Etherstack Pty Ltd
64 Rose Street
Chippendale
NSW 2008
AUSTRALIA
Email:info-au@etherstack.com
P:+61 2 8399 7500
F:+61 2 8399 7507

Etherstack XBR5100
Fully Integrated P25 Base-Station

Technical Manual

Document Version: **1.00**

Document ID**: ES2304-UM01**

Author: Etherstack
Created: 21 October, 2023
Last Updated: 21 October, 2023
Last Updated By: Etherstack

Contents

1 Copyright

Etherstack Pty Ltd

ARBN 156 640 532

64 Rose Street

Chippendale

NSW 2008

Australia

Ph: +61 (0)2 8399 7500

Fax: +61 (0)2 8399 7507

info-au@etherstack.com

www.etherstack.com

2 Regulatory Information

2.1 FCC Compliance

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.

2.2 FCC Interference Warning

Note: This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, may cause harmful interference to radio communication. Harmful interference is any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radio communications service operating in accordance CFR Title 47 Part 15.

2.3 HUMAN EXPOSURE TO RADIO FREQUENCY RADIATION (FCC)

USA Customers - Warning to comply with the maximum permissible exposure (MPE) limits referenced in 47 CFR 1.1310, the following minimum safe operating distances must be observed:

MODEL	FREQ. RANGE OPERATION	SAFE OPERATING DISTANCES
XBR5100T5V	769-775 MHz 851-869 MHz	2.6 m*

3 Change Record

Date	Version	Chapter Changes	Pages Changed
Oct. 2023	1.00	All - Initial Release	All

4 Warranty & Safety

4.1 Safety Summary

Only the XBR5100 self-contained power supply, if installed, contains dangerous mains voltages within. Normal operation and use of the XBR5100 does not expose the operator or service technician to high voltage parts. The power supply is isolated from and maybe removed safely from the main chassis. For servicing, please return to your nearest distributor. No fuses or user-serviceable parts are within the power supply module.

The following general safety precautions as would normally apply, should be observed during all phases of operation, service, and repair of this equipment.

AROUND THE EQUIPMENT

To minimise any possible shock hazard from an external power supply or lightning strike, the chassis or equipment cabinet must be connected to an electrical ground. This is normally achieved by the Earth grounding wire within the 3 wire mains cable. Provide adequate ventilation around the rear of the equipment.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

DO NOT ATTEMPT INTERNAL SERVICE WHILE TRANSMITTING

Thermal or RF burns may result from touching certain components within the power amplifier module while transmitting or operating the transmitter.

DO NOT SUBSTITUTE PARTS OR MODIFY THE EQUIPMENT

Because of the danger of introducing additional hazards, do not install substitute or lower voltage parts to the equipment. Return to your authorised distributor.

Any modifications you make to this equipment which are not authorized by Etherstack and may invalidate your compliance authority's approval to operate the equipment.

EXERCISE CAUTION AND CORRECT DISPOSAL OF RF POWER DEVICES

Most RF power transistors and some RF power hybrids contain Beryllium Oxide. Although they are normally safe, if physically damaged toxic dust may be released. Consult your local authority for correct disposal thereof. Such devices are not normally used in the XBR5100.

4.2 Warranty Conditions & Precautions

The following conditions are not covered by the warranty of the XBR5100. Please ensure that the XBR5100 is not subject to;

1. Over voltage or Reverse Power Supply Voltage.

2. Operation in locations subject to abnormal environmental conditions such as extreme temperatures or ingress of moisture or excessively dusty environments.

3. Operation of the XBR5100 Transmitter output into an open or short circuit or an incorrectly terminated load. Although a level of VSWR protection is included, greater protection is provided by the addition of a TX RF isolator.

5 Product Description

5.1 Overview

The XBR5100 series employs state of the art design and construction methods to deliver a range of high performance, very reliable radio base stations and repeaters. They are ideally suited for use in narrowband voice and data communications radio systems. Fractional synthesizers' and the two-point modulation method give the added advantage of linear frequency and phase response from DC to 3 kHz for accurate reproduction of voice and low frequency digital signalling systems.

The Receiver and Exciter circuits are contained in single special aluminium housing together with the associated audio processing and digital control on a single circuit board. The Power Amplifier is also contained in its own extruded aluminium housing and can be easily removed from the main chassis. The XBR5100 also incorporates 'Plug and Play' technology and performs automatic self-calibration. A complete module changeover is field replaceable in very short time.

The XBR5100 employs some unique features in its design and much thought and consultation has been used to provide a product that offers an extreme degree of flexibility for the installer and service person. For example, all options may be easily field retrofitted at a later date. In addition, servicing is simplified with PCB's having all components on one side of the PCB. This permits the Technician to diagnose problems while either still connected in the chassis or powered simply and independently on the test bench.

The flexibility of the XBR5100 series allows it to be configured for a wide range of applications without removing any covers.

The XBR5100 incorporates special technical features, of which the key ones are listed below:

- Extremely low conducted emissions
- Extremely low transmitter spurious
- Fast transmitter on time
- Transmitter frequency response down to DC
- Low group delay distortion
- Full sub band RF switching bandwidth
- No re-tune design for receiver and transmitter
- Fully software programmable
- Built in diagnostics
- Programmable channel spacing
- Flash upgradeable

5.2 Physical Attributes

The XBR5100 is a compact lightweight standard 19" rack mounting transceiver. It is designed to mount horizontally in a 19" standard rack frame and occupies 2RU (89mm). The depth of the unit is 330mm and the weight is less than 6kg.

The unit consists of four main sub-assemblies, the main RF assembly, a Power Amplifier Module, Logic controller and rear interface PCB's. These modules are housed in sturdy steel case.

The XBR5100 features a high degree of RFI and EMI screening throughout the design and construction. The receiver and exciter RF circuits are contained in solid aluminium enclosure. The PA module is contained in a special compact and efficient extrusion for minimum harmonic radiation. This design results in low conducted and radiated emissions and minimal susceptibility to RFI and EMI.

User interface is via the rear panel sockets which includes a DC power in and USB for software programming and upgrading.

5.2.1 Front Panel

The XBR5100 front panel provides the user with real time status of the XBR5100.

5.2.2 Front Panel LEDs

The table below explains the functions of the front panel LED's. Each LED indicates the status of the XBR5100 in real time.

LED	COLOR	FUNCTION
POWER	GREEN	Indicates the power supply voltage is within limits. No display indicates the voltage is not normal.
ONLINE	AMBER	Online mode is active.
HA	BLUE	High Availability mode is active.
SYSTEM	YELLOW	System connection is active.
RX	AQUA	A wanted signal is being received by the receiver. Digital Mode: Inbound Slot 2 is receiving
TX	RED	The transmitter is transmitting RF power.
SIMULCAST	GREEN	The transmitter is operating in simulcast mode.
ALARM	RED	A prearranged alarm condition exists.
F1	YELLOW	Reserved
F2	YELLOW	Reserved

5.2.3 Rear Panel

The XBR5100 rear panel provides the user with all functional connections as well as the passive heatsink and active cooling fan.

Connector Type	Function	Description
GX25 Style Power Connector	DC Power input	13.8V and 28V DC power input.
N TYPE	N type RX input	The input to the receiver for full duplex operation.
N TYPE	TX output	The RF power output from the transmitter for full duplex operation.
BNC	Frequency reference	10 MHz frequency reference input.
BNC	Timing reference	1 PPS input.
RJ45	Ethernet	Gives the base station an identity as a network element, and provides the physical connections for the Ethernet
RJ45	Ethernet	HA mode link connection.
DB25	External I/O	Baseband and I/O.
USB	USB TYPE B	Serial Data interface.
RJ45	Spare	

5.2.1 XB5100 Internal Modules

The XBR5100 consists of a full duplex RF module with its own shielded metal housing and a Main Controller board integrated on a single PCB. Using advanced yet simplified circuit designs, the size and complexity is reduced. This affords a number of advantages including;

- Cost reduction
- Reduced number of components improves reliability and MTBF
- Consistent and improved manufacture
- Elimination of connectors and cabling
- Reduction of human error
- Faster maintenance or swap out

5.2.2 Exciter Module

The Exciter module generates the low level, on frequency, RF transmitter signal which is later amplified to nominal output power level by the Power Amplifier module. The exciter consists of a Voltage Controlled Oscillator (VCO) and associated main RF board, which, in conjunction with the reference oscillator and the PLL circuitry, forms a two-point modulation programmable frequency synthesiser. Frequency programming data is received from the Micro Controller via a 3-wire serial data bus.

The exciter circuitry features a modulation bandwidth from DC and a wide RF switching bandwidth which covers the entire sub-band. The average maximum RF output power is > +24.7 dBm / 300 mW. Normally no adjustments are required, however should the carrier frequency need re-alignment for future maintenance, the TCXO reference oscillator frequency can be adjusted manually or electronically adjusted via software settings.

The fractional N synthesiser provides ultra-low spurii while still maintaining fast lock times. The frequency step size is auto determined at 5.0 kHz or 6.25 kHz.

5.2.3 Receiver Module

The receiver section accepts the low-level RF input signal and amplifies, filters and conditions the signal prior to detecting the wanted audio component. The Receiver features the same advanced synthesiser and wide bandwidth as the exciter. The front-end bandpass filter uses very high tolerance components to minimise production spread variations has a wide bandwidth and eliminates the need for future alignments. The bandwidth is equal to the band allocation (refer to Section 9.6 for details of the band allocations). The VCO has low phase noise and covers the full sub-band.

The receiver has high sensitivity while maintaining excellent Intermodulation immunity and adjacent channel rejection. A dual first IF filter provides excellent rejection to common known spurious responses. High blocking of over 100 dB typical ensures that strong interfering signals do not desensitise the receiver when receiving weak signals.

5.2.4 Micro-Controller Module

The Micro Controller section is physically located towards the centre on the main board and controls all signal connections (apart from the RF connections). It controls the operation of the RF sections and acts as the interface between the user controls, indicators and the RF sub sections. Together with the VF DSP chip, processed transmit and received audio is passed to and from the Exciter and Receiver sections as well as providing all other audio signalling functions of the transceiver.

An on onboard EEPROM stores all the user channel related data such as transmit and receive frequencies. A serial port at the Microphone accessory socket of the XBR5100 provides access to the Controller card software configurations for the purpose of the user to create and change this channel related information.

Digital pots under the control of the processor ensure that user set up levels for TX deviation and power levels are correctly set for each channel.

5.2.5 Power Amplifier Module

The PA receives the low-level modulated RF signal from the Exciter RF output and amplifies and filters it to final output power level. Forward and reflected power voltages are fed to the Micro Controller.

The PA is very compact and efficient for high reliability and low cost. The heatsink has minimal temperature rise even under continuous operation, ensuring the best MTBF obtainable for a practical design. A low loss 13 element elliptical low pass filter ensures that harmonics remain below –90 dBc. The new PA module uses the latest LDMOS technology and using only two active RF transistors improves efficiency and increases the operating bandwidth. At the same time this reduces the number of components used and further improves the long-term reliability.

5.2.6 Interface Module

The interface module is responsible for the conversion and routing of I/O between the rear external connectors, the Micro-Controller Module and the front LED board.

A FTDI module converts between external USB and the internal serial communications interface from the Micro-Controller Module.

PTT, alarm I/O, baseband and RSSI signals are routed between the external I/O interface and the Micro-Controller Module.

LED control I/O signals are routed from the Micro-Controller Module to the front LED board, with custom logic applied to select control signals to support dual control from the external I/O interface.

6 Installation & Operation

6.1 Installation

The XBR5100 Radio is securely packed for transport within a pasteboard container. Before unpacking the XBR5100 radio, please inspect the packaging for signs of damage and report any damage to your XBR5100 distributor.

Upon unpacking of the XBR5100 radio, please ensure that all items shipped were received, report any missing items to your XBR5100 distributor.

Check the fan is free or does not look blocked as operation of the radio will be affected if any packaging or shipping damage causes the fan to stop working.

If you intend to install the radio in an equipment rack consult the supplier's instructions for your system. If the radio is to be used in a stand-alone configuration, ensure that it is in a secure, dry location with sufficient air space around it to allow for adequate ventilation. It is recommended that the chassis is earthed to the equipment rack.

See the product specification sheet for band specific power requirements.

6.2 Screw Head Types

Modern screws employ a wide variety of drive designs, each requiring a different kind of tools to drive in or extract them. Etherstack has chosen the Pozidriv® screw head and screwdriver as it preferred screw type on all of its products, sizes 1 & 2. This is because the Pozidriv system is the choice for high volume assembly operations. It provides self-centring system and excellent driving control with less operator fatigue.

It is similar to the Phillips crosshead. The differences lie in the way that the heads are machined. The Phillips head has 4 simple slots cut out of it, whereas in the case of the Pozidriv each slot is the result of two machining processes at right angles. The result of this is that the arms of the cross are parallel sided in the case of Pozidriv and tapered in the case of Phillips. The Pozidriv has four additional points of contact and does not have the rounded corners that the Phillips screwdriver has.

Phillips screwdrivers will usually work in Pozidriv screws, but Phillips screwdrivers are likely to slip or tear out the screw head when used in Pozidriv screws. It is important that you use the correct type and size screwdriver to avoid damaging the screw head.

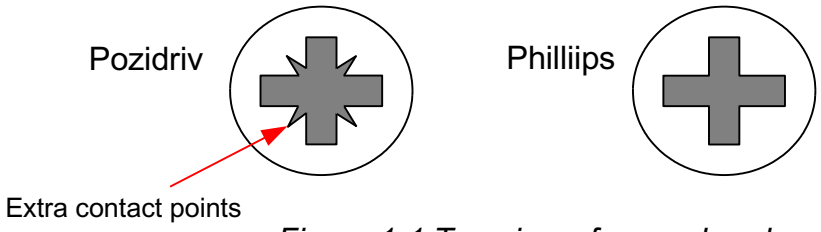


Figure 1-1 Top view of screw heads

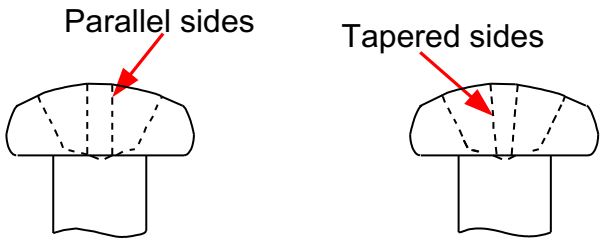


Figure 1-2 Side View of screw Heads

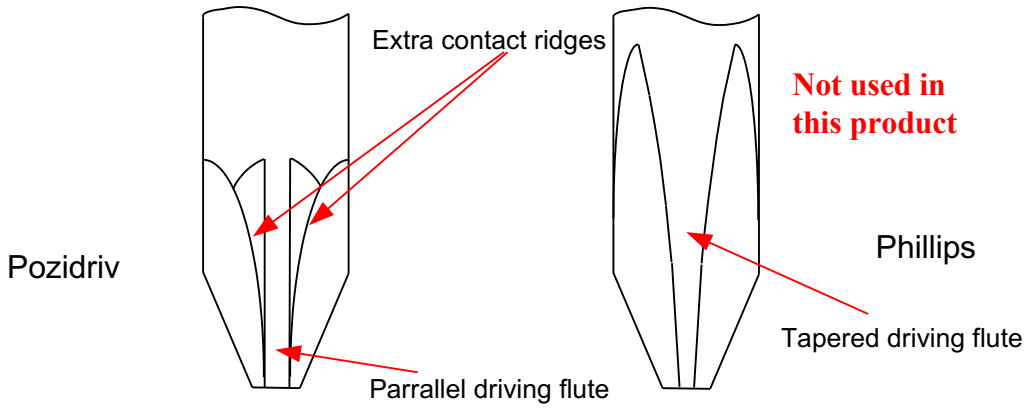


Figure 1-3 Screw driver Tip View

6.3 Operation

Setting up the XBR5100 to operate in the wanted settings is straightforward and involves one main step:

- Using a PC or handheld serial computer running standard communications terminal software, connect the PC USB port to the radio USB type B socket at the rear panel of the XBR5100. Set the appropriate parameters as required.

Note: All XBR5100s' are set up with a standard default configuration. Test frequencies are stored within the XBR5100 as supplied from the factory; however, these are not normally accessible, and each station is supplied with no test channel.

6.3.1 Setting to Work

The following sections describe the steps necessary to set the XBR5100 to operate as required.

6.3.1.1 Micro Controller Jumper

There are two jumpers located on the main Micro Controller - J1 & CNVSS. CNVSS is used for selecting the microcontroller operation mode. The user will not normally have to change the position of this jumper as it is only used in the initial factory setup. J1 is for RF power control type selection. This should always be set to D.

6.3.1.2 Select Operating Mode

The XBR5100 can operate in a number of different modes. The primary alternatives are full duplex repeater, which is the default mode and simplex. Using the built-in radio configuration menu system, the operating mode is programmed for each channel. When a channel is selected in operation, the XBR5100 adopts the mode programmed for that channel.

6.3.1.3 Select Operating Channel

The XBR5100 has a channel capacity of 128. The RF frequencies setting for each channel are programmed using the radio configuration menu system channel edit screen. The operating channel is set via a Software channel command to the radio to select the channel. i.e CH001 <ENTER>

6.3.1.4 Configure Alarms

The XBR5100 has an LED to display the status of alarms. The alarm trigger conditions can be set using the built-in radio configuration menu system software. The LED can be set to trigger on low forward power, high reflected power, power supply voltage out of range, VCOs unlocked and high PA temperature. The status of the alarm conditions can be expanded in the on-line diagnostics mode.

Three alarm output signals are supported on the external I/O interface. Each alarm source may be individually enabled on each of the three alarm output signals.

Please refer to the radio configuration menu system for additional setup information.

6.3.2 Adjustments

The XBR5100 has adjustable parameters which are under the control of the Micro Controller. These comprise of TX power, TX VCO deviation, TX reference oscillator deviation and TX reference oscillator frequency. All of these are adjusted with the aid of the built-in radio Alignment menu system. The XBR5100 comes pre-aligned from the factory, so in most cases no alignment will be necessary.

7 Alignment & Testing

The XBR5100 test and alignment section assumes that the radio is a working module. Due to ongoing development the instructions may vary please refer to the Etherstack website for updates.

7.1 Transceiver Setup, Calibration and Alignment

This section explains how to setup, calibrate, and align the complete XBR5100 Base Station. A number of procedures are required to fully initialise the XBR5100. The following test equipment will be needed:

- A PC with a terminal emulator to run the built-in radio configuration menu system software
- RF Test Set (HP 8920) or equivalent
- CRO (Cathode Ray Oscilloscope)
- RF Power Meter (Watts)
- RF Signal Generator
- Multimeter
- +13.8V and +28V DC power supplies
  (+28V is only required for the 700/800 MHz band variant)

The order of some, but not all, of the procedures is important to ensure correct setup of the radio. The order of the procedures as described is recommended and those that are critical are mentioned. If the radio has been previously setup and the user intends to recalibrate and align the radio then steps 7.1.1, 7.1.2 and 7.1.3 can be ignored as the model number, serial number, configuration and channel information will have already been loaded.

Using a PC or handheld serial computer running standard communications terminal software, connect the device USB port to the Rear USB 'B' type socket at the rear panel of the XBR5100.

7.1.1 Setting the Model Number and Serial Number

The user cannot alter the serial and model number, as this is factory set.

7.1.2 Setting the Configuration Information

Firstly, the basic configuration information for the radio needs to be setup, this is done at the factory. Using in-built menu system, changes to the configuration information needs to be filled out on the Configuration Screen. Once the configuration information has been set then all of the programmable parameters within the XBR5100 Base Station are initialised.

7.1.3 Adding and Setting Channel Alignments

The XBR5100 channel frequencies, subtones and other parameters are setup in the channel edit screen of the radio Channel Edit Menu system and then downloaded to the XBR5100.

The channel may be edited via the Channel Edit Screen of the built menu system software. The current operational channel can be selected by using the software channel select command.

The XBR5100 comes from the factory pre-aligned, so in most cases adjustment will not be required. The XBR5100 employs Frequency Alignment Compensation, which is setup during factory alignment. This reduces the need of individual channel alignment for Tx Power and modulation depth. If, however, adjustments are required on a particular channel this can be done via the built-in alignment menu.

7.1.4 Power Calibration

DO NOT USE THIS PROCEDURE TO SET THE TX OUTPUT POWER. REFER 7.1.7 TX POWER ADJUSTMENT TO DO THIS.

Power calibration affects the forward and reflected power meters on the Diagnostics Screen. This procedure requires a power meter and the relevant leads to connect the transmitter output to the meter. Power calibration is done using software commands. To complete the power calibration, send the command CALP <enter>, and follow the instructions that Built in menu system provides.

These readings are subsequently used for the real-time update and display of the VSWR. The live VSWR values are used in the PA protection routines in the firmware.

7.1.5 RSSI Calibration

The RSSI calibration is used to calibrate the RSSI meter on the in-built menu system via Diagnostics Screen. The procedure requires an RF signal generator and the relevant leads to connect the signal generator to the RF input of the XBR5100 Base Station. RSSI calibration is done via software command. To complete the RSSI calibration send the command CALR <enter> and follow the instructions that in-built menu system provides.

7.1.6 Temperature Calibration

The temperature calibration is used to calibrate the temperature meter on the in-built menu system via Diagnostics Screen and the temperature-controlled switch/alarm points. The procedure requires dummy cable for SKB on the micro controller having a 2060-ohm resistor between pins 4 and 6 of this connector of the XBR5100 Base Station. Temperature calibration is done via the software command. To complete the temperature calibration, send command CALT <enter>, and follow the instructions that in-built menu system provides.

7.1.7 TX Power Adjustment

The XBR5100 employs SMART PA® technology. This provides hassle free power setting. This means that the user can type in a direct Power level in the channel edit menu. E.g., 50W.

If however the required power level is not achieve a manual alignment can be done on a per channel basis via the alignment menu.

7.1.8 Peak Deviation and Modulation Balance Alignment

This procedure is used to set the peak deviation and modulation balance for each channel. This is done on a per channel basis. The alignment is done using the Alignment Screen in the built menu system. To carry out this procedure the demodulated output of the transmitter output needs to be connected to a CRO or some other piece of equipment giving a visual display of the demodulated output. IF Bandwidth of the RF test set should be set at 20kHz or greater (230kHz on the HP 8920) and de-emphasise should be off. The audio filters should be set at <20Hz HPF and 15kHz LPF.

The peak deviation is aligned on wide band. The following table specifies the peak deviation to align to.

Bandwidth	Peak Deviation (Hz)
Narrow (12.5kHz spacing)	2250

Peak Deviation Settings

The test tones used in this routine are generated internally and are a 1 kHz square wave for the transmitter deviation and a 400 Hz square wave for the modulation balance.

Procedure:

- Using in-built menu system, select --- ALIGNMENT MENU –
- Select Tx Deviation and Modulation Balance - current channel (O)
- The radio will now transmitter.
- Follow the built-in menu system instructions.
- The transmitter will be modulated with test frequencies (1kHz, & 400Hz tone generators under micro controller control)
- Adjust the VCO Deviation digital potentiometer using built menu system until the correct deviation is obtained. (See Peak Deviation Settings).
- Adjust the Reference Deviation digital potentiometer until the top of the waveform is flat. If the waveform top droops increase the level (see Figure 7-1) and if it peaks reduce the level (see Figure 7-2).
- Repeat steps 5 through to 9 until the correct peak deviation and modulation balance is obtained.

Examples of incorrect, observed waveforms are as follows:

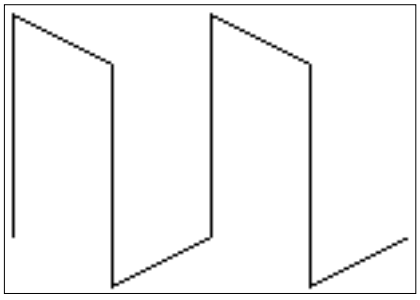


Figure 7-1 Mod Under (increase level)

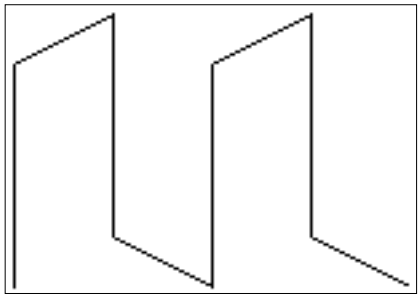


Figure 7-2 Mod Over (decrease level)

The waveform when correctly aligned should look as follows:

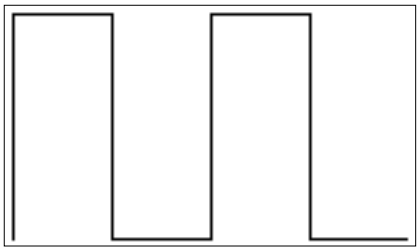


Figure 7-3 Correctly Aligned Waveform

Choose ‘OK’ to accept the changes made. This then saves the changes that you have made to the radio.

After balancing and setting the correct peak deviation is necessary to align the reference oscillator and re-check the deviation alignment, as the reference oscillator alignment affects the deviation. This may require running through the deviation alignment again after the oscillator alignment procedure.

7.1.9 TX Centre Frequency Alignment

The reference oscillator alignment is used to set the correct centre frequency for each channel. This is done on a per channel basis. Oscillator alignment is done using a digital potentiometer adjustment through the Built-in menu system. To carry out this procedure the transmitter output needs to be connected to a RF test set displaying the frequency error. This procedure should be done after the deviation alignment procedure has been done. Transmitter modulation we be disabled.

Select Tx Reference Oscillator and Output Power and follow the in-built menus instructions. Alter the Reference Oscillator Frequency potentiometer until the channel is “on frequency”. Choose ‘enter’ to accept the changes made. This then saves the changes that you have made to the radio.

7.1.10 Nominal Deviation

The required nominal deviation is dependent on whether the radio is programmed for either narrow or wide. The following table lists the required level for each case:

Bandwidth	**FM Nominal Deviation (kHz)**
Narrow (12.5kHz spacing)	1.5

Table 7-1 Nominal Deviation

8 Powering

The XBR5100 is powered with 13.8V and 28V connected at the rear of the appliance.
The 28V supply is only required for the 700 / 800 MHz band variant.

8.1.1 DC Input Pinouts

Figure 4.1 DC INPUT Supply (GX25 Style)

PINS	Description
1	+ 28V DC (700 / 800 MHz variant only)
2	GND
3	+ 13V8 DC

9 Specifications

Minimum performance to exceed the following*:

- AS4295
- ETS 300 086, ETS 300 113, ETS 300 489
- FCC Part 90
- TIA/EIA-603
- CE Marking
- IC (ISED)

* Conforms but may not be approved.

Consult Etherstack regarding current type approvals and for latest and current XBR5100 Specification Data sheet.

9.1 Operating Frequency Bands

The XBR5100 is available in a number of models which cover the range of operating frequency bands. Refer to Section 9.6 for details of the band breakdown.

9.2 General

Parameter	Specification
XBR5100 Rack Size:	2RU Case
XBR5100 Overall Physical Size	89mm high, 325mm deep, 483mm wide * Requires extra depth (40mm) for Fan operation.
Weight	8 kg
Supply Voltage:	13.8V ± 20% 28V ± 20% (700 / 800 MHz Band)
Operating Temperature:	-30 to +60ºC.
Standard LED indicators:	POWER, ONLINE, HA, SYSTEM, RX, TX, SIMULCAST and ALARM. See 5.2.2
Frequency Range:	Model dependent.
Synthesis Method:	Non mixing PLL Fractional N synthesiser.
Modulation:	Direct FM, two-point method
	±2.5 kHz narrow band, ±5 kHz wide band
Channel Spacing:	12.5 kHz, software selectable.
Synthesiser Step Size:	5 kHz or 6.25 kHz.
Channels:	128 Software selectable.

Table 9-1 General Specifications

9.3 Transmit

See product specification sheet.

9.4 Receive

See product specification sheet.

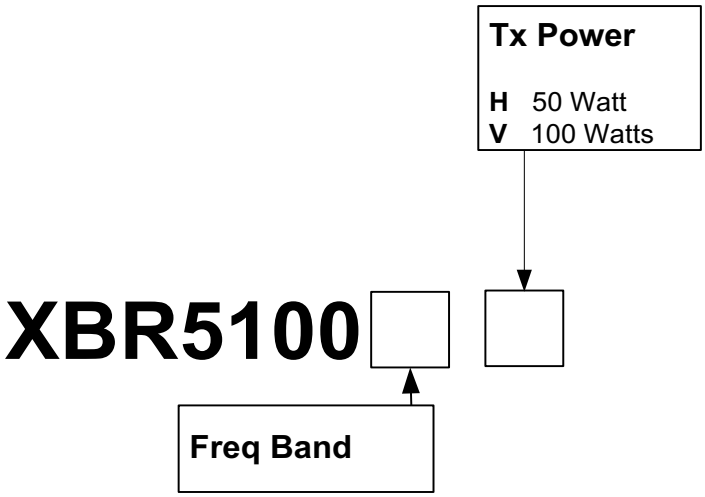
9.5 Ancillaries

Parameter	Specification
TX Timer:	Programmable, on / off selectable.
Channel Select:	Software Select
Repeater Tail Timer:	Programmable.

Table 9-2 Ancillary Specifications

9.6 XBR5100 Model Number Configuration Guide

The XBR5100 build can be specified by the model number. The diagram below shows how the model number is derived from the wanted options. Consult Etherstack for availability details on specific configurations and options.



Band	Frequency
T5	136-174 MHz
N5	400-470 MHz
P5°	450-520 MHz
T5	700 / 800 MHz

Table 9-3 XBR5100 frequency bands

Due to ongoing development please refer to Etherstack for the latest revision of the specifications.