Broadcast Electronics
4100 North 24th Street, Quincy, Illinois 62305 USA • Phone (217) 224-9600 • Fax (217) 224-9607 • www.bdcast.com • bdcast@bdcast.com

STXe – 60 Watt FM Exciters

Installation and Maintenance Guide

597-4061
Preliminary
July 23, 2013

STXe – 60 Watt FM Exciters
Installation and Maintenance Guide

Proprietary Notice

Trademarks

Copyright

Broadcast Electronics Product Warranty (Two-Year Limited)

BE hereby warrants all new products manufactured by BE 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.

BE reserves the right to repair equipment under warranty with new or refurbished equipment or parts. BE's 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 BE's 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 BE 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. BE 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 new their new condition.

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

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 BE 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 BE, or if not installed according to BE's 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 BE's 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.** BE shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BE. The warranty provided herein shall terminate at the end of the period set forth above. **This warranty extends only to the original Purchaser and is not transferable.** There are no third party beneficiaries of any of the provisions of

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 BE, 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. 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. Do not mail the equipment. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact the RF Technical Services Department for a Return Authorization.

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 at the number shown below.

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
General E-Mail: bdcast@bdcast.com
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 WHICH UTILIZES SUCH DEVICES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. EXERCISE EXTREME CARE AROUND SUCH PRODUCTS. UNINFORMED OR CARELESS OPERATION OF THESE DEVICES CAN RESULT IN POOR PERFORMANCE, DAMAGE TO THE DEVICE OR PROPERTY, SERIOUS BODILY INJURY, AND POSSIBLY DEATH.

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

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

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

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

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

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

HIGH VOLTAGE

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

RADIO FREQUENCY RADIATION

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

The effect of prolonged exposure to "low level" RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm^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.

Table of Contents

Figures

Tables

1 Overview

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

Selected exciter settings such as frequency, expected output power, Ethernet settings, etc. can be communicated at the time of purchase. After preliminary testing of all systems in the transmitter, technicians use customer settings and verify full system operation under closer conditions compared to the intended installation.

IP network interfacing features are optional, and thus not included. Network cables and hardware depend on the desired networking setup and are relatively common.

For details in operation, please see the STXe – 60 Watt FM Exciters Operation Manual. A copy can be found in the binder containing this manual that is shipped with all transmitters. For electronic copies of any technical documentation please visit http://www.bdcast.com/information-center/ and follow navigation on the left side of the page – authorized login is required for download of technical documents.

Order for experienced quick installation:

See section 4 Installation and Initial Setup for detailed directions of all of these steps.

1. Install the exciter in a rack – not required but highly recommended
2. Exciter RF coaxial cable
3. Transmitter RF coaxial cable
4. AC power service
5. Active stub
6. Assemble exciter interface adapter and connect (only in select transmitters)
7. Turn on AC power
8. Set Ethernet/IP network settings and connect Ethernet to local networking
9. Set time and date
10. Connect and set up all program services
11. Turn RF on

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	22.5" (57 cm) including connectors
Weight	19lbs (8.6 kg) unpacked
Outlet Size	30 in^2 (194 cm^2), rear of unit
Environmental	
Temperature	-10°C to +50°C
Altitude	10,000ft (3048M) maximum
Humidity	95% maximum, non-condensing
Air Capacity	80 CFM (2.3 m^3/Min)
Heat Dissipation	90 W at Rated Output
BTU	300 BTU/H at Rated Output
AC Input	
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) at Rated Output
Single Phase -	
Voltage	90 to 264 VAC Split Phase
RF Output	
Power Accuracy	+/-5% of Total Output Power Setting
Asynchronous AM S/N Ratio	Better than -65 dB (typical -70dB) below referenced to 100% peak AM
Synchronous AM S/N Ratio	Better than -53 dB (typical -60dB) below referenced to 100% peak AM 75usec de-emphasis with 75 kHz deviation @ 400 Hz
Impedance	50 Ohms nominal
VSWR	Rated Power into 1.5:1 VSWR
FM Only Power	5-70W
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	+/-100 Hz factory calibration, +/-4ppm aging/temperature
Modulation	
Type	Direct-to-Channel; FM

Capability	300 kHz
Maximum Overshoot	150%
RF Harmonics Suppression	
FCC; DOC; CCIR	Meets all requirements/recommendations
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%
IMD	0.005%
SNR	-90dBr below 100% modulation @ 400 Hz
SCA1 & 2 Inputs	
Connectors(2)	BNC
Impedance	10k ohms, un-balanced
Level	3.5V p-p for 10% modulation
Response	+/-0.1 dB; 53 kHz to 100 kHz
RDS Input	
Connector	BNC
Impedance	10k ohms, un-balanced
Level	3.5V p-p for 10% modulation
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 for 100% modulation
Analog L/R Input	
Connectors	XLR Female
Impedance	600 Ohms or 10K Ohms selectable, balanced
Level	10dBm into 600 Ohms for 100% modulation
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 at 100% modulation @ 400 Hz
SNR	Mono (L+R) 90 dB, Stereo 80 dB or better below 100% modulation @ 400 Hz
Stereo Separation	70 dB; 20 Hz to 15kHz
Pilot Output	
Connector	BNC, un-balanced
Level	1V p-p +/- 5% into high impedance

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

2 Preparing to Install

STXe systems come with installation kits tailored to standard BE transmitter installations. Standard C and T series transmitters require an adapter board and some alternate cabling. Ensure that the appropriate kit is received, checked, and installed.

2.1 Verify Contents of Shipment

	BEI Part #	Quantity	Description
☐	909-4060-C	1	60W STXe
☐	STXe Manuals		
☐	597-4061	1	STXe60 Installation and Maintenance Guide
☐	597-4062	1	STXe60 Operation Manual
☐	979-4160[-100]	1	Both STXe60 Standard Installation Kits
☐	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
☐	979-4160	1	STXe60 Standard Installation Kit Only
☐	949-4144	1	STXe TO FM10S CABLE
☐	979-4160-100	1	STXe60 C or T Series Installation Kit Only
☐	422-0106	4	PHILLIPS SCREW10-32X3/8"
☐	441-0101	2	ALUMINUM STANDOFF 10-32X7/8” 5/16HEX
☐	849-3701	1	DB37 MALE - DB37 FEMALE CABLE
☐	919-4001	1	STX I/O INVERTER BOARD
☐	949-4150	1	STXe TO C OR T SERIES CABLE

2.2 Items Sold Separately or Not Supplied

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

2.3 Tools and Materials

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

Remote Station Interface Connections

- ☐ Wire strippers
- ☐ Soldering iron and solder

2.4 Estimated Time for Installation

Installation and initial setup should take approximately 30 minutes.

3 Rear Panel Connections

Before assembling the system, please take some time to familiarize yourself with all of the connectivity features included in STXe Systems.

Note that "low" logic in the context of machine interface connections refers to a connection to logic ground pins. "High" logic is a connection to +5V (supplied by GPIO pin 32). Active edge refers to a transition from the inactive state to the active state. Inactive inputs are internally pulled high and should be open/floating, and not driven. Active low refers to a momentary transition from the high state to the low state, and the implication is that no action is performed on the transition back to high. A momentary input pulse such as this should be approximately 100ms in duration to ensure capture of the event.

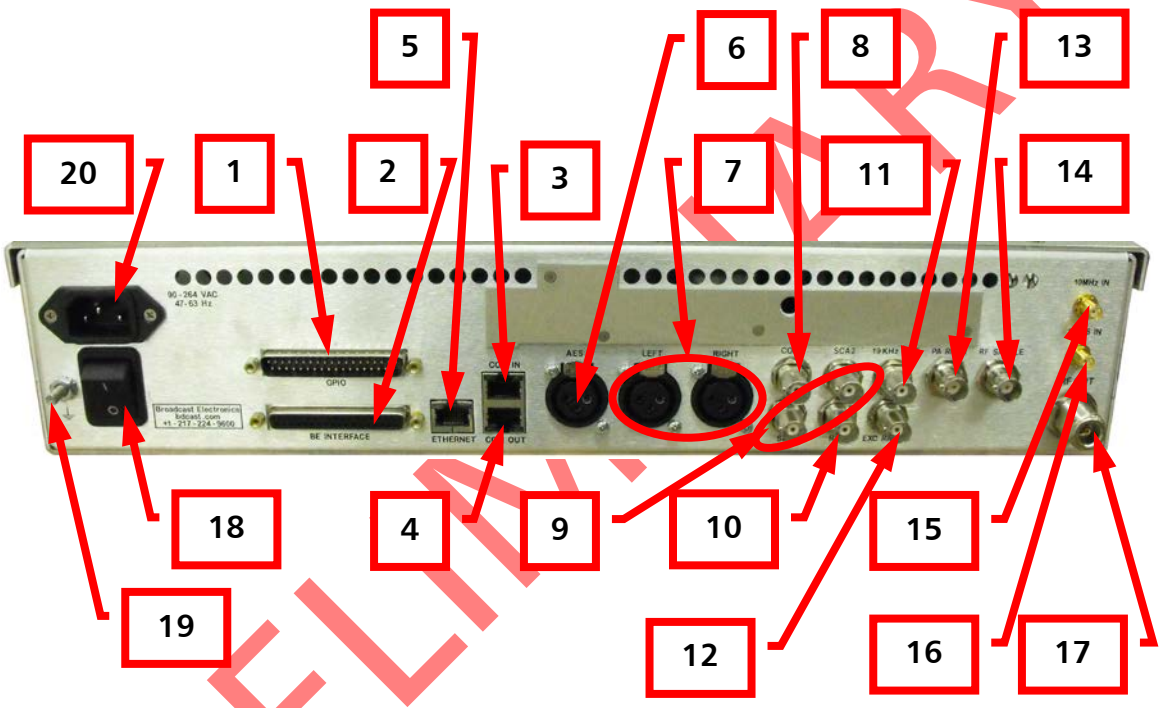


Figure 2 –Rear Panel

3.1.1 GPIO

General purpose input/output 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 2.

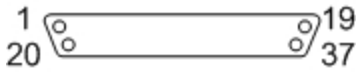


Figure 3 - Standard D-Sub 37 Connector Numbering

Table 2 – 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" with a low edge and "Transmitter On" with a high edge.
6	Input	Raise Transmitter Power	Raises the system power 1 Watts every second that this input is held low.
7	Input	Lower Transmitter Power	Lowers the system power 1 Watts 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. Hold this line low for up to 5 seconds and release to enable RF output once again. 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	FM Only Mode	Reserved
12	Input	Ground	Isolated ground to be used for remote input connections.
13	Input	Reserved	Reserved
14	Input	Reserved	Reserved
15	Output	Reflected Power	DC voltage for total reflected power at the system RF output. Varies linearly from 0V = 0W to 5V = 8 Watts
16	Output	PA Total Current	DC voltage for total RF power supply current for PA module. Varies linearly from 0 = 0A to 5 V = 6 A.
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 allows this to be wired to a system-wide chassis ground. Pin 37 provides an alternate place to connect to this circuitry.
20	Output	General Fault	Low when any fault is active in the system. Can be setup to be active High.

Pin	Direction	Name	Description
21	Output	VSWR Fault	Low when the affected 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	Reserved	Reserved
32	Output	+5V	Low power logic voltage supply for remote interface logic on this interface. Jumper J26 allows this to be wired for fused or isolated power supply. Isolated current limit is 7.5mA. Fused current limit is 0.5A.
33	Output	Forward Power	DC voltage for system forward output power. Varies linearly from 0V = 0W to 5V = 70 Watts
34	Output	PA Voltage	DC voltage representing the variable RF power supply. Linear from 0V = 0V to 5V = 30 V.
35	Output	Reserved	Reserved
36	Output	Reserved	Reserved
37	N/A	Ground	Alternative isolated ground pin internally connected to pin 19, see above for details.

3.1.2 BE INTERFACE

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

Table 3 – BEI Pins

Pin	Direction	Name	Description
2	N/A	Ground	Chassis Ground
4	Input	Active/Standby	Tie to ground to activate this CPE, open for standby
Other		Reserved	Reserved

3.1.3 COM IN

This input is not used in STXe applications.

3.1.4 COM OUT

This input is not used in STXe applications.

3.1.5 ETHERNET

Standard 10/100 Mbps RJ45 IP network communications input/output. Connect to a local area network switch and/or to a gateway for access through the internet. This interface automatically negotiates hardware interfacing, and 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 configured through the transmitter control center. There is no explicit cap on the number of connections that can be made to the network controller; however an excessive number of connections will cause a decrease in performance in any of these IP interfaces.

3.1.6 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 as the primary audio source to modulate RF with this audio.

Supported bitrates are 32, 44.1, 48, and 96k.

3.1.7 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 to 10k Ohm impedance.

3.1.8 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.

3.1.9 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.

3.1.10 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.

3.1.11 19 kHz OUT

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.

3.1.12 EXC RF OUT

Internal exciter RF output connector. This BNC connector outputs the internally generated exciter power level RF signal. For 1kW systems this should be jumped to PA RF IN using a coaxial connector. For all other system types this should be connected to the RF SPLT IN on the combiner module.

3.1.13 PA RF IN

Power Amplifier RF Input connector. For 1kW systems this is cabled from EXC RF OUT. For combined systems, this should be connected to one of the splitter RF outputs on the combiner module designated A, B, C, D, or E using phase matched cables.

3.1.14 RF SAMPLE

Power amplifier RF sample connector. This BNC carries a coupled RF signal from the module's PA. This is intended to be used in 1kW systems in optional monitoring of RF output.

Nominally generates about 19 dBm at about 1kW PA output power. The output level scales with total output power of the PA module.

3.1.15 10 MHz IN

10 MHz clock input connector. This BNC synchronizes the exciter's internal clocking to a connected sinusoidal clock signal. To lower the chances of drift, connect high precision clock generators such as GPS receiver modules or digital radio signal generators.

3.1.16 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. A high precision clock generator such as GPS receiver modules or digital radio signal generators is recommended.

3.1.17 RF OUT

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

3.1.18 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.

3.1.19 Ground

Ground bolt that can be used to locally connect chassis ground to source connections or any other device that may generate ground loop noise.

3.1.20 AC Input

The AC power input terminal block provides a direct connection for split-phase service. Conductors must be in proper order. From left to right these are Line, Line/Neutral, and Ground.

4 Installation and Initial Setup

This section covers standard installation requirements. Non-standard installations or optional features and equipment may be covered in other technical documents. Be sure to check the Operation Manual or http://www.bdcast.com/information-center/ for details.

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

4.1 Install in Rack

The STXe60 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. For non-threaded rails attach the provided clips in the lowest and highest holes of the two selected rack units. Set the STXe in place and use provided screws to secure the system in the rack.

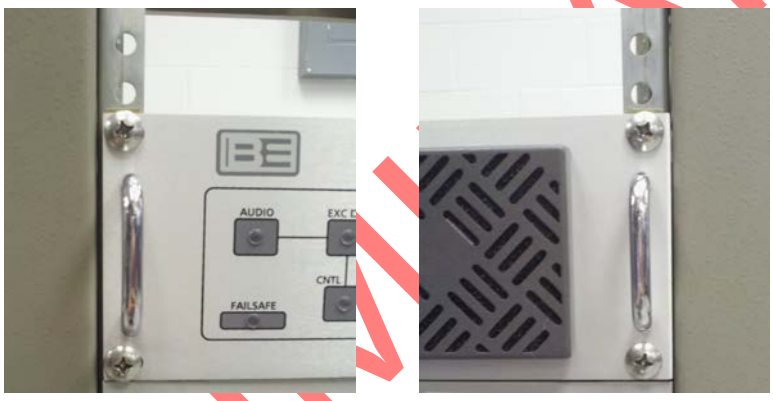


Figure 4 – Rack Mounting

4.2 Exciter RF Jumper

Use the provided BNC jumper to connect EXC RF OUT to PA RF IN.

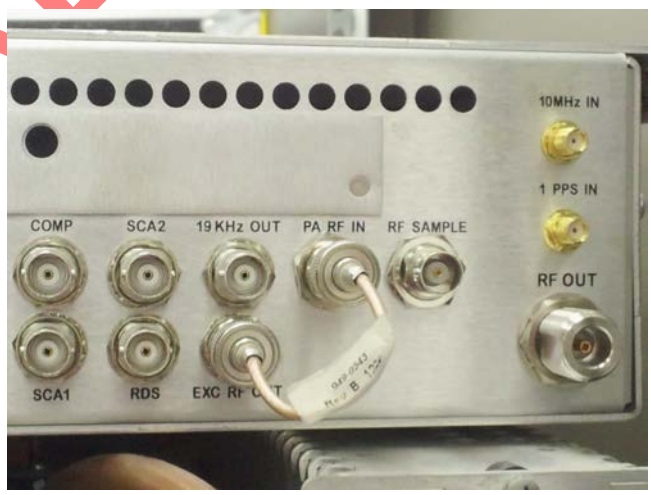


Figure 5 – Exciter RF Jumper

4.3 RF Output

Connect STXe60 RF OUT to the transmitter RF in. Use provided N-type to BNC adapter if necessary.

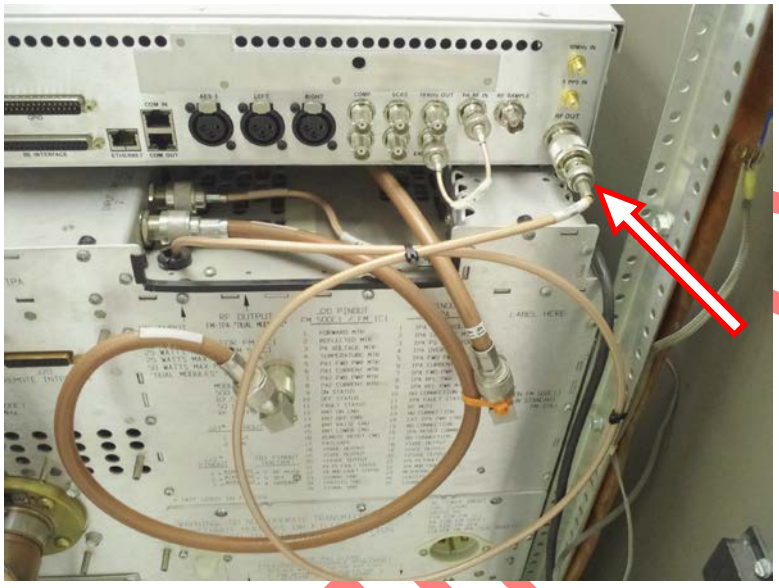


Figure 6 – 1C Transmitter RF Example

For standalone installations simply connect RF out to the antenna transmission line.

4.4 AC Power

Connect AC power from the transmitter. Alternatively, one of the provided power cables can be plugged into a building power socket.

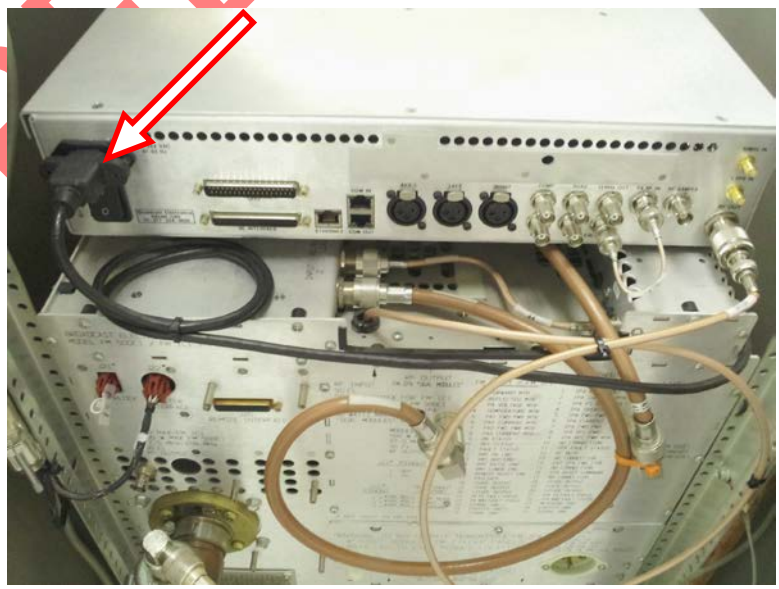


Figure 7 – 1C AC Power Example

4.5 Active Stub

Connect the provided exciter activation stub and secure it with a small screwdriver.

Figure 8 – Active Stub

4.6 Exciter to Transmitter Interface

Exciter interface cables included in STXe60 kits, 949-4144 or 949-4150, are built using solder pot D-subminiature connectors that can be accessed by opening the shell. These can be modified to suit the requirements of the transmission system.

The 919-4001 interface adapter board is required to adapt machine interfaces of select transmitters, such as C- and T-series transmitters, that output active high control logic. Note that STXe60 output signals pass through unchanged. Systems with active low/ground control logic can skip this section. Follow the remaining steps in this section to mount this adapter to a P-rail in the back of a rack and make the required cable connections.

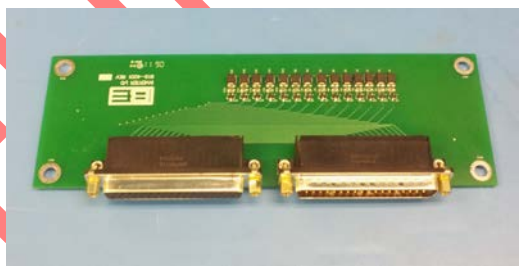


Figure 9 – Adapter Board

1. Use two of the provided Phillips screws in the screw holes shown to attach standoffs to the bottom of the board. Note that the side of the board shown is important to avoid interference with the rail.

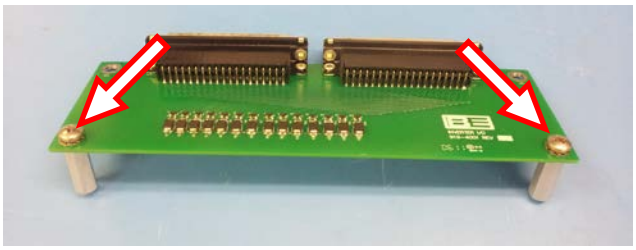


Figure 10 – Adapter Standoffs

2. Use a small screwdriver and/or the thumb screws to attach the provided D-Subminiature cable harnesses.

Figure 11 – Adapter Cables

3. Screw hole spacing is exactly 5 Rack units, so the board can be positioned anywhere vertically. Carefully insert the assembly in the back of the rack and secure with two Phillips screws.

Figure 12 – Mounting the Adapter Assembly

4. Connect the existing EXCITER INTERFACE cable to the 25 pin D- Subminiature cable from the adapter assembly and tighten the thumb screws.

Figure 13 – Exciter Interface Cable

5. Connect the 37 pin D- Subminiature cable from the adapter assembly to the 37-pin GPIO interface on the STXe60.

Figure 14 – GPIO Connection

Secure all loose cabling with ty-wraps.

4.7 Turn on AC

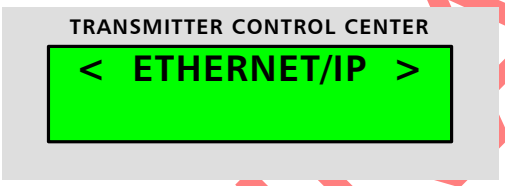
1. Unlock AC main breaker on the service line and turn the switch to the on position.
2. Turn on all transmitter circuit breakers.
3. Flip the Power Switch to the on position on the STXe unit.

4.8 Ethernet/IP Network

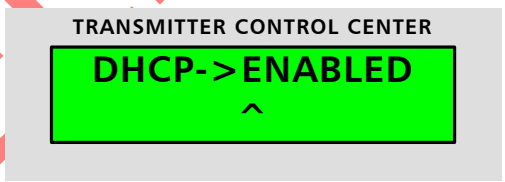
IP network features are entirely optional. System setup sections below contain procedures based on the LCD interface on the front panel of the main assembly, but there is alternative user interfacing for control of all of these setup parameters in both the web and SNMP interfaces. If utilization of these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

4.8.1 Dynamic Host Control

1. Connect an Ethernet cable to networking equipment (such as a switch or gateway).



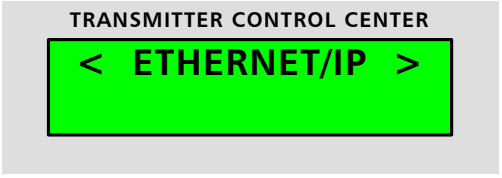
2. Using the transmitter control center on the front panel of the main assembly, navigate to the ETHERNET/IP menu.



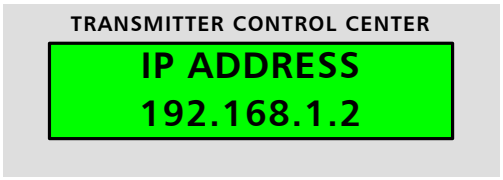
3. Set DHCP to ENABLED (see below for static IP settings).

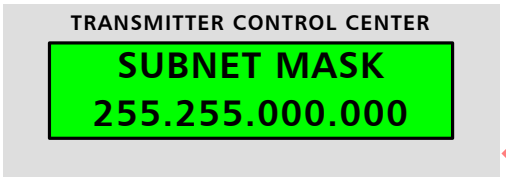
4.8.2 Static IP

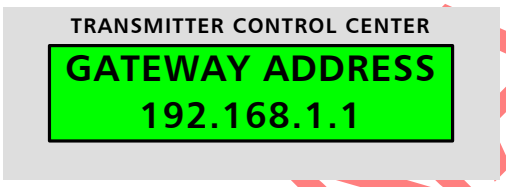
1. Connect an Ethernet cable to networking equipment (such as a switch or gateway).



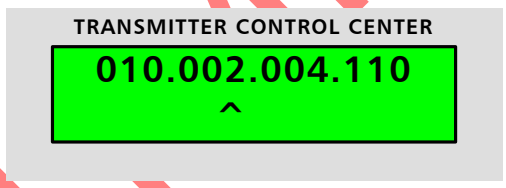
2. Use the transmitter control center on the front panel of the main assembly to navigate to the ETHERNET/IP menu. Because of the way all network adapters function, the actual address, mask, and gateway address utilized are displayed in the second menu layer.







3. With DHCP disabled, press enter on these displays to open a submenu and edit the static IP Address, Subnet Mask, and Gateway address settings. The curser can be moved to any digit using Left or Right buttons.

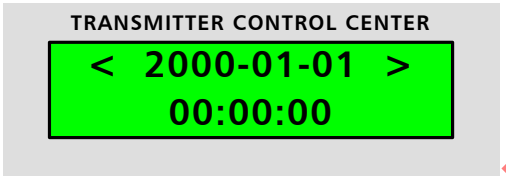


The actual address used in the system may be determined by DHCP rather than these static settings. Settings should appropriately match the local network setup. Consult your network manager or internet service provider to ensure that the correct settings are used.

4.9 Set Time and Date

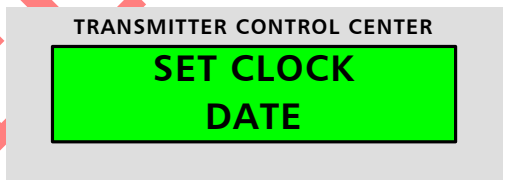
The internal real time clock holds the current time and date for use in the event log. This is a rudimentary device that supports 24-hour format and does not adjust for daylight saving. If installing during summer in a daylight saving region, following standard non-daylight time is recommended instead.

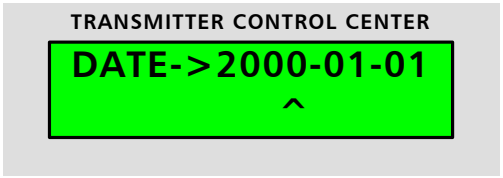
1. Use the transmitter control center on the front panel of the main assembly to navigate to the Date and Time menu.



2. Navigate to the time editing screen and set the local (24 hour non-daylight saving) time.

3. Navigate to the date editing screen and set the current date.





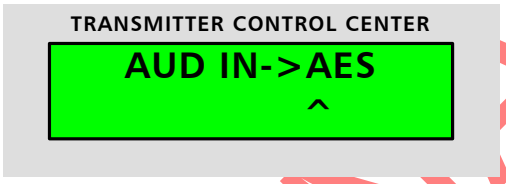
4.10 Primary Program Services

The STXe 60 provides built-in injection of one primary audio source – AES, Composite, or Analog L/R.

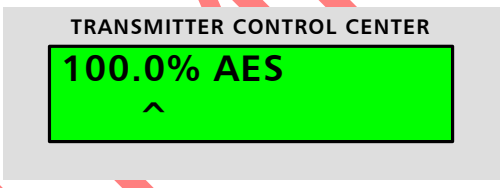
4.10.1 AES

1. Connect an XLR cable from the desired AES audio source.
2. Navigate to the audio input screen.

3. Select AES as the primary audio source and return.



4. Set the stereo injection reduction (to allocate injection budget for secondary services). Leave this at 100% if there are no secondary services. Return when finished adjusting.

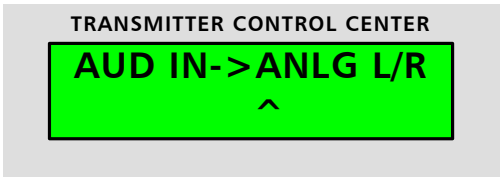


Note that -2 dBFS is the 100% peak modulation reference level for the AES stereo signal.

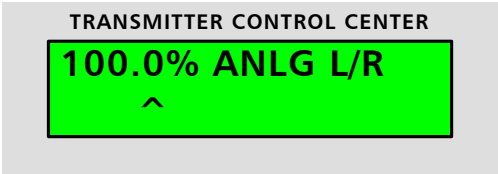
4.10.2 Analog L/R

1. Connect XLR cables from the desired Analog Left and Right audio source. Activate the source with reference tones for level calibration.
2. Navigate to the audio input menu.

3. Select analog L/R as the primary audio source.

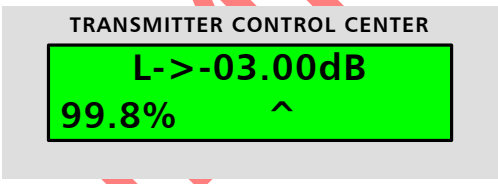


4. Set the stereo injection reduction (to allocate injection budget for secondary services). Leave this at 100% if there are no secondary services. Return when finished adjusting.

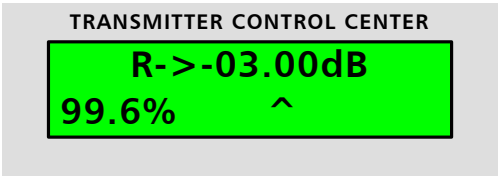


5. Enter the audio level menu.

6. Select L and adjust until the displayed left channel peak hold is 100% within a few percent.

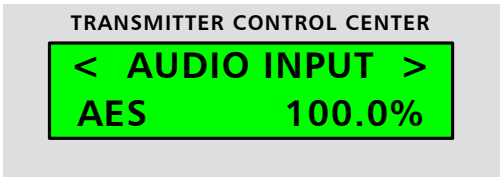


7. Repeat step 6 for R.

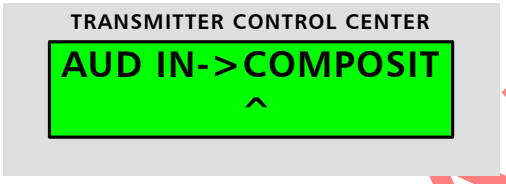


4.10.3 Composite

1. Connect a BNC cable from the desired unbalanced composite audio source. Activate the source with reference tones for level calibration.
2. Navigate to the audio input menu.

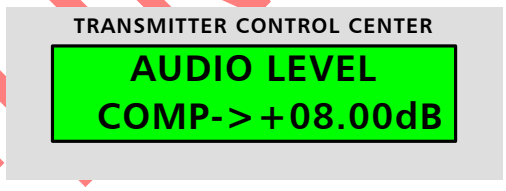


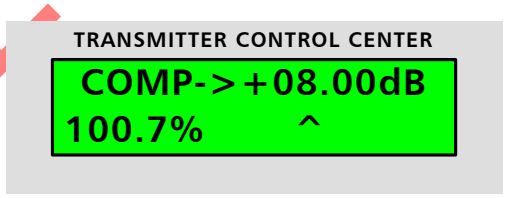
3. Select composite as the primary audio source.



4. Navigate to the audio level menu.

5. Select comp and adjust until the displayed composite peak hold is approximately 100%. Note that enabled SCA1, SCA2, and RDS input signals also contribute to this composite peak hold value. These sources should be turned off for this calibration.





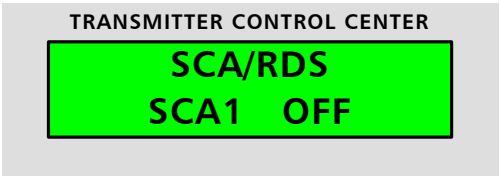
4.11 Additional Program Services

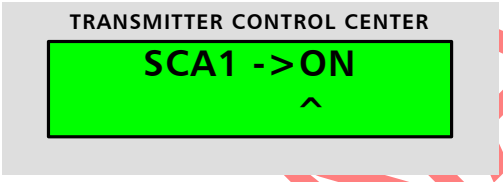
Extra externally generated audio input sources SCA1, SCA2, and RDS all follow the same pattern. Repeat these steps below to utilize any of these inputs.

1. Connect a BNC cable from the external signal generator source to the secondary program input. Activate the source with reference level for calibration.

2. Navigate to the SCA/RDS menu.

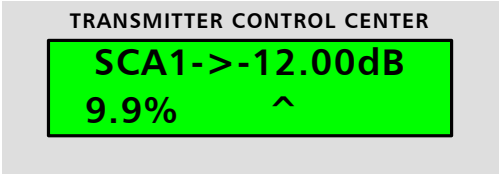
3. Select the desired SCA/RDS input and change the setting to ON.





4. Navigate to the audio level menu.

5. Select the desired input and adjust until the displayed composite peak hold is approximately 10%. Note that enabled SCA1, SCA2, RDS, and composite input signals all contribute to this peak hold value. Other sources should be turned off for calibration of each individual channel.



5 Maintenance

These sections detail steps to maintain or replace STXe60 system modules.

5.1 Clean the Air Filter

STXe60 systems come standard with snapped washable air filters. Air filter cleaning should be a part of regular system maintenance. To remove the filter from the front of the exciter, use the opening on the bottom to pry the snaps by hand.

Figure 15 – Air Filter Removal

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

Figure 16 – Separated Air Filter

Snap the air filter back on once clean. Carefully pinch to tighten the snaps if the case is loose enough to rattle.

Figure 17 – Re-insertion of Air Filter

5.2 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 the 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 18 – Top Cover Screws

5.3 Main Power Supply

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

Tools

☐ 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 unlatching and pulling three cable plugs. To unlatch the cables, pinch the top of the connector at the points indicated in Figure 19.

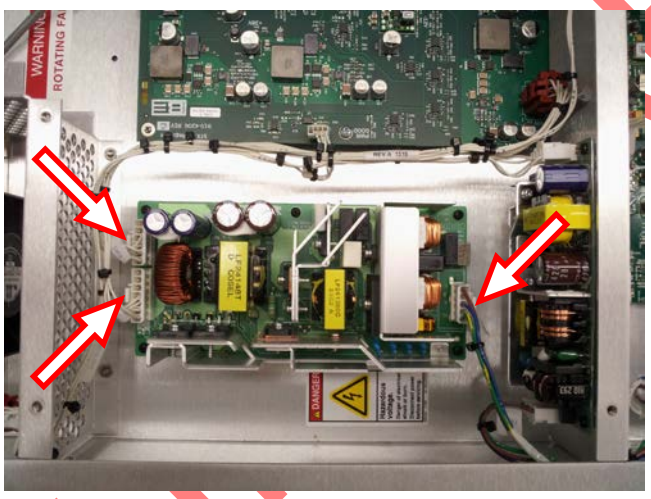


Figure 19 – Main Power Supply Cable Removal

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

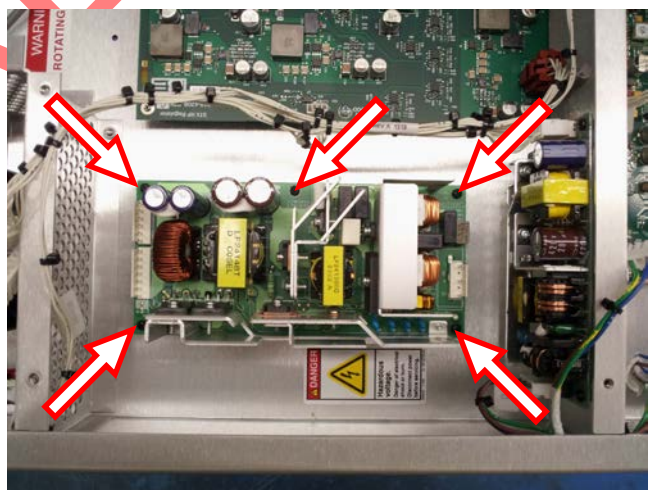


Figure 20 – Main Power Supply Screws

3. 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 21 – Safe Power Supply Removal

With the replacement 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.

5.4 Fan Power Supply

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

Tools

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

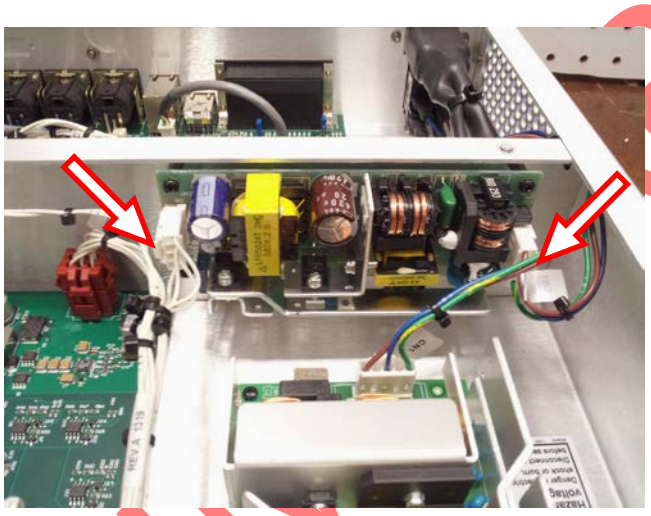


Figure 22 – Fan Power Supply Cable Removal

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

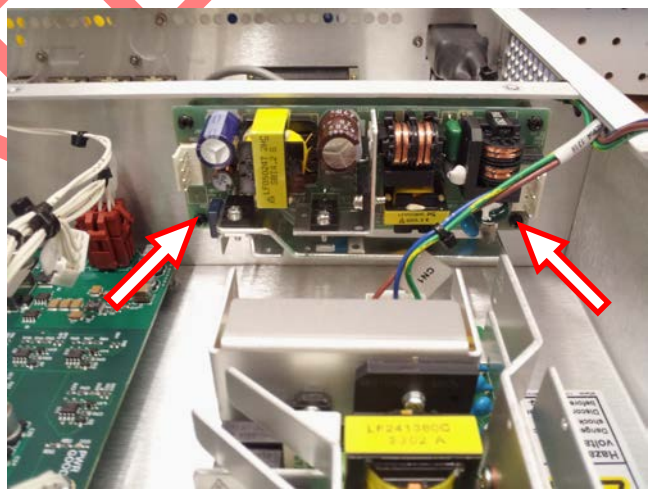


Figure 23 – Fan Power Supply Bottom Screws

3. 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.

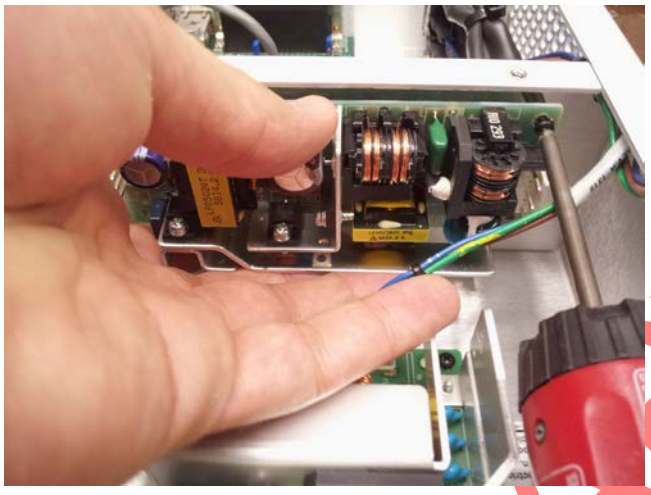


Figure 24 – Safe Fan Power Supply Removal

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.

5.5 Fan

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

Tools

☐ 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.

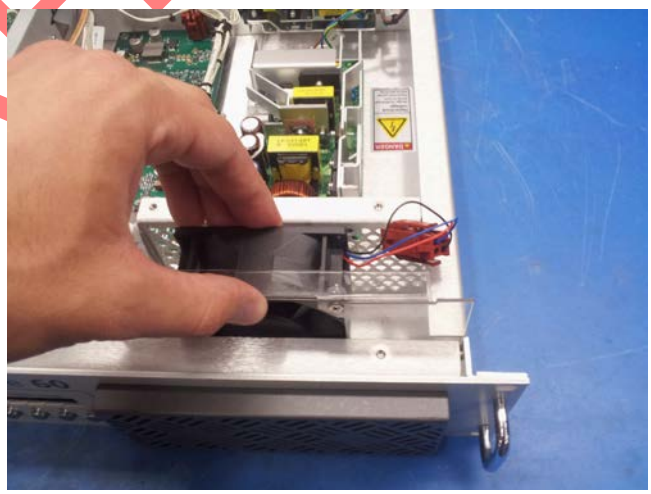


Figure 25 – Fan Assembly Removal

2. Note the front/back and wire orientations highlighted in Figure 26 relative to the case cutout. Use a Phillips screwdriver to remove the four screws and nuts securing the fan to the case.

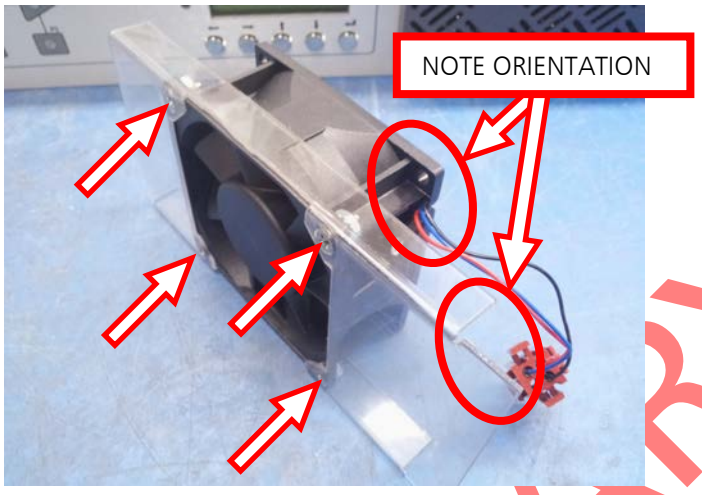


Figure 26 – Fan Assembly Detail

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.

5.6 Front Panel Display

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

Tools

☐ 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.

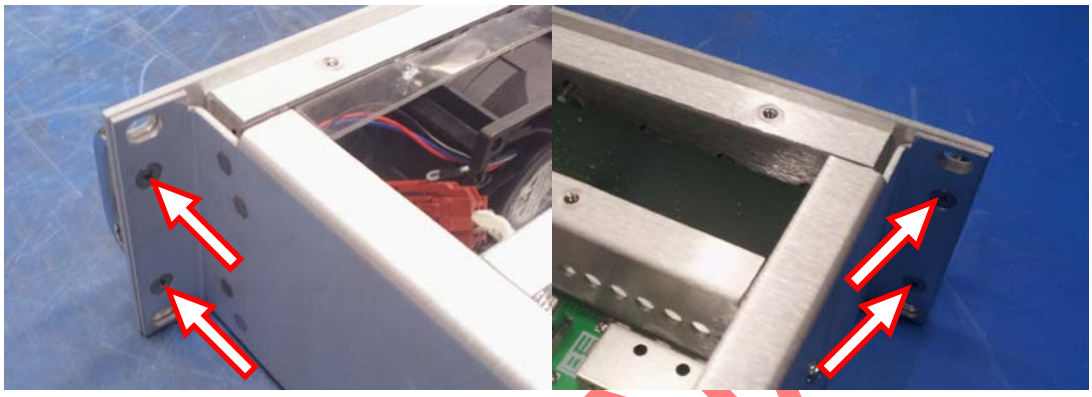


Figure 27 – Front Handle Screws

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

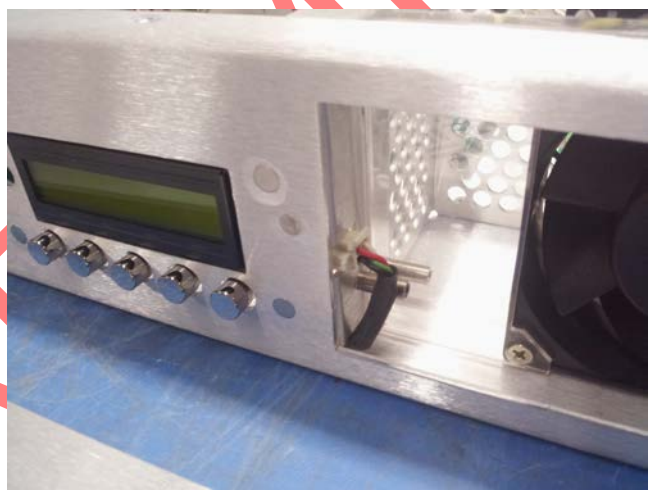


Figure 28 – Front Panel Display Cable

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

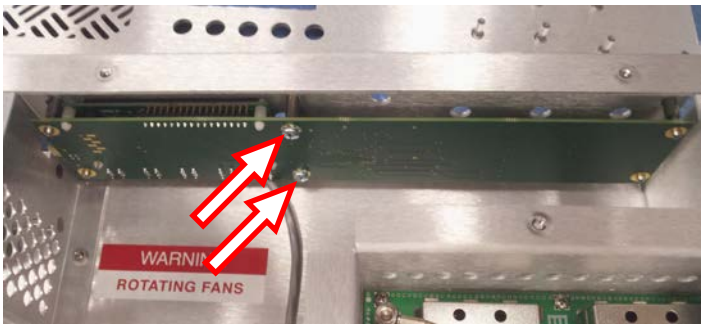


Figure 29 – Front Panel Display Screws

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

Figure 30 – Front Panel Display Snaps

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

Figure 31 – Front Panel Board Assembly

5.7 DC Regulator

☐ 919-4206 1 DC Regulator Board Assembly

Tools

☐ Phillips Screwdriver

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

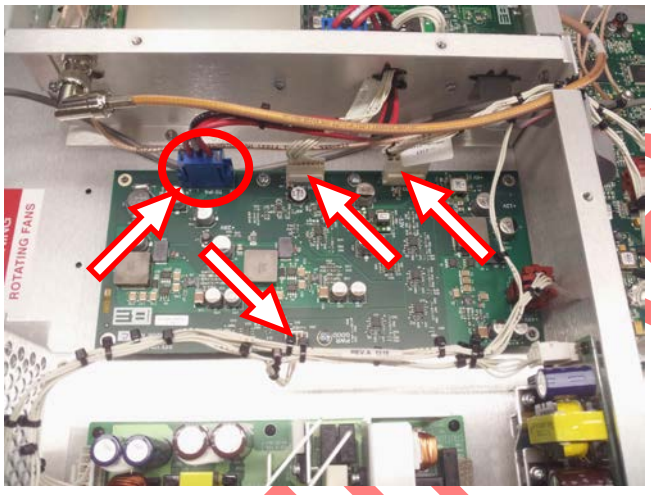


Figure 32 – DC Regulator Cables

2. Use a Phillips screwdriver to remove the three screws.

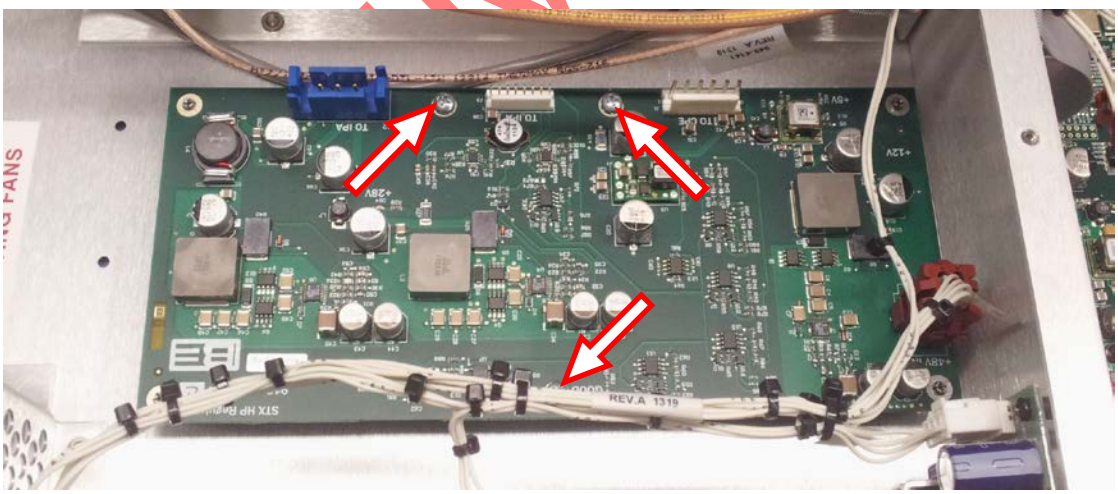


Figure 33 – DC Regulator Screws

3. Pop the board assembly off the four corner snaps. Set the board about an inch to the side to the position shown in Figure 35.

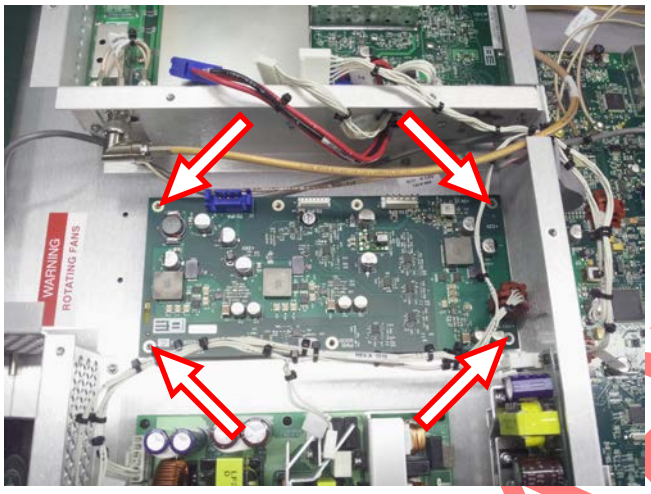


Figure 34 – DC Regulator Snaps

4. Pinch the latches on the now easily accessed red connector and pull the cable.

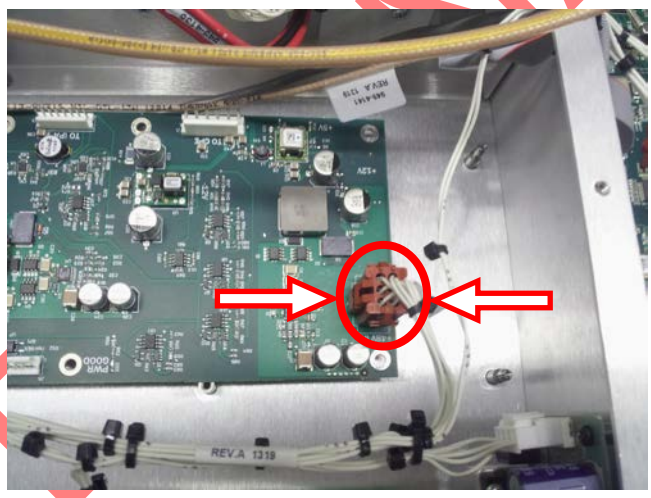


Figure 35 – DC Regulator Cable Latch

With the replacement DC regulator board assembly, repeat the previous steps in reverse. Note that step 4 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 in Figure 45 at the end of the next section.

5.8 Controller Exciter

☐ 919-4200-100 1 STX Controller Exciter Board Assembly

Tools

☐ Phillips Screwdriver

☐ 3/16" Nut Driver

☐ 9/16" Wrench (or machine-thinned 9/16" deep-well nut driver)

1. Use a 3/16" nut driver to unscrew the four total D-Subminiature jackscrews that secure the GPIO and BE INTERFACE jacks.

Figure 36 – CPE D-Subminiature Jackscrews

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

Figure 37 – CPE XLR Screws

3. Use a 9/16" wrench to loosen the six BNC nuts. Space is tightly constrained, and once the nuts are loose they can be removed by hand.

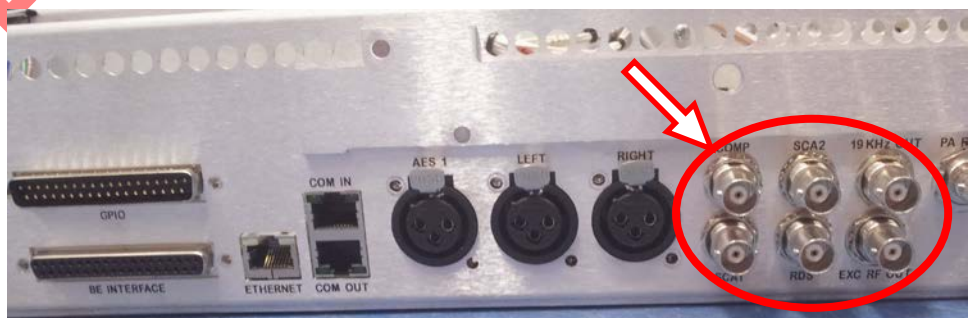


Figure 38 – CPE BNC Nuts

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

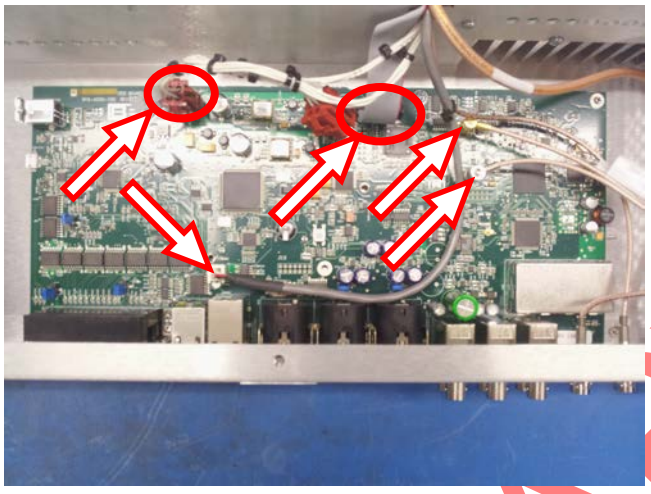


Figure 39 – CPE Cables

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

Figure 40 – CPE Screw

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

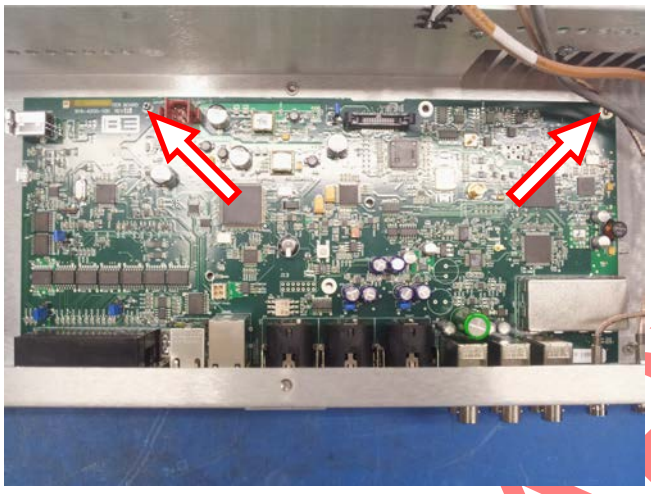


Figure 41 – CPE Snaps

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

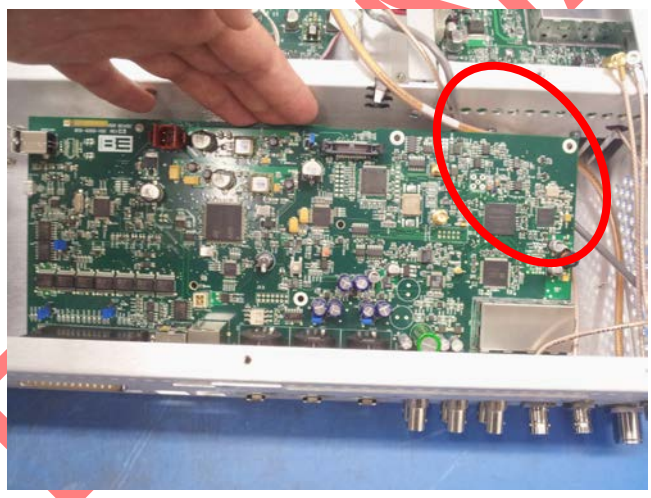


Figure 42 – Start of Board Extraction

8. 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 board assembly and

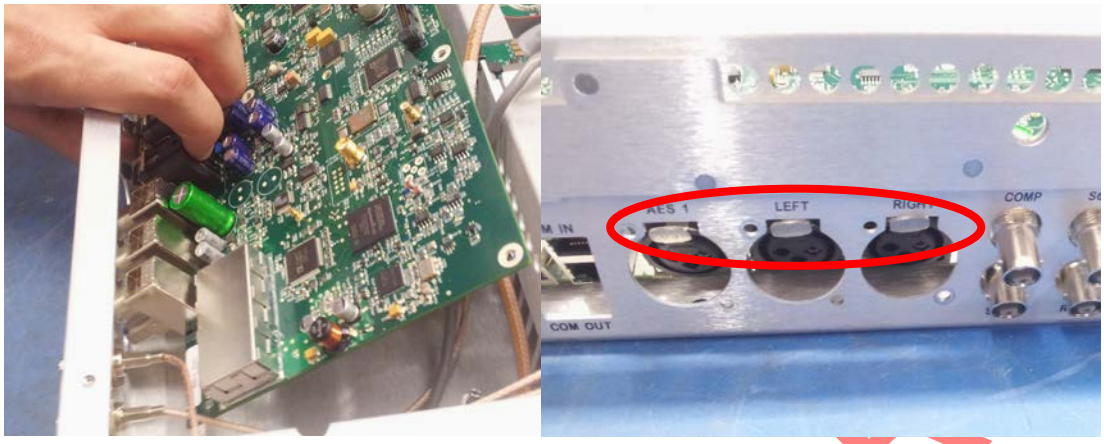


Figure 43 – XLR Jack Tabs

With the replacement controller exciter board assembly, repeat the previous steps in reverse.

Figure 44 – Controller Exciter Outside Chassis

Cable harnesses should be neatly arranged in the notch in the chassis as shown.

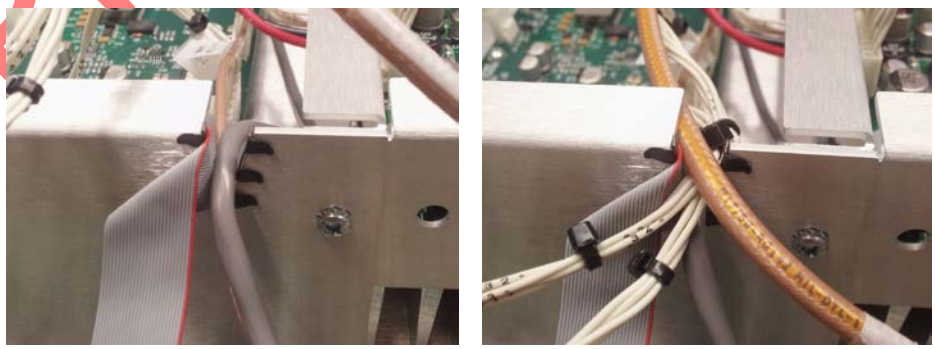


Figure 45 – Middle Cable Positioning

5.9 Power Amplifier

☐ 959-4210 1 60W PA Board Assembly

Tools

☐ Phillips Screwdriver

☐ Extra-Long/Short Phillips Screwdriver

1. Set the STXe60 unit on its side and use a Phillips screwdriver to remove the two screws shown.

Figure 46 – Bottom PA Screws

2. Set the STXe60 unit back down. Use a Phillips screwdriver to remove the five screws on the side.

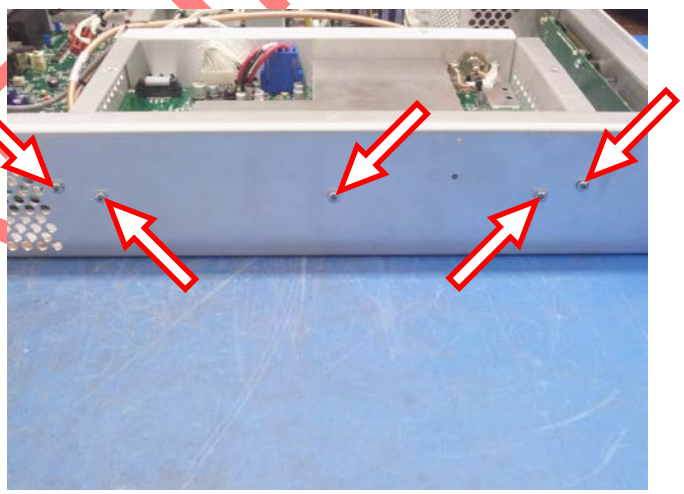


Figure 47 – Side PA Screws

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 is also valid.

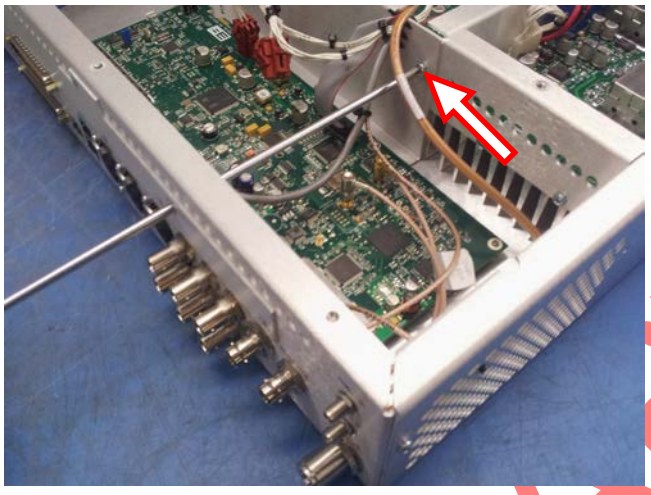


Figure 48 – Front PA Screw

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

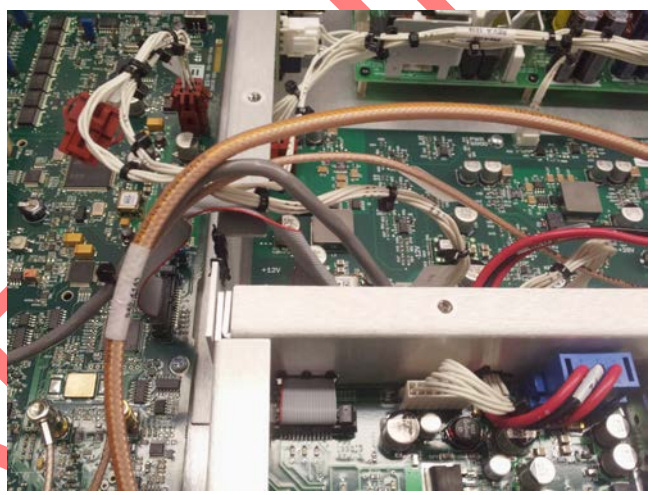


Figure 49 – Unseated Cables

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

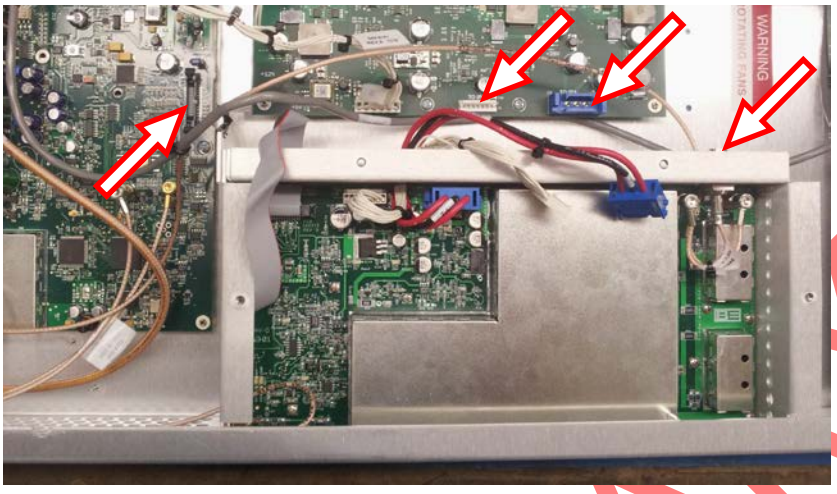


Figure 50 – Disconnected Cables

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

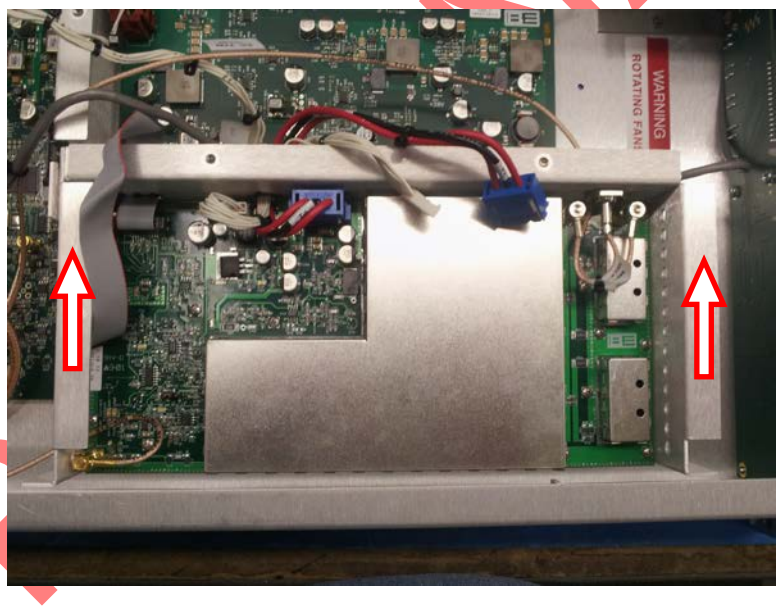


Figure 51 – Displaced PA Assembly

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

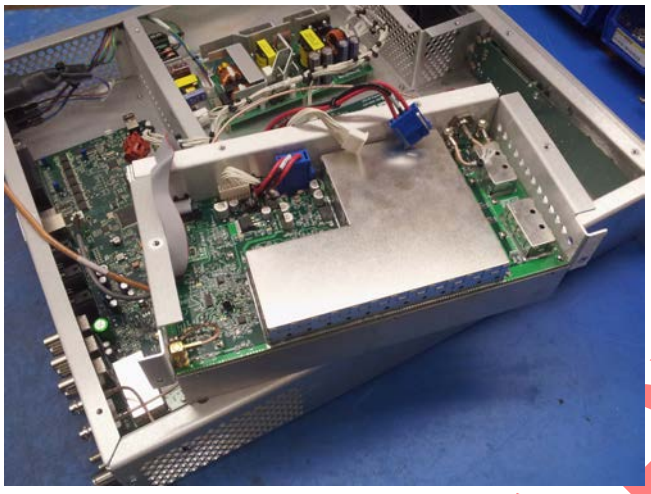


Figure 52 – PA Assembly on Chassis

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

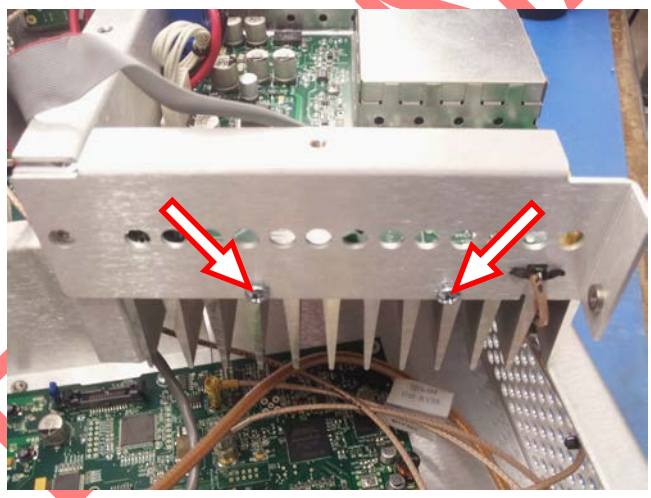


Figure 53 – PA Chassis 1

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

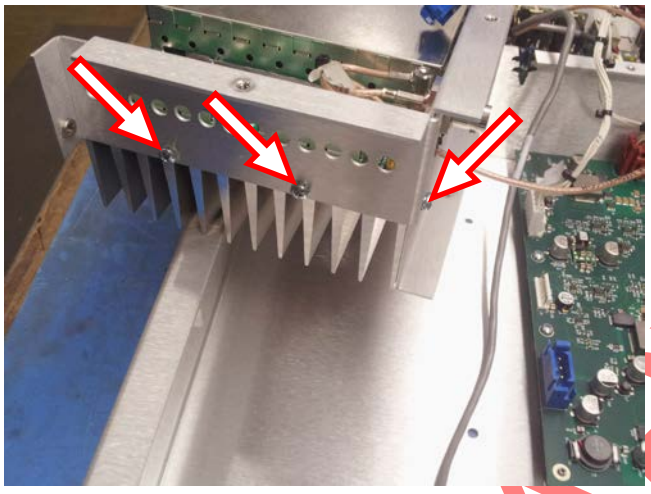


Figure 54 – PA Chassis 2

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

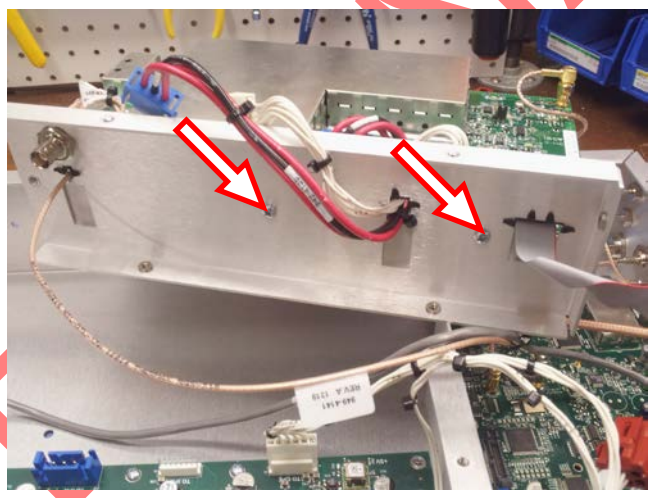


Figure 55 – PA Chassis 3

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.

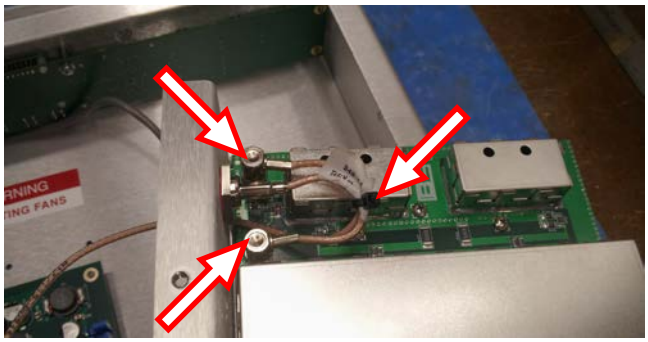


Figure 56 – SMA Connections

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

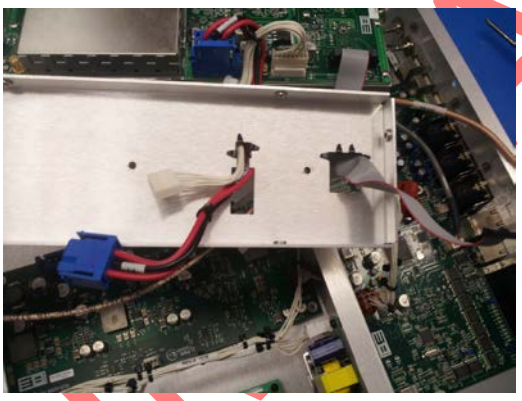


Figure 57 – Cable Extraction 1

13. Disconnect the cables from the PA board.

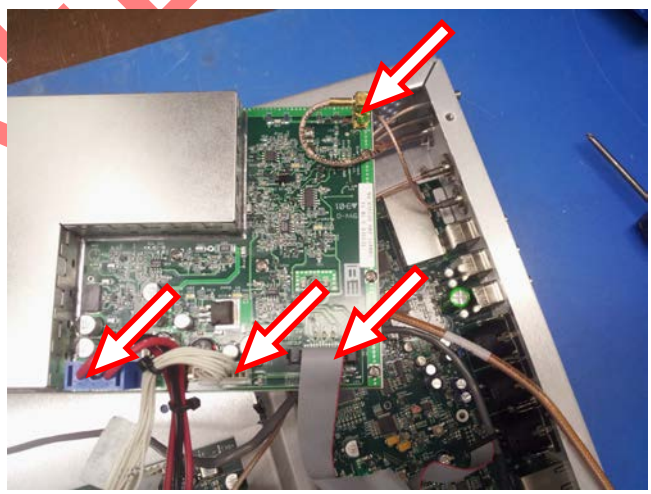


Figure 58 – Cable Extraction 2

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

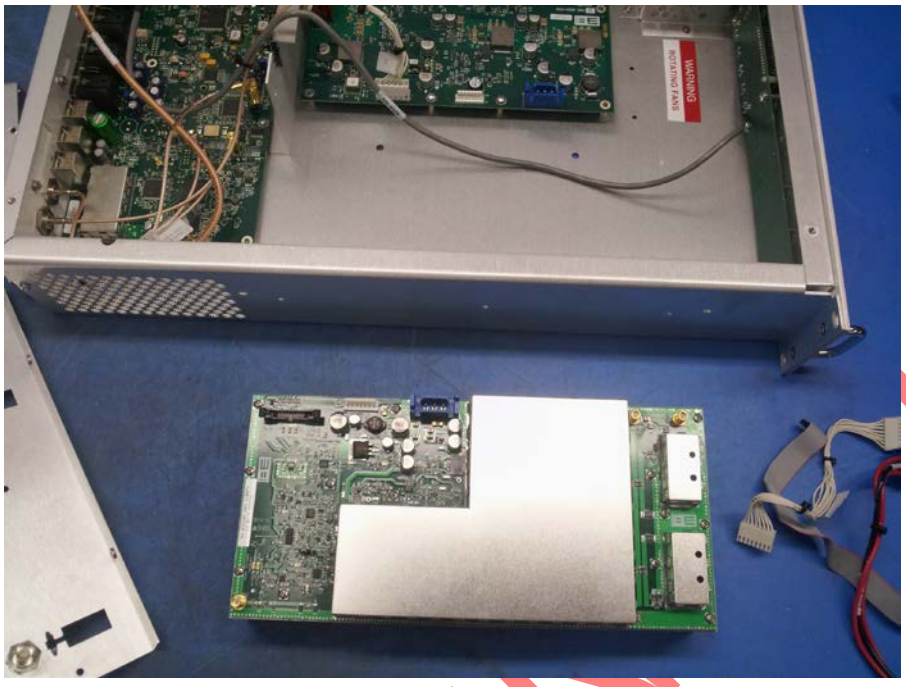


Figure 59 – PA Module