursor. Press up or down on each digit to increment or decrement the number. This has immediate effect. Do this until the displayed peak hold is the desired value – typically 100%.

7. Note: The Composite input is summed with the supplementary sources SCA1, SCA2, and RDS. When calibrating the Composite input, the supplementary sources should be turned off.



8. Press enter when finished editing to save the Composite calibration setting.

3.13 Exciter-Transmitter Integration Settings

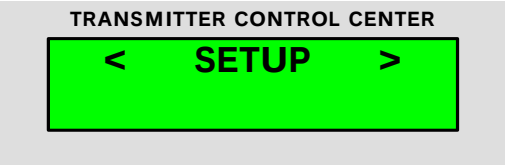
Certain outputs from the STXe 60 can be configured as active high or active low. Follow the instructions of this section if the STXe is being interfaced to a transmitter that utilizes active high logic. The outputs that can be configured are: 1) AFC unlock alarm output, and 2) general fault output.

For use with Broadcast Electronics S-, C-, and T-series transmitters the settings should be:

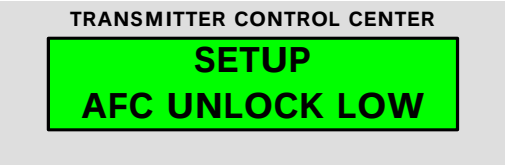
AFC Lock = Low

Fault Out = High

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the SETUP menu. Press enter to continue.



2. Press up or down to select AFC UNLOCK and press enter to continue.



3. Press up or down to change the selection to HIGH.

4. Press enter for the logic setting to save and take effect in the system.

5. Press enter at < SETUP > again and press up or down to select FAULT OUT.

6. Press up or down to change the selection to HIGH.

7. Press enter for the logic setting to save and take effect in the system.

8.

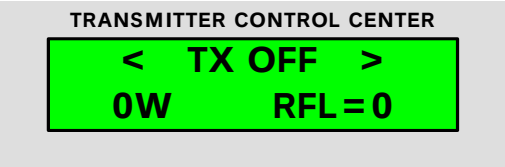
3.14 Turn RF Transmission On

After all setup steps have been completed, including desired optional features in the next section and transmitter setup/integration, the system is ready for operation.

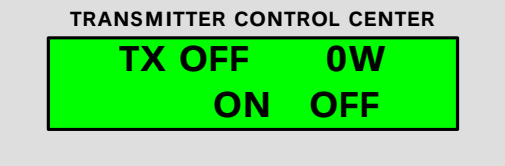
If the STXe 60 is being used as an Exciter for a Transmitter, the STXe 60 is controlled by the Transmitter; turning the RF on at the Transmitter should unmute the STXe60.

If the STXe 60 is being used as a Standalone Transmitter, follow these steps to turn the RF on.

1. At the main screen on the Transmitter control center, press the return button.



2. Press the button under “ON” to power up the Transmitter.



4 Optional Installation Steps

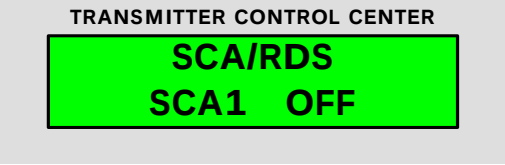
4.1 Additional Program Services

The STXe 60 allows operation of three supplementary audio services. These are labelled SCA1, SCA2 and RDS. It is expected that these will be generated by an external system, modulating the audio at the proper frequency between 57 kHz and 100 kHz.

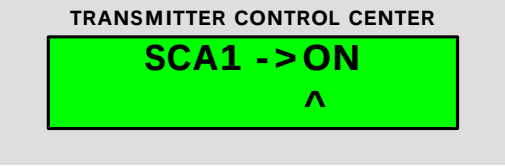
The setup of these audio input sources all follow the same pattern as one another. Repeat these steps below to utilize any of these inputs.

1. Connect a BNC cable from the external signal generator source to the supplementary program input. Activate the source with a constant level tone or typical level audio.
2. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the SCA/RDS menu. Press enter to continue.

3. Press up or down to select the desired SCA/RDS input.



4. Press up or down to change the setting to ON.



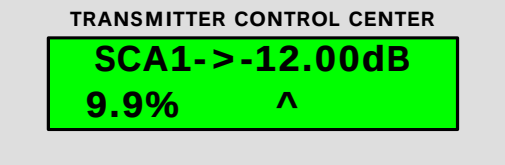
5. Press enter for the on/off setting to save and take effect in the system.

6. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

7. Press up or down to select the desired input and press enter to continue.

8. Press left or right buttons to move the cursor. Press up or down buttons for each digit to increment or decrement the number. This has immediate effect to allow calibration. Do this until the displayed composite peak hold is within a few percentage points of 100%.
9.
10. Note: Composite, SCA1, SCA2, and RDS input signals all contribute to this composite peak hold value. Only the source being calibrated should be driven during calibration; the other sources should be turned off.

11. Adjust until the displayed composite peak hold is at the level desired for the particular input – typically between 5% and 10%.



4.2 Ethernet/IP Network

IP network features are entirely optional. System setup sections below contain procedures based on the LCD interface on the front panel of the main assembly, but there is alternative user interfacing for control of all of these setup parameters in both the web and SNMP interfaces.

The currently used configuration, such as IP address, can be observed in front panel menus. The actual configuration of the system may be determined by DHCP rather than the static settings. Configuration should be made to match whatever network setup is installed.

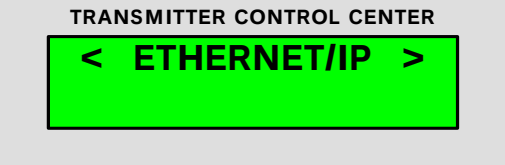
Consult your network manager or internet service provider to ensure that the correct IP settings are used.

For any network type, connect an Ethernet cable from the ETHERNET port to networking equipment (such as a switch or gateway).

4.2.1 Static IP

Use either this simple static IP setup or dynamic host control setup.

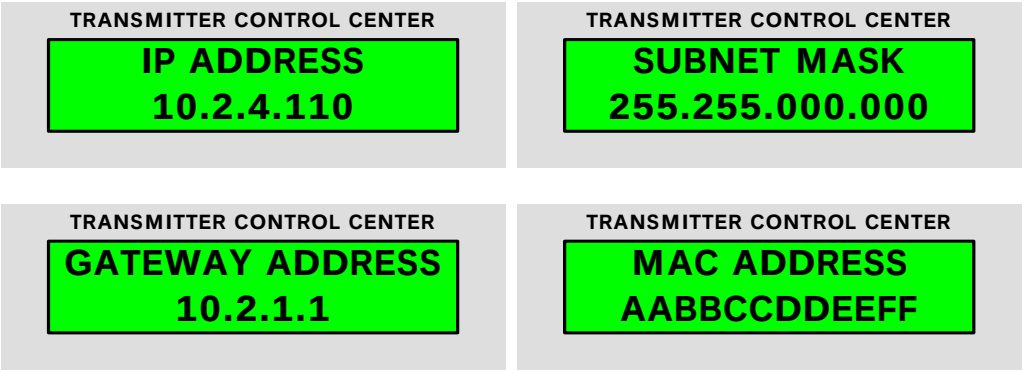
1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the ETHERNET/IP menu. Press enter to continue.



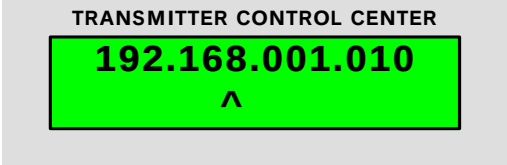
2. Press up or down to select the port to be set up. CONTROLLER is the ETHERNET port on the STXe 60. Exine is the ETHERNET DATA port on the optional VPe/XG system. VPe is the ETHERNET VPE port on the optional VPe/XG system. Press enter to continue.

3. Press up or down to select the IP parameter to be observed or changed. Press enter to continue.

4. This level displays the current state of the IP port, which includes DHCP, IP address, subnet mask, gateway address, and MAC address. Press up or down to observe the currently active IP configuration (0.0.0.0 IP address typically indicates that the port is not connected), and then press enter to modify the static IP setting.



5. Press left or right to move the cursor to any of the 12 digits. Press up or down to increment or decrement the number. Press enter when finished making the setting change.



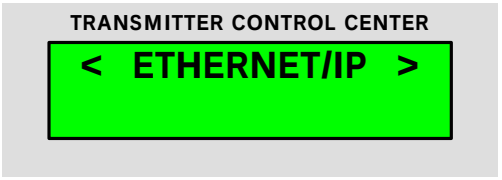
6. Verify that the settings are active by connecting to the port.
7.

4.2.2 Dynamic Host Control

Dynamic IP setup using DHCP is appropriate for more sophisticated and secure network setups. Ethernet will not function when DHCP is enabled and a DHCP-based host controller (typically an internet gateway) is missing from the network setup.

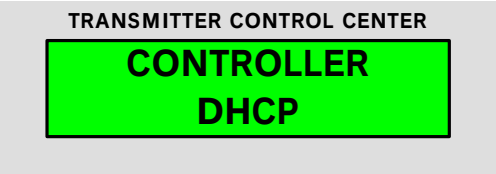
Use either this dynamic host control setup or static IP setup.

1. From the main screen on the transmitter control center on the front panel of the main assembly, navigate to the ETHERNET/IP menu. Press enter to continue.

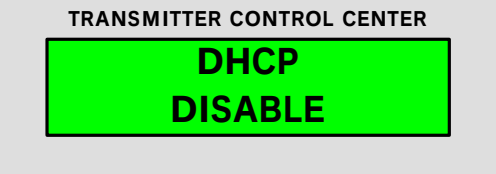


2. Press up or down to navigate to the ETHERNET/IP CONTROLLER. Press enter to continue.

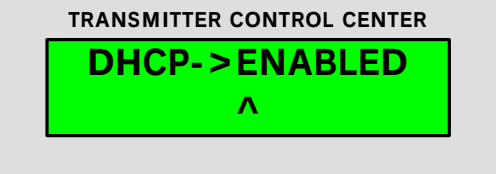
3. Once in the menus, press up or down to select CONTROLLER DHCP and press enter.



4. Once in the menu, press up or down to select DHCP and press enter.



5. Press up or down to change the selection to ENABLED and press enter.



6. Verify that the host control function is active by connecting to the IP port with a web browser. Connect through the managed switch/gateway. Alternatively, view the IP ADDRESS status in these menus to retrieve the current host and access the port through a different local switch.

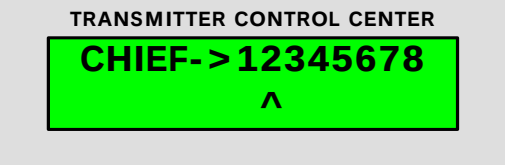
4.3 Password

The default password is invalid for control access. One or more of the passwords (operator, user, or chief) must be set to be used to control the system through any IP interfaces.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the PASSWORD menu. Press enter to continue.

2. Press up or down to select the password to be set. Press enter to continue.

3. Press left or right to move the cursor between password digits. Press up or down on each digit to increment or decrement the number password.

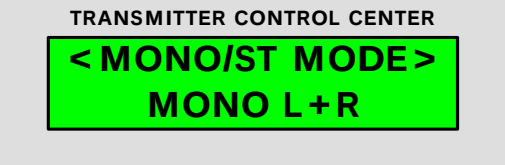


4. Press enter when finished editing for the password to take effect in the system.

4.4 Stereo Generation and Stereo Pilot Injection

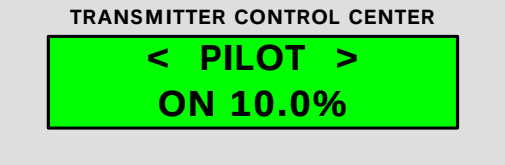
Internal stereo generation utilizing the AES or Analog L/R audio input channels is optional.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the MONO/ST MODE menu. Press enter to continue.

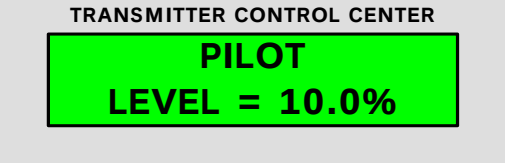


2. Press up or down to select STEREO.

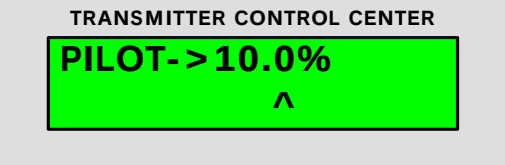
3. Press enter for the selected mono/stereo mode to save and take effect in the system.
4.
5. Note that if changing from any mono mode to stereo, the internally generated 19 kHz stereo pilot will automatically turn on at the previously set level. Changing back to mono from stereo automatically turns the stereo pilot off.
6.
7. To change the injection of the 19kHz stereo pilot: from the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the MONO/ST MODE menu. Press enter to continue.



8. Press up or down to select LEVEL.



9. Set the injection level of the pilot in the stereo signal. The percentage of peak injection is relative to the AES or Analog L/R level. If the AES level is set to 70% reduction factors, a pilot level setting of 10% would cause 7% deviation. Press left or right to move the cursor. Press up or down to increment or decrement the number.



10. Press enter for the pilot level to save and take effect in the system.
11.
12. The Pilot has two modes of operation: 1) On, or 2) Stereo. When the On mode is selected, the 19 kHz pilot will always be present. If in Stereo mode, the Pilot will only be present if the STXe is in Stereo mode.

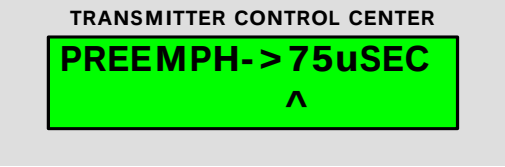
13.
14.

4.5 Pre-Emphasis

Internal pre-emphasis filtering on the AES and Analog L/R audio inputs is another standard option feature tied to internal stereo generation. North American receivers are typically compatible with 75 uS filters while European receivers typically utilize 50 µS filters.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the pre-emphasis menu. Press enter to continue.

2. Press up or down to select the desired filter type. This cycles between NONE, 75 µS, and 50 µS.

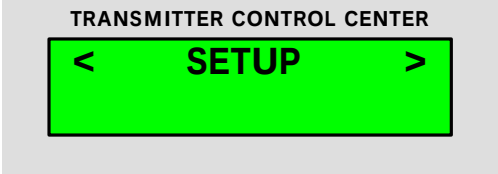


3. Press enter for the filter change to save and take effect in the system.

4.6 Secondary Audio and Silence Timeout

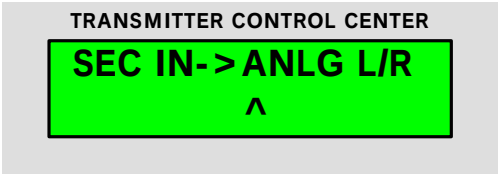
The SECONDARY AUDIO feature allows switching to an alternate source after the PRIMARY AUDIO is absent for the time entered in the SILENCE TIMEOUT setting.

1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the SETUP menu. Press enter to continue.



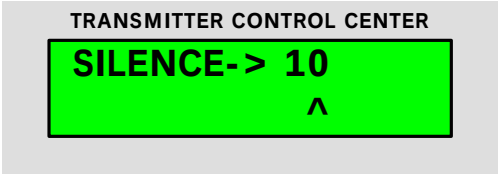
2. Press up or down to select the secondary audio to be set. Press enter to continue.

3. Press up or down to select one of the 4 inputs; Composite, Analog L/R, AES, AES Composite, or None if secondary audio isn't used. Injection level setup for Secondary Audio will be same as outlined in section 3.12**Error! Reference source not found.**.



4. Press enter when finished with selection for the secondary audio source to take effect in the system.
5. Press SET UP again.
6. Press up or down to select SILENCE TIMEOUT and press enter to continue.

7. Press up or down, left or right to enter a timeout in seconds.



8. Press enter when finished for the time out setting to take effect in the system.

5 Rear Panel Connections

Before installing the STXe 60, please take some time to familiarize yourself with all of the connectivity features included in STXe.

Logic “low” refers to a connection to within 0.8V of isolated ground. The logic “High” level is a connection to a voltage greater than 2.4V compared to the isolated ground. A floating input is at the logic “High” level due to internal pull-up resistors on the inputs. Inactive inputs should be left open/floating and not driven. The STXe has active Low inputs. (Refer to section 3.6 for systems requiring active High inputs.) That is, when a pin is grounded, it is asserted.

Active edge refers to a transition from the inactive state to the active state and the implication is that no action is performed on the transition back to high. A momentary input pulse on an active edge input should be at least 100ms in duration to ensure capture of the event.

Active low refers to an application of the low state. The STXe will treat the input as active as long as it is held low.

The reference designators in the figure below refer to sub-section numbers. For example, flag 1 corresponds to details in section 5.1.

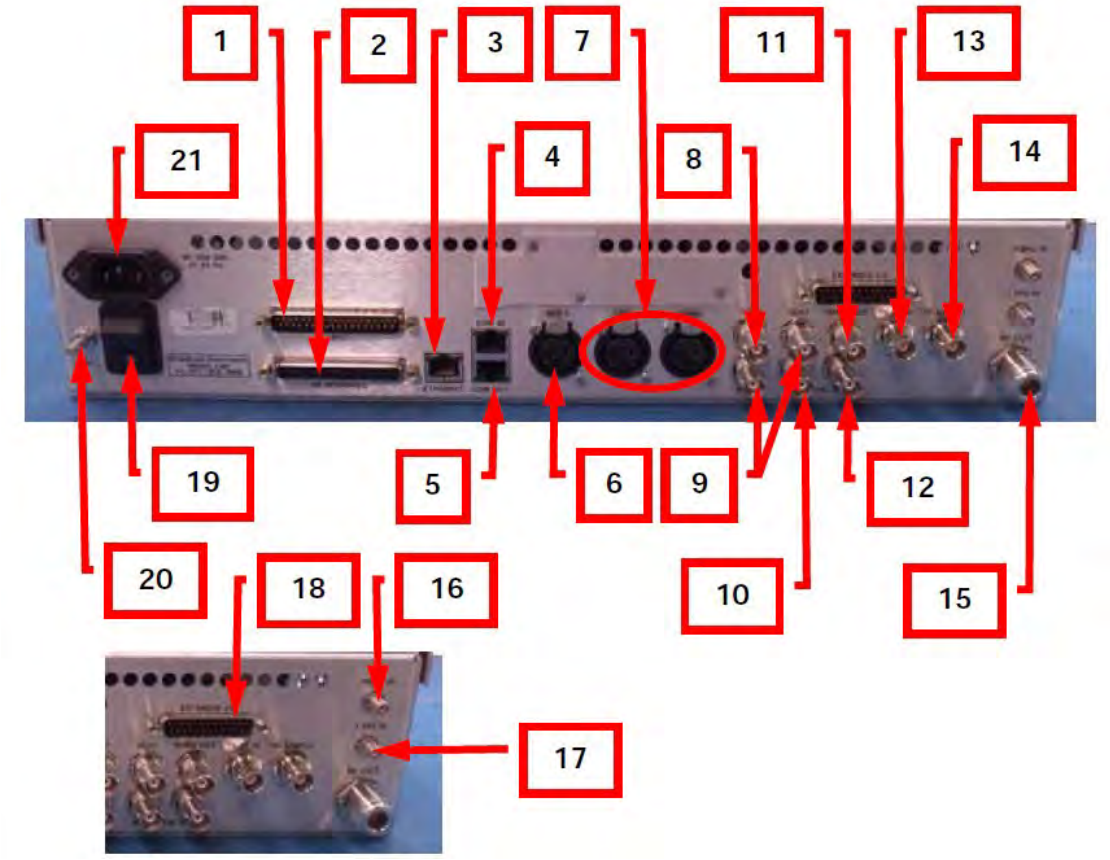


Figure 15 – Rear Panel Features

THIS SYSTEM USES CMOS LOGIC ON "GPIO" AND "BROADCAST ELECTRONICS INTERFACE" CONNECTIONS. LOGIC VOLTAGES THAT EXCEED +5V WILL DAMAGE CIRCUITRY. THIS TYPE OF DAMAGE REQUIRES HARDWARE SERVICE AT THE USERS EXPENSE AS THE WARRANTY ON THIS SYSTEM WILL BE VOID!

5.1 GPIO

General Purpose Input/Output (GPIO) connector. This D-Sub 37 male connector is used in remote station interface control and other machine interfacing. Pin descriptions are described in detail in Table 5.

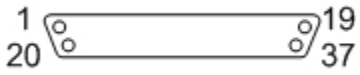


Figure 16 - Standard D-Sub 37 Connector Numbering

Table 5 – GPIO Pins

Pin	Direction	Name	Description
1	Input	Fault Reset	Resets all the Transmitter faults with an active low edge.
2	Input	Failsafe	Transmitter failsafe input. Requires a sustained low to run RF in the system.
3	Input	Transmitter On	Turns RF power on with an active low edge.
4	Input	Transmitter Off	Turns RF power off with an active low edge.
5	Input	Mute	Mutes RF while the input is held low. This essentially performs the function of "Transmitter Off" when held low.
6	Input	Raise Transmitter Power	Raises the system power 1 Watt every second that this input is held low.
7	Input	Lower Transmitter Power	Lowers the system power 1 Watt for every second that this input is held low.
8	Input	Reserved	Reserved
9	Input	Controller Reset	Forces hardware reset on the system Controller and Exciter when active. . Note: this input is not intended to be used during normal operation of the system and should only be used in extreme circumstances.
10	Input	Reserved	Reserved
11	Input	Reserved	Reserved
12	Input	Ground	Alternative isolated ground pin internally connected to pin 19, see below for details.
13	Input	Reserved	Reserved
14	Input	VPe System Present	Indicates the presence of a VPe system in the setup..
15	Output	Reflected Power	DC voltage for total reflected power at the system RF output. Can be set up to vary linearly from 0V = 0W to 5V = 8 Watts or logarithmically to drive a T-series meter
16	Output	PA Total Current	DC voltage for total RF power supply current for PA module. Varies linearly from 0 = 0A to 5 V = 30 A.

Pin	Direction	Name	Description
17	Output	PA Temperature	DC voltage for heat sink temperature reading in PA module. Varies linearly from 0V = 0 degrees C to 5V = 100 degrees C.
18	Input	Reserved	Reserved
19	N/A	Ground	Isolated ground intended to be used for safe remote input logic connections on this interface. Jumper J9 on the 919-4200-100 board allows this to be wired to a system-wide chassis ground. Internally connected Pin 12.
20	Output	General Fault	Low when any fault is active in the system. Can be setup to be active High.
21	Output	VSWR Fault	Low when any part of the system is shut down due to reflected power above safe levels or VSWR greater than 2.0:1
22	Output	Transmitter On	Low when system RF output power is on.
23	Output	Transmitter Off	Low when system RF output power is off.
24	Output	Mute Status	Low when the Transmitter is muted via input pin 5.
25	Output	AFC Lock	Low when the internal Exciter is locked onto the set frequency. Can be setup to be active High.
26	Output	Power Supply Fault	Low when a power supply fault is detected in any RF power supply.
27	Output	Reserved	Reserved
28	Output	PA Fault	Low when any fault is detected in any PA module.
29	Output	Reserved	Reserved
30	Output	Reserved	Reserved
31	Input	Raise/Lower	This is only utilized in FM+Dig and Dig only Exciter system configurations. FMi-Transmitter four-state power control input: 0-0.75V mute, 0.75-2V lower, 2-3V hold, 3-5V raise
32	Output	+5V	DC voltage for system forward output power. Can be set up to vary linearly from 0V = 0W to 5V = 70 Watts, or logarithmically to drive a T-series meter.
33	Output	Forward Power	DC voltage for system forward output power. Varies linearly from 0V = 0W to 5V = 550 Watts
34	Output	PA Voltage	DC voltage representing the variable RF power supply. Linear from 0V = 0V to 5V = 60V.
35	Output	Reserved	Reserved
36	Output	Reserved	Reserved
37	N/A	Ground	Chassis ground

5.2 Broadcast Electronics INTERFACE

Broadcast Electronics machine interface. This D-Sub 37 female connector provides conduits for many exciting new product options including a standby Exciter and digital radio generators.

Table 6 – BEI Pins

Pin	Direction	Name	Description
2	N/A	Ground	Chassis Ground
4	Input	Active/Standby	Tie to ground to activate this CPE for normal operation. Open for standby required for firmware updates.
Other		Reserved	Reserved

5.3 ETHERNET

Ethernet is provided on a standard 10/100 Mbps RJ45 connector. Connect to a local area network switch and/or to a gateway using Cat5E cable for access through the network. This interface automatically negotiates speed and hardware interfacing; a crossover cable is not required. Direct connections to a PC or other network controller can be made with either a crossover or straight Ethernet cable.

IP-based interfaces such as the built-in website and SNMP require this to be connected and the network parameters set up through the front panel interface. There is no explicit limit on the number of concurrent users that can be connected to the STXe; however an excessive number of connections will cause a decrease in performance.

5.4 COM IN

This input is not used in standard STXe applications at this time. Connecting to this jack may cause internal system communications failures.

5.5 COM OUT

This output is not used in standard STXe applications at this time. Connecting to this jack may cause internal system communications failures.

5.6 AES

AES/EBU audio input connector. This XLR connector is used for inputting digital audio to the standard stereo generator in the internal Exciter. Select AES or AES COMP as the primary audio source to modulate RF with this audio.

Supported bitrates include 32, 44.1, 48, 96, and 192 KSPS.

5.7 LEFT and RIGHT

Left and Right balanced analog audio input connectors. These XLR connectors input audio into the standard stereo generator system in the internal Exciter. Set Analog L/R as the primary audio source in order to modulate RF with this audio.

An internal hardware jumper allows these inputs to be switched between 600 ohm or 10k ohm impedance.

5.8 COMP

Unbalanced composite audio input connector. This BNC connector allows input of baseband audio up to 100 kHz into the internal Exciter. Setting Composite as the primary audio source modulates RF with this signal.

5.9 SCA1 and SCA2

Subsidiary Communications Authorization audio input connectors. These BNC connectors allow subcarrier programs up to 100 kHz generated by external devices to be injected in the internal Exciter. These inputs are enabled and disabled independently.

5.10 RDS

Radio Data System input connector. This BNC connector allows input of an externally generated RDS standard signal to broadcast time, station identification, and program service information. This input is enabled and disabled independently.

5.11 19 kHz OUT

This is a 19 kHz stereo pilot output connector. This BNC connector is used to output the pilot signal for optional use in external synchronization equipment. The output wave form is a constant 1 V peak-to-peak sinusoid when connected to a high impedance termination.

5.12 EXC RF OUT

Internal Exciter RF output connector. This BNC connector outputs the internally generated Exciter power level RF signal.

5.13 PA RF IN

Power Amplifier RF Input BNC connector. This is connected to the EXC RF OUT for FM operation. It is connected to the optional VPe/XG if operating in a Digital mode (e.g. HD radio or Digital Radio Mondiale).

5.14 RF SAMPLE

Power amplifier RF sample output connector. This BNC carries a coupled RF signal from the PA. Nominally generates +19 dBm at 60W PA output power. The output level scales with total output power of the PA module. This is not a calibrated output.

5.15 RF OUT

Power Amplifier RF output connector. This N-connector output carries the amplified RF output. Connect this output to a 50 ohm load.

5.16 10 MHz IN

This is a 10 MHz clock input connector. This BNC synchronizes the Exciter's internal clocking to a connected sinusoidal clock signal. This may optionally be connected to a high precision clock generator such as a GPS receiver module or a digital radio signal generator.

5.17 1 PPS IN

The one pulse per second BNC input connector synchronizes stereo pilot signals such that rising zero-crossing point in the pilot signal corresponds to the rising edge of this logic clock. This may optionally be connected to a high precision clock generator such as a GPS receiver module or a digital radio signal generator.

5.18 Extended I/O

Interface specifically designed for legacy Broadcast Electronics transmitter integration. See section 3.6.3 for details.

5.19 Power Switch

AC power switch. This hand operated switch turns on or off power service to the device. Complete power-down of the module may take a few seconds.

5.20 Ground

Ground bolt that should be used to locally connect chassis ground to the transmitter station ground.

5.21 AC Input

This is the AC power input jack. Use the provided AC power cord to plug into a standard AC outlet or create a custom cable for 220 single phase service.

6 Front Panel Features

The main assembly front panel contains LED indicators for the system controller, internal Exciter, internal power amplifier, and an LCD user interface.

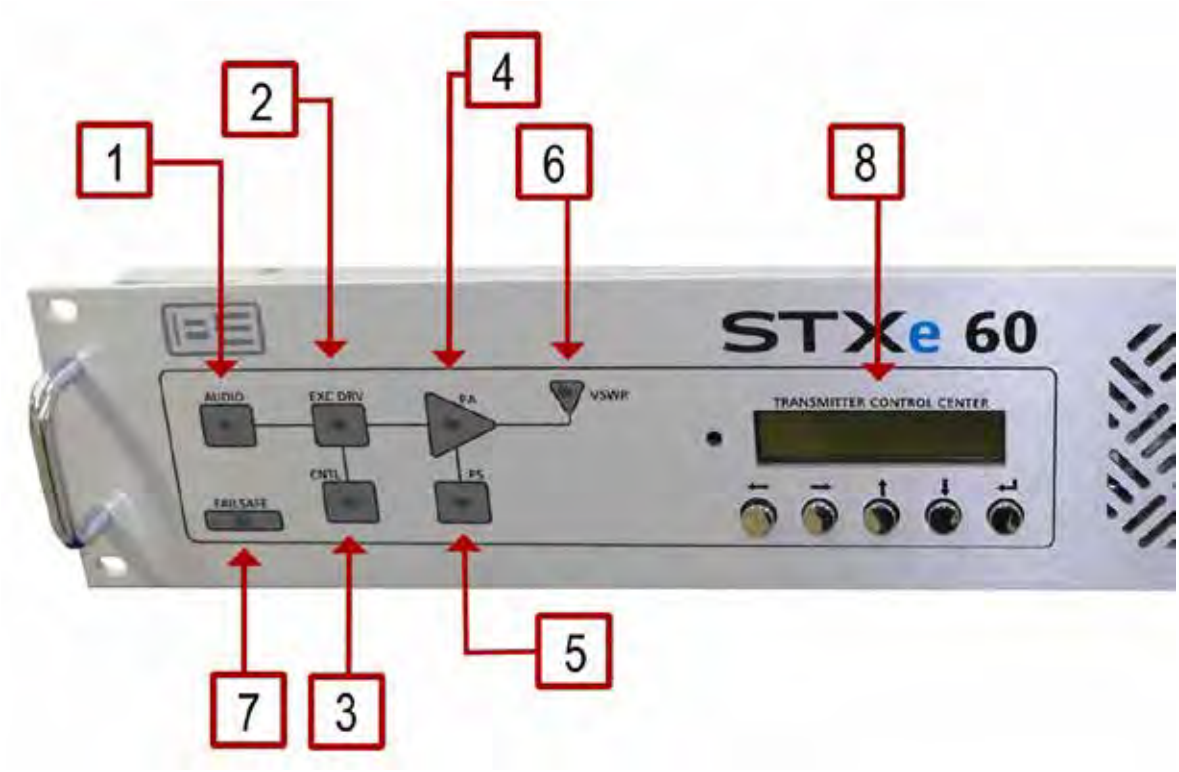


Figure 17 - Front Panel

6.1 AUDIO

The audio LED indicates the status of the current primary audio source and remains green until a fault is detected. If an audio peak is detected, this LED turns red and also during a silence condition when no secondary audio is setup. If a secondary audio source is setup, the LED will turn orange after the primary silence timeout. The LED will return to green when the fault is cleared and the exciter switches back to primary. Check the exciter diagnostics for details on what alarms or faults may be active.

6.2 EXC DRV

The Exciter drive LED indicates the status of any alarms or faults related to the Exciter or Exciter drive in an internal PA. Green indicates that the Exciter has settled into normal operating conditions. Orange indicates an alarm condition. Red shows when the Exciter has a fault condition. See Table 12 – Exciter Diagnostics Details in section 13.5 for more information.

Note that there is overlap between internal Exciter and internal PA status for drive detection. An Exciter drive alarm indication may originate in measurements within the PA.

6.3 CNTL

The system control LED shows the status of the system controller. Green indicates normal control operation. Red indicates a loss of monitoring and control communication between controller units. This could be between the system controller and the front panel display, any PA controller, or the combiner controller.

6.4 PA

The power amplifier LED shows status of the internal PA. Green indicates normal operation. Orange indicates an alarm condition. Red indicates a fault and PA shutdown condition. See Table 13 – PA Diagnostics Details in section 13.6 for details on what alarms or faults may be active.

6.5 PS

The power supply LED shows the status of the RF power supply module. Green indicates normal operation. Orange indicates a self-reported alarm. Red indicates a determined fault. Check PA diagnostics for details on what alarms or faults may be active in the supply connected to the PA.

Note that these power supplies are on the same communications node as the PA they are paired with. A communication fault will illuminate red on both the PA and the PS LEDs.

6.6 VSWR

The voltage standing wave ratio LED shows the status of the internal PA output in terms of measured reflected power. Green indicates normal operation into an acceptable load. Orange indicates active foldback protection. Red indicates a fault and shutdown condition.

6.7 FAILSAFE

The failsafe LED is coupled to the failsafe input on the back panel when running transmitter modes. Green indicates the failsafe is connected for normal operation. If red, the failsafe is not connected and RF power will not turn on. In Exciter setups this LED is turned off.

6.8 TRANSMITTER CONTROL CENTER

This front panel LCD interface can be used for control and monitoring of all features in the system. Use the five buttons below the screen to navigate and make modifications. Refer to Section 8, Transmitter Control Center, for details on how to use this interface.

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7 Theory of Operation

Refer to the system block diagram in Figure 18 on the page following.

Broadcast Electronics STXe FM transmission systems are equipped with a system controller and exciter platform. The exciter sub-system routes audio and other program service data through digital signal processing, digital up conversion, a numerically controlled oscillator, RF digital to analog conversion, and low-power RF analog signal output. This signal path generates a frequency modulated carrier waveform centered within the traditional FM band.

A micro-controller provides user interfacing (including IP), regulates all signal path stages in the exciter, and negotiates control and monitoring with PA controller and front panel interface controller peripheral micro-control modules through controller area network CAN communications.

STXe systems include numerous built-in safety features. Hardware failsafe can be used to reliably disable RF with external automated or manual controls. Automatic RF power fold-back, and system shutdown mechanisms protect power amplification in events of DC over-currents, excessive reflected RF power, or dangerously high internal temperatures. Dedicated circuits immediately mitigate unsafe conditions while micro-controllers self-determine system problems, take action as necessary, report faults/alarms, and log issues for troubleshooting.

In standard setups, exciter RF is routed from lower power exciter RF output back into the system in order to drive RF power amplification. Operating mode setup parameters determines the definition of this interface, which is described in following paragraphs.

Systems come standard equipped to run either of two standard modes of power amplification. FM-only mode utilizes a fixed exciter RF drive level. Variable final amplifier voltages compress the RF signal in class C amplifier operation, effectively controlling system gain to maximize power efficiency. FM+Digital and Digital-Only modes utilize fixed gain while operating class AB amplifiers for minimal signal distortions. The exciter drive level then varies to control system output power level.

Power in a digital RF mode exciter system setup is controlled by a higher power transmitter through a 4-state input with these states; mute, lower, hold, and raise. The duty cycle on this input determines system response.

Standalone transmitter and FM-only exciter setups utilize internal digital closed power control based on system forward output. Forward power approaches the active system set-point. The exciter is included in this loop when running digital power modes. FM-only closed loop is entirely contained within a PA microcontroller.

Fans are two-speed and fully turn on through active hardware logic. This logic is coupled to un-inhibit logic between the PA controller and DC power regulation circuitry.

Standard AC mains supply electrical power. An AC throw switch is included. A main power supply module converts AC to fixed DC power for use throughout the system. Power regulation systems input fixed DC and supply various lower level static and variable voltage levels to all circuitry and RF amplifiers. A fan power supply provides dedicated DC to fan(s).

There are two DB-37 connectors and a DB-25 connector to allow the STXe to interface with other equipment. This includes transmitters, remote monitoring and control, and signal generation options. With a provided cable harness, the STXe can seamlessly interface with legacy Broadcast Electronics transmitters. Using the configuration capability of the I/O pins, the STXe can be made to interface with most other manufacturers' transmitter models as well.

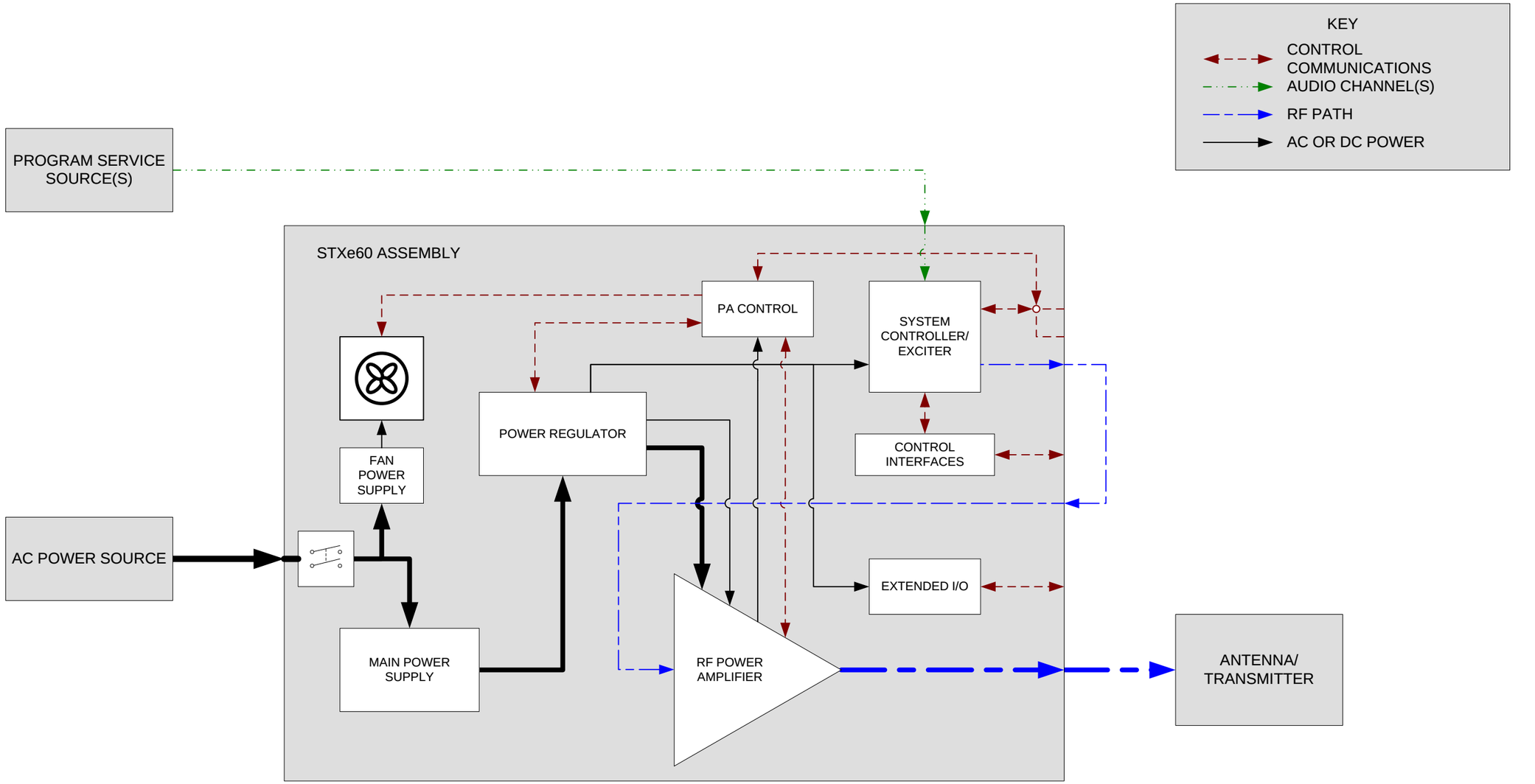


Figure 18 – STXe 60 System Block Diagram

8 Transmitter Control Center

Initial system setup after installation requires interfacing with the LCD display and buttons on the front of the main assembly. Once initial setup is complete, almost all configurations accessible on this control center can be modified remotely via Ethernet interfaces.

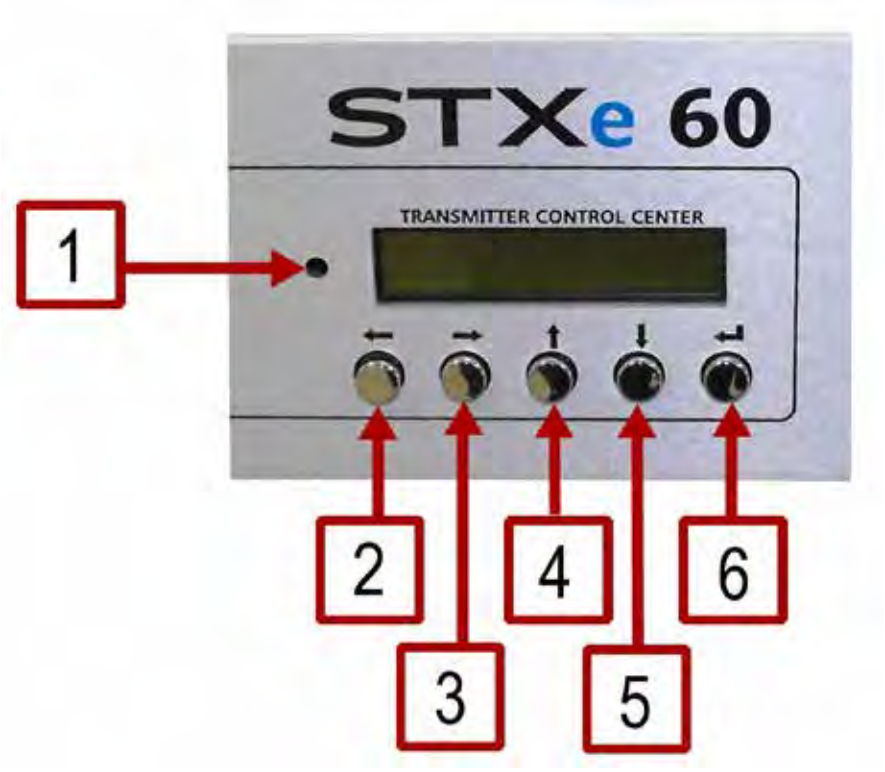


Figure 19 - Transmitter Control Center

8.1 Contrast Control

A potentiometer tuning tool can be used to adjust the contrast on the LCD screen if desired. Turning the potentiometer clockwise reduces contrast and turning it counter-clockwise increases contrast.

8.2 f Left Button

The context dependent left button performs two primary functions. When navigating between screens it allows a return to the main screen from any other navigation screen. When an editing screen is entered, this button moves the cursor one space to the left.

8.3 g Right Button

The context dependent right button performs two primary functions. When navigating between screens, it allows a return to the first screen of the submenu tree. When an editing screen is entered, this button moves the cursor one space to the right.

8.4 h Up Button

The context dependent up button performs various functions. When navigating between screens through the trunk, it selects a new submenu tree. After entering a submenu screen, it either selects different branches or cycles through options. When an editing screen is entered, this button modifies the object located at the cursor.

8.5 i Down Button

The context dependent down button performs various functions. When navigating between screens through the trunk, it selects a new submenu tree (in the opposite direction as the up button). After entering a submenu screen, it either selects different branches or cycles through options. When an editing screen is entered, this button modifies the object located at the cursor.

8.6 8 Return Button

The context dependent down button performs two primary functions. When navigating between screens through the trunk, it enters the next level in the menu. This can lead to submenu screens, options selection, or field editing. Once an editing function has been made, this saves the field and returns to the first screen in the submenu tree.

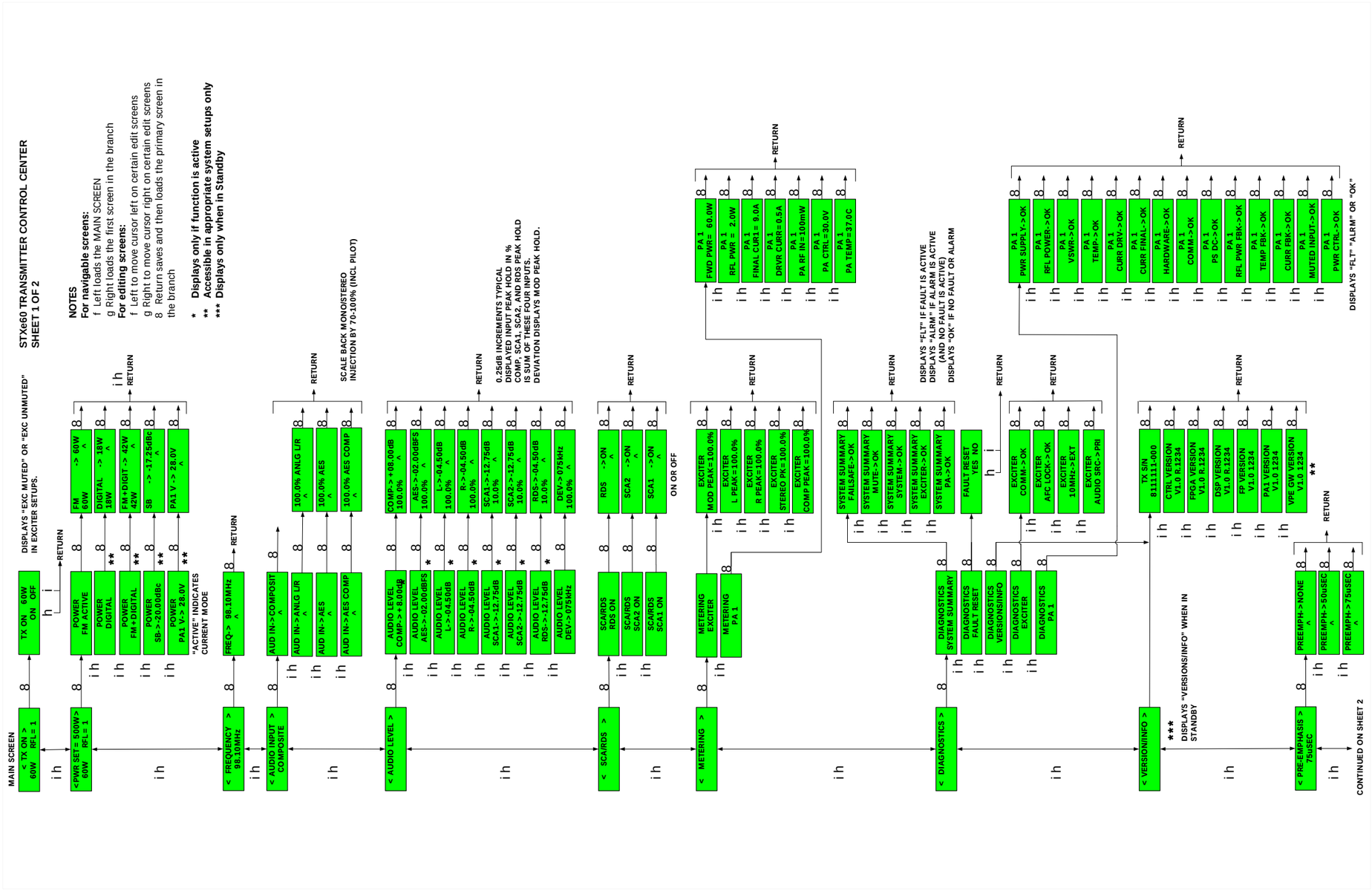


Figure 20 - Transmitter Control Center Menus Sheet 1

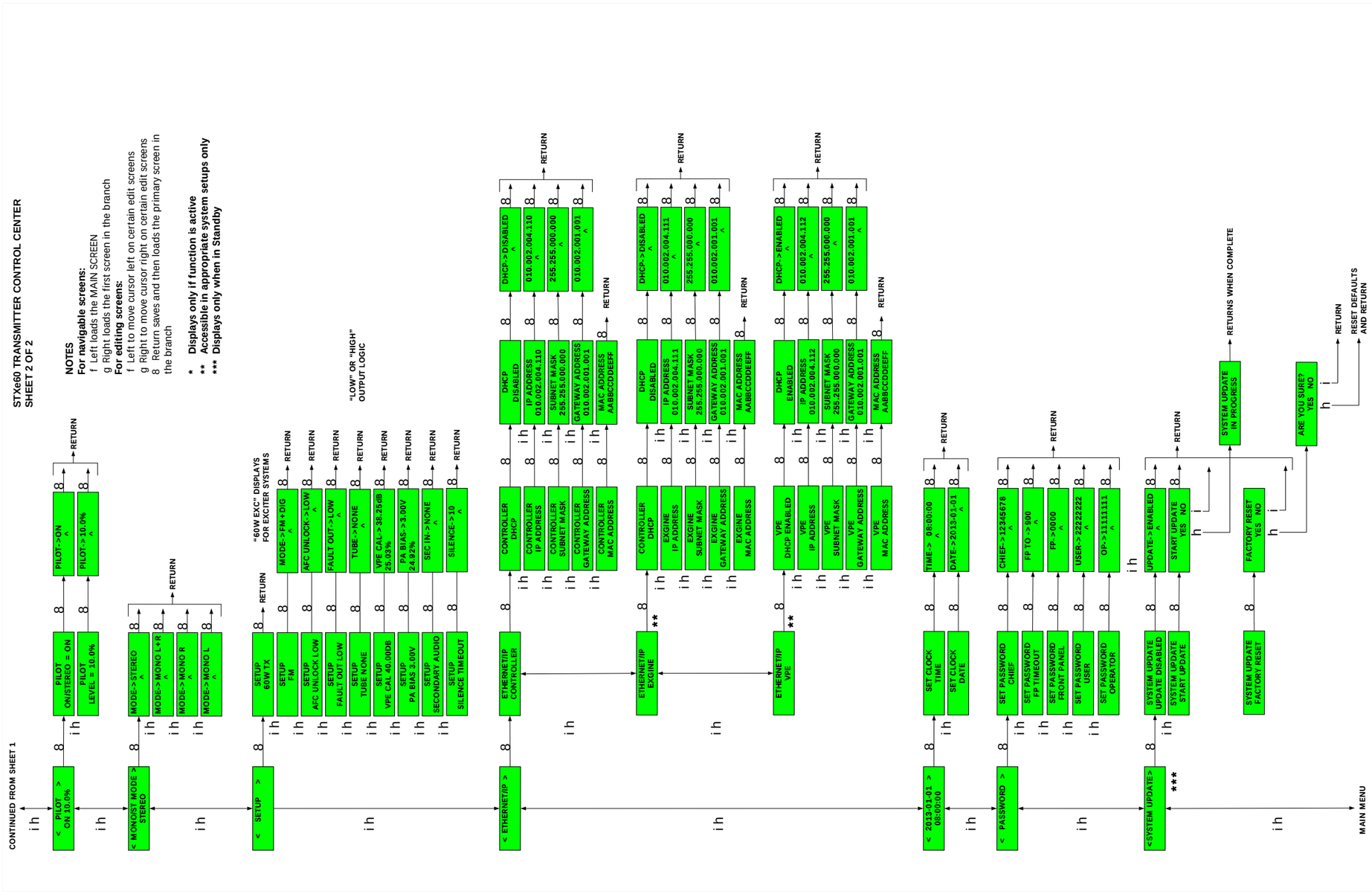


Figure 21 - Transmitter Control Center Menus Sheet 2

9 Basic Web Page

The STXe system comes standard with a built in small-capacity HTTP web server. To load the web page, simply direct a standard web browser on a local- or network-connected PC to the IP address assigned to the controller – static IP set during system installation or dynamic host control regulated by the network.

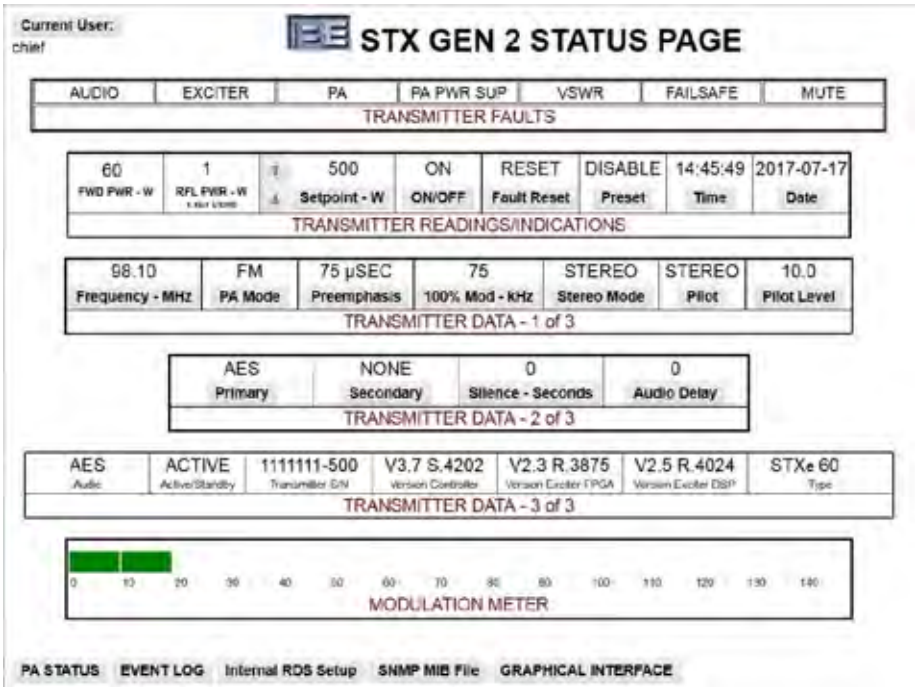


Figure 22 - Basic Web Interface Main Page

The basic settings and monitoring fields in the system are shown above in Figure 22. To cycle through the active user selection, click the "Current User" link in the upper left.. To access PA monitoring information or the event log click on "PA STATUS" or "EVENT LOG" links respectively. These can be seen in Figure 24 and Figure 25

Posting any settings to the exciter requires an appropriate login. The graphic button objects are disabled for user types that do not have permission to modify exciter settings. Once an adequate user selection is made, the buttons can be clicked to display input options. When the change is attempted a dialog box will pop up, which can be seen Figure 23. Simply enter the active user type (exactly as displayed in the upper left of the page) and the correct 8-digit numerical password that goes with it to save the setting.

NOTE: The transmitter is shipped with both of the passwords set to a default of "00000000". However, as a security measure, the password "00000000" is not accepted as valid by the transmitter. The customer must change the password to something other than "00000000" before remote operation is allowed. The password can only be changed at the front panel. Refer to Section 4.3 regarding setting the passwords.

Password entry times out after 10 seconds. If the password entry session times out, simply try again in a new session. Valid login is remembered for the active session only. If the user changes to a different sub-page in the Standard HTTP interface, the password is lost and it will need to be re-entered.

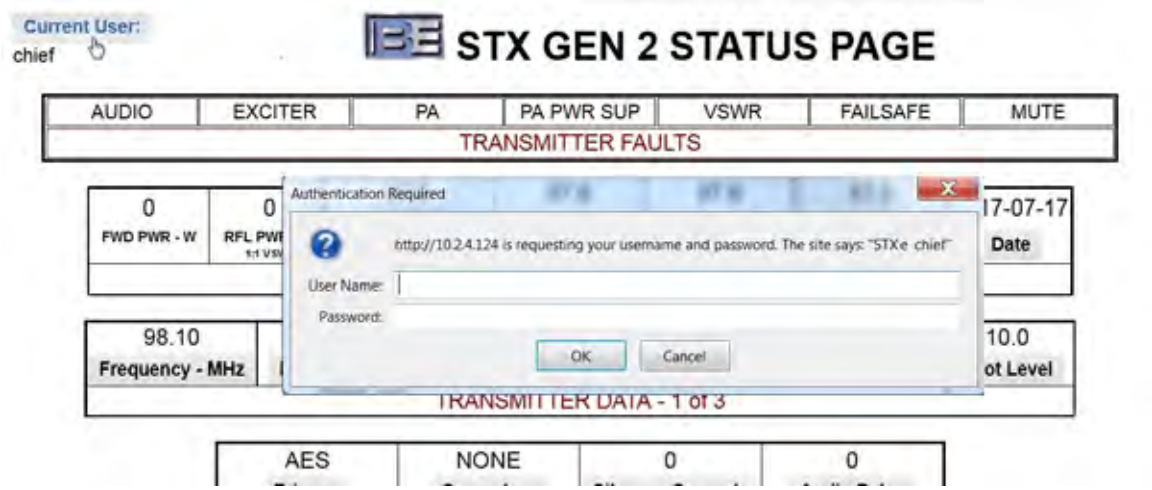


Figure 23 – Basic Web Interface Authentication

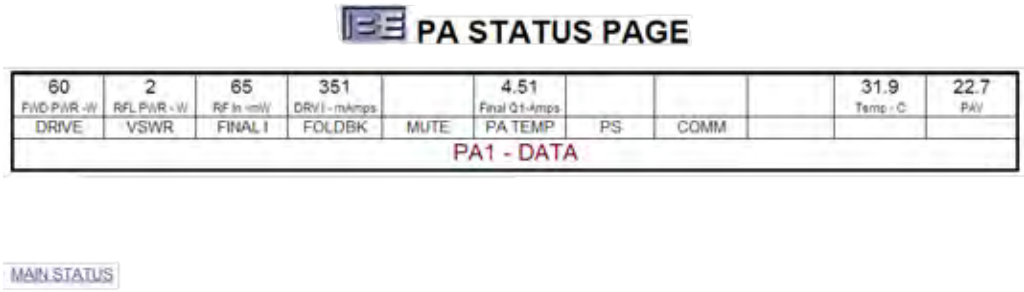
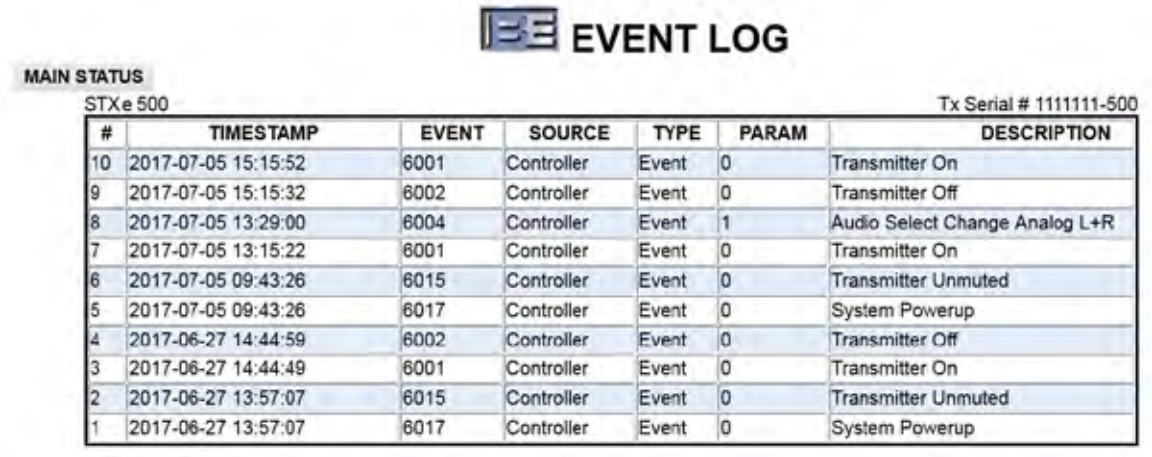


Figure 24 - Basic Web Interface PA Page



#	TIMESTAMP	EVENT	SOURCE	TYPE	PARAM	DESCRIPTION
10	2017-07-05 15:15:52	6001	Controller	Event	0	Transmitter On
9	2017-07-05 15:15:32	6002	Controller	Event	0	Transmitter Off
8	2017-07-05 13:29:00	6004	Controller	Event	1	Audio Select Change Analog L+R
7	2017-07-05 13:15:22	6001	Controller	Event	0	Transmitter On
6	2017-07-05 09:43:26	6015	Controller	Event	0	Transmitter Unmuted
5	2017-07-05 09:43:26	6017	Controller	Event	0	System Powerup
4	2017-06-27 14:44:59	6002	Controller	Event	0	Transmitter Off
3	2017-06-27 14:44:49	6001	Controller	Event	0	Transmitter On
2	2017-06-27 13:57:07	6015	Controller	Event	0	Transmitter Unmuted
1	2017-06-27 13:57:07	6017	Controller	Event	0	System Powerup

Figure 25 - Basic Web Interface Events Page

9.1 RDS and FSK Setup

To enter static RDS information or FSK ID data such as Translator Identification, use the "Internal RDS Setup" link from the Basic Web page, Figure 26, to access the RDS Setup Page, Figure 27.

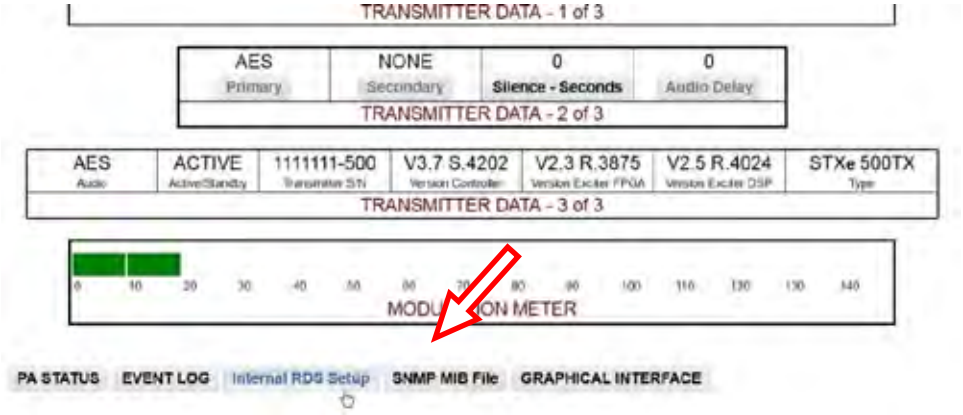


Figure 26 – Internal RDS Setup Link

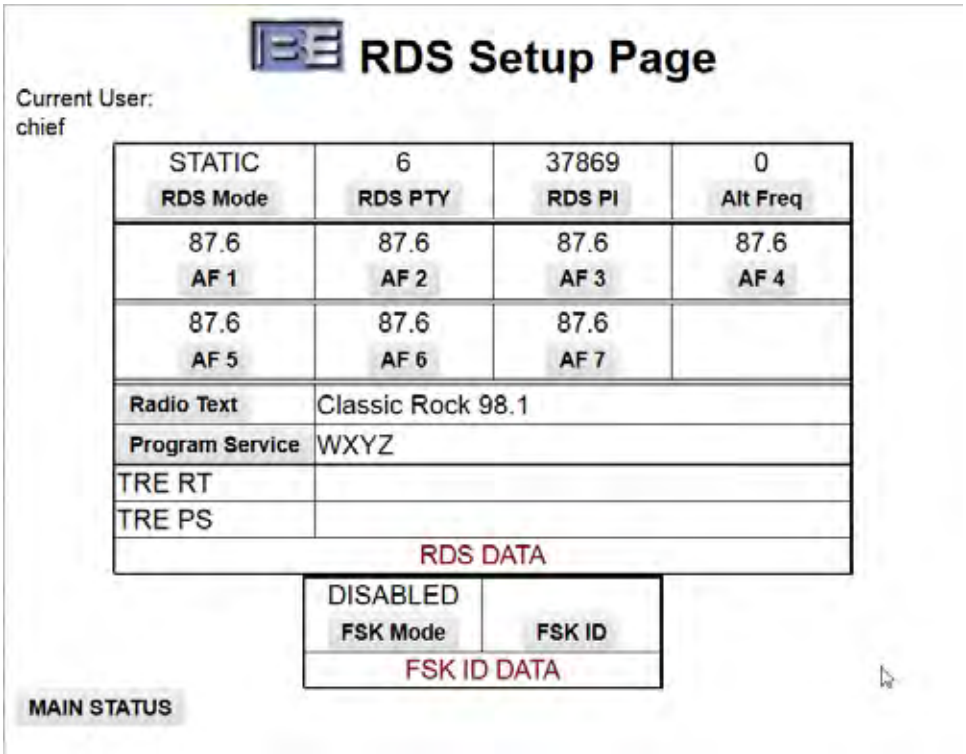
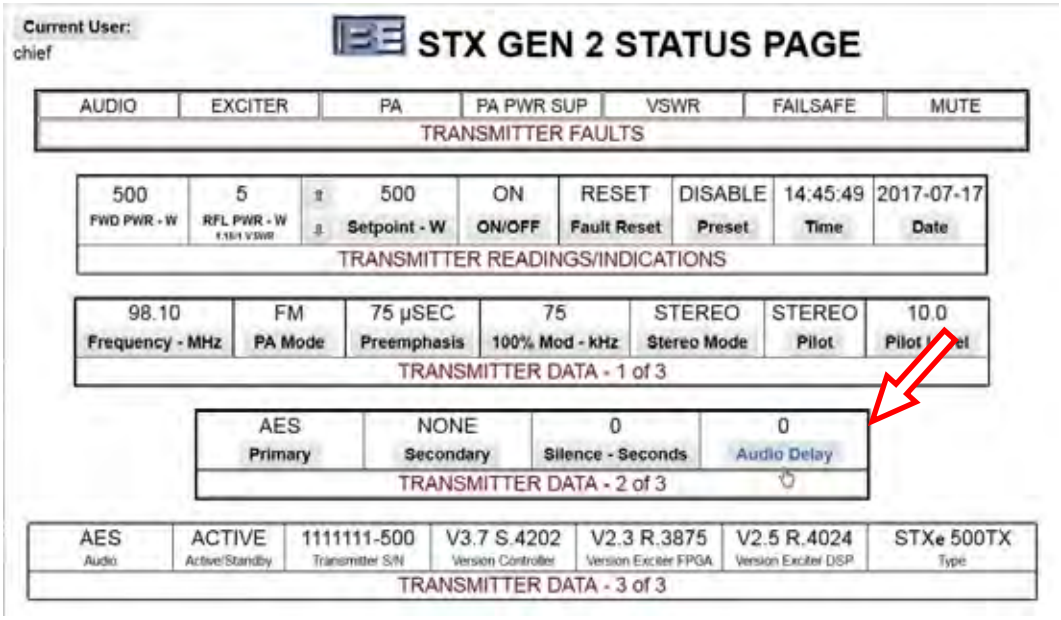


Figure 27 – RDS Setup Page

9.2 Audio Delay Setup

This is an adjustable audio delay to help set up a single-frequency network, or a repeater station by getting the delays of the system in sync.

The audio delay sets the amount of time from when the analog/AES/AES-Comp signal arrives at the rear panel until it affects the modulation of the RF signal The audio delay is settable with an integer number, (steps) from 0 to 8128, where each step is on the order of 5.3 micro-seconds. This correlates to a delay range from 0 to 43.7 milliseconds .



To enter a delay setting, click on the Audio Delay radio button above, to display the setting window in Figure below. Enter a number calculated from the 5.3 micro-second step amount. The example below of “20” equals a delay of 106 micro-seconds.

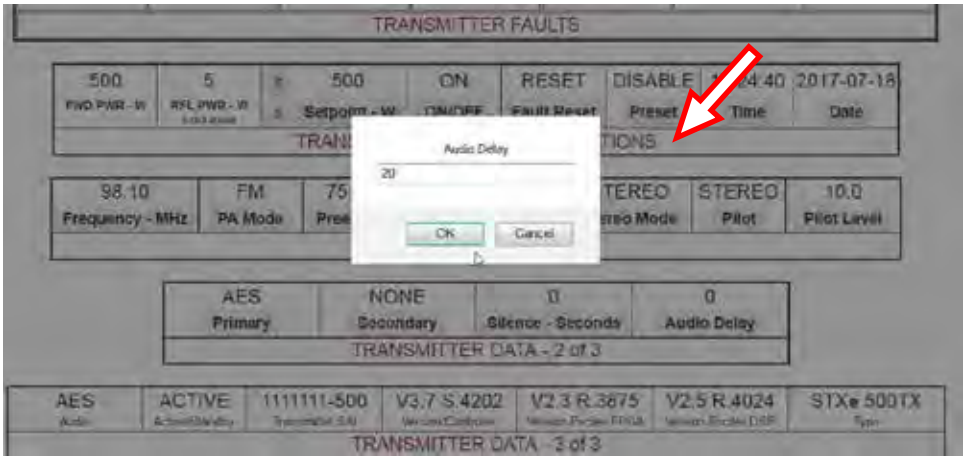


Figure 28 – Audio Delay Web Interface

When finished, press OK to save and exit the menu.

10 Enhanced Web GUI

Along with the basic web page that comes standard, STXe systems also come standard with an Enhanced Web GUI. This provides a more intuitive viewing and control experience than the Basic Web Interface while still providing all the features but in a more dynamic and user-friendly format. To access this page, click the “GRAPHICAL INTERFACE” link at the bottom of the basic web page,.

Figure 29 – Link from Basic Page to GUI Main Page

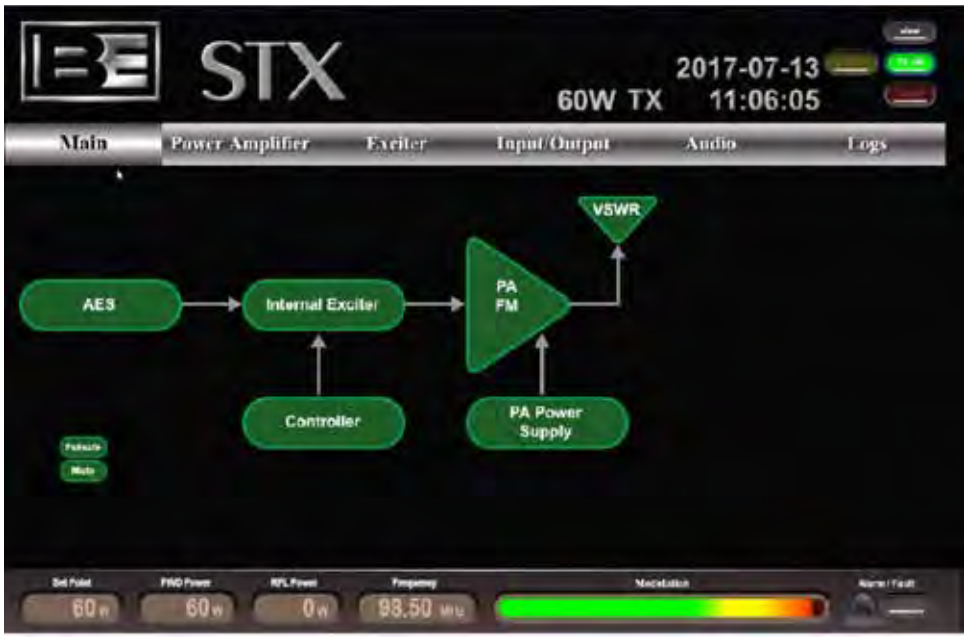


Figure 30 – Enhanced Web Page

Refer to Fig 30. While navigating the screen pages, buttons that are banded in Blue are the current settings. When the PC’s mouse pointer icon comes in contact with one these buttons, it will change from the user’s default mouse icon, (Arrow) to either the (Hand/Finger) icon or (Not-Allowed) icon, depending on the Login Profile

Figure 31 – GUI Pointer Icons

10.1 Login

The default login profile is “View”. This does not require a password and allows monitoring only. Basic control of system power is allowed with the “Operator” profile. Full control of all settings that can be modified through the web interface requires the “Chief” login profile.

To change the login profile, move cursor into the “view” button and a popup window will display, [click to change Logged in status] as in Figure 32 A. The previous screen being displayed will change to that in Figure 32B. Move cursor into the desired profile. In this example “Chief” is being selected.

Figure 32 – Login Profile Selection

Next, a dialog box will pop up requesting password entry. Change browser settings if this dialog box is being blocked by the browser. Enter the password and press enter or click Save and the process displayed will move to “Pending”, followed by “Logged in”.

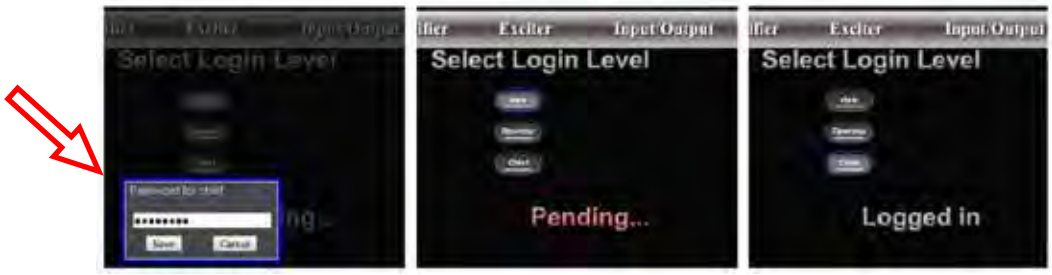


Figure 33 – Password and Log In Window

Figure 34 - Profile Logged Out

10.2 Navigation

All of the screens in the Enhanced Web GUI can be accessed by clicking on the text in the silver navigation bar near the top of the page. The currently displayed screen becomes highlights as shown.

Figure 35 - Navigation Bar

10.2.1 Main and Always-Displayed Items

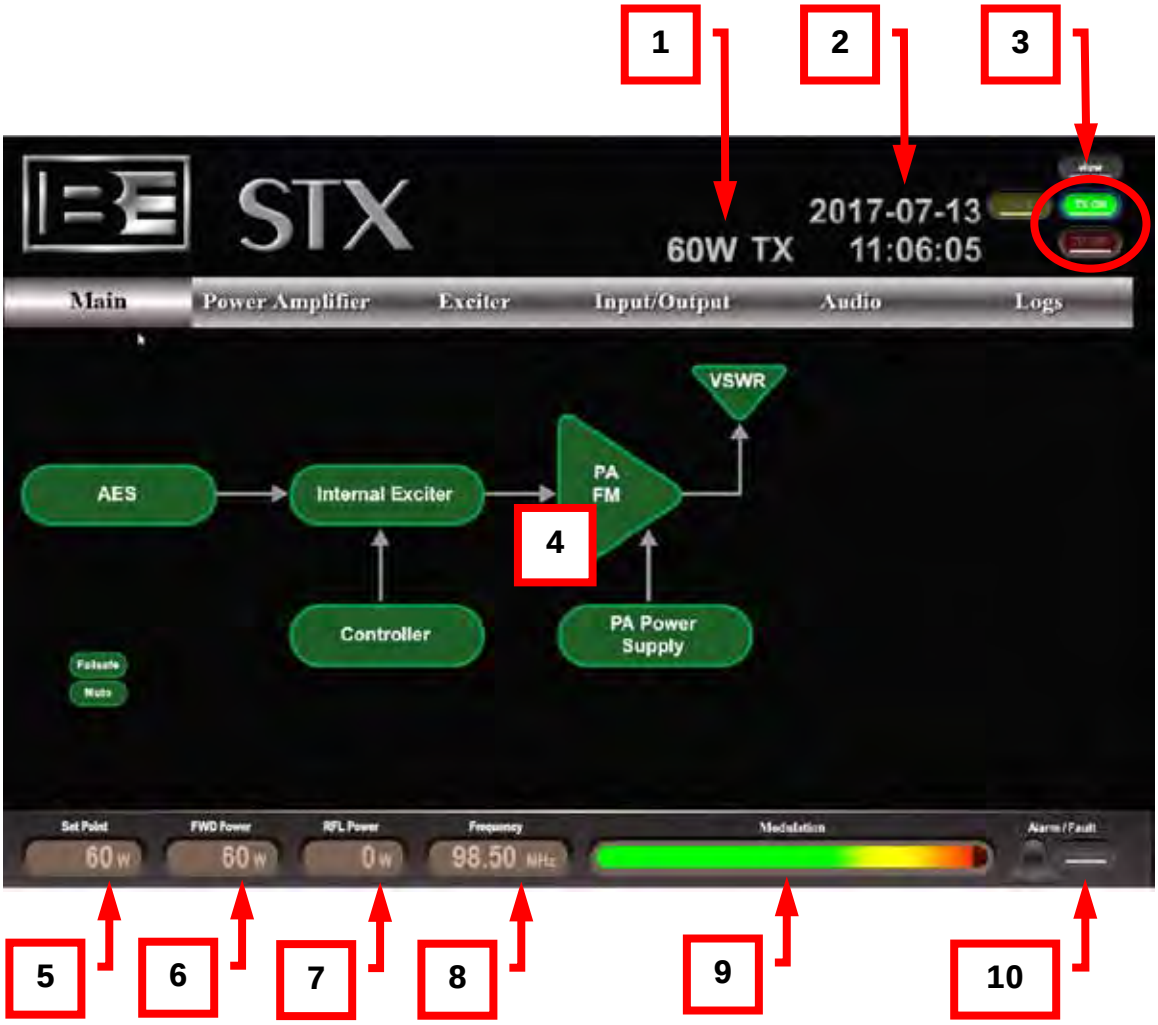


Figure 36 - Main Screen

Table 7 – Main Page and Common Features

Num	Feature	Description
1	STX System Type	Currently configured hardware setup type. This is determined during initial setup of the system and might be 60W or 500W, TX (Transmitter) or Exciter.
2	Date and Time	Real time clock data configured during setup.
3	Transmitter ON/OFF	ON/OFF status of the final RF output (not just the control status). Transmitter setups allow RF to be turned on and off with proper login level.
4	System Block Diagram	Overall system status. Green, amber, and red block colors correspond to front panel LED behaviors. See section 6 Front Panel Features for details.
5	Power Control Set Point	Forward power value that automatic power control attempts to converge to. Note that Exciter setups do not rely on this. External power control from a Transmitter is utilized instead.
6	Forward Power	Internally measured system forward RF power output reading.
7	Reflected Power	Internally measured system reflected RF power reading.
8	Frequency	FM carrier frequency setting.
9	Modulation	Internal frequency modulation peak hold as a percentage of peak deviation from nominal frequency.
10	Fault/Alarm	System faults cause this to display red, and alarms in the system cause this to display amber. Check the Logs page for details.

10.2.2 Block Diagram Figures used for Navigation

Several of the figures in the block diagrams may also provide navigation to another screen.

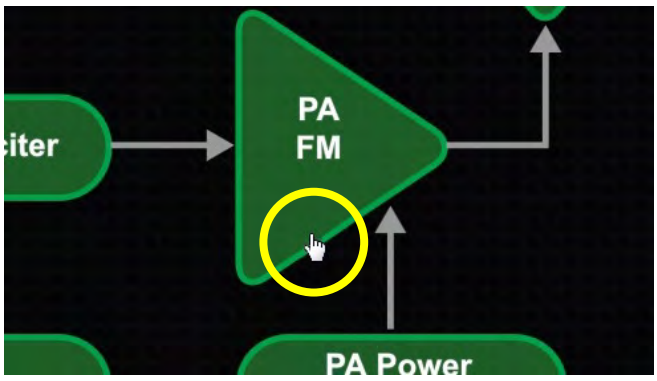


Figure 37 – Block Diagram for Navigation

10.3 Power Amplifier

The Power Amplifier page contains detailed status information for the internal power amplifier. Note that STXe PAs only takes up one column, but the page is sized to allow the display of multiple PAs, as in 2, 3, and 5kW STX LP Gen II systems.

The measurement meters displayed scale with the PA type as appropriate. For instance, the maximum scale for 60W PAs is 70W while the maximum scale for 500W PAs is 550W.

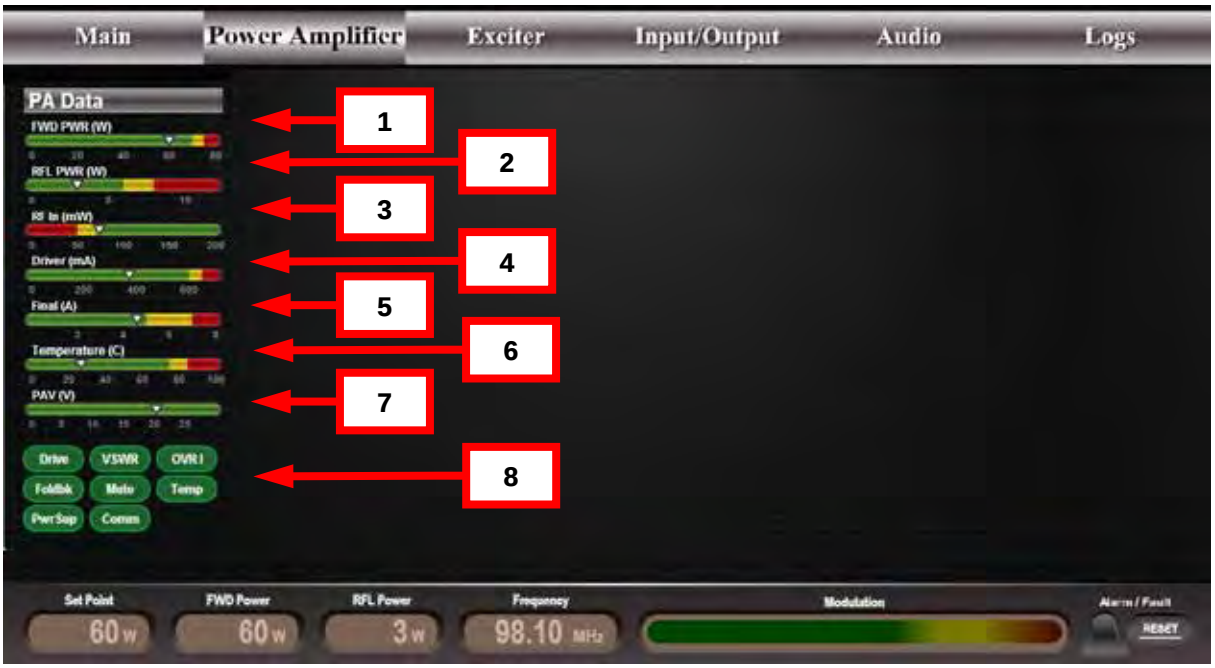


Figure 38 - Power Amplifier Page

Table 8 – Power Amplifier Page Features

#	Feature	Description
1	Forward Power FWD PWR (W)	PA forward RF power output reading. This is also the System Forward output power in STXe systems.
2	Reflected Power RF In (mW)	PA reflected RF power reading. This is also the System Reflected power in single PA STXe systems.
3	RF Input Power RF In (mW)	PA RF drive input power reading in milliwatts
4	Driver Current Driver (mA)	Current in milliamperes for the driver stage RF Power amplifier
5	Final Current Final (A)	Current in amperes for the final stage RF power amplifier.
6	Temperature Temperature (C)	Internal heat sink temperature measurement.
7	PAV PAV (V)	Final amplifier drain voltage. This variable voltage supply is sourced from the PA power supply.
8	Status Balloons	Fault and alarm indications for the PA. These will be red, yellow or green depending on the status of each item. Check the log or Table 13 in section 13.6 for details.

10.3.1 Reflected or VSWR Metering Selection

Another feature located in the lower bar is part of the power readings. You can chose to display Reflected Power or VSWR as shown in Figure 39. The display can be toggled to either mode with proper login profile

Figure 39 - REF Power vs VSWR Feature

10.4 Exciter

Figure 40 – Exciter Page

Table 9 – Exciter Page Features

#	Feature	Description
1	Source	Audio input source selection. Choose one of the listed options. Composite ignores stereo generation settings
2	Pre-emph	Pre-emphasis setting for internal stereo generation
3	Stereo	Frequency deviation amount in kilohertz from nominal carrier frequency. This setting represents 100% peak frequency modulation
4	Pilot	19 kHz pilot on/off and level controls. This automatically updates with changes to the mono/stereo setting. Can be controlled independently
5	Modulation	Frequency deviation amount in kilohertz from nominal carrier frequency. This setting represents 100% peak frequency modulation
6	Secondary	Secondary Audio input source selections. Choose one of the listed options
7	Transmitter Power	Automatic power control set point. Transmitter mode setups attempt to regulate total system forward output power to this value.
8	Frequency	Nominal FM carrier frequency
9	Silence Timeout	Time allowed before loss of primary audio source switches to secondary audio source

10.5 Input/Output

Figure 41 - Input/Output Page

The Input/Output page contains information for connections on the GPIO connector pins, shown in the left columns. These connections may be used for machine interfaces with remote station controllers/monitors or with other transmission system equipment. Refer to section 5.1 for detailed function descriptions.

10.6 Audio

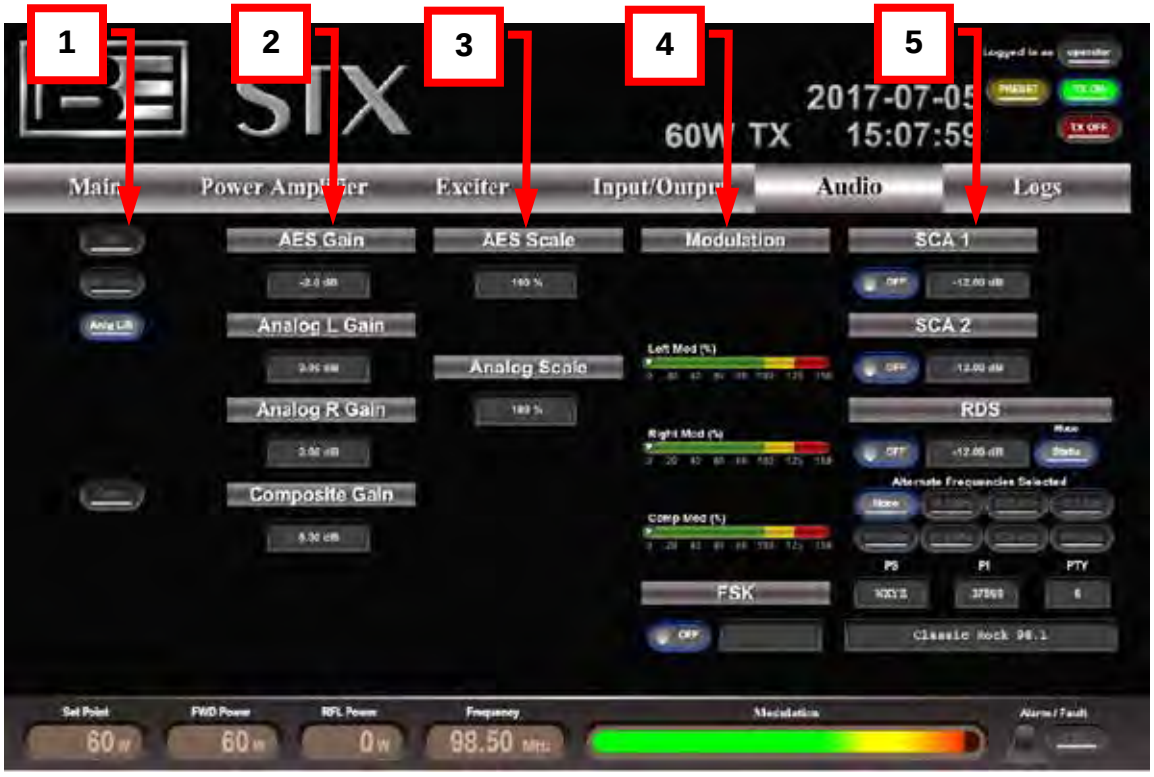


Figure 42 - Audio Page

Table 10 – Audio Page Features

	Feature	Description
1	Source	Audio input source selection. Choose one of the listed options. This duplicates the function in the Exciter page
2	Gain	Gain settings for hardware amplification/attenuation. AES gain is a digital scale factor
3	Stereo Injection Scale	Allows the stereo composite to be scaled down to balance modulation budget without changing gain calibration setup. This also scales pilot when in stereo
4	Modulation	Peak holds for inputs displayed as effective percentage of peak modulation. Composite Mod includes Unbalanced Composite, SCA1, SCA2, and RDS inputs
5	SCA1, SCA2, and RDS	Allows on/off control and input hardware amplification/attenuation adjustment

10.7 Logs

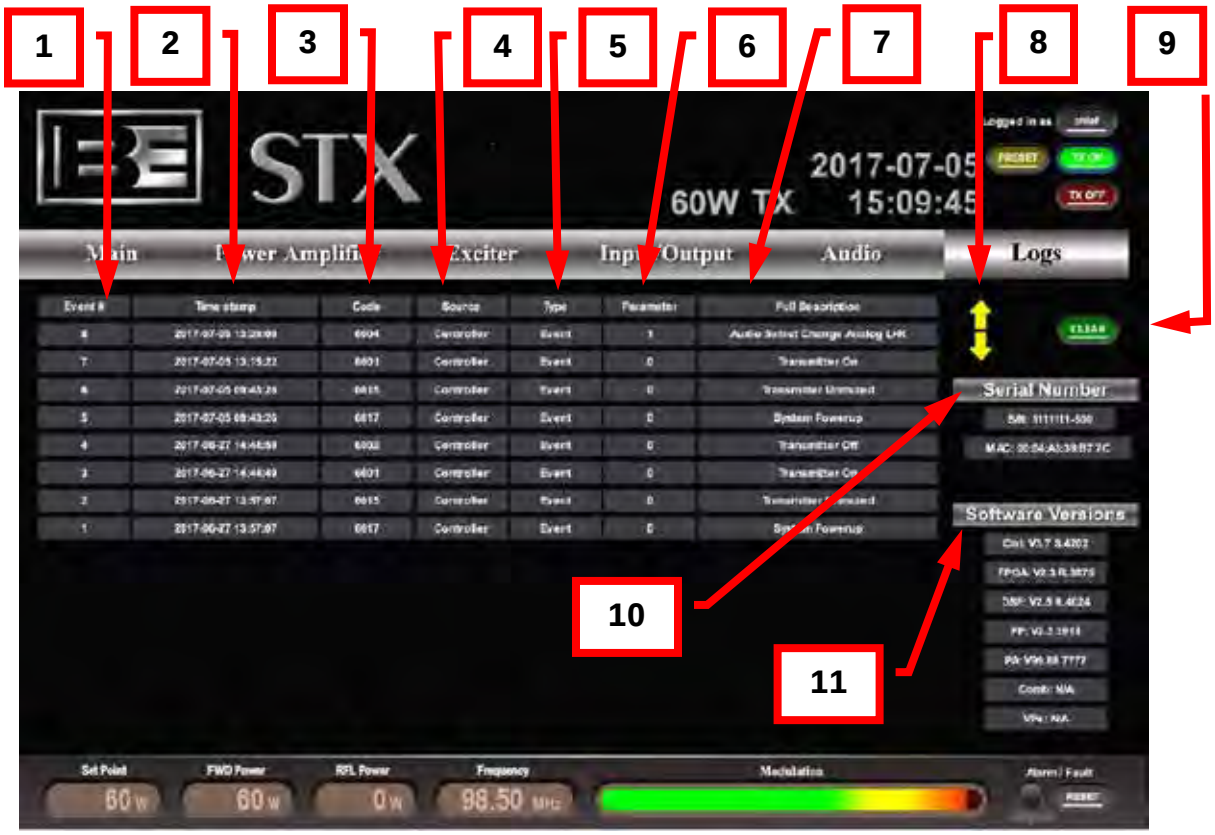


Figure 43 – Logs Page

Table 11 – Logs Page Features

#	Feature	Description
1.	Index	Event index number. Initially (or after a clear) this starts at 0 and increments for every event. If the log fills, half of the current entries are deleted and numbering resumes. When 65535 entries are created, the log clears itself.
2.	Time Stamp	Date and time of the event based on the system's internal real time clock and calendar.
3.	Type Code	Unique event type identification number.
4.	Source	Controller node from which the entry was triggered.
5.	Classification	Type category identification in a readable format.
6.	Parameter	Event-specific value for logging some changes.
7.	Description	Log entry details in a readable format.
8.	Scroll	Click the up and down arrows to scroll through the log.
9.	Clear	Wipes all log entries from memory permanently
10.	Serial Number	Displays BE serial number and controller Ethernet MAC.
11.	Software Versions	Listing of all viewable software versions in the system.

11 SNMP

Simple Network Management Protocol is a member of the Internet Protocol standard communications suite. The STXe system comes with a built-in SNMP agent (SNMP version 2c) for handling all request types included in the protocol – GET, SET, GETNEXT, and GETBULK. The appropriate MIB for the version of SNMP agent installed on the Exciter must be downloaded from the Exciter itself. As with any MIB, this ASCII text file completely defines the data structure within the agent. The MIB also provides textual descriptions for every accessible object.

SNMP IS FOR ADVANCED APPLICATION INTEGRATION. THIRD PARTY APPLICATIONS THAT UTILIZE THE SNMP INTERFACE ARE NOT SUPPORTED BY BROADCAST ELECTRONICS.

To download the file access the web interface using a standard web browser. Right click on the "SNMP MIB File" link and click "Save link as…". Save a local copy of the MIB file wherever desired for use in an SNMP manager application. Alternatively, click the link and navigate to the file in the browser. Right click anywhere in the viewing space and click "Save as…" Simply remove the .txt extension (leaving only the .MIB extension) and save at the desired location.

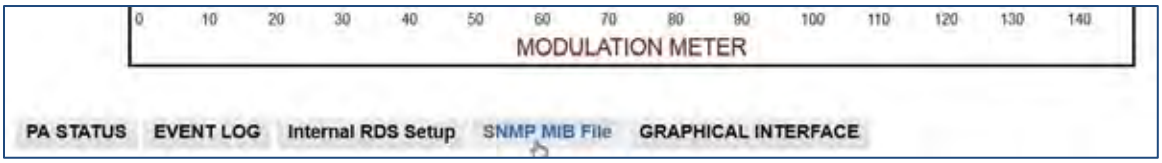


Figure 44 - SNMP MIB Download Dialog Box

An SNMP manager application must be utilized in order to access the interface. Integrating a manager into custom station automation programs provides numerous possibilities. Alternatively, various third party MIB browser GUI applications are available for free download; however Broadcast Electronics does not endorse any specific application. Simply direct the manager to the Ethernet port for communication across a network.

11.1 Authentication

Data is accessible by using the correct community strings for the desired login level. The formula for these strings is a combination of the login type (chief, user, or operator), a delimitating '+' character, and the eight digit numerical password associated with that login type. For example, "chief+12345678" in both the read community and write community passes authentication and allows read and write to essentially every object in the MIB with the appropriate max-access type. User and Operator login levels provide more strict control over what settings can be modified and what commands can be issued in the system.

11.2 Objects

The SNMP interface utilizes tables wherever it makes sense to communicate data in an indexed fashion. To accommodate a scalable transmitter product design, for example, almost all PA data is structured as tables by using the PA number as the index. This works by appending ".1" to the object indicating the single PA in the system. Note that a normal "leaf" node is accessed by appending ".0" as in …38118.2.2.2.0, the object for system forward power.

12 Backup Control Modes

STXe systems come equipped with two backup control methods. Emergency Control Mode is integrated standard with all systems and allows the system to continue functioning in the event of a system controller failure. The Backup System Control and Exciter feature utilizes an entire STXe system to also allow for full control interfacing with an identical standby Exciter.

12.1 Emergency Control Mode

In the event of a loss in communications with the system controller, all sub-systems enter emergency control mode. Behavior when in this mode depends on user-specified emergency power levels. The emergency power level must be set to the desired emergency power level in order to enable the feature, which comes from the factory set at 0 W and is effectively disabled. The system will continue to function at full emergency power as long as the Exciter maintains drive to the power amplifier. The power amplifier can only enter emergency power mode from a working state, so it will not unmute or initialize in the emergency power state.

12.2 Standby System Control and Exciter

For complete Exciter redundancy, an Exciter switcher kit can be acquired. These kits supply all required hardware for utilization of standby STXe systems. The switcher system is then paired with a second fully functional two rack unit STXe system.

Detailed information including installation and operation of this optional configuration are contained in an application guide. A copy is included in standard kits and/or inserted in the front of the binder containing this manual if shipped as part of the same order. For electronic copies of this and any other technical documentation please visit http://www.bdcast.com/information-center/ and follow navigation on the left side of the page – authorized login is required.

13 Troubleshooting

Some basic information and troubleshooting steps are included below. If problems persist after basic troubleshooting steps are taken, please contact RF Technical Services. Contact information is located on our website at www.bdcast.com and on page iii in the front of this manual.

A fault in any part of the system indicates a complete disruption in normal operation of at least one part of the transmitter system. Once the problem has been identified, a fault reset command should always be issued through diagnostics in any user interface to attempt to recover from fault conditions. If the reset is not successful or a condition that caused a fault still remains, the fault will re-assert.

An alarm typically indicates an abnormal condition that represents a disruption that may resolve itself. Alarms in unexpected situations could indicate serious conditions. Alarms that persist or unexpectedly appear on a regular basis should not be ignored. To get a good feel for what alarms are expended under which conditions, see the alarm details in the sections that follow.

13.1 Event Log

The system event log can be accessed through the Basic Web Interface log page or in its raw form through the event Log tree in SNMP. An event is defined by its index, starting with the first saved event at index 1, a timestamp from the system's internal real time clock, an event identification number, and the sub-system where the event triggered. Some events also have context-based parameters that are embedded in the description of the event.

13.2 Standby

The STXe Exciter comes with built-in functionality for a standby controller and Exciter – see section 12.2 Standby System Control and Exciter. A system that is in standby is muted and not actively controlling the Transmitter. This mode is not intended in a setup that has a single system controller and Exciter. Standby system control and Exciter setups should have no more than one unit active at a time.

If a system is locked in standby mode, this typically indicates a setup problem. Single system controller and Exciter setups require a stub 949-4130 that activates the Transmitter. This must be attached to the Broadcast Electronics Interface jack, see section 0. Dual system controller and Exciter setups require a switcher system, such as the FW Exciter Switcher product series, that connects to both assemblies through this interface. The switcher must be operated to activate one controller/Exciter.

13.3 Failsafe

An asserted failsafe input on the remote station interface is required for operation of the system. The intended usage of this input is to make a loop that passes through safety relays in all critical transmission system components. When any part of the transmission system becomes unsafe, the circuit should open and de-assert the failsafe on the Transmitter. When a failsafe condition is active, check all systems that are wired into the failsafe circuit.

13.4 Mute

A mute generally refers to a lack of an RF source in some part of the system, and the affected part depends on the context of the notification. Mute indications can happen at various stages for different reasons and details in system sections listed here should be considered.

Transmitter mute conditions typically refer to the FM Exciter. In internal Exciter setups this commonly occurs when:

- There is no power to the Exciter
- The mute GPIO input pin on the remote station interface is asserted
- Unmute/Failsafe GPIO input is not asserted
- The BE Interface active input is not asserted
- VPe/XG setup presence GPIO input is active when no VPe/XG is in the system, or is not activated when it is in the system.

13.5 Internal Exciter Diagnostics

Table 12 – Exciter Diagnostics Details

Fault/Alarm	Description
Communication Fault	This fault occurs when communication between the system controller and the internal Exciter is nonfunctional.
AFC Unlock Alarm	Automatic frequency control system does not yet have lock.
10MHz Status	Displays INT when Exciter is on the Internal reference or EXT for when an External reference is used.
Audio SCR Status	Secondary (SCR) Audio displays PRI for primary audio or SEC for secondary audio

13.6 Power Amplifier Diagnostics

Table 13 – PA Diagnostics Details

Fault/Alarm	Description
RF Power Supply Fault	This fault activates when a power source failure is detected.
Reflected Power Fault	This fault activates when a sudden increase in reflected power is detected by hardware in the power amplifier.
VSWR Fault	This fault activates when the measured VSWR is greater than the maximum VSWR rating of the system at any power level.
Temperature Fault	This fault activates when the measured internal heat sink temperature exceeds the safe limit.
Current Fault	There is current monitoring on the final stage RF amplifiers. The PA shuts down when measured current on any of these solid state amplifiers exceeds the safe limit.
Hardware Fault	This is an internal self-report of problems in the PA control hardware.
Communication Fault	This fault occurs when communication between the system controller and the PA is lost.
Reflected Power Foldback Alarm	During FM only operation, the PA attempts to lower its output power when reflected power approaches dangerous levels. This keeps the Transmitter running at reduced power in order to prevent a reflected power fault.
Temperature Foldback Alarm	During FM only operation, the PA attempts to lower its output power when the internal heat sink temperature approaches dangerous levels. This keeps the Transmitter running at reduced power in order to prevent a temperature fault.
Current Foldback Alarm	During FM only operation, the PA attempts to lower its output power when the final power transistor current approaches dangerous levels. This keeps the Transmitter running at reduced power in order to prevent a current fault.
Muted Input Alarm	This alarm is asserted when in FM-only mode and the RF power from the Exciter to the PA is below the minimum threshold for safe operation. This alarm is not reported when the PA is turned off for any reason.
Railed Alarm	During FM-only operation this indicates a condition where automatic power control has reached its highest or lowest possible control value indicating that the Transmitter cannot reach the RF power set-point. The power control system automatically leaves this state if the condition is resolved.

14 Maintenance

These sections detail steps to maintain or replace STXe 60 system modules and spare parts.

14.1 Clean the Air Filter and Check Fan

STXe 60 systems come standard with snap-on washable air filters. Air filter cleaning should be a part of regular system maintenance.

While cleaning air filters, air circulation should also be verified in case fans have stopped functioning

To remove the filter from the front of the Exciter, use the opening on the bottom to pry the snaps by hand.

Figure 45 - Air Filter Removal

Remove the filter material from the case for thorough cleaning. Use compressed air or water to remove debris.

Figure 46 - Separate Air Filter

Snap the air filter back on once clean.

If the filter case becomes loose enough to rattle, reset it after carefully pinching the snaps to tighten them.

Figure 47 - Re-insertion of Air Filter

14.2 Remove the Top Cover

To perform remaining module replacement actions in this section, the top cover must be removed. Full precautions should be taken against electrostatic discharge. Any such shocks may cause permanent damage to any electronic components.

ENSURE AC POWER INPUT IS COMPLETELY DISCONNECTED BEFORE ACCESSING ANY INTERNAL MODULES.

Use a Phillips screwdriver to unscrew all 15 top cover screws and lift the cover. Lift straight up as there is an air dam that can wedge itself in. If this occurs, push down and retry.

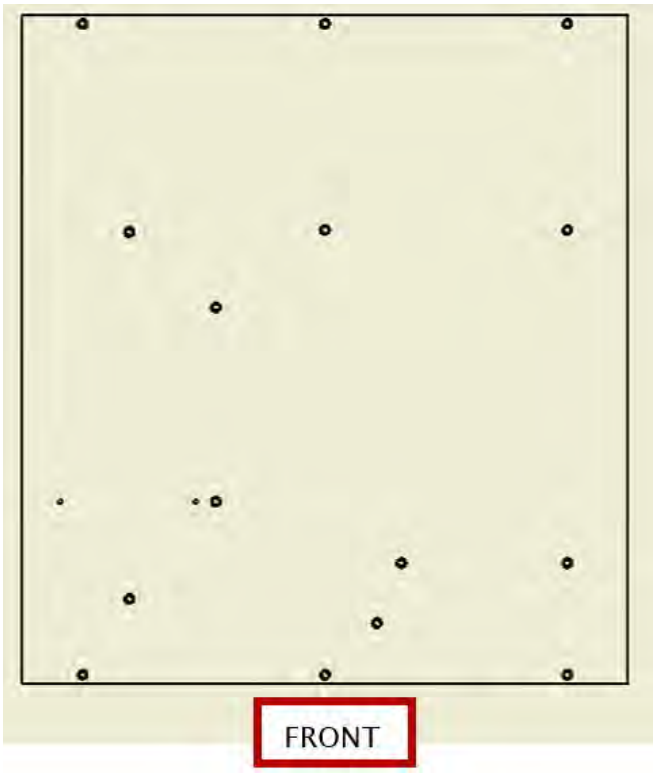


Figure 48 - Top Cover Screw Locations

14.3 Main Power Supply

Items Needed:

☐ 540-4048 1 Power Supply Board Assembly, 48VDC 240W

☐ Phillips Screwdriver

POWER SUPPLY PARTS MAY HOLD THIER CHARGE FOR MINUTES AFTER AC POWER IS DISCONNECTED. SHOCKS AND BURNS MAY RESULT IF JACKS OR PART LEADS ARE TOUCHED, ESPECIALLY ON THE BOTTOM OF MODULES!

1. Start by removing the polycarbonate power supply safety cover. Remove the screw, and then the barrier should slide away from the edge of the main chassis, up, and out.

Figure 49 - Power Supply Safety Cover

2. Unlatch and pull the three harness plugs. To unlatch the cables, pinch the top of the connector at the points indicated below.

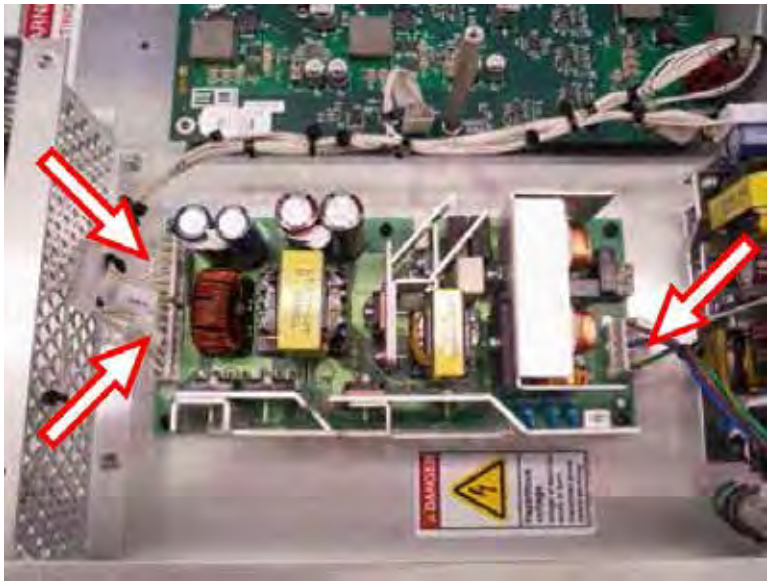


Figure 50 - Main Power Supply Cable Removal

3. Remove the five screws securing the power supply assembly.

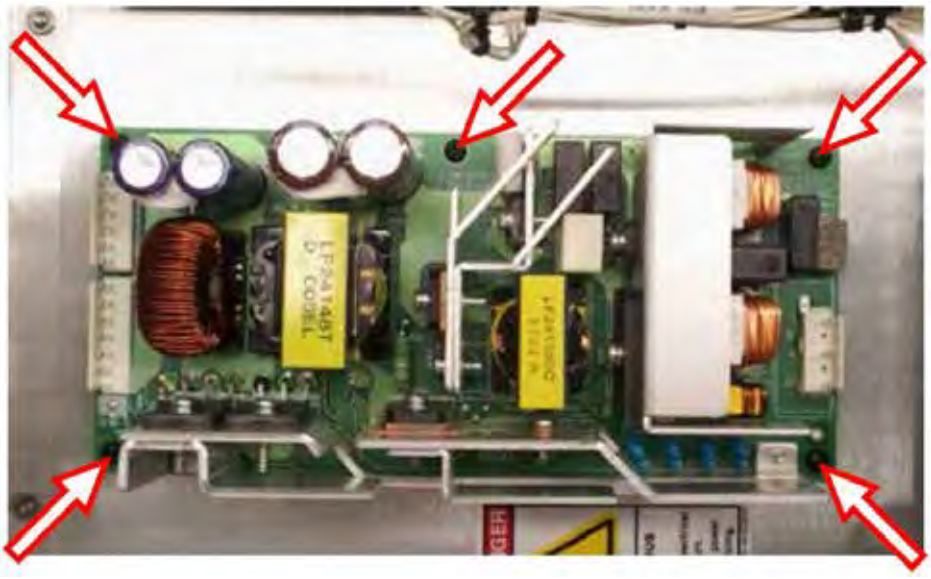


Figure 51 - Main Power Supply Screws

4. Lift the board assembly from the chassis by holding the edges of the board and the heat sinks. Note that heat sinks carry AC when the system is powered. When holding by the edge avoid curling fingers around to the bottom.

Figure 52 - Safe Power Supply Removal

When replacing the new power supply module, repeat the previous three steps in reverse. The cable latches should engage themselves when the cables are fully plugged. Ensure solid latching on all cables is made.

14.4 AC Switch

The AC switch should only be replaced if it is known to have failed. Plastic retaining snaps must be deformed or destroyed to remove the switch from the chassis.

Figure 53 - AC Switch

Items Needed:

☐ 349-0020 1 20A double pull single throw rocker switch
☐ Phillips screwdriver
☐ Side cutters

1. Use a Phillips screwdriver to remove the five screws that secure the back panel to the main chassis: one on either side and three on the bottom.

Figure 54 - Back Panel Screws

2. Remove the screw securing the Controller/Exciter board and unsnap the corners.

Figure 55 - Controller/Exciter Screw

3. Carefully lift and rotate the assembly to gain easy access to the AC switch.

Figure 56 - Displaced Panel Assembly

4. Use side cutters to cut the AC switch's housing tabs. The switch should then slip through the chassis as shown.

Figure 57 - AC Switch Tabs

5. Exchange wires from the old switch to the replacement switch one at a time to ensure that wires are placed in the correct configuration.

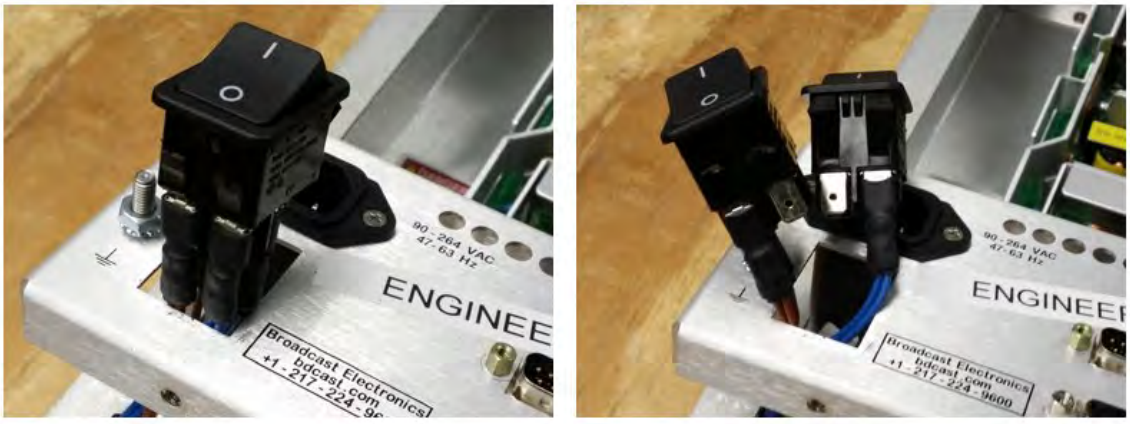


Figure 58 - AC Switch Wires

6. Insert the switch back into the chassis and repeat the initial steps in reverse to replace the back panel and Controller/Exciter board.

14.5 AC Input and EMI Filter

Figure 59 - AC Input/EMI Filter

Items Needed:

☐ 339-0006	1	10A 50/60 Hz 250V AC input filter
☐ 402-0015	1	Cable tie
☐ 611-1501	4”	1-1/2” diameter heat shrink wrap
☐ Phillips screwdriver		
☐ Side cutters		
☐ Heat gun		

1. Use cutters to cut the cable tie.

Figure 60 - AC Cable Tie

2. Cut the shrink wrap.

Figure 61 - Cut Shrink Wrap

3. Carefully pull the three wires off the exposed internal studs.

Figure 62 - AC Studs

4. Use a Phillips screwdriver to remove the two screws that secure the input shell to the chassis.

Figure 63 - AC Input Screws

5. Slide the AC assembly out of the chassis. Place its replacement in the same spot, and secure it with the Phillips screws.

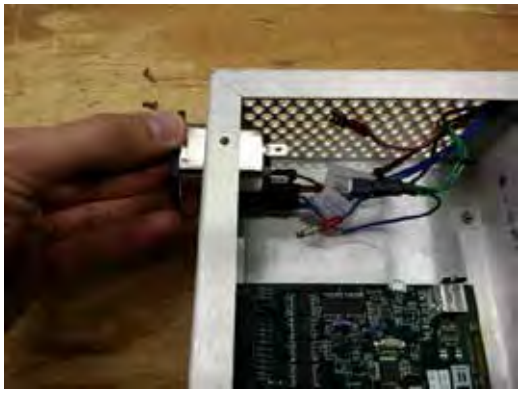


Figure 64 - AC Input Assembly Removal

6. Feed the wires through the shrink wrap. Hold the wrap back and secure the wires on the internal studs. Ensure proper wire placement per wire colors indicated in the figure.

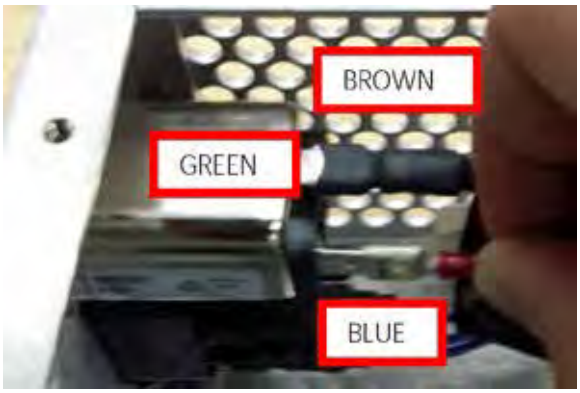


Figure 65 - Internal AC Connections

7. Slide the shrink wrap all the way up and over the AC input assembly. Apply heat with a heat gun.

Figure 66 - Shrink Wrap

8. While the shrink wrap is still malleable secure it with the cable tie.

14.6 Fan Power Supply

Items Needed:

☐ 540-5024 1 Power Supply Board Assembly, 24VDC 50W

☐ Phillips Screwdriver

POWER SUPPLY PARTS MAY HOLD THIER CHARGE FOR MINUTES AFTER AC POWER IS DISCONNECTED. SHOCKS AND BURNS MAY RESULT IF JACKS OR PART LEADS ARE TOUCHED, ESPECIALLY ON THE BOTTOM OF MODULES!

1. Follow step 1 in section 14.3 to remove the power supply safety cover.

2. Disengage the latch on the DC cable harness and pull the plug. Simply pull the plug on the AC cable harness.

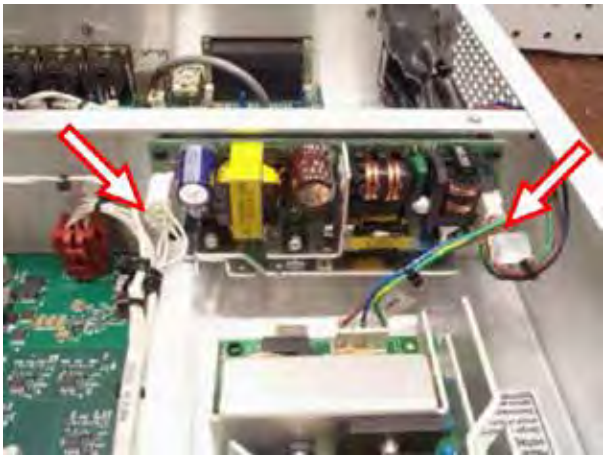


Figure 67 - Fan Power Supply Cable Removal

3. Start by unscrewing the bottom two screws of the power supply module.

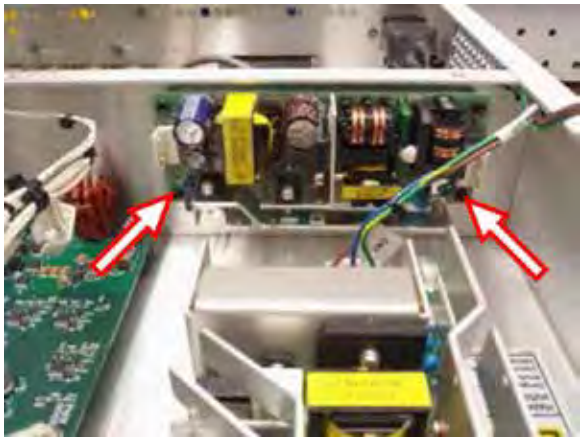


Figure 68 - Fan Power Supply Bottom Screws

4. Hold the board assembly by the edges of the board and the heat sinks. When holding by the edge avoid curling fingers around to the bottom. Remove both of the top screws and lift the module out of the chassis.

Figure 69 - Safe Fan Power Supply Removal

5. With the replacement power supply module, repeat the previous steps in reverse. The cable latches should engage themselves when the cables are fully plugged. Ensure solid latching on all cables is made.

14.7 Fan

Items Needed:

☐ 380-9008-001 1 Fan with Connector, 24V 80 mm X 38 mm
☐ Phillips Screwdriver

1. Slide the fan assembly straight up and out of the chassis and disconnect the cable harness - pinch latches on both connectors and then pull apart.

Figure 70 - Fan Assembly Removal

2. Note the front/back and wire orientations relative to the case cutout. Use a Phillips screwdriver to remove the four screws and nuts securing the fan to the case.

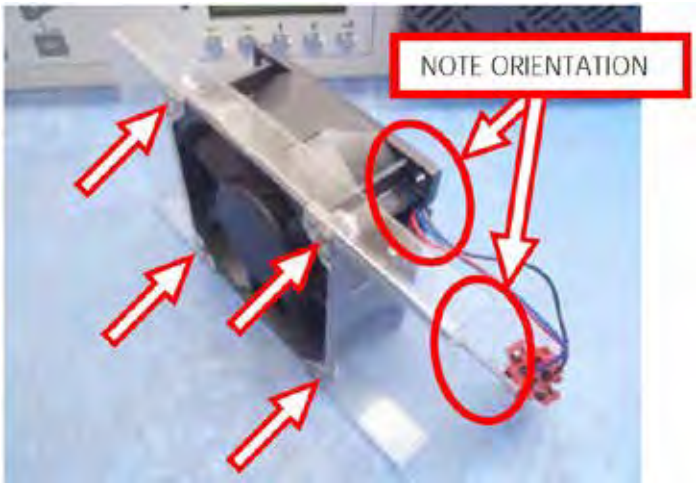


Figure 71 - Fan Assembly Detail

3. With the replacement fan, repeat the previous steps in reverse. Again, ensure fan direction and orientation in the case is proper to avoid improper airflow or strain on cables.

14.8 Front Panel Display

Items Needed:

☐ 919-4070-100	1	STX CPE Display Board Assembly
☐ Phillips Screwdriver		

1. Use a Phillips screwdriver to remove the front panel handle screws. Be careful not to let the handles spin and scratch the front panel. Slide the front panel off.

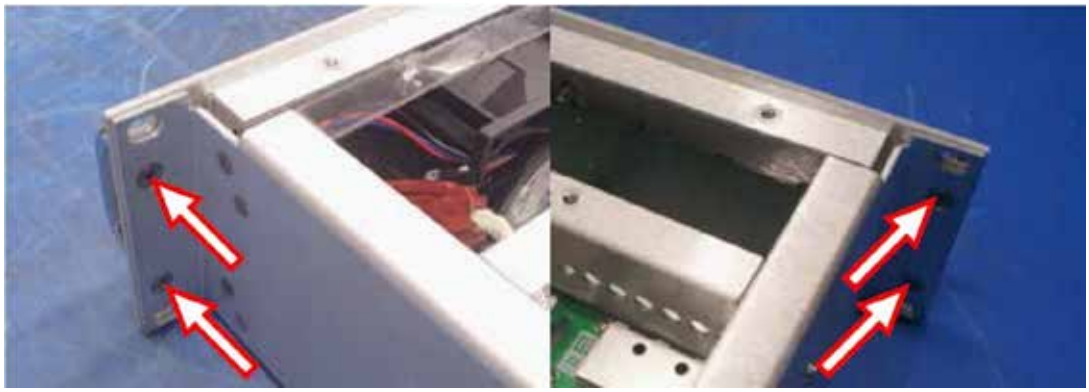


Figure 72 - Front Handle Screws

2. Disengage the latch on the cable harness and disconnect it from the display board.

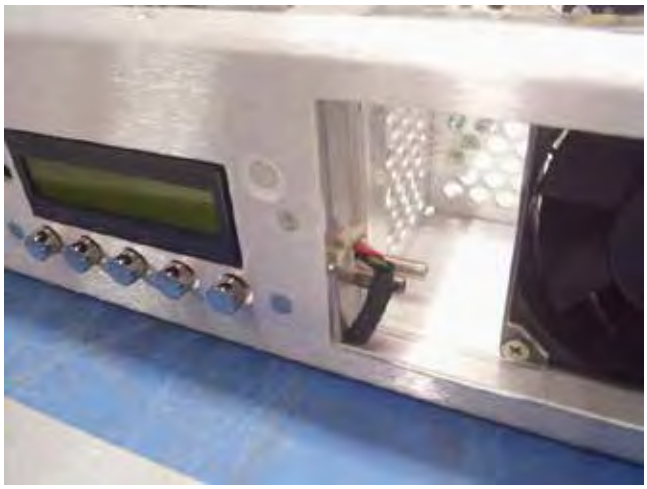


Figure 73 - Front Panel Display Cable

3. Use a Phillips screwdriver to remove the two screws securing the board assembly.

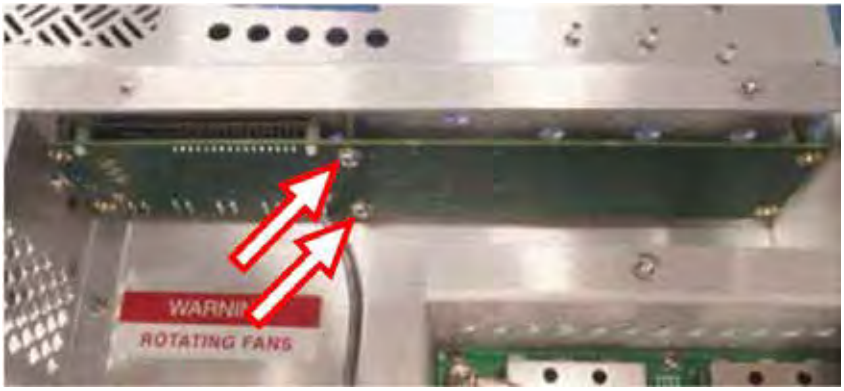


Figure 74 - Front Panel Display Screws

4. Pop the board out of the four snaps in the corners.

Figure 75 - Front Panel Display Snaps

5. With the replacement front panel display board assembly, repeat the previous steps in reverse.

Figure 76 - Front Panel Board Assembly

14.9 DC Regulator

Items Needed:

☐ 919-4206 1 DC Regulator Board Assembly
☐ Phillips Screwdriver
☐ 1/4” nut driver (or 1/4” wrench)

1. Follow step 1 in section 14.3 to remove the power supply safety cover.

2. Disengage latches on the blue connector and pull it. Pull the three white cable connectors. Set the cables aside.

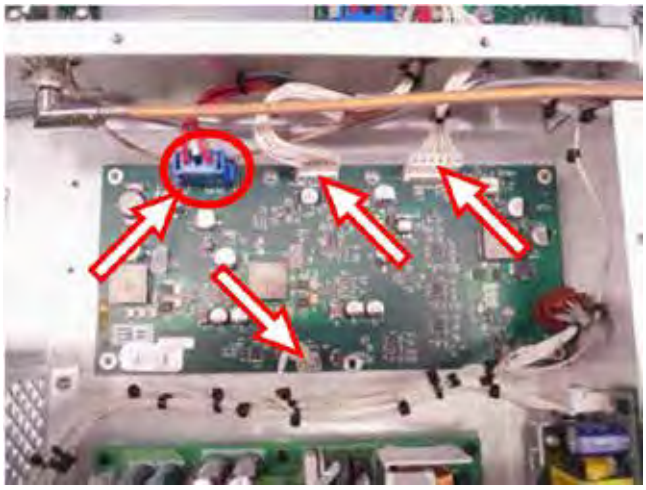


Figure 77 - DC Regulator Cables

3. Use a Phillips screwdriver to remove two screws. Use a 1/4" nut driver to remove the standoff with lock washer.

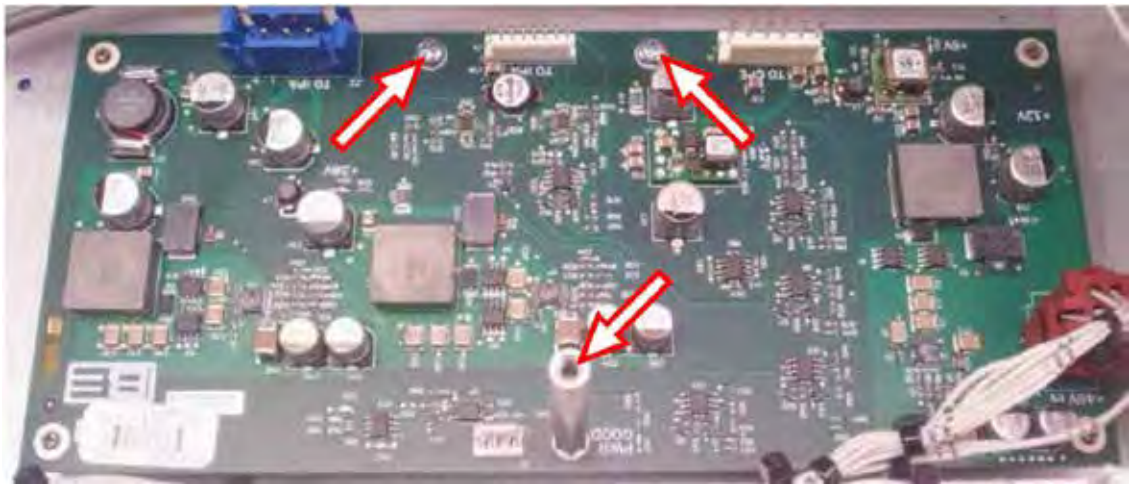


Figure 78 - DC Regulator Screws

4. Pop the board assembly off the four corner snaps.

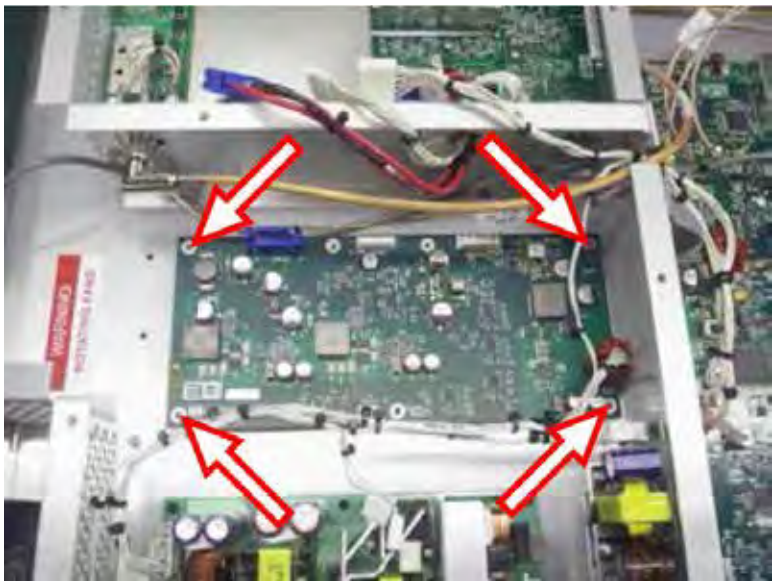


Figure 79 - DC Regulator Snaps

5. Set the board about an inch to the side to the better access the connecter circled below. Pinch the latches on the connector and pull the cable.

Figure 80 - DC Regulator Harness

6. With the replacement DC regulator board assembly, repeat the previous steps in reverse. Note that step 5 can be performed when plugging in the other cables in step 1 when assembling. If the cables come unseated from the internal chassis wall, reset them according to the details at the end of the next section.

14.10 Extended I/O

Figure 81 - Extended I/O Interface Board Assembly

☐ 919-4213 1 STX Extended I/O Interface Board Assembly
☐ 3/16” Nut Driver

1. Disconnect the cable harness by unlatching and pulling the miniature rectangle connector.

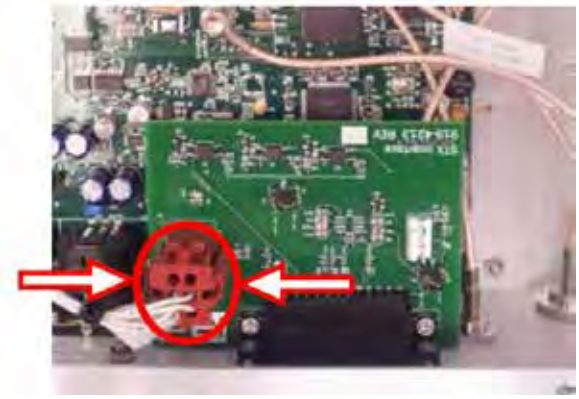


Figure 82 - Extended I/O Harness

2. Use a 3/16” nut driver to remove the two jack screws and split lock washers.

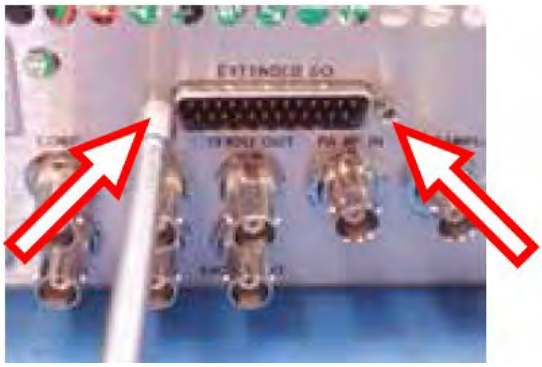


Figure 83 - Extended I/O jack Screws

3. Repeat these steps in reverse to replace the board assembly.

14.11 Controller Exciter

Figure 84 - Controller Exciter Board Assembly

Items Needed:

☐ 919-4200-100	1	STX Controller Exciter Board Assembly
☐ Phillips Screwdriver		
☐ 3/16” Nut Driver		
☐ 9/16” Wrench (or machine-thinned 9/16” deep-well nut driver)		

1. Repeat the steps in 14.10 to remove the extended I/O board assembly.

2. Use a 3/16” nut driver to unscrew the four D-Subminiature jack screws that secure the GPIO and Broadcast Electronics Interface jacks.

Figure 85 - CPE D-Subminiature Jackscrews

3. Use a Phillips screwdriver to remove the six screws that secure the XLR jacks.

Figure 86 - CPE XLR Screws

4. Use a 9/16” wrench to loosen the six BNC nuts. Space between the double-stack BNC jacks is tightly constrained, and once the nuts are loose they can be removed by hand.

Figure 87 - CPE BNC Nuts

5. Disconnect all cables and harnesses from the Controller Exciter board. Unseat them from the notch in the chassis wall and set them out of the way.

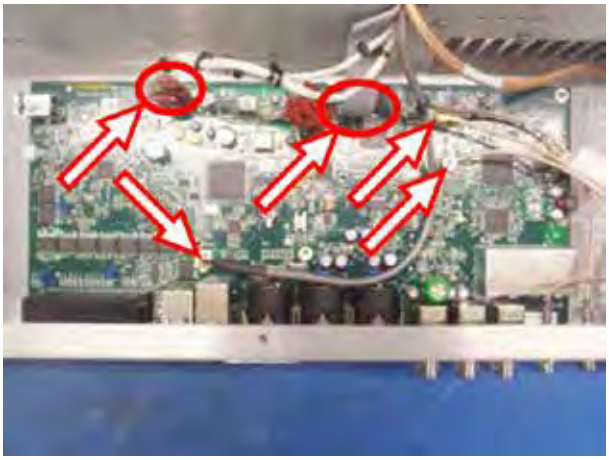


Figure 88 - CPE Wiring

6. Use a Phillips screwdriver to remove the screw securing the board.

Figure 89 - CPE Screw

7. Insert fingers under the board next to the two snaps and pop them up to free the board.

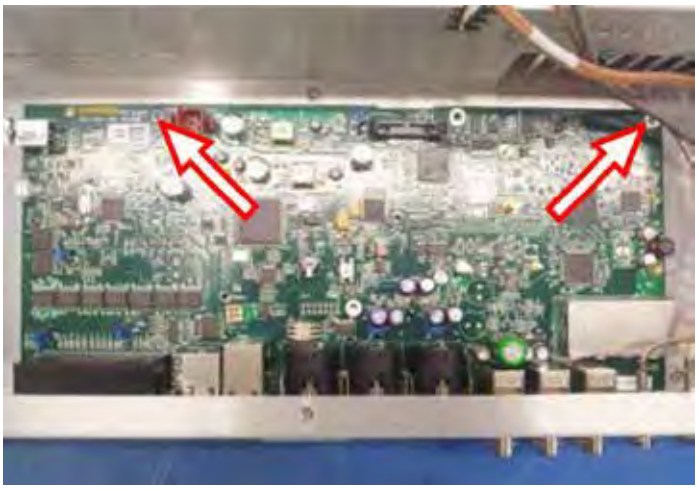


Figure 90 - CPE Snaps

8. Angle the back of the board up and slide cables underneath the corner of the board.

Figure 91 - Start of Board Extraction

9. Carefully support the board by the XLR jacks as shown and ensure that the XLR push tabs clear the chassis, especially the RIGHT tab. Lift the freed board assembly out of the chassis.

Figure 92 - XLR Jack Tabs

10. With the replacement Controller Exciter board assembly, repeat the previous steps in reverse. Cables and harnesses should be arranged in the notch in the chassis as shown.

Figure 93 - Wiring Positions

14.12 Power Amplifier Part

RF power transistors should only be replaced if they are known to have failed. Bending leads to separate from boards during the removal process will cause damage. If a final stage power transistor has failed, both of the parts in the pair should be replaced. Fuses and other components in surrounding circuitry may also be damaged depending on the failure mode.

This is a difficult process that should only be attempted by skilled technicians.

Figure 94 - RF Power Amplifier Transistor

- ☐ 210-0245 RF Power Amplifier
- ☐ 700-0028-004 Thermal Compound
- ☐ 6 lb.-in (0.6-0.75 Nm) Torque 3/32” Allen (hex key) wrench
- ☐ Solder
- ☐ Soldering Irons
- ☐ Solder Wick
- ☐ Phillips Screwdriver
- ☐ Extra-Long/Short Phillips Screwdriver

1. Set the STXe 60 unit on its side and use a Phillips screwdriver to remove the two screws.

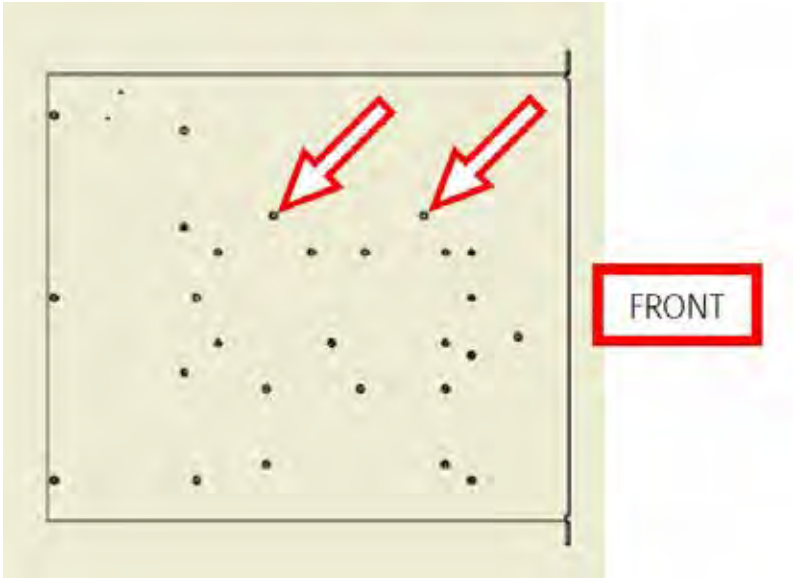


Figure 95 - Bottom PA Screw Locations

2. Set the STXe 60 unit back down. Use a Phillips screwdriver to remove the five screws on the side.

Figure 96 - Side PA Screw Locations

3. Insert an extra-long Phillips screwdriver through the hole in the back of the chassis and unscrew the front PA screw. An extra-short Phillips screwdriver that can fit inside the cavity may also work.

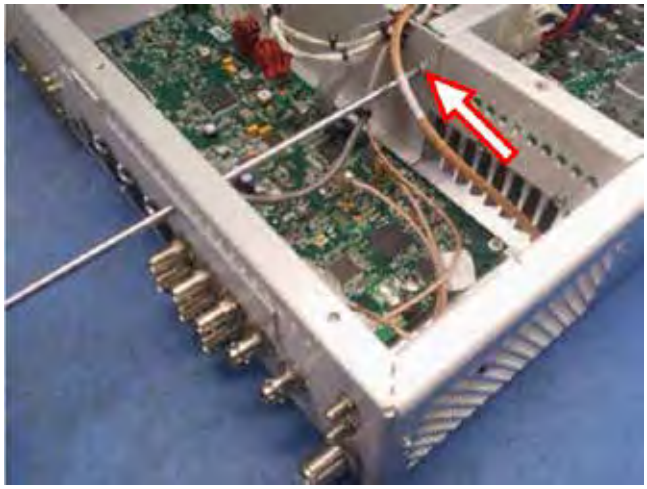


Figure 97 - Front PA Screw Location

4. Displace the PA assembly enough to allow clearance of the RF shield.

5. Identify the amplifier device(s) to be replaced.

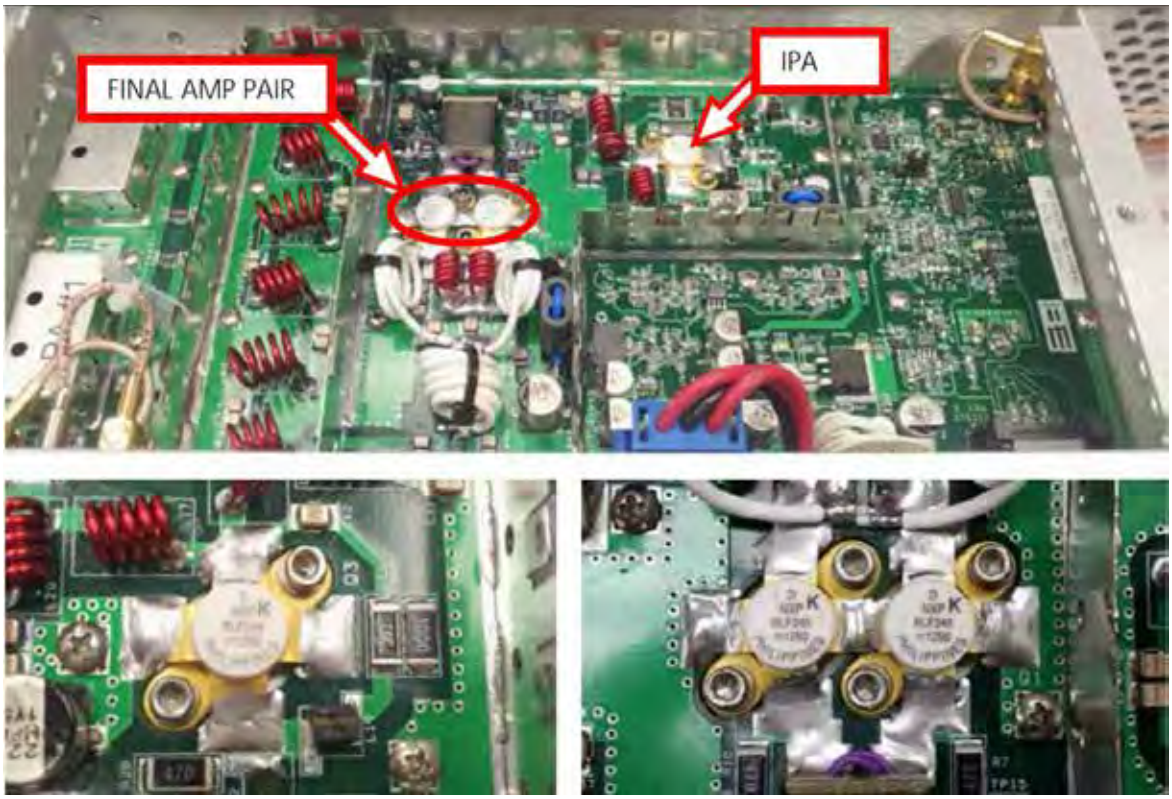


Figure 98 - PA Transistors Identification

6. Use a 3/32” Allen wrench to remove the socket head mounting screws.

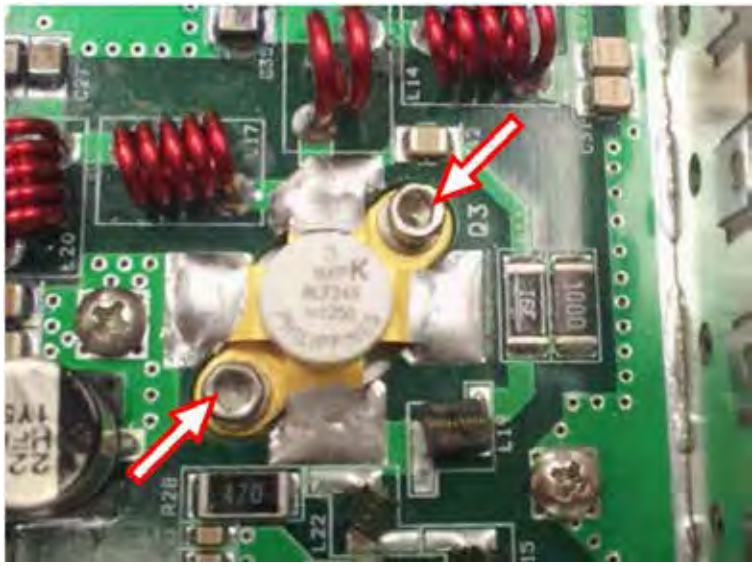


Figure 99 - RF Power Transistor Mounting Screws

7. Use a soldering iron to separate the four leads from the circuit board and remove the part (note orientation of the notched lead).

8. Solder wick all residual solder to remove it from the circuit board to prevent lead strain.

9. Apply a thin film of thermal grease to the bottom of the replacement amplifier part where the base of the part contacts the heat sink.

Figure 100 - Bottom of RF Power Amplifier with Grease

10. Place the part – look at the notch to ensure the proper orientation. Use the Allen torque wrench to tighten the socket head screws (screw in figure may vary from actual) with 6in-lb of Torque.

Figure 101 - RF PA Transistor Mounted

11. Apply solder to all four leads. Minimize strain on the leads.

12. Performance of the module after the amplifier part replacement process has been completed may depend on part to part variations of the amplifier parts and surrounding circuitry. If there is degradation in performance please contact BE technical services to arrange to ship the module/system for diagnosis, repair, and re-tuning.

14.13 Power Amplifier Fuses

Use a multi-meter set to ohm measurement to identify failed fuses. A fuse should have resistance near zero while a failed fuse is an open circuit with extremely high impedance.

Figure 102 - PA Fuse

- ☐ 330-0009 10A surface mount fast acting fuse
- ☐ Soldering irons pair or hot air pencil
- ☐ Solder Wick
- ☐ Solder

1. Identify the failed fuse to be replaced. Move cables as needed to gain access.

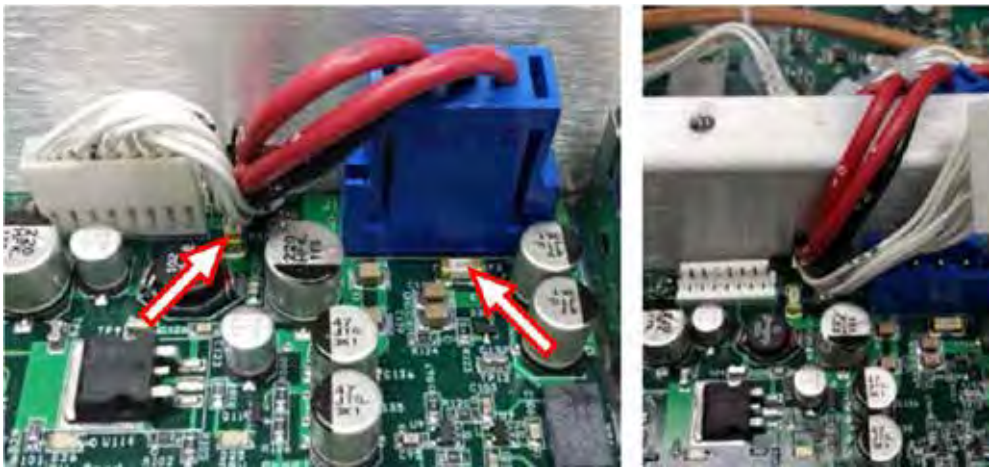


Figure 103 - Fuse Locations

2. Use the soldering irons on both sides of the part to remove it. Be careful not to damage wires.

3. Use solder wick to remove residual solder.

4. Set the new fuse in place (orientation does not matter), and re-solder to both sizes.

14.14 Power Amplifier Assembly

Figure 104 - PA Assembly

Items Needed:

☐ 959-4210 1 60W PA Board Assembly
☐ Phillips Screwdriver
☐ Extra-Long/Short Phillips Screwdriver

1. Set the STXe 60 unit on its side and use a Phillips screwdriver to remove the two screws shown.

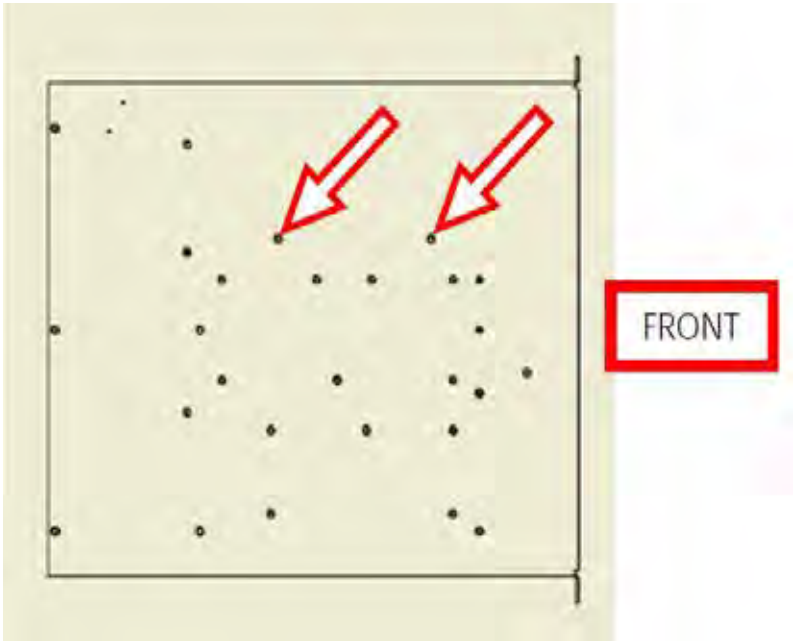


Figure 105 - Bottom PA Screws

2. Set the STXe 60 unit back down. Use a Phillips screwdriver to remove the five screws on the side.

Figure 106- Side PA Screws

3. Insert an extra-long Phillips screwdriver through the hole in the back of the chassis and unscrew the front PA screw. An extra-short Phillips screwdriver that can fit inside the cavity may also be used.

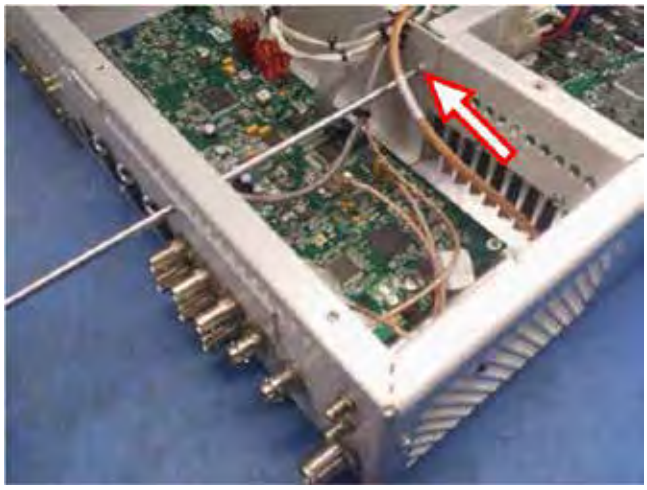


Figure 107 -Front PA Screw

4. Move the heavy RF-out cable to the side and lift all of the cables and harnesses out of the notch in the chassis as shown.

Figure 108 - Unseated Cables

5. Disconnect the highlighted cables from the CPE and DC regulator boards and disconnect the RF-out BNC connector.

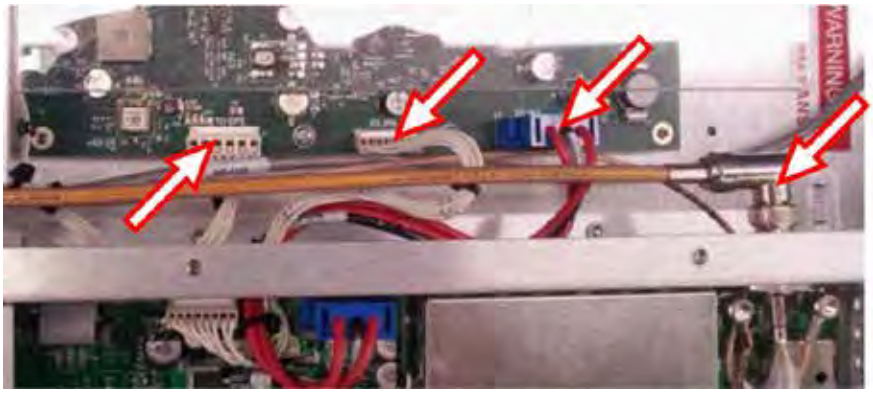


Figure 109 - Disconnected Cables

6. Slide the PA assembly to the side in order to clear the top lip of the main chassis.

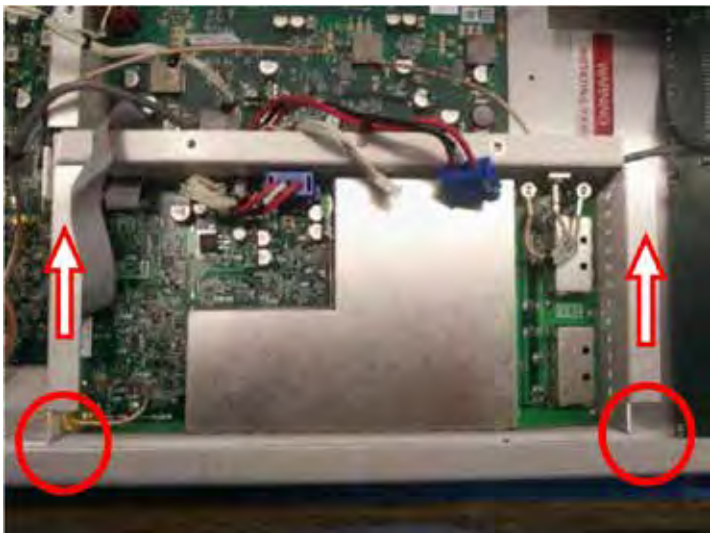


Figure 110 - Displaced PA Assembly

7. Carefully lift the PA assembly and set it on the main chassis as shown.

Figure 111 - PA Assembly on Chassis

8. Use a Phillips screwdriver to unscrew the two screws and remove the back chassis section.

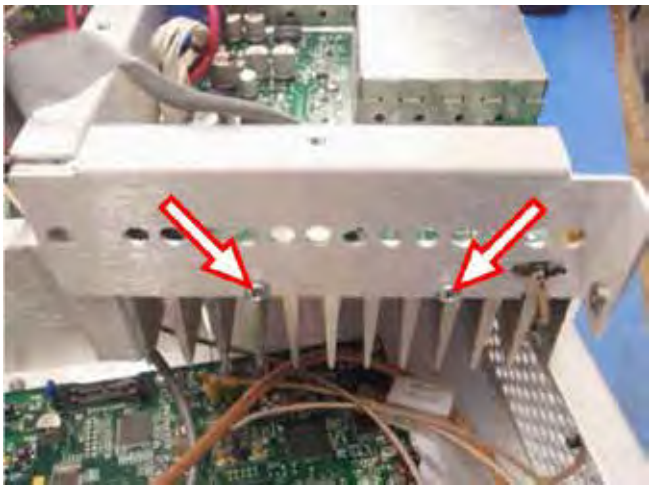


Figure 112 - PA Chassis 1

9. Use a Phillips screwdriver to unscrew the three screws and remove the front chassis piece.

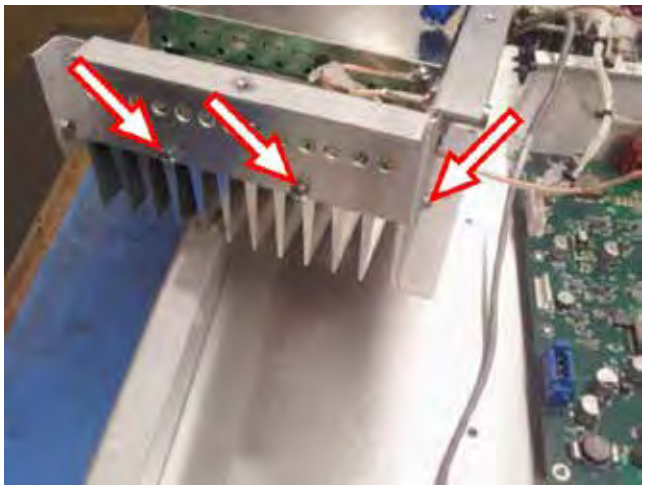


Figure 113 - PA Chassis 2

10. Use a Phillips screwdriver to unscrew the two screws on the remaining chassis section.

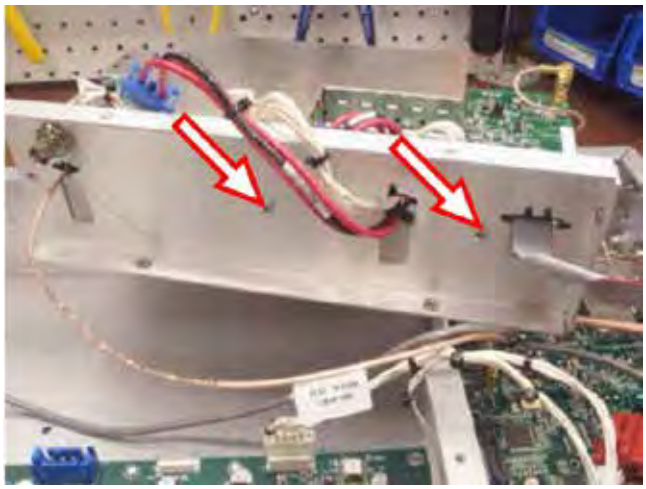


Figure 114 - PA Chassis 3

11. Cut the ty-wrap holding the SMA cables together. Unscrew both SMA connectors. Feed the RF sample SMA connector through the hole in the chassis section.

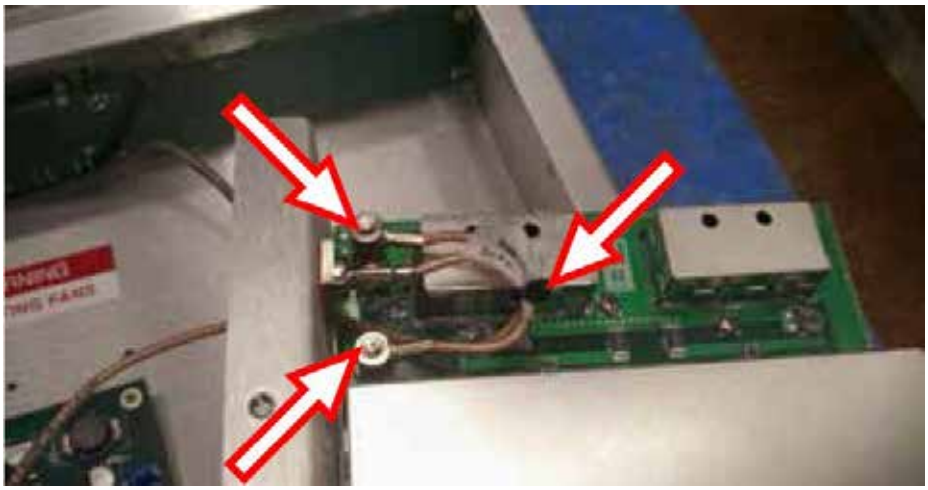


Figure 115 – SMA Connections

12. Feed the remaining three cables through the chassis section as well.

Figure 116 - Cable Extraction 1

13. Disconnect the cables from the PA board.

Figure 117 - Cable Extraction 2

With the replacement PA module, repeat the previous steps in reverse.