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

STX LP Generation II
1 kW, 2 kW, 3 kW, 5 kW
FM Transmitters
Technical Manual

597-4101-200
Revision J
Oct 6, 2017

STX LP Generation II - 1 kW, 2 kW, 3 kW, 5 kW FM Transmitters
Technical Manual

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
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 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 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 STX LP FM transmitter series is designed to provide a low power cost effective solution for the FM broadcast market. The STX LP is available in 4 models providing power levels from 250 W to 5 kW.

1.1 Instructions

Use this document as an all-inclusive technical resource for STX LP Generation II transmitter systems. Determine broadcast system scope and design. Follow the detailed installation instructions and interfacing descriptions to integrate the STX in 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.

Photographs in this document typically show the STX LP Generation II combined systems in an optional 19" EIA 21RU sold-separately rack. Racks sized at 21, 35, or 42 RU are available for purchase and installation through Broadcast Electronics. It is highly recommended that customers specify and purchase one of these sold-separately racks for factory setup of new transmitters.

Selected transmitter 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 are only included to the extent of the ETHERNET port interface and setup. Network cables and hardware depend on the desired networking setup and are relatively common. Please consult a local IT professional if more is needed.

1.2 Other Documents

See the STX CPE Software Update Application Guide 597-4200 for software and firmware update details.

For electronic copies of these 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 STX LP system running. This list reflects the headings under the installation and initial setup section:

1. Rack Mount
2. Control Communications
3. Exciter PA RF Drive
4. PA Combiner RF
5. Transmitter Antenna RF
6. BE-Interface active stub
7. GPIO Remote Station Interface
8. AC Distribution
9. AC Power Service
10. Turn on AC
11. Time and date
12. Frequency
13. 100% peak modulation
14. Power set point
15. Primary program services
16. Turn RF transmission on

1.4 Product Specifications

Figure 1 – STX LP Generation II – 1kW

Figure 2 – STX LP Generation II – 2kW

Figure 3 – STX LP Generation II – 3kW

Figure 4 – STX LP Generation II – 5kW

Table 1 – Specifications

Parameter	Specification
Physical	
1 kW Model -	
Height	3 RU 5.25" (13.4 cm)
Width	19" (48.3 cm) EIA Rack Mount
Depth	26" (66.1 cm) including connectors
Weight	44lbs (20 kg) unpacked
Outlet Size	50 in^2 (323 cm^2), rear of unit
2 kW Model -	
Height	12 RU 21" (44.5 cm)
Width	19" (48.3 cm) EIA Rack Mount
Depth	26" (66.1 cm) including connectors
Weight	130lbs (59.0 kg) unpacked
Total Outlet Size	125 in2 (806 cm2), rear of unit
3 kW Model -	
Height	15 RU 26.25" (66.7 cm)
Width	19" (48.3 cm) EIA Rack Mount
Depth	26" (66.1 cm) including connectors
Weight	170lbs (77.1kg) unpacked
Total Outlet Size	175 in^2 (1129 cm^2), rear of unit
5 kW Model -	
Height	21 RU 36.75" (93.4 cm)
Width	19" (48.3 cm) EIA Rack Mount
Depth	26" (66.1 cm) including connectors
Weight	250lbs (113.4 kg) unpacked
Total Outlet Size	275 in^2 (1774 cm^2), rear of unit
Environmental	
Temperature	-10°C to +50°C
Altitude	10,000ft (3048M) maximum
Humidity	95% maximum, non-condensing
1 kW Model	
Air Capacity	200 CFM (5.7 m^3/Min)
Heat Dissipation	587 W at 1kW into 50 Ohm load
BTU	2003 BTU/H into 50 Ohm load
2 kW Model	
Air Capacity	600 CFM (17.0 m^3/Min)
Heat Dissipation	1175 W at 2kW into 50 Ohm load
BTU	4009 BTU/H into 50 Ohm load
3 kW Model	
Air Capacity	800 CFM (22.7 m^3/Min)
Heat Dissipation	1762 W at 3kW into 50 Ohm load
BTU	6012 BTU/H at 3kW into 50 Ohm load

Parameter	Specification
5 kW Model	
Air Capacity	1200 CFM (34.0 m^3/Min)
Heat Dissipation	2937 W at 5kW into 50 Ohm load
BTU	10,021 BTU/H at 5kW into 50 Ohm load
AC Input	
Frequency	47-63 Hz
Power Factor	≥0.98
Surge Protection	Not included – External surge protection recommended
1 kW Model	
Power Consumption	1.58 kW (calculated)
Voltage	180 to 260 V AC Split Phase
Power	Disconnect Size 20 Amps
Current Draw	7.6 Amps Typical @ 208V,1kW FM. 16 Amps Max
2 kW Model	
Power Consumption	3.15 kW (calculated)
Single Phase -	
Voltage	180 to 260 VAC Split Phase
Power	Disconnect Size 40 Amps
Current Draw	15.3 Amps Typical. 32 Amps Max
3 kW Model	
Power Consumption	4.75kW (calculated)
Single Phase	
Voltage	180 to 260 VAC Split Phase
Power	Disconnect Size 60 Amps
Current Draw	22.9 Amps Typical. 48 Amps Max
Three Phase	
Voltage	180 to 260VAC Delta or 311 to 449VAC 4 Wire Wye
Power	Disconnect Size 30 Amps
Current Draw	13.2 Amps Typical. 28 Amps Max
5 kW Model	
Power Consumption	7.9 kW (calculated)
Single Phase -	
Voltage	180 to 260 VAC Split Phase
Power	Disconnect Size 100 Amps
Current Draw	38.2 Amps Typical. 80 Amps Max
Three Phase -	
Voltage	180 to 260VAC Delta or 311 to 449VAC 4 Wire Wye
Power	Disconnect Size 60 Amps
Current Draw	22 Amps Typical. 47 Amps Max
RF Specifications	
Output Power Accuracy	+/-5% of Total Output Power Setting
Resolution	1W FM-only, 1% of set point FM+Dig and Dig-only
Impedance	50 Ohms nominal
VSWR	Rated Power into 1.5:1 @ FM Only TPO

Parameter	Specification
Asynchronous AM SNR	Better than -65 dB (typical -70dB) referenced to average peak-to-peak carrier amplitude. 75 uSec de-emphasis
Synchronous AM SNR	Better than -60dB
1kW, 2kW & 3kW	Better than -56dB referenced to average peak-to-peak carrier
5kW	amplitude. 75 kHz deviation @ 400 Hz
1 kW Model	
FM Only Power	250-1100W
FM+HD (with VPe XG)	780W @ -20dB; 555W @ -14dB; 445W @ -10dB (All powers approximate. Actual power levels dependent upon installation and frequency.)
HD Only (with VPe XG)	335W (Typical. Actual output power dependent upon installation and frequency.)
Efficiency	63% typical AC to RF (FM Only)
RF Output Connector	Type N, Female. (7/16" DIN Optional)
2 kW Model	
FM Only Power	500-2200W
FM+HD (with VPe XG)	1,555W @ -20 dB;1,110W @ -14dB; 890W @ -10dB (All powers approximate. Actual power levels dependent upon installation and frequency.)
HD Only (with VPe XG)	670W (Typical. Actual output power dependent upon installation and frequency.
Efficiency	63% typical AC to RF (FM Only)
RF Output Connector	1 5/8" EIA Flange and 1-5/8" 90 degree Elbow provided.
3 kW Model	
FM Only Power	750-3300W
FM+HD (with VPe XG)	2,335W @ -20 dB;1,670W @ -14dB; 1,335W @ -10dB (All powers approximate. Actual power levels dependent upon installation and frequency.)
HD Only (with VPe XG	1000W (Typical. Actual output power dependent upon installation and frequency.
Efficiency	63% typical AC to RF (FM Only)
RF Output Connector	1 5/8" EIA Flange and 1-5/8" 90 degree Elbow provided.

Parameter	Specification
5 kW Model	
FM Only Power	1250-5500W
FM+HD (with VPe XG)	3,890W @ -20 dB; 2780W @ -14dB; 2225W @ -10dB (All powers approximate. Actual power levels dependent upon installation and frequency.)
HD Only (with VPe XG	1670W (Typical. Actual output power dependent upon installation and frequency
Efficiency	63% typical AC to RF (FM Only)
RF Output Connector	1 5/8" EIA Flange and 1-5/8" 90 degree Elbow provided.
Frequency	
Range	87.5MHz to 108MHz; 10kHz increments
Stability	Internal TCXO +/-100 Hz, factory calibration, +/-4ppm aging/temp, -10°C to +50°C External Input: +/- accuracy of reference source
Modulation	
Type	300KF8E Direct-to-Channel, digitally generated FM (no analog up conversion), FM Only, HD Radio Only, HD Radio + FM, DRM+
Capability	Up to 300 kHz
Maximum Over	150%
RF Harmonics Suppression	
FCC, IC, ETSI	Meets all requirements/recommendations 85dB or better typical, low pass filter standard.
Composite Input	(With Internal Exciter)
Connector	BNC
Impedance	10k ohms, un-balanced
Level	3.5V p-p for 75kHz deviation
Amplitude Response	+/-0.03 dB 30 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 @ 400Hz, 10-22kHz bandwidth, 75uS deemphasis
IMD	0.13% or less SMPTE 60/7000 Hz; 1:1 RATIO 0.008% typical DIM-B (14 kHz)
SNR	85dB or better below 100% modulation @ 400Hz, 10Hz-22Khz bandwidth, unweighted

Parameter	Specification
AES Input	(With Internal Exciter)
Connector	XLR Female
Impedance	110 Ohms, balanced
Level	-2 dBFS for 100% modulation
	Adjustable in 0.1-dBFS steps, 15 dBFS to 0 dBFS
Amplitude Response	+/-0.03 dB 30 Hz to 53 kHz; +/-0.1 dB 53 kHz to 100 kHz
THD + Noise	
Stereo	0.01% typical @ 400 Hz, 10-22kHz, 75uS deemphasis
Mono	0.005% typical @ 400Hz, 10-22kHz, 75uS deemphasis
SNR	
Stereo	80dB below 100% modulation @ 400 Hz
Mono	85dB below 100% modulation @ 400 Hz
Stereo Separation	-74dB below 100% modulation @ 400 Hz
Preemphasis	Selectable; 50us, 75us,or none
Modes	Mono L, Mono R, L+R, Stereo
Analog L/R	(With Internal Exciter)
Connectors	XLR Female
Impedance	600 Ohms or 10kOhms, selectable, balanced
Level	3.5V p-p for 100% modulation into 10kOhms.
	Adjustable in 0.25 dB steps, -10dBM to +10dBm
Amplitude Response	+/-0.25dB; 30 Hz to 53 kHz
Stereo Separation	-70dB or better, 30Hz to 15kHz
SNR	
Stereo	80dB below 100% modulation @ 400Hz,
Mono:	83dB below 100% modulation @ 400Hz
IMD	0.01% or less SMPTE 60/7000Hz; 1:1 RATIO
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
THD + Noise	
Stereo	0.01% typical @ 400 Hz, 10-22kHz, 75uS deemphasis
Mono	0.008% typical @ 400Hz, 10-22kHz, 75uS deemphasis
SCA & RDS Inputs	
Connectors(2)	BNC
Impedance	10k ohms un-balanced
Level	3.5V p-p for 10% injection level
Response	+/-0.1dB; 53 kHz to 100 kHz
THD + Noise	0.15% 53kHz to100kHz
10 MHz Input	
Connector	SMA, un-balanced
Level	1 to 3 V p-p, nominal 2.8 V p- p (13 dBm)

Parameter	Specification
Pilot Output (19kHz)	
Connector	BNC un-balanced
Level	1V p-p +/- 5% into high impedance
Stability	
Internal Reference	TXCO +/- 0.18Hz Factory Calibration, +/- 4ppm aging/temp, -10 to +50 degrees C. +/- 3.0° or better per ITU-R on internal reference.
External Reference	External reference dependent on accuracy of reference source
1 Pulse Per Second Input	
Connector	SMA un-balanced
Level	5V TTL Rising Edge
Regulatory	
FCC; IC; CE; IEC215	Meets or exceeds requirements

1.5 Default Operation

Every STX LP Generation II transmitter is tested at the factory for quality and reliability. Technicians use settings given to sales representatives at the time of purchase. Unspecified levels are set to nominal levels for testing. Systems are shipped with specified and default settings intact. In the absence of user settings and when a reset to factory defaults command is issued on the front panel user interface, the following default settings are used:

1. Transmitter RF On/Off – Off
2. Frequency – 98.1 MHz
3. Operating Mode – FM Only
4. FM-only Power Set point – 250W
5. Digital-only Power Set point – 75W
6. FM+Digital Power Set point – 175W
7. Sideband power level – -20 dBc
8. Digital PAV – 44.0V
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
    - Off
    - -12.0 dB input gain
24. Real Time Clock – shipped with Quincy, IL time, factory reset does not affect this
    Note: The internal real time clock is likely to have stopped keeping time and reset to 2000-01-01 00:00:00 during shipping or any other time when the system is unpowered for days.

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
31. Forward Power Output Power Voltage – Linear Scale
32. VPe Calibration – 40.00dB (RF attenuation level)

2 Preparing to Install

2.1 Verify Contents of Shipment

Use the checklist for the appropriate STX LP Generation II system type.

Note for 2, 3, and 5kW systems with the backup system controller and exciter option: substitute one main assembly for one add-on assembly.

2.1.1 1kW Systems

BEI Part #	Qty.	Description
☐ 909-4104-041		STX LP Generation II 1kW Transmitter
☐ 909-4104	1	1kW System
☐ 909-4104-001	1	Main Unit
☐ 979-4118	1	Manual Binder
☐ 597-4102-200	1	Technical Manual
☐ 598-0010-001	1	1” BLUE BINDER
☐ 979-4120	1	1kW Installation Kit
☐ 417-0284	1	37PIN D-SUB SHELL
☐ 418-0283	1	37PIN D-SUB FEMALE SOLDERPOT
☐ 420-0007	8	PHILLIPS SCREW 12-24X3/4"
☐ 420-0710	4	PHILLIPS SCREW 10-32X5/8"
☐ 421-0002	8	EIA RACK SCREW CLIPS 12-24
☐ 422-0110	2	PHILLIPS SEMS SCREW 10-32X5/8"
☐ 423-1018	4	FIBER WASHER .500X.218X.030
☐ 471-4219	2	STX PA REAR RACK SUPPORT
☐ 949-0543	1	BNC CABLE JUMPER
☐ 949-4130	1	EXCITER ACTIVATION STUB
☐ 979-4100	1	Air Filter for 1kW STX Systems
☐ 407-0178	1	STX LP Air Filter
☐ 471-4263	1	STX LP Air Filter Housing

2.1.2 1kW Systems 7/16 DIN Variant Systems

☐ 909-4104-741		STX LP Generation II 1kW 7/16 DIN Transmitter
☐ 909-4104-716	1	1kW 7/16 DIN System
☐ 909-4104-016	1	7/16 DIN Main Unit

All other part numbers are identical to 909-4104-041 package, please see above list.

2.1.3 2 kW Systems

☐ 909-4204-041		STX LP Generation II 2kW Transmitter
☐ 427-0006	1	1 5/8" 90 DEGREE ELBOW
☐ 427-0010	1	1 5/8" FLANGED ADAPTOR
☐ 909-4201-100	1	2kW One-Phase AC Distribution
☐ 909-4204	1	2kW FM TRANSMITTER
☐ 909-4104-001	1	Main Unit
☐ 959-4114	1	Add-on PA
☐ 959-4201-200	1	2kW Splitter/Combiner
☐ 979-4118	1	STX LP Generation II Manual Binder
☐ 597-4102-200	1	STX LP Generation II Technical Manual
☐ 598-0010-001	1	1" BLUE BINDER
☐ 979-4220	1	2kW Installation Kit
☐ 417-0105	2	RIGHT ANGLE N-TYPE ADAPTER
☐ 417-0284	1	37PIN D-SUB SHELL
☐ 418-0283	1	37PIN D-SUB FEMALE SOLDERPOT
☐ 420-0000	4	PHILLIPS SCREW BLK 10-32X1/2"
☐ 420-0007	24	PHILLIPS SCREW 12-24X3/4"
☐ 420-0031	4	PHILLIPS SCREW BLK 12-24x3/4"
☐ 420-0710	12	PHILLIPS SCREW 10-32X5/8"
☐ 421-0002	28	EIA RACK SCREW CLIPS 12-24
☐ 422-0110	6	PHILLIPS SEMS SCREW 10-32X5/8"
☐ 423-1018	12	FIBER WASHER .500X.218X.030
☐ 471-4219	4	STX PA REAR RACK SUPPORT
☐ 471-4258	2	STX COMBINER REAR RACK SUPPORT
☐ 846-4005	1	1/2m BLUE CAT5E COMMUNICATIONS CABLE
☐ 846-4010	1	1m BLUE CAT5E COMMUNICATIONS CABLE
☐ 949-4105	3	BNC CABLE
☐ 949-4106	2	N-Type CABLE
☐ 949-4130	1	EXCITER ACTIVATION STUB
☐ 979-4200	1	Air Filters for 2kW STX Systems
☐ 407-0178	3	STX LP Air Filter
☐ 471-4263	3	STX LP Air Filter Housing

2.1.4 3 kW Systems

☐ 909-4304-041		STX LP Generation II 3kW Transmitter One-Phase
☐ 427-0006	1	1 5/8" 90 DEGREE ELBOW
☐ 427-0010	1	1 5/8" FLANGED ADAPTOR
☐ 909-4301-100	1	3kW One-Phase AC Distribution
☐ 909-4304	1	3kW FM TRANSMITTER
☐ 909-4104-001	1	Main Unit
☐ 959-4114	2	Add-on PA
☐ 959-4301-200	1	3kW Splitter/Combiner
☐ 979-4118	1	STX LP Generation II Manual Binder
☐ 597-4102-200	1	STX LP Generation II Technical Manual
☐ 598-0010-001	1	1" BLUE BINDER
☐ 979-4320	1	3kW Installation Kit
☐ 417-0105	3	RIGHT ANGLE N-TYPE ADAPTER
☐ 417-0284	1	37PIN D-SUB SHELL
☐ 418-0283	1	37PIN D-SUB FEMALE SOLDERPOT
☐ 420-0000	4	PHILLIPS SCREW BLK 10-32X1/2"
☐ 420-0007	32	PHILLIPS SCREW 12-24X3/4"
☐ 420-0031	4	PHILLIPS SCREW BLK 12-24x3/4"
☐ 420-0710	16	PHILLIPS SCREW 10-32X5/8"
☐ 421-0002	36	EIA RACK SCREW CLIPS 12-24
☐ 422-0110	8	PHILLIPS SEMS SCREW 10-32X5/8"
☐ 423-1018	16	FIBER WASHER .500X.218X.030
☐ 471-4219	6	STX PA REAR RACK SUPPORT
☐ 471-4258	2	STX COMBINER REAR RACK SUPPORT
☐ 846-4005	2	1/2m BLUE CAT5E COMMUNICATIONS CABLE
☐ 846-4010	1	1m BLUE CAT5E COMMUNICATIONS CABLE
☐ 949-4105	4	BNC CABLE
☐ 949-4106	3	N-Type CABLE
☐ 949-4130	1	EXCITER ACTIVATION STUB
☐ 979-4300	1	Air Filters for 3kW STX Systems
☐ 407-0178	4	STX LP Air Filter
☐ 471-4263	4	STX LP Air Filter Housing

2.1.5 3kW Three-Phase Delta Variant Systems

☐ 909-4304-042		STX LP Generation II 3kW Transmitter Three-Phase Delta
☐ 909-4301-200	1	3kW Three-Phase Delta AC Distribution

Replaces 909-4301-100 One-Phase Panel in 909-4304-041 packages, please see above list. All other part numbers are identical.

2.1.6 3kW Three-Phase Wye Variant Systems

☐ 909-4304-043		STX LP Generation II 3kW Transmitter Three-Phase Wye
☐ 909-4301-300	1	3kW Three-Phase Wye AC Distribution

Replaces 909-4301-100 One-Phase Panel in 909-4304-041 packages, please see above list. All other part numbers are identical.

2.1.7 5 kW Systems

☐ 909-4504-041		STX LP Generation II 5kW Transmitter One-Phase
☐ 427-0006	1	1 5/8" 90 DEGREE ELBOW
☐ 427-0010	1	1 5/8" FLANGED ADAPTOR
☐ 909-4501-100	1	5kW One-Phase AC Distribution
☐ 909-4504	1	5kW FM TRANSMITTER
☐ 909-4104-001	1	Main Unit
☐ 959-4114	4	Add-on PA
☐ 959-4501-200	1	5kW Splitter/Combiner
☐ 979-4118	1	STX LP Generation II Manual Binder
☐ 597-4102-200	1	STX LP Generation II Technical Manual
☐ 598-0010-001	1	1" BLUE BINDER
☐ 979-4520	1	5kW Installation Kit
☐ 417-0105	5	RIGHT ANGLE N-TYPE ADAPTER
☐ 417-0284	1	37PIN D-SUB SHELL
☐ 418-0283	1	37PIN D-SUB FEMALE SOLDERPOT
☐ 420-0000	4	PHILLIPS SCREW BLK 10-32X1/2"
☐ 420-0007	48	PHILLIPS SCREW 12-24X3/4"
☐ 420-0031	4	PHILLIPS SCREW BLK 12-24x3/4"
☐ 420-0710	24	PHILLIPS SCREW 10-32X5/8"
☐ 421-0002	52	EIA RACK SCREW CLIPS 12-24
☐ 422-0110	12	PHILLIPS SEMS SCREW 10-32X5/8"
☐ 423-1018	24	FIBER WASHER .500X.218X.030
☐ 471-4219	10	STX PA REAR RACK SUPPORT
☐ 471-4258	2	STX COMBINER REAR RACK SUPPORT
☐ 846-4005	4	1/2m BLUE CAT5E COMMUNICATIONS CABLE
☐ 846-4010	1	1m BLUE CAT5E COMMUNICATIONS CABLE
☐ 949-4105	6	BNC CABLE
☐ 949-4106	5	N-Type CABLE
☐ 949-4130	1	EXCITER ACTIVATION STUB
☐ 979-4500	1	Air Filters for 3kW STX Systems
☐ 407-0178	6	STX LP Air Filter
☐ 471-4263	6	STX LP Air Filter Housing

2.1.8 5kW Three-Phase Delta Variant Systems

☐ 909-4504-042		STX LP Generation II 5kW Transmitter Three-Phase Delta
☐ 909-4501-200	1	5kW Three-Phase Delta AC Distribution

Replaces 909-4501-100 One-Phase Panel in 909-4504-041 packages, please see above list. All other part numbers are identical.

2.1.9 5kW Three-Phase Wye Variant Systems

☐ 909-4504-043		STX LP Generation II 5kW Transmitter Three-Phase Wye
☐ 909-4501-300	1	5kW Three-Phase Wye AC Distribution

Replaces 909-4501-100 One-Phase Panel in 909-4504-041 packages, please see above list. All other part numbers are identical.

2.2 Items Sold Separately or Not Supplied

- ☐ 19" EIA rack at appropriate height and depth for system type, includes rear support rails
- ☐ AC power main service connection with main breaker
- ☐ 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 flat blade screwdriver (or 5/16" nut driver)
- ☐ Large Phillips screwdriver
- ☐ Tie-wraps

2kW, 3kW, 5kW AC Power Distribution

- ☐ 3/16" Allen Wrench

Remote Station Interface Connections

- ☐ Wire - at minimum 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 between 30 minutes and 1 hour. Larger system types generally take longer to install than smaller types.

3 Installation and Initial Setup

This section covers installation requirements for a full-featured STX Generation II transmitter package in any system size – 1kW, 2kW, 3kW, and 5kW. Non-standard installations or optional equipment may be covered in other documents.

3.1 Rack Mount

Rack mounting is highly recommended for safe and stable operation. Racks can be purchased through Broadcast Electronics to allow quick and easy final installation at the transmission site. If your transmitter has already been assembled in a rack, please skip this section.

Many different 19" EIA rack product variants exist; however the STX LP Generation II requires a four-post rack and a path for exhaust air to exit the back of the transmitter. Other considerations should include paths for transmission line out to the antenna or load, AC power into the unit, and any external control and communications cabling for remote station control or Ethernet. The installation kit includes screws and clips for non-threaded rails, and a separate set of screws for installing in racks with threaded front rails. Unused screw sets can be discarded.

The vertical location of the transmitter is recommended, as typically pictured, towards the bottom of the rack. This represents the lowest and safest weight distribution. Placing the transmitter at the top of the rack creates a top-heavy and potentially hazardous tipping condition. Lighter optional systems, such as audio processing, studio, or other extra equipment, should be placed towards the top where they raise the centers of gravity less and are more easily accessible for a standing operator.

If the standard AC power distribution breaker panel is used, start mounting the system with the bottom PA assembly positioned 3 or more rack unit from the bottom. In this case, prop up the back of the unit while fastening screws in the front panel to relieve strain until rear supports are attached.

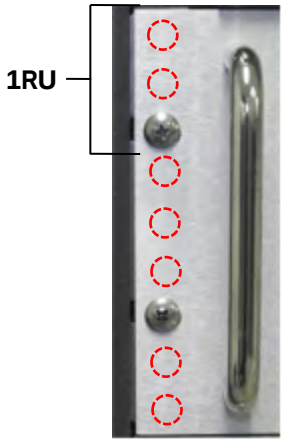


Figure 5 – Front Mounting Screws

1. On the front mounting rails, locate the desired set of three rack units – 9 screw holes in total. Place a clip at the top hole of the bottom rack unit and place a clip at the bottom hole on the top rack unit. Refer to Figure 5 to the right.

2. Set the assembly in place, insert screws in the provided felt washers, and insert the screws in the mounting holes. Drive screws enough to give good vertical support but allow movement; do not fully tighten.

3. On the back left rail, locate the same set of three rack units. Place the top clip one RU above the top assembly RU in the middle screw hole. Place the second clip in the top screw hole of the middle assembly RU. Refer to Figure 7.

4. On the back right rail, locate the set of three rack units occupied by the assembly. Place one clip in the middle hole of the top RU and one in the top hole of the bottom RU. Refer to Figure 6.

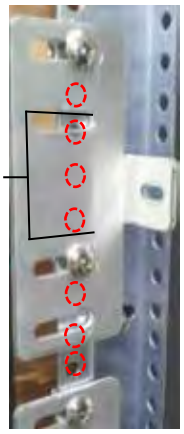


Figure 7 – Left Rear Support Mounting

Figure 6 – Right Rear Support Mounting

5. Arrange main/add-on rear support brackets such that the screw holes line up with the top slot and insert screws. As with the front panel screws, drive screws enough to give good vertical support and still allow movement.

6. Insert 10-32 sim screws in the rear bracket and fully tighten it to the nut embedded in the back of the assembly's chassis. Tighten fully.

7. Fully tighten all screws in the front support rails.

8. Fully tighten all screws in the rear support rails.

9. Repeat steps 1-8 above for all main and add-on assemblies.

10. Follow step 1 above for the combiner assembly. Note that there are two empty RU between the screws rather than one RU in with the main and add-on assemblies.

11. Use a similar process for mounting both of the combiner back rail supports: Locate the four rack units occupied by the assembly. Place clips in the bottom screw holes of the top RUs, and place clips in the bottom hole of the RU 2nd from bottom. Refer to Figure 8.

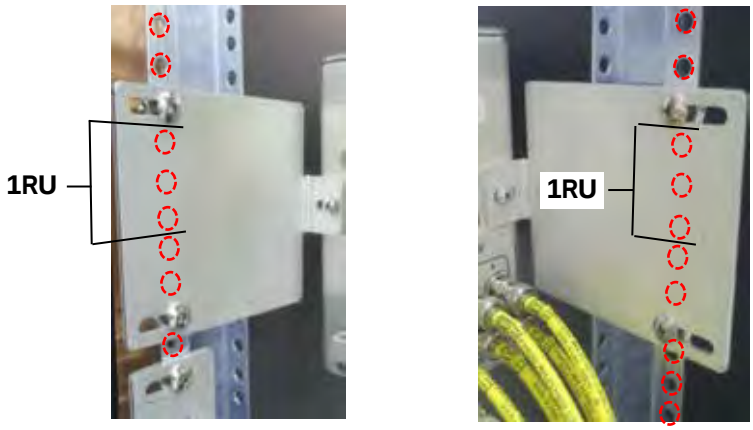


Figure 8 – Combiner Left and Right Rear Support Mounting

3.2 Control Communications

The control communications chain must be connected in a specific way for the communications to function. The numbering scheme for PAs is also determined by the order that they are connected in this chain, and skipping a PA results in a shift in all PAs that are further down the chain.

PA numbering starts at the top:

1. Connect a provided 1/2m blue communications cable from COM OUT to COM IN on the assembly immediately below it.

2. Repeat for all main and add-on assemblies to the bottom of the transmitter.

3. Use the provided 1m blue communications cable to connect from COM OUT on the bottom unit to CONTROL on the combiner assembly.

3.3 Exciter PA RF Drive

1kW transmitters simply require a BNC coaxial connection between exciter RF output and power amplifier RF input. This short cable is shipped with all 1kW systems.

Combined systems require two stages of exciter level RF coaxial connections:

1. Connect EXC RF OUT on the main assembly to RF SPLITTER IN on the combiner assembly.

2. Use the provided phase matched BNC cables to connect RF SPLITTER OUT jacks to PA RF IN on all main and add-on assemblies in the system

3.4 PA Combiner RF

1kW transmitter installations skip this step.

Use provided phase matched N-Type coaxial cables to connect RF OUT on all main and add-on assemblies to COMBINER RF IN on the combiner assembly. Ensure all RF coaxial cables are dressed away from control communications cabling.

3.5 Transmitter Antenna RF

1kW systems simply connect to the antenna or other load via N-Type connector and coaxial transmission cabling.

2, 3, and 5kW systems COMBINER RF OUT requires 1 5/8" hard coaxial plumbing.

1. Loosen the hose clamp that ships attached to the flange.

2. Ensure that the inner conductor is aligned with the male inner connector on the transmitter and slide the piping into place.

3. Tighten the hose clamp and verify a good mechanical connection between the flange and pipe.

3.6 Broadcast Electronics-Interface active stub

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

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.

3.7 GPIO Remote Station Interface

All installation kits include a loose 37PIN female D-Subminiature solder pot connector 418-0283 and D-Sub Shell 417-0284 for the solder pot connector.

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. Broadcast systems should be designed (refer to section 5.1.1 GPIO), integrated at installation time to the appropriate 37-pin solder cup connector, and dressed in a way that avoids shorts. For wires on adjacent pins, an insulator sleeve such as shrink-wrap is recommended.

All installations require unmute/failsafe be activated at a minimum. Follow these steps for the most basic setups.

1. Connect unmute/failsafe pin 2 (left connection in figure) to ground pin 19 (right connection in figure) through a failsafe relay. If no transmitter failsafe circuitry exists, substitute a wire jumper as shown in Figure 9.

Figure 9 – Failsafe to Ground

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

Figure 10 – D-Sub Shell Half

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

Figure 11 – 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.

3.8 AC Distribution

ENSURE AC MAIN IS DISCONNECTED AND LOCKED OUT BEFORE INTERACTING WITH ANY AC CONNECTIONS

1. Insert AC wiring into the appropriate terminal block: black line conductor to the terminal block labeled L, connect white line conductor to N (L), and connect green conductor to G. Refer to the left of Figure 12. Secure each wire with a flat head screwdriver.

2. Connect the AC terminal safety cover with a normal Phillips screwdriver. Refer to the right of Figure 12.

Figure 12 – AC Power Block

3. Use an Ohm meter probing between the chassis and L, N, and G conductors to verify proper connections; G should be connected to chassis ground, ~0 Ohm measured, and the L and N should not be connected to chassis ground, Mega Ohm measured. Probe between the L and N conductors and verify they are also not connected, Mega Ohm measured.

4. Repeat steps 1 through 3 for all assemblies in the system.

3.9 AC Power Service

CONSULT YOUR LOCAL ELECTRIC UTILITY PROVIDER AND/OR LICENSED AUTHORITY BEFORE CONNECTING ANY CONDUCTORS TO THE TRANSMITTER. OPERATION FROM AN UNSATISFACTORY POWER SOURCE WILL VOID THIS TRANSMITTER'S WARRANTY.

ENSURE AC MAIN IS DISCONNECTED AND LOCKED OUT BEFORE INTERACTING WITH ANY AC CONNECTIONS.

For constraints on the types of AC service that must be connected to the transmitter, please consult the AC Input section in the system specifications. The STX LP Generation II 1kW and 2kW systems require split-phase service. 3kW and 5kW transmitters can operate when serviced by split-phase, three phase closed delta, or three phase wye AC power – be sure to inform the sales representative which AC configuration is desired.

3.9.1 Single Phase

For 1kW systems, simply connect service Line, Line/Neutral, and Ground conductors to the AC Input terminal block. See section 3.9.

2, 3, and 5kW systems require conductors to be connected to the proper terminal on the AC power distribution breaker panel.

1. Connect Line conductor to terminal block labeled L
2. Connect Line for ~120V configurations, Neutral for ~220V configurations conductor to terminal block labeled N
3. Connect Neutral/Ground to terminal block labeled G
4. Connect an earth ground strap to the earth ground terminal.

3.9.2 Three Phase

If the transmitter is to be operated from a three phase power service, the transmitter must be connected to a closed delta or wye. Open delta, V to V, T to T, T to L, and Scott configurations have unsatisfactory performance in this application. Transients and unstable power may damage internal components of the transmitter and will cause degradation of performance, possibly outside specifications.

Proper power service can be identified by transformers: three transformers with one winding each or one transformer with three windings. Invalid service configurations use two transformers. Refer to Figure 14 and Figure 15 for acceptable main power service configurations.

Delta configurations:

1. Connect Phase A conductor to first terminal block labeled L
2. Connect Phase B conductor to second terminal block labeled L
3. Connect Phase C conductor to third terminal block labeled L
4. Connect an earth ground strap to the earth ground terminal.

Wye configurations:

1. Connect Phase A conductor to first terminal block labeled L
2. Connect Phase B conductor to second terminal block labeled L
3. Connect Phase C conductor to third terminal block labeled L
4. Connect Neutral conductor to terminal block labeled N
5. Connect an earth ground strap to the earth ground terminal.

Once AC conductors are connected, attach rack screw clips as necessary in the middle of the two selected rack units, and insert the AC panel in the rack. Secure with proved black head rack screws.

Figure 13 – AC Power Panel Screws

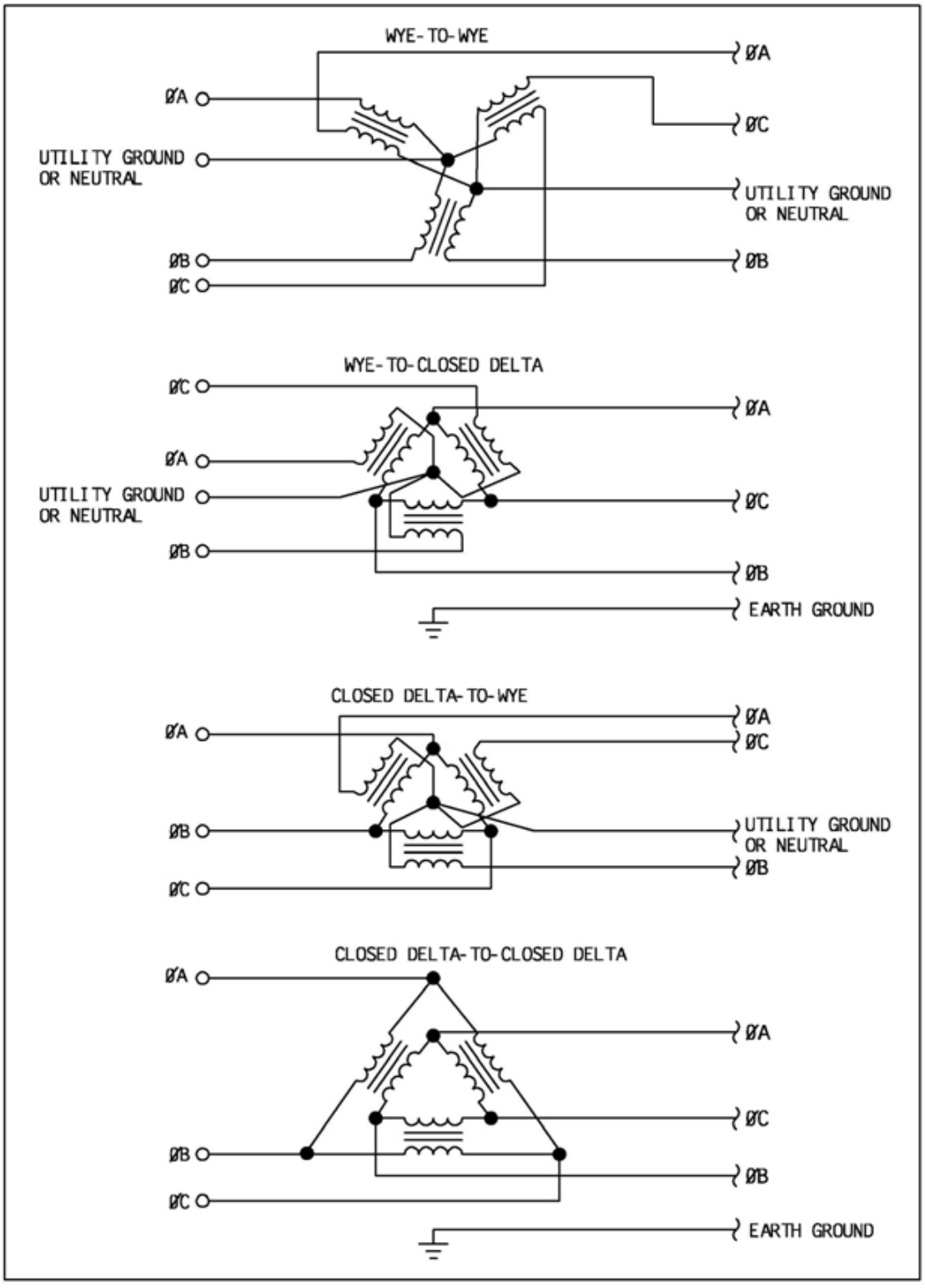
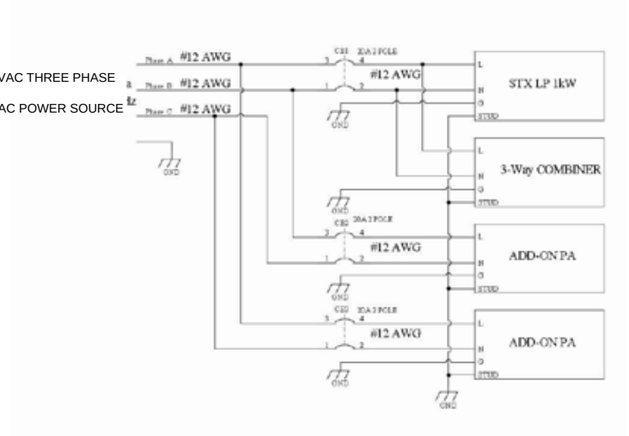


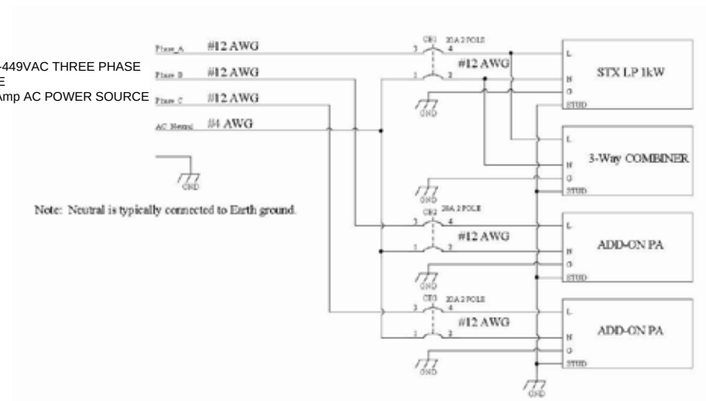
Figure 14 - Three Phase AC Main Configurations

180-260VAC THREE PHASE
DELTA
30 Amp AC POWER SOURCE



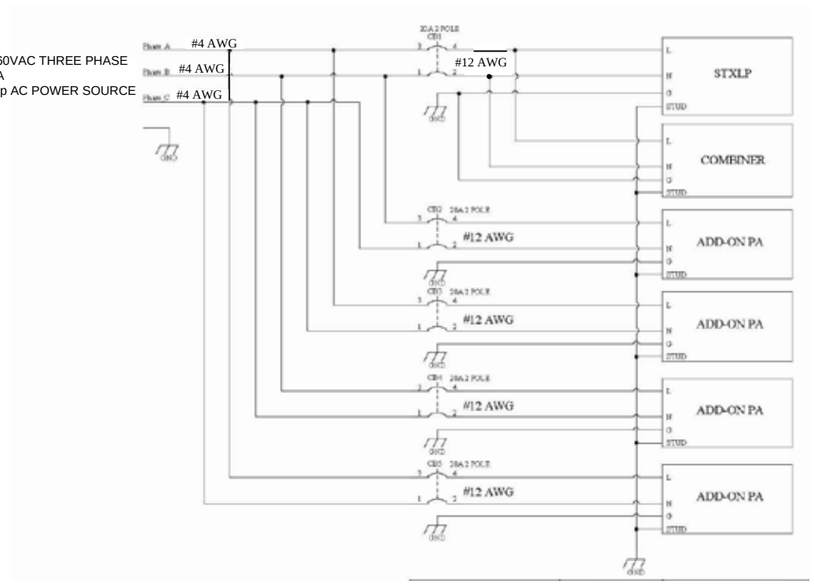
STXLP 3KW THREE PHASE DELTA

311-449VAC THREE PHASE
WYE
30 Amp AC POWER SOURCE



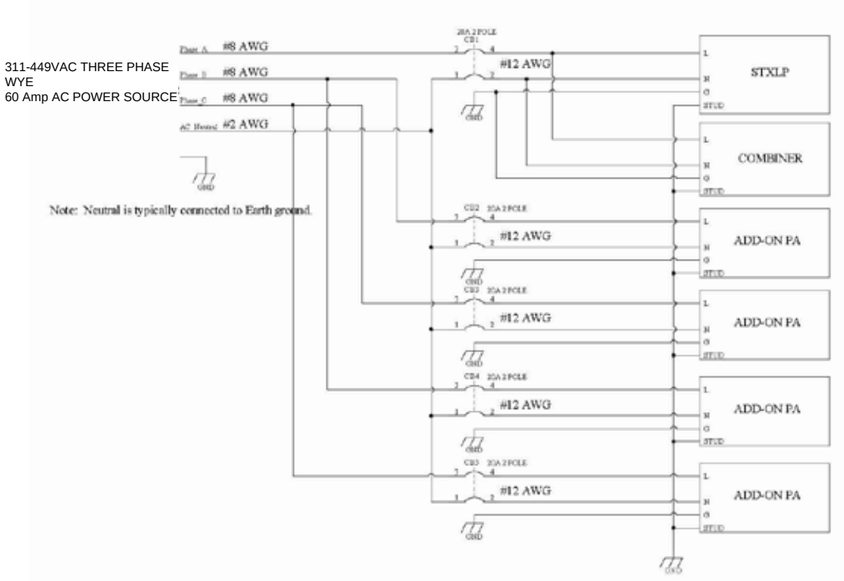
STXLP 3KW THREE PHASE WYE

180-260VAC THREE PHASE
DELTA
60 Amp AC POWER SOURCE



STXLP 5KW THREE PHASE DELTA

311-449VAC THREE PHASE
WYE
60 Amp AC POWER SOURCE



STXLP 5KW THREE PHASE WYE

NOTES –
FOR PROPER FUSE/CIRCUIT BREAKER SIZE, ALWAYS CONSULT LOCAL AND NATIONAL ELECTRIC CODES.

Figure 15 – Three Phase Power Distribution Schematic

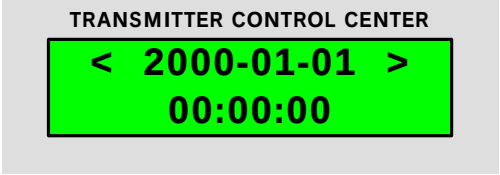
3.10 Turn on AC

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

3.11 Set Time and Date

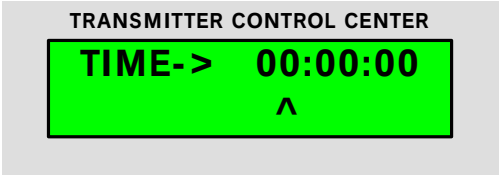
The internal real time clock holds the current time and date for use in the event log. This is a rudimentary device that supports 24-hour format and does not adjust for daylight saving. If installing during summer in a daylight saving region, following standard non-daylight time is recommended instead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

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.



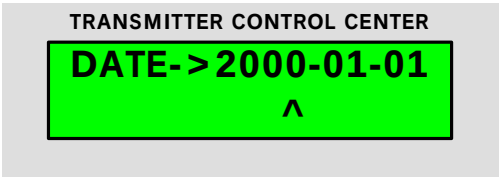
2. Press up or down to select the time editing screen.

3. Set the local (24 hour non-daylight saving) 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, 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.



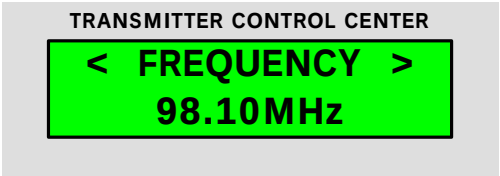
7. Press enter when finished editing for the setting to take effect in the system, save, and keep time.

3.12 Frequency

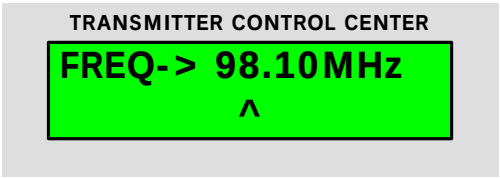
STX LP Generation II systems are built around frequency agile exciter and PA hardware. The frequency can be changed directly from the front panel – no hardware modifications or tuning procedure is required when the carrier frequency is changed.

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 frequency digits. Press up or down on each digit to increment or decrement the number.



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

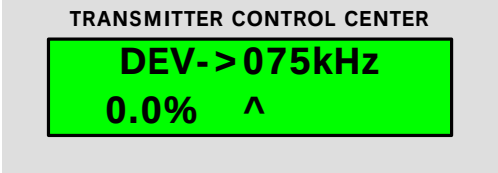
3.13 100% peak modulation

The STX LP Generation II defaults to 100% modulation being +/- 75 kHz. This section only applies if the STX 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. Press enter to continue.

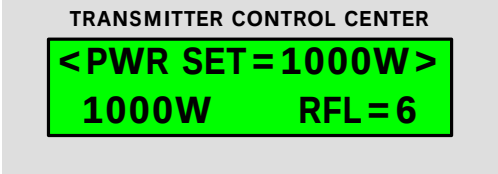
3. Press left or right to move the cursor between frequency digits. Press up or down on each digit to increment or decrement the number. This change takes effect immediately in the system without saving the setting to allow for active tuning.



4. Press enter when finished editing to save the deviation control setting.

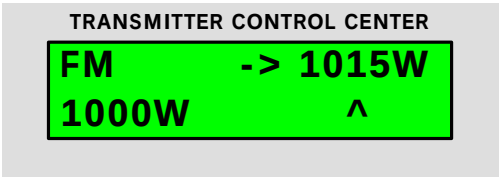
3.14 Power set point

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. 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.

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



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

3.15 Primary Audio Source

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

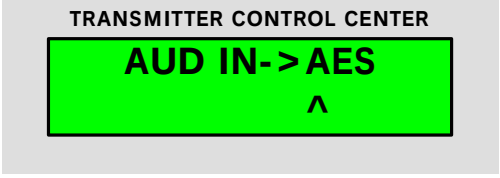
3.15.1 AES

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.

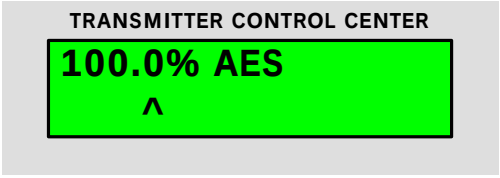
To operate Composite over AES, follow the steps below, but select "AES COMP" rather than "AES" as the input

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.

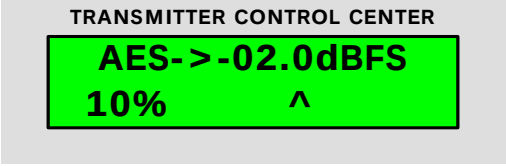


5. Press enter when finished editing for the setting to take effect in the system and save.
6. AES audio levels are expressed in terms relative to Full Scale of the digital signal path selected.
7. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

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

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%.

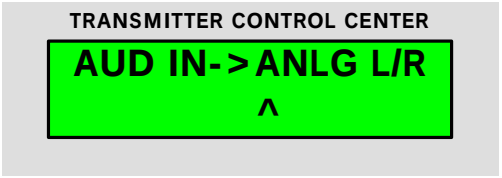


11. Press enter when finished editing to exit the sub-menu.

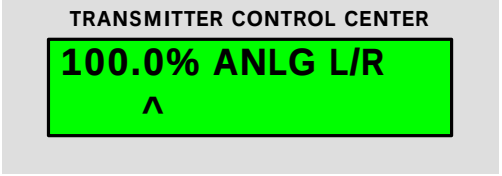
3.15.2 Analog L/R

1. Connect XLR cables from the desired Analog Left and Right audio sources. Activate the source with constant level tones or typical level real 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 secondary services). Leave this at 100% if there are no secondary services.
   Press left or right to move the cursor. Press up or down on each digit to increment or decrement the number.



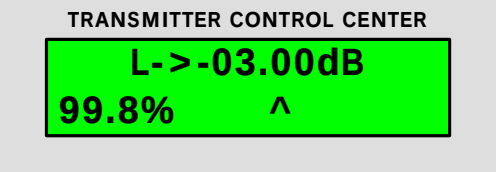
5. Press enter when finished editing for the setting to take effect in the system and save.

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.

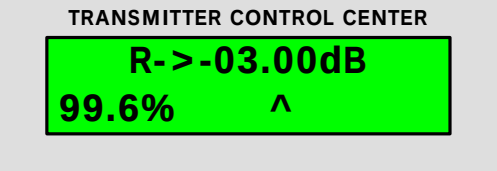
8. The display will show the current peak modulation attributable to the Left input. The level can be adjusted by changing the associated gain/attenuation. This has a range of -96.0 dB to +22.0 dB in 0.25 dB steps. Press left or right to move the cursor.

   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%.



9. Press enter when finished editing to save the L calibration setting.

10. Repeat these steps 6 – 9 for R.



3.15.3 Composite

1. Connect a BNC cable from the desired unbalanced composite audio source. Activate the source with a constant level tone or typical level real 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.

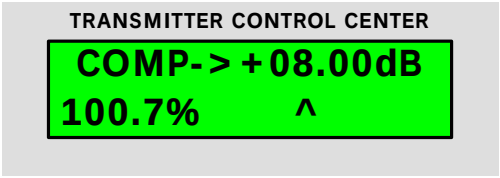
3. Press up or down to select COMPOSIT as the primary audio source. Press enter to continue.

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%.

   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

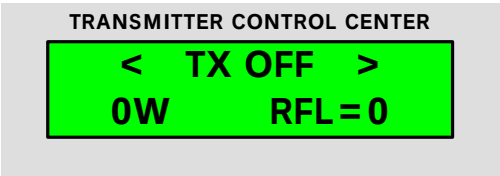


7. Press enter when finished editing to save the L calibration setting.

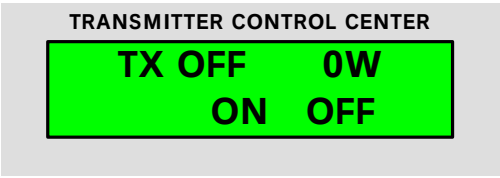
3.16 Turn RF Transmission On

If all setup steps have been completed, including desired optional features in the next section, the system should be ready for operation.

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

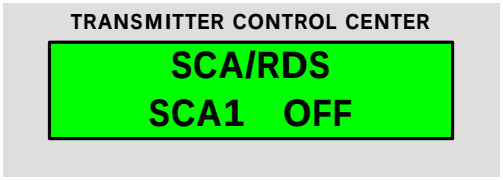
The STXe 500 allows operation of three supplementary audio services. These are labeled SCA1, SCA2 and RDS. It is expected that these will be generated by an external system, modulating the audio at the proper frequency between 57 kHz and 100 kHz.

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.

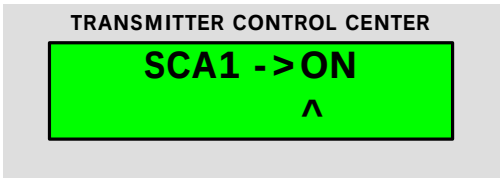
1. Connect a BNC cable from the external signal generator source to the secondary program input. Activate the source with a constant level tone or typical level real audio.

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.

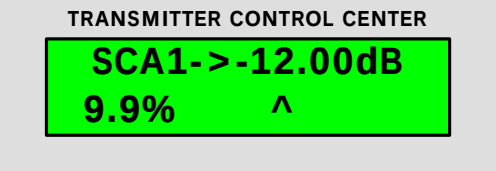
6. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the AUDIO LEVEL menu. Press enter to continue.

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

8. Press left or right to move the cursor. Press up or down on each digit to increment or decrement the number and take effect in the system. Do this until the displayed composite peak hold is within a few percent of 100%.

   Note: SCA1, SCA2, and RDS input signals (that are enabled) also contribute to this composite peak hold value. These sources should be turned off before attempting this calibration.

9. 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.



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

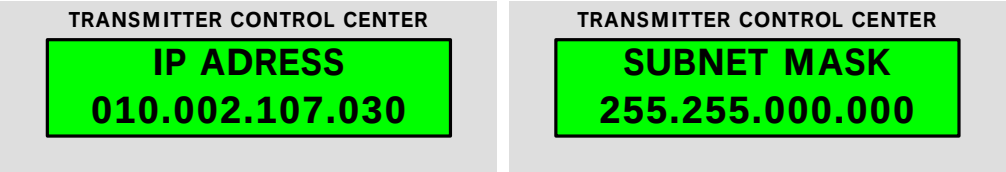
Use either this simple static IP setup or dynamic host control setup.

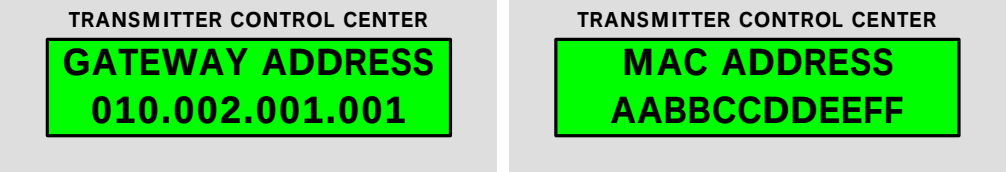
1. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the ETHERNET/IP menu. Press enter to continue.

2. Press up or down to select the port to be set up. CONTROLLER is the ETHERNET port on the STX. Exgine is the ETHERNET DATA port on the optional VPeXG system. VPe is the ETHERNET VPE port on the optional VPeXG system. Press enter to continue.

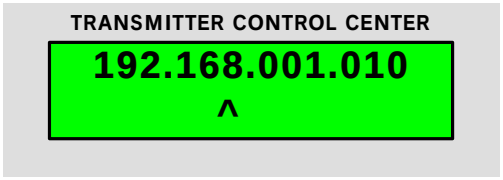
3. Press up or down to select the IP parameter to be observed or changed. Press enter to continue.

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.



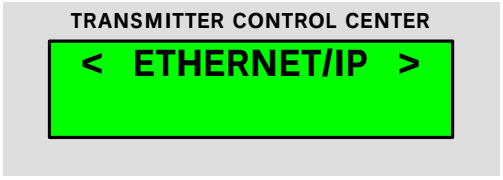
6. Verify that the settings active by connecting to the port.

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.

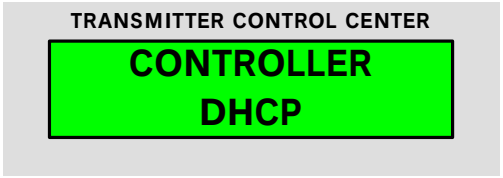
Use either this dynamic host control setup or static IP setup.

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.

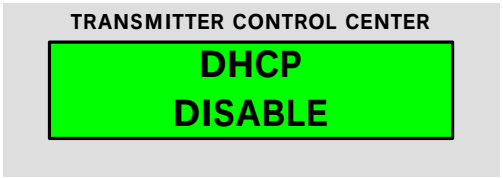


2. Press up or down to navigate to the ETHERNET/IP CONTROLLER. Press enter to continue.

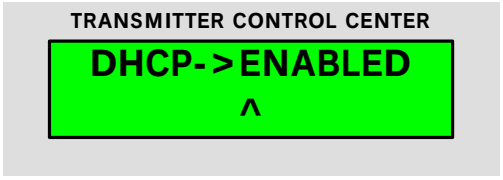
3. Once in the menus, press up or down to select CONTROLLER DHCP and press enter.



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.

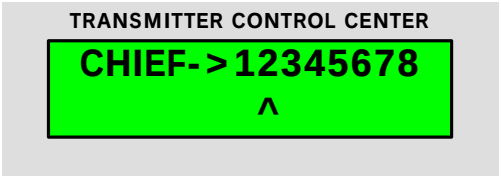
4.3 Password

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.

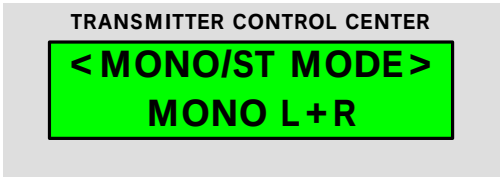


4. Press enter when finished editing for the password to take effect in the system.

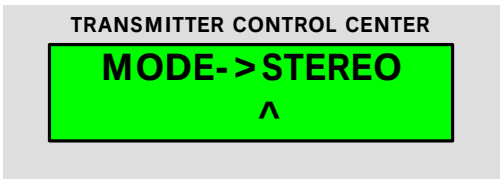
4.4 Stereo Generation and Stereo Pilot Injection

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.



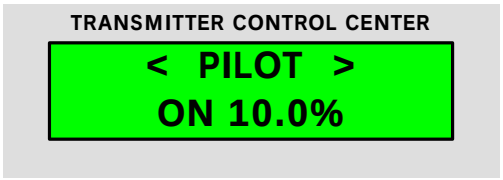
2. Press up or down to select STEREO.



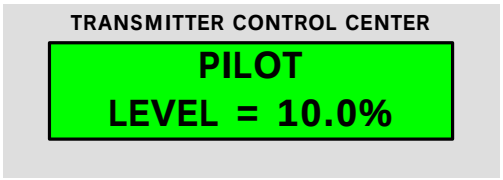
3. Press enter for the selected mono/stereo mode to save and take effect in the system.

   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. Change back to mono from stereo automatically turns the stereo pilot off.

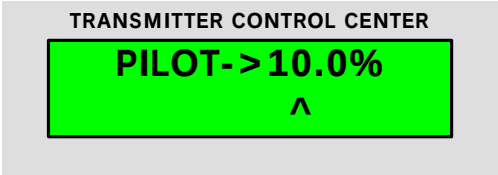
4. To change the injection of the 19kHz stereo pilot: from the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the PILOT menu. Press enter to continue.



5. Press up or down to select LEVEL.



6. Set the injection level of the pilot in the stereo signal (% peak injection is multiplicative to stereo AES or Analog L/R reduction factors). Press left or right to move the cursor. Press up or down to increment or decrement the number.



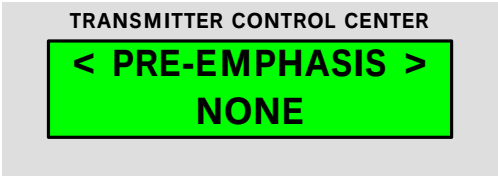
7. Press enter for the pilot level to save and take effect in the system.

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.

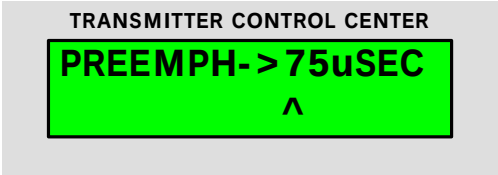
4.5 Pre-Emphasis

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 microsecond filters while European receivers typically utilize 50 μs.

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.



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

4.6 Tuning Digital Mode RF Amplifier Linearity

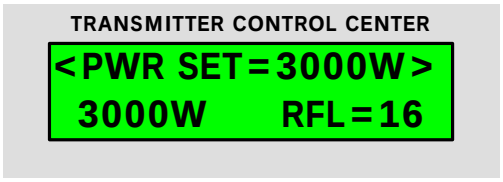
Some VPe XG option setup conditions (frequency, loads, etc.) require PA digital operation tuning to successfully transmit Digital-only or FM+Digital waveforms. This is typically accomplished by increasing PAV to linearize, or by decreasing PAV to add efficiency and keep power amplifiers as cool as possible.

If PAs are ever excessively hot during this process, immediately restore voltages to default on all PAs, reduce system power (total or side-band power in hybrid modes) until within limits, and contact RF Technical Services.

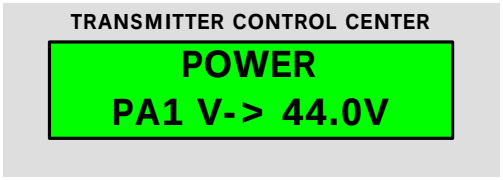
THIS PROCESS CARRIES A RISK OF AMPLIFIER PART FAILURE DUE TO EXCESSIVE TEMPERATURES. PROCEED WITH CAUTION.

Open a PA web page on a local PC to see all power and temperature statuses at once.

1. Navigate to the power settings menu on the transmitter control center front panel interface.

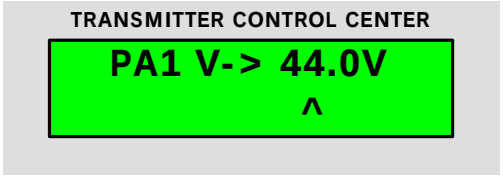


2. Press down/up to one of the PA# V screens. There is a screen for each PA in the system, where # is the PA number 1, 2, 3, 4 and 5.



3. 1kW systems: increase PAV by 1.0 V at a time and continue to the next step.

   In combined systems, look at the forward power out of each PA. Select the PA that has the lowest power compared to the rest. Increase Voltage in small increments and check the power of all PAs in the system. Note that if power does not increase, the PA is already operating as linear as possible. Do not continue to increase voltage in a linear PA. It will reduce efficiency with no added benefit to the system and can do this to the point of thermal failure. Also note that other PAs will reduce power to maintain total output power. Repeat this step for other PAs in the system.



4. After giving VPe adequate time to adapt to the new system characteristics, observe the spectrum and check for sufficient spectral improvement.

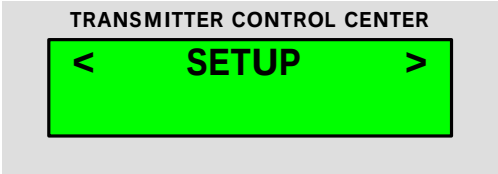
5. Verify all PA heat sink temperatures at least remain below ambient air temperature plus 50 degrees C, or about 74 degrees C total when the transmitter is operating in a comfortable room temperature.

To increase efficiency in systems operating below nominal power levels, follow a similar process to reduce voltage in a PA until PA output power starts to reduce. In combined systems, this process should start with the highest temperature PAs.

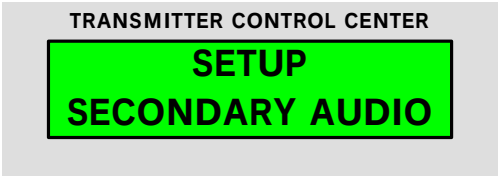
4.7 Secondary Audio and Silence Timeout

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.

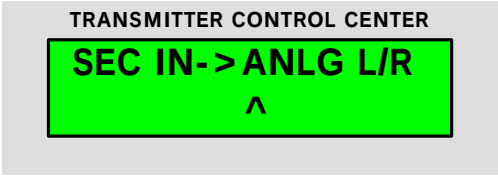
5. From the main screen on the transmitter control center on the front panel of the main assembly, press up or down to navigate to the SETUP menu. Press enter to continue.



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

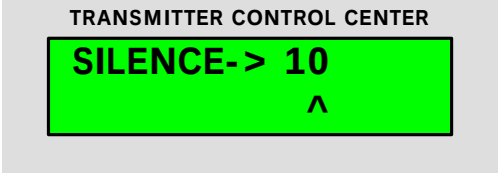


7. Press up or down to select one of the 4 inputs; Composite, Analog L/R, AES, AES Composite, or None if secondary audio isn't used. Injection level setup for Secondary Audio will be same as outlined in section 3.15.



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

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



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

5 Rear Panel Features

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

In the context of TTL interfaces in GPIO and BE-Interface connections, logic low refers to a connection to within 0.8V of isolated ground. Logic high inputs are internally pulled up through 2kOhms to isolated +5V (referenced to GPIO pin 32). Inactive inputs should be open/floating, and not driven. Active edge refers to a transition from the inactive state to the active state. 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.

The reference designators in the figures below refer to sub-section numbers. For example, flag 1 under the Main Assembly Features corresponds to details in section 5.1.1.

THIS SYSTEM USES CMOS LOGIC ON "GPIO" AND "BE 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 Main Assembly Rear Features

For STX LP 1kW models, the STX LP main assembly is used as a standalone transmitter. In STX LP 2kW, 3kW, and STX LP 5kW models, the STX LP 1kW assembly is used as the system control and audio interface center. The assembly's rear panel connections and features are detailed in the following pages. Block #3 for example is detailed in 5.1.3.

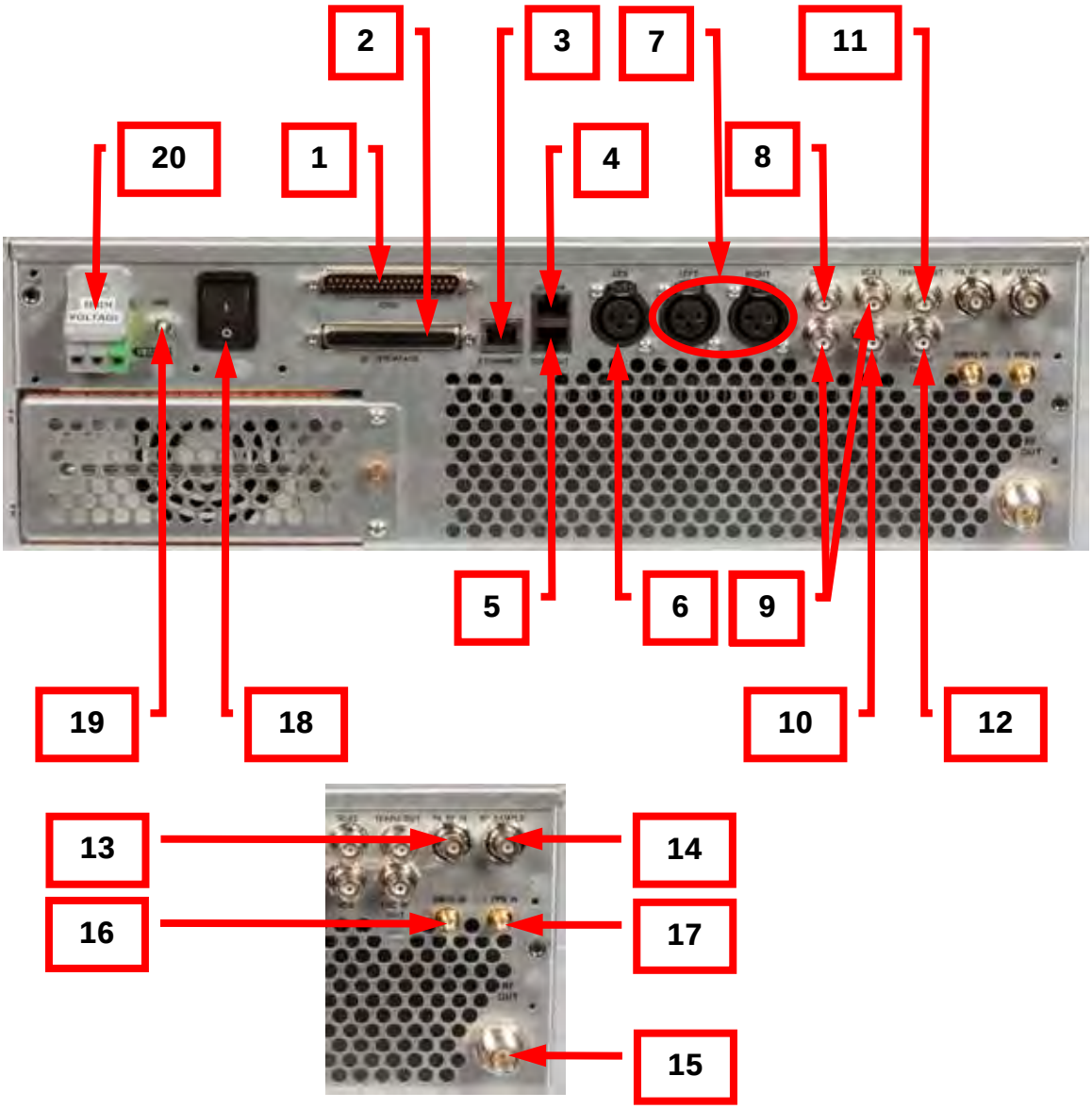


Figure 16 – Main Assembly Rear Panel

5.1.1 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.

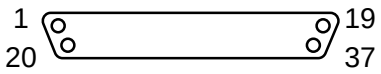


Figure 17 – Standard D-Sub 37 Connector Numbering

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 10 Watts every second that this input is held low.
7	Input	Lower Transmitter Power	Lowers the system power 10 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	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. Checked at system boot for a held low level.
15	Output	Reflected Power	DC voltage for total reflected power at the system RF output. Varies linearly from 0V = 0W to 5V = 100 * Model W (100W for 1kW, 200W for 2kW, etc.).
16	Output	Selected PA Total Current	DC voltage for total RF power supply current for a PA module (select via pin 18). Varies linearly from 0 = 0A to 5 V = 50A.
17	Output	Selected PA Temperature	DC voltage for heat sink temperature reading for a PA module (select via pin 18). Varies linearly from 0V = 0 degrees C to 5V = 100 degrees C.
18	Input	PA Module Select	Controls which PA is being monitored by other output pins. Each active low edge cycles through selections. The end of the selectable PAs is indicated by all outputs being ~0V. Reserved in 1kW systems.

Pin	Direction	Name	Description
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 12 provides an alternate connection.
20	Output	General Fault	Low when any fault is active in the system.
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.
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	PA Forward Power	DC voltage for PA forward power (select via pin 18). Varies linearly from 0V = 0W to 5V = 1250 W.
30	Output	PA Reflected Power	DC voltage for PA reflected power (select via pin 18). Varies linearly from 0V = 0W to 5V = 100 W.
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 = 1100 * Model Watts (1100W for 1kW, 2200W for 2kW, etc.).
34	Output	PA Voltage	DC voltage representing the variable RF power supply in a PA (select via pin 18). Linear from 0V = 0V to 5V = 50 V.
35	Output	Reserved	Reserved
36	Output	Reserved	Reserved
37	N/A	Ground	Chassis ground

5.1.2 BE INTERFACE

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

5.1.3 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.

5.1.4 COM IN

System communications bus input. This RJ45 jack is intended to be used in the backup main unit in redundant internal exciter configurations. In this case, a communications cable must be connected from COM OUT on the primary main unit to this input on the standby unit.

This output is not used in typical 1kW configurations. Connecting to this jack improperly may cause internal system communications failures.

5.1.5 COM OUT

System communications bus output. This RJ45 jack is used to wire the communications bus to the rest of the system. For main/backup systems, this connects to the standby unit. The second main assembly in a 2kW system setup connects to the combiner. For all other configurations, this must connect to the next add-on PA in the chain.

This output is not used in typical 1kW configurations. Connecting to this jack improperly may cause internal system communications failures.

5.1.6 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 include 32, 44.1, 48, 96, and 192 ksps.

5.1.7 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.

5.1.8 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.

5.1.9 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.

5.1.10 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.

5.1.11 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.

5.1.12 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.

5.1.13 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 in a Digital mode, (e.g. HD radio or Digital Radio Mondiale).

5.1.14 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.

5.1.15 RF OUT

Power Amplifier RF output connector. This N-connector output carries the amplified RF output at a maximum (FM-only) forward power level of 1250 W. For 1kW system setups, connect this output to a 50 Ohm antenna. In combined systems this should be connected to a COMBINER RF IN designated by J1, J2, J3, J4, or J5 on the combiner module using a provided right angle adapter and phase matched cable.

5.1.16 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.

5.1.17 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. A high precision clock generator such as a GPS receiver module or a digital radio signal generator is recommended.

5.1.18 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.

5.1.19 Ground

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

5.1.20 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.

5.2 Add-on PA Assembly Rear Features

Add-on power amplifier modules are used to simply add 1kW more nominal power amplification to STX systems. These must be used in concert with an appropriately sized combiner module in order to generate rated total output power for 2kW, 3kW, and 5kW systems.

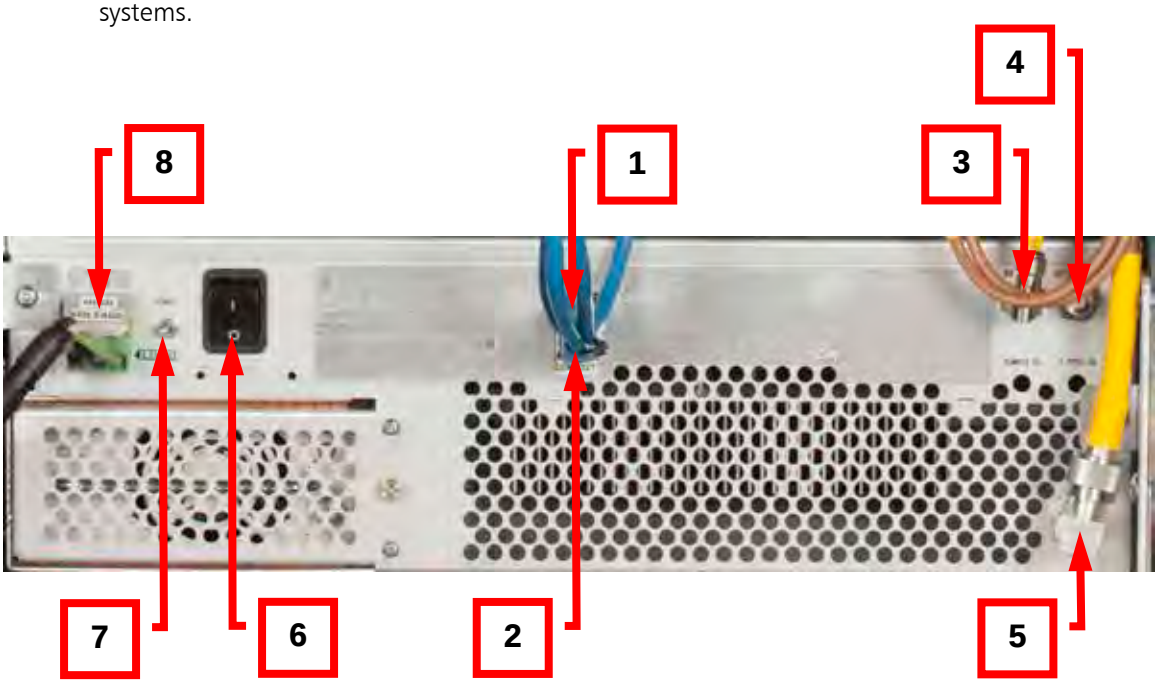


Figure 18 – Add-on Assembly Rear Panel

5.2.1 COM IN

System communications bus input. This RJ45 input must be connected from COM OUT on the previous unit in the chain with a provided communications cable. This could either be a main assembly or a previous add-on assembly. Connecting to this jack improperly may cause internal system communications failures.

5.2.2 COM OUT

System communications bus output. This RJ45 jack is used to wire the communications bus to the rest of the system. This must connect to either the next add-on PA in the chain or the combiner with a provided communications cable. Connecting to this jack improperly may cause internal system communications failures.

5.2.3 PA RF IN

Power Amplifier RF Input BNC connector. Connect from an exciter power drive source, which is typically one of the splitter RF outputs on the combiner module designated A, B, C, D, or E using the provided phase matched cables.

5.2.4 RF SAMPLE

Power amplifier RF sample connector. This BNC carries a coupled RF signal from the module's PA. Nominally generates about 19 dBm at about 1kW PA output power. The output level scales with total output power of the PA module.

5.2.5 RF OUT

Power Amplifier RF output connector. This N-connector output carries the amplified RF output at a maximum (FM-only) forward power level of 1250 W. This should be connected to a COMBINER RF IN designated by J1, J2, J3, J4, or J5 on the combiner module using a provided right angle adapter and phase matched cable.

5.2.6 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.

5.2.7 Ground

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

5.2.8 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.

5.3 Combiner Assembly Rear Features

Combiner modules are required for 2kW, 3kW, and 5kW output power levels. A balanced amount of amplified power at all 1kW nominal power inputs is required to achieve rated power levels. Modules themselves cannot be modified to increase power capacity and must be exchanged in full for any upgrade applications.

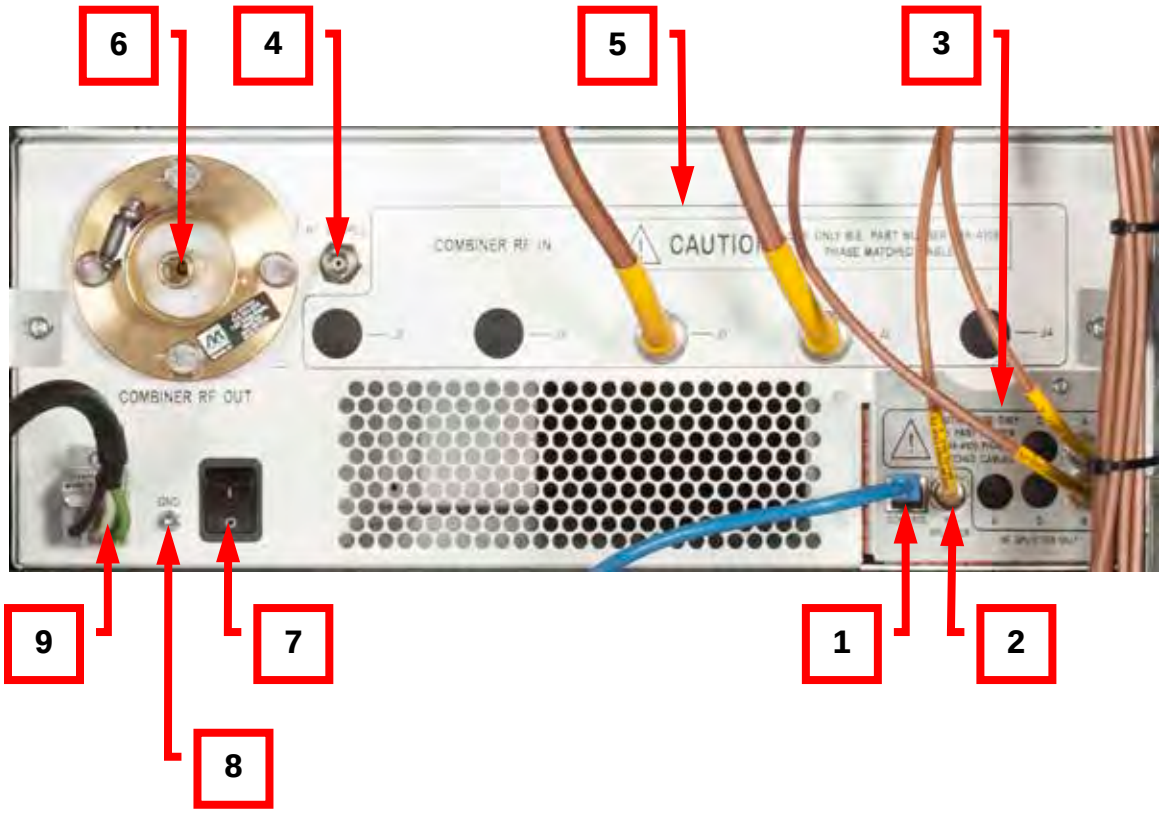


Figure 19 – Combiner Assembly Rear Panel

5.3.1 CONTROL

System communications bus input. This RJ45 input must be connected from COM OUT on the last unit in the communications chain with a provided communications cable. This could either be a backup main assembly or the last add-on assembly. Connecting to this jack improperly may cause internal system communications failures.

5.3.2 RF SPLITTER IN

RF splitter input connector. This BNC connector should be connected to the exciter level RF source that is intended to be used in the system.

5.3.3 RF SPLITTER OUT

RF splitter output connectors A, B, C, D, and E. These BNC connectors output exciter level RF that is essentially equivalent to the signal connected to the RF splitter input. Note that 2kW and 3kW systems will only have 2 or 3 of these connectors respectively, and the extra holes have covers.

5.3.4 RF SAMPLE

Combiner RF output sample connector. This BNC carries a coupled RF signal from the combiner module and provides an optional method for monitoring RF output. Nominally generates about 19 dBm at about 1kW PA output power. The output level varies proportionally with total output power of the system.

5.3.5 COMBINER RF IN

Combiner RF input connectors J1, J2, J3, J4, and J5. These N-connectors connect to the outputs of all of the power amplifiers in the system using phase matched cables. Note that 2kW and 3kW systems will only have 2 or 3 of these connectors respectively, and the extra spaces have covers.

5.3.6 COMBINER RF OUT

System RF output connector. This 1 5/8" hard coax flange output is for connection to transmission and antenna systems.

5.3.7 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.

5.3.8 Ground

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

5.3.9 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.

6 Front Panel Features

6.1 Main Assembly Front Features

The main assembly front panel contains LED indicators for the system controller, internal exciter, internal power amplifier, and an LCD user interface. The assembly's front panel features are detailed in the in the following pages. Block #7 for example is detailed in section 6.1.7

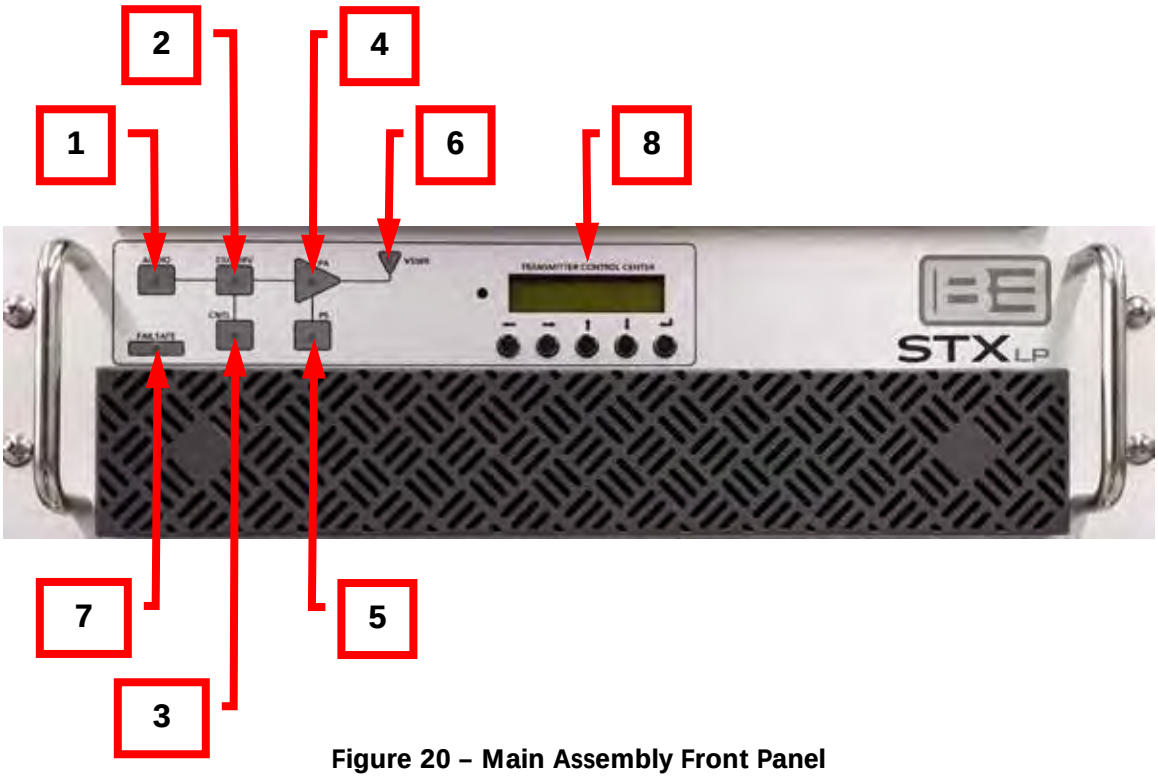


Figure 20 – Main Assembly Front Panel

6.1.1 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.

6.1.2 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 9 – 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.

6.1.3 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.

6.1.4 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 10 – PA Diagnostics Details in section 13.6 for details on what alarms or faults may be active.

6.1.5 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.

6.1.6 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.

6.1.7 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.

6.1.8 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. See section 8 Transmitter Control Center for details on how to use this interface.

6.2 Add-on PA Assembly Front Features

The add-on power amplifier assembly front panel contains LED indicators for the power amplifier.

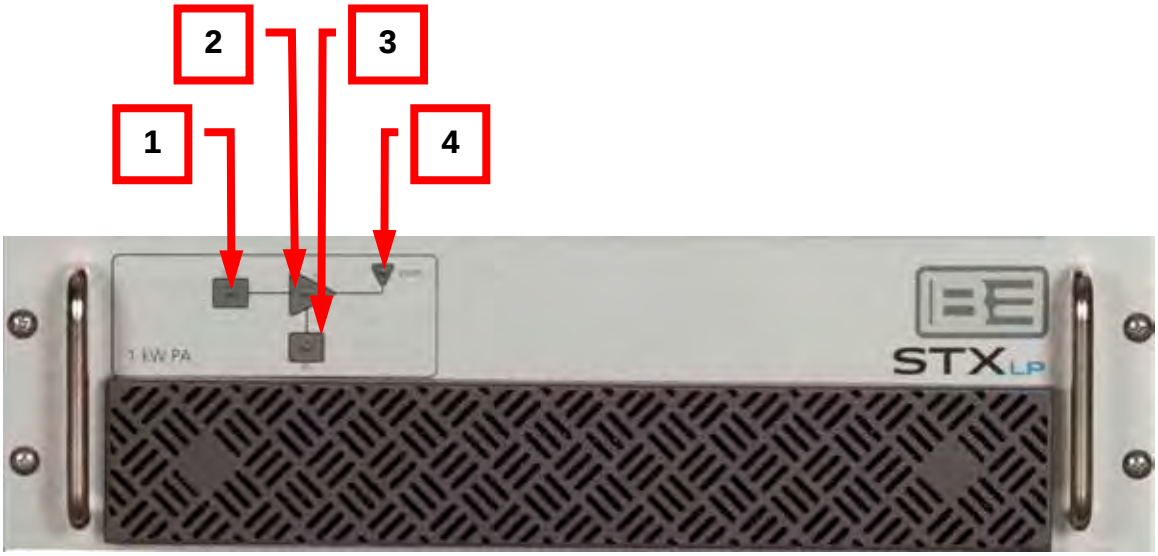


Figure 21 – Add-on PA Assembly Front Panel

6.2.1 DRV

The exciter drive LED shows the status of the RF input connected to PA RF IN. Green indicates normal operation levels. Red shows if an improper drive power level is detected.

6.2.2 PA

The power amplifier LED shows the status of PA hardware foldback protection. Green indicates normal operation. Red indicates an active hardware foldback. Check PA diagnostics for details on what alarms or faults may be active.

6.2.3 PS

The power supply LED shows the status of power to the front panel. Green shows when there is power, otherwise the LED is off. Check PA diagnostics for details on what alarms or faults may be active in the supply connected to the PA.

6.2.4 VSWR

The voltage standing wave ratio LED shows the status of the PA output in terms of measured reflected power. Green indicates normal operation into an acceptable load. Red indicates a fault and shutdown condition. Check PA diagnostics for details on what alarms or faults may be active in the PA.

6.3 Combiner Assembly Front Features

The combiner assembly front panel contains LED indicators for the splitter and combiner.

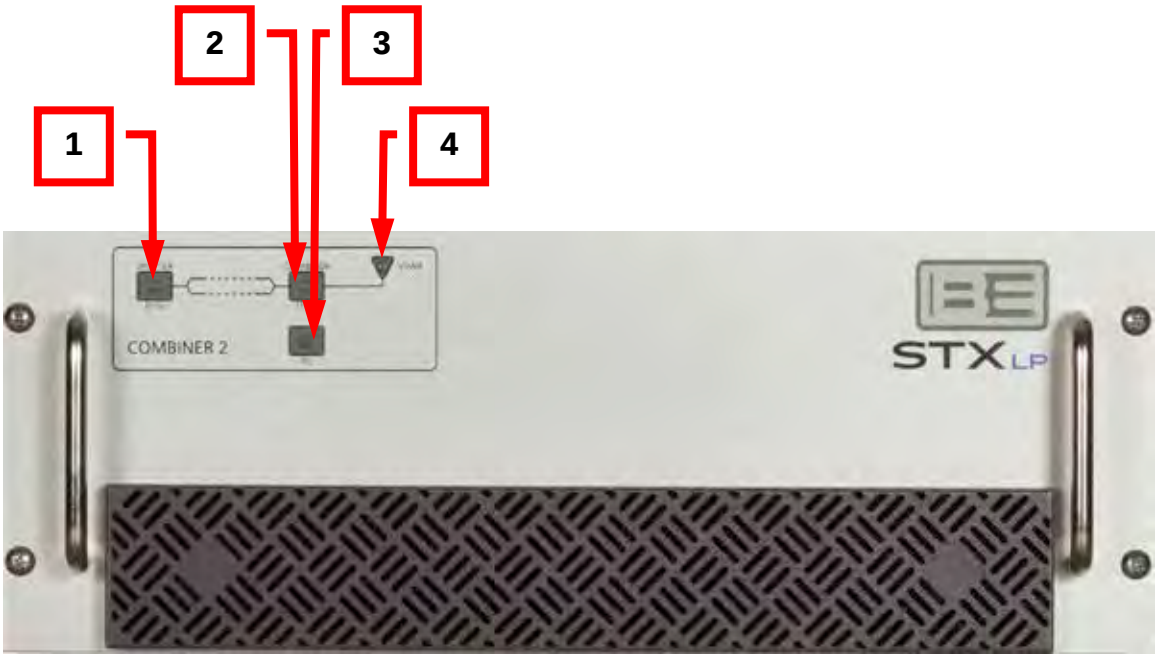


Figure 22 – Combiner Assembly Front Panel

6.3.1 RF IN

Splitter RF input LED. This LED indicates the general status of the RF splitter. Green indicates normal operation. Red indicates that the splitter output is turned off. There are a number of factors that can cause this to occur including invalid splitter input levels or detected problems in the combining system. Refer to the muted splitter output alarm in combiner diagnostics for details on what alarms or faults may be active causing this LED to turn red.

6.3.2 TEMP

Combiner temperature LED. This LED indicates the status of the internal temperature of the combiner. Green indicates normal operation with acceptable temperatures. Red indicates a fault due to excessively high temperatures.

6.3.3 PS

Power supply LED. This indicator shows the status of power to the combiner front panel. Green shows when there is power, otherwise the LED is off. Check combiner diagnostics for details on what alarms or faults may be active in the combiner.

6.3.4 VSWR

Voltage standing wave ratio LED. This shows the status of the system output in terms of measured reflected power. Green indicates normal operation into an acceptable load. Red indicates a fault and shutdown condition. Check combiner diagnostics for details on what alarms or faults may be active in the combiner.

7 Theory of Operation

Refer to the system block diagrams in Figure 23, Figure 24, and Figure 25 on following pages.

Broadcast Electronics STX LP Generation II FM transmitter 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.

STX LP Generation II 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 determine the definition of this interface, which is described in following paragraphs.

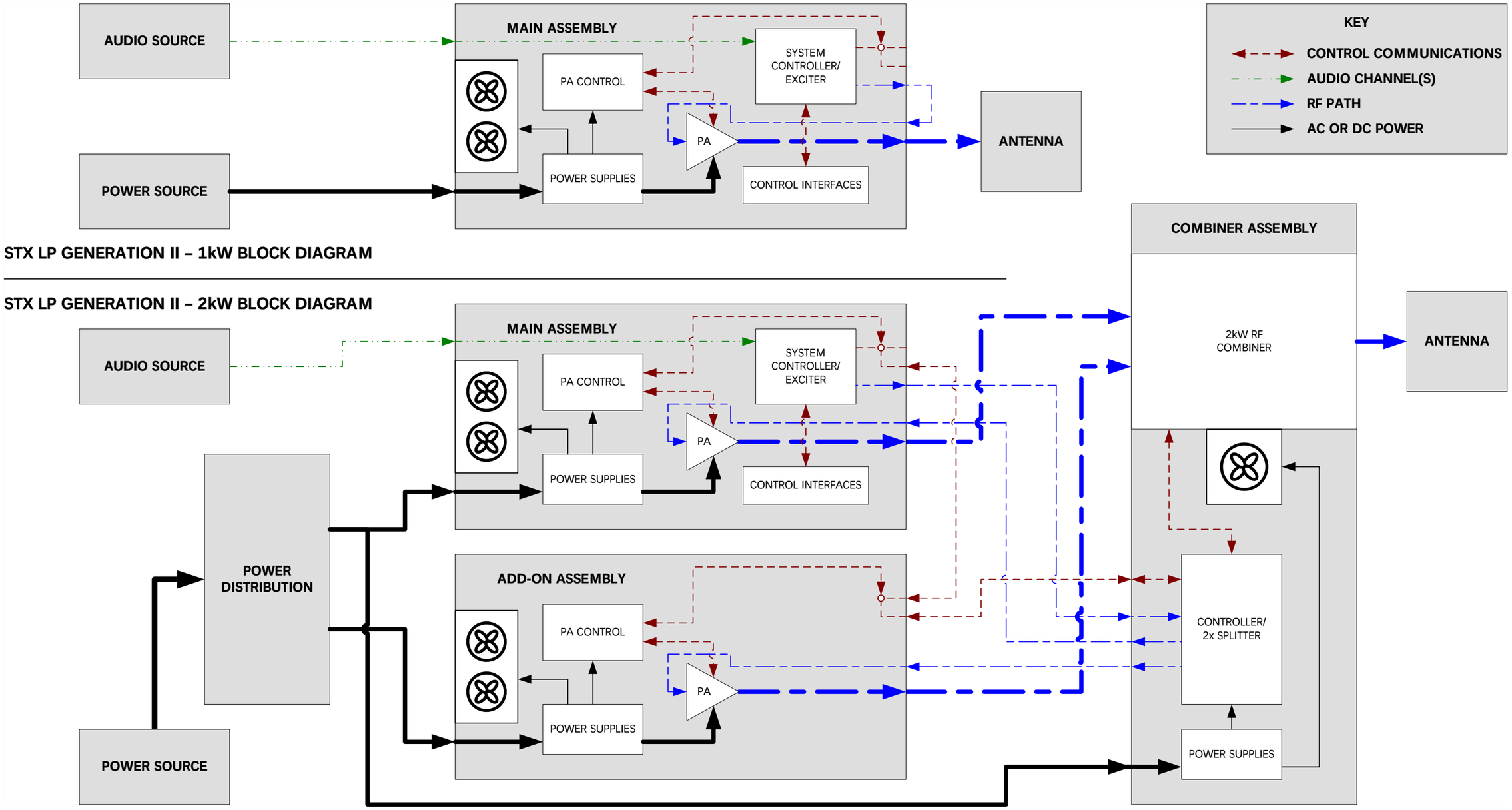
Systems come standard equipped to run either of two standard modes of power amplification. FM-only mode utilizes a fixed exciter RF drive level. Variable final amplifier voltages compress the RF signal in class C amplifier operation, effectively controlling system gain to maximize power efficiency. FM+Digital 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.

Transmitters utilize internal digital closed power control based on measured system forward output power. Control mechanisms are adjusted in this manner such that 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 on each main, add-on PA, and combiner system. A main power supply module converts AC to fixed DC power for use throughout the system. Power supply 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 fans.

There are two DB-37 connectors and a DB-25 connector to allow the STX to interface with other equipment. This includes transmitters, remote monitoring and control, and signal generation options.



STX LP GENERATION II – 1kW BLOCK DIAGRAM

STX LP GENERATION II – 2kW BLOCK DIAGRAM

Figure 23 – STX LP Generation II 1kW and 2kW Block Diagrams

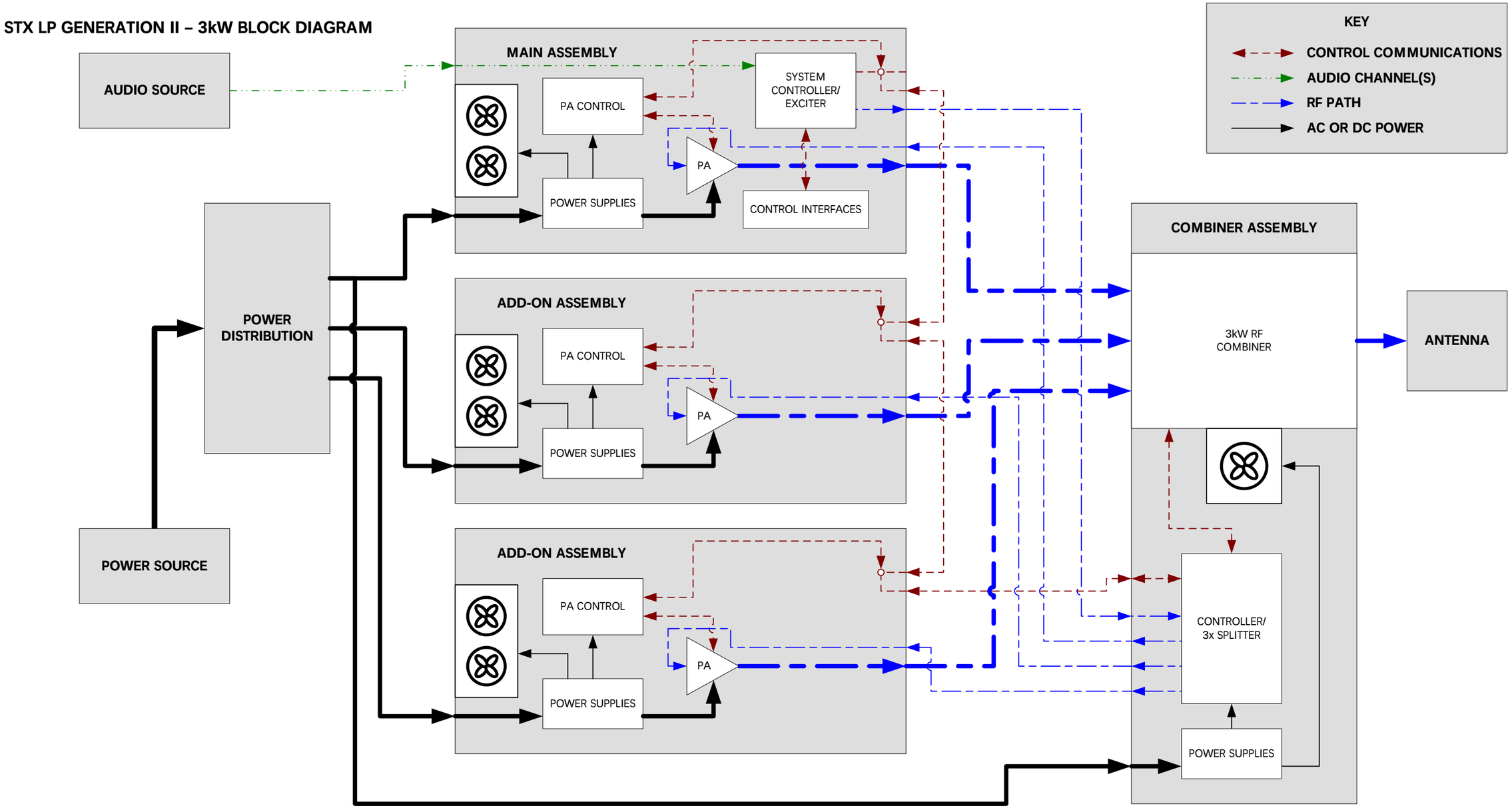


Figure 24 – STX LP Generation II 3kW Block Diagram

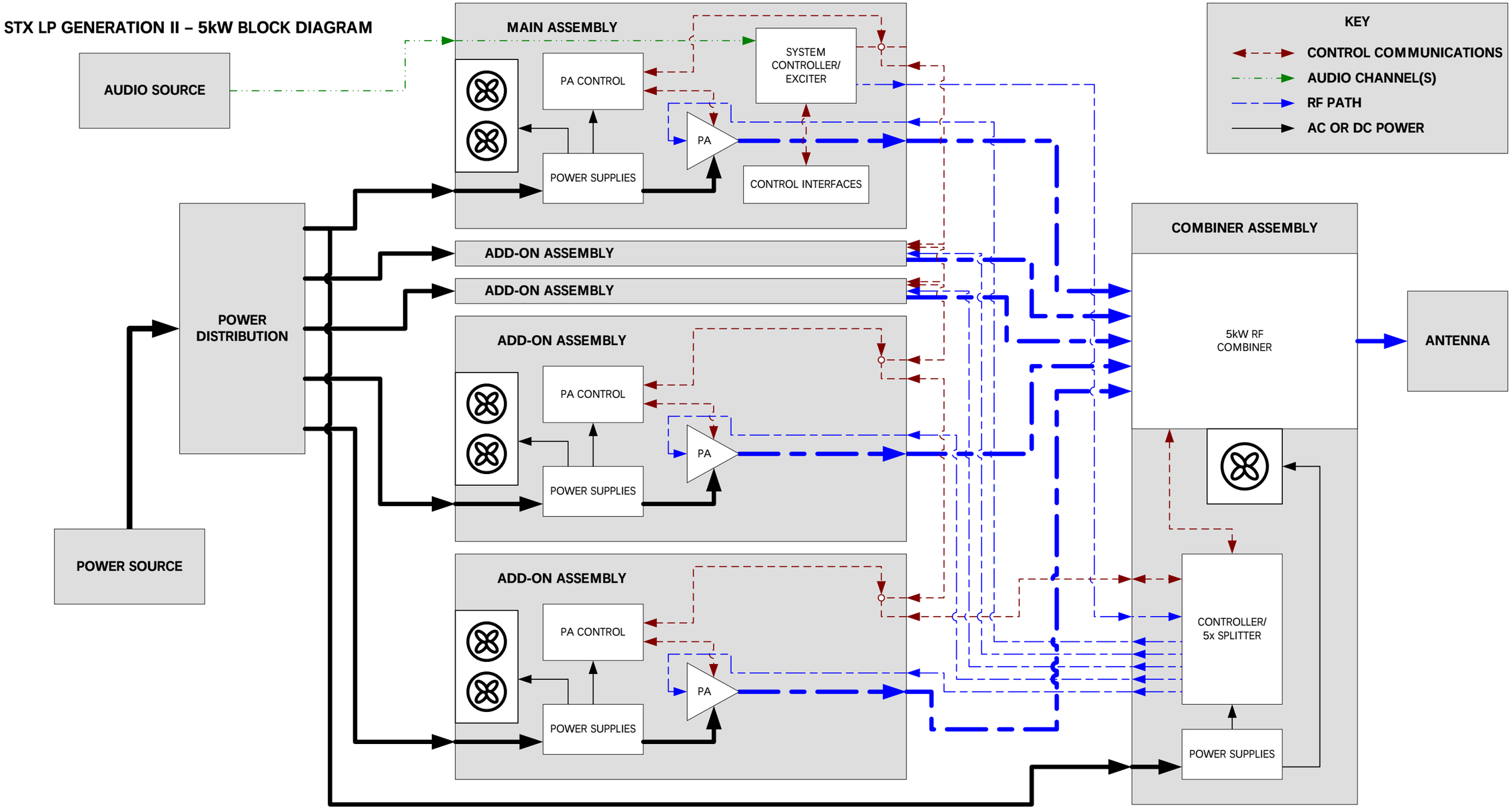


Figure 25 – STX LP Generation II 5kW Block Diagram

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.

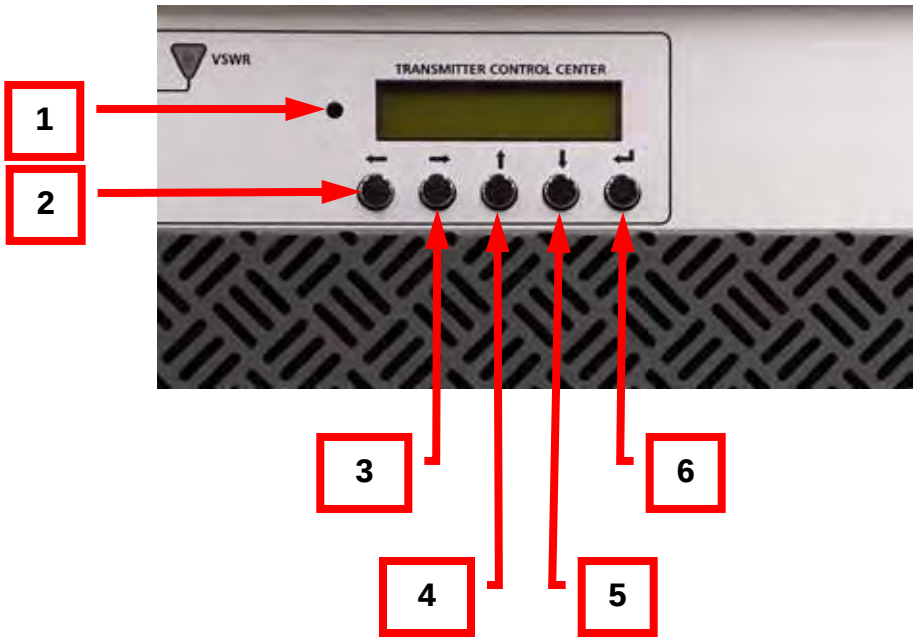


Figure 26 – Transmitter Control Center

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.

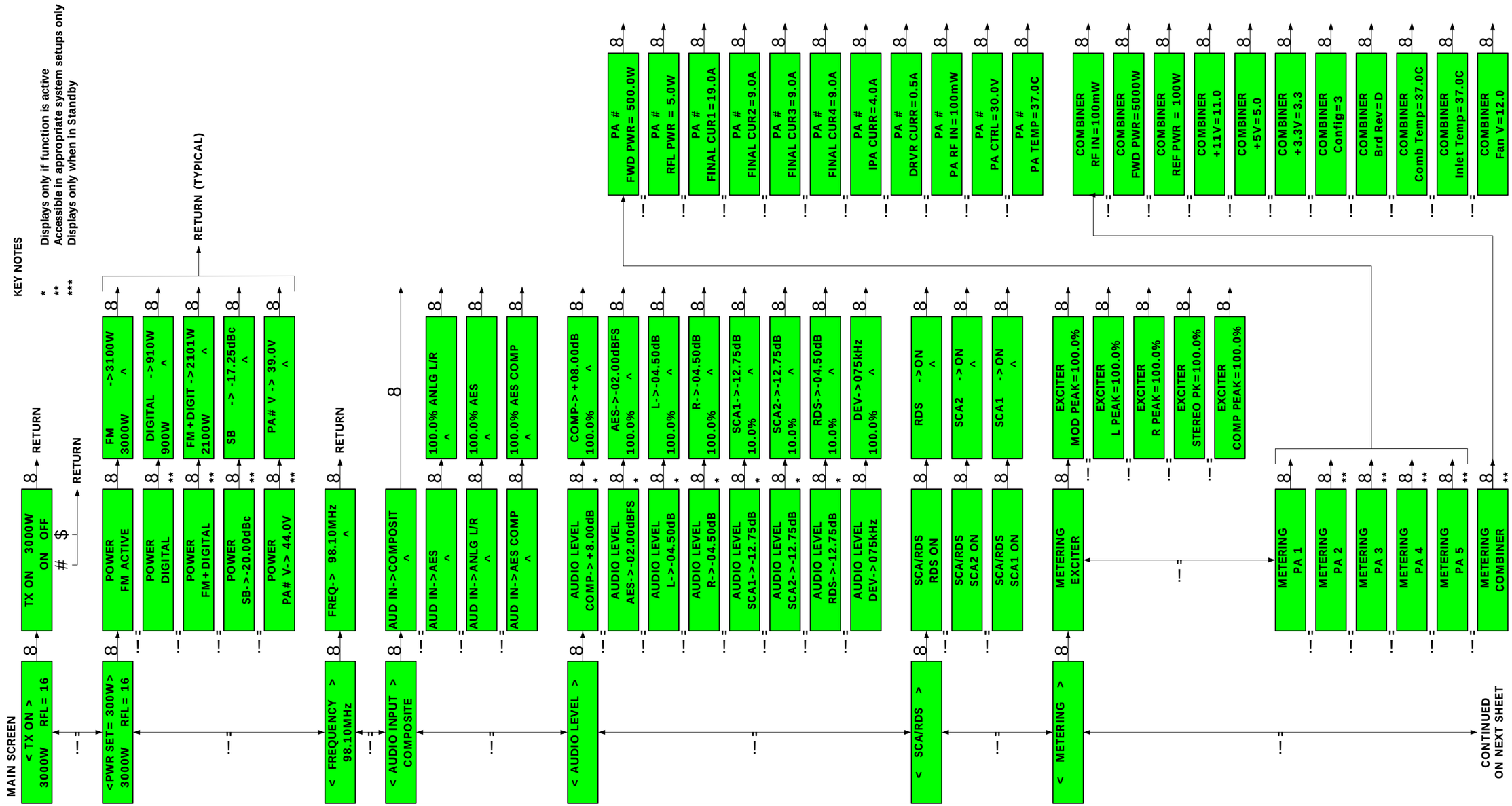


Figure 27 – Transmitter Control Center Menus Sheet 1

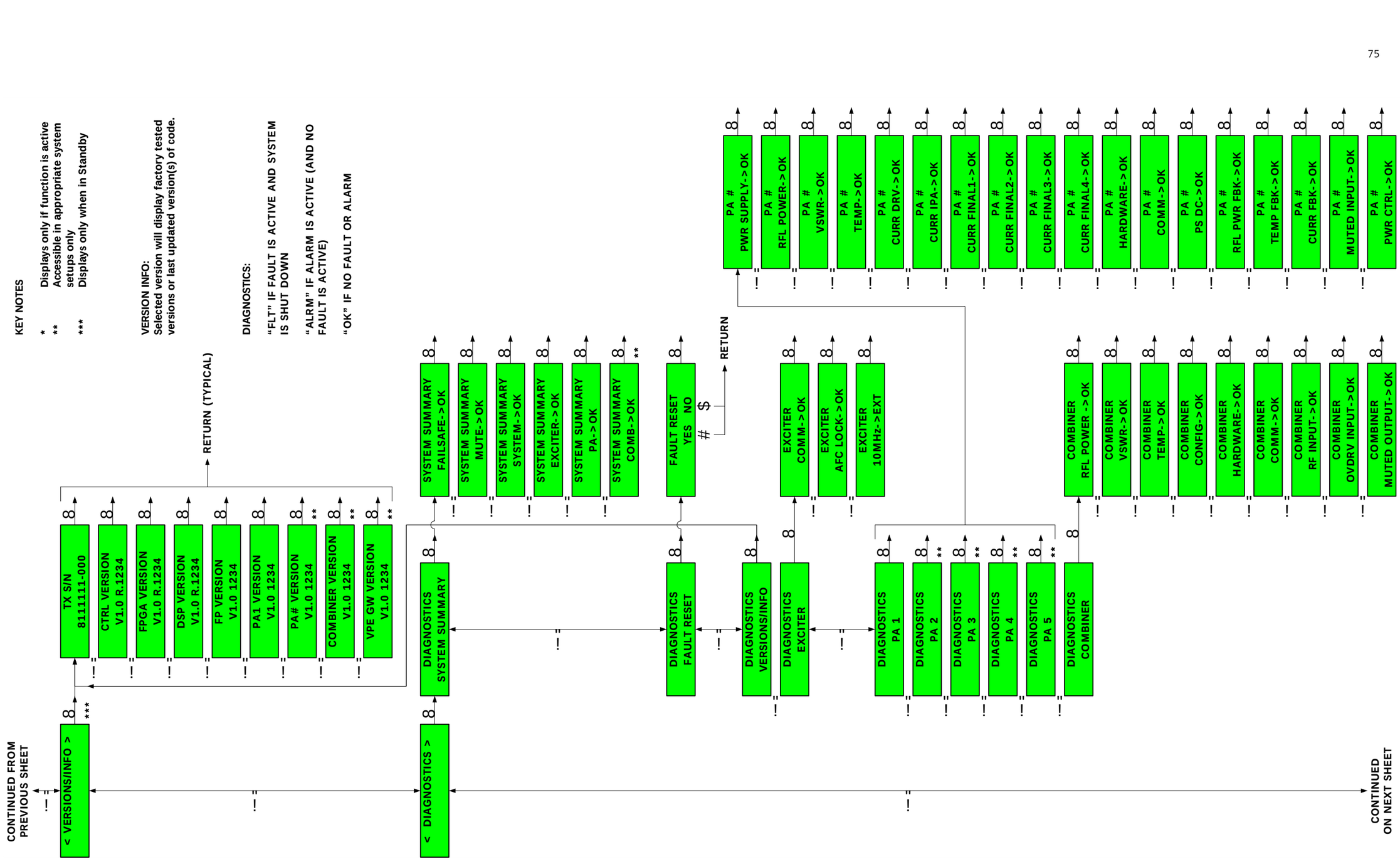
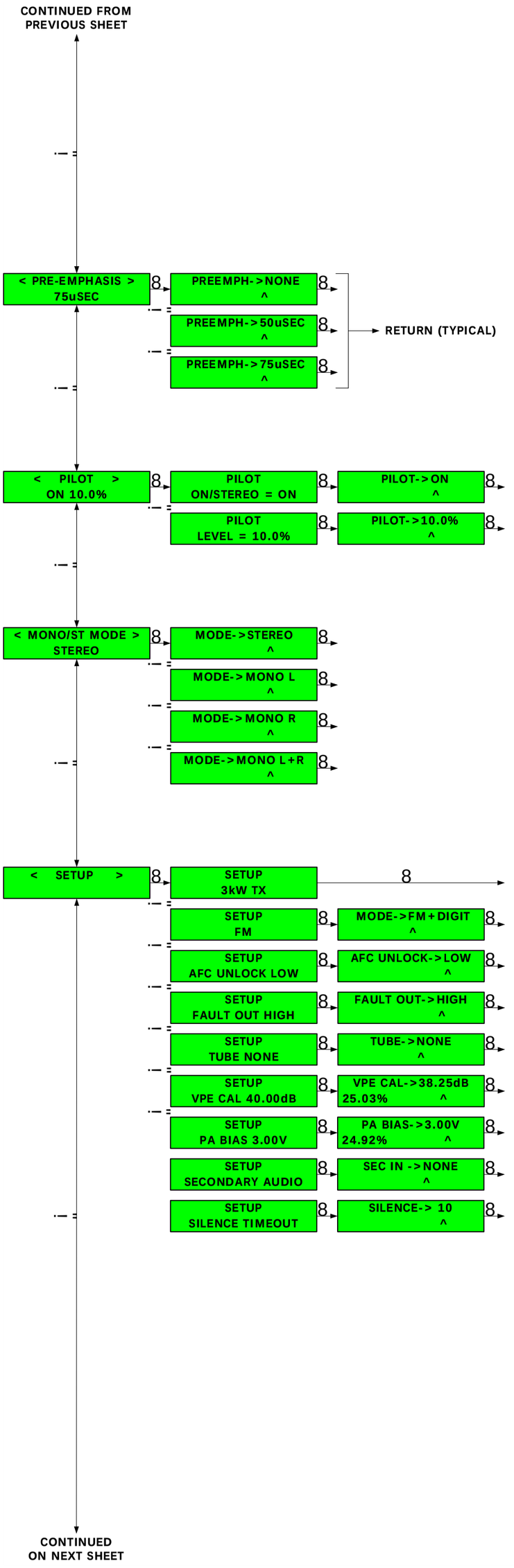


Figure 28 – Transmitter Control Center Menus Sheet 2



KEY NOTES

*	Displays only if function is active
**	Accessible in appropriate system setups only
***	Displays only when in Standby

Figure 29 – Transmitter Control Center Menus Sheet 3

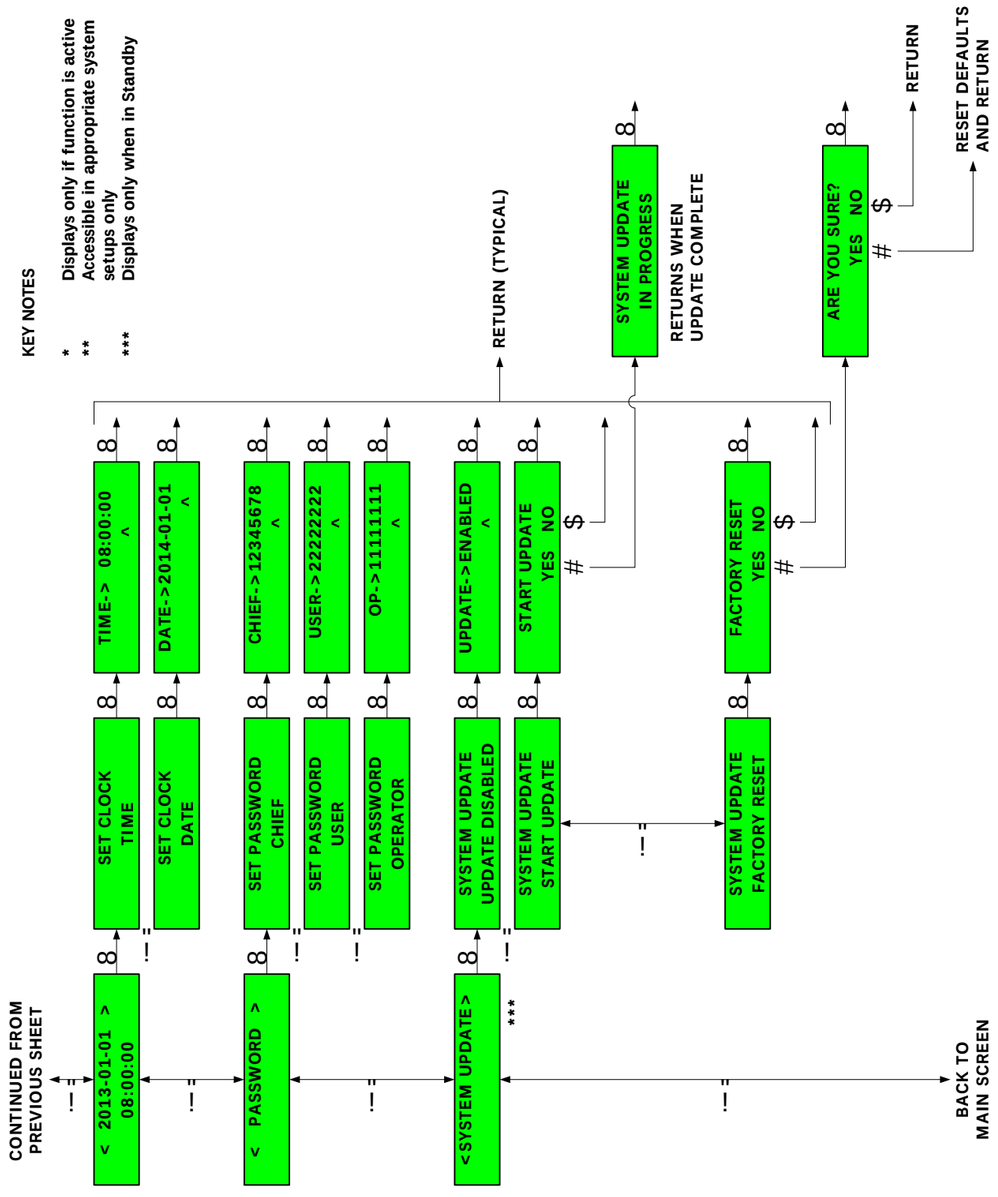


Figure 30 – Transmitter Control Center Menus Sheet 4

9 Basic Web Page

The STX LP Generation II comes with a built in HTTP web server monitoring and control interface. To load this page, direct a standard web browser to the IP assigned to the Ethernet port on the system.

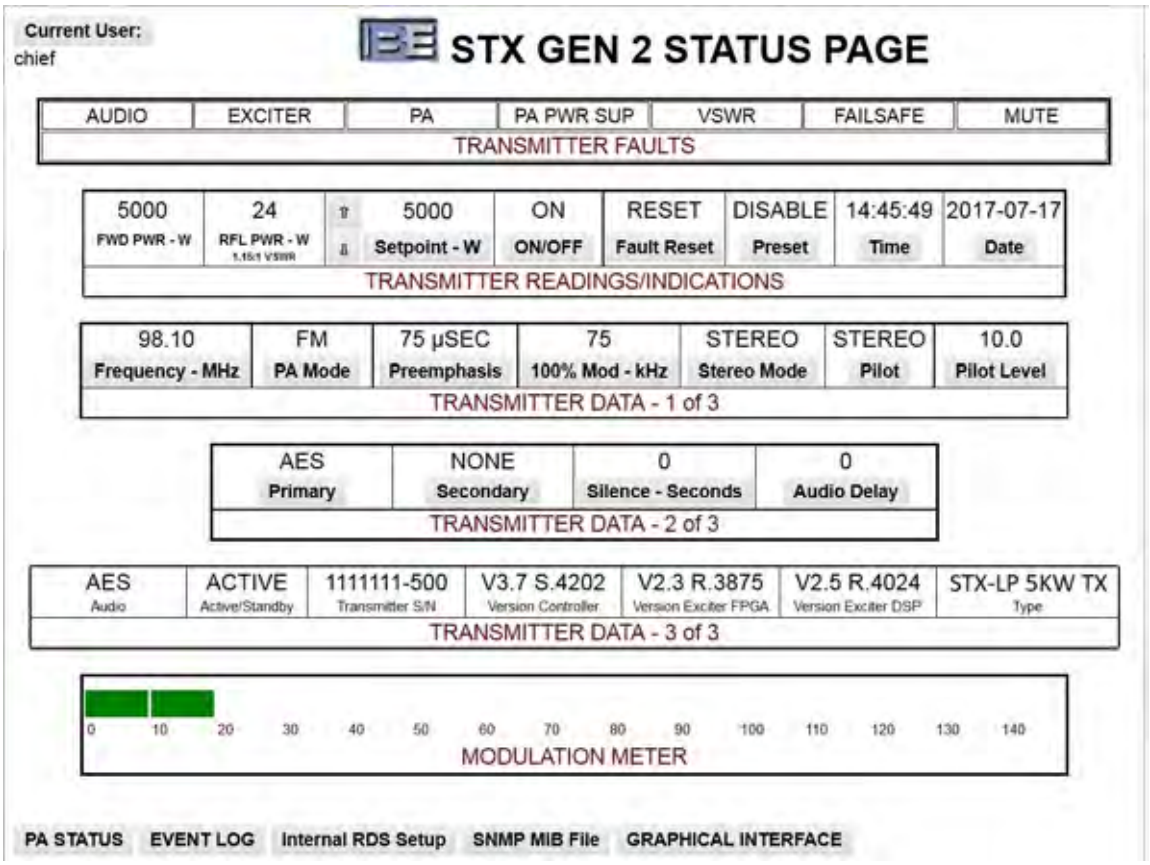


Figure 31 – Web Interface Main Page

The settings and monitoring fields in the system are shown above in Figure 31. Several of these fields allow settings to be selected. In these fields such as Exciter Settings, the row will expand as shown in Figure. To navigate to additional status, monitoring information, and other settings, click on the link buttons located on the bottom of the Main Page.

9.1 Login Profiles - Basic Web Page

Posting settings to the exciter and other settings in **bold** requires an appropriate login profle. If the text is not in **bold**, it is for monitoring only or it is disabled for user profiles that do not have permission to modify 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.

To switch profiles, such as" Chief" or "Operator", click the "Current User" link in the upper left. of the screen shown by the arrow in Figure 32. You can also click on a text field of the desired change in any of the option windows shown in Figure 33

The Authentication dialog box will pop up, as shown inFigure 32. Simply enter the user profile required and the correct 8-digit numerical password that goes with it to save the setting.

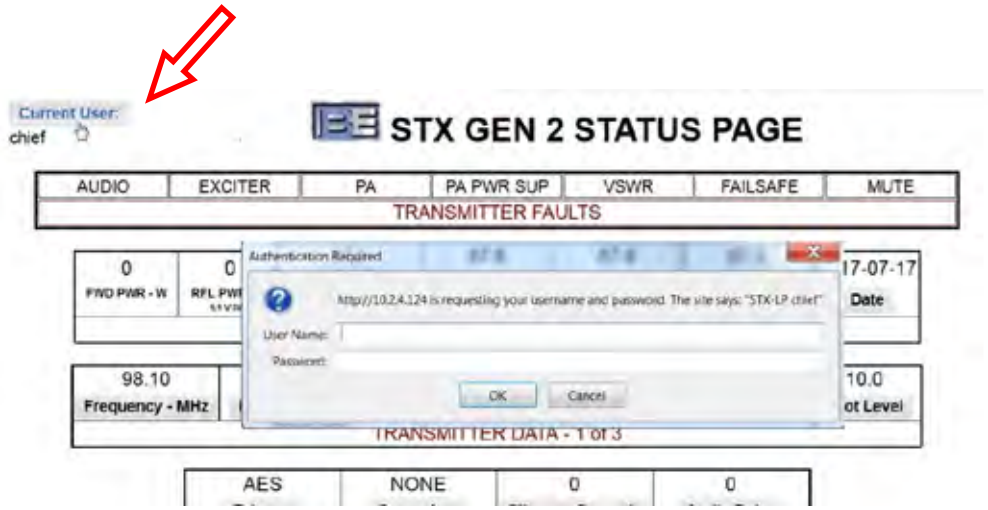


Figure 32 - Web Interface Authentication

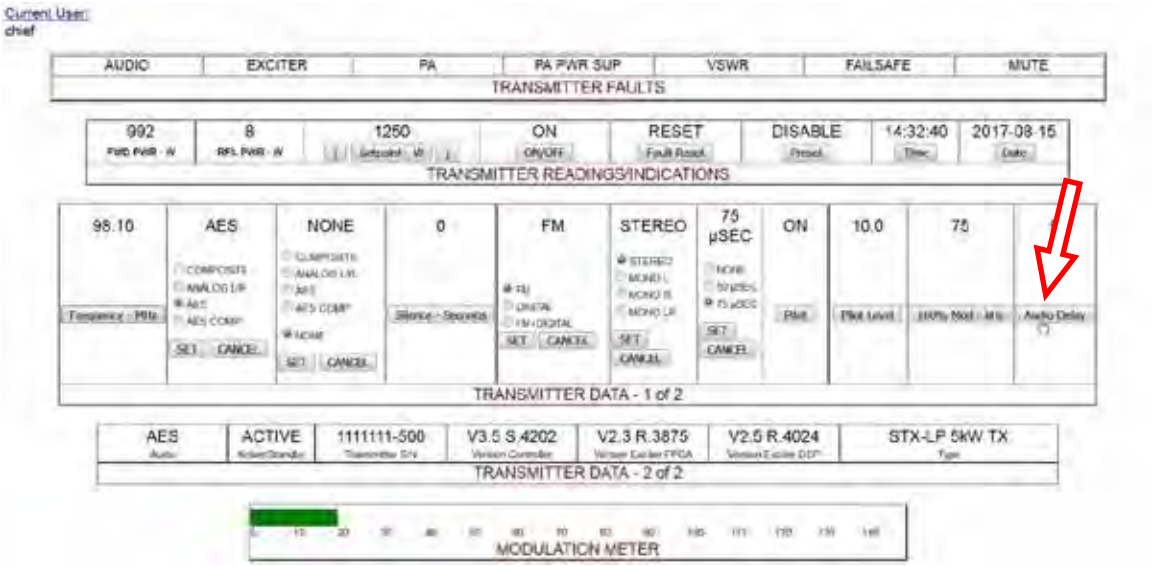
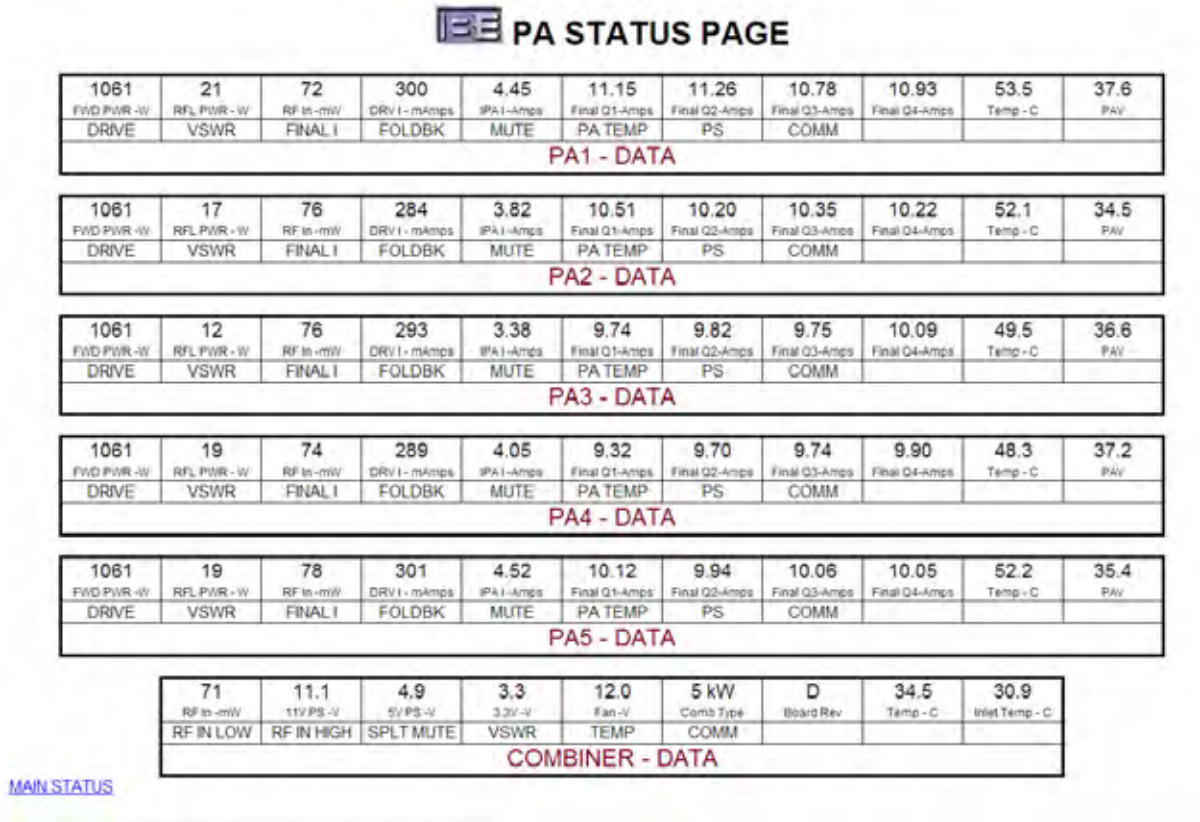


Figure 33 – Expanded View on Main Page



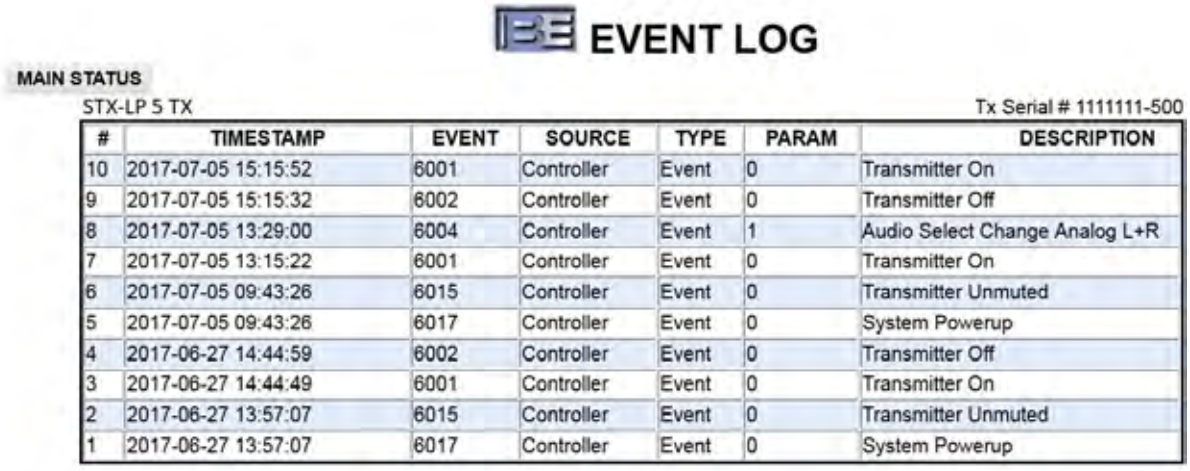
PA STATUS PAGE

FWD PWR -W	RFL PWR - W	RF In -mW	DRV I - mAmps	IPA I -Amps	Final Q1-Amps	Final Q2-Amps	Final Q3-Amps	Final Q4-Amps	Temp - C	PAV
1061	21	72	300	4.45	11.15	11.26	10.78	10.93	53.5	37.6
DRIVE	VSWR	FINAL I	FOLDBK	MUTE	PA TEMP	PS	COMM			
PA1 - DATA										
1061	17	76	284	3.82	10.51	10.20	10.35	10.22	52.1	34.5
DRIVE	VSWR	FINAL I	FOLDBK	MUTE	PA TEMP	PS	COMM			
PA2 - DATA										
1061	12	76	293	3.38	9.74	9.82	9.75	10.09	49.5	36.6
DRIVE	VSWR	FINAL I	FOLDBK	MUTE	PA TEMP	PS	COMM			
PA3 - DATA										
1061	19	74	289	4.05	9.32	9.70	9.74	9.90	48.3	37.2
DRIVE	VSWR	FINAL I	FOLDBK	MUTE	PA TEMP	PS	COMM			
PA4 - DATA										
1061	19	78	301	4.52	10.12	9.94	10.06	10.05	52.2	35.4
DRIVE	VSWR	FINAL I	FOLDBK	MUTE	PA TEMP	PS	COMM			
PA5 - DATA										

RF In -mW	11V PS -V	5V PS -V	3.3V -V	Fan -V	Comb Type	Board Rev	Temp - C	Inlet Temp - C
71	11.1	4.9	3.3	12.0	5 kW	D	34.5	30.9
RF IN LOW	RF IN HIGH	SPLT MUTE	VSWR	TEMP	COMM			
COMBINER - DATA								

MAIN STATUS

Figure 34 – Web Interface PA Status Page



EVENT LOG

MAIN STATUS

STX-LP 5 TX

Tx Serial # 1111111-500

#	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 35 – Web Interface Events Page

To check the current web page version, simply point a web browser to [IP Address]/rev.htm

9.2 RDS and FSK Setup

To enter static RDS information or FSK ID data such as Translator Identification, use the "Internal RDS Setup" link listed in the bottom of the Basic Web page, Figure 36, to access the RDS Setup Page, Figure 37.

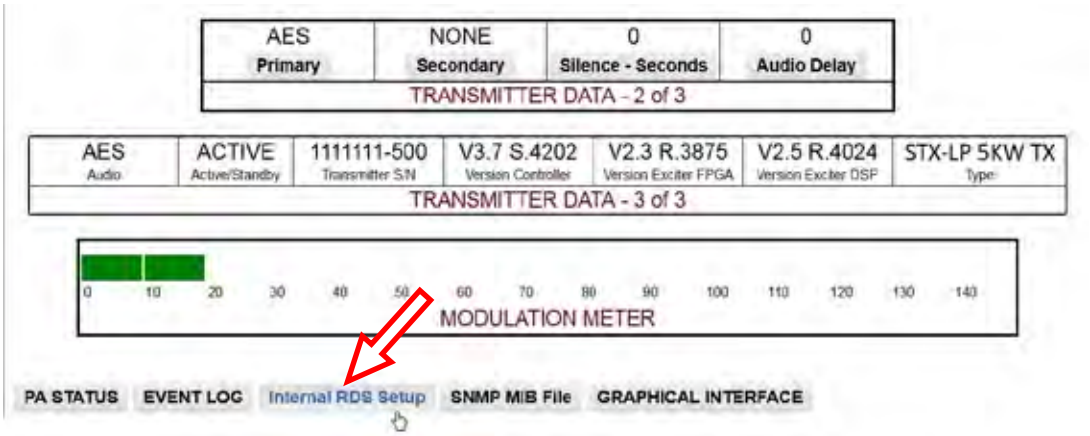


Figure 36 – Internal RDS Setup Link

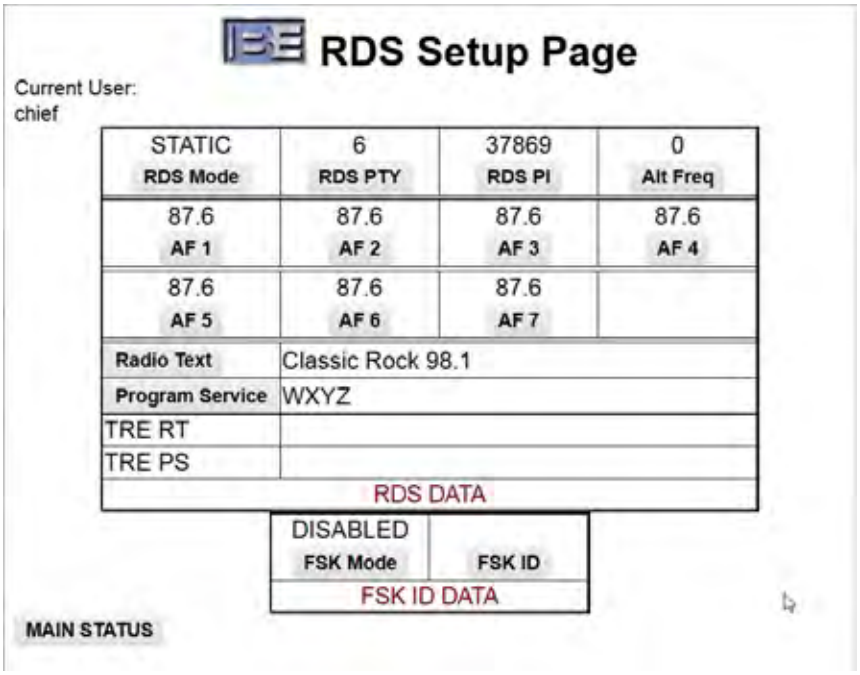
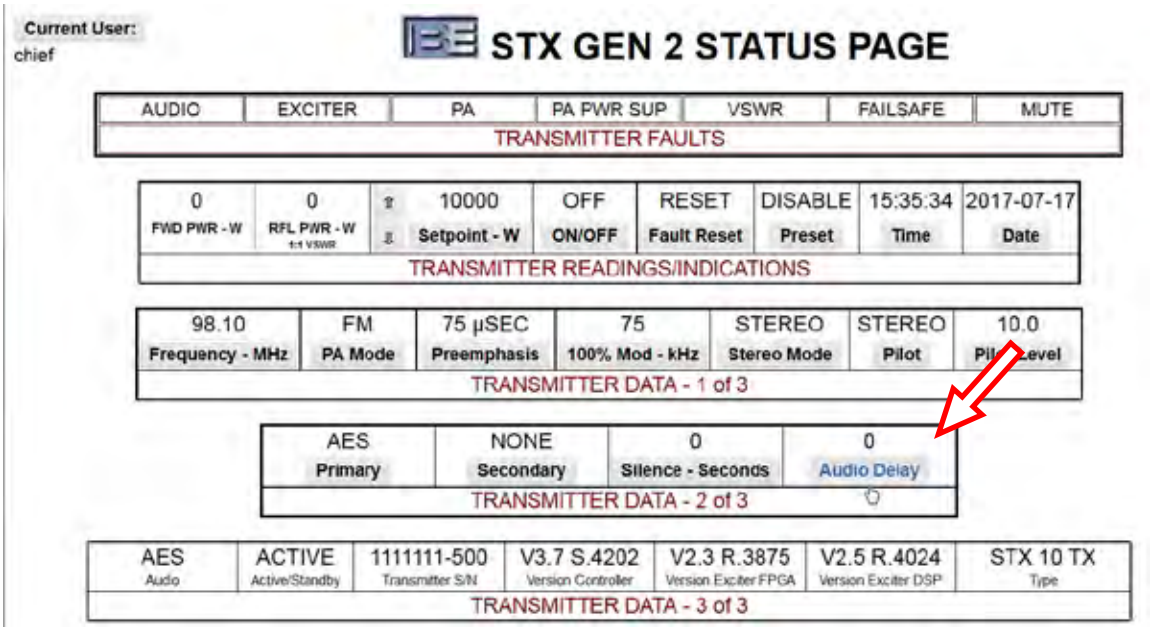


Figure 37 – RDS Setup Page

9.3 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.

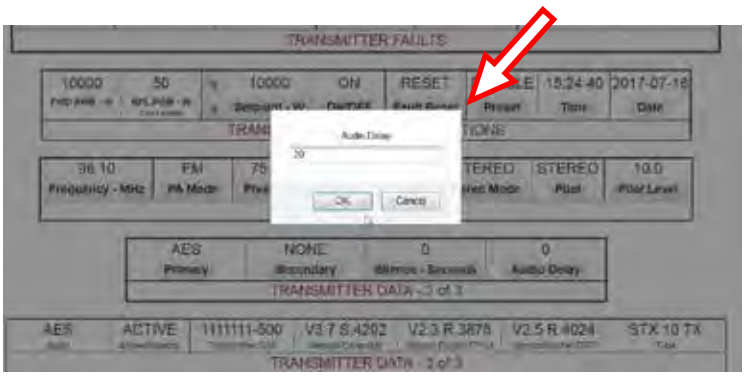


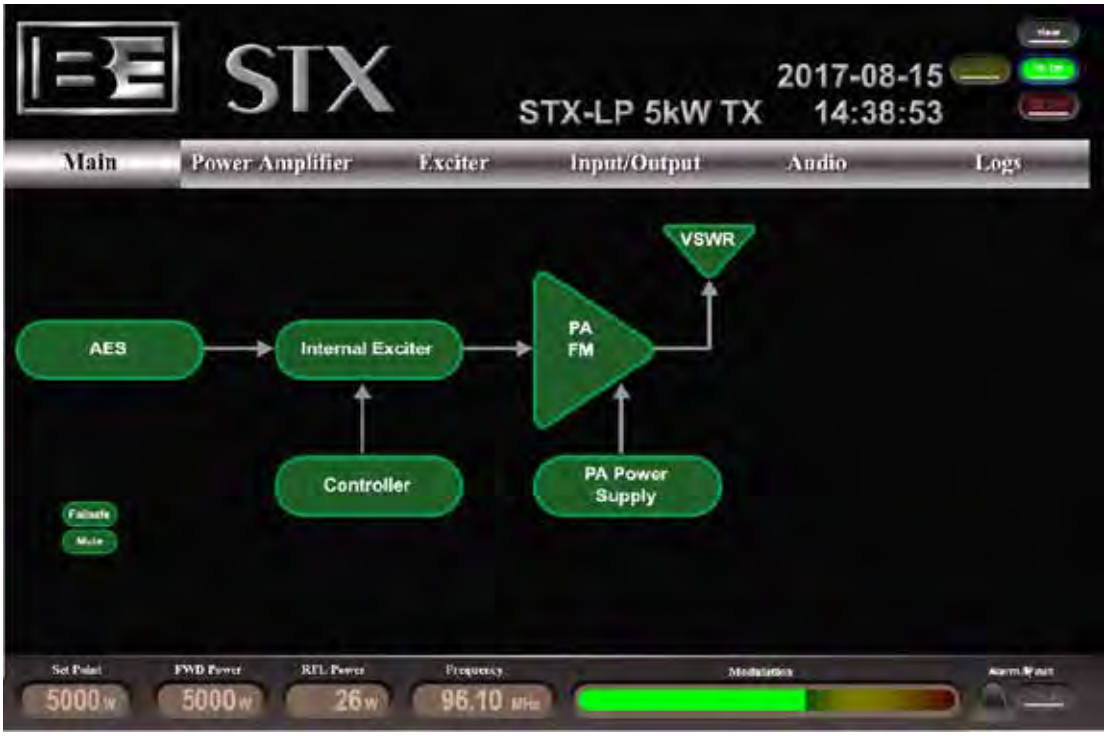
Figure 38 – Audio Delay Web Interface

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

10 Enhanced Web GUI

STX systems also come standard with an enhanced Web GUI. This provides a more intuitive viewing and control experience than the basic web HTML while still providing all the features and more. To access this page, click the "GRAPHICAL INTERFACE" link at the bottom of the basic web page.

Figure 39 – Link from Basic Web Page to GUI Main Page



Refer to Figure 40. While navigating the screen pages, buttons with 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 40 – GUI Pointer Icons

10.1 Login Profiles – GUI Web Page

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 A. The previous screen being displayed will change to that in Figure B. Move cursor into the desired profile. In this example "Chief" is being selected

Figure 41 – Login 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"

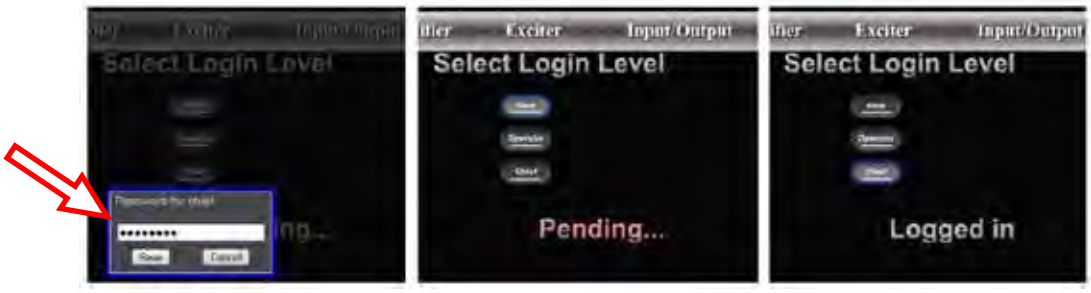


Figure 42 – Login Process

Figure 43 – Profile Logged Out

10.2 Navigation

The primary screens in the GUI can be accessed by clicking on the text in the Navigation Bar near the top of the page in Figure 44.

Figure 44 – Navigation Bar

10.2.1 Features & Items Always-Displayed Items

The Navigation Bar as well the Features and Items in Figure 45 are displayed in all screens

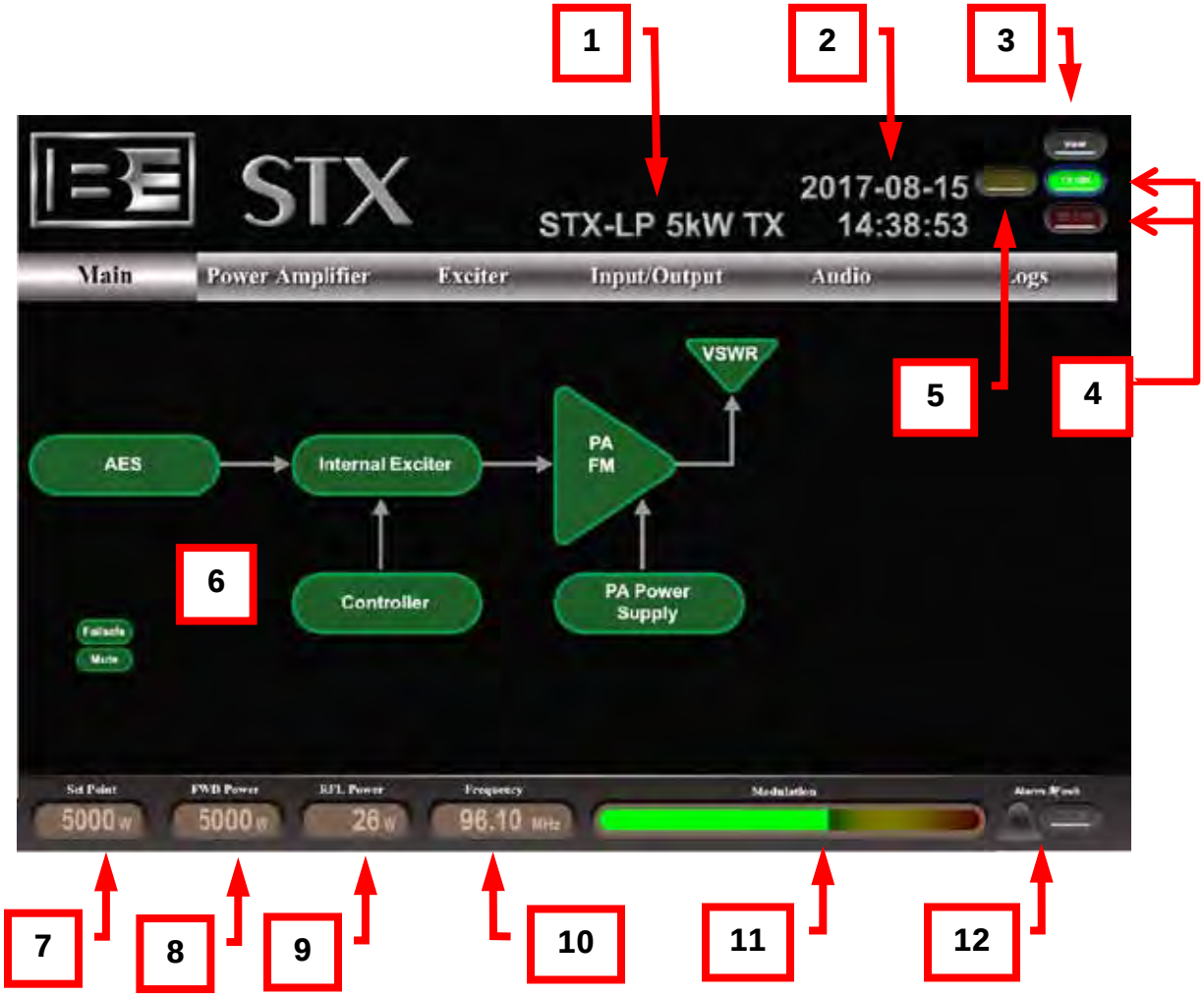


Figure 45 – Main Screen

Table 4 – Main Page and Common Features

#	Feature	Description
1.	STX System Type	Currently configured hardware setup type. This is determined during initial setup of the system, and might be 1kW, 2kW, 3kW, or 5kW TX (transmitter).
2.	Date and Time	Real time clock data configured during setup.
3.	Login Profile	Active login status displayed as View, Operator, or Chief and control button to change profile
4.	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 sufficient login level.
5.	Preset	Provides a secondary APC setpoint for setting power to a lower power level. When Preset is Enabled the setpoint is for the Preset APC setpoint
6.	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.
7.	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.
8.	Forward Power	Internally measured system forward RF power output reading.
9.	Reflected Power	Internally measured system reflected RF power reading.
10.	Frequency	FM carrier frequency setting.
11.	Modulation	Internal frequency modulation peak hold as a percentage of peak deviation from nominal frequency.
12.	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 used for Navigation

In any of the System Block Diagrams, many of the block figures will also provide navigation to the screen represented by the figure

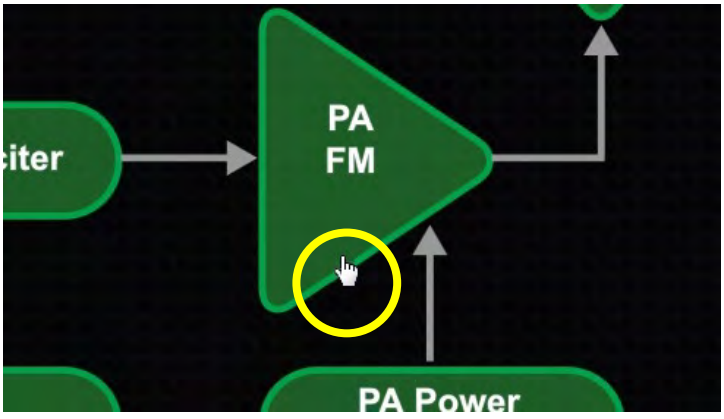


Figure 46 – Block Diagram for Navigation

10.3 Power Amplifier

The power amplifier page contains detailed status information for all power amplifiers in the system. In addition to power amplifier data, is a link to the combiner assembly via the COMB button.

Figure 47 – Power Amplifier Page

Underneath each PA 1 Data through PA 5 Data are the following measurement and status numbered from Top to Bottom in Table 5:

Table 5 – Power Amplifier Display Features

#	Feature	Description
1.	Forward Power FWD PWR (W)	PA forward RF power output reading. This is also the system forward output power in 1kW systems.
2.	Reflected Power RFL PWR (W)	PA reflected RF power reading. This is also the system reflected power in single-PA 1kW systems.
3.	RF Input Power RF In (mW)	PA RF drive input power reading in mili-Watts.
4.	Driver Current Driver (mA)	Current in milli-Amperes 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 see Table 10 – PA Diagnostics Details in section 13.6 for details.

10.4 Combiner

Data for the Combiner Assembly is displayed on this web page.

Figure 48 – Combiner Display

Table 6 – Combiner Display Features

#	Feature	Description
1.	Forward Power FWD PWR (W)	System forward RF power output reading.
2.	Reflected Power RFL PWR (W)	System reflected RF power reading.
3.	RF Input Power RF In (mW)	Splitter RF drive input power reading in mili-Watts.
4.	Inlet Temperature Inlet Temp (C)	Front inlet temperature measurement in degrees Celsius.
5.	Combiner Temperature Combiner Temp (C)	Internal heat sink temperature measurement in degrees Celsius.
6.	PS Measurements	Measurements in Volts for fixed DC power supply voltages.
7.	Status Balloons	Fault and alarm indications for the splitter and combiner systems. Check the log or see Table 11 – Combiner Diagnostics Details in section 13.7 for details.

NOTE:

The Combiner page in not listed on the Navigation Bar, but via the Power Amplifier page with a dedicated link button. The link button toggles to "PA" to return to the Power Amplifier. As normal, the Navigation Bar allows you return to the Power Amplifier page or any other page selected.

Figure 49 – Exciter Page

Table 7 – Exciter Page Features

#	Feature	Description
1.	Primary	Primary 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	Mono/stereo setting for stereo generation.
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.	Audio Delay	Audio Delay displayed in steps from 0 to 8128 as detailed in Section 9.2

10.6 Input/Output

Figure 50 – 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 5.1.1 for detailed function descriptions.

10.7 Audio

Figure 51 – Audio Page

Table 8 – Audio Page Features

#	Feature	Description
1.	Source	Audio input source selection. Choose one of the listed options. This duplicates 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 % of peak modulation. Composite Mod includes Unbalanced Composite, SCA1, SCA2, and RDS inputs.
5.	SCA 1,and SCA 2	Allows on/off control and input hardware amplification/attenuation adjustment.
6.	RDS	Allows on/off for an external RDS or mode control of the internal RDS, (Static vs From TRE)
7.	FSK	Allows on/off control and setting adjustment.

10.8 Logs

Figure 52 – Logs Page

#	Feature	Description
1.	Event #	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.	Type	Type category identification in a readable format.
6.	Parameter	Event-specific value for logging some changes.
7.	Full 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 forever. NOTE: Only displays when in the "Chief" login profile.
10.	Serial Number	Displays BE serial number and controller Ethernet MAC.
11.	Software Versions	Listing of all viewable software versions in the system.

10.9 Other Features - VSWR vs Reflected Power

Another feature added to the revision of GUI is to either display Reflected Power or VSWR shown in Figure 53

The display can be toggled to either mode with proper login profile

Figure 53 – RFL Power vs VSWR Feature

11 SNMP

Simple Network Management Protocol is a member of the Internet Protocol standard communications suite. The STX LP Generation II 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 transmitter must be downloaded from the transmitter 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 BE.

To download the file access the web interface using a standard web browser. Right click on the link titled "SNMP MIB File" and then "Save link as…", 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.

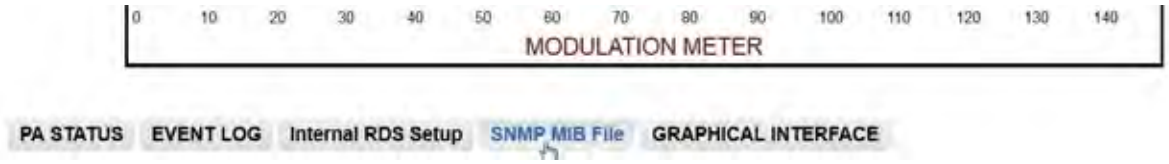


Figure 54 – MIB Download

An SNMP manager application must be utilized in order to access the interface. Integrating a manager into custom station automation programs provides countless 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 8 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 types provide more strict control over what settings can be modified and commands 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 ".#" to the object where # is the PA number. 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

STX Generation II systems come equipped with two backup control methods. Emergency control mode is integrated standard with all systems and simply allows the system to continue functioning in the event of a system controller failure. The backup system control and exciter feature utilizes an entire controller and exciter sub-system to also allow for full control interfacing with an identical synchronized internal 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. This 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 transmitter will continue to function at full emergency power as long as the exciter maintains drive to all power amplifiers. 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 system control and internal exciter redundancy an exciter switcher option can be acquired. These packages supply all required hardware for utilization of standby units in STX LP Generation II transmitters.

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 for long periods of time 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 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 STX LP Generation II 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 also be able to have no more than one unit active at a time.

If a system is stuck 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 BE Interface jack, see section 3.6 Broadcast Electronics-Interface active stub. Dual system controller and exciter setups require a switcher 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 exciters this commonly occurs when:

- There is no power to the exciter
- The transmitter is turned off
- 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
- VPeXG setup presence GPIO input is active when no VPeXG is in the system, or is not activated when it is in the system.

13.5 Internal Exciter Diagnostics

Table 9 – 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 10 – 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 PA control hardware.
Communication Fault	This fault occurs when communication between the system controller and the PA is lost.
Power Supply DC Alarm	This alarm is asserted when there is a fault with the DC power regulator. It will occur if any of the regulated DC voltages are outside acceptable levels. This alarm will not occur when the PA is turned off for any reason, e.g. when the transmitter RF is off.
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 worst case 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.

13.7 Combiner Diagnostics

Table 11 – Combiner Diagnostics Details

Fault/Alarm	Description
Reflected Power Fault	This fault activates when a sudden increase in reflected power is detected by hardware in the combiner.
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.
Config Fault	This fault activates when the system setup does not match the configuration of the combiner.
Hardware Fault	This is an internal self-report of problems in combiner controller hardware.
Communication Fault	This fault occurs when communication between the system controller and the combiner is lost.
Muted Splitter Input Alarm	No longer used. RF mute protection occurs at the PAs to ensure correct operation in both FM and digital modes.
Overdriven Splitter Input Alarm	This alarm activates when the exciter drive input to the splitter is above the maximum threshold for safe operation, about 24 dBm.
Muted Splitter Output Alarm	This alarm activates when the exciter drive outputs from the splitter are turned off by the combiner controller due to problems in the combiner module and its sub-systems. Reflected power fault, temperature fault, and overdriven splitter input alarm will disable the splitter output.

14 Maintenance

ENSURE AC POWER INPUT IS COMPLETELY DISCONNECTED BEFORE ACCESSING ANY INTERNAL COMPONENTS

14.1 Clean Air Filters and Check Fans

STX LP Generation II systems come standard with snapped washable air filters for each system module. 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 (they will eventually break down after years of operation).

To remove the filter from the front of the system module, use the opening on the bottom to pry the snaps on either side by hand. Repeat on the other side.

Figure 55 – Air Filter Removal

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

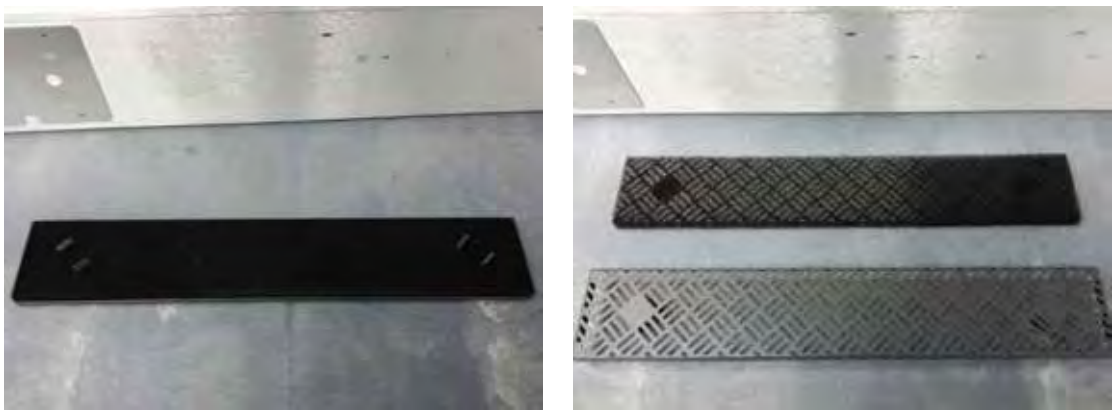


Figure 56 – Separated Air Filter

Snap the air filters back on all modules once they are clean.

Carefully pinch to tighten the snaps if the case became loose enough to rattle.

14.2 Main Power Supply

☐ 540-0016-007 Power Supply Assembly, 53VDC 2kW
☐ Phillips Screwdriver

1. Using a Phillips screwdriver, remove the screws securing the power supply cover plate and remove the plate by swinging it out.

2. Insert a Phillips screwdriver into the exposed holes and loosen the screws enough to allow the retaining bracket to slide.

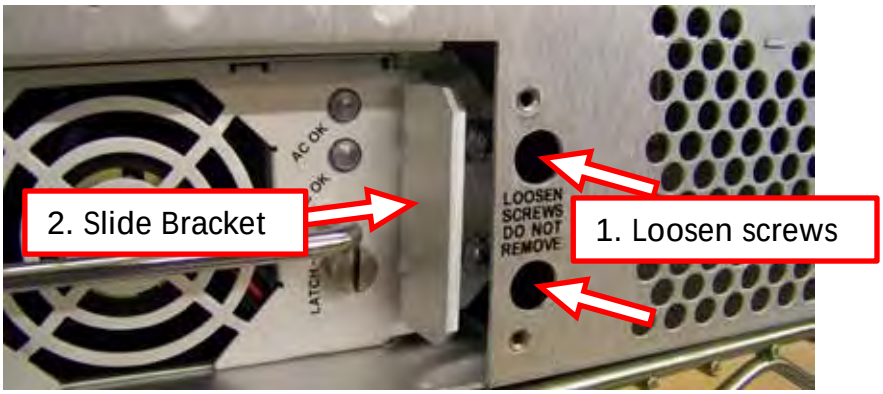


Figure 57 – Power Supply Retaining Bracket

3. Unlatch the power supply by rotating the latch knob counterclockwise.

4. Carefully pull the power supply by the handle until it slides out of the chassis.

5. Insert the new power supply, slide it all the way in, and firmly push to engage the power supply with its blind mate connector.

6. Ensure full connection by rotating the locking knob clockwise to engage the latch.

7. Slide the retaining bracket in front of the flange and tighten the screws.

8. Replace the cover and secure it with screws.

14.3 Low Voltage Power Supply

☐ (See figures below for BE part number) Low Voltage Power Supply Assembly
☐ Phillips Screwdriver

Low voltage power supplies produce DC that is +/-12V or less. These power supplies run low power PA stages, fans, and logic boards. Main assemblies have three of these power supplies each, add-on assemblies have two each, and combiner assemblies have two each. All of these low voltage power supplies have identical footprints, but their functions are all very different.

MIXING UP POWER SUPPLIES WILL RENDER THE AFFECTED SYSTEM INOPERABLE AND MAY CAUSE DAMAGE TO INTERNAL COMPONENTS. CAREFULLY IDENTIFY THE POWER SUPPLY THAT NEEDS TO BE REPLACED.

To replace any of these power supplies:

1. Identify the power supply to replace:

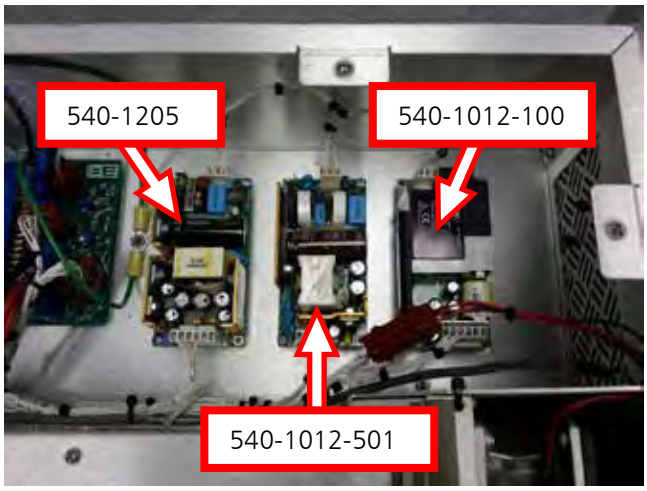


Figure 58 – Main Assembly Low Voltage Power Supplies

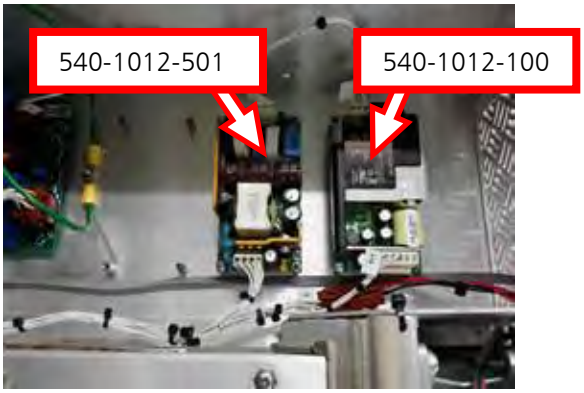


Figure 59 – Add-on Assembly Low Voltage Power Supplies

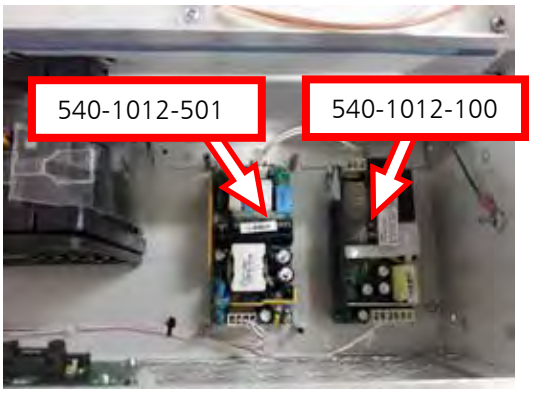


Figure 60 – Combiner Power Supplies

2. Disconnect AC and DC cable harnesses.
3. Remove the two corner screws.
4. Lift up carefully to disengage the snaps in the other two corners.
5. Note the orientation of the replacement supply so that the two AC pins are facing the AC harness. Snap the power supply into place.
6. Secure the power supply with screws to ensure proper grounding and safety in any future shipping.
7. Reconnect both cable harnesses.

14.4 Combiner Fan

☐ 380-9006-001	1	Counter-rotating fan, 12V DC with connector
☐ 402-0001	2	Ty-wrap
☐ Side Cutters		
☐ Phillips Screwdriver		

1. Use a Phillips screwdriver to remove the combiner assembly top cover.
2. Disconnect the fan's cabling by disengaging the latch.
3. Cut any tie-wraps that secure the fan to the internal section of the chassis.
4. Carefully disengage the fan harness by twisting the end and sliding it through the slot.
5. Lift the fan out of the chassis.
6. Lower the replacement fan assembly into place.
7. Secure the fan with the harness for safety in any future shipping.
8. Further secure the fan to the chassis with tie-wraps to ensure good air flow.
9. Connect the fan's cable harness to the appropriate jack on the pcb.

14.5 Main/Add-on Fan

☐ 380-9007-001	1	Fan, 12V DC with connector
☐ 402-0000	1	Ty-wrap
☐ Side Cutters		
☐ Phillips Screwdriver		

1. Use a Phillips screwdriver to remove the main/add-on assembly top cover.
2. Disconnect the fan's cable harness.
3. Cut the tie-wrap that ties the fan assembly to the chassis.
4. Lift the assembly out of the unit.
5. Replace the failed fan in the assembly.
6. RE-insert the new fan assembly by lining up the edges in the mounting channels and gently lowering it into the chassis.
7. Tie-wrap the assembly to the chassis for future safe shipment.
8. Connect the cable harness.
9. Replace the main cover.

14.6 Front Panel Board

☐ 919-4070-100	STX LP Gen II Front Panel Display Board	
☐ 402-0000	1	Ty-wrap
☐ Side Cutters		
☐ Flat Screwdriver		

1. Repeat steps 1 through 4 in section 14.5 Main/Add-on Fan to provide space for removal of this board.
2. Use a flat blade screwdriver to disengage the latch on the cable harness connected to the board.
3. Use a flat blade screwdriver to gently pry the board from its snap mounts and pull the board from the chassis.
4. Gently snap on the new front panel board ensuring that all snaps are completely engaged.
5. Connect the cable harness
6. Repeat the remaining steps in section 14.5 Main/Add-on Fan to restore the fan assembly to its original state.

14.7 Power Amplifier

Tasks in this section require removal and replacement of both the top cover and the secondary power amplifier cover. Follow these steps to access power amplifier components:

1. Use a Phillips screwdriver to remove the top cover of the main/add-on assembly in which the PA is located.

2. Use the same Phillips screwdriver to loosen all PA cover screws. Lift the cover until the top of the lid reaches the top of the chassis. Carefully swing the lid up to clear the screw standoffs from running into the low pass filter coils and slide the lid out.

When tasks in this section are complete, simply execute these steps in reverse to return the system to a safe operating state.

14.7.1 PA Assembly

☐ 979-4101-200		PA and 4-1 combiner field replacement kit
☐ 471-4223	1	PA shipping panel
☐ 597-4101-001	1	Application Guide, STX amplifier field service
☐ 700-0028-004	1	Thermal joint compound
☐ 959-4101-200	1	PA and 4-1 combiner assembly
☐ Tools		(please refer to included guide for details)

See the application guide that ships with the field service kit for detailed replacement instructions.

14.7.2 Final Amplifier Transistor

☐ 210-2932	RF power transistor
☐ 700-0028-004	Thermal joint compound

☐ Soldering Iron(s)

Note: Adequately sized soldering irons are required to complete step 3. If you do not have adequate soldering irons, do not attempt this task.

☐ Solder, silver-based high temperature
☐ Solder Wick
☐ Phillips Screwdriver
☐ 6 in-lb Torque Phillips Screwdriver

BROADCAST ELECTRONICS (B.E.) WILL ONLY HONOR WARRANTY CLAIMS ON TRANSISTORS THAT ARE INSTALLED BY B.E. PERSONNEL OR AN AUTHORIZED B.E. REPRESENTATIVE.

1. Identify the final stage amplifier to be removed – Q1 is Final 1, etc.
2. Remove the two screws securing the transistor to the heat sink.
3. Use soldering irons to lift the (smaller) gate leads.
4. Use soldering irons again to lift both the (larger) output leads and remove the transistor.
5. User solder wick to remove all solder from these locations on the board.

6. Wipe to remove excess thermal compound.
7. Lightly and carefully apply an even and thin coat of thermal compound to the bottom of the new transistor.
8. Place the transistor in its spot and secure it with screws. Tighten to 6 in-lb.
9. Solder all leads to the board assembly.

If swapping final amplifiers in this manner does not yield good operating results, the PA assembly may need to be sent in for repair and tuning.

14.7.3 Low-Pass Filter Assembly

☐ 919-4060-100 Low Pass Filter Board Assembly
☐ Soldering Iron(s)

Note: Adequately sized soldering irons are required to complete step 1. If you do not have adequate soldering irons, do not attempt this task.

☐ Phillips Screwdriver
☐ 3/4" wrench
☐ 5/8" wrench

1. Use two large soldering irons to heat both sides of the conductors between the power amplifier's combiner circuit board and the low pass filter circuit board. Slide the conductors one at a time onto the combiner circuit board enough to clear the low pass filter.
2. Disconnect the ribbon cable connecting low pass filter to the power amplifier circuit board.
3. Use a 3/4" wrench to loosen and remove the nut securing the N-connector to the back panel.
4. Use a 5/8" wrench to loosen and remove the nut securing the BNC RF Sample jack. Set the sample cable and BNC to the side.
5. Use a Phillips screwdriver; Start by removing the screw at the front of the chassis and work your way to the back to remove all screws securing the low pass filter to the heat sink.
6. Carefully swing the board up, pivot slightly to avoid the chassis, and slide out the coax and N-connector.
7. Repeat all of these steps in reverse to install the replacement.

14.8 Splitter

☐ 959-4205-102 2kW Splitter Assembly. or
☐ 959-4205-103 3kW Splitter Assembly or
☐ 959-4205-105 5kW Splitter Assembly
☐ Phillips Screwdriver

1. Disconnect communication, exciter drive in, and splitter RF out cables from the splitter.
2. Use a Phillips screwdriver to remove the two screws securing the splitter board.
3. Slide the board out and disconnect the ribbon cable.
4. Repeat all these steps in reverse to install the replacement. When sliding the replacement into place be mindful of the slide channels for the board.

14.9 Add-on PA Controller

☐ 919-4201 Add-on Controller Board Assembly
☐ Phillips Screwdriver

1. Use a Phillips screwdriver to remove the main/add-on assembly top cover.
2. Disconnect the PA ribbon cable.
3. Use a Phillips screwdriver to remove the single screw holding the board to the chassis.
4. Gently disengage the snaps and carefully swing the board up to remove it from the chassis.
5. Repeat all of these steps in reverse to install the replacement.

14.10 System Controller and Exciter

☐ 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. Use a Phillips screwdriver to remove the top cover of the main assembly.
2. Disengage the latch on the power cable harness and disconnect it from the board.
3. Disengage the latch on the front panel harness and disconnect it from the board.
4. Disconnect the ribbon cable.
5. Unscrew the 10 MHz SMA cable and disconnect it.
6. Gently pull the 1PPS SMB cable and disconnect it. Do not yank the cable – use a set of pliers for sufficient grip on the cable end if necessary.
7. Disconnect all cabling from the back panel jacks.
8. Use a 3/16" nut driver to remove the four D-Subminiature jackscrews.
9. Use a Phillips screwdriver to remove the screws on the XLR connectors – 2 per connector.
10. Use a 9/16" wrench to remove all six nuts from the BNC connectors.
11. Use a Phillips screwdriver to remove the single screw holding the board to the chassis.
12. Disengage both snaps by reaching under both sides of the rear of the board and gently lifting up.

13. Swing the board up and slide it out of the back panels. Be mindful of the XLR jack latches – they will typically catch on the chassis.

14. Repeat all of these steps in reverse to install the replacement.

14.11 Power Output with PA Failures

For STX LP – 2 kW, 3 kW, and 5 kW models, the transmitter will attempt to maintain on-air operation during a PA failure. For example, if a 3 kW unit is operating at 3 kW and one PA fails completely, the unit will output a specific output power level. If a 3 kW unit is operating at 1.3 kW, the transmitter will increase the output power in the remaining 2 operating PAs to maintain a 1.3 kW power level. A 5 kW unit will operate in a similar manner with the addition of ambient air de-rating.

The following text presents the typical output power for complete PA failure conditions. If a PA unit fails partially (such as 1, 2, or 3 final transistors), the transmitter output power will be higher than shown.

Table 12 – 2KW Models w PA Failure

FAILURE CONDITION – 2kW Models	RF OUTPUT LEVEL
Programmed Output Between 2 kW and 500W with 1 Failed PA.	500 Watts

Table 13 – 3kW Models w PA Failure(s)

FAILURE CONDITION – 3kW Models	RF OUTPUT LEVEL
Programmed RF Output :	
Between 3 kW and 1333 W with 1 Failed PA. Between App. 1332 kW and 750 W with 1 Failed PA	1333 Watts. Programmed RF Output.
Between 3 kW and 750 W with 2 Failed PAs	333 Watts.

Table 14 – 5kW Models w PA Failure(s)

FAILURE CONDITION – 5kW Models	RF OUTPUT LEVEL
Programmed RF Output :	
Between 5 kW and App. 3200 W with 1 Failed PA at 18C. Between App. 3200 W and 1250 W with 1 Failed PA at 18C	3200 Watts. Programmed RF Output.
Between 5 kW and App. 3150 W with 1 Failed PA at 20C. Between App. 3150 W and 1250 W with 1 Failed PA at 20C.	3150 Watts. Programmed RF Output.
Between 5 kW and App. 2800 W with 1 Failed PA at 30C. Between App. 2800 W and 1250 W with 1 Failed PA at 30C.	2800 Watts. Programmed RF Output.
Between 5 kW and App. 2500 W with 1 Failed PA at 40C. Between App. 2500 W and 1250 W with 1 Failed PA at 40C.	2500 Watts. Programmed RF Output
Between 5 kW and App. 2133 W with 1 Failed PA at 50C. Between App. 2133 W and 1250 W with 1 Failed PA at 50C.	2133 Watts. Programmed RF Output.
Between 5 kW and 1250 W with 2 Failed PAs	1800 Watts.
Between 5 kW and 1250 W with 3 Failed PAs	800 Watts.
Between 5 kW and 1250 W with 4 Failed PAs	200 Watts.

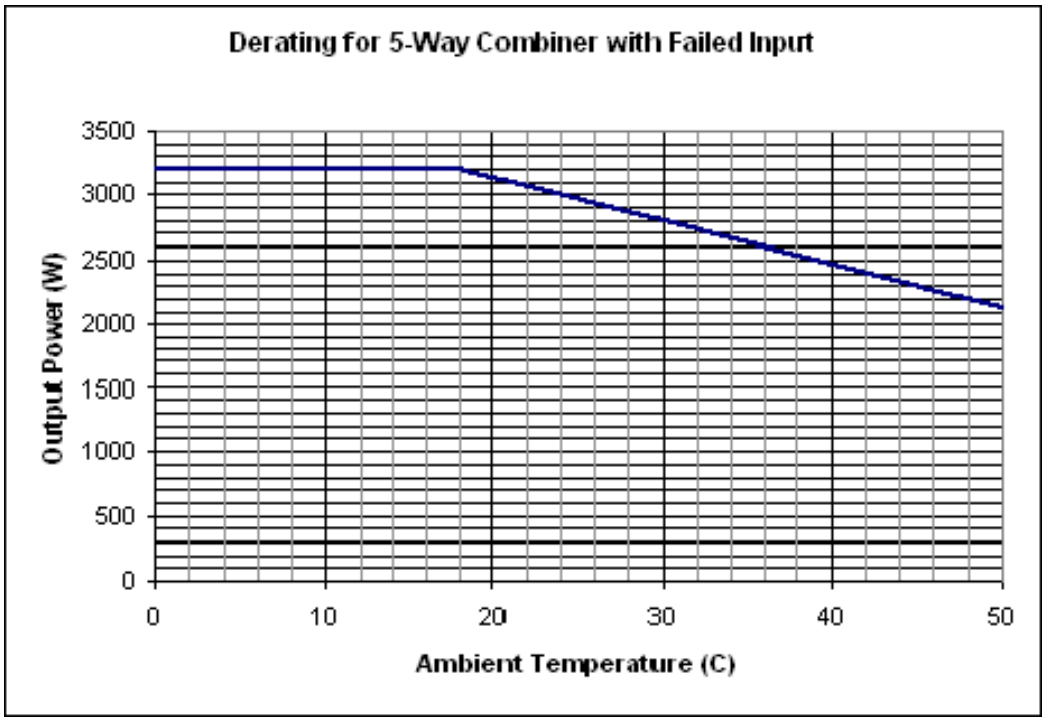


Figure 61 – 5-Way Combiner Derating Curve