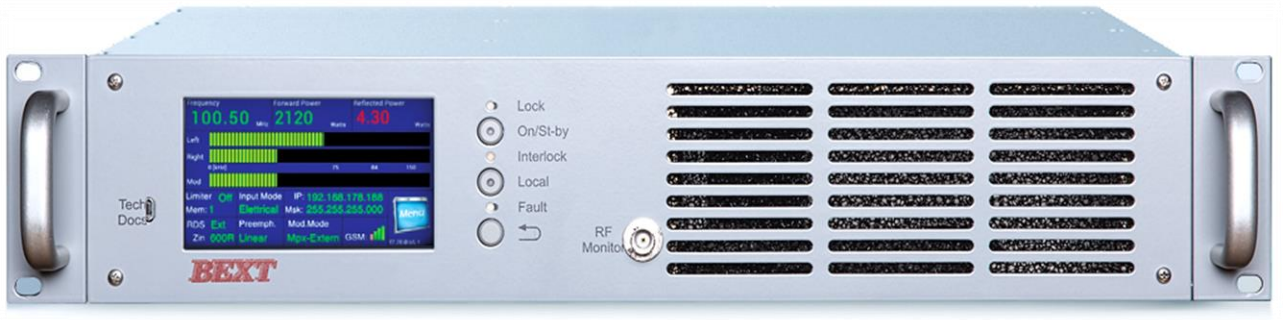
XL150

FM Exciter / Transmitter



Installation and Operation Manual

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

Contents

Proprietary Information

Only the customer to whom this manual has been supplied is permitted to use the information herein contained. This documentation is to be used only for installation, commissioning, operation, and maintenance of the equipment to which the manual refers. The manual can be transferred to third parties only in cases where the transfer is integral part of the product sale, or Bext has given written permission.

Symbols conventions

Notes marked with this symbol refer to those procedures whose non-observance can cause damage or malfunction to the equipment itself and / or other equipment connected to it.

Notes marked with this symbol refer to those procedures whose nonobservance can compromise safety of personnel.

Notes marked with this symbol refer to those procedures which are important for the correct operation of the transmitter.

XL150 Installation and Operation Manual

Revision 1

1045 Tenth Avenue, San Diego, CA 92101

If you have any comment that could help us to improve this document, please write to **bext@bext.com.** *we will be happy to consider your input.*

Thank you for choosing BEXT!

1. Safety information

This chapter provides information about safety procedures and their application while using or servicing the equipment described in this manual.

1.1 About Safety

All BEXT products are designed to meet the requirements of internationally approved electrical safety criteria.

The removal of any cover or protective panel that can be only opened using a tool is considered a maintenance activity, and that any person performing a maintenance activity it is expected to be properly trained for such activity.

Under International Safety Standard EN60215, it is assumed that trained personnel will be knowledgeable, and will take all the precautions necessary to operate safely.

1.1.1 Electrical Hazards

To remove power from the equipment, switch off and lock out the AC power. Put the lock out device on the breaker that feeds AC to the equipment. Follow specific lock out and safety procedures in use where the equipment is located.

Use a proper look out procedure to ensure that another worker cannot accidentally reapply power while you are performing maintenance on any part of the transmitter, site, or antenna system. Before opening the equipment and touching any internal part, remove and solidly connect the antenna to ground.

- *It is not enough to switch off the equipment. The power line it is still connected. Disconnect and lock out the upstream supply before servicing.*
- *After turning off the AC power, always perform a measurement to confirm the power is off before touching anything within the equipment. If the wrong breaker was opened, the equipment may be subjected to live voltage.*
- *Do not use an ordinary multi-meter to check for voltage. The instrument could have been inadvertently left in the Ampere (A) range. This could cause a short circuit and an arc blast that could result in severe burns or other injury.*
- *Use a non-contact voltage probe or a safety voltmeter to conduct the voltage test.*
- *Use a proper lock-out procedure to ensure that another worker cannot accidentally reapply power while you are performing maintenance on any part of the transmitter, site, or antenna system. Before opening the equipment and touching any internal part, remove and solidly connect to ground the antenna connection.*

1.1.2 Symbols and markings on the equipment

DANGER! High Voltage

This label indicates that dangerous voltages (more than 72 volts), capable of causing a fatal electric shock, are present on or near parts bearing this label.

Lightning Hazards

Before opening the equipment and touching any internal part, remove and solidly short circuit the antenna feed line leaving it disconnected.

It is not enough to ground the antenna terminal with the antenna still connected. Even a little impedance in the ground strap could result in lethal voltages during a lightning strike.

RF Energy Hazard

Serious RF Hazard and extremely high voltages could be present in the vicinity of the RF output, and related electrical networks, during normal operation.

Toxic Hazard

Some devices used in this equipment contain Beryllium Oxide ceramic, which is not harmful during normal device operation, and under normal device failure conditions. These devices are specifically identified with “BeO” in the Description column of the Service Section parts list.

Do not crush, grind, or otherwise break the case of these devices because the resulting powder may be hazardous if inhaled. Not serviceable parts and devices should be in any case disposed as toxic waste.

DANGER! Moving Parts!

Fans can start at any moment and their blades can cause injury. Lock out power before removing safety protections from fans and any other moveable part.

1.1.3 Other Hazards

Ensure that the appropriate fire alarms and fire extinguishers are available and in a proper state of maintenance. Fire extinguishers must be suitable for use on electrical fires.

Many other site or equipment safety hazards exist. It is beyond the scope of this manual to identify all the risks and related procedures to avoid them.

1.2 Safety Precautions

Training of any personnel who will have physical access to the site or the equipment is particularly important. Personnel must be familiar with the equipment, so that they can avoid exposing themselves to potential dangers.

1.2.1 Personal Safety

Familiarize all new personnel to the safety procedures in use for the site and the equipment. It is a good idea to give a site orientation class which should cover the following topics:

- *Securing the site (locking doors and fences) to prevent unauthorized access.*
- *How and when to call for technical support or emergency assistance.*
- *Areas of the site and equipment that are off-limits.*

Ensure that all personnel who can access areas with high voltage circuits or presence of high RF field strengths are aware of the hazard associates with high voltage. Cover the following topics:

- *Awareness of high voltage or high RF field strength areas where caution is required.*
- *Awareness of physical risk of electric shock.*
- *Risks for personnel with peacemakers or other sensitive medical devices.*
- *Induced voltages in high field strength areas.*
- *On-site risks during thunderstorms and lightning strikes.*
- *Operation of safety interlocks if applicable.*

1.2.2 Site Safety

Site safety is maintained by implementing safety rules and procedures which have to be strictly followed by all personnel who have access to the transmitting site.

As a minimum the following should be implemented to guarantee safety of employees and equipment:

Controlling access:

RF devices and antennas generate and carry dangerous voltages that can be harmful or fatal. It is especially important that the site and the equipment therein are secured with a controlled access system. As a minimum, you should use locking security doors (better if made of steel), a perimeter fence to keep away unauthorized people from the antenna and its feedline, and an alarm system. "No Trespassing" signs should be posted on the fence and doors.

Marking hazards:

Place warning signs close to any hazardous area (e.g., the feedline or the antenna system). Make the signs large enough that they cannot be missed. Provide the signs in all languages used in the region. These signs are intended not only for authorized personnel, but also for emergency responders and accidental trespassers.

Ac Power Protection:

Protect station equipment by installing surge protectors at the transmission site. These should be installed at the main point of entry for the ac power, immediately after the utility company meter and main breaker.

Power surges may occur during thunderstorms or malfunctions in the electrical distribution grid. Surge suppressors and ac power conditioners can prevent serious damage to all your on-site equipment.

RF Protection:

RF devices and their antennas systems create intense radio frequency fields at the transmitter site, particularly near the feedline, antenna, and antenna tower. At some sites, these fields can be so intense that they cause biological effects, including the heating of body tissues. Intense RF fields can also create dangerous high voltages on ungrounded conductive surfaces and objects. At certain points where high voltages conductors come close to grounded conductors (e.g., at feed-line junctions or on the antenna tower), dangerous arching or flash-over can occur. It is particularly important that you take steps to prevent damage to equipment or personnel due to RF fields.

Safety interlocks:

All RF power equipment built by BEXT is provided with an external interlock circuit which can be connected to external safety devices. When such circuit is electrically open, the RF output of the equipment is immediately interrupted. Once the circuit is closed again, the RF output will be immediately re-activated.

Summary:

- *Use safety interlocks to isolate equipment from ac power lines when opening panels.*
- *Place warning signs in any locations where high fields can occur.*
- *Train personnel about short term and long-term effects of RF radiations exposure.*
- *Physically block access to the area around the antenna system, feedline, and tower.*
- *Ground all exposed conductive surfaces or objects in high field areas.*

1.2.3 Equipment Safety

The equipment has been designed to be rugged and resistant to damage. However, it is possible for damage to occur because of extremely high voltage electrostatic discharge during servicing. Technicians opening the equipment and touching internal parts should do so only after having bled off any accumulated electrostatic charge on themselves by touching a well-known metallic grounding surface.

Surge Protection:

Surge protection is recommended for your entire site. However, even if you do not use a surge protector on the service entrance to the site, we recommend that you install one in the equipment's power feed to prevent over-voltage to reach it and potentially cause damage.

Lightning Protection:

The equipment incorporates built in lightning protection devices. However, particularly intense or repeated strikes could still cause severe damage. We recommend that you install lightning suppression on the feedline to reduce the effects of lightning strikes on the equipment itself, and to protect the rest of your site equipment and your personnel.

Physical Protection:

Consider the possibility of physical hazards to equipment at your site. Ensure that equipment is protected from weather events, like rain or flooding, even during extreme weather conditions. Place equipment so that is not in the path of swinging doors or high traffic areas. Do not allow wheeled items like office chairs, or carts close to equipment as these may damage front panels and components if accidentally pushed or knocked over. Do not place equipment under water pipes, AC system units or devices, drains, or sprinklers. Keep the equipment away from flammable materials like ceiling panels, cubicle dividers, or curtains.

1.2.4 First Aid

BEXT Inc. does not offer first aid advice. The associated procedures are subject to frequent changes and the topic must be taught by those who have medical knowledge.

However, the customer should provide first aid training to all personnel who have access to the equipment and the associate facilities. First aid training should specifically address CPR, care of burns, artificial respiration, and defibrillation if the specific equipment is available on-site.

BEXT Inc. does not assume any responsibility for injuries occurred while using or servicing the equipment. As stated at the beginning of the chapter, personnel who use, install, or have access to this kind of equipment, are expected to be knowledgeable and professionally trained.

2. Technical support and warranty

This chapter provides information on how obtain technical support from the factory, and the procedures to be followed to solve your problem quickly and effectively.

2.1 Technical support

BEXT Inc. is committed to provide technical support for installation and use of its products. The company Technical Support Team will answer your questions and work with you to identify and solve problems.

BEXT will also try to help you troubleshoot your equipment in case it needs repair work done. However, due to the always increasing complexity and miniaturization of electronic circuitry, on site repairs are becoming more and more difficult to perform, and it is highly likely that, in the event of a failure, your equipment will need to be returned to us to be repaired.

2.1.1 Contacting technical support

For non-office hours technical support, you may call +1 619 685 3917. For technical support during office hours, you *MUST* call +1 619 685 3913. Please do not call the 24-hours technical support number during normal office hours. This number is active only after 5:00 PM and until 8:00 AM Pacific Time the following day, or during holidays and weekends; it is NOT monitored during normal office hours.

If the on-call engineer does not answer your call immediately, make sure to leave a message on the line's voicemail. He or she could be on another call helping another customer. Rest assured that you will be called back as soon as possible.

If you do leave a message, it is important that you provide enough information so that the support engineer can reach you easily when he or she will call you back. As an example, always leave your first and last name, your phone number, and a brief description of the reason for your call. If you do so, not only the engineer who will call you back can be sure of reaching the right person, but also, he or she can better prepare to answer your questions. Finally, remember that sometimes, especially if calling from noisy environments, the quality of the call is less than optimal, and it can make understanding your message quite difficult. Please speak slowly and state your name and phone number at least two times.

2.1.2 Shipping your equipment for repair

Modern gear is technically complex and built with surface mounting components which are particularly hard to rework without the necessary knowledge and appropriate tools. For this very reason, if the problem is due to an actual failure, the equipment has, in most cases, to be sent back to be repaired in our laboratories.

BEXT recommends using the original package when shipping equipment to the factory. The original package has the proper sturdiness and padding to withstand the stresses to which packages are subjected during transit.

If the original package is not available, make sure that the equipment has the proper amount of padding all around it. Six inches of Closed Cell Styrofoam, or similar material, is considered the strict minimum. When using a third-party box, it would be better if such box were made of double walled cardboard. As an alternative to double walled cardboard, it is advised to put the equipment inside a box with proper padding as previously mentioned, then put the first box inside a bigger box with further padding between the two boxes.

In any instance it is not advisable to use boxes to ship a piece of equipment that weighs more than forty pounds. In that case consider using a wooden crate and a freight service.

Please be aware that different shipping providers have different policies regarding damaged goods. These policies always include a clause that specifies the height from which the package MUST be able to survive a drop. In case of damage If, in the courier's inspector own determination, the equipment was not packaged in the proper way to survive such drop, their insurance will not pay.

As unfortunate as this is, it happens more times than not. Be aware of this and invest some time in properly preparing your shipment!

BEXT does not assume responsibility for equipment damage that may occur during shipping to and from repair service.

Shipping expenses to and from repair service are, per BEXT warranty policies, always customer's responsibility.

2.2 Warranty Policies

BEXT Inc. standard warranty lasts for 24 months from the date of purchase. The warranty covers part and labor required to bring the piece of equipment back to its normal working conditions and or specifications.

Repairs will be executed free of charge if, in BEXT engineer's own determination, the equipment has not been misused and / or damaged by events which are not a direct consequence of a factory defect.

Such external events may include but are not limited to:

- *Electrical power surges or erroneous AC power voltage or wiring.*
- *Atmospheric events such as electrostatic discharge or lightning.*
- *Water or other liquids infiltration.*
- *Damage caused by rodents or other pests.*
- *Overheating due to improper transmitter site environmental control.*
- *High reflected RF power caused by defective antenna systems or inappropriate load.*

2.2.1 Warranty starting date

The equipment will be invoiced when it is ready for pick or delivery. The invoice is considered as proof of purchase document, and its date is the official starting date for the warranty contract.

Have the invoice number, date of purchase and name of the entity that purchased the item, ready when you call for tech. support or other reason.

3. Unpacking transportation & storage

This chapter explains the steps necessary to unpack the transmitter and get it ready for use. It also explains how to safely store the transmitter in case it is not used for long periods.

3.1 Before opening the box

Carefully inspect the exterior of the package before opening it and remove anything from the inside. If the box shows signs of stress, like deformation or holes, take pictures of the damage before opening it. The images could be helpful in placing a claim with the courier in case there is actual damage to the equipment.

It is good habit to do the above upon receiving the box and, at the same time, notify the delivery person. Furthermore, have them note the damage on their receipt before you sign it.

If the box shows signs of extreme mishandling, and you suspect that the equipment has been damaged, you have the option of refusing the delivery. In this case, have the delivery service associate note the reason for your refusal.

In any case where the package shows signs of stress and / or damage, the shipping materials, container padding etc., should be kept secure, pending any necessary inspection by the carrier or their insurance inspectors. If possible, leave the package as you received it.

Please, be aware that the merchandise always travels under customer's responsibility, even in those cases where the shipment has been directly booked by BEXT Inc.

It is customer's responsibility to inspect the equipment upon arrival and initiate a claim with the carrier if any damage has been noticed.

3.2 Checking box contents

After opening the box and before removing the transmitter, check to see if all accessories are included and note any visible damage to the equipment. If there is visible damage take a few pictures to document it before removing the transmitter from the inside.

3.2.1 Box Content

The transmitter comes packaged with the following accessories:

- *A thumb drive memory containing this manual and a quick start guide in PDF format.*
- *A printed copy of the transmitter's final test report.*
- *An AC power cable, the type depends on the specific model.*
- *D-SUB 25 poles connector with interlock jumper.*
- *Rack Rails, if ordered (Optional).*

If any of the listed accessories is missing, please contact us immediately and we will provide to replace them as soon as possible.

Upon request, BEXT, Inc. will deliver a printed copy of the user manual and quick start guide.

3.2.2 Thumb Drive content

The thumb drive included with the transmitter contains the following:

- *A PDF copy of this manual.*
- *A PDF copy of the quick start guide.*
- *A PDF copy of the transmitter's final test report.*
- *A PC executable file containing the software for programming the RDS encoder.*

All the above is also contained in a media support located inside the transmitter and accessible through the transmitter front panel, using a normal micro-USB cable. The memory area is accessible also if the transmitter is not connected and / or turned on.

3.3 Unpacking

Remove the bag with the accessories and store it in a safe place.

After removing the padding materials, the transmitter can be lifted off the box by grabbing it from its front handles and from the underside of the cabinet's back.

Store the original package in a safe place where it can be retrieved for later shipment. The original package is the safest container to use, should the transmitter be shipped back to BEXT or to other locations.

Do not lift the transmitter holding it by the RF output connector of by the cooling fans.

Upon unpacking the transmitter, any signs of damage to the equipment should be noted and, if possible, photographed. If there is severe damage, the equipment should not be installed or used but kept secure pending instruction from Bext shipping office or the courier's relevant Agent.

3.4 Shipping and storage

In case the transmitter needs to be moved or shipped, we recommend using the original package and padding. It is our advice to strap the box on a wooden pallet and ship the item as freight. In our experience, heavy packages are easily damaged when using regular package services, as they are generally handled by a single person who, due to their weight, tends to roll rather than lift them.

3.4.1 Storage

For short term storage (less than 30 days), the equipment should be kept in a secure indoor place,

not exposed to weather, and satisfying the following conditions:

- *Temperature interval -13° to 155° F or -25°C to +70°C.*
- *Humidity interval 30% to 95%.*
- *Adequate load bearing for the supporting surface.*
- *Adequate space around the unit to allow access and lifting in safety.*

The equipment should be wrapped with polythene sheeting. No person should be permitted to climb or stand on the shelving. No other equipment should be placed on top of the transmitter.

If the transmitter needs to be stored for more than one month it is better to use the original container to do so. The same conditions explained above apply.

4. Introduction

This chapter introduces the XL transmitter, as well as its principal features, and controls.

4.1 Basic Description

The XL series was designed, using modern concepts and technologies, to obtain a very high efficiency of the RF chain. The net result is an extremely compact and lightweight transmitter, which is energy efficient and economical to operate.

The user interface is made up by a four inch color touch panel, supported by an easy-to-use software, which helps making the operation of the transmitter as functional and easy as possible.

The audio interface includes a high-performance stereo encoder, a soft composite limiter (brick wall compressor), and a wide band composite input. AES/EBU and audio-over-IP interfaces are available as options.

Remote control of the equipment is available either via a 25-pin D-SUB port, which can be interfaced to pre-existing remote-control systems, via ethernet connection and control web page, or via ethernet connection and SNMP interface. These features are all available by default

The output power is adjustable between 10% and 110% of the nominal power, and it is constantly monitored by the control system to maintain the adjusted level within 0.1 dB from the set value.

- *LCD color display with touch screen for easy use and control.*
- *Extremely low distortion: TFID, IMD & TIM.*
- *High stereo separation: 60 dB typical.*
- *L/R, RDS / SCA, AUX, MPX, AES-EBU XLR & Optical, and Audio IP inputs.*
- *Audio changeover built in.*
- *Possibility of setting and recalling six setting groups (frequency, sensitivity, power).*
- *Ready for an N+1 system.*
- *Completely broadband.*
- *Remote control for telemetry LAN, RS-485.*
- *RF amplifiers using the latest generation of RF Power LDMOS semiconductors.*
- *Automatic Power Control (APC) maintaining stable pre-set RF power.*
- *Included low-pass filter to suppress harmonics.*
- *High spectral purity FCC and CCIR compliant.*

4.2 Front panel Description

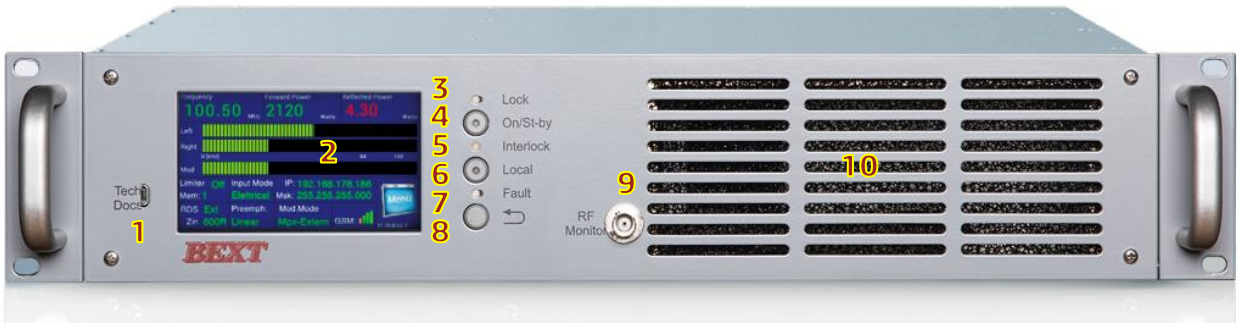


Figure 4-1 - Front Panel

The front panel includes a 4" color LCD touch panel, as well as three buttons, three LEDS, the RF monitor connector and finally, the cooling air inlet. On the left side, a micro-USB connector gives access to the technical documentation: this manual, a copy of the transmitter's test document, and the installation file for the software needed to program the internal (optional) RDS encoder.

The memory area where these files are stored is also accessible with the transmitter turned off or inoperative.

Ref.	Description	Notes
1	USB Connector for internal storage	Connect to a PC to access technical documentation.
2	LCD Touch Panel	Shows parameters and menus. Touch "menu" icon to access settings
3	Lock LED	Green. On when Synthesizer is locked on its operative frequency
4	ON/St-By Button	Push to toggle transmitter status from Stand By to RF-On and vice versa. Green light indicates On-Air status.
5	Interlock Open Alarm LED	Orange when Ext Interlock Active.
6	Local/Remote Button	Push to toggle command mode from local to remote and vice versa. When lit indicates local mode.
7	Fault LED	Red when an alarm condition is active. Push the "Home" button to reset.
8	Home/Reset Button	Push to return to main screen. Pushing when on the Home screen resets alarms.
9	RF Monitor Output	0 dBm RF Output at Nominal power. Suitable for all RF measurements.
10	Cooling Air Inlet	Includes an air filter.

4.3 Rear Panel Description

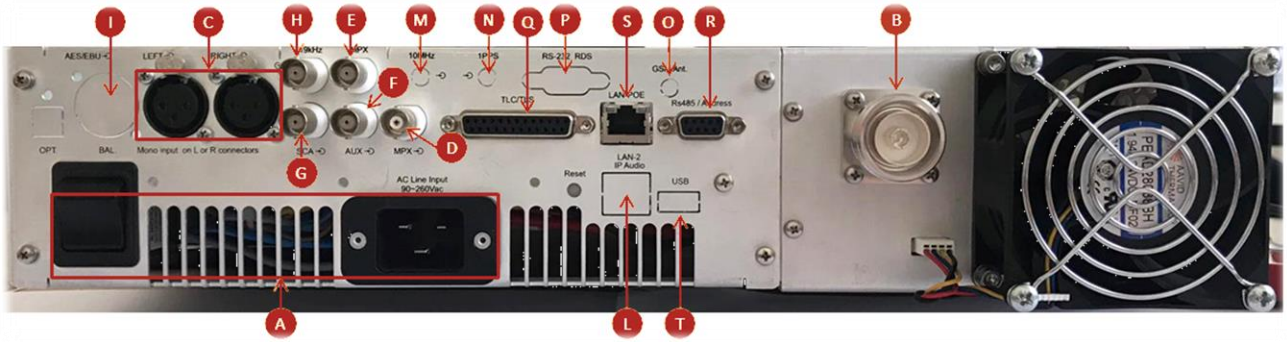


Figure 4-2 - Rear Panel

The back panel contains the input and output connectors used to operate the transmitter. The cooling fan is externally attached to the back panel with four screws and a snap-in connector. This facilitates maintenance from outside the chassis.

Ref.	Description	Notes
A	A.C. Power connector and Power Switch	From 85 to 265 Volts AC
B	RF Output Connector	N or DIN Type female connector, depending on power level
C	Right & Left Audio Inputs	XLR Female 600 or 10K Ohm
D	Composite (MPX) Input	BNC Female 50 or 10K Ohm
E	Composite (MPX) Output	Internal Stereo Generator Composite Output
F	AUX Input	BNC Female Aux. Baseband Input -20 dB
G	SCA Input	BNC Female SCA Subcarrier Input
H	19 kHz Output	BNC Female 19 kHz for external RDS encoder.
I	AES/EBU Input (Optional)	XLR Female or TOS-LINK Inputs for AES/EBU Option
L	AoIP Input (Optional)	Ethernet Input for web audio optional input
M	External Freq. Reference Input (Opt.)	SMA Female for external 10 MHz reference signal
N	1pps Frequency Sync. (Optional)	SMA Female for external 1pps reference signal
O	GSM Antenna input (Optional)	SMA Female for optional GSM telemetry module
P	Internal RDS Encoder Control (Opt.)	9-pin D-SUB female for internal RDS optional module RS232 control
Q	Parallel Remote Control I/O	25-pin D-SUB female for analog telemetry interface
R	Address Selection (For combined use)	Used in combined high-power transmitters
S	Web Interface Ethernet Connection	Ethernet Input for web interface control

4.4 Technical Specifications

4.4.1 General

Output power:	From 0 to 165 Watts front panel adjustable
RF Output Impedance:	50Ω.
RF Output Connector:	DIN7-16 female.
RF Monitor:	0 dBm at 150 Watts output, BNC female.
Frequency Range:	87.5 to 108.0 MHz, adjustable in 10 kHz steps.
Frequency Stability:	±1 ppm, from -5 to 45 °C
Off Lock Attenuation:	Better than -80 dBc.
Modulation Capability:	±150 kHz Maximum
Modulation Limiter	Built in, 83 kHz limit
Power Good Detector:	Adjustable from 10% to 90% of the power
Audio Presence Detector:	Intervention time adjustable
Modulation Modes:	Mono, Stereo, Composite, SCA, RDS, Aux
Preemphasis:	Linear, 50µs, 75µs, front panel selectable
Asynchronous AM noise:	≤70 dB down from 75 kHz deviation
Synchronous AM noise:	≤65 dB down from 75 kHz deviation
RF Harmonics emission	Meets FCC/CCIR/EBU requirements
RF Spurious emission:	Meets FCC/CCIR/EBU requirements

4.4.2 Monoaural Operation

Audio Input Impedance:	600Ω or 10 kΩ Balanced, menu selectable
Audio Input Levels:	-6 to +12 dBm menu selectable
Input Connector:	XLR Female
Audio Frequency Response:	±0.1 dB from 30 Hz to 15 kHz
Harmonic Distortion + Noise:	0.1% with 400 Hz tone
Intermodulation Distortion:	0.1%, with 1 kHz/3.3 kHz tones, 1:1 ratio
Transient Intermodulation distortion:	0.1% with 2.96 kHz square wave and 1.4 kHz sine wave
Signal-to-Noise Ratio	85 dB below 75 kHz deviation, RMS detector

4.4.3 Stereo Operation

Stereo Separation:	45 dB at 30 Hz, ≥60 dB for freq. over 100 Hz.
Crosstalk Attenuation:	70 dB 30 Hz to 15 kHz.
Stereo Sub Carrier Suppression:	≥ 80 dB.
Pilot Tone Frequency:	19 kHz ± 1 Hz.
Pilot Tone Output:	2 Vpp BNC Female, adjustable

4.4.4 Multiplex Operation

Composite Input Impedance:	2 kΩ Unbalanced BNC type female
Composite Input Level:	-6 to 12 dBm, menu selectable
Composite Amplitude Response:	±0.1 dB, 30 Hz to 100 kHz
Harmonic Distortion + Noise:	0.1% with 400 Hz tone
Intermodulation Distortion:	0.1%, with 1 kHz/3.3 kHz tones, 1:1 ratio
Transient Intermodulation distortion:	0.1% with 2.96 kHz square wave and 1.4 kHz sine wave
Signal to Noise Ratio	85 dB below 75 kHz deviation, RMS detector

4.4.5 AES/EBU Operation

Input Connector:	Balanced XLR Female or Optical TOSLINK
Data Format:	S-PDIF, AES/EBU, IEC958, EIA-JCP340/1201
Bits Per Sample	24 Bits
Sampling Frequency:	32 to 96 kHz

4.4.6 SCA, RDS, AUX Operation

Input Impedance:	≥ 2 kΩ, BNC Female
Input Level:	-6 to 12 dBm, menu selectable
Frequency Response:	±0.1 dB, 50 kHz to 100 kHz

4.4.7 Audio-Over-IP (Optional)

Transport Protocol:	RTP over UDP
ShoutCast/IceCast Audio Codex:	AAC, AAC PLUS, MP3, Ogg Vorbis (IceCast 2x)
Audio Codecs:	ALAX, Ogg Vorbis, MP3, AAC, PCM.

4.4.8 Electrical and Noise

AC Input Power:	94 ~ 260 VAC, 50/60Hz, single phase.
AC Apparent Power Consumption:	250 VA.
Phase Factor:	Cos Ø> 0.98.
Cooling Type:	Forced air.
Acoustic Noise:	< 56 dBa at 1 meter.

4.4.9 Environmental and Physical

Operating Temperature:	-5°C to 50°C.
Maximum Operating Altitude:	3000 mt.
Relative Humidity Range:	0 to 90%.
Enclosure:	Standard 19” Rack, 2RU Height.
Size (W x D x H):	483 x 600 x 132 mm.
Weight:	Approx 15 lbs and approx. 17 lbs packed.

5. Installation and Use

This chapter contains instructions on the installation of the transmitter and its first commissioning into service.

5.1 Before Installation

5.1.1 AC Power Protection

You should take steps to protect equipment from surges (over-voltage spikes) on the AC power lines. Surges may occur during thunderstorms, or because of malfunctions in the electrical distribution grid. Surge suppressors and AC power conditioners can prevent serious damage to your on-site equipment, including the transmitter.

5.1.2 RF Protection

Transmitters and their antenna systems create intense radio frequency fields at the transmitter site, particularly near the feedline, antenna, and tower. At some sites, these fields may cause biological effects, including the heating of body tissues. Intense fields can also create dangerous high voltages on ungrounded, conductive surfaces and objects. At certain points where high voltage conductors come close to grounded conductors (e.g., at feedline junctions or on the tower), dangerous electrical arcing or flashovers can occur. It is very important that you take the following steps to prevent damage to equipment or personnel due to RF fields:

- *Use safety interlocks to de-energize the transmitter, or shut off its RF emission if personnel open doors or panels that give access to areas exposed to high RF fields.*
- *Place warning signs in any locations where high energy fields can occur.*
- *Train personnel about the short-term and long-term hazard of RF radiations.*
- *Physically block access to the area around the antenna system, feed line and tower.*
- *Ground all exposed conductive surfaces or objects in high field areas.*

The RF connection to the transmitter output can be a serious safety hazard. Connect a 50Ω test load during installation and commissioning. It is recommended that a switch be used to automatically connect the transmitter to the antenna system without human contact with the transmission line.

5.1.3 Safety Interlock

The transmitter contains an electrical interlock system, which is an external circuit that turns off the RF output when triggered.

The interlock can be programmed to react to an open or a closed circuit. The transmitter leaves the factory with such setting programmed on “normally closed,” which means that, if pin number 4 and pin number 1 of the TLC connector are not connected to each other, the transmitter will not be able to produce RF power. This will be signaled by the orange led “interlock” lit on the front panel.

The accessory bag shipped with the transmitter contains a D-SUB 25 pin connector with pins number one and four short circuited. This must be placed on the TLC connector on the back panel of the transmitter to allow the transmitter to be enabled.

5.2 AC Power Connection

The transmitter has been designed to be rugged and resistant to damage. However, it is possible for damage to occur because of electrostatic discharge, atmospheric events such as lightning storms, and power surges.

5.2.1 Surge Protection

Surge protection is recommended for your entire site. However, even if you do not use a surge protector on the power service entrance to the site, you should install a surge protector in the transmitter AC power feed to prevent overvoltage from entering the transmitter.

5.2.2 Operating Voltage and Current, Fuse

The transmitter uses a transformer-less power supply, and it does not include a voltage changer. Any AC power source between 90 and 260 Vac can be used. The shipping container includes a power cord with a NEMA 5-15P plug on one side, and an IEC63020-C13 Connector on the other side.

The Transmitter consumes about 90 VA, which corresponds to 0.75 Amps at 120 Vac, and about 0.43 Amps at 208 Vac.

The fuse is rated at 1A slow blow, and it is suitable for use whether the voltage used is 120 or 208~240 Volts.

5.2.3 Grounding

It is essential that the transmitter site has a proper ground connection independent of the electrical ground provided by the utility company, which could be connected to a ground point far away from the site power service entrance point. In the event of high electrostatic activity due to lightning storms or very dry windy days, a substantial voltage could develop across the ground wire.

The transmitter has a grounding post on the back panel. The post should be connected to the site ground system which, in turn, should be connected to its own grounding rod with a known low resistance to site earth.

5.2.4 AC Power Connection

We recommend connecting the transmitter to a dedicated circuit breaker, separate from any other equipment at the site.

5.3 Initial Power-Up

Before applying power, connect the RF output to a dummy load or antenna rated to handle the full output of the transmitter.

Connect the audio or composite input to a source of audio from your FM or audio processor.

Connect the AC mains to an outlet and turn on the transmitter. If you want to start with the lowest possible power output, keep the Home/Back button pressed while you turn on the transmitter. The display should light up and show a screen of information similar to the diagram below.

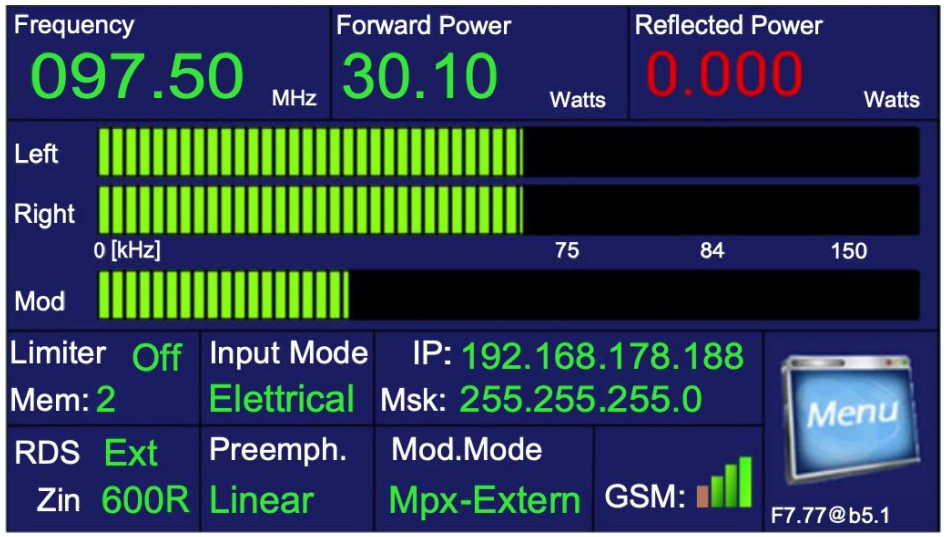


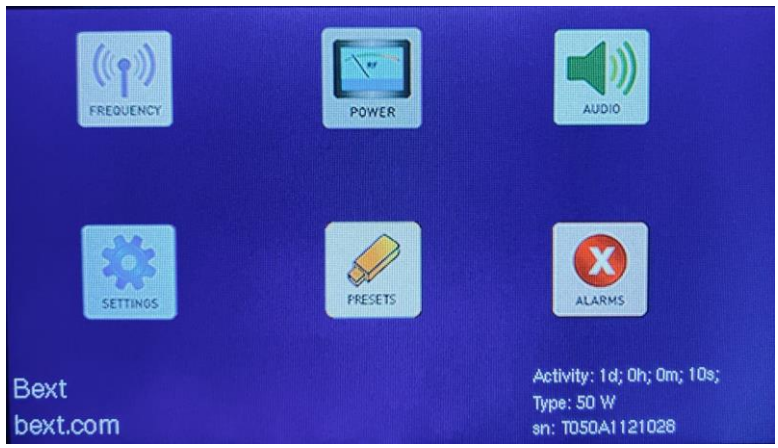
Figure 3: Power-on transmitter start page

The initial display includes:

- Frequency in Megahertz
- Forward power in watts
- Reflected power in watts
- Left & Right audio modulation relative to full
- Frequency modulation in percent
- Limiter status (ON/OFF)
- Input mode (Digital AES, Analog, Composite External)
- LAN IP address and subnet mask
- Memory (menu preset number)
- Internal RDS processor (ON/OFF)
- Audio input impedance (600Ω, 15KΩ)
- Pre-emphasis (Linear, 75µS, 50µS)
- Modulation mode (Mono, Stereo, Composite External)

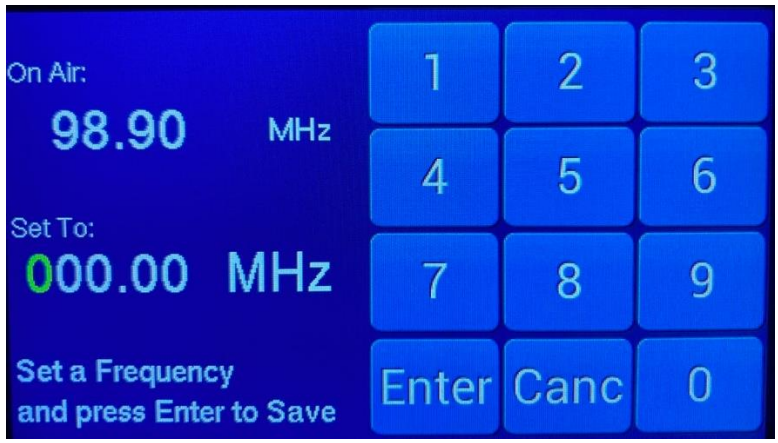
5.4 Menu Structure

Click on the Menu symbol in the lower right corner of the home screen to open the menu.



5.4.1 Frequency

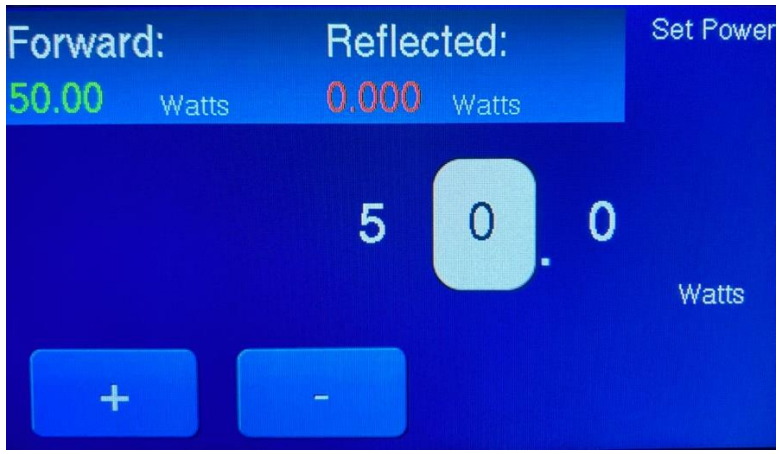
Press the frequency key to access the panel for setting the transmitter output carrier frequency.



From the keyboard, type a new frequency, then confirm by pressing Enter. You can delete an entry by pressing the “Canc” button. The system will ask you to confirm a change with an “Are you sure?” question. Press Yes to confirm.

5.4.2 Power

From the Power menu, transmitter output power can be set.



Forward and Reflected power are displayed to show real-time output power. Click on a digit of the adjustment display to highlight it, then click on a + or – button to raise or lower power to that digit of significance. Note that the range of power you can set is limited from approximately 20% to 105% of specified output.

5.4.3 Audio

From the Audio menu, you can adjust the following:

- Internal RDS processor On or Off
- Internal limiter On or Off. The limiter is factory set for 84.2 kHz. Other settings are available on request.
- Pre-emphasis for 50µS (European), 75µS (N American), or Linear (if you have set the pre-emphasis in your external FM processor—most common).
- Modulation mode (Mono, Stereo, Composite External). Normally you would feed the transmitter from an external FM processor through its Composite port. Note that when you select Digital, you are offered a secondary screen on which you can choose between balanced AES/EBU, Optical, or IP input. If you have a talk-only format feeding from the audio input, you may wish to select Mono mode. Selecting Mono brings up a secondary screen on which you can choose between Left, Right, or a mix of L+R.
- Audio input impedance (600Ω, 15KΩ). If you are feeding audio from an active amplifier source, your audio source impedance would normally be low and you would select 15KΩ bridging impedance here. If your audio source has a 600Ω transformer output, you can select 600Ω for an accurate load.

Pressing the SET INPUT LEV screen button opens a screen where the Audio Input Level can be trimmed. This screen is divided into five adjustment levels. It is recommended that you make these adjustments while using a calibrated modulation monitor to confirm legal and proper levels. Clicking on the Change button for any of the items opens a Change panel where you can change the value with a touch keypad.

5.4.4 Settings

The displayed readings are:

- Ipa 1-2-3: currents supplied by the power supplies
- 3v3/5vO/Serv: service voltages
- Vpa: Voltage power amplifier, the voltage with which the RF is working
- Eff: efficiency in percent
- RF: RF heatsink temperature in Celsius degrees
- Amb: room temperature in Celsius degrees

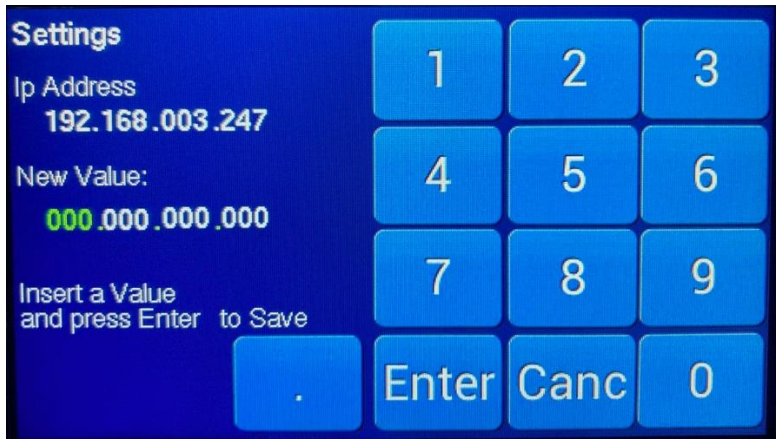
In the main setting panel, you can enable or disable:

- FSK
- 19 kHz Out
- GMT En

5.4.4.1 LAN

Configure the LAN connection parameters from this panel.

Set the IP address by clicking on the virtual button next to the default address. On the number entry screen, enter the numbers for each IP octet followed by "." Then the following octet numbers, and so on. When finished, press ENTER. You cannot simply enter all of the numbers in order without the period.



Set the Subnet Mask, LAN Gateway, and DNS address similarly.

Set the NTP (Network Time Protocol) Time Server address. If you have an internal network NTP server, use that address. U.S. residents can use any number of external addresses. NIST in Boulder, CO can be reached at 132.163.96.1. NIST in Gaithersburg, MD can be reached at 129.6.15.28, but is subject to change.

5.4.4.2 Time

Clicking on Time will allow you to set the initial time and date of your transmitter. Select a value and modify with the screen numeric keypad. If you are connecting to an NTP server, your device will automatically correct the time during the course of a day. The date should be formatted as

MM/DD/YYYY, placing the month first.

5.4.4.3 DB25 Connector

The transmitter can be controlled through the DB25 connector located in the rear panel of the device.

Clicking on the "DB25" key it is possible to set:

- Power Check Pin (Normal Open or Normal Closed)
- Percent Value Power
- Audio Mute time in seconds
- Audio Presence time in seconds
- Interlock IN (Normally Open or Normally Closed)

5.4.4.4 RS485 Address

If you use the RS485 serial port for passing monitor and control information, you can supply a communication port address here.

5.4.4.5 19 kHz Output Amplitude

This configuration panel allows you to change the amplitude of the pilot as output on the 19 kHz port only—not the MPX port.

5.4.4.6 19 kHz Deviation Amplitude

This configuration panel allows you to change the deviation of the 19 kHz pilot. Do not change this adjustment without using a calibrated modulation test instrument that has a pilot deviation amplitude reading available.

5.4.4.7 19 kHz Deviation Phase

This configuration panel allows you to change the deviation phase of the 19 kHz pilot. Do not change this adjustment without using a calibrated modulation test instrument that has a pilot phase reading available.

5.4.4.8 Power Reduction

You may make scheduled changes to your transmitter output power; e.g., to reduce output overnight if you have limited available line power from a solar-charged battery. Enter a Start Reduction and End Reduction time, and % power to reduce power to. This not a normal setting in the USA.

5.4.4.9 Set FSK

Your transmitter can transmit its callsign via Frequency Shift Keying (FSK) for translator automatic station identification. Use the slider to select each character, then press Enter to input the ID Code. Then click on the next dash and repeat the input character selection until the ID Code entry is completed. Press Enter on the final character to exit this screen. This is often done for identifying FM translators that are passing hourly voice station identifications of the mother station.

5.4.4.10 Audio Changeover

You can set a backup audio source (Digital, Analog, or Mpx Ext). For Digital sources, select whether

derived from the AES electrical connection, Optical, or IP. For Analog sources, select whether using only the Left channel, Right channel, or Stereo (L&R). You can turn the Reserve audio source On or Off.

5.4.4.11 AES/EBU

From this panel, you can set the clock ratio of the digital audio signal (highlighted for 128-bit or de-selected for 256-bit).

Set the deemphasis either Off or Automatic.

Set the deemphasis frequency at 32 kHz, 44 kHz, or 48 kHz, depending on your local standard. If you are feeding AES/EBU audio, the most common standard is 44 kHz; however, your plant standard may be different.

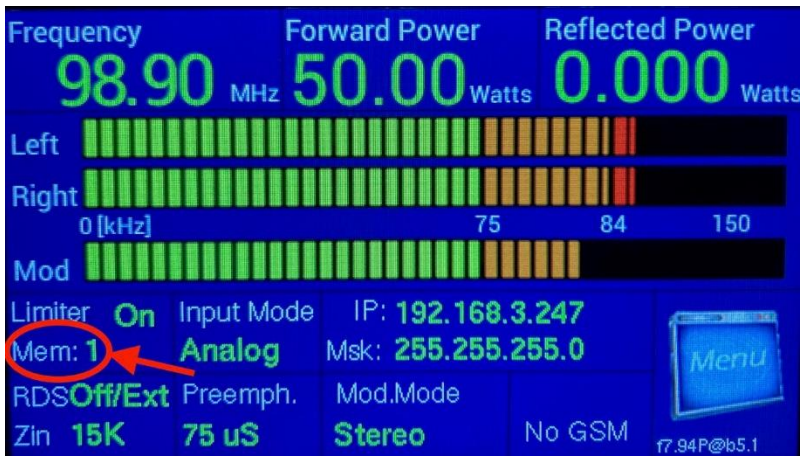
5.4.4.12 Options

Clicking on the Options button will bring up a small screen listing options selected and their status (On or Off). This is a read-only screen.

- AES/EBU audio source
- GSM telecom board audio
- SNMP v. 1
- SNMP v. 2C
- Audio Over IP
- RDS

5.4.5 Presets

From this control panel, you can memorize up to six operational presets. The active preset is displayed on the main panel in the lower left corner. You can use these presets to maintain a single transmitter to use at one or more sites as a backup unit, activating the appropriate memorized settings to operate the transmitter for the desired station.



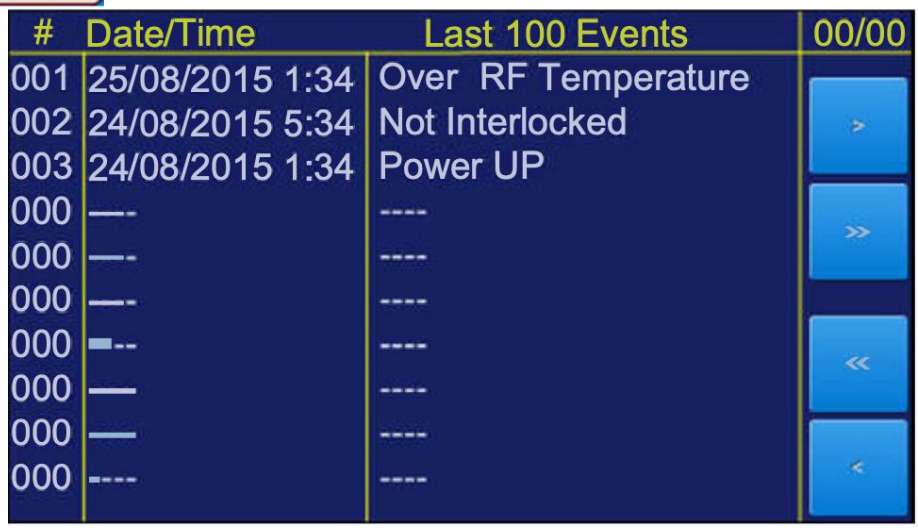
Save or activate another set of settings by accessing the Menu button, then the Memories button.

The active preset is accompanied by an "EXIT OF SETTING" button while the other memories show buttons ACTIVE and SET. Navigate between the 6 memories using the Pag+ and Pag- buttons.

In the next figure, Preset 1 is displayed. In order to save a second page of settings, press Pag+ to access Preset 2, then press Set to save to memory all of the settings you are using for that station. Press Active to activate the transmitter with those settings. This happens immediately upon pressing the Active button, so use with caution. In order to clear any undesired presets, navigate to that page and Set the memory, saving the current operating set to that memory page.

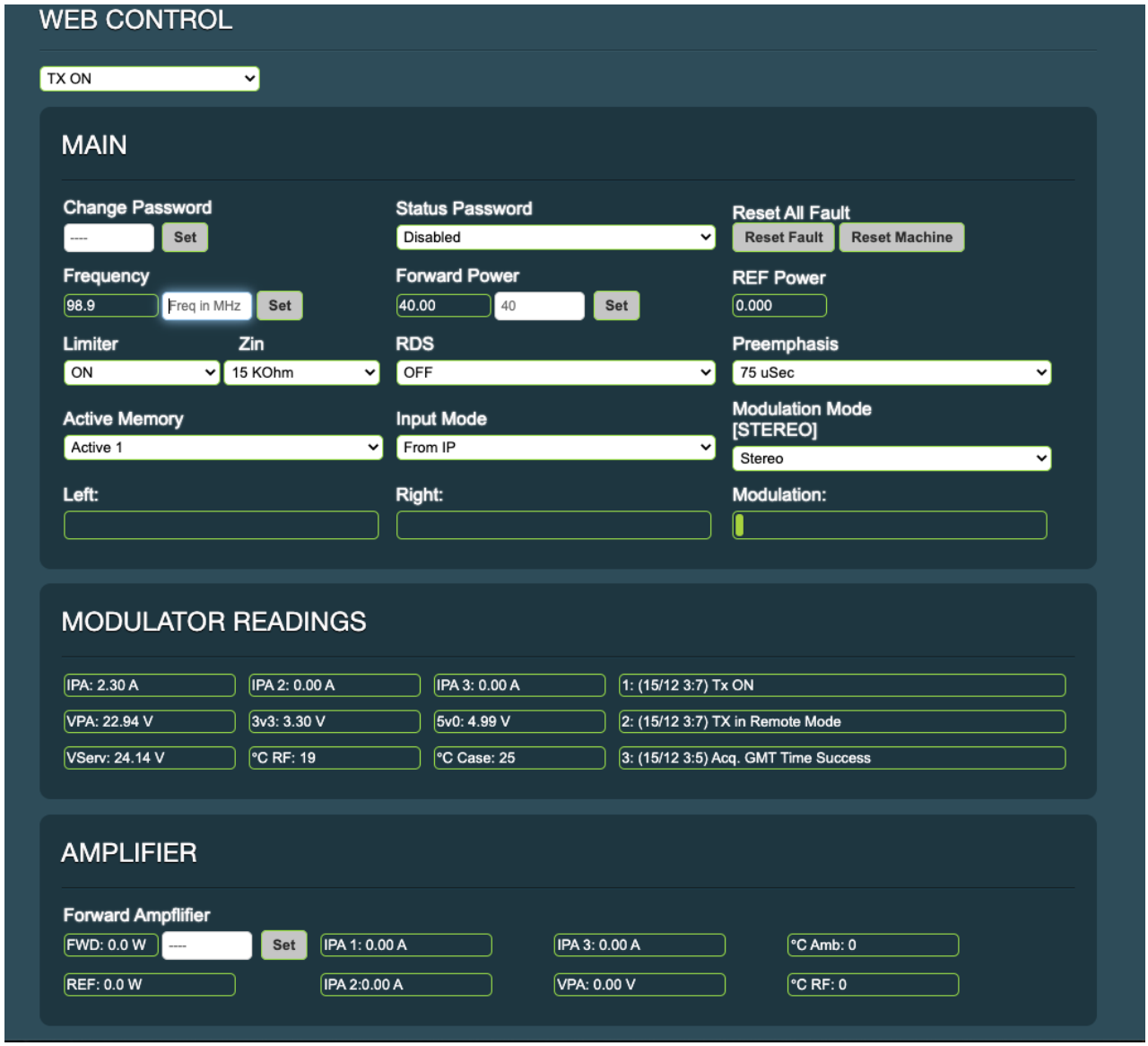
5.4.6 Alarms

Pressing the Alarms button will take you to a log of events. This log stores up to 100 messages divided into pages for browsing. Access the pages using the navigation buttons on the right side of the screen.



5.5 Web Server

You can monitor and control your Bext XL transmitter via IP using the on-board web server accessed through the LAN-POE port on the rear panel. The IP address to access the board is listed on the front touchscreen panel. The default password is really a four-digit PIN, **1000**.



All transmitter parameters are visible on the Main Page and can be modified by setting the transmitter in REMOTE mode from the front panel Local control button; otherwise, changes are not allowed. The very top of the WEB CONTROL index page will display a rectangular box with the message “Remote control is disabled” when the front panel Local control button is depressed and has its amber indicator lit.

Note the audio Left, Right, and Modulation readings are relative only and do not refresh frequently. Do not depend on them to accurately reflect instantaneous modulation conditions.

Under the MODULATOR READINGS heading, the right side three rows represent the last three alarm statements, with GMT zone date and time.

6. IP Audio with the IPA400 Option

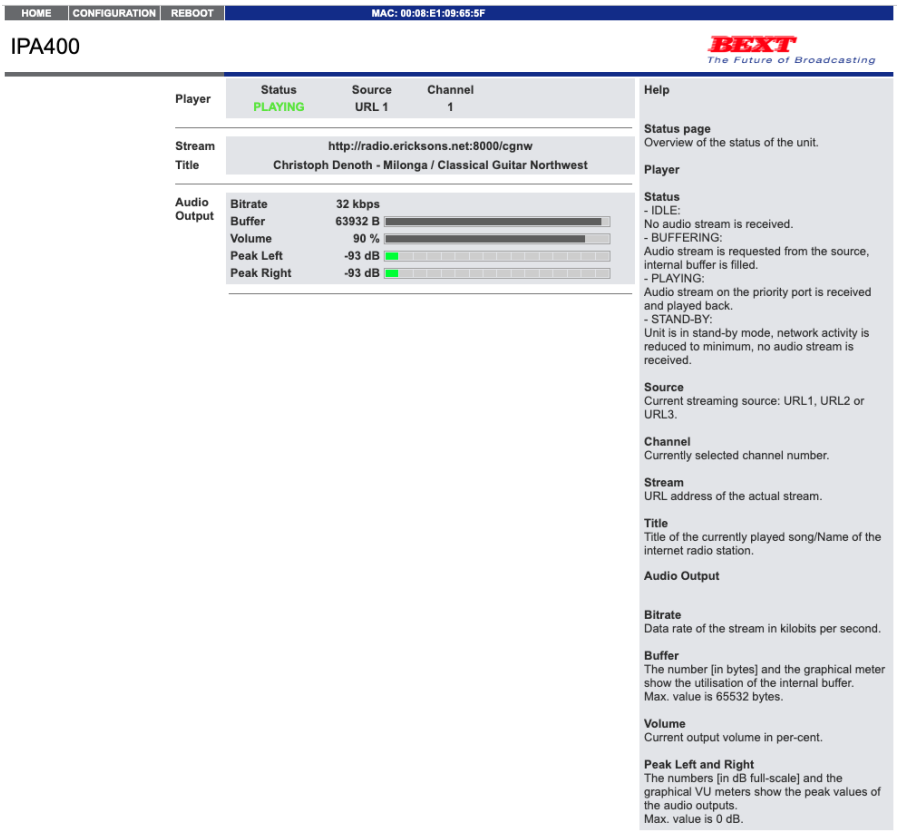
The IPA400, installed inside the XL transmitter, gives you the option to receive a digital audio stream using IP over the internet. The audio is converted into analog audio in order to transmit a modulated FM signal.

When the IPA400 is installed, a LAN connector labeled “LAN2-IP Audio” appears on the real panel.

Attach an Ethernet cable to this connector, then go to the front panel screen, select Menu in the lower right corner, then Audio Settings, then Input Mode, then select Digital.

6.1 Accessing the Stream Decoder

The default address of the LAN2-IP Audio port is 192.168.178.120/24. You can change this address after initial access, so you’ll need to configure an access computer with an IP address in the .178 subnet; e.g., 192.168.178.1 with a mask of 255.255.255.0. Upon connection, enter the Username: admin and Password: admin. The Home page should look like the display below.



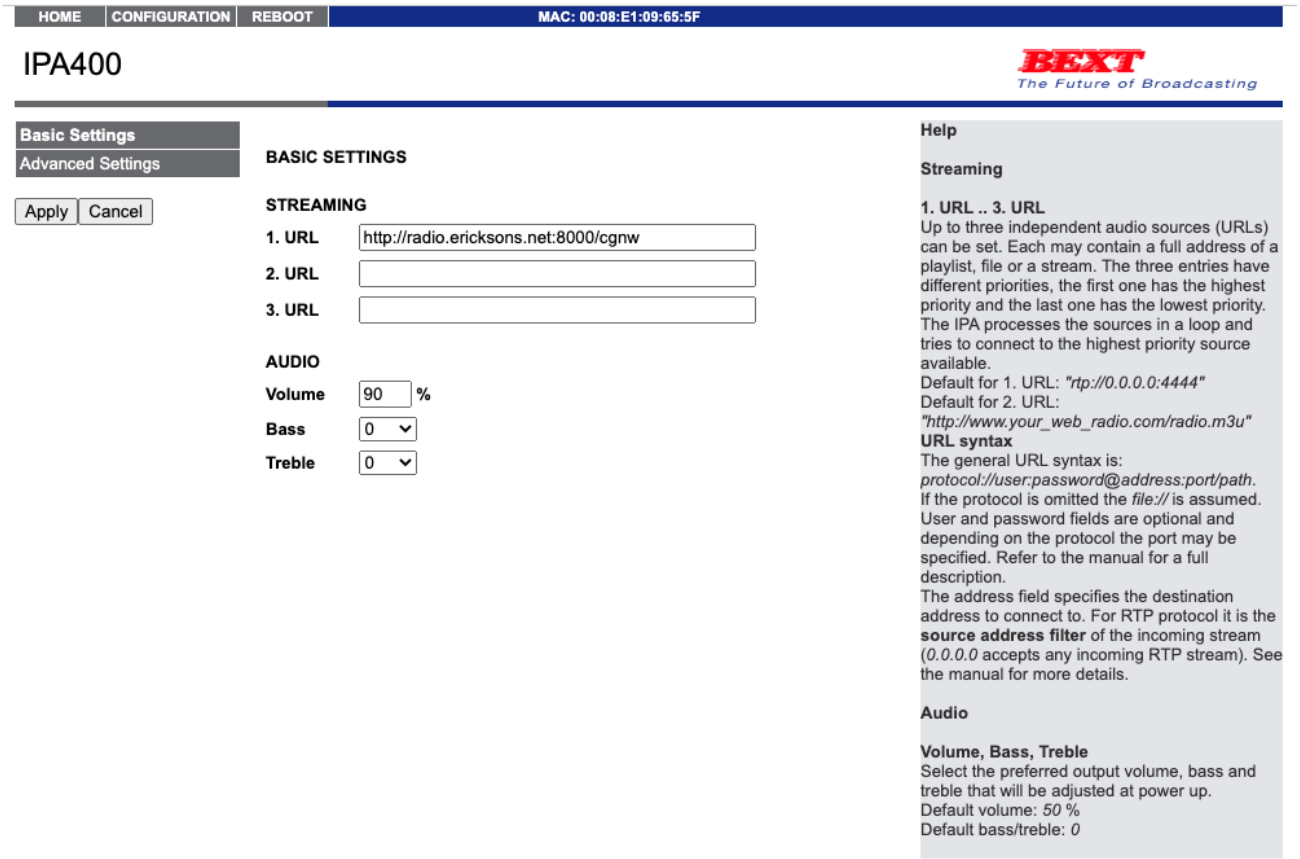
The Home page will display:

- Status: IDLE with no stream, BUFFERING when a stream is requested and the buffer is filling, PLAYING (green) when the audio stream is successfully received and decoding, and STAND-BY when the unit is in Stand-by mode and there is no network activity.
- Source: URL 1, URL 2, or URL 3.
- Channel: The current channel selected.
- Stream: The URL of the active stream.

- Title: The metadata accompanying the stream, which may identify the source and/or the title of the program or music piece.
- Bitrate of the incoming stream.
- The dynamic buffer quantity in Bytes.
- Volume setting, 0–100%, as set on the Configuration screen.
- Peak audio levels, which are input levels only and not modulation. Peaks should not go into the RED zone to avoid clipping distortion.

6.2 Configuring the IPA400 – Basic Settings

Click on the Configuration button at the top of the screen to access the Configuration screen, seen below.



Here you can enter the URL of the source stream you wish to transmit. Each URL may contain the full address of a playlist, file, or stream. The IPA-400 will try first to connect to the #1 URL, then #2, then #3, always giving first priority to the URL at the top of the list. There are instructions on the right side of this page for formatting the URL. The IPA-400 will decode an MP3, WMA, or a WAV PCM stream.

After every change, you must confirm by clicking on the Apply button. The audio stream decoder will then reboot, taking up to 20 seconds to return.

You can trim the audio level using the Volume field, but you should be aware of the leveling and limiting characteristics of the streaming source before setting this level to avoid over- or under-modulation and keep your audio consistent and competitive in loudness. You can trim Bass or Treble with two controls displayed. You can further adjust audio using the front panel Menu > Audio > Set

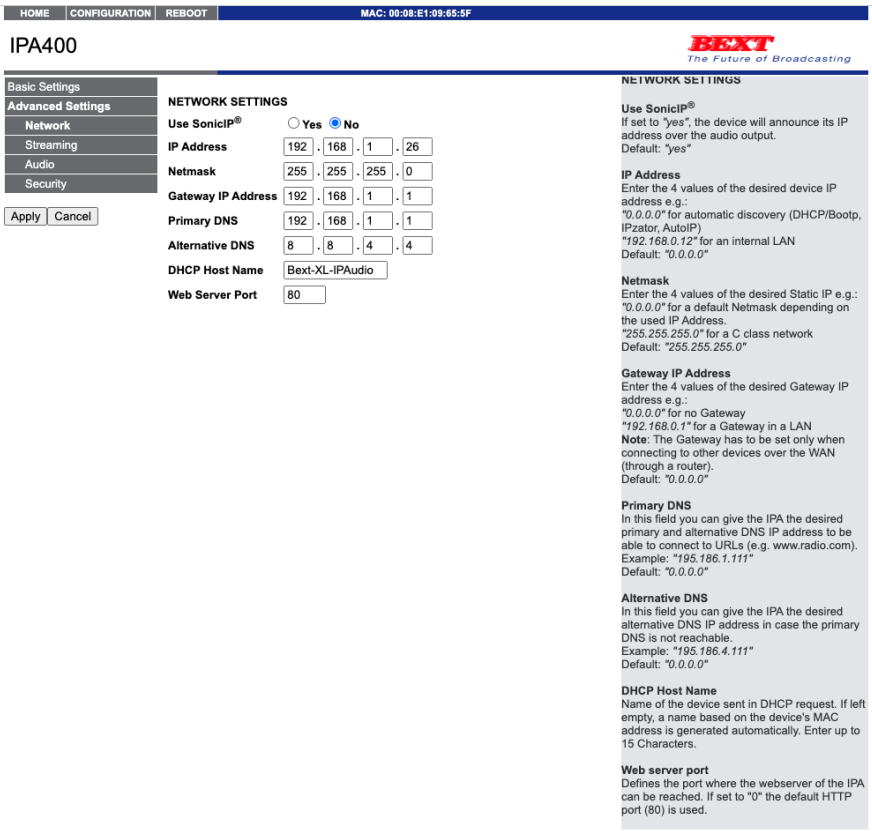
Input Lev. Input your desired gain or loss.

6.3 Configuring the IPA400 – Advanced Settings

From the Configuration Screen, select from the left side button Advanced Settings. On the Advanced Settings/Network Settings page, instructions are listed on the right column (see graphic below). You will find several Network Settings fields:

- Use SonicIP: Yes, if you want to hear the IP address declared vocally by this Scottish guy upon power up. This is handy for diagnostics when you don't know the IP address otherwise, and an embarrassment when it's announced over your radio station. No, if you want this feature off.
- IP Address: This is where you can change the IP address to match your network.
- Netmask: 255.255.255.0 for the most common Class C network.
- Gateway IP Address: Enter 0.0.0.0 for no gateway, your assigned router address for WAN access.
- Primary DNS: Domain Name Service, required if your stream source has a domain name rather than literal IP address. Usually this will be your router address, though you can use a public DNS like 1.1.1.1 for Cloudflare or 8.8.8.8 for Google.
- Alternative DNS: If you used your router address as primary, you might use a public DNS for secondary.
- DHCP Host Name: The name of your device given to the DHCP server. You might wish to call it BEXT-XL-IPAudio or some other name you can use to identify it on your network, handy when you are scanning for devices.

- Web Server Port: Defines the port where the web server of the IPA can be reached, usually 80. If set to “0”, the default 80 is used.



6.3.1 Streaming

TIP: You can use Barix documentation and forums to explore possibilities in setting up your stream decoding.

URL: Up to three independent audio sources (URLs) can be set. Each may contain a full address of a playlist, file, or a stream. The general URL syntax is: *protocol://user:password@address:port/path.* The first entry has the highest priority and the last entry the lowest priority.

If the protocol is omitted, *file://* is assumed. User and password fields are optional; the port may or may not be used by the source.

The address field specifies the destination address to connect to. For the RTP protocol, it is the source address filter of the incoming stream; i.e., 0.0.0.0 accepts any incoming RTP stream. A useful URL for this might be *“rtp://0.0.0.0:4444”.*

Supported protocols vs. audio formats:

Format ↓ ***Protocol*** →	**HTTP**	**RTP**	**BRTP**	**FILE**	**NULL**	**LINE**
M3U playlist	√			√		

M3P stream	√	√	√			
MP3 file	√	√	√	√		
WMA file	√			√		

The “Null” protocol shuts down audio streaming entirely.

Stream Check Period - The XL device processes the URL sources in a loop and tries to connect to the highest priority source available. This value sets the amount of time (in seconds) that a URL with a higher priority has to be available before the device will switch from a lower priority URL. To prevent frequent switching between URLs (due to network drop outs) the value is multiplied by 4 on every further drop out up to the value of "Check Period Limit" (see below).

Default = “1 second”

Check Period Limit - to prevent frequent switching between URLs (due to network drop outs) the "Stream Check Period" value is increased (multiplied by 4) on every drop out up to the "Stream Check Limit" value in seconds. Every time the higher priority URL becomes available the current value is decreased (divided by 4) until it the value drops to the configured "Stream Check Period" (see above).

Default = "1 second"

RTP delay - The RTP decoder keeps constant decoding latency within one frame accuracy. Set the required delay in milliseconds. To synchronize multiple receivers to the same stream, set all to the same value. The delay value should be set large enough to cope with network jitter (difference in packets delivery time) and possible packet loss. Increase the value if you are experiencing audio dropout.

Default = "600 ms"

Recommended:

- MP3 low bitrate streams: 600 ms
- MP3 high bitrate streams: 300 ms
- PCM 44.1 or 48 kHz streams: 80 ms

Audio Buffer Size – The larger the buffer, the better for handling network errors like packet loss. However, to reduce end-to-end network accumulated latency, use a smaller buffer.

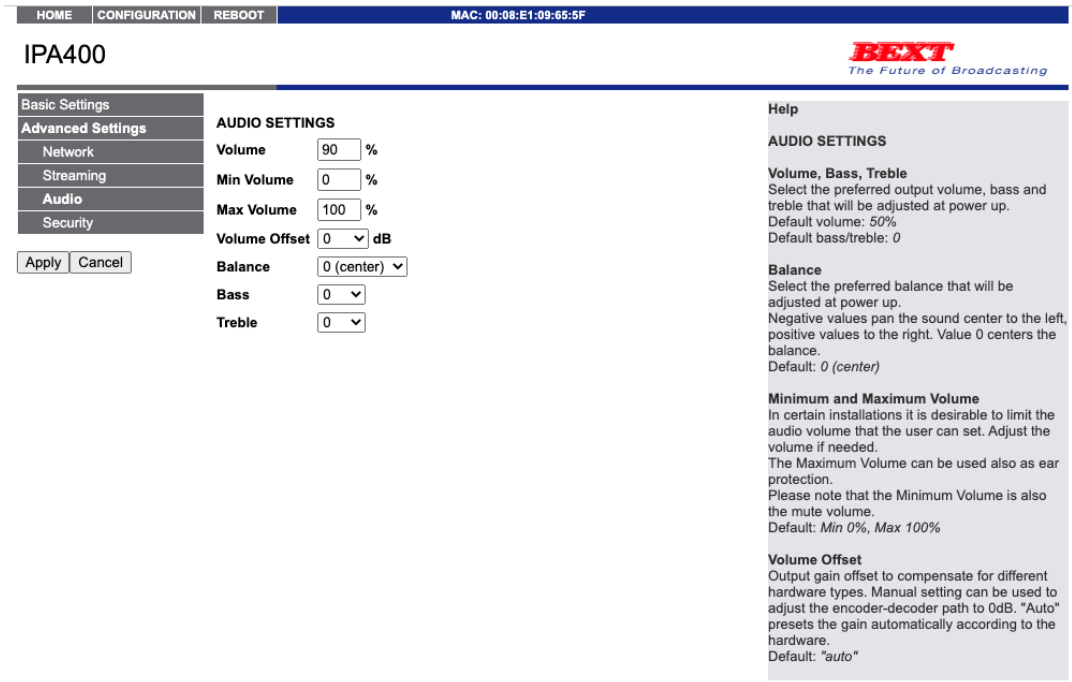
- High sets the largest buffer, 64 kB (default)
- Medium sets half of the default, 32 kB
- Low sets a quarter of the default, 16 kB

Fade-in Period – When a stream connects and begins playing, the audio is faded in by an amount that is determined by this setting.

- Long sets a fade-in of 2.5 seconds
- Short sets a fade-in of 1 second
- None starts playback without a fade-in

6.3.2 Audio

Select the preferred output volume, bass, and treble that will be set at power up. It is recommended these settings be kept at default levels during normal operation since these are downstream of any audio processing you apply upstream. An increase in volume, bass, or treble after processing could cause undesired clipping in the modulator stage of your transmitter. An increase in bass, for example,



will necessarily cause a reduction in overall audio level. Default volume = 50%. Default bass or treble = 0. Default Balance = 0.

Minimum and Maximum Volume can be used to limit the range of audio level adjustment settings available to the user. Default: Min 0%, Max 100%.

Volume Offset can be used to compensate for different hardware types. Manual setting can be used to adjust the encoder-decoder path to 0 dB. “Auto” presets the gain automatically to match the hardware. Default: “auto.”

6.3.3 Security

The default Username is **admin** and is not changeable.

Set Password: This is visible as long as no password is set. Enter a password of up to 25 characters in length and click on the Apply button. After a restart you should close the browser window and open a new browser window. You will be asked to supply a new password.

Once a new password is set, you will see the fields Old Password and New Password displayed. To allow free access (clearing the password), enter the old password and leave the field New Password empty. Enter the old password in the password field above the Apply button as well and then click on the Apply button. After a restart you will not be asked for a username and password anymore.

To change the password, enter the old password and enter the new password in the field New

Password. Enter the old password in the Password field above the Apply button, then click on the Apply button. After a restart you will be asked for a Username and Password. The Username can be omitted but the new Password has to be supplied in order to see the web configuration.

6.4 Reboot

On the Reboot page you can restart the IPA400 if necessary. This will not restart the transmitter but will interrupt audio if you are using the IPA400 audio-over-IP as the audio source. If the REBOOT function is disabled in Security Settings, the link “Reboot the Device” will be grayed out.

The REBOOT page lists the Firmware (FW) version and WEB version.

Appendix A – Rear Panel DB Connector Pinouts

TLC/TLS DB25 Connector Pinout

PIN	TYPE	FUNCTION	NOTES
1		GROUND	
2	Output – Analog	Analog PA Current I_{pa}	0–5 VDC
3	Output – Analog	Analog Reflected Power	5 VDC @ Nominal Reflected Power
4	Input – Optocoupled	External Interlock	NO or NC in Settings
5	Input – Optocoupled	Transmit ON on Closure	Connect to Ground to activate
6	Input – Optocoupled	Activate Memory 2	Connect to Ground to activate
7	Input – Optocoupled	Activate Memory 4	Connect to Ground to activate
8	Input – Optocoupled	Activate Memory 6	Connect to Ground to activate
9-22	Output – Digital	Summary Alarm Contact	Closed Upon Alarm
10-23	Output – Digital	Power Good Relay	Closed Upon Power Good
11-24	Output – Digital	ON/STANDBY Relay	Closed Upon Output ON
12-25	Output – Digital	LOCAL/REMOTE Relay	Closed Upon Remote
13	Output – Analog Output - Digital	+24 VDC Aux Out AC Power Loss Contact	24 VDC @ 500 mA max, Closed with Pin 21 Upon Loss of Power
14	Output – Analog	Analog V_{pa} Power Amp. Voltage	5 VDC @ Max. PA Supply Voltage

15	Output – Analog	Analog W_{pa} Forward Power	5 VDC @ Design Output Power
16	Input – Optocoupled	Reset Alarms	Connect to Ground to Activate
17	Input – Optocoupled	Transmit OFF on Closure	Connect to Ground to Activate
18	Input – Optocoupled	Activate Memory 1	Connect to Ground to Activate
19	Input – Optocoupled	Activate Memory 3	Connect to Ground to Activate
20	Input – Optocoupled	Activate Memory 5	Connect to Ground to Activate
21	Output – Analog	AC Power Loss	Closed with Pin 13

RS-485 DB9 Connector Pinout

PIN	TYPE	FUNCTION	NOTES
1		Ground	
2	Data	RS-485 – A	
3	Data	RS-232 - Tx	
4	Input	RS-485 Address Bit 1	Service Only
5	Output – Analog	+5 VDC Service	Maximum 500 mA
6	Data	RS-485 – B	
7	Data	RS-232 – Rx	
8	Input – Optocoupled	RS-485 Address Bit 2	Service Only
9	Input – Optocoupled	RS-485 Address Bit 0	Service Only

Appendix B - Touch Screen Calibration

1. Put the transmitter in LOCAL MODE. The Local amber LED should be lit.
2. Press and hold simultaneously Home ⮌ + Local front panel buttons.
3. Follow the instructions on the display.

Appendix C – Upgrade Firmware

To update the firmware and access the page for the control of the system it is necessary to connect the LAN to the LAN-POE port located on the rear panel of the transmitter between the TLC/TLS and RS-485 ports. The Set IP address is visible on the first page of the LCD display.

Each BEXT Transmitter/Amplifier has a local memory EPROM that stores some information about the equipment (i.e. serial number, model, installed options and other info).

This stored information may be erased by an EPROM update. In this case it's necessary to use this procedure to restore the data contained in this internal memory.

You'll need:

- Personal computer running Windows 7 or 10.
- Standard Ethernet LAN cable.
- TFTP Client Software (e.g., Weird TFTPC_Free or Solarwinds TFTP)

Reset the Firmware file. This file is specific for each transmitter. Ask Bext Support for the correct RESET file. Be aware that using the wrong RESET firmware can cause transmitter malfunctions. For example, "Reset-T500A0717044.bin" can be used only to RESET the memory of the transmitter with serial number T500A0717044.

Use a standard firmware file (for example, "Firmware-TX-7.62b.bin" to upgrade the transmitter to firmware version 7.62b).

Firmware Reset Procedure

1. Configure the PC on the same subnet as the transmitter. For example, if the transmitter IP address is 192.168.178.1, you can configure the PC to have a fixed IP address of, for example, 192.168.178.55.
2. Connect the PC to the LAN-POE port of the transmitter.
3. Launch the TFTP client software on the PC.
4. Configure the client:
    - TFTP server: 192.168.178.55
    - Operation: Upload
    - Format: Binary
    - Local file name: Click on the folder button 🗁 and select the correct RESET file, for example:
      "Reset-T500A0717044.bin" (Your serial number will be different.)
    - Remote file name: "Firmware.bin". **No other file name will work.**
5. Make sure the transmitter is disconnected from the AC line or the rear power switch is in the OFF position.
6. Push the Home ⮌ button and turn on the transmitter. When the LEDs start blinking, lift your

finger off the Home button. The LEDs should continue to blink and the LCD display will activate.

7. Go to the PC and press the button labeled “Upload Now…”. The firmware will transfer to the transmitter. When the transfer is completed, the transmitter will restart automatically.
8. Now the data in the local memory is restored and you can install the desired firmware version. Repeat steps 4 to 7 using the Local File Name of the firmware version. Your file should look like “Firmware-TX-7.62b.bin” and NOT contain the transmitter serial number.
9. Once you have completed this second upload, you should check to make sure the firmware was updated. Under the Menu button on the LCD screen the current firmware version will be shown. This version should match that of your uploaded file.
10. Confirm that your serial number is still correct. Press the LCD screen MENU button. In the bottom right corner of the Menu screen, the serial number is displayed.

Appendix D – Log Event and Alarms List

Your transmitter is equipped with a register of alarms that can be listed either on the front panel or the web interface. Each event that generates an alarm is registered with the date and time at which the event occurred. Here's a list of alarms and what they mean:

MESSAGE	DESCRIPTION
TX Power UP	The transmitter has been turned ON or rebooted
TX Power DOWN	The transmitter has been turned OFF or rebooted
TX in LOCAL MODE	The transmitter has been set to LOCAL mode
TX in REMOTE MODE	The transmitter has been set to REMOTE mode
TX ON	The transmitter output has been switched ON
TX STAND-BY	The transmitter has been set to STAND-BY mode
ALARM – OVER CURRENT	The RF stage current consumption is higher than the threshold value
RESET – OVER CURRENT	The transmitter has reset the OVERCURRENT alarm
RESET – FAULT	Operator reset critical alarms initiated by a summary FAULT condition
ALARM – POWER GOOD	The output power fell below the HIGH threshold value
ALARM – AUDIO GOOD	Audio has been missing for more than a threshold time
RESERVE SRC AUDIO	The Reserve Audio input activated after the AUDIO GOOD alarm
ALARM – AC LINE OFF	AC Line absent (when the logic board powered by the PoE connector)
AC LINE ON	AC Line power initiated
ALARM – RF BURNING	RF failure, typically a hardware problem in the RF section
ALARM – 485TX FAULT	RS-485 connection absent
ALARM – PMAX	Power higher than the nominal design value
RESET – PMAX ALARM	The transmitter has reset the PMAX alarm

DERATING–RF TEMP>60C	Power reduced due to RF section temperature > 60°C. Transmitter will resume normal power output if the RF temperature returns to < 50°C.
ALARM – RF OVERTEMP	RF section temperature >65°C.
RESET – TEMPERATURE	The transmitter has reset the TEMPERATURE alarm after the RF section temperature returned to below 50°C.
ALARM-VSWR SOFT PROTECT	The VSWR is higher than the software threshold value.
RESET – ACK VSWR HW	Transmitter reset the VSWR alarm. It will attempt this reset three times per hour after initial alarm condition.
ALARM – VSWR HW STOP	Transmitter locked OFF following a large number of VSWR alarms.
Playing ID-CODE	The FSK-ID code transmission activated.
ALARM – FAN FAULT	One or more transmitter fans are not rotating.
ALARM – MODULES FAULT	One or more transmitter modules have an error.
POWER REDUCTION PROG	A programmed power reduction has been activated.
LOCAL ACCESS DENIED	Local access to transmitter control disabled due to password access enabled and a wrong password entered from the front panel.
WEB ACCESS DENIED	The remote web access is denied because transmitter is in Local mode.
AES/EBU ERROR	An error in the AES/EBU audio stream occurred.
PASSWORD MODIFIED	The password was successfully changed.
PASSWORD RESET = 1000	The password was changed to the default 1000.
ENABLED PASSWORD	Password access successfully initiated.
DISABLED PASSWORD	Password access successfully canceled.
ACQ GMTTIME SUCCESS	A network time update occurred.
FAILED TO ACQ GMTTIME	A network time update failed.
GMT SERVER ERROR	A network time update failed due to an NTP protocol error.

GMT SERVER UNREACHABLE	A network time update failed due to the NTP server not reached.
TX INTERLOCKED	The transmitter has been locked OFF by external interlock command.
NOT INTERLOCKED	The transmitter has been enabled by an external interlock command.
TX LOCKED	The transmitter is locked to the SET frequency
TX UNLOCKED	The transmitter frequency can be changed.
ALARM – PWS 1 ABSENT	Power Supply 1 voltage output is absent.
ALARM – PWS 2 ABSENT	Power Supply 2 voltage output is absent.
ALARM – PWS 3 ABSENT	Power Supply 3 voltage output is absent.
ALARM – PWS 1 FAULT	Power Supply 1 has encountered a fault.
ALARM – PWS 2 FAULT	Power Supply 2 has encountered a fault.
ALARM – PWS 3 FAULT	Power Supply 3 has encountered a fault.
PRIMARY SRC AUDIO OK	The Primary Audio Source is present.
MESSAGE SENT	An SMS message was sent successfully.
MESSAGE SEND FAILED	An SMS message failed to send.
MESSAGE RECEIVED	An SMS message was received successfully.
GSM READY	The GSM module is configured and ready.
REMOTE RESTART MACHINE	The transmitter has been rebooted by a remote command.
ALARM – FWD OUT	The output power had a fault.

Appendix E – Advanced Web Server and SNMP Board Option

The SNMP board option implements the SNMPv2C protocol. It includes an advanced web server that allows access to transmitter live parameter readings, settings, and logs.

All transmitter parameters are visible on the Main Page and can be modified by setting the transmitter in REMOTE mode from the front panel Local control button; otherwise, changes are not allowed. The very top of the WEB CONTROL index page will display a rectangular box with the message “Remote control is disabled” when the front panel Local control button is depressed and has its amber indicator lit.