Instruction Manual

Innovator, CLV1TD/CLV1RD (500W) to CLV4TD/CLV4RD (2000W)

VHF Low Band, ATSC Transmitter/ Regenerative Translator w/Adaptive Modulator

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NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to pro-vide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Chapter 1 Introduction

1.1 Manual Overview

This manual contains the description of the Innovator CLV1TD/CLV1RD through CLV4TD/CLV4RD Transmitter/Regenerative Translator and the circuit descriptions of the boards, which make up the system. The manual also describes the installation, setup and alignment procedures for the system. **Appendix A** of this manual contains the system level drawings for the Innovator CLV1TD/CLV1RD through CLV4TD/CLV4RD ATSC Transmitter/Regenerative Translator System that was purchased.

NOTES: If your system contains Dual Exciters with a Remote Interface Panel and Exciter Control Panel, information and drawings on the system and panels are contained in the separate Remote Interface Panel instruction manual. Information on the optional K-Tech Receiver or Signal Converter, if part of the system, is contained in the separate manufacturers supplied manual. Information on the optional UPS, if part of the system, is contained in the separate manufacturers supplied manual.

1.2 UBS-Axcera Numbering System Explanation

The UBS-Axcera numbering system is explained as follows - CLV2RD system.

C – CX Series, H – HX Series
LV – Low VHF Frequency Band, HV - High VHF Frequency Band, U - UHF Frequency Band
0 or X - Number of external Power Amplifier drawers
R - Regenerative translator, T - Transmitter, L - Echo cancelling repeater
D – ATSC, C - COFDM (DVB-T/H/T2), I - ISDB-T, No letter or blank means analog

1.3 Assembly Designators

UBS-Axcera has assigned assembly numbers, Ax designations such as A1, where x=1,2,3…etc, to all assemblies, modules, and boards in the system. These designations are referenced in the text of this manual and shown on the block diagram and interconnect drawings provided in Appendix A.

Cables that are connected between boards within a drawer or assembly and cables that are connected between the drawers, racks and cabinets are labeled using markers – see Figure 1. There may be as few as two or as many as four Markers on any one cable. These markers are read starting farthest from the connector. If there are four Markers, the marker farthest from the connector is the system number such as system 1 or translator 2. The next or the farthest Marker is the rack or cabinet "A" number on an interconnect cable or the board "A" number when the cable is within a drawer. The next number on an interconnect cable is the Drawer location or Board "A" number. The marker closest to the connector is the jack or connector "J" number on an interconnect cable or the jack or connector "J" number on the board when the cable is within a drawer.

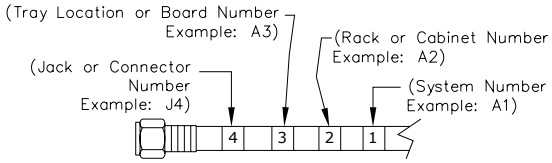


Figure 1: Marker Identification Drawing

1.4 Safety

The Innovator CLV1TD/CLV1RD – CLV4TD/CLV4RD ATSC Transmitter/Regenerative Translator systems manufactured by UBS-Axcera are designed to be easy to use and repair while providing protection from electrical and mechanical hazards. Please review the following warnings and familiarize yourself with the operation and servicing procedures before working on the system.

Hazardous Accessibility – UBS-Axcera has made attempts to provide appropriate connectors, wiring and shields to minimize hazardous accessibility.

Circuit Breakers and Wiring – All circuit breakers and wire are UL and CE certified and are rated for maximum operating conditions.

Single Point Breaker or Disconnect - The customer should provide a single point breaker or disconnect at the breaker box for the main AC input connection to the transmitter.

Transmitter Ratings - The transmitter ratings are provided in the text of this manual along with voltage and current values for the equipment.

Protective Earthing Terminal – A main protective earthing terminal is provided for equipment required to have protective earthing.

Read All safety Instructions – All of the safety instructions should be read and understood before operating this equipment.

Retain Manuals – The manuals for the system should be retained at the system site for future reference. UBS-Axcera provides two manuals for this purpose; one manual can be left at the office while the other can be kept at the site.

Heed all Notes, Warnings, and Cautions – All of the notes, warnings, and cautions listed in this safety section and throughout the manual must be followed.

Follow Operating Instructions – All of the operating and use instructions for the system should be followed.

Cleaning – Unplug or otherwise disconnect all power from the equipment before cleaning. Do not use liquid or aerosol cleaners. Use only a damp cloth for cleaning.

Ventilation – Openings in the cabinet and module front panels are provided for ventilation. To ensure the reliable operation of the system, and to protect the unit from overheating, these openings must not be blocked.

Servicing – Do not attempt to service this product yourself until becoming familiar with the equipment. If in doubt, refer all servicing questions to qualified UBS-Axcera service personnel.

Replacement Parts – When replacement parts are used, be sure that the parts have the same functional and performance characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards. Please contact the UBS-Axcera Technical Service Department if you have any questions regarding service or replacement parts.

1.5 Contact Information

The UBS-Axcera Field Service Department can be contacted by PHONE at **724-873-8100** or by FAX at **724-873-8105**.

Before calling UBS-Axcera, please be prepared to supply the UBS-Axcera technician with answers to the following questions. This will save time and help ensure the most direct resolution to the problem.

1. What are your Name and the Call Letters for the station?
2. What are the model number and type of system?
3. Is the system digital or analog?
4. How long has the system been on the air? (Approximately when was the system installed?)
5. What are the symptoms being exhibited by the system? Include the current front panel LCD readings and what the status LED is indicating on the front panel of the drawer. If possible, include the LCD readings before the problem occurred.

1.6 Return Material Procedure

To insure the efficient handling of equipment or components that have been returned for repair, UBS-Axcera requests that each returned item be accompanied by a Return Material Authorization Number (RMA#). The RMA# can be obtained from any UBS-Axcera Field Service Engineer by contacting the UBS-Axcera Field Service Department at 724-873-8100 or by Fax at 724-873-8105. This procedure applies to all items sent to the Field Service Department regardless of whether the item was originally manufactured by UBS-Axcera.

When equipment is sent to the field on loan, the RMA# is included with the unit. The RMA# is intended to be used when the unit is returned to UBS-Axcera. In addition, all shipping material should be retained for the return of the unit to UBS-Axcera.

Replacement assemblies are also sent with the RMA# to allow for the proper routing of the exchanged hardware. Failure to close out this type of RMA# will normally result in the customer being invoiced for the value of the loaner item or the exchanged assembly.

When shipping an item to UBS-Axcera, please include the RMA# on the packing list and on the shipping container. The packing slip should also include contact information and a brief description of why the unit is being returned.
Please forward all RMA items to:

UBS-Axcera
103 Freedom Drive
P.O. Box 525
Lawrence, PA 15055-0525 USA

For more information concerning this procedure, call the UBS-Axcera Field Service Department at 724-873-8100.

UBS-Axcera can also be contacted through e-mail at **info@UBS-Axcera.com** and on the Web at **www.UBS-Axcera.com.**

1.7 Limited One Year Warranty for UBS-Axcera Products

UBS-Axcera warrants each new product that it has manufactured and sold against defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment from UBS-Axcera's plant, when operated in accordance with UBS-Axcera's operating instructions. This warranty shall not apply to tubes, fuses, batteries, bulbs or LEDs.

Warranties are valid only when and if (a) UBS-Axcera receives prompt written notice of breach within the period of warranty, (b) the defective product is properly packed and returned by the buyer (transportation and insurance prepaid), and (c) UBS-Axcera determines, in its sole judgment, that the product is defective and not subject to any misuse, neglect, improper installation, negligence, accident, or (unless authorized in writing by UBS-Axcera) repair or alteration. UBS-Axcera's exclusive liability for any personal and/or property damage (including direct, consequential, or incidental) caused by the breach of any or all warranties, shall be limited to the following: (a) repairing or replacing (in UBS-Axcera's sole discretion) any defective parts free of charge (F.O.B. UBS-Axcera's plant) and/or (b) crediting (in UBS-Axcera's sole discretion) all or a portion of the purchase price to the buyer.

Equipment furnished by UBS-Axcera, but not bearing its trade name, shall bear no warranties other than the special hours-of-use or other warranties extended by or enforceable against the manufacturer at the time of delivery to the buyer.

NO WARRANTIES, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, AND NO WARRANTIES OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR FREEDOM FROM INFRINGEMENT, OR THE LIKE, OTHER THAN AS SPECIFIED IN PATENT LIABILITY ARTICLES, AND IN THIS ARTICLE, SHALL APPLY TO THE EQUIPMENT FURNISHED HEREUNDER.

☞ WARNING!!!

≺ HIGH VOLTAGE ≻

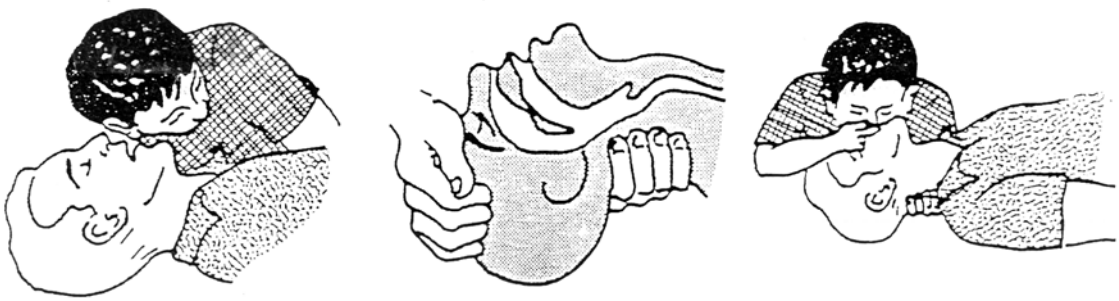
DO NOT ATTEMPT TO REPAIR OR TROUBLESHOOT THIS EQUIPMENT UNLESS YOU ARE FAMILIAR WITH ITS OPERATION AND EXPERIENCED IN SERVICING HIGH VOLTAGE EQUIPMENT. LETHAL VOLTAGES ARE PRESENT WHEN POWER IS APPLIED TO THIS SYSTEM. IF POSSIBLE, TURN OFF POWER BEFORE MAKING ADJUSTMENTS TO THE SYSTEM.

★ RADIO FREQUENCY RADIATION HAZARD ★

MICROWAVE, RF AMPLIFIERS AND TUBES GENERATE HAZARDOUS RF RADIATION THAT CAN CAUSE SEVERE INJURY INCLUDING CATARACTS, WHICH CAN RESULT IN BLINDNESS. SOME CARDIAC PACEMAKERS MAY BE AFFECTED BY THE RF ENERGY EMITTED BY RF AND MICROWAVE AMPLIFIERS. NEVER OPERATE THE TRANSMITTER SYSTEM WITHOUT A PROPERLY MATCHED RF ENERGY ABSORBING LOAD OR THE ANTENNA ATTACHED. KEEP PERSONNEL AWAY FROM OPEN WAVEGUIDES AND ANTENNAS. NEVER LOOK INTO AN OPEN WAVEGUIDE OR ANTENNA. MONITOR ALL PARTS OF THE RF SYSTEM FOR RADIATION LEAKAGE AT REGULAR INTERVALS.

EMERGENCY FIRST AID INSTRUCTIONS

Personnel engaged in the installation, operation, or maintenance of this equipment are urged to become familiar with the following rules both in theory and practice. It is the duty of all operating personnel to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.



RESCUE BREATHING

1. Find out if the person is breathing.

You must find out if the person has stopped breathing. If you think he is not breathing, place him flat on his back. Put your ear close to his mouth and look at his chest. If he is breathing you can feel the air on your cheek. You can see his chest move up and down. If you do not feel the air or see the chest move, he is not breathing.

2. If he is not breathing, open the airway by tilting his head backwards.

Lift up his neck with one hand and push down on his forehead with the other. This opens the airway. Sometimes doing this will let the person breathe again by himself.

3. If he is still not breathing, begin rescue breathing.

-Keep his head tilted backward. Pinch nose shut.
-Put your mouth tightly over his mouth.
-Blow into his mouth once every five seconds
-DO NOT STOP rescue breathing until help arrives.

LOOSEN CLOTHING - KEEP WARM

Do this when the victim is breathing by himself or help is available. Keep him as quiet as possible and from becoming chilled. Otherwise treat him for shock.

BURNS

SKIN REDDENED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with a clean sheet or cloth to keep away air. Consult a physician.

SKIN BLISTERED OR FLESH CHARRED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

EXTENSIVE BURN - SKIN BROKEN: Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

dBm, dBw, dBmV, dBμV, & VOLTAGE EXPRESSED IN WATTS

50 Ohm System

WATTS	PREFIX	dBm	dBw	dBmV	dBμV	VOLTAGE
1,000,000,000,000	1 TERAWATT	+150	+120			
100,000,000,000	100 GIGAWATTS	+140	+110			
10,000,000,000	10 GIGAWATTS	+130	+100			
1,000,000,000	1 GIGAWATT	+120	+ 99			
100,000,000	100 MEGAWATTS	+110	+ 80			
10,000,000	10 MEGAWATTS	+100	+ 70			
1,000,000	1 MEGAWATT	+ 90	+ 60			
100,000	100 KILOWATTS	+ 80	+ 50			
10,000	10 KILOWATTS	+ 70	+ 40			
1,000	1 KILOWATT	+ 60	+ 30			
100	1 HECTROWATT	+ 50	+ 20			
50		+ 47	+ 17			
20		+ 43	+ 13			
10	1 DECAWATT	+ 40	+ 10			
1	1 WATT	+ 30	0	+ 77	+137	7.07V
0.1	1 DECIWATT	+ 20	- 10	+ 67	+127	2.24V
0.01	1 CENTIWATT	+ 10	- 20	+ 57	+117	0.707V
0.001	1 MILLIWATT	0	- 30	+ 47	+107	224mV
0.0001	100 MICROWATTS	- 10	- 40			
0.00001	10 MICROWATTS	- 20	- 50			
0.000001	1 MICROWATT	- 30	- 60			
0.0000001	100 NANOWATTS	- 40	- 70			
0.00000001	10 NANOWATTS	- 50	- 80			
0.000000001	1 NANOWATT	- 60	- 90			
0.0000000001	100 PICOWATTS	- 70	-100			
0.00000000001	10 PICOWATTS	- 80	-110			
0.000000000001	1 PICOWATT	- 90	-120			

TEMPERATURE CONVERSION

°F = 32 + [(9/5) °C]

°C = [(5/9) (°F - 32)]

USEFUL CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY
mile (US statute)	kilometer (km)	1.609347
inch (in)	millimeter (mm)	25.4
inch (in)	centimeter (cm)	2.54
inch (in)	meter (m)	0.0254
foot (ft)	meter (m)	0.3048
yard (yd)	meter (m)	0.9144
mile per hour (mph)	kilometer per hour(km/hr)	1.60934
mile per hour (mph)	meter per second (m/s)	0.44704
pound (lb)	kilogram (kg)	0.4535924
gallon (gal) U.S. liquid	liter	3.7854118
(One U.S. gallon equals 0.8327 Canadian gallon)		
fluid ounce (fl oz)	milliliters (ml)	29.57353
British Thermal Unit	watt (W)	0.2930711 per hour (Btu/hr)
horsepower (hp)	watt (W)	746

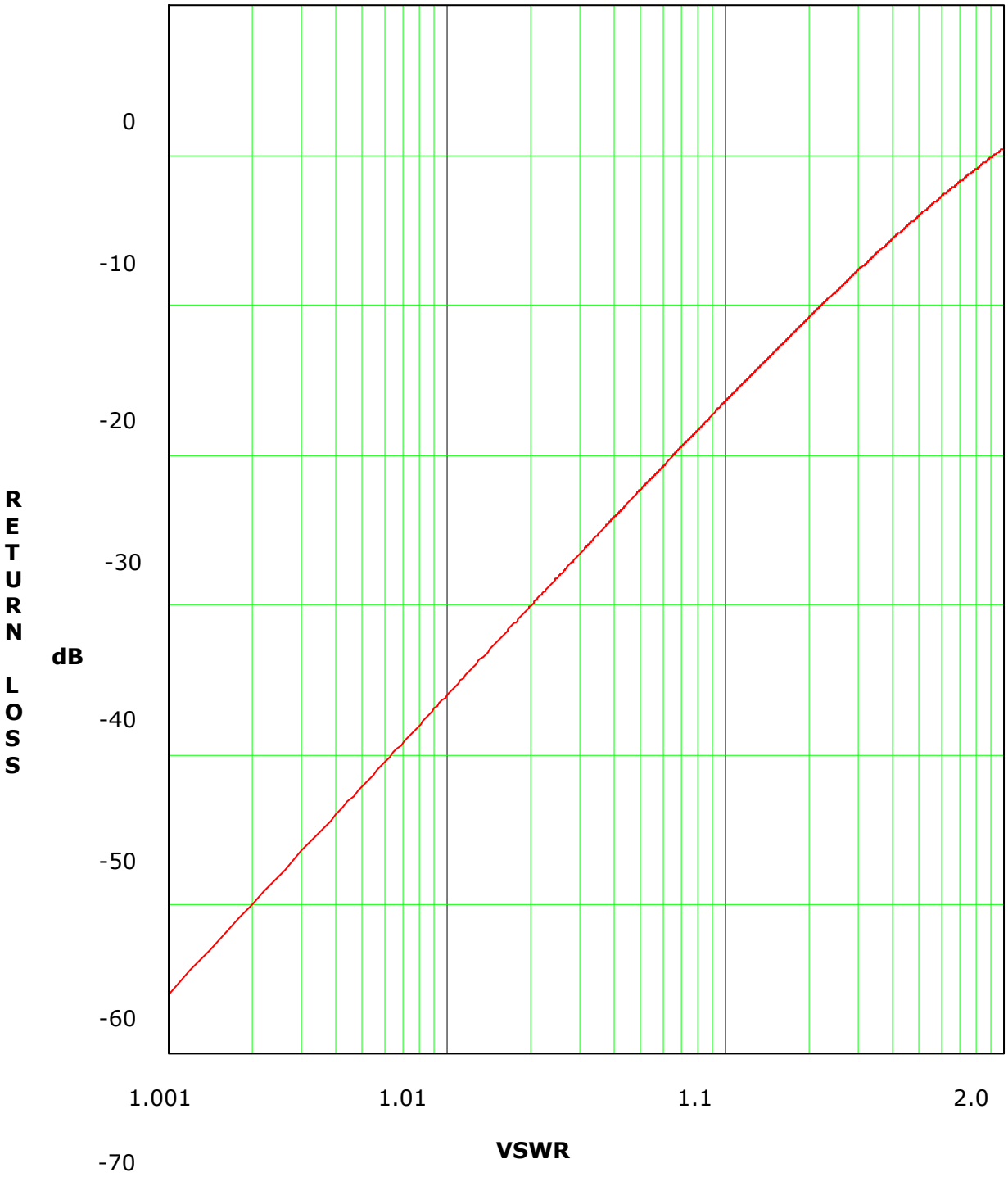
NOMENCLATURE OF FREQUENCY BANDS

FREQUENCY RANGE	DESIGNATION
3 to 30 kHz	VLF - Very Low Frequency
30 to 300 kHz	LF - Low Frequency
300 to 3000 kHz	MF - Medium Frequency
3 to 30 MHz	HF - High Frequency
30 to 300 MHz	VHF - Very High Frequency
300 to 3000 MHz	UHF - Ultrahigh Frequency
3 to 30 GHz	SHF - Superhigh Frequency
30 to 300 GHz	EHF - Extremely High Frequency

LETTER DESIGNATIONS FOR UPPER FREQUENCY BANDS

LETTER	FREQ. BAND
L	1000 - 2000 MHz
S	2000 - 4000 MHz
C	4000 - 8000 MHz
X	8000 - 12000 MHz
Ku	12 - 18 GHz
K	18 - 27 GHz
Ka	27 - 40 GHz
V	40 - 75 GHz
W	75 - 110 GHz

RETURN LOSS VS. VSWR



ABBREVIATIONS/ACRONYMS

AC: Alternating Current

AFC: Automatic Frequency Control

AGC Automatic Gain Control

ALC: Automatic Level Control

AM: Amplitude Modulation

AGC: Automatic Gain Control

ATSC: Advanced Television Systems Committee (Digital)

AWG: American Wire Gauge

B/D: Block Diagram

BER: Bit Error Rate

BW: Bandwidth

COFDM: Coded Orthogonal Frequency Division Multiplexing modulation scheme.

CLV2RD: Line **C**, Frequency **LB VHF**, # of HPA's **2**, System **Regenerative Translator**, Modulation Standard **ATSC**.

DC: Direct Current

D/A: Digital to Analog

DSP: Digital Signal Processing

DTV: Digital Television

dB: Decibel

dBm: Decibel referenced to 1 milliwatt

dBmV: Decibel referenced to 1 millivolt

dBw: Decibel referenced to 1 watt

FEC: Forward Error Correction

FM: Frequency Modulation

FPGA: Field Programmable Gate Array

Hz: Hertz

I/C: Interconnect

ICPM: Incidental Carrier Phase Modulation

I/P: Input

IF: Intermediate Frequency

LED: Light emitting diode

LSB: Lower Sideband

LDMOS: Lateral Diffused Metal Oxide Semiconductor Field Effect Transistor

MPEG: Motion Pictures Expert Group

NTSC: National Television Systems Committee (Analog)

O/P: Output

PLL: Phase Locked Loop

PCB: Printed Circuit Board

QAM: Quadrature Amplitude Modulation

RD: Regenerative Translator, Digital

SMPTE: Society of Motion Picture and Television Engineers

TD: Transmitter, Digital

VSB: Vestigial Side Band

Chapter 2 System Description

2.1 Product Architecture

The Innovator CX Series Systems can be configured as DTV Transmitters (i.e CLV2TD) or Regenerative Translators (i.e CLV2RD). The DTV Transmitter (TD) takes an ASI input and converts it to an On-Channel DTV RF output signal. The Regenerative Translator (RD) accepts an On-Channel RF signal (-79 to –8 dBm) and converts it to an On-Channel DTV RF output signal. If an optional preamp is present in the system, it is connected to the output of the receive antenna and amplifies the weak signal approximately 20 dB.

In multi drawer systems, the CX drawer is configured as an exciter/driver used to drive additional power amplifier drawers; a single amplifier drawer can operate at 500 Watts ATSC; two amplifier drawers can operate at 1000 Watts ATSC; three amplifier drawers can operate at 1500 Watts ATSC; and four amplifier drawers can operate at 2000 Watts ATSC.

The Innovator CX Series system provides Adaptive Linear and Non-linear correction capability for the transmission path as well as internal test sources that are used during initial system installation. If your system contains the Optional Internal GPS Kit, the output of the GPS Antenna connects to the J5 TNC connector on the rear panel of the CX drawer. This kit supplies 10 MHz and 1 PPS references for use in the CX drawer.

2.2 CX Drawer

The CX drawer contains the (A4) 8VSB ATSC Digital Modulator (1316294), the (A15) Downconverter (1316715) and the (A16) Capture Board (1316716). The drawer also contains the (A6) Amplifier Assembly, the (A7) Output Detector Board, the (A8) Innovator CX Control Board (1312543), the (A10) 24VDC Power Supply and the (A9) 12V Power Supply. To make the system a regenerative translator, the Demod Kit (1316534) supplies the (A1) 8 VSB Demodulator Board (1308275) for the drawer.

When the system is configured as an ATSC Transmitter (TD), the ASI "A" input at (J1) is connected directly to the input jack (J30 or ASI IN1), and the ASI "B" input at (J2) is connected directly to the input jack (J31 or ASI IN2), on the (A12) 8 VSB Modulator Board. The 8 VSB Modulator Board automatically selects the ASI "A" or "B" input, depending on which connector the input signal is present on.

When configured to operate as a Regenerative Translator (RD), the DTV ON Channel RF Input at (J1 or J5), (-8 to -79 dBm) is connected to the Tuner Input Jack on the (A1) 8 VSB Demodulator Board (1308275) supplied with the Demod kit. The 8 VSB Demodulator Board converts the DTV input to a SMPTE-310 output at (J13), which is connected to the input jack on the (A12) 8 VSB Modulator Board. The output of the 8 VSB modulator board (at the RF output jack X-502) is connected to J1 on the (A6) amplifier assembly.

The 8 VSB Modulator Board converts the ASI or SMPTE-310M input to a digital RF TV channel frequency in the range of 54 MHz - 88 MHz.

The 8 VSB Modulator Board's RF on channel signal is connected to J1 on the amplifier assembly, which is connected to the (A6-A4) ALC Board (1315006). The ALC board is used to control the drive power to the High Power Amplifier chain.

The (A6) Amplifier Assembly (1316313) is made up of the (A6-A1) 1W VHF Amplifier Board (1310282) and the (A6-A2) the BLF881 Single Stage Amplifier Board (1314882). The assembly has approximately 35 dB of gain. The amplified output at approximately +37 dBm is connected to the (A7) Output Detector Board (1312207) which provides forward (2V=100%) and reflected (2V=25%) power samples to the CX Control Board (1312543) for metering and monitoring purposes.

An output power sample is also supplied to the front panel sample jack J15, which is a 50 Ohm BNC-type connector. The typical sample value is approximately 60dB down from the output power level of the drawer.

The RF output is cabled to J9 the "N-type" connector RF output jack on the rear panel of the drawer. The CX drawer RF output is then connected to the High Power Amplifier Assembly RF Input located on the rear panel of the assembly.

Note: Systems with 2 CX drawers will include a Remote Interface with Dual Exciter Switching system that includes an Exciter Output Routing Switch. In this case, the amplifier assembly RF input will be connected to the Routing Switch output.

2.3 Amplifier Drawers

Each VHF amplifier assembly serves to amplify the RF signal delivered by the exciter to the power level needed to attain the full rated output power of the transmitter. Nominal transmitter output power is achieved by adding the parallel connection of individual amplifier assemblies, within a cabinet assembly, and then the adding of a number of multiple amplifier cabinet assemblies. For system with two or more amplifier drawers, the high power amplifier assembly includes a quadrature splitter , which feeds up to 4 VHF amplifier drawers (1308727) via an N-typ input (J1).

The control and operating parameters of the amplifier assembly's amplifier drawers are displayed on the LCD Screen on the driver drawer.

The amplifier operates over the VHF Low Band TV frequency spectrum from 54 MHz to 88 MHz without any special tuning requirements. It is a three-stage amplifier design formed by a pre-driver, driver, and final stage as shown in Figure 2; all stages incorporate technology. The driver is a single stage amplifier module whose output is split four ways. The final stage is made up of four identical power modules. Each power module contains a dual stage amplifier whose outputs are combined in a 2-way hybrid combiner. The four 2-way hybrid combiner outputs are connected to a 4-way combiner assembly whose output is the RF output of the individual amplifier assembly.

The features of the VHF amplifier assembly include:

- All amplifying stages are equipped with transistors
- Operates over the complete frequency band without special tuning requirements
- High redundancy due to the parallel connection of many power transistors
- Mean junction temperature <120° C
- Important operating parameters displayed in the transmitter control assembly
- Multiple fault protection circuitry against mismatch, overvoltage, overcurrent and overtemperature conditions

The amplifier possesses multiple fault-protection circuits that prevent damage to the power transistors during critical operating conditions, such as high mismatch, overtemperature, overcurrent, or overvoltage. Important operating parameters, such as drain currents, operating voltages, RF powers, and temperatures are polled and displayed in the transmitter control assembly.

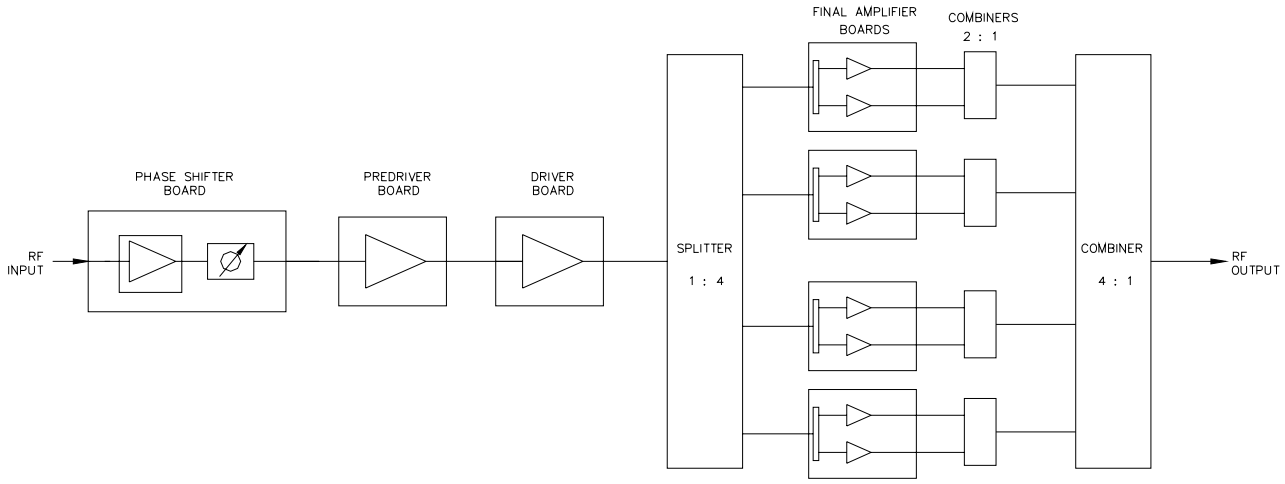


Figure 2: VHF LB Amplifier Assembly

The paralleling network of the amplifier is arranged so that it continues to operate at reduced power if a module fails. The remaining available power is given by:

$$P_{rem} = P_{nom} \cdot ([m - n] / m)^2$$

where:

P_{rem} = remaining power
P_{nom} = nominal power

m = number of modules
n = number of failed modules

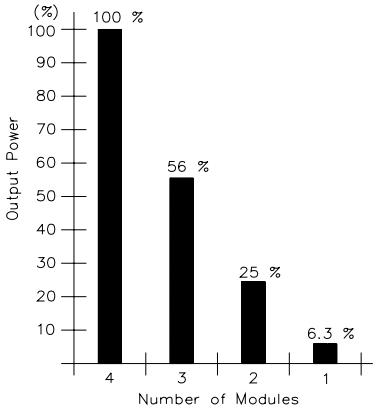


Figure 3: Remaining Power after Failure of Amplifier Modules

When multiple amplifier drawers are used, the 7-16" RF output (J2) of each amplifier drawer is combined using a hybrid or progressive combiner (system dependant).

Systems with 2 amplifiers and a hybrid combiner include a reject load, which provide isolation protection for the operating power amplifier if the second amplifier fails; any reflected energy will be dissipated by the 500W load. The reject load includes thermal switches which monitor the temperature of the load and provide an over-temperature fault (if it occurs) to the CX Exciter(s) through the system metering board(s).

Systems with 3 amplifiers and a progressive combiner include multiple reject loads, which provide isolation protection for the operating power amplifiers if one of the amplifiers fails. If the first or second amplifier fails, any reflected energy will be dissipated by the 500W load. If the third amplifier fails, any reflected energy will be dissipated by the 1kW load. The reject loads include thermal switches which monitor the temperature of the load and provide an over-temperature fault (if it occurs) to the CX Exciter(s) through the system metering board(s).

The combiner 1-5/8" output is connected to a pre-filter coupler, which provides forward power feedback signals for Non-linear Pre-correction as well as a reflected power feedback signal for system metering.

The pre-filter coupler forward power sample (FWD1) is connected directly to the RF Input 1 jack (J3), located on the rear panel of the CX drawer(s). This forward power sample is used for Non-linear Pre-correction. In dual CX drawer systems, the output sample is connected to a 2-way splitter (A105), which is feed directly to the RF Input 1 jack (J3), located on the rear panel of the CX drawers.

The output of the pre-filter coupler is connected to a harmonic low pass filter (system dependant), digital band pass filter and post-filter coupler.

The post-filter coupler provides forward power samples for Linear Pre-correction and system metering as well as a reflected power sample for system metering. The pre-filter coupler, filters and post filter coupler are all installed outside of the cabinet.

In single CX drawer systems, the post-filter coupler forward power sample is connected to the RF Input 2 jack (J4), located on the rear panel of the CX drawer through a 2-way splitter (A5). This forward power sample is used for Linear Pre-correction. In dual CX systems, the forward power sample (FWD1) is connected to a 2-way splitter (A115), which is connected directly to the RF Input 2 jack (J4), located on the rear panel of the CX drawers.

In single CX drawer systems, the post-filter coupler forward power sample is also connected to the RF input (J3), located on the System Metering board (1312666) through a 2-way splitter (A5). The post-filter coupler reflected power sample is connected directly to the RF input (J8), located on the System Metering board. The System Metering board is connected to the CX Exciter, via the Exciter's serial ports (J11 and J13).

In dual CX drawer systems, the post-filter coupler forward power sample (FWD2) is connected to a 2-way splitter (A5), which is conected directly to the RF input (J3), located on two System Metering boards (1312666). The post-filter coupler reflected power sample (REFL2) is connected to a 2-way splitter (A15), which is connected directly to the RF input (J8), located on two System Metering boards.

Each System Metering board is connected to an individual CX Exciter, via the Exciter's serial ports (J11 and J13).

The System Metering Board(s) (1312666) provides over-temperature and other parameters to the CX Exciter(s), in addition to the forward and reflected power samples.

The amplifier assembly also include an air cooling assembly and a DC power supply assembly.

2.4 Air Cooled Assembly

The air cooling assembly consists of four axial fans, which are mounted under the VHF Amplifier drawers. The input air is drawn through the front of the cabinet and forced up through the amplifier drawers and out of the top of the cabinet. **WARNING**: Do not block the input or output air flow to the cabinet.

2.5 Power Supply Assembly

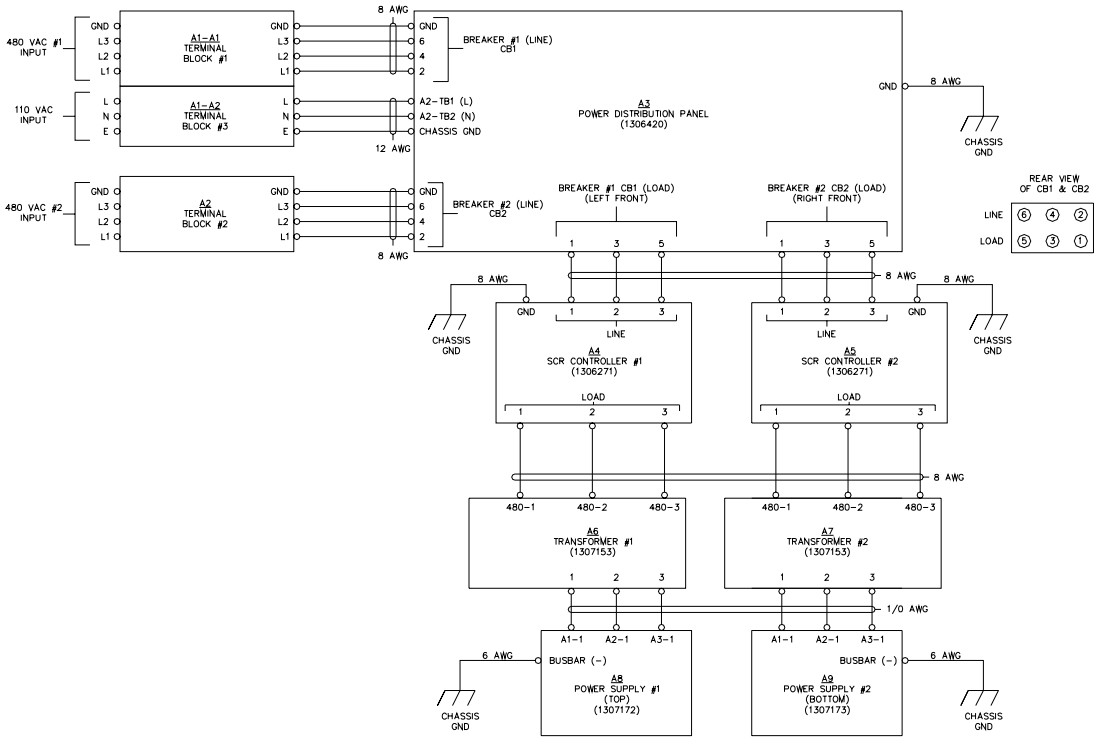


Figure 4: AC Wiring Harness VHF Amplifier Cabinet

The DC voltages to the VHF amplifier assemblies mounted in each VHF amplifier cabinet are supplied by the switching power supplies, which are mounted in a power supply chassis shelf located in the same cabinet.

The supplies are connected in parallel via the capacitor bank mounted in the rear of the cabinet. The power supplies operate at +48Vdc and are not monitored by the control system. They have their own internal protection circuitry and are ON and enabled when AC power is applied.

The power supply shelf can be configured with 1, 2, 3, or 4 rectifiers depending on the configuration of the system. A 1kW transmitter typically requires 3 rectifiers, leaving one empty slot, which can be populated with a 4th rectifier providing N+1 power supply redundancy (optional). Contact UBS-Axcera for more details on the configuration of your system.

The individual power supply modules are "hot swappable". The lever built into the front grill cover of the module can be used to disconnect and remove from the power supply module from the chassis shelf.

The power supply modules are high efficiency (better than 93%) air cooled units. Each module has a single phase input with a typical power factor of 0.98. The module inputs are wired to accommodate the 230 VAC line input.

Refer to the AC wiring and interconnect drawings provided with your system for more information. Contact UBS-Axcera if you have any questions regarding the AC requirements.

2.6 Optional Remote Interface with Dual Exciter Switching System

The optional Remote Interface with Dual Exciter Switching system includes a Remote Interface Panel (1314493) with ABS Control Panel (1314609) and Relay Interface board (1311403) as well as a Signal Routing Board (1314440) and a Serial Loop-Through Board (1307811). The system components listed above are installed at various locations within the cabinet.

The Remote Interface Unit monitors the state of the Digital Exciters and provides automatic exciter switching based on current conditions and operator inputs. The Remote Interface Unit's RJ-45 Ethernet connector is connected to a router, which provides a user connection point for access to the transmitter Web and SNMP interfaces.

The Relay Interface Board RF output is connected to the Quadrature Splitter (1309334) RF input.

The Serial Loop-Thru board and Signal Routing board provide the amplifier drawers with system serial interface connections to the CX Exciter drawers and the Remote Interface panel.

For detailed operating instructions, please refer to the CX Dual Exciter System and Remote Interface Panel manual (1314493).

2.7 Pre-Filter Sample (Non-Linear Distortion)

The pre-filter sample from the pre-filter coupler connects to (J3), the RF input 1 jack, located on the rear panel of the driver drawer. This sample connects to the modulator board where it is used in the correction system.

2.8 Post-Filter Sample (Linear Distortion)

The post-filter sample from the post-filter coupler connects to (J4), the RF input 2 jack, located on the rear panel of the driver drawer. This sample connects to the modulator board where it is used in the correction system.

IMPORTANT NOTES:

RF feedback sample lines must not be disturbed when adaptive pre-correction is enabled. If a sample line is removed, the appropriate pre-correction mode must first be disabled and only re-enabled after the feedback signal is re-connected. RF feedback sample #1 is feedback for the non-linear pre-corrector system and sample #2 is used for the linear pre-corrector system.

The adaptive pre-correction systems are likely to be significantly affected if the sense port is moved to another coupler port with a different level or if a sample level is changed significantly (a few dB). If the linear pre-corrector system is exposed to this scenario it may generate a notable ripple in the output that may translate into an increase (or decrease) of the measured RMS level. Should this situation occur, the only way to restore proper operation is to reset the linear corrector using the controller's 'Set To Neutral' command or the web interface's 'Reset Current Curve To Factory' command and allow the pre-corrector system to start over again.
The On Channel RF output of the amplifier drawer either connects directly to the low pass filter and digital mask filter and then to the antenna in single amplifier systems or to a combiner, pre-filter coupler, low pass filter, the digital mask filter, post-filter output coupler and finally to the antenna in multiple amplifier systems. The post-filter output coupler provides a forward and a reflected power sample to the system metering board which detects the samples and supplies the forward and reflected power levels to the exciter/driver drawer for use in the metering circuits.

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Chapter 3 Unpacking, Installation and Maintenance

3.1 Unpacking

UBS-Axcera certifies that upon leaving our facility all equipment was undamaged and in proper working order. It is imperative that all packages be inspected immediately upon arrival to verify that no damage occurred in transit to the site.

Inspect all packages for exterior damage and make note of any dents, broken seals, or other indications of improper handling. Carefully open each package and inspect the contents for damage.

Verify that all materials are enclosed as listed on the packing slip. Report any shortages to UBS-Axcera. In the event any in transit damage is discovered, report it to the carrier. UBS-Axcera is not responsible for damage caused by the carrier.

If the equipment is not going to be installed immediately, return all items to their original packaging for safe storage. Save all packing material for future use. If equipment is ever removed from the site, the original packaging will ensure its safe transport.

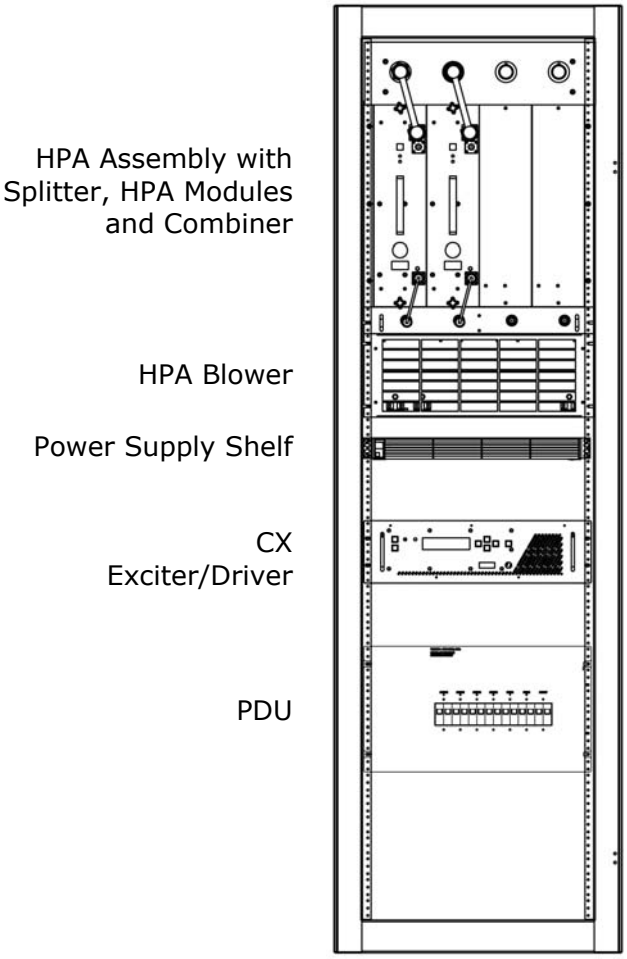


Figure 5: CLV2TD/RD Front View Typical Racking Plan

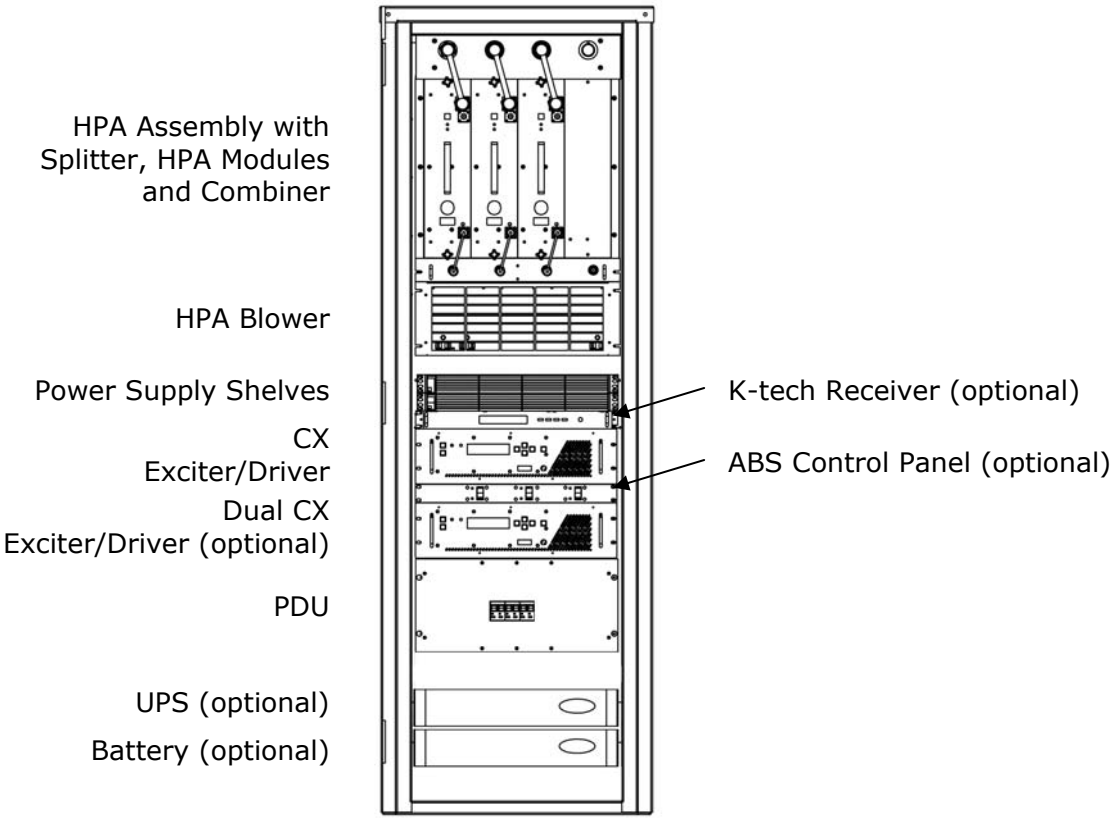


Figure 6: CLV3TD/RD Front View Typical Racking Plan

3.2 Installation Overview

The Innovator CX Series transmitters are designed for simple installation. Expensive test equipment is not required for installation and set up and to keep a system operational. An information decal, with Voltage Range, Current Range, Manufacturer, Model and ratings is attached to the rear panel of the stand alone drawer or if mounted in a cabinet, to the top of the frame above the door facing the rear of the cabinet. Prior to installing the product, review the following items. Check that they been installed, tested and/or inspected.

- Building Structure
- Electrical Systems
- Heating and Air Conditioning
- Receive Antenna or Satellite Dish and input cabling
- Optional ASI to S310 Converter, if needed
- Transmit Antenna and output transmission line

The Innovator CX Series systems are 17" (43.2cm) wide standard rack mountable drawers. They are sometimes supplied with side mounted Drawer Slides for ease of installation and removal.

The CLV0TD/RD-1 through CLV0TD/RD-5 systems require a single CX exciter drawer which occupies 3 RU, or 5.25" (13.3cm) of rack space.

The CLV1TD/RD through CLV4TD/RD systems require a single CX exciter drawer, as well as the vertically mounted high power amplifier drawers. 14 RU, or 24.5" (62.23cm) of rack space is required for the amplifier assembly which includes splitter and combiner assemblies as well as an amplifier shelf, which can accommodate 1 to 4 amplifier drawers. An additional 4RU, 7" (17.78cm) is required for the blower system and up to 2RU, or 3.5" (8.9cm) is required for the DC power supply shelves.

NOTE: The optional dual exciter/driver system requires an additional 4 RU, or 7" (17.78cm) of rack space for mounting equipment in the cabinet; 3 RU, or 5.25" (13.3cm) for the second Exciter/Driver drawer and 1 RU, or 1.75" (4.43cm) for the Exciter Switcher panel.

Also needed for FCC compliance operation is an ATSC filter on the broadcast channel that connects to the output of the CLV0TD/RD-1 thru CLV4TD/RD systems. Space must be provided for the ATSC filter, and in some systems, for the circulator, splitter, combiner, reject load, and low pass filter whose dimensions will vary depending on manufacturer and channel. Refer to the vendor supplied information included with your ATSC filter and low pass filter for specific dimensions. Make sure that the space provided for the CX Series equipment is sufficient and includes the circulator, splitters, combiner, reject load and external filters. Check that any additional equipment, which is included in the system that extends above or to the side of the mounting rack, has sufficient clearance space. Refer to the custom racking plan for the system, if prepared, for detailed information.

3.3 CX Drawer Slide-rail Installation

If the system is pre-mounted in a cabinet skip this section.

Locate the drawer slide-rails included in the installation material for your system. Refer to Figure 7 and the manufacturers instructions, included with the drawer slide-rails, for the cabinet mounting instructions of the drawer slide-rails.

Install the left drawer slid-rail into the left side of the cabinet (as viewed from the rear). Allow 3 RU, or 5.25" (13.3cm) of space between the CX drawers used in the CLV0TD/RD-1 through CU4TD/RD systems.

Space must also be provided for the splitter, combiner, ATSC filter and low pass filter (if present) whose dimensions will vary depending on the manufacturer and the output channel. Secure the left drawer slide-rail by connecting it to the front and rear mounting bars using No. 10 screws and the bar nuts that have been provided.

Install the drawer slide-rail on the right side of the cabinet (as viewed from the rear) making sure that it is aligned with the drawer slide-rail on the left side. Secure the slide-rail by connecting it to the front and rear mounting bars using No. 10 screws and the bar nuts that have been provided. Repeat this process for any other drawers if purchased. With both slide-rails in place, slide the drawer or drawers into the cabinet.

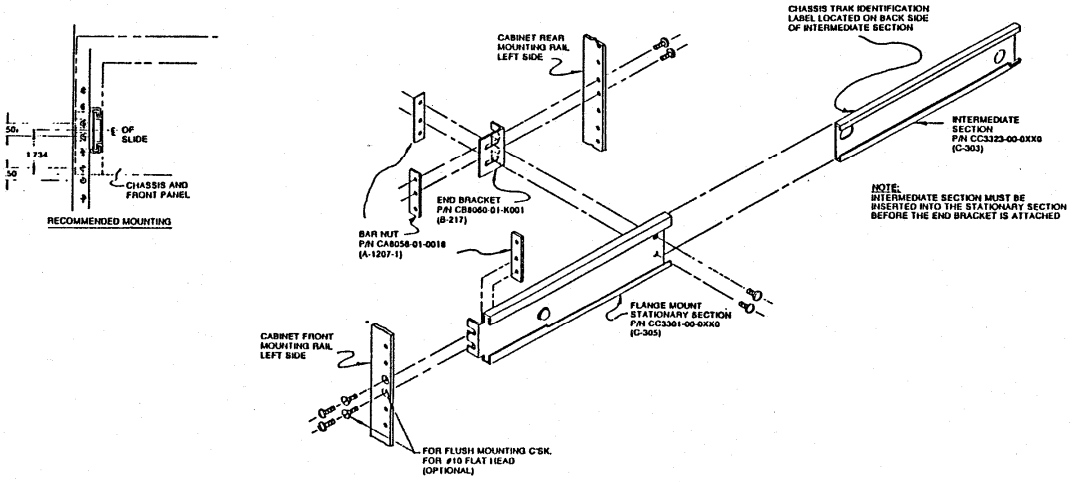


Figure 7: Cabinet Slides

3.4 Amplifier Installation and Removal

WARNING: The High Power Amplifier weighs approximately 54 lbs (25kg) and should be installed with caution.

For CLV1TD/RD through CLV4TD/RV systems with vertically mounted amplifier drawers, the cabinet is equipped with a High Power Amplifier Assembly which houses 1 to 4 High Power Amplifier drawers, as well as splitter and combiner assemblies and a blower system. The user will be required to install the amplifier drawers as they are removed prior to shipping.

Using two handlers, one located on each side of the amplifier, lift the amplifier and position it level to the open space in the cabinet. Carefully place the bottom of the amplifier onto the support shelf. Slowly slide the power amplifier into the cabinet until it stops. There are two blind mate connectors (DC power and Serial Communication) located on the amplifier rear panel which are aligned with corresponding connectors on the Amplifier Assembly backplane. Ensure that the connectors are aligned properly and slowly push the amplifier into the backplane until it stops. The amplifier should be secured to the Amplifier Assembly using the No. 10 screws provided.

The user will also be required to install several front panel connectors – see Section 3.7.3.

The amplifier drawers can be replaced, but the transmitter must be placed in standby first. The user must then switch the circuit breakers for the DC power supply shelves OFF. Once this is done, the cables can be disconnected and the amplifier can be removed from the assembly.

3.5 DC Power Supply Chassis Shelf and Module Installation and Removal

Figure 8: Front View of DC Power Supply Chassis Shelf with Modules

For systems with HPA's, one or more DC power supply chassis shelves are mounted to the 19" (483mm)" rails below the High Power Amplifier assembly using a total of 6 screws, 3 on each side.

The individual power supply modules are "hot swappable". The lever built into the front grill cover of the module can be used to disconnect and remove from the power supply module from the chassis shelf. Push the mounting clip (see Figure 8) to the left to release the grill cover then pull forward on the grill cover to disconnect the module's rear connections. Pull farther to remove the module from the chassis shelf altogether.

To replace a power supply module, place the new module in the shelf's vacant space with the LEDs located on the right side of the opening and slide the module into the shelf until the rear panel connectors mate. Close the grill cover until the mounting clip locks.

3.6 AC Input Connections

Multi drawer systems with vertically mounted amplifiers will always be mounted in a rack or cabinet. An AC distribution box is connected to an AC distribution panel, which is supplied to connect AC to the individual drawers and the amplifier DC power supply shelf. The AC distribution panel is mounted facing the front of the cabinet.

Note: If the system includes an optional UPS, the AC distribution panel will be connected to the UPS, which will provide power to all of the drawers except the DC power supply shelves.

3.6.1 AC Distribution Box

The AC distribution box provides a connection point for the Mains AC input and is pre-wired to the AC distribution panel. The AC distribution box is mounted on the right side of the top of the rack (when facing the back of the rack).

The customer should provide a single point disconnect for the main AC input that connects to the transmitter. Please refer to table 1 for power requirements.

The AC input lines connect inside the AC distribution box by first removing the screws that hold the cover plate to the front of the AC distribution box. Then connect the three wire main AC input to the L1, L2 and Ground cables using Marrette wire connectors.

The AC distribution box is pre-wired to the AC distribution panel and does not require any other electrical connections.

3.6.2 AC Distribution Panel

The transmitter rear panel AC distribution box is connected internally to an AC distribution panel using a 3 conductor cable. The panel is mounted at the front of the cabinet, in the lower section underneath the Exciter/Driver drawer(s). **NOTE:** No user installation is required for the AC distribution panel.

The PDU includes a mounting block which provides the Mains AC input to the PDU circuit breakers.

3.6.3 Power Requirements

Table 1: CX Series Digital Systems Typical AC Input and Current Requirements

System	O/P Power	Power Consumption	Voltage	Current
CLV1TD/RD	500 Watts	4600 Watts	230 VAC	20 Amps to the Cabinet
CLV2TD/RD	1000 Watts	8700 Watts	230 VAC	37.8 Amps to the Cabinet
CLV3TD/RD	1500 Watts	11880 Watts	230 VAC	51.7 Amps to the Cabinet
CLV4TD/RD	2000 Watts	14800 Watts	230 VAC	64.4 Amps to the Cabinet

NOTE: All values are approximate.

3.7 Input and Output Connections

3.7.1 CX Drawer

The CX drawer rear panel includes a number of input, output and serial connectors that require the user to connect cables to when installing the drawer.

When configured as an RD system, the drawer accepts an On Channel RF signal. When configured as a TD system, the drawer accepts an ASI or SMPTE 310M input. In each case, the drawer outputs a digital On Channel RF signal.

When the system had been configured as a complete rack/cabinet mounted transmitter system, cables have been installed in the rack/cabinet and hang loosely near the rear panel of the CX drawer when it is pushed all the way into the cabinet. Each cable has been labeled to simplify installation. Please refer to Figure 6 and Table 3 for the locations and information on the CX drawer rear panel connectors.

If your system contains the Optional Internal GPS Kit, the output of the GPS Antenna connects to the J5 TNC connector on the rear panel of the CX drawer.

Figure 9: CX Drawer Rear Panel Connectors

Port	Type	Function	Impedance
J1	BNC	Input A: On Channel RF Input (RD) –78 to –8 dBm or ASI Input or SMPTE-310M Input	50 Ohms
J2	BNC	Input B: ASI Input or SMPTE-310M Input	50 Ohms
J3	BNC	Input C: RF Sense-1 Input from pre-filter coupler See notes 5 & 6	50 Ohms
J4	BNC	Input D: RF Sense-2 Input from post-filter coupler. See notes 5 & 6	50 Ohms
J5	BNC	I/O E: On Channel RF Input (RD)	75 Ohms
J6	BNC	10 MHz Input: Optional External 10 MHz Reference Input	50 Ohms
J7	BNC	1 PPS Input: Optional External 1 PPS Reference Input	50 Ohms
J9	N	RF Output: On Channel RF Output	50 Ohms
J10	IEC	AC Input: AC input connection to 85-264VAC Source and On/Off circuit breaker	N/A
J11	9 Pos Male D	Power Monitoring: Provides communication with System Metering board, which generates forward and reflected power samples for system metering and ALC loop control. Also provides an interlock for the Reject Loads through the System Metering board. If not used (in systems with no external amplifier) a jumper from J11-6 to J11-9 needs to be in place. Refer to Table 3 or information on the connections.	N/A
J12	15 Pos Female D	Remote: Provides communication with Remote Interface Module (A27). Used for CX Exciter remote control and status indications. Refer to Table 4.	N/A
J13	RJ-45	Serial: Provides communication to System and to external amplifier drawers, if present.	N/A
J14	RJ-45	Ethernet: Optional Ethernet connection. May not be present in your drawer.	N/A
J15 Front Panel	BNC	RF Sample: Output Sample from Output Detector Board. The sample level at J15 is approximately 60dB down from the output power level of the drawer.	50 Ohms
J16 Front Panel	9 Pos Female D	Serial: Used to load equalizer taps into the modulator.	N/A

Table 2: CX Drawer Connectors

NOTES:

1) If your transmitter (TD) system contains an Optional ASI to S310 Converter, connect the ASI output of the STL to the ASI in jack on the rear panel of the converter. Connect the SMPTE-310 Output from the SMPTE 310 Out jack on the rear panel of the converter module to the input jack J1 on the rear panel of the CX drawer.

2) If your transmitter (TD) system contains an Optional K-Tech receiver, connect the RF from the receive antenna or one output of the splitter to the input jack J1 on the rear panel of the K-Tech receiver. Connect the SMPTE 310 Out jack J2 on the rear panel of the K-Tech receiver to the input jack J5 on the rear panel of the CX drawer.

3) If the system contains the optional K-Tech back up system, the K-Tech receiver is bypassed by using the second output of the splitter that connects to J1 on the rear panel of the CX drawer and connecting a jumper from J4 to J5, after removing the cable from the K-Tech receiver, on the rear panel of the CX drawer. This configuration uses the 8VSB demodulator board in the CX drawer to produce the SEMTE-310 signal.

4) If the system contains an optional pre-amp, it is connected to the output of the receive antenna and to J1 on the rear panel of the CX drawer.

5) RF feedback sample lines must not be disturbed when adaptive pre-correction is enabled. If a sample line is removed, the appropriate pre-correction mode must first be disabled and only re-enabled after the feedback signal is re-connected. RF feedback sample #1 is feedback for the non-linear pre-corrector system and sample #2 is used for the linear pre-corrector system.

6) The adaptive pre-correction systems are likely to be significantly affected if the sense port is moved to another coupler port with a different level or if a sample level is changed significantly (a few dB). If the linear pre-corrector system is exposed to this scenario it may generate a notable ripple in the output that may translate into an increase (or decrease) of the measured RMS level. Should this situation occur, the only way to restore proper operation is to reset the linear corrector using the controller's 'Set To Neutral' command or the web interface's 'Reset Current Curve To Factory' command and allow the pre-corrector system to start over again.

3.7.1.1 Input Connections

Connect the On Channel RF Input (RD) –78 to –8 dBm signal, or the ASI Input or the SMPTE-310 Input to the 50Ω BNC input jack (J1 or J5) located on the rear panel of CX drawer.

If used, connect the external 10 MHz reference input to the 50Ω BNC 10 MHz input jack (J6) located on the rear panel of the CX drawer.

If used, connect the external 1 PPS reference input to the 50Ω BNC 1 PPS input jack (J7) located on the rear panel of the CX drawer.

If used, connect the external forward power sample from the pre-filter coupler to the 50Ω BNC Input C jack (J3) located on the rear panel of the CX drawer.

If used, connect the external forward power sample from the post-filter coupler to the 50Ω BNC Input D jack (J4) located on the rear panel of the CX drawer.
If your system contains the Optional Internal GLONASS or GPS Kit, the output of the GPS Antenna connects to the (J5) TNC connector on the rear panel of the CX drawer. This kit supplies 10 MHz and 1 PPS references for use in the CX drawer.

In Translator (RD) systems there is a SMPTE-310 loop-thru from the output of the Demodulator Board at J4, mounted on the rear panel of the transmitter or driver drawer, to the input to the Modulator Board at J5, mounted on the rear panel of the transmitter or driver drawer. There is a jumper installed from J4 to J5. To feed SMPTE-310 directly to the Modulator Board, remove the jumper and insert SMPTE-310 into J5. This is only used in Translator (RD) systems not Transmitter (TD) systems.

3.7.1.2 Output Connection

The digital RF On-Channel output of the CX drawer is the (J9) 50Ω "N-type" connector RF output jack located on the CX drawer rear panel.

The CX drawer RF output is connected to the Amplifier Assembly RF Input. In multi-amplifier systems, the Amplifier Assembly includes a splitter which feeds the signal to the individual amplifier drawers.

Note: In dual Exciter systems, the output of the CX drawers will be connected to a Relay Interface Board, which is part of the Remote Interface and Exciter Switching system.

In single and dual CX drawer systems with vertically mounted amplifier drawers, all equipment is mounted in a pre-wired cabinet. The users should use the system block diagram or interconnect to verify that all CX drawer input and output cables are connected as some may have been disconnected prior to shipping.

3.7.1.3 Power Monitoring Connections to J11

In systems with one or more external amplifiers, J11 is used to communicate the output forward and reflected metering voltages back to the driver. J11 is connected directly to the external amplifier when there is only one external amplifier and is connected through the system metering module when multiple external amplifiers are used.

In multiple external amplifier systems there are thermal switches mounted on the output combiner reject loads. The reject load interlock is connected to thermal switches and is used to shut down the system if the reject load overheats. In systems with no external amplifier, the only connection used is the Reject Load Interlock, which must be connected to Supply Return using a jumper from J11-6 to J11-9.

J11 Pin	Function
1	+12VDC
2	System Forward Power
3	System Reflected Power
4	System Aural Power
5	Remote Spare Input
6	Reject Load Interlock. (If not used, in systems with no external amplifier, must be jumpered to J11-9)
7	System Serial +
8	System Serial -
9	Supply Return (If Reject Load Interlock is not used, in systems with no external amplifier, must be jumpered to J11-6)

Table 3: Power Monitoring Connector J11

3.7.1.4 Remote Connections to J12

The remote connections for the Innovator CX Series system are made to the Remote 15 Pos Female "D" connector Jack J12 located on the rear panel of the drawer.

NOTE: In dual exciter systems, remote connections are made to the rear panels of the two drivers.

Remote Signal Name	Pin Designation	Signal Type	Description
System Operate	J12-1	Discrete Open Collector Input - A pull down to ground on this line indicates that the System is to be placed into the operate mode. Not Available in dual exciter systems. (Low = Activate : Floating = No Change)	Command
System Standby	J12-2	Discrete Open Collector Input - A pull down to ground on this line indicates that the System is to be placed into the standby mode. Not Available in dual exciter systems. (Low = Activate : Floating = No Change)	Command
Power Raise	J12-3	Discrete Open Collector Input - A pull down to ground on this line indicates that the Power of the System is to be Raised. (Low = Activate : Floating = No Change)	Command
Power Lower	J12-4	Discrete Open Collector Input - A pull down to ground on this line indicates that the Power of the System is to be Lowered. (Low = Activate : Floating = No Change)	Command
System Interlock	J12-5	Discrete Open Collector Input - A pull down to ground on this line indicates that the Interlock is present. Normally jumpered to J12-15. (Low = OK : Floating = Fault)	
Set to Modulation Type (system specific and may not be available)	J12-6	Discrete Open Collector Input. - Sets the Modulation type of the system. (Low = Analog : Floating = Digital)	Command
Set Channel (Set Up 1 or Set Up 2) - (system specific and may not be available)	J12-7	Discrete Open Collector Input. – Selects one of two possible Channel Setups of the system. (Low = Set Up 2, CH 2 : Floating = Set Up 1, CH 1) **NOTE:** The Set Up 1 & Set Up 2 settings are displayed and changed in the Upconverter Set Up Menus.	Command
Ground	J12-8	Ground.	
System Forward	J12-9	Analog Output - 0 to 4.0 V. - This is a	Metering

Remote Signal Name	Pin Designation	Signal Type	Description
Power Level		buffered loop through of the calibrated "System Forward Power". Indicates the System Forward power. Scale factor is 100 % = 2.0V.	
System Aural Power Level	J12-10	Analog Output - 0 to 4.0 V. - This is a buffered loop through of the calibrated "System Aural Power". Indicates the System Aural power. Scale factor is 100 % = 2.0V. **(Not used in Digital)**	Metering
System Reflected Power Level	J12-11	Analog Output - 0 to 4.0 V. - This is a buffered loop through of the calibrated "System Reflected Power". Indicates the System Reflected power. Scale factor is 25 % = 2.0V.	Metering
Report Input Status	J12-12	Discrete Open Collector Output. - Indicates if input to system is Normal or Not. (Low = OK : Floating = Fault)	Status
Report Fault Status	J12-13	Discrete Open Collector Output. - Indicates if system is Operating Normally or has a Fault. Not available in dual exciter systems. (Low = OK : Floating = Fault)	Status
Report Operate Status	J12-14	Discrete Open Collector Output. – Indicates whether system is in Operate or Standby. Not available in dual exciter systems. (Low = Operate : Floating = Standby)	Status
Ground	J12-15	Ground. Not Available in dual exciter systems. Normally jumpered to J12-5.	

Table 4: Remote Connector J12

3.7.2 Vertically Mounted HPA

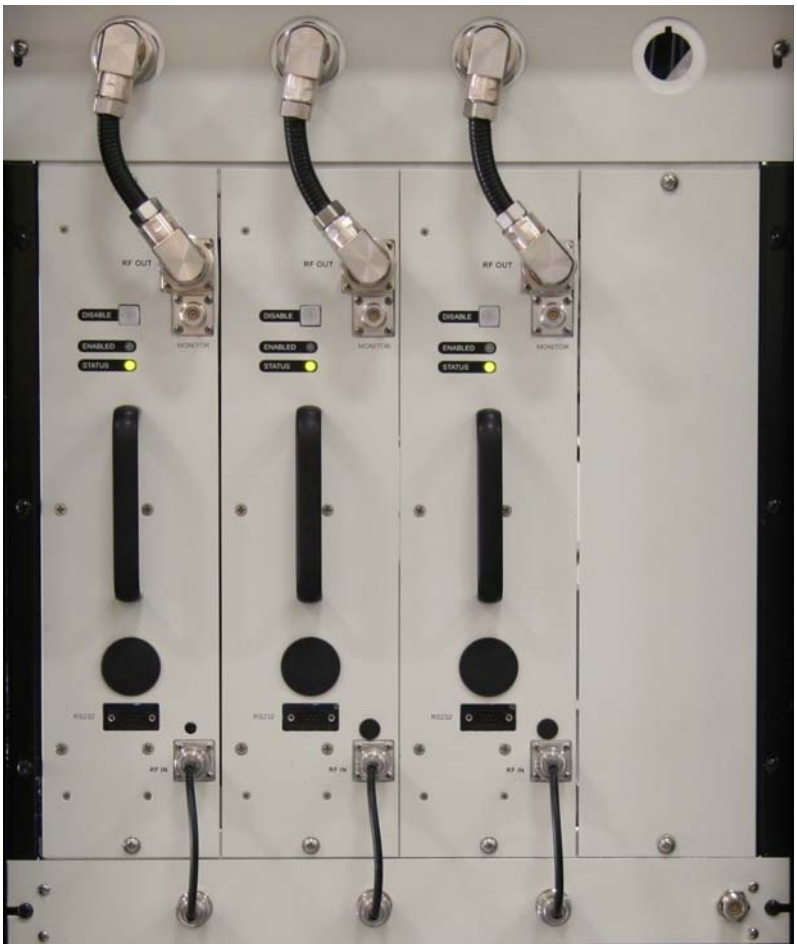


Figure 10: Vertical Amplifier Assembly w/Three Amplifier Drawers

Port	Type	Function	Impedance
J1	N	RF In: On Channel RF from CX driver drawer or Relay Interface board (dual CX only)	50Ω
J2	7/16" (1.1cm) DIN	RF Out: On Channel RF Output	50Ω
J3	N	Monitor: Output Sample from Combiner thru Coupler. Sample level is approximately 70dB down from the output power level of the drawer.	50Ω
J7	9 Pos D	RS232: Serial interface for factory configuration	
J4 Rear Panel	19 Pos Metrimate	Provides +/- 12V DC and serial connection for amplifier control board	N/A
J5 Rear Panel	10MM Contact Pin	+50V DC input from power supply shelves	N/A

Table 5: Vertical Amplifier Connectors

When the amplifier drawers are installed in the Amplifier Assembly the rear panel blind mate connectors (J4 and J5) are connected to the Amplifier Assembly backplane.

The amplifier drawers also have front panel input and output connectors that must be connected to the Amplifier Assembly when the transmitter is installed.

- The quadrature splitter RF output must be connected to the RF In (J1) on the amplifier front panel using the N-male to N-male jumper provided.
- The RF Out (J2) on the amplifier front panel must be connected to the combiner RF input using the 7/16" DIN-M to 7/16" DIN-M jumper provided.

Note: The vertical amplifier assembly includes an RF monitor N-type connector with a coupling factor of 60 dB. The RF monitor connector is used to monitor the transmitter reflected power on the pre-filter coupler.

3.7.3 Optional K-Tech Receiver

If your transmitter (TD) contains an Optional K-Tech receiver and is mounted in a cabinet with vertically mounted amplifiers, BNC and F-type connectors have been mounted on the cabinet rear panel at the top of the cabinet. The BNC connector has been wired to the K-Tech receiver ASI input connector and the F-type connector has been wired to the K-Tech receiver RF input connector. **Note:** If the user would like to feed the K-Tech receiver with an SMPTE 310M input signal, the user should move the BNC cable on the rear panel of the K-Tech receiver from the ASI input connector to the S310 input connector.

3.8 Connecting your Transmitter to a TCP/IP Network

To connect your transmitter to a TCP/IP Network you must set up the IP address, subnet mask, and gateway values of both the Ethernet controller and the modulator. DHCP is not available for the Ethernet controller but it can be turned on for the modulator controller. However, both devices should use static IP addressing so that these values remain constant after a power cycle. Refer to Figure 19.1.13 for setting up the Ethernet controller and see Figure 19.2.5 for setting up the modulator IP values.

If the transmitter system is pre-wired at the factory and includes a router, the router's WAN port should be the connection point to the network. The user must configure the router's WAN port for access to the network.

Note: All other devices (Remote Interface panel and CX Exciters) connected to the router have been configured with a static IP address. The operator can access the other devices though the router, but the IP addresses must not be changed. Changing the static IP addresses could prevent communication between the devices and render the transmitter inoperative.

Contact your local IT administrator for the proper TCP/IP address subnet mask and gateway settings of your network.

3.9 Maintenance

The Innovator CX Transmitters are designed with components that require little or no periodic maintenance, except for the routine cleaning of air intakes, fans and module front panels as well as the periodic check of general tightness of hardware.

It is recommended that periodically (the time interval depends on the amount of movement the cabinet receives) all mounting hardware, holding drawer slides, shelving and mounting plates inside the cabinet are checked for tightness. All screws and bolts that are accessible should be tightened initially when the transmitter is received and periodically thereafter if the transmitter is moved by vehicle. All coaxial connectors, hard-line connections and hardware holding combiners, splitters, or any other mounted items should be checked and tightened.

The amount of time between cleanings of the drawers and cabinets depends on the conditions within the transmitter room. While the electronics have been designed to function even if covered with dust, a heavy buildup of dust, dirt, or insects will affect the cooling of the components. This could lead to a thermal shutdown or the premature failure of the affected drawer. When the front panels of the drawers become dust covered, the drawer should be pulled out and any accumulated foreign material should be removed.
NOTE: To remove a drawer from the cabinet, the input and output cables must be removed from the rear (and/or front) of the transmitter before the drawer can be pulled out completely from the cabinet.

A vacuum cleaner, utilizing a small, wand-type attachment, is an excellent way to suction out any dirt from the drawer and cabinet. Alcohol and other cleaning agents should not be used unless you are certain that the solvents will not damage components or the silk-screened markings on the drawers and boards. Water-based cleaners can be used, but do not saturate the components. The fans and heatsinks should be cleaned of all dust or dirt to permit the free flow of air for cooling purposes.

It is recommended that the operating parameters of the transmitter be recorded from the LEDs and the LCD system metering on the front panel of the drawer at least once a month to be used for comparison purposes in case of a failure. It is suggested that this data be retained in a rugged folder or envelope and stored near the transmitter.

Chapter 4 Initial On Site Turn On Procedure

4.1 Turn On Procedure

Once the cabinet, cabinet drawers and the transmission lines have been installed, the system should first be swept and fine matched through to the Station Load. During the initial turn-on procedure the system should be tested into a system test load and not the antenna. The transmitter should be operated in this mode until initial testing is completed. After the initial turn-on procedure is completed, the output of the transmitter can be connected to the antenna for normal operation.

NOTE: Check that all installation has been completed before proceeding with the initial turn-on of the transmitter. Check that the combined RF output of the RF system is terminated into a dummy load with a rating of at least the rated output of the transmitter.

- Switch on the Main AC circuit breaker located in the building service panel.
- Switch on the cabinet AC Distribution panel circuit breaker labeled Modulator, which is connected to the UPS.
- Locate the UPS in the bottom of the cabinet and turn on the power using the front panel power button.
- Switch on the CX drawer AC power switch which is located on the rear panel. All other optional devices (K-tech receiver, Ethernet Switch, DC Power Supply) will be turned on when the UPS is turned on.
- Switch on the cabinet AC Distribution panel circuit breakers HPA-1 and HPA2. The 50 VDC power supply shelves, amplifier assembly blower unit and amplifier drawers will power on.
- Ensure that the K-Tech receiver is locked to the incoming signal and that there are no alarms on the CX drawers, remote interface switching panel and amplifier drawers.
- Place the transmitter in operate. This can be done by pressing the Operate button on the CX drawers or by using the Web interface. Refer to section 6 of this for Web interface instructions.
- Monitor the transmitter forward power using the LCD on either of the CX drawers or via the Web interface. It should increase to 100% in less than 10 seconds.

When the transmitter is placed into operate the individual amplifiers drawers are enabled, then the CX drawer RF is un-muted and slowly increased to the operating power as set by the GUI; the default value is 100%. The Operate/Standby LED on the main CX drawer will turn Green and the Enable LED on the amplifier drawers will turn Green.

WARNING: Do not operate the control amplifier cabinet assembly with the fan assembly not providing air flow.

4.2 Typical System Operating Parameters

Typical Operating Parameters for the external Amplifier Drawer(s)	
Parameter	**Typical Reading**
Forward Power	100%
Reflected Power	<5%
Power Supply Voltage	+ 48 VDC
Heatsink Temperature	20º to 30º F/15º to 20º C above ambient temperature

Table 6: Typical Operating Parameters

4.3 Typical Problems, Indications and Causes in CU0TD/RD-2 or -3 Drawer

Problem	Indication	Cause
No power to drawer	Operate/Standby and Enable LED indicators and LCD display are Off	AC power cord not connected. Main AC to System missing. On/Off switch on back of drawer Off. 10 Amp fuse (F1) blown*. Power supply (A9) not operating
No Output Signal	Front Panel Status LED is Amber and blinking with no events, faults indicated.	On the 8VSB Modulator S310 MPEG Input Selection Set Up Screen, the Input is currently set incorrectly to "from Internal Source". Set to "from External Source".
Loss of Input Signal	Loss of Input on Modulator Menu	Loss of input signal.
Loss of Output Signal	Amber Operate/Standby LED. Blinking Red Status LED.	Any Event, Fault, which Mutes the output. Including Input Fault, VSWR Cutback, Overdrive, Over-temperature and Overvoltage.
Loss of 48V	Power Supply Fault on Power Supply Menu	Power supply not operating
Loss of ±12V or 5V	Operate/Standby and Enable LED indicators and LCD display are Off	Power supply not operating

Table 7: Typical Problems

NOTE: *A spare 10 Amp fuse is provided in the blank fuse holder under the active fuse.

If there is an Event (Fault) occurring in the system, the Status LED on the front panel will flash RED as long as the Event (Fault) is present. In addition, the menu will jump to the current Event (Fault) on the display and blink the Event (Fault) continuously, if the Jump to Fault screen is set to Yes. When the Event (Fault) is corrected, the drawer will turn the Status LED to AMBER to indicate that there was a Fault and the menu will still display the Fault but it will not flash. This gives the user the knowledge that there was an Event (Fault) and what type of Event (Fault) occurred. Before clearing the fault, check if there were other Events (Faults) by stepping through the menus. To reset the indication of previous Events (Faults) the user must push the Enter button with the Event (Fault) Reset Screen displayed. This will reset all previous Events (Faults).

Chapter 5 Front Panel Pushbutton and LCD/LED Operation

5.1 CX Drawer

The CX drawer front panel includes a LCD with menu control pushbuttons, Operate and Standby pushbuttons and several LEDs.

Figure11: CX Drawer Front Panel

1) OPR (operate) pushbutton
2) STBY (standby) pushbutton
3) OPR/STBY LED
4) Status LED
5) LCD
6) LCD menu control pushbuttons (▲, ▼, ◄, ►)
7) Enter pushbutton
8) Serial port
9) Sample port

NOTE: J15 is a Front Panel, 50Ω, BNC RF Sample Jack that provides an RF output sample from the output detector board in the drawer. The sample level at J15 is approximately 60dB down from the output power level of the drawer.

Pushbutton	Function
OPR	Places the system in Operate mode.
STBY	Places the system in Standby mode.
ENTER	Selects changes made in the LCD menus and sub-menus.
▲ (up) ▼ (down)	Scrolls through the LCD main menus and after entering a main menu, scrolls through its sub-menus (when present).
◄ (left) ► (right)	Used to exit a LCD main menu or sub-menu (when present).

Table 8: CX Drawer Pushbutton Functions

LED	Color	Description
OPR/STBY	Green	System is in Operate mode.
	Amber	System is in Standby mode.
STATUS	Green	CX drawer is functioning normally.
	Red (blinking)	CX drawer Event (fault) is present.
	Amber	CX drawer Event (Fault) occurred, but the CX drawer is now operating normally.
	Amber (blinking)	CX drawer MPEG input set to internal source (with no Events [Faults]).

Table 9: CX Drawer LED Indicators

5.2 Vertical Amplifier Drawer

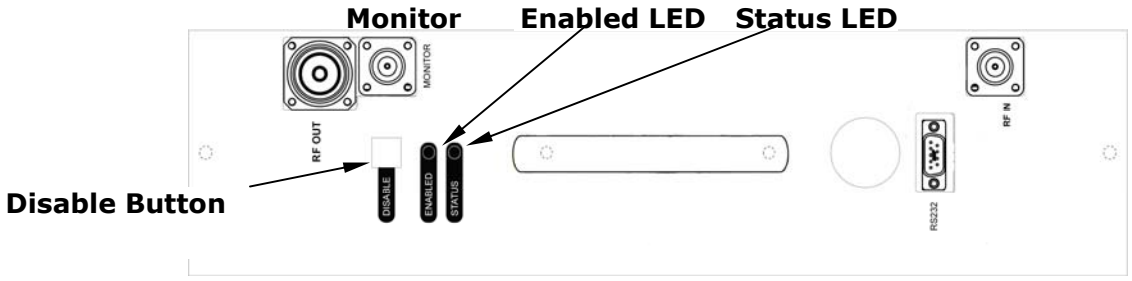


Figure 12: Front View Vertical Amplifier Drawer

Pushbutton	Function
DISABLE	Disables or enables the power amplifier.

Table 10: Power Amplifier Pushbutton Function

Pushbutton	Color	Description
DISABLE	OFF	Power amplifier is in Operate mode.
	Red	Power amplifier is in Standby mode.

Table 11: Power Amplifier Pushbutton Color Indicators

LED	Color	Description
ENABLE	OFF	Power amplifier is in Standby mode.
	Green	Power amplifier is in Operate mode and is operating normally.
	Amber	Power amplifier is in Operate mode, but is not operating.
STATUS	Green	Power amplifier is operating normally.
	Red (1 blink)	Amplifier current fault is present
	Red (2 blinks)	Temperature fault is present.
	Red (3 blinks)	Power supply over voltage fault is present.
	Red (4 blinks)	Power supply under voltage fault is present.
	Red (5 blinks)	Reflected power fault is present.
	Red (6 blinks)	+12V or –12V power supply fault is present.
	Red (7 blinks)	AGC overdrive fault is present.

Table 12: Power Amplifier LED Indicators

5.3 LCD Front Panel Screens

An LCD display, located on the front of the Innovator CX drawer, displays the current operating status of the system. When the drawer is powered On, the LCD will initially display two splash screens. The first splash screen will be displayed for a few seconds, then the second splash screen will be displayed for a few seconds and finally the RF Power Display default screen will be displayed. See typical examples of the screens below.

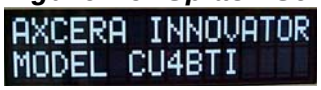
NOTE: These screens are typical examples of an operating system; your systems screens may be different. The RF Power Display default screen will be the screen displayed if no buttons are pushed to access other screens. While viewing the RF Power Display default screen, pushing the Left and Right arrow buttons together will also access the splash screens.

NOTE: In dual exciter systems, the On Air Exciter will display the operating parameters of the system.

5.3.1 Implementation

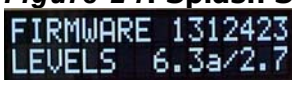
The first splash screen displayed indicates the manufacturer and the model number of the UBS-Axcera product.

Figure 13: Splash Screen #1



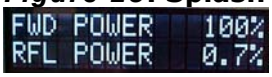
The second splash screen indicates the Firmware and Version Numbers of the software used in the system. The example shown is Firmware number 1312423 Version number 6.3a/2.7.

***Figure 14*: Splash Screen #2**



The final screen is the default screen which indicates the Forward Power and Reflected Power for the system.

***Figure 15*: Splash Screen #3**



The user can scroll through the following screens by using the buttons to the right of the LCD display. Pushing and releasing the Up & Down Arrows will scroll through the Main Menus (level 1), which are shown on the following pages and are aligned on the left side of the page.

The Sub-menus (level 2) are accessed by pushing and releasing the ENTER button. Once in the Sub-menu (level 2), the user can scroll through the menu items (level 3) listed in the Sub-menus (level 2) by pushing and releasing the Up & Down Arrows. The Sub-menus (level 2) are shown on the following pages, indented to be below the Main Menus (level 1).

The sub-menus (level 3) of the Sub-menus (level 2) are indented to be under the Sub-menu (level 2) in which they are contained.

In the Set-up Menus, changes are made to the display by Pushing and releasing the ENTER button. This will cause the item, which is to be changed, to blink. The user can then press the left and right arrow buttons to display the new parameter. Finally, pushing the ENTER button will accept the changes made upon exit of the Set-up Menu.

NOTE: An example of accessing and changing a parameter using the Set-up Menus is as follows. This procedure is to set the Off Air Receive Channel to the desired channel.

- Push and release the DOWN Arrow button until the SYSTEM SET-UP Main Menu is displayed.
- Push and release the ENTER button and the Authorization Warning screen is displayed.
- Push and release the ENTER button again and the ENTER BUTTON SETS TO CHANGE MODE screen is displayed.
- Push and release the ENTER button again and the first set-up menu, which is the SET-UP MENUS OF CHASSIS VALUES screen is displayed.
- Push and release the DOWN Arrow button until the SET-UP 8VSB DEMODULATOR screen is displayed.
- Push and release the ENTER button to display the submenus under the SET-UP 8VSB DEMODULATOR menu.
- Push and release the DOWN Arrow until the 8VSB DEMODULATOR USE OFF AIR CHxx is displayed.
- Push and release the ENTER button and the XX, which indicates the Channel Number, will blink.
- Push and release the UP or DOWN Arrow button until the desired new channel number is displayed.
- Push and release the ENTER button, and the PUSH ENTER TO ACCEPT CHANGES menu is displayed.
- Push and release the ENTER button again to accept the changes made. The channel is now changed.
- Push and release the LEFT Arrow to exit to the SET-UP 8VSB DEMODULATOR screen.
- Push and release the LEFT Arrow again to exit to the SYSTEM SET-UP Main Menu.
- Push and release the UP or DOWN arrows to browse the main menus.

The following screens are typical of an operating system. The values indicated on the screens in your system may vary from those shown below.

5.3.2 Operation Screens

NOTE: The following Operation screens provide operating information only. No adjustments are available using these screens.

Figure 16: Transmitter Forward Power Screen

This is the default screen that is displayed after the splash screens are displayed. This screen provides an indication of the Output Power of the transmitter in terms of Percent (typically 100%). The screen also provides an indication of the Reflected Power of the transmitter in terms of Percent (typically less than 5%). Push the DOWN Arrow to view the next main menu, which is the Transmitter Fault Log Main Menu.

Figure 17: Transmitter Event Log Main Screen

This is the Transmitter Event Log Main Screen. Push the ENTER button to access the Fault List submenu. Push the DOWN Arrow to view the next main menu, which is the Transmitter Details Main Menu.

Figure 17.1: Transmitter Event List Screen

When events occur, they will be displayed on this screen. The Up and Down arrow will scroll you through the different entries in the event log. The above screen indicates the 001 event of 013 total events that have occurred in the Transmitter. The number in the parenthesis on the top right, is this case 01, indicates the number of times the displayed event has occurred. The bottom line scrolls to indicate the event that occurred, in this case RF Interlock Fault, and the time the event occurred after the prior event. Push the LEFT Key to exit to the Transmitter Event Log Main Menu screen. Pushing the RIGHT Key will access the Event Reset Screen.

Figure 17.2: Event Reset Screen

This screen allows the user to reset the event log, after they are observed or corrected. **NOTE:** Resetting the events on an amplifier may cause the transmitter to momentarily mute.

Figure 17.3: Event Reset Old Faults Screen

This screen allows the resetting of old faults that are latched from the event log after they are observed or corrected. The transmitter can be configured to latch faults as detailed in Figure 19.1.4. That means that if a fault occurs and then it clears, the status of the parameter in the details screen will not blink indicating an active fault, but it will still show fault indicating that previously this parameter was faulted. Within the web pages, a latched fault is shown with an orange background while faulted parameters are shown in red and good values are shown in green. Resetting Old Faults will clear the latched fault and the display will show the value as OK or with other text that indicates that it is not faulted.

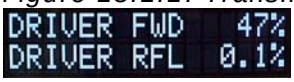
Figure 18: Transmitter Details Main Screen

This is the Transmitter Details Main Screen. Push the ENTER button to access the Device Details Chassis Values Main Sub Screen. Push the DOWN Arrow to view the next main menu, which is the Transmitter Set -Up Main Menu.

Figure 18.1: Transmitter Device Details Chassis Values Screen

This is the Transmitter Device Details Chassis Values Main Sub Screen. Push the ENTER button to access the Device Details Chassis Values submenus. Push the DOWN Arrow to view the next main submenu, which is the Modulator Sub Menu.

Figure 18.1.1: Transmitter Driver Forward/Reflected Power Details Screen



This screen provides an indication of the Output Power of the Driver Drawer in terms of Percent, typically 20-70%, when there are external amplifiers in the system. In single drawer systems, the driver power is actually the system power. It may be 100% when used as stand alone transmitter. This screen also provides an indication of the Reflected Output Power of the Driver Drawer in terms of Percent, typically less than 3%.

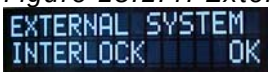
Figure 18.1.2: Heatsink Temperature Details Screen

This screen indicates the temperature of the amplifier heatsink assembly, mounted in the transmitter or driver drawer, in degrees Fahrenheit. If the temperature is below the trip point, it will indicate OK. Typically, the temperature is 15ºC to 20º C above ambient temperature.

Figure 18.1.3: Power Supply Voltage Details Screen

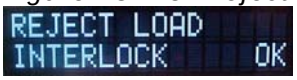
This screen shows the power supply voltage in the transmitter or driver drawer. If the power supply voltage is below the trip point, it will indicate OK.

Figure 18.1.4: External Interlock Details Screen



This screen indicates if an external interlock is present in your system. Typically Present - it must be present or system will remain in Standby.

Figure 18.1.5: Reject Load Interlock Details Screen (BTD/BRD)



This screen indicates if the external Reject Load interlock is present in your system. Typically Present – it must be present or system will remain in Standby.

Figure 18.1.6: AGC Details Screen

This menu indicates if the AGC circuit has an input. An AGC input fault indicates that there is no RF input to the board, which could occur if anything before it fails.

Figure 18.1.7: AGC Overdrive Details Screen

This menu indicates if the AGC circuit is operating within its range.

Figure 18.1.8: AGC Auto/Manual Details Screen

This menu indicates if the AGC circuit is operating in Auto or Manual.

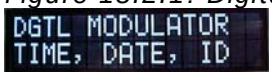
Figure 18.1.9: ALC Voltage Level Details Screen

This menu indicates the Auto ALC voltage setting, typically 1 to 5 V.

Figure 18.2: Modulator Device Details Screen

This is the Transmitter Device Details Modulator Main Sub Screen. Push the ENTER button to access the Device Modulator submenus. Push the DOWN Arrow to view the next main submenu, which is the Upconverter Sub Menu. Push the LEFT Arrow to go back the Main Device Details Screen. Then push the DOWN Arrow to access the Transmitter Set -Up Main Menu.

Figure 18.2.1: Digital Modulator Identification Screen

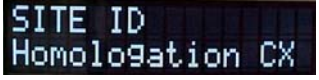


This menu provides access to screens that display the Modulator's Date and Time or the Modulator's Site ID.

Figure 18.2.1.1: Digital Modulator Time Set Date Set Screen

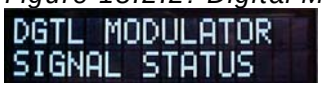
This Screen displays the Modulator's date and time to allow confirmation that the communications system between the Innovator CX and the Digital Modulator is operational. Adjustments to the date and time are available through the Digital Modulator's web pages.

Figure 18.2.1.2: Digital Modulator Site ID Set Screen



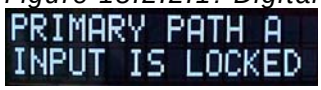
This Screen displays the Digital Modulator's Site ID which confirms that the communications system between the Innovator CX and the Modulator is operational. Adjustment to the Site ID is available through the Modulator's web pages.

Figure 18.2.2: Digital Modulator Signal Status Screen



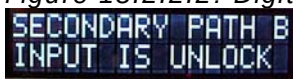
This menu provides access to screens that display the status of the Digital Modulator's signals. As these are detail screens, they are read only and not adjustable. They provide basic feedback on the configuration of the Digital Modulator. Configuration is completed through the Modulator's web pages.

Figure 18.2.2.1: Digital Modulator Primary Path A Set Screen



This Screen indicates the status of the Primary Input Path A. Configuration is completed through the Digital Modulator's web pages.

Figure 18.2.2.2: Digital Modulator Secondary Path B Set Screen



This Screen indicates the status of the Secondary Input Path B. Configuration is completed through the Digital Modulator's web pages.

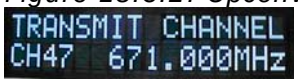
Figure 18.3: Upconverter Device Details Screen

This is the Transmitter Device Details Upconverter Main Sub Screen. Push the ENTER button to access the Device Upconverter submenus. This is the final Device Details Main Sub Menu. Push the LEFT Arrow to go back the Main Device Details Screen. Then push the DOWN Arrow to access the Transmitter Set-Up Main Menu.

Figure 18.3.1: Upconverter 10 MHz Details Screen

This menu indicates if the 10 MHz reference used is generated internally or provided by an external reference source, such as a GPS.

Figure 18.3.2: Upconverter Transmitter Channel Details Screen



The upconverter transmit channel screen indicates the channel that the upconverter is currently set and the center frequency of that channel. Displayed above is CH: 47 that has a Center Frequency of 671MHz.

Figure 18.4: External Amplifier Device Details Screen

This is the Transmitter Device Details External Amplifier Main Sub Screen. This is the final Device Details Main Sub Menu. Push the ENTER button to access the Device External Amplifier #1. Push the LEFT Arrow to go back the Main Device Details Screen. Then push the DOWN Arrow to access the Transmitter Set-Up Main Menu.

NOTE: Shown below are the External Amplifier #1 Details Screens. The External Amplifier #2, #3 or #4 Details Screens are presented in the same order if they are present in the system.

Figure 18.4.1: External Amplifier #1 Forward Power Details Screen

Indicates the Output Power for external amplifier #1.
NOTE: See the final test data sheet for the typical value.

Figure 18.4.2: External Amplifier #1 Reflected Power Details Screen

Indicates the Reflected Power for external amplifier #1.
NOTE: See the final test data sheet for the typical value.

Figure 18.4.3: External Amplifier #1 I1-A1 Current Details Screen

Indicates the Current of the A1 device in the external amplifier #1.
NOTE: See the final test data sheet for the typical current value.

Figure 18.4.4: External Amplifier#1 I2-A2 Current Details Screen

Indicates the Current of the A2 device in the external amplifier #1.
NOTE: See the final test data sheet for the typical current value.

Figure 18.4.5: External Amplifier#1 I3-B1 Current Details Screen

Indicates the Current of the B1 device in the external amplifier #1.
NOTE: See the final test data sheet for the typical current value.

Figure 18.4.6: External Amplifier#1 I4-B2 Current Details Screen

Indicates the Current of the B2 device in the external amplifier #1.
NOTE: See the final test data sheet for the typical current value.

Figure 18.4.7: External Amplifier #1 A Power Supply Details Screen

Indicates the voltage of the A power supply in the external amplifier #1.
NOTE: Typical voltage value is +42VDC nominal.

Figure 18.4.8: External Amplifier #1 B Power Supply Details Screen

Indicates the voltage of the B power supply in the external amplifier #1.
NOTE: Typical voltage value is +42VDC nominal

Figure 18.4.9: External Amplifier #1 A Temperature Details Screen

Indicates the temperature of heatsink A in the external amplifier #1.
NOTE: Typical temperature for DVB = ≈20-30°C above ambient.

Figure 18.4.10: External Amplifier#1 B Temperature Details Screen

Indicates the temperature of heatsink B in the external amplifier #1.
NOTE: Typical temperature for DVB = ≈20-30°C above ambient.

Figure 18.4.11: External Amplifier #1 Code Version Details Screen

Indicates the code version in the external amplifier #

5.3.2 Set-up Screens

Figure 19: Transmitter Set-Up Main Screen

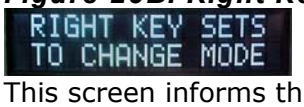
This is the Transmitter Set-Up Main Screen. Push the ENTER button to access the Authorization Warning Main Sub Screen. This is the final Main Screen, pushing the DOWN Arrow will take you back to Transmitter Details Main Menu.

The Set-Up item or parameter that can be changed on the displayed sub menu screen, is indicated by pushing the ENTER button, which causes the changeable item to blink. The UP or DOWN arrow will change the selection until the desired result is displayed. Pushing the ENTER Button will accept the change.

Figure 19A: Authorized Personnel Screen

This screen of the transmitter notifies an operator that they are only to proceed if they are authorized to make changes to the transmitter's operation. Changes made within the following set-up screens can affect the transmitter's output power level, output frequency, and the general behavior of the transmitter. Please do not make changes within the transmitter's set-up screens unless you are familiar with the operation of the transmitter. Pressing the ENTER button will display the Enter Key Sets to Change screen.

Figure 19B: Right Key Sets to Change Mode Screen



This screen informs the operator that to make changes, the Right key or the Enter key must be pushed, which will cause the display that can be changed to blink. Use the up or down key to change the display and the left or right key to move the blinking item on the display. After changes are made in the Set-Up Menus pushing the enter Key, Button, will accept the changes made. With the Right Key Sets To Change Mode screen displayed, pushing the ENTER button will access the first main submenu under the Set-Up main menu, which is the Chassis Values Set-Up Menu.

Figure 19.1: Chassis Values Main Set-Up Menu Screen

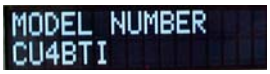
This is the Transmitter Set-Up Chassis Values Main Sub Screen. Push the ENTER button to access the Chassis Values submenus. Push the DOWN Arrow to view the next Set-Up Main Sub Screen, which is the Set-Up Upconverter Main Sub Screen.

Figure 19.1.1: Chassis Values Forward Power Set-Up Screen

This screen allows remote or front panel adjustment of the output power of the transmitter. The bar graph indicates the range remaining in the adjustment.

NOTE: If the transmitter's output power is being adjusted through the web page, the transmitter's forward power will be blinking on this screen. It will remain blinking while the transmitter is adjusting to the desired target power level.

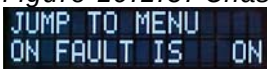
Figure 19.1.2: Chassis Values Model Number Set-Up Screen



This screen allows the set-up of the Model Number of the transmitter. This causes the system to access the proper parameters to be displayed on the LCD screens.

NOTE: Do not change this screen without first consulting with UBS-Axcera.

Figure 19.1.3: Chassis Values Jump to Menu on Fault Set-Up Screen



The 'Jump To Menu' setting screen allows an operator to change how the transmitter's display system works. When this value is set 'ON' and a new fault occurs, the transmitter will automatically change the display screen to show the new fault condition. When this value is set 'OFF', the display screen does not change when a new fault is detected.

Figure 19.1.4: Chassis Values Latch On a Fault Set-Up Screen

This screen, by selecting ON, allows the user to select that the system will latch the fault if it occurs, then if the problem is corrected the fault will still register. Since latched faults are used to set the status LED color. When fault latching is OFF, the status LED should only be green if there are no faults or red if there are one or more active faults. When fault latching is ON, the status LED will be amber if there are no current faults but a fault was previously detected and is now a latched fault. A blinking amber status LED indicates that there are no current faults or latched faults but that an internal signal source is selected instead of an external source.

Figure 19.1.5: Chassis Values External Amplifier Fault Number Set-Up Screen

1 **2**

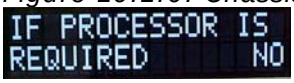
This screen allows the user to set the number of faults that are allowed before the external amplifier is disabled. **NOTE**: Only used with external amplifiers are in the system.

Screen 1: If One Fault is selected and a fault occurs in an external amplifier, the entire transmitter is muted and the faulted external amplifier is latched off. The transmitter is then unmuted and any external amplifiers (fully or partially operational) are enabled.

Screen 2: If Three Fault is selected and a fault occurs in an external amplifier, the entire transmitter is muted and unmuted three times before the faulted external amplifier is latched off.

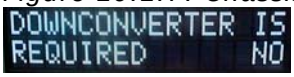
NOTE: Faulted amplifier sections are re-enabled when latched faults are cleared in the event log. See Table 9.1 for more information on clearing the logs.

Figure 19.1.6: Chassis Values IF Processor Selection Screen



This screen allows the user to select that the system has an IF Processor.

Figure 19.1.7: Chassis Values Downconverter Selection Screen



This screen allows the user to select that the system has a Downconverter.

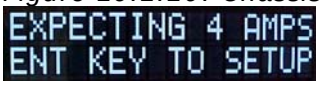
Figure 19.1.8: Chassis Values Amplifier Power Supply Voltage Screen

This screen allows the user to select the Power Supply Voltage.

Figure 19.1.9: Chassis Values Forward Power Fault Adjust Screen

This screen allows the operator to configure a forward power fault threshold setting. When the exciter is enabled for at least a few seconds and the system forward power is not greater than or equal to this setting, a fault is indicated on the status LED and also on the remote fault indicator pin.

Figure 19.1.10: Chassis Values number of Amplifiers in System Screen



This screen indicates the number of external amplifier drawers in the system. By selecting the enter key, the system will scan to find the number of external amplifier drawers.

NOTE: Do not change this screen without first consulting with UBS-Axcera.

Figure 19.1.11: Chassis Values Ethernet Option Set-Up Screen

This screen is only displayed if Ethernet Controller is not present in your system.

Figure 19.1.12: Chassis Values Reset Ethernet User Name Set-Up Screen

When the optional Ethernet Controller is present, this screen is displayed. It is used to reset the first username / password account of the Ethernet controller. There are a total a five accounts available on the Web. If this operation is selected, ON, and the change accepted, only the fist username / password account file is replaced, with the user name set to 'admin' and the password set to 'UBS-Axcera'.

Figure 19.1.13: Chassis Values Ethernet Address Set-Up Screen

When the optional Ethernet Controller module is present, this screen is used to view or change the Ethernet TCP Address of the controller.

Figure 19.1.14: Chassis Values Ethernet Netmask Set-Up Screen

When the optional Ethernet Controller module is present, this screen is used to view or change the TCP subnet mask of the Ethernet controller.

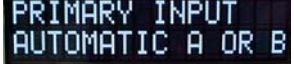
Figure 19.1.15: Chassis Values Ethernet Gateway Set-Up Screen

When the optional Ethernet Controller module is present, this screen is used to view or change the TCP gateway (router) address of the Ethernet controller.

Figure 19.2: Modulator Main Set-Up Menu Screen

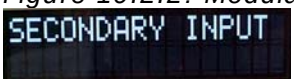
This is the System Set-Up Modulator Main Sub Screen. Push the ENTER button to access the Set-Up Modulator submenus or push the DOWN Arrow to view the next Set-Up Main Sub Screen, which is the Set-Up Upconverter Main Sub Screen.
NOTE: Refer to the description in Table 30B for how to change the values on the following set-up screens.

Figure 19.2.1: Modulator Primary Input Selection Set-Up Screen



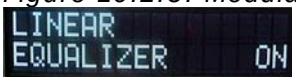
This screen allows the user to select between an A and a B source input to the modulator. When set to automatic, the modulator will automatically sense an input and chose that input as the primary input.

Figure 19.2.2: Modulator Secondary Input Selection Set-Up Screen



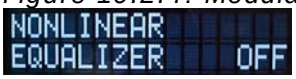
This screen allows the user to select a secondary input source to the modulator.

Figure 19.2.3: Modulator Linear Equalization Selection Screen



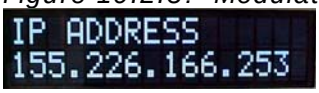
This screen controls the operation of the linear equalizer. When set to ON, the modulator applies linear correction to the IF output. When set to OFF, no correction is applied to the IF.

Figure 19.2.4: Modulator Non Linear Equalization Selection Screen



This screen controls the operation of the non linear equalizer. When set to ON, the modulator applies non linear correction to the IF output. When set to OFF, no correction is applied to the IF.

Figure 19.2.5: Modulator Values IP Address Set-Up Screen

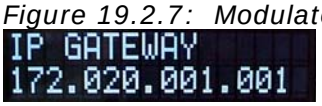


This screen is used to view or change the IP Address of the modulator.

Figure 19.2.6: Modulator Values IP Netmask Set-Up Screen

This screen is used to view or change the IP subnet mask of the Modulator.

Figure 19.2.7: Modulator Values IP Gateway Set-Up Screen



This screen is used to view or change the IP gateway (router) address of the Modulator.

This is the final screen in the Transmitter Set-Up Modulator Main Sub Screens. Push the down arrow to repeat the Modulator Main Sub Screens or Push the LEFT Arrow to go back the Modulator Main Set-Up Screen.

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Chapter 6 Innovator CX Series Web Ethernet Interface Kit

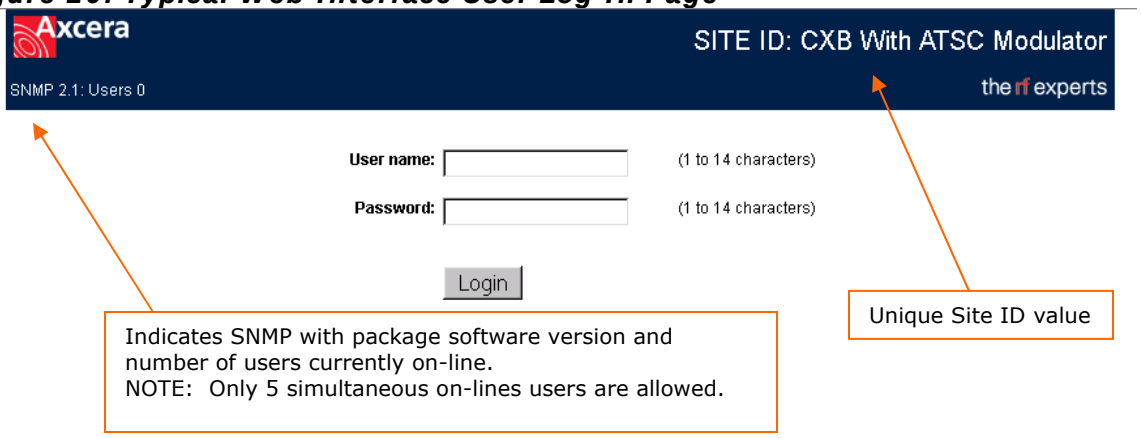
6.1 Introduction

The Innovator CX Series transmitter is available with an optional Web Ethernet interface package (1313100). Another Web Ethernet Interface package that provides an SNMP interface to transmitter parameters and serves HTML web pages is available (1316423). This option may be added to the Innovator CX Series transmitter if it was not originally installed at the factory. **NOTE:** If an ATSC modulator is present in your system, please refer to the ATSC Modulator section of this manual for more information on the ATSC modulator Web Interface.

NOTE: Mozilla Firefox is the preferred browser for this Web Ethernet interface kit.

6.2 Logging In

Figure 20: Typical Web Interface User Log In Page



Once a connection has been established, the Web interface can be launched by entering the IP address of the Innovator CX Ethernet Controller (as a URL) in the browser of the remote computer. A login page will be displayed prompting the user to enter a User Name and Password, **which are case sensitive**.

The controller has three levels of user access: Administrative, Read/Write and Read Only. Administrators have full access to transmitter controls and controller configuration. Read/Write users have full access to transmitter controls and can change all controller configurations except for the user name and password accounts. Read Only users can view all transmitter parameters and the event log entries but they can not change the transmitter's state, clear faults, clear the event log or configure the Ethernet parameters.

Five unique login accounts are available. The factory default user name and password for account number one is:

User Name	Password	Access Level
admin	axcera	Administrator

The user name and password of account number one may be reset to factory default values through a transmitter setup page.

6.3 Main Control/Monitoring Page

After logging in, the main control/monitoring page is displayed. Administrators have the ability to change the transmitter's operate/standby state, and configure the application. All users have the ability to view the transmitter's event log, and review system parameters. Refer to Figure 21 or 22 for a sample of the main control/monitoring page.

Figure 21: Web Interface Main Control/Monitoring Page

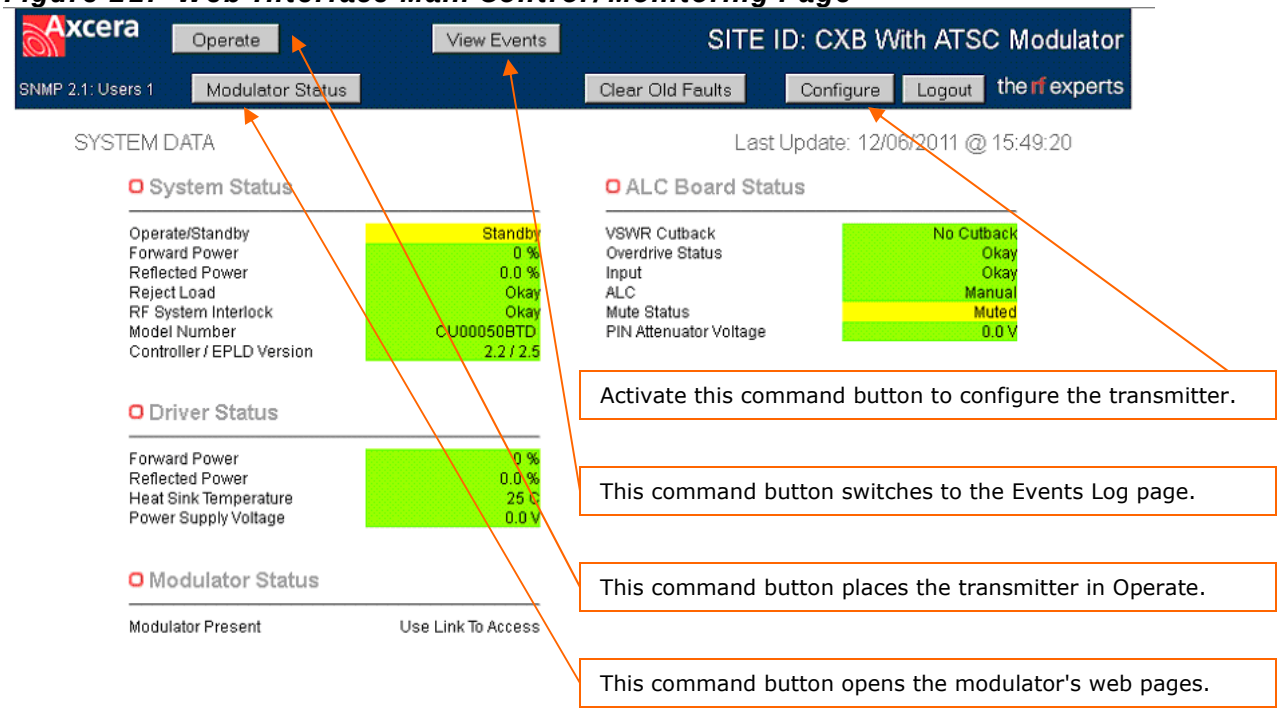
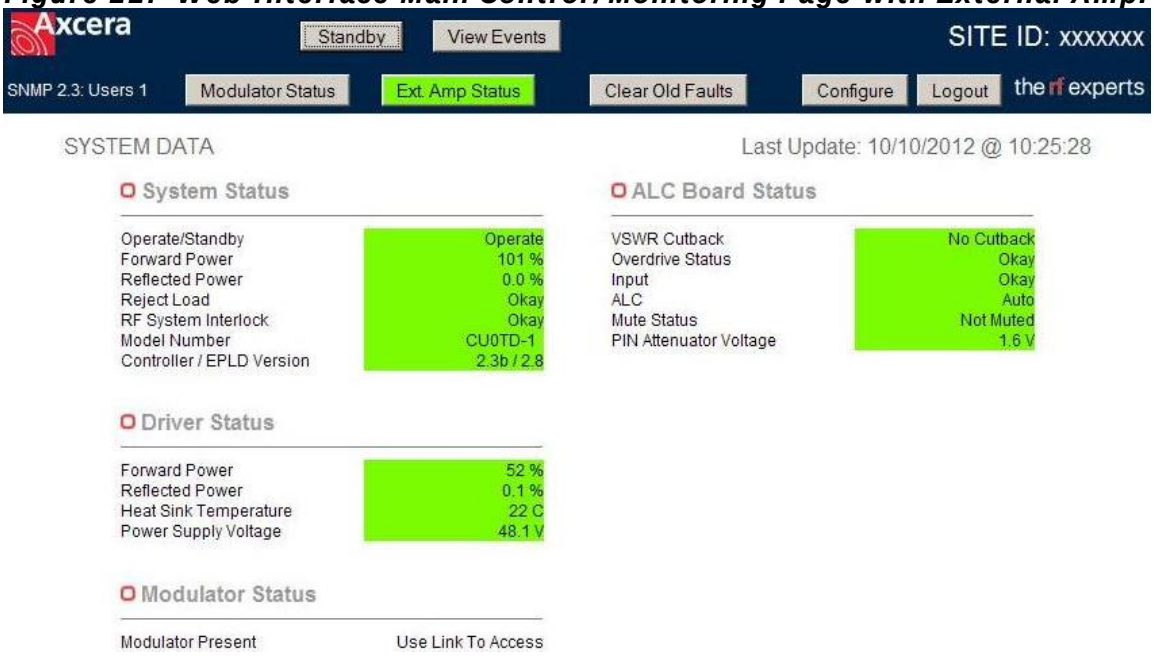


Figure 22: Web Interface Main Control/Monitoring Page with External Amp.



The buttons at the top of the page allow the user to access a number of status and configuration pages. For systems with external amplifiers, an additional Ext. Amp Status button is available.

To place the transmitter in Operate mode, the user must click on the '**Operate**' button – see Figure 21. When the transmitter is in operate mode, Operate/Standby, found under System Status, will be highlighted Green and will indicate operate. To place the transmitter in standby mode, the user must click on the '**Standby**' button – see Figure 22. When the transmitter is in standby mode, Operate/Standby, found under System Status, will be highlighted yellow and will indicate Standby.

System Status will display the status of a number of overall transmitter system parameters. These include Operate/Standby status, forward and reflected power levels (as a percentage), reject load status and RF system interlock status. Model number and software revisions are also displayed.

Driver Status will display the status of a number of CX drawer low power amplifier parameters. These include forward and reflected power levels (as a percentage), heatsink temperature and power supply voltage.

ALC Board Status will display the status of a number of CX drawer ALC board parameters.

Color Key:

Green = Okay or Normal Operation
Yellow = Warning, But Not faulted
Red = Currently Active Fault
Orange = Old or Previously Latched Fault

If an item on page is Orange, a latched fault is present. Activating the **'Fault Reset'** button will reset any latched faults, clear the transmitter's event log and cause the parameter to display normally.

The date and time of the last message received by the web page browser is present to assure connectivity. If the browser does not receive a new set of data from the Ethernet Controller, it will show the last update field with a yellow background indicating a connection problem is present.

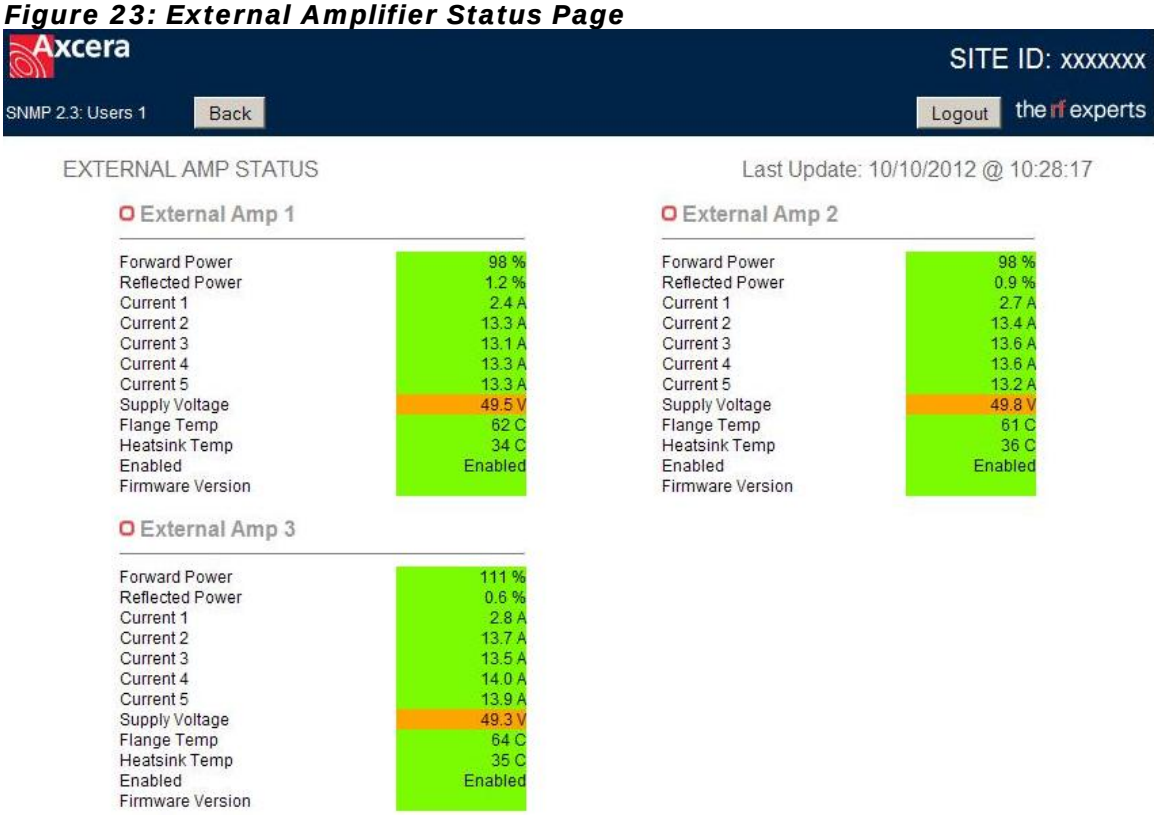
From the main page, administrators and accounts with read/write access may change the Web interface settings by activating the '**Configure**' button near the top of the page.

The user can return to the main control/monitoring page by selecting the '**Back**' button.

6.4 External Amplifier Status Page

The user can access the external amplifier status page by selecting the '**Ext. Amp Status**' button on the CX Ethernet Controller main control/monitoring page.

Figure 23: External Amplifier Status Page



The external amplifier status page allows the user to view the forward and reflected power as well as the driver current, pallet current, supply voltage and temperature for each external amplifier in the transmitter system.

The user can return to the main control/monitoring page by selecting the '**Back**' button.

6.5 View Events Page

The user can access the transmitter's event log by selecting the '**View Events**' button on the CX Ethernet Controller main control/monitoring page.

Figure 24 Typical Event Log Page

This page allows the user to view events and to determine the time between events. Events are logged in the order they are received. If more than 200 events are detected, the transmitter's System Controller drops the oldest event to record the new event. Transferring of events from the transmitter's System Controller and the Ethernet Controller is scheduled so that device details are continuously monitored. Therefore the event log page may update a few seconds behind the transmitter display when the log is full or changing quickly.

Each event record indicates the event number, the number of events, an occurrence counter and text describing the event. The occurrence counter keeps track of the number of times a specific event has occurred since the log was last cleared. Up to 99 occurrences are available for each event.

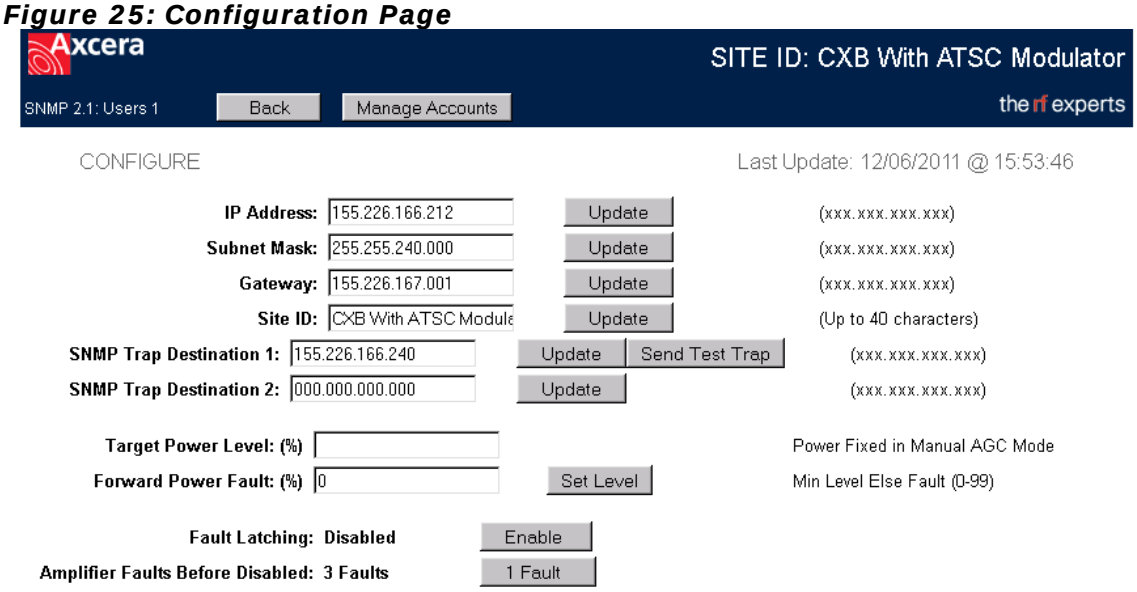
To view the next set of twenty events, activate the **'Next'** button. If viewing events higher in the log, the **'Previous'** button allows you to return to prior events.

The user can return to the main control/monitoring page by selecting the '**Back**' button.

6.6 Configure Page

The user can access the configuration page by selecting the '**Configure**' button on the CX Ethernet Controller main control/monitoring page.

Figure 25: Configuration Page



NOTE: The Innovator CX Ethernet controller does not use DHCP addresses – TCP/IP settings must be fixed and entered manually. A crossover cable may be needed if connecting directly from a computer to the Innovator CX drawer.

Note: If the transmitter system is pre-wired at the factory and includes a router and Remote Interface Panel, CX drawers connected to the router have been configured with a static IP address. The operator can access the CX drawers though the router, but the IP addresses must not be changed. Changing the static IP addresses of the CX drawers could prevent the drawers from communicating with other devices in the system and render the transmitter inoperative.

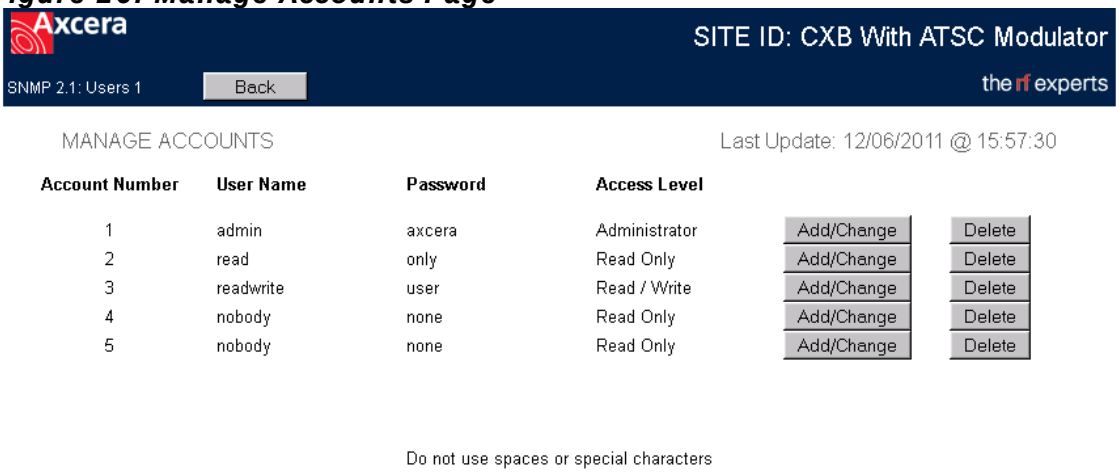
When entering a site ID, be sure to not use special characters except underscores, dashes, and forward slashes.

The page above displays SNMP parameters and allows an operator to send a test trap. If this system did not have SNMP enabled, then fields would not be populated and the **'Send Test Trap'** button would not be present. New event log entries including an activated test trap are automatically forwarded to SNMP agents specified to receive trap messages. Trap messages do not need to be acknowledged by an agent.

Changes to the transmitter's output power are available to administrators when the transmitter is operating. Once changed, the menu defaults back to the main display page and the systems forward power is noted as changing.

To manage user accounts, administrators may click the '**Manage Accounts**' button near the top of the configure page.

Figure 26: Manage Accounts Page



The Innovator CX Ethernet controller supports up to 5 different user accounts. To add or change one of the accounts, click the '**Add/Change**' button in the row of the account you want to modify. Enter the desired name, password, and administrator or read/write access rights for the user and click save.

NOTE: The transmitter's set up menus contain a Reset Ethernet User ID page. This page allows a user to reset the first account User Name and Password. The Yes or No selection can be changed by pushing the Up or Down Button. After the selection has been made, the user needs to depress the right or left arrow and then the display will ask "PUSH ENTER TO ACCEPT CHANGES". If the ENTER button is depressed, the change will be accepted. If any other button is depressed, the change will not be made. If Yes is selected on the page, and accepted, the User name and Password will reset to the factory default of admin / axcera.

Activate the '**Back**' button to return to the main control/monitoring page.

When you have completed using the web interface, please remember to log out via the **'Logout'** button at the top of the control/monitoring page.

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Chapter 7 Innovator CX Series SNMP Interfaces

7.1 Introduction

The Innovator CX Ethernet Controller implements Simple Network Management Protocol (SNMP). SNMP is a standardized method of transferring information from one electronic device to another. SNMP is typically used to remotely control and monitor several transmitter devices from a centralized network management system (NMS). SNMP is a communication method between two applications and is not a graphical user interface. Therefore, SNMP functionality is included along with web page server functionality. SNMP is used to gather information or set control states but it requires additional computer applications for operator monitoring and control.

The Innovator CX Ethernet Controller implements SNMP version 2 (SNMP v2), using a Management Information Base (MIB). The MIB file defines all SNMP parameters of the transmitter, specifies the format of data, and orders the presentation of the parameters using a hierarchical namespace containing object identifiers (OID). Each OID identifies a variable that can be read, read and set, or only set via SNMP commands.

SNMP functionality also provides for alert messages that are issued from the Ethernet Controller to one or two network computers. A SNMP trap message is sent only once and is not acknowledged by the receiving device. The Ethernet Controller issues a trap message when data is added to the transmitter Event log (either activation of a fault or when a fault is cleared), or when the transmitter operate/standby status changes.

7.2 SNMP Configuration

The Ethernet Controller's TCP/IP Address, Subnet Mask, and Gateway must be configured with static values that are valid within your network. Dynamic Host Configuration Protocol (DHCP) is not implemented; however access to these configuration parameters is available through the front panel setup menus of the Innovator CX drawer.

The Innovator CX drawer’s SNMP MIB allows up to two SNMP trap destinations. The trap destination values can be set through WEB pages. The TCP/IP address of a trap processing computer can also be configured through the SNMP parameters called 'site_trap_adr1' and 'site_trap_adr2'. To clear a previously configured trap destination and cause the system not to issue traps to a specific address, set the value to '000.000.000.000'.

Reading of SNMP values is done with the message's community access set to 'public'. When setting SNMP values, a default community access level of 'private' is used. Future implementations of the Ethernet SNMP agent may allow for the set community access level to be defined through the device's web server.

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Chapter 8 8VSB ATSC Modulator Board

Access to view the Modulator Web Interface is available by selecting the **'Modulator Status**' button on the CX Ethernet Controller main control/monitoring page.

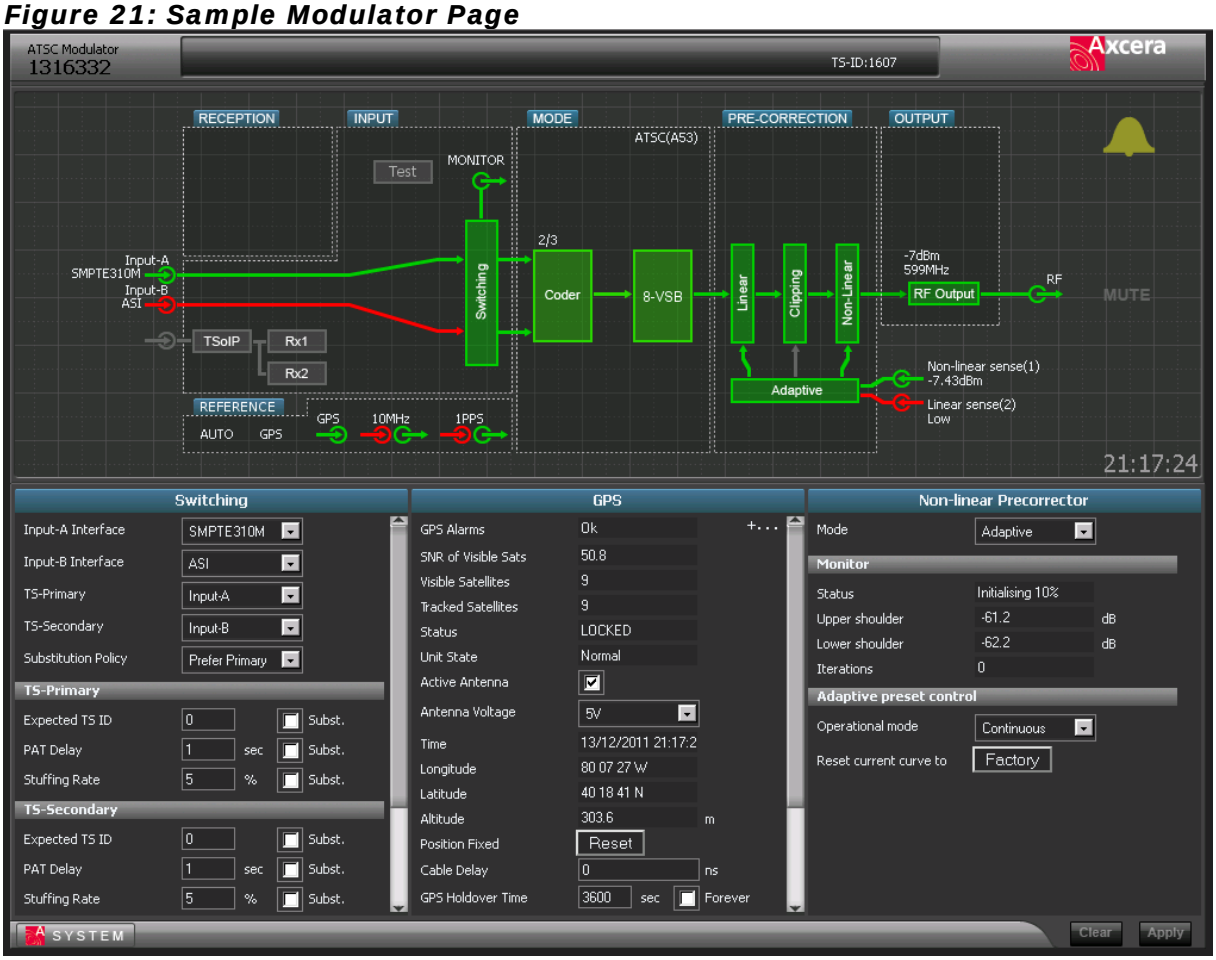
The modulator requires a valid username and password for login access. When launched from the Axcera CX Ethernet Controller Web interface, the login address of username / password information is automatically included in the login script. Since username and passwords of the modulator are fixed, we recommend modulator Web pages are only launched from the main CX Ethernet Controller Web page using the modulator command button.

NOTE: Mozilla Firefox is the preferred browser for this modulator Web interface.

Three levels of access are provided:

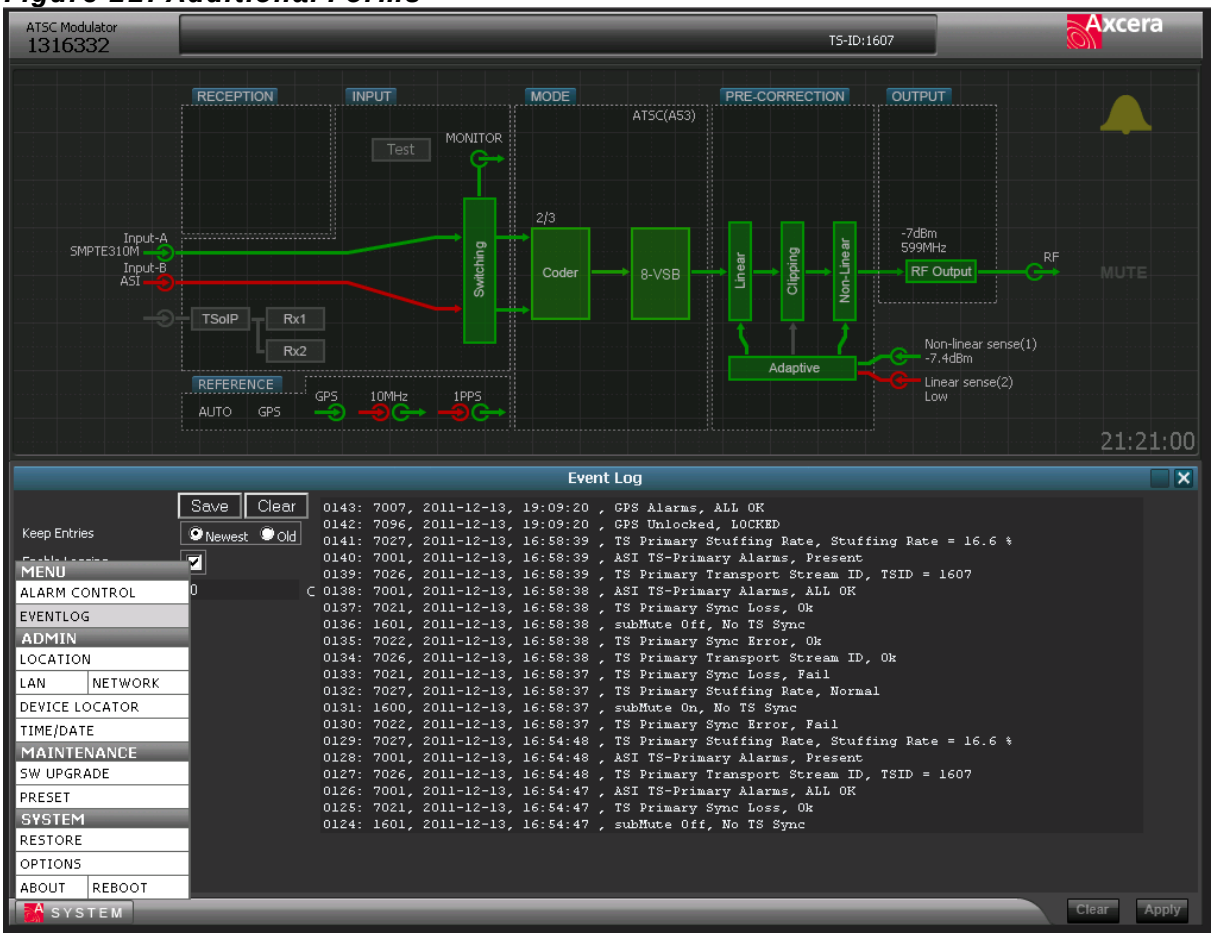
1. Administrators have full read/write control of the modulator and they can configure all system parameters of the modulator.
2. Operator has read/write control of most modulator parameters and limited ability to configure system parameters.
3. Observer has read only access to the modulator parameters.

Figure 21: Sample Modulator Page



The modulator's Web page contains an upper form and three lower forms – see Figure 21. The upper form always shows a graphical representation of the modulators system. A Block of the upper form can be dragged into any one of the three lower forms to view specific details of the specific system. In the above figure, the "Switching" block of the Input System was dragged into the lower left form. The GPS Reference block was dragged into the lower middle form and the Pre-correction Nonlinear block was placed into the lower right form.

Figure 22: Additional Forms



Activating the "System" icon, located at the lower left corner of the page accesses additional forms – see Figure 22. The sample page above is typical of forms available to an administrator. Operators and Observers will have different forms available.

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Chapter 9: Descriptions of Boards in the CLV1TD/RD through CLV4TD/RD Systems

9.1 CX Drawer Boards

9.1.1 (A1) 8 VSB Demodulator Board (1308275)

NOTE: The 8 VSB demodulator board is only used in RD systems except when the output of an external K-Tech Receiver is used**.**

9.1.1.1 Overview

The 8 VSB demodulator assembly receives an off air 8 VSB signal on any VHF or UHF channel and demodulates this to an MPEG-2 transport stream that is per the SMPTE-310M standard. The input to the assembly is at an "F" style connector on the shielded tuner and can be at a level of –8 to –78 dBm. The tuner (TU1) down converts the RF channel to a 44 MHz IF signal. This signal is the input to the digital receiver chip U1. The digital receiver chip subsequently decodes the IF and delivers an MPEG-2 transport stream on a parallel data bus to a programmable logic array, U8. U8 clocks the asynchronous MPEG data from the receiver chip and outputs a synchronous data stream at a 19.39 MHz rate to buffer/driver U11. U11 subsequently drives the output at J13 to a lower level that is AC coupled out of the board.

9.1.1.2 Microcontroller Functions

A microcontroller, U17, is provided on this assembly to supervise the operation of the receiver chip and the tuner. In addition, the microcontroller also interfaces to the front panel LCD display via connector J24 and pushbutton interface on J27. On power up, the microcontroller sets the tuner to the last channel that was selected when the unit was powered down. In addition, the microcontroller also configures the digital receiver to operate as an 8 VSB receiver. The communication between all of the devices on this board is via an I2C serial bus that is local to this board.

9.1.1.3 Jumper and DIP Switch Settings

This board can be used in various assemblies. When this assembly is installed in the Innovator CXB product, the jumpers on J7 and J8 should be placed between pins 2 and 3 for normal operation. The DIP switch SW1 should be configured as indicated in Table 12.

Position	Function	When Switch is Off	When Switch is On
SW1-1	Tuner Type	Original Tuner (DTT765xx)	Recent Tuner (DTT7680x)
SW1-2	Signal Strength Gain	Gain = 8.0	Gain = 9.3
SW1-3	Special Channel Plan	Normal	Channels 2, 3, or 4 are offset up 4 MHz
SW1-4	Reserved for Future		
SW1-5	Reserved for Future		
SW1-6	Reserved for Future		
SW1-7	Reserved for Future		
SW1-8	Operation Type	Transcoder Operation	Innovator CX/CXB Operation

Table 40: Innovator CX Receive /Demodulator/Transcoder Dip Switch SW1

NOTES: SW1-8 operation is available in software versions greater than or equal to 2.3 with hardware versions greater than or equal to D0, unless the board was factory modified. These switch positions are factory set for your system and should not be changed.

9.1.2 (A8) Control Card, Innovator CX (1312543)

The Innovator CX control board provides the overall system control for the CX system. There are two main elements of the board, U7 and U9. U7 is a programmable logic device that is loaded with firmware, which provides the overall system control. It decides whether or not to allow the system to generate RF output power, and turns the +40 VDC power supply on and off depending on whether or not it is receiving any faults, either faults generated on board, or faults generated externally. The second major component of the board is the microcontroller U9, which controls the front panel indications and drives the display. The U9 microcontroller is not involved in the decision making process, U7 does that. Rather, it is layered on top of U7 and is the EPLD's interface to the outside world. Information is passed between the microcontroller and the EPLD. The microcontroller communicates information to and from the front panel and sends the EPLD the information it needs to decide whether or not to allow the system to turn on. The front panel viewable LEDs DS3 for Operate/Standby and DS4 for Status indicate the current operating condition of the system are mounted on and controlled by this board. The U9 microcontroller can also communicate, using the Optional Ethernet Kit, with a daughter card that allows the user to view remote control parameters via a web Ethernet interface.

The ±12 VDC and +5 VDC from the (A9) power supply and the 39-42 VDC from the (A10) power supply are routed to the other boards in the drawer through this board. The +40 VDC power supply operates all the time, and connects the 39-42 VDC to the board at J19-1, 2, & 3 with 5 common. Q13 on the control board is turned on and off to gate the 39-42 VDC, which connects through J19-6, 7 & 8, to the RF output stages.

The ±12 VDC and +5 VDC input voltages to this board is connected through J21 and filtered before being connected to the rest of the board. +12 VDC connects through J21-1, +5VDC through J21-2 & 3, and -12 VDC through J21-6. Common connections for the input voltages are connected to J21-4 & 5. The ±12 VDC and +5 VDC are used on this board and also routed to the other boards in the drawer through this board. The +3.3 VDC for the microcontroller and programmable logic array, mounted on the board, is provided by the voltage regulator IC U6 from the filtered +5 VDC input. The output of U6 can be adjusted to +3.3 VDC using R120.

9.2 VHF Amplifier Boards

9.2.1 Amplifier Design

The amplifier is designed as a slide-in unit. The mechanical support structure is formed by a finned heat sink on which the individual assemblies are mounted. The amplifier assemblies are listed in Table 3-1.
All RF connectors are located on the front panel, while the control and power connectors are mounted at the rear. The control board is mounted behind the front panel. Two LEDs on the control board (visible through the front panel) signal the operating status of the amplifier, Module OK and Enable LEDs

Position	Assembly	Remarks
A14	Control Board	For control, monitoring, and test signal capture
A1	Phase/Gain Board	Phase and gain adjustment of amplifier tray
A2	Low Level VHF Pre-driver Board	Pre-driver
A3	VHF Single Amplifier Board	IPA, Driver, to the splitter
A4	Splitter (1:4)	Distributes the RF input power to the final amplifier boards A5 to A8
A17	FET Switch Board	Takes the two +48VDC inputs and switches them to the 4 way combiner that distributes them to the driver pallets and the amplifier pallets
A5 to A8	VHF Dual Stage Amplifier Boards	Four final amplifier boards
A9 to A12	2-Way Hybrid Combiners	Combines the outputs from each Dual Stage Final Amplifier Board
A13	Combiner (4:1)	Sums the output powers of the two way hybrid combiners

Table 41: Assemblies in the VHF Amplifier

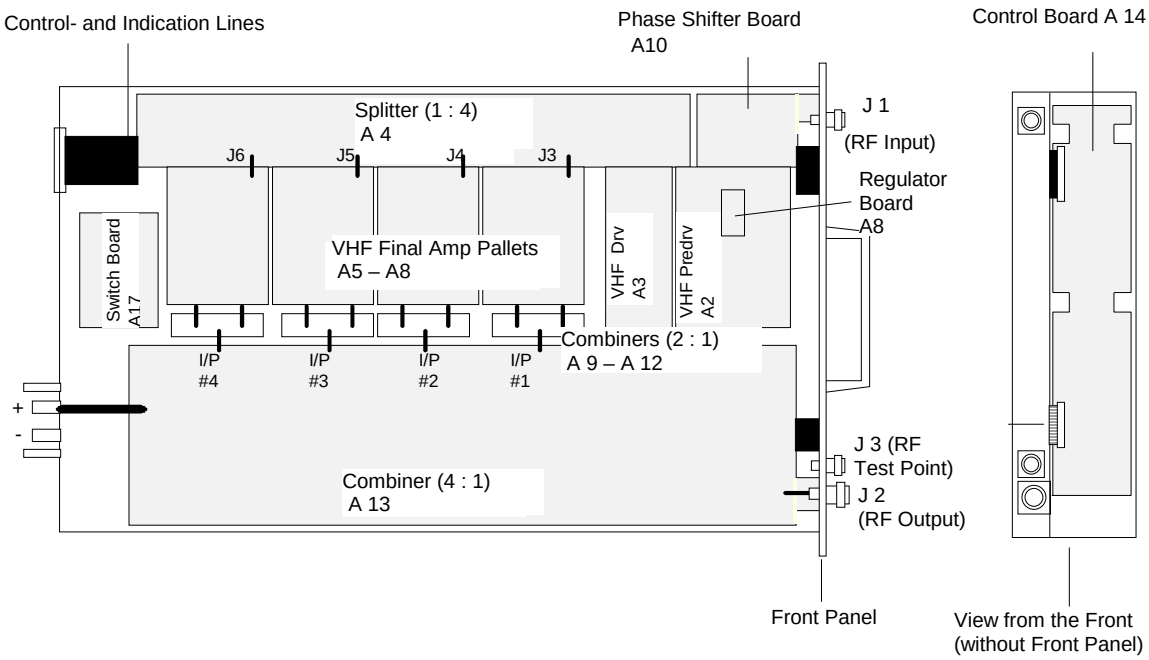

Figure 68: Location of the Assemblies in the VHF Amplifier

The amplifier is a four-stage design with variable phase shifter board, low level pre-driver, VHF single amp driver and final amplifier stages operating in class AB. The RF input signal is fed to the amplifier through connector J1 on the front panel. The signal is phase corrected on A1 the phase shifter board, pre-amplified by the low level board A2 (pre-driver), amplified by the single stage module A3 (driver) before it is passed through the splitter A4 and distributed to the four VHF dual final stage modules A5 to A8. The outputs of each of the final stage modules are combined in 2-way combiners. The outputs of the 2-way combiners are summed in the combiner A13 and the resultant signal is passed to RF output connector J2.

The pre-driver and combiner incorporate directional couplers output voltages proportional to the forward powers at the input and output of the amplifier. They also couple out voltages proportional to the forward power behind the driver as well as a voltage proportional to the reflected power at the output of the amplifier. These test voltages are passed to the control board for internal evaluation and partly for interrogation by the control unit. In addition, the reflected power at the amplifier output is monitored in the control board and, if the threshold value is exceeded, the operating voltages for the pre-driver and driver are switched off and a fault indication is stored. A directional coupler in the combiner couples out a signal proportional to the forward power at the output of the amplifier. This signal is passed to connector J3 on the front panel to provide the RF test signal.

Test voltages derived from the forward power of the amplifier are generated in the control board to provide automatic level control (ALC) in the exciter or modulator stage of the transmitter. The ALC is a function of the rms value of the output power

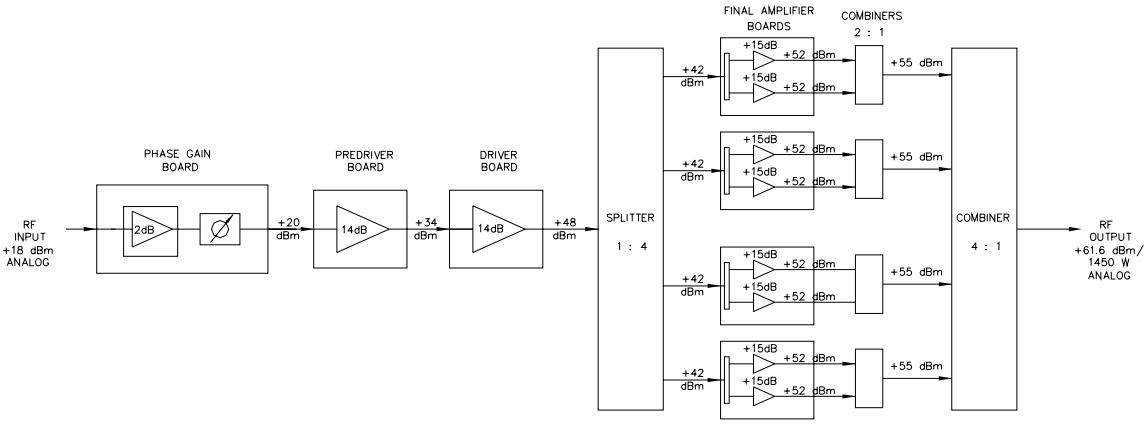

Figure 69: Block Diagram of the VHF Amplifier

No new alignment work is necessary. The frequency-dependent operating parameters for the complete frequency range are stored in the controller and are automatically enabled by the frequency setting of the exciter. The RS 232 port is used for the factory alignment of operating parameters, e.g., calibration of RF and drain current test values.

The operating voltage U_{op} of +48 volts is distributed to the final amplifier modules by a current bus underneath the combiner. In addition to U_{op} for the modules, the amplifier requires auxiliary voltages of $\pm$12 volts for the control board. The operating voltage and current consumption of the individual modules are captured in the combiner board and passed to the control board where they are available for interrogation by the control unit. Furthermore, threshold values are monitored in the control board and, if a fault condition arises, the operating voltage for pre-driver A2 and driver A3 is disconnected by the action of field effect transistor mounted on the A18 regulator board. The fault indication is stored and passed to the control unit.

The measured values of the temperature sensors A15, mounted on driver front, and A16, mounted on final rear, are passed to the control board where they are monitored and available for interrogation by the control unit.

The control board possesses a number of LEDs that indicate the status of the amplifier. Two of these LEDs are visible through the front panel. The green Module OK LED indicates fault-free operation. The Green Enable LED indicates that the enable is applied to that assembly. It will not be lit if the Enable is removed. It will be lit Amber if the Enable is applied but tne amplifier is not operating.

A fault condition is indicated by a Red Module OK, either continuously illuminated or flashing Red. The flashing Red LED interprets as follows:

1 Blink indicates Amplifier Current Fault.
2 Blinks indicate Temperature Fault.
3 Blinks indicate Power Supply Over Voltage Fault.
4 Blinks indicate Power Supply Under Voltage Fault.
5 Blinks indicate Reflected Power Fault.
6 Blinks indicate +12V or –12V Power Supply Fault.
7 Blinks indicate AGC Overdrive.

9.2.2 Capture of the Test Values in the VHF Amplifier

The following test values are passed the transmitter control unit:

- Forward power at the amplifier output – rms output power7
- Reflected power at the transmitter output – peak level
- Operating voltage
- Current consumption of the modules
- Temperatures

The following test values are used only for internal purposes on the control board:

- Forward power behind drive module A3 (not displayed in the control unit)

The following test points are available for external equipment:

- RF test connector J3 on the front panel

Output power behind drive module A3 (this test point is exclusively intended for factory measurements

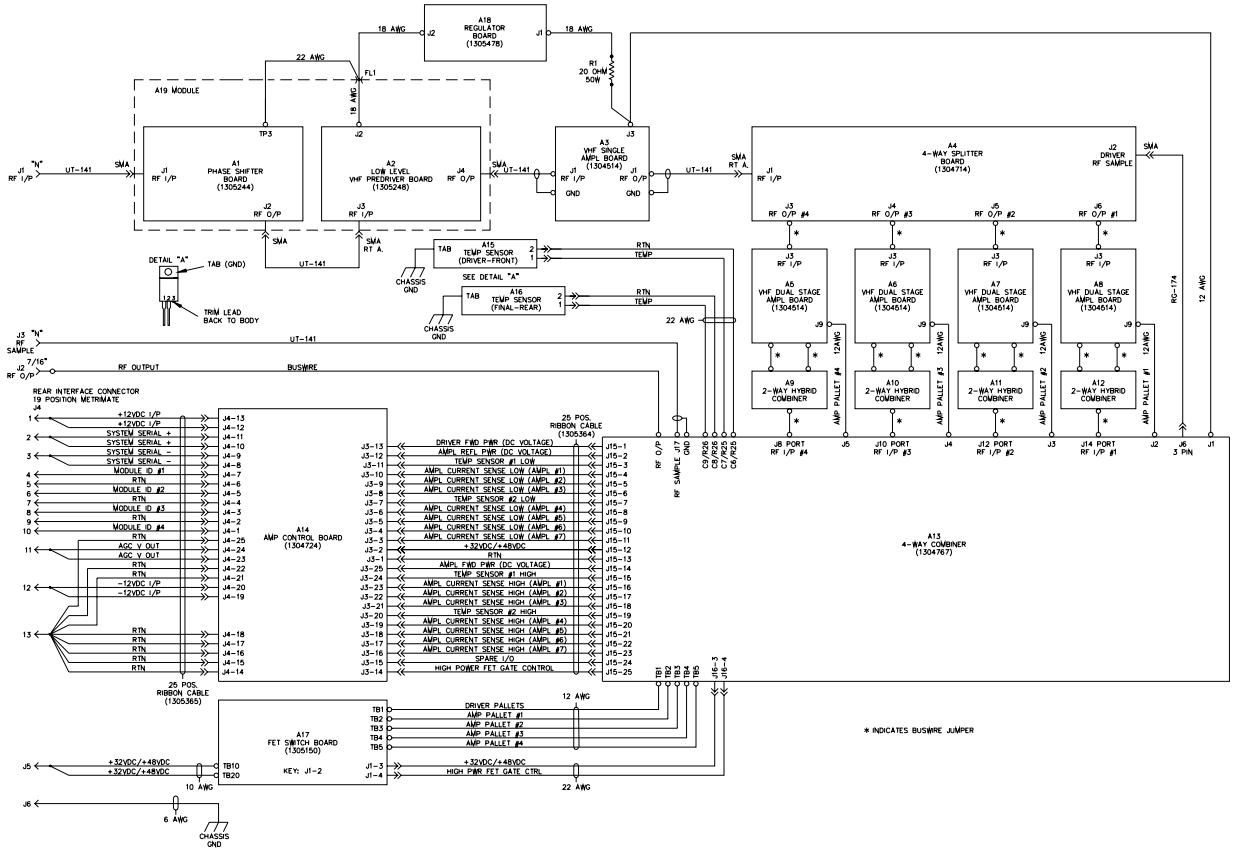

Figure 70: Typical Low Band VHF Amplifier Assembly Interconnect

9.2.3 Functional Description of the Boards in the VHF Amplifier

9.2.3.1 (A1) Phase/Gain Board (1307780; Appendix B)

The Phase Gain Board provides an adjustment of the phase using R21 and the gain using R10 of the RF signal that passes through it so that the output of each amplifier assembly has the same insertion phase and can be combined to produce the maximum output power from the array.

The RF signal enters the board at J1, is attenuated by 1 dB pi-network consisting of R5, R7 and R8, and is split by Z2. One output of the splitter is sent to an RF detector CR5, which detects the peak level of the input signal. The other output of the splitter is sent to a pin attenuator consisting of Z1, CR2, CR3 and associated components. The attenuator is a constant impedance pin attenuator, controlled by the Gain Adjust Pot R10, which has a range of approximately 10 dB. The output of the pin attenuator is sent to a phase shifter circuit consisting of Z3, CR4 and CR6, which adjusts the phase shift through the tray. The Phase Adjust Pot R21 sets the amount of phase shift. The output of the phase shifter is sent to a Pin Switch consisting of CR1 and associated components. Under normal operation, this switch is on, passing the RF signal through to the output amplifier U2. In a fault condition, the bias to CR1 goes away, providing at least 20 dB more attenuation through the board.

The board is supplied with +12VDC at J5-5. The +12VDC is filtered and isolated by C15, C16 and L5 before it is connected to the rest of the board. The filtered +12 VDC is also connected to the regulator IC U3 that produces +9 VDC output which is used as the reference voltage for the gain adjust circuitry consisting of U1A, R10 and associated components.

9.2.3.2 (A2) VHF Pre-Driver Board (1307278; Appendix B)

This board consists of a single stage push-pull RF amplifier. The amplifier has approximately 18 dB of gain, and is biased at an idle current of 0.5A. The input signal at J3 is sent to a 1:1 balun, T4, which converts it from an unbalanced, to a balanced signal. The signal is then sent to a 4:1 impedance transformer, t3 and T5, which matches the signal to the low input impedance of the transistor. On the output side of the transistor, the signal is applied to another balun, T2, which converts the signal back to an unbalanced signal that is connected to J4 the output Jack of the board.

+48 VDC connects to the board at J1 and is fed to U1 a +28 VDC Voltage Regulator. The +28 VDC provides the voltages needed to operate the transistor on board.

9.2.3.3 (A3) VHF Driver Board (1305101; Appendix B

This board consists of a signal stage push pull MOSFET RF amplifier. The amplifier is capable of putting out up to 300W Peak Envelope power, though it typically operates as a driver at power levels much lower. The amplifier has about 17 dB gain and is biased at an idle current of 1A.

The input RF signal at J2 is applied to a balun, then to a 9:1 Impedance transformer to match the 50 Ohm input signal to the balanced low impedance input of the transistor. The output of the amplifier is applied to a 4:1 transformer, which provides the functionality of both transformer and balun. The bias circuit is temperature compensated by CR3 so that the bias remains relatively constant over temperature.

+46 VDC connects to the board at J3 and is used as the drain voltage for Q1. The +46 VDC is also connected through three 5.1 V Zener diodes which drops the voltage to 30 VDC, that is connected to the regulator IC U1. U1 provides approximately 15 VDC for the source bias
voltage to Q1.

9.2.3.4 (A4) 1:4 Splitter (1304714)

The (A4) 4-way splitter distributes the output signal of the VHF single amplifier board (A3), typically +44.5 dBm, to the four, parallel connected, VHF Dual Stage Amplifier Boards A5 to A8.

The splitter circuits are in the form of IC circuits, U1, U2 and U3. The splitter networks do not incorporate tuning elements. The networks provide for an equal splitting, over the 54-88 MHz frequency range, of the input power to the four output ports. The input signal is first split by U2 in a ratio of 1:2. After this, both partial powers are split in a second stage, U1 and U3, in the ratio of 1:2 again. Each output is typically +38.3 dBm pk sync visual.

9.2.3.5 (A5-A8) VHF Dual Stage Amplifier Board (1304514; Appendix B)

The (A5, A6, A7 & A8) VHF Dual Stage Amplifier Boards (1304514) provide approximately 17.5 dB of gain through each of the boards The RF input at a level of approximately +40.3 dBm pk sync visual connects to J3 on the board. The input is applied to U1 a hybrid splitter that produces two outputs, one at 0° and one at -90°. Each output connects to identical circuits. The -90° signal is applied to T1 a 9:1 transformer assembly that produces two 180° out of phase outputs. The two outputs connect to Q1 a dual FET, configured in a push pull arrangement, with approximately 16 dB of gain. The amplified outputs of the IC connect to T2 a Balun assembly that combines the two 180° out of phase signals into a single output, +54.3 dBm, which connects to J1 one of the RF output jacks of the board. The 0° signal is applied to T3 a 9:1 transformer assembly that produces two 180° out of phase outputs. The two outputs connect to Q2 a dual FET, configured in a push pull arrangement, with approximately 16 dB of gain. The amplified outputs of the IC connect to T4 a Balun assembly that combines the two 180° out of phase signals into a single output, +57.5 dBm, which connects to J5, the other RF output jack of the board.

The +48 VDC, from the 4-way combiner, connects to J9 on the board. The voltage is applied through the resistors R2 and R18 and the transformers T2 and T4 to each of the halves of Q1 and Q2.

9.2.3.6 2:1 Combiner

There is one 2-way quadrature hybrid combiner (A9 – A12) that combines the two outputs from each of the VHF dual stage amplifier boards. With typical +54.3 dBm inputs to the combiner a +57.2 dBm pk of sync output is expected.

9.2.3.7 (A13) 4:1 Combiner (1304767)

The (A13) 4-way combiner (1304767) is designed to perform the following functions:

- Summing the output signals of the four 2-way combiners A9 to A12
- Supplying a forward and reflected power sample of the output of the amplifier
- Distributing the operating voltage to all the amplifier boards and to the amplifier control board
- Switching off the low level pre-driver A2 and VHF single amplifier driver A3 after a command from the amplifier control board to shutdown.
- Monitoring the operating currents for the individual amplifier boards.
- Monitoring the driver forward power level.
- Monitoring the temperatures sensed by sensors A15 on driver front and A16 on final rear.

Signal Path

The output signals from the 2 –way hybrid combiners A9 to A12 are fed to the combiner through RF input #1 (J14 Port), RF input #2 (J12 Port), RF input #3 (J10 Port), and RF input #4 (J8 Port). The combiner circuit is in the form of microstrips mounted on a Teflon board. The actual combiner network functions over the 54-88 MHz frequency range without the aid of tuning elements. The input signals are first summed in a ratio of 4:1. Thereafter, the resultant powers are summed in a second stage in the ratio of 2:1. The load (balancing) resistor of both 2:1 stages are formed by the series connection of two 50-Ω cables terminated with power resistors. The outer conductors of these cables represent short circuit lines that are part of the necessary impedance transformation of the paralleling network from the combiner inputs to the respective summation point.

Directional couplers in the output circuit couple out RF voltages proportional to the forward and reflected powers of the output power of the combiner. These test voltages are demodulated and passed to the amplifier control board at J15-2 for reflected power and J15-14 for forward power. Another coupler provides an RF voltage proportional to the forward power at J17 that is passed to the RF test connector J3 located on the front panel of the amplifier. A sample of the A3 VHF single amplifier driver RF forward power connects to the combiner at J6 and is supplied as a sample to the amplifier control board.

Operating Voltage for the Amplifier Boards

The operating voltage of +48 volts is distributed to each of the VHF dual stage amplifier boards, J2 to A8, J3 to A7, J4 to A6, & J5 to A5, and to the A3 VHF single driver board and the A18 regulator board through J1 on the combiner. The A17 FET switch board will remove the +48 VDC from the amplifier boards during hot replacement of the VHF Amplifier Assembly.

The drain currents of the power transistors on the VHF dual stage amplifier boards are captured by .01Ω precision resistors connected to their supply lines. The voltage drop across these resistors is passed to the amplifier control board through 43.2kΩ bleeder resistors. In addition, the operating voltage is also passed to the control board for monitoring purposes.

Shutdown

Critical operating parameters, including current high or low and temperature, of the amplifiers are monitored on the amplifier control board. If threshold values are exceeded, the control board switches off the operating voltage for the pre-driver and driver through the action of the A17 FET switch board.

Temperature Measurement

The temperature in the amplifier is measured at the driver-front and the final-rear by means of temperature sensors A15 and A16.

9.2.3.8 (A14) Amplifier Module Control Board (1306830; Appendix B)

All protective, switching, display, and monitoring functions required for the operation of the VHF amplifier assembly are realized by the control board. The control board is mounted in a RF enclosure behind the front panel of the amplifier and performs the following tasks:

- Capture and processing of test values
- Fault protection for the amplifier modules
- Generating the actual value for transmitter ALC
- Communication with the transmitter control unit

The circuits in the control board do not contain elements that can be adjusted. All of the required settings are software implemented in the factory through an RS 232 port and must not be altered.

Schematic Page 1

U2 is an 8 bit RISC microcontroller that is in circuit programmed or programmed using the serial programming port J2 on the board. It is an in-circuit ATMEL microcontroller is operated at 3.6864 MHz. Programming of the device is performed through J2. PF4 and PF5 are analog inputs for ICs locate on locate on page 4 of this schematic.

The desired analog channels of U33 and U34 are selected by the setting of PA0, PA1 & PA2. PA 3 of U2 is a processor operating LED that can be flashed to show continued operation. PF0 and PF1 are used to monitor the +12VDC and -12VDC supplies to the board. PF3 and other select microcontroller pins are connected to a via for future access.

U6 is a standard serial to RS-485 driver IC. Resistor R25 sets U6 to transmit mode when the micro is held in reset or PE2 is configured as an input. R30 and CR7 hold the data output of U6 low whenever the programming pot has U2 in reset. The result should be that the
RS-485 does not transmit data during micro controller programming and U6 is held in the transmit mode therefore received RS-485 signals should not be able to change the state of PE0 and thus corrupt the code being sent during programming fo the micro.

U4 is a watchdog IC, which holds the microcontroller in reset, if the supply voltage is less the 4.21 VDC; (1.25 VDC < Pin 4 (IN) < Pin 2 (Vcc). The watchdog momentarily resets the microcontroller, if Pin 6 (ST) is not clocked every second.

U3 is a RS-232 serial port on UART 1 of the microcontroller. J1 is used to provide front panel RS-232 access, without hardware handshaking. A standard NULL modem cable is needed to connect to a PC. For test and debug all data into and out of the RS-485 interface of UART 1 can be transmitted out through R149 to J1-9. This is not usually used unless hardware handshaking is implemented.

The IC U1 is used to determine where the amplifier control board is located. Three of the four inputs require an external Pull-Down to ground to set the logic state, but Module ID 4 requires an external Pull-Up. Diodes such as CR1 prevent un-powered modules from pulling down the module ID lines of other installed modules. The external pull down to ground connections are made in the amplifier cabinet wiring harness.

U5 below U1 is used to control the board's status LEDs and other circuits that are allowed to change state during a microcontroller reset. A FET is turned on to shunt current away from the LED to turn it off. U7 below U5 is used to enable different features within the software. Since the actual use of this part is to be determined, the circuit components associated with this IC is not installed at this time

The flashing Red Module OK LED interprets as follows:

1 Blink indicates Amplifier Current Fault.
2 Blinks indicate Temperature Fault.
3 Blinks indicate Power Supply Over Voltage Fault.
4 Blinks indicate Power Supply Under Voltage Fault.
5 Blinks indicate Reflected Power Fault.
6 Blinks indicate +12V or –12V Power Supply Fault.
7 Blinks indicate AGC overdrive.

Schematic Page 2

U8, U9, U11 and U12 are located in the upper center section on Page 2 of the schematic. When the high voltage power supply is enabled, U9 is used to generate a regulated voltage that is about 5 VDC less that the +48VDC supply. U12 is used to generate a regulated voltage that is about 10 volts less than the high voltage power supply. U11 is used to generate a voltage that is about 10 VDC greater than the high voltage power supply. U8 is used to produce a regulated voltage that is 5 volts greater than the high voltage power supply. The regulated voltages that are 5 volts above and below the high voltage power supply are used to power the unity gain op-amp circuits located on Page 3 of the schematic.

The output of U8 is also used to drive the gate of two external Power FETs. These FETs are used to control the high voltage power supply current to the amplifier pallets. Since than high voltage power supply can be +48VDC and the IC is rated for a maximum drain to source voltage of 60 volts, Q8 is used with Q9 to make a circuit that controls the high voltage power supply control voltage of the two external power FETs. Q11 and Q12 allow the hardware to automatically disable the external power FETs on detection of a critical fault. Q13 is used by the software to disable the external power FETs.

U10A is used to detect high current in Amplifier #1. At 0.886 VDC the current to Amplifier #1 should be approximately 5.12 Amps. U10B is used to detect a high current condition in amplifier stages 2 through 7. With a 2.8 VDC reference, high current shut down should be approximately 18 Amps.

U13A is used to detect high power supply voltage. U13B is used to indicate that the power supply voltage is too low. Q6 and Q9 are used to select the fault thresholds of U13.

CR27 uses the output signal of U32A to shut-down on high reflected power. U14 determines if the power amplifier heat sink temperature is too high.

Schematic Page 3

The current monitoring circuits are shown on page 3. A .01Ω resistor is used on the combiner board for monitoring the current through several sections of the amplifier. The voltage developed across this resistor is provided to the control board through current limiting resistors. The control board has current limiting resistors and filtering capacitors on the input circuits. These resistive components would not work well with the internal structure of the ICs precision high side current sense amplifiers. A unity gain low input offset op-amp is used in both the high and low sense lines. The 43.2 kΩ resistor from pin 5 to ground sets the gain of the current sense amplifiers to about 17.28. This value is not set with much accuracy since the manufacturer internally matches the resistors to this part but the actual resistance value is not closely defined. A diode clamps the input level to not be less than the supply voltage of the op-amps negative rail.

Schematic Page 4

U32A is used to detect high reflected power.

U29 is rated for 0.14 Amps of power using its 92 C/W rating, If Ta = 60°C max and TJ = 125°C max. 0.26 Amps can be obtained from U29 if the mounting pad is 0.5 square inches. The controller will not need this much current.

U30 and U321 are low drop-out voltage regulators with a tolerance greater than or equal to 1%. 100mA is available from each device but the controller will not need this much current.

The RF power circuits are calibrated on the combiner board. The DC output voltage of these circuits is passed to the control board over the ribbon cable. The module forward power is placed on the non-inverting input of U32B pin5. If this module has the highest detected forward power in a multi-amplifier system, it will have the highest forward power signal. This signal level into U32B pin 5 will be used to set the AGC output voltage of the system. If another amplifier has a higher forward power, the level into U32B pin 6 will be higher than pin 5 and his amplifiers output signal will not be used to set the AGC voltage level.

9.3 (Optional) ASI to S310 Converter Module

NOTE: The ASI to S310 Converter Modules is only used with STL ASI feed inputs.

The ASI to SMPTE 310M converter takes the STL ASI feed input, if present in your system, and converts it to a SMPTE 310M output which connects to the input to the Axcera system. The converter contains an ASI Motherboard (1311179), an ASI to 310 Conversion Board, Non-SFN (1311219) or ASI to 310 Conversion Board, SFN (1309764), and a 120 VAC to +12 VDC converter module.

9.3.1 ASI Motherboard (1311179)

The ASI motherboard takes the +12 VDC, from the 120 VAC to 12 VDC converter module, and converts it to +5 VDC and +3.3 VDC which are used by the ASI to S310 conversion board.

U1 is a regulator IC that supplies an output of +5 VDC at J2-7 that connects to the ASI to 310 converter board. U2 is a regulator IC that supplies an output of +3.3 VDC at J2-11 that connects to the ASI to 310 converter board. Also +12 VDC is wired to J2-3 that connects to the ASI to 310 converter board.

The ASI motherboard is the mounting platform for the four LEDs that are displayed on the front of the module. The LEDs will be Green if everything is OK or Red if the indicated function is malfunctioning. The LEDs are Power, which indicates +12 VDC is connected to the converter, FIFO ERROR, which indicates an overflow or underflow condition in the input buffer, S310 Lock, which indicates the converted S310 signal is in a locked condition, and ASI Lock, which indicates the recovered ASI signal is in a locked condition.

9.3.2 ASI to 310 Conversion Board, Non-SFN (1311219)

The ASI signal is input to the ASI to S310 conversion board via J1. U2 de-serializes the ASI input signal into a parallel byte stream. The parallel byte stream is clocked into U6 which buffers and converts it to a valid S310 bi-phase encoded signal. Null packets are added or dropped during this process to obtain the valid 19.393 Mb/s output. U6 is also responsible for re-stamping the PCR clock. The final S310 output of the board is at J5.

9.3.3 ASI to 310 Conversion Board, SFN (1309764)

The ASI signal is input to the ASI to S310 conversion board via J1. U2 de-serializes the ASI input signal into a parallel byte stream. The parallel byte stream is clocked into U6 which buffers and converts it to a valid S310 bi-phase encoded signal. For SFN operation the ASI payload must be 19.392568 Mb/s +/- 2 ppm. A 38.785317 MHz VCXO locks to the exact S310 bit-rate using a Digital PLL. This method ensures the extracted S310 stream is frequency locked without modifying its content i.e. add/drop null packets, PCR restamp, etc. The final S310 output of the board is at J5.

9.4 (Optional) K-Tech Receiver

NOTE: If your system contains an (Optional) K-Tech Receiver, information on the receiver is contained in the separate manufacturers supplied instruction manual.

Chapter 10: System Repair and Set-Up Procedures

This system was aligned at the factory and should not require additional adjustments to achieve normal operation.

This Innovator CX Series system is of a drawer design with multiple boards inside the drawer. If a board fails, that board needs to be changed out with a replacement board. The failed board can then be sent back to Axcera for repair.

NOTE: Contact UBS-Axcera Customer Service Department at 1-724-873-8100 or fax to 1-724-873-8105, before sending in any board or module.

10.1 Troubleshooting and Repair of the VHF Amplifier

10.1.1 Safety Information

Work on the amplifier must only be carried out by qualified personnel according to good electrical engineering practice, taking into account all relevant safety precautions. Furthermore, the following should be noted:

- Before working on an amplifier, e.g., removing cables, removing the front panel etc., ensure that the amplifier is disconnected from the operating voltages. Carry out all work with extreme caution.

10.1.2 Troubleshooting

10.1.2.1 Front Panel LEDs

A visual indication of the operating status of the VHF amplifiers is signaled by front panel LEDs.

Fault-free operation is signaled by the lit Green Module OK LED, located nearest the handle.

A fault condition is indicated by a Module OK, either continuously illuminated Red or flashing Red.

The flashing Red LED interprets as follows:

1 Blink indicates Amplifier Current Fault.
2 Blinks indicate Temperature Fault.
3 Blinks indicate Power Supply Over Voltage Fault.
4 Blinks indicate Power Supply Under Voltage Fault.
5 Blinks indicate Reflected Power Fault.
6 Blinks indicate +12V or –12V Power Supply Fault.
7 Blinks indicate AGC overdrive.

10.1.2.1 Polling Fault Indications

Detected fault conditions are passed to the control unit. The fault indications are entered in a list and can be viewed at any time during transmitter operation.

The system control unit is used for polling stored fault indications and reading actual operating parameters.

10.2 Exchanging Amplifiers

An exchange of amplifiers during transmitter operation is possible. The paralleling networks in the amplifier cabinet are designed so that if an amplifier fails or an amplifier is removed, operation continues at reduced power without degradation of performance data.

10.2.1 Exchange of a Module

Caution: The load (balancing) resistors in the modules contain Beryllium Oxide.

1. Remove the amplifier from the cabinet as described in the Chapter 2 of this volume.
2. Undo the side panel of the amplifier.
3. Unsolder the connections for the operating voltage as well as the RF input and output connections of the defective module.

NOTE: The temperature sensors A15 or A16 may need to be unscrewed to remove the module.

4. After undoing the screws, the module can be lifted from the heat sink.
5. Remove the old heat-transfer paste from the heat sink.

NOTE: In order to ensure proper heat conduction, the contact surface of the heat sink must be clean and free of foreign particles.

10.2.2 Mounting a New Module

1. Apply a thin film of heat-transfer paste to the contact surface.
2. Fix the module into position with the mounting screws. At first, only tighten the screws by hand.
3. Next, tighten the screws, in repeated steps, to a torque of 0.8 Nm.

Caution: A torque of 1.2 Nm must not be exceeded.
(1.2 NM ≈ 10 in/lb)
(0.8 Nm ≈ 7 in/lb)

10.2.3 Final Steps

Replace the cover on the amplifier, insert the module into the transmitter cabinet, and make the RF input and output connections.

NOTE: Alignment work on the amplifier is not required. If more than two modules of an amplifier have been replaced, the phase response of the amplifier should be checked. The exchange of a module should be reported to Axcera with information on the cause of the fault, module location, identification number of the amplifier, and the type of transmitter.

10.3 Adjusting the Output Power of an Amplifiers

The amplification of the individual amplifiers has been factory set. The amplification can, however, be adjusted on-site with the aid of a potentiometer accessible on A1 the phase shifter module. This measure may be required to ensure that all amplifiers in the transmitter deliver the same output power. Readjustment may be necessary under the following conditions:

- When the output power of the amplifier is too high
- After repairing an amplifier
- After a change in operating frequency
- After an exchange of an amplifier (replacement amplifiers delivered by Axcera are factory set to maximum amplification)

The maximum adjustment range of the potentiometer is 20 dB. The standard setting is 6 dBm out.

NOTE: Alignment of the amplification to a less than 0.5 dB difference between amplifiers is not necessary.

10.3.1 Adjustment Procedure

Before beginning this procedure, the ALC for the transmitter power must be switched off at the exciter or modulation stage.

Turning the potentiometer clockwise increases the amplification, Turning in the opposite direction decreases the amplification. The pot must be turned very slowly, as the pot is only ¾ turn max to min.

During the adjustment procedure, the output power of the amplifier can be read in the LCD of the control unit (refer to Volume 1, Control Cabinet, of this manual for further information).

After the output powers of the individual amplifiers have been aligned, the ALC must be switched on again and the nominal output power of the transmitter must be set.

10.4 Amplifier Connections

Connector	Assignment	Type
J1	RF Input	Female N-type
J2	RF Output	Female HF 7/16
J3	RF Test Point	Female N-type

RS 232 C	**reserved for factory alignment only!**

Table 42: RF Connectors on the VHF Amplifier Front Panel

Pin	Assignment
J5	+48 V
J6	Ground

Table 43: Operating Voltage Connection (Rear Panel)

APPENDIX A:

Innovator,
Innovator CLV1TD/CLV1RD – CU4TD/CU4RD,
Transmitter or Regenerative Translator
System and Drawers Drawings and Parts Lists

Innovator CLV2RD Regenerative Translator System with Adaptive Modulator Drawing List

CLV2RD Regenerative System w/ Adaptive Modulator
(Consists of one CLV0Rx-1 Drawer driving two VHF Low Band Amplifier Drawers)

CLV2RD, Racking Plan and Interconnect 1316816
CLV2RD, Parts List.....CB006089

CLV0Rx-1 Drawer w/Adaptive Modulator (Used as a driver)

CLV0Rx-1 Drawer w/Adaptive Modulator Interconnect 1316704
CLV0Rx-1 Drawer w/Adaptive Modulator Block Diagram.....1316705
CLV0Rx-1 Drawer w/Adaptive Modulator Parts List CB006070

VHF Low Band Amplifier Drawer (Two used with the CLV2RD system)

VHF Low Band Amplifier Drawer Interconnect.....1308211
VHF Low Band Amplifier Drawer Assembly Drawing.....1308727
VHF Low Band Amplifier Drawer Parts List.....1308727