TX V3 series transmitters

Technical Manual

V2.4

Contents

The TX V3 series

Congratulations on your purchase of the new BW Broadcast V3 transmitter!

The V3 solid-state transmitter family provides today's broadcaster with a no-compromise, cost-effective transmission platform with features previously only found in top of the line products.

Incorporating field-proven technology, BW V3 transmitters deliver world-class performance, reliability and quality.
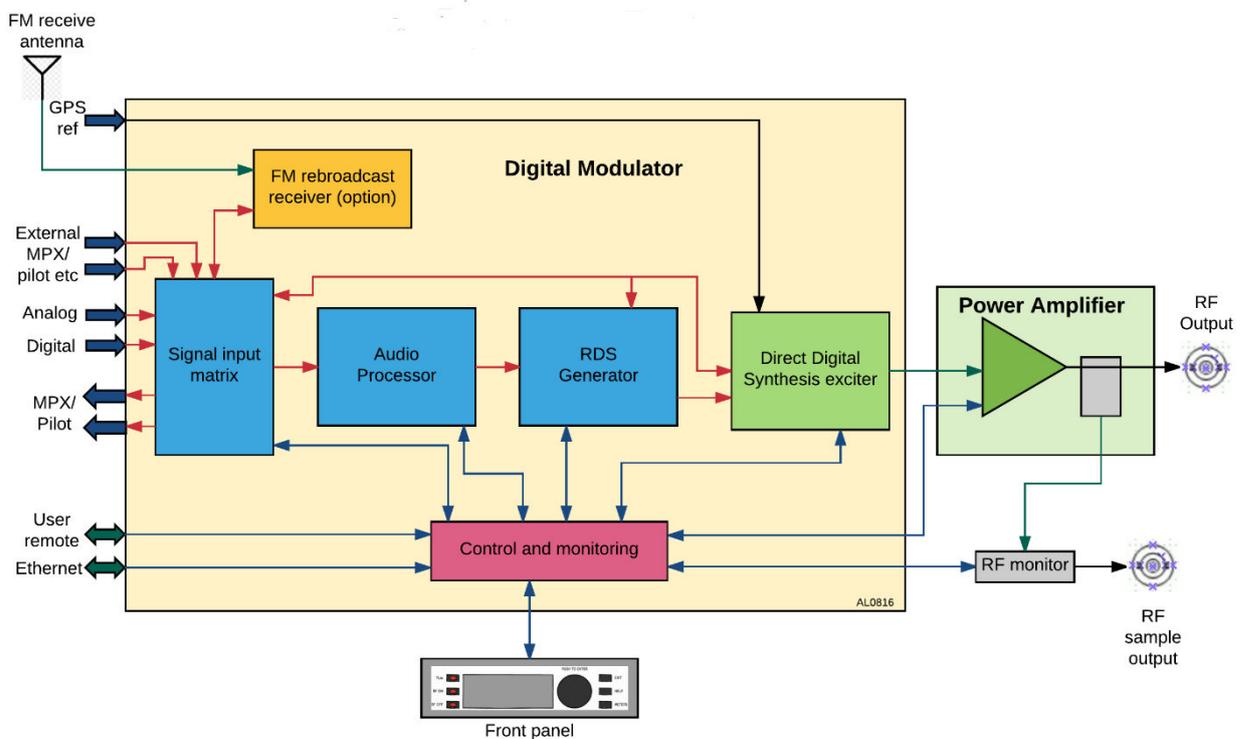
This transmitter boasts the following features:

- Built-in Graphical User Interface

- Multiple program inputs including Digital Composite over AES192

- VSWR protection

- Digital Direct Synthesis exciter

- GPS and 10MHz synch inputs for SFN use

- Powerful 4-band audio processor

- Dynamic RDS

- LDMOS-FET based power amplifier

- Monitoring, logging and control systems with web, email, SNMP and RS232 connectivity

- Translator-ready with optional DSP-based rebroadcast receiver

Please be sure to read this manual thoroughly before installation and use.

1.1   Approvals

Canada:

This device complies with Industry Canada's licence-exempt TSSs. Operation is subject to the following two conditions:

1. This device may not cause interference;
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Please see Section 8.4 of RSS-Gen Issue 5 for further information.

IC: 11730A-UNIFIEDTX

USA:

FCC COMPLIANCE This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

FCC ID: 2ABPH-UNIFIEDTX

Europe:

Please see the following link for current certification:

https://www.bwbroadcast.com/FM_transmitters/txcert/certification

NOTE: BW BROADCAST 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.

The V3 series is part of the 'UNIFIEDTX' project from BW Broadcast Ltd.

Warranty

Please ensure the Warranty Registration process is completed upon receipt of this product. To do so, go to www.bwbroadcast.com/warranty with your product's serial number to hand. BW Broadcast warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of two years* from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified warranty period that are not due to normal wear and tear and/or improper handling by the user, BW Broadcast shall, at its sole discretion, either repair or replace the product. If the warranty claim proves to be justified, the product will be returned to the user freight prepaid. Warranty claims other than those indicated above are expressly excluded.

Return authorisation number: To obtain warranty service, the buyer (or his authorized dealer) must contact BW Broadcast during normal business hours BEFORE returning the product. All inquiries must be accompanied by a description of the problem. BW Broadcast will then issue a return authorization number. Subsequently, the product must be returned in its original shipping carton, together with the return authorization number to the address indicated by BW Broadcast. Shipments without freight prepaid will not be accepted.

Warranty regulations: Any product deemed eligible for repair or replacement by BW Broadcast under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at BW Broadcast. If the product needs to be modified or adapted in order to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/- adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, BW Broadcast shall not be held responsible for any cost resulting from such a modification/adaptation. Free inspections and maintenance/repair work are expressly excluded from this warranty, in particular, if caused by improper handling of the product by the user. This also applies to defects caused by normal wear and tear, in particular, of faders, potentiometers, keys/buttons and similar parts. Damages/defects caused by the following conditions are not covered by this warranty: Misuse, neglect or failure to operate the unit in compliance with the instructions given in BW Broadcast user or service manuals. Connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used. Damages/defects caused by force majeure or any other condition that is beyond the control of BW Broadcast. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty. If an inspection of the product by BW Broadcast shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer. Products that do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. BW Broadcast will inform the buyer of any such circumstance.

Warranty transferability: This warranty is extended exclusively to the original buyer (customer of retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promise on behalf of BW Broadcast.

Claims for damages: Failure of BW Broadcast to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of BW Broadcast exceed the invoiced value of the product.

Other warranty rights and national law: This warranty does not exclude or limit the buyer's statutory rights provided by national law, in particular, any such rights against the seller that arise from a legally effective purchase contract. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

*Warranty period can be extended for an additional cost at point of purchase.

Safety 3

MAINS VOLTAGE: the BW Broadcast products operate from an AC power source between 110 and 240 V.

These power supplies use an IEC plug. The wiring format is:

Ground – GREEN or GREEN/YELLOW
Neutral – WHITE or BLUE
Live - BLACK or BROWN

SWITCHED MODE POWER SUPPLY HAZARD Please note that the power supply unit in this equipment is of the switched mode variety and has lethal voltages present internally. The switched mode supplies are universal input fully approved type. They are non-serviceable modules and should be replaced if they fail.

FUSES Only use fuses with the specified voltage and current ratings as stated on the back panel. Failure to do so may increase the risk of equipment failure, shock and fire hazard.

TOXIC HAZARD This equipment may include R.F. components that may contain Beryllium oxide which is a highly toxic substance that could be hazardous to health if inhaled or ingested. Care should be taken when replacing or discarding such devices. Seek expert advice from the manufacturer should you physically damage a device that contains Berillyium Oxide.

OTHER SAFETY CONSIDERATIONS Do not operate this equipment in the presence of flammable gases, fumes or liquids Do not expose this equipment to rain or water.

CONFORMANCE This device complies with the following requirements:
Radio Equipment Directive 2014/53/EU
Low Voltage Directive 2014/35/EU
Electromagnetic Compatibility Directive 2014/30/EU
RoHS 2 Directive 2011/65/EU
ETSI EN302 018 v2.1.1 – Radio
ETSI EN301 489-53 v1.1.0 (ETSI EN301 489-1 v2.1.1) – EMC
IEC 60950-1:2005/A2:2013 – Safety.

WEEE COMPLIANCE BW Broadcast Ltd is registered with Northern Compliance PCS number WEE/P3438PR/ SCH and has been issued with WEE/FA0268RX as its unique producer ID by the appropriate environment agency. BW Broadcast fully comply with its explicit responsibilities, subject to WEEE Collections Policy outlined in their General Terms and Conditions of Sale, when it sells Electrical and Electronic Equipment (EEE) to B2B customers in the UK and EU.

This appliance has been designed and manufactured with high quality materials and components that can be recycled and reused. Electronic appliances are liable to contain parts that are necessary in order for the system to work properly but which can become a health and environmental hazard if they are not handled and disposed of in the proper way. Consequently, please do not throw your inoperative appliance with the household waste. Having purchased this appliance it is your responsibility to dispose of this equipment appropriately.

CAUTION: To reduce the risk of electrical shock, do not remove the cover. No user service- able parts inside. Refer servicing to qualified personnel.

WARNING: To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture.

DETAILED SAFETY INSTRUCTIONS:

All the safety and operation instructions should be read before the appliance is operated.

Retain Instructions: The safety and operating instructions should be retained for future reference.

Heed Warnings: All warnings on the appliance and in the operating instructions should be adhered to.

Follow instructions: All operation and user instructions should be followed.

Water and Moisture: The appliance should not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool etc.). The appliance should not be exposed to dripping or splashing and objects filled with liquids should not be placed on the appliance.

Ventilation: The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa rug, or similar surface that may block the ventilation openings, or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

Heat: The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliance (including amplifiers) that produce heat.

Power Source: The appliance should be connected to a power supply only of the type de- scribed in the operating instructions or as marked on the appliance.

Grounding or Polarisation: Precautions should be taken so that the grounding or polarisation means of an appliance is not defeated.

Power-Cord Protection: Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles and the point where they exit from the appliance.

Cleaning: The appliance should be cleaned only as recommended by the manufacturer. Always wash your hands before eating.

Non-use Periods: The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

Object and Liquid Entry: Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

Damage Requiring Service: The appliance should be serviced by qualified service personnel when:

- The power supply cord or the plug has been damaged;
- Objects have fallen, or liquid has been spilled into the appliance;
- The appliance has been exposed to rain;
- The appliance does not appear to operate normally or exhibits a marked change in performance;
- The appliance has been dropped, or the enclosure damaged.

Servicing: The user should not attempt to service the appliance beyond that is described in the Operating Instructions. All other servicing should be referred to qualified service personnel.

WARNING: Use in the EU is subject to a licence and local regulations. This equipment should be put into service by qualified persons only.

Front and rear panels

4

4.1 Front panel:
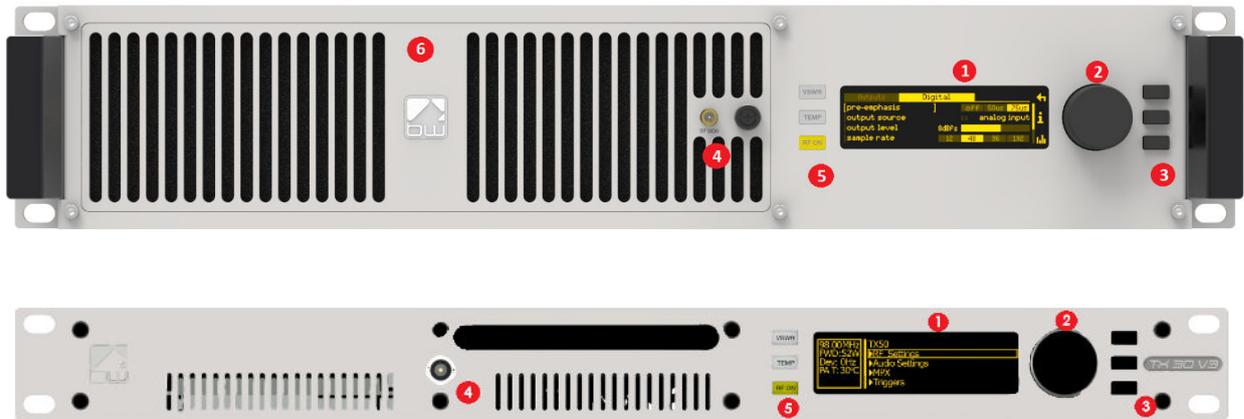
1. OLED display – shows status and used for programming.
2. Menu navigation knob – turn to highlight and press to select options.
3. Push-buttons for menu navigation/selection, and RF and telemetry on/off. Left buttons are illuminated to show status.
4. RF sample port – for connection to test equipment.
5. LED indicators to show status.
6. Removable front panel – provides access to washable air filter and hot-swappable power supplies (2U variants only).
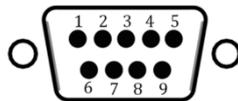
4.2   Rear panel:

XLR Audio connectors

1. Ground
2. Hot (+)
3. Cold (-)

I/O Parallel Connector

1. Ground   6. Alarm A
2. RF mute   7. Alarm B
3. Alarm C   8. Trigger 1
4. Trigger 2   9. Trigger 3
5. Trigger 4

7.   RF output connector.
8.   External reference inputs – 10MHz and 1pps.
9.   RS-232 serial interface.
10.   GPIO / parallel remote control connector.
11.   Ethernet port.
12.   Analog Program audio inputs.
13.   Digital (AES-EBU) or digital mpx input and output.
14.   Composite baseband (mpx) inputs and outputs.
15.   AC power connector.
16.   Rx antenna connector (optional)(2U variants only).

User Interface

5.1   The input interface

The V3 series has an intuitive interface based around a pushable scroll knob and six buttons:

The buttons on the right of the scroll knob interact with the menu system, usually button 1 is 'exit', button 2 is 'help' and button 3 is 'meters'. In some menus however their functions change. The indicators on the left show RF on, and VSWR and TEMPerature warnings.

5.1.1   Navigating the menu

The menu is navigated by rotating the scroll wheel, and pushing it to open a submenu. When in a submenu, pressing the 'exit' button will return to its parent menu.

5.1.2   Editing a parameter

To edit a parameter, navigate to it in the menu using the knob - square brackets […] will surround the currently highlighted parameter. Press the knob to select the parameter, then rotate the knob to change it. When the desired value is attained, press the knob to accept, then press exit to return to navigation mode.

Some parameters require a bit more space to edit – like text fields. For these parameters, a dialog box will pop up allowing more space.

5.1.3   Text fields

When editing a text field, a 'qwerty' keyboard graphic will appear allowing entry or modification of the full text. Turn the knob to select the letter, press it to set the letter. In this menu, button 2 will toggle the 'keyboard' between upper case and lower case, and button 3 acts as backspace/delete.

Scrolling through the text – the selected character will have a yellow rectangle around it;
Modifying the current character – the character will be highlighted (it'll be black on a yellow background).

5.2   Display

Status box   Menu box
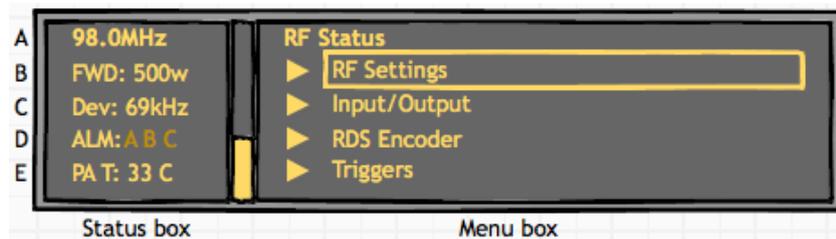
5.2.1   Status box

This selection of the display gives real-time information on the status of the transmitter.

A	Frequency	The programmed frequency of operation. When the transmitter is out of lock, such as at start-up, this will flash between half and full brightness. When the exciter is locked, it will show full brightness.
B	Power	The actual output power of the transmitter. After the exciter has locked on frequency, the power will ramp up to the set level. During this time the power display will flash between half and full brightness. When the programmed power is reached, the display will show full brightness.

If the RF has been muted either manually or automatically, this section will show 'RF MUTE'. If the reverse power is greater than 10% of the forward power, this section will alternate between 'FWD' and 'REV' to display both readings.

C	Deviation	Shows the current peak FM deviation of the transmitter. If the deviation falls below 30kHz for 30 seconds, the deviation display will flash to indicate abnormal modulation.
D	Alarms	Indicates which of the three alarms are set or triggered. The presence of the letters A to C indicate when an alarm is enabled, and when it is triggered.

If greyed out, the alarm is enabled but not triggered; If flashing, the alarm is triggered.

For example:

Not shown = no alarms set.
ALM A = only alarm A is enabled.
ALM A B C = all alarms are enabled.
ALM A B C = all alarms enabled, A and C triggered.

An indication that an alarm has been triggered will also be shown on the screensaver.

E   PA Temperature / power supply voltages / reverse power.

        This section displays the power amplifier temperature, the voltages of
        the power amplifier power supply and the reverse power.

        If FSK is enabled, this section will read FSK ACTIVE while the transmitter
        is keying. This will only display for around 15 seconds every hour.

5.2.2   Menu Box

This is the main section of the user interface. Navigate by rotating the control knob and
select a menu option by pushing.

Button 1 is the 'back' button in this menu, and will move the menu selection up one
level.

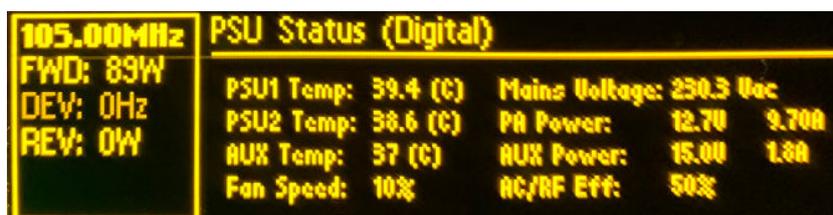Button 2 is 'help' in this menu, and will show a brief description of the function of each
item.

The arrow > in the menu indicates that there is a submenu available. A map of the entire
menu structure is shown later in this manual.

5.2.3   Meters

The V3 transmitter offers extensive metering with just a few clicks of button 3. Press this to
cycle through each of the six meter screens: RF Status, Audio Status, PSU Status, AIO
Status, and Status Overview.

Press button 1 'exit' to leave the meters screen.

Meter screens:

105.00MHz
FWD: 89W
DEV: 0Hz
REV: 0W

AIO Status

AIO Temp: 49 (C)   Clock Loop: Locked
DSP Temp: 56 (C)

105.00MHz
FWD: 89W
DEV: 0Hz
PA V: 12.7V

Audio Status

IN   AGC   LIM   OUT   MPX

Peak Dev: 0Hz
Input: Digital
Mode: Stereo
MPX Src: Int

105.00MHz
FWD: 89W
DEV: 0Hz
AUX: 15.0V

Config Status

2018-10-30 16:39:41   Serial #:   30323
UP: 0 days, 00:27:06   Born: 2018-04-05
                              FW Ver: 2.0 Beta
IP: 192.168.2.98   HW Ver: 0
HTTP Port: 80

Installation

6.1   Quick Start

Important: Never power on an FM transmitter without a suitable antenna or dummy load connected. The V3 series transmitter's protection circuitry will prevent any internal damage, but it is not advisable to run an FM transmitter without a load connected.

The transmitter should be installed in a properly grounded rack or enclosure, the front and rear ventilation slots should not be blocked in any way. Please note that the airflow runs front to back.

Note that the 2U versions (150, 300, 600 and 1000W) versions of the transmitter feature removeable power supplies. These are shipped *not fitted*. Prior to use, these should be installed, as follows:

1. Unscrew the locking nut securing the removable ventilation grille.
2. Carefully slide the power supplies into the slots on the left.
3. IMPORTANT: Be sure to insert the correct way up – the locking tab at the bottom with its arrow pointing up, as shown below.
4. Ensure that the power supply slides all the way in, and that the locking tab engages.
5. Replace the grille, hand-tighten the locking nut.

> *If you ever need to ship the transmitter in its supplied (or any other) carton, please remove the PSUs and pack separately. Do not ship the transmitter with PSUs fitted, as if your shipper decides to play an impromptu game of 'catch' with it, the PSU bays may become damaged.*

Setting up a V3 series transmitter couldn't be any easier. First connect either analogue audio to the left and right back panel connectors (12), digital audio AES/EBU into the RJ45 connector (if necessary use the supplied adaptor) (13) or feed the MPX input (14) from an audio processor. Connect the RF output (7) to a 50ohm antenna of the correct power handling capability. Connect the required remote control / monitoring ports (Ethernet, RS232, Alarms/Triggers Port).
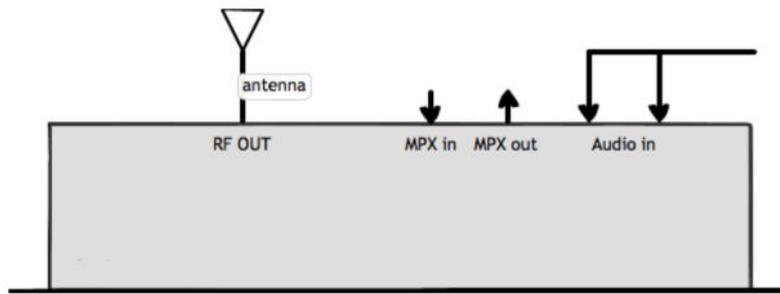
The transmitter's frequency and power are both set from the **RF Settings** menu:
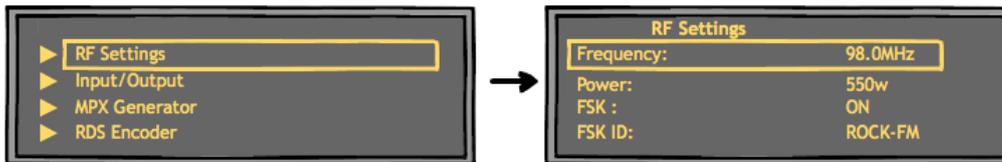
Input selection, pre-emphasis, processing and the stereo parameters are set in the **Audio Settings** menu:
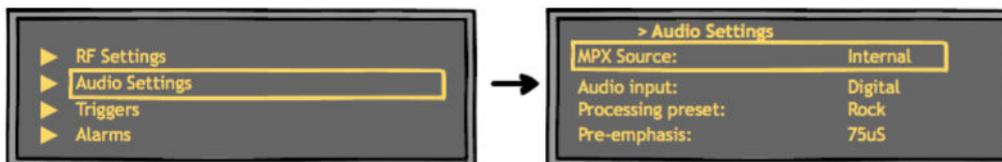
|	
Input source	Selects analog or digital input to the transmitter's built -in stereo encoder/audio processor. For analog, connect to left and right XLR inputs. For digital, connect an AES/EBU connection to the 'digital' RJ45 connector, if necessary using the supplied XLR-RJ45 adaptor (which adheres to the StudioHub wiring convention). Also selects whether the unit is fed from an external mpx generator or digital mpx over AES signal.
MPX1/2 Input	Allows selection of usage of the MPX1 and 2 input connectors.
MPX1/2 Output	Allows selection of what signal is available at the MPX1 and 2 2 output connectors.
MPX Generator	Sub-menu: Settings for the internal MPX, multiplex or 'composite' generator.
SFN	Sub-menu: Settings for use in a Single-Frequency Network
Processing	Sub-menu: Settings for the internal 4-band audio processor.

Please see Section 7 of this manual for a more detailed explanation of the menu items.

6.2   Examples of use

6.2.1   Transmitter with external RDS coder and internal audio processing
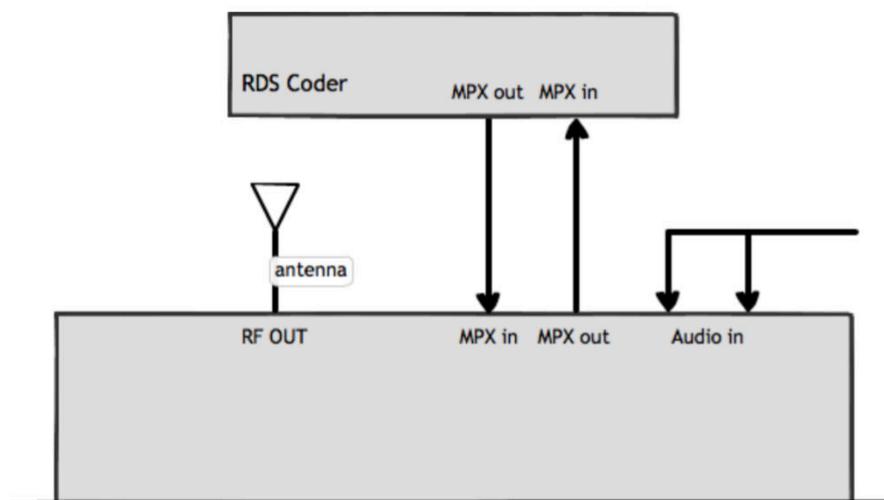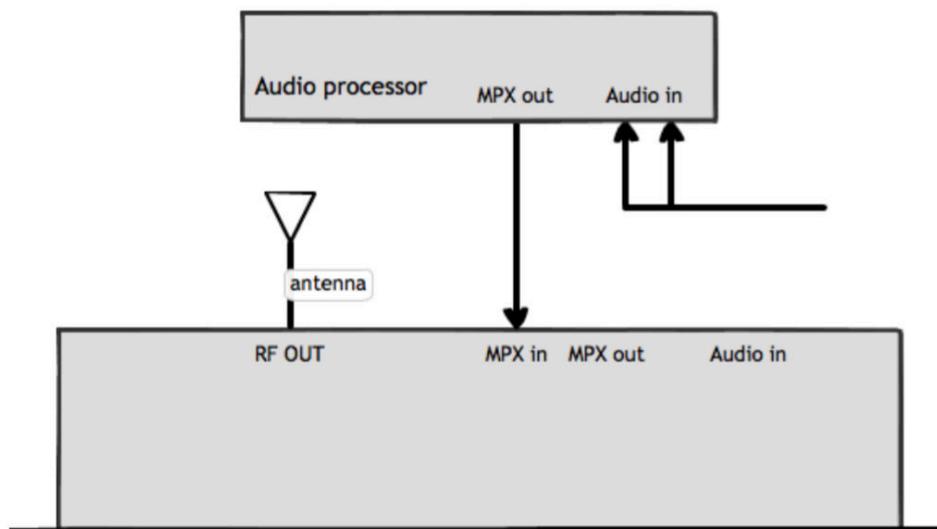

1.   Place the transmitter in a well ventilated space.
2.   Connect the antenna to the RF output connector on the back of the
        transmitter.
3.   Connect the left and right program audio signals to the XLR input
        connectors on the back of the transmitter. If using AES/EBU digital, connect this
        to 'AES' RJ45 connector.
4.   Connect the MPX1 output on the back of the transmitter to the MPX input of the
        RDS encoder.
5.   Connect the MPX output of the RDS encoder to the MPX1 input on the back   of
        the transmitter.
6.   Plug the power cord into the power supply module on the rear panel of the
        transmitter.
7.   Connect the required remote control / monitoring ports (Ethernet, RS232,
        Alarms/Triggers Port).
8.   In the **Audio Settings** menu, select the **input source** (analog/digital).
9.   In the **RF Settings** menu, set **MPX Source** to *MPX Input 1*.
10.   Once the transmitter is operating, set the correct carrier frequency and RF
        power from the RF settings menu. Check reflected power is OK.

Check the documentation that came with your RDS encoder on how to set/check the
proper RDS injection level.

Note: If using the transmitter's internal RDS coder, in **RF Settings** set **MPX Source** to
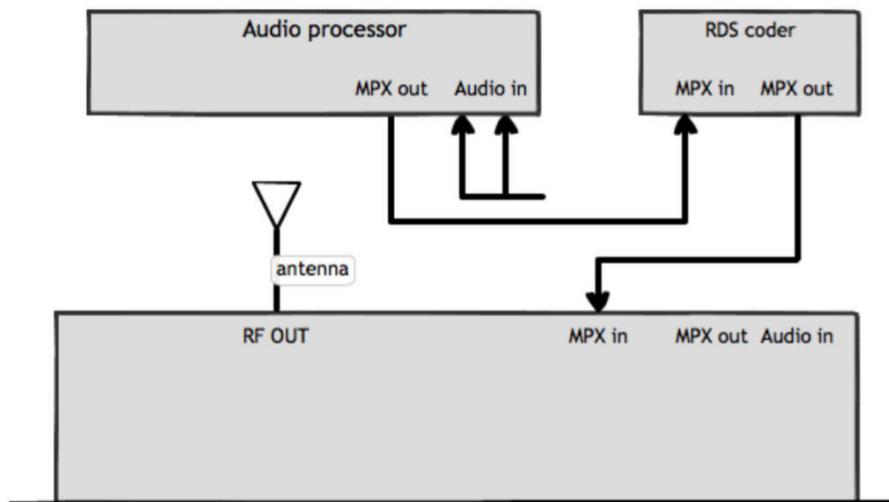*Internal.*

6.2.2 Transmitter with external audio processor

1. Place the transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX1 input on the back of the transmitter, and in **RF Settings**, set **MPX Source** to *MPX Input 1*.
4. Plug the power cord into the power supply module on the rear panel of the transmitter.
5. Connect the required remote control / monitoring ports (Ethernet, RS232, Alarms/Triggers Port).
6. Once the transmitter is operating, set the correct carrier frequency and RF power from the RF settings menu. Check reflected power is OK.
7. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator). The maximum modulation should not exceed 75kHz.
8. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.

In this setup, the stereo multiplex is generated by an external stereo generator and is fed directly into the transmitter exciter of the transmitter stage. Note that the transmitter's onboard processing will have no effect on the signal in this configuration.

6.2.3 Transmitter with an external audio processor and RDS (inline connection)
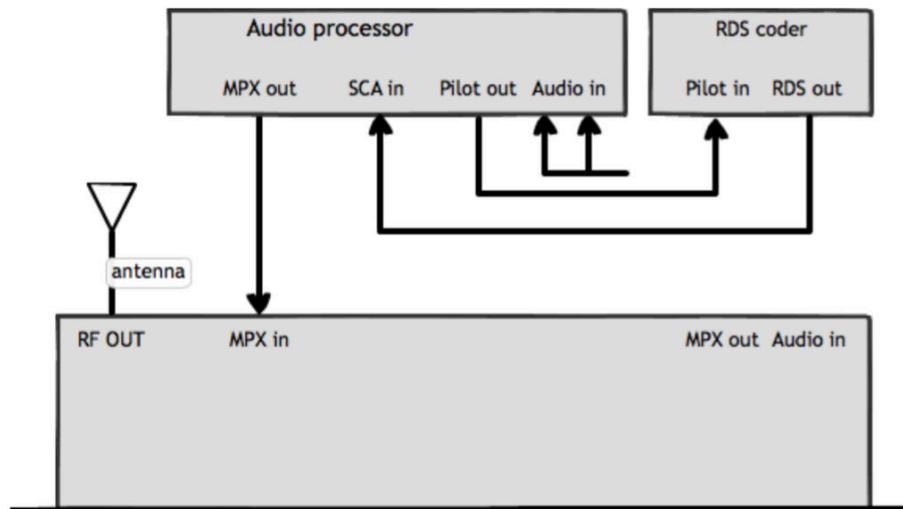

1. Place the transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX input of your RDS encoder.
4. Connect the MPX output of your RDS encoder to the MPX 1 input on the back of the transmitter.
5. Plug the power cord into the power supply module on the rear panel of the transmitter.
6. Connect the required remote control / monitoring ports (Ethernet, RS232, Alarms/Triggers Port).
7. In the **RF Settings** menu, set **MPX Source** to *MPX Input 1*.
8. Once the transmitter is operating, set the correct carrier frequency and power from the RF settings menu. Check reflected power is OK.
9. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator), RDS encoder. The maximum modulation should not exceed 75kHz.
10. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.
11. Check the documentation that came with your RDS encoder on how to set/check the proper RDS injection level.

In this setup, the stereo multiplex is generated in the audio processor, it is then fed through the RDS encoder where the RDS subcarrier is added. It is then fed directly into the transmitter's exciter. Note that the transmitter's onboard processing will have no effect on the signal in this configuration.

Also note that the V3 transmitter includes an on-board RDS encoder – so unless you have requirements particular to your existing RDS coder, you do not have to use an external unit to achieve RDS/RBDS.

6.2.4 Transmitter with an external audio processor and RDS (sidechain connection)

1. Place the transmitter in a well ventilated space.
2. Connect the antenna to the RF output connector on the back of the transmitter.
3. Connect the MPX output of your audio processor (or stereo generator) to the MPX input on the back of the transmitter.
4. Connect the Pilot output of your audio processor (or stereo generator) to the pilot/reference input on your RDS encoder.
5. Connect the MPX output of your RDS encoder to the SCA input on your audio processor.
6. Plug the power cord into the power supply module on the rear panel of the transmitter.
7. Connect the required remote control / monitoring ports (Ethernet, RS232, Alarms/Triggers port).
8. Once the transmitter is operating, set the correct carrier frequency and power from the RF settings menu. Check reflected power is OK.
9. In the **RF Settings** menu, set **MPX Source** to *MPX Input 1*.
10. Check the modulation level - if the modulation level is low, adjust the MPX output level on your audio processor (or stereo generator). The maximum modulation should not exceed 75kHz.
11. Check the documentation that came with your audio processor on how to set/check the proper pilot injection level.
12. Check the documentation that came with your RDS encoder on how to set/check the proper RDS injection level.

In this setup, the audio stereo multiplex is generated in the audio processor. The RDS data is fed into the audio processor where it is combined with the audio multiplex. This combined signal is fed directly into the transmitter exciter. Note that the transmitter's onboard processing will have no effect on the signal in this configuration.

This is the best connection in terms of pilot and RDS subcarrier phase synchronisation and MPX spectrum cleanliness, if you're not using the V3's internal RDS and stereo generators.

Operation

7.1   RF Settings

Note: Never power on an FM transmitter without a suitable antenna or dummy load connected. The V3 transmitter's protection circuitry will prevent any internal damage, but it is not advisable to run a transmitter without a load connected.

7.1.1   Basic setup

1.   Set the desired **Frequency**. Note that the frequency displayed in the status box will flash for a few seconds, indicating that the system is out of lock and has not yet reached that frequency. Once locked, the display will become steady.

2.   Set the required **Power**. The system will take time to ramp the power to the selected value. During this time, the value displayed in the status box will flash.

3.   Set the **100% modulation** level: This will usually be 75kHz deviation – and should only be adjusted under special circumstances and then with caution.

4.   Select the **MPX Source** – 'Internal' if you're feeding L/R analog or digital audio directly into the transmitter and using its built-in stereo coder and audio processor, 'MPX Input 1', MPX Input 2' or 'Digital MPX' if you're feeding an MPX signal into the V3 from an external audio processor or composite STL.

4.   Select whether you require the unit to send the **FSK ID** every hour. If enabled, enter the FSK ID (applies only to translator application in the USA).

5.   **RF Mute** must be switched to off once the unit is set up, to allow it to transmit.

The in-build web server duplicates all settings. Please see section 7.9 for a full explanation of this, but the RF Settings pane shows:

7.1.2   RF Mute on Silence

This feature is useful if your station does not broadcast all day, or if your licence requires that you do not transmit a dead carrier if your station audio should go silent.

With a choice of delays of 1m, 10m, 30m, 1h – the transmitter will mute if the input audio goes silent. The transmitter will resume normal power output when the audio returns.

7.1.3   Power Scheduler

This feature will switch the output power of the unit to an alternate value set in **Power Scheduler | Power** during the selected time interval. This is to allow you to lower the power of the transmitter, for example at night, to reduce power consumption.

To set up this feature, enter the **Power Scheduler** sub-menu:

1.   In **Power** set the power that the unit will switch to during the scheduled interval;

2.   Set the **start time** at which the unit will switch to this power level;

3.   Set the **finish time**, when the unit will switch back to its normal power level;

4.   **Current time** is the system time. This is displayed here as a reference for use when setting the start and finish times. It can be adjusted if required.

5.   Set **Enable** to On. The power scheduler is now running.

7.1.4   Synchronisation

The V3 transmitter includes support for synchronising with either a 10MHz, or a 1pps external timing signal, for use in a Single Frequency Network (SFN). The 'Synchronisation' sub menu contains the following items:

External 10MHz ref: off/on

Determines whether to use the transmitter's internal 10MHz ref, or to accept an external reference from, for example, a GPS receiver. Switch 'off' if you not need to externally synchronise the transmitter.

Internal 10MHz trim: Allows the internal 10MHz ref to be trimmed +/- 10ppm.

1PPS synch: off/on

Determines whether to synch to an external 1pps reference.

Audio Delay: Allows the audio to be delayed by up to 20mS in 1uS steps, to synchronise audio with other transmitters on the SFN.

Pilot Phase: 0-359 degrees, to allow the stereo pilot to be synchronised with that of other transmitters in the SFN.

MPX Delay: Allows a delay to be added to the internally-generated mpx signal, to synchronise audio with other transmitters in the SFN.

7.2 Audio Settings
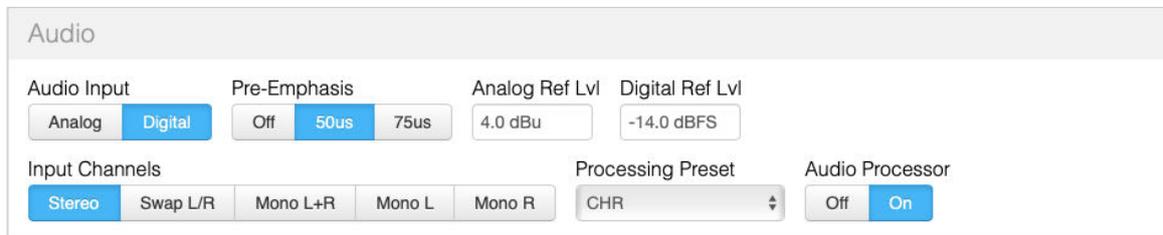
Web remote 'audio settings' pane

The Audio Settings menu contains the following parameters:

Audio Input: Analog/Digital/Tuner.

         Analog refers to the left and right XLR connectors, Digital refers to the AES/EBU digital RJ45 connector, and Tuner refers to the optional internal tuner card, if the transmitter is configured as a translator (or 'rebroadcaster').

         If the source is MPX over AES then select Digital; in this case the digital audio connector is reconfigured automatically to receive MPX over AES.

Analog Ref Level: Set to the reference level of your facility, i.e. its nominal operating level. So if your mixing desk, for example, runs at around +4dBm, set this to +4.

Digital Ref Level: Set to the reference level of your facility, as above. For example, if you run your digital mixing desk so that it peaks at -10dBfs, set this to -10dBfs.

The V3 transmitter features a 4-band audio processor built in as standard.
The processor takes its input from the digital or analog input connectors.

The following items allow setup of the processor:

Audio Processor: on/off.

         When off, the processor is bypassed – use this setting if feeding audio to the V3 transmitter from an external audio processor. If you're using the optional internal tuner with the V3 transmitter configured as a translator or rebroadcaster, you will probably want to bypass the audio processor, because presumably the receive audio is already processed.

Preemphasis: off/50/75uS – this affects the stereo generator's pre-emphasis, and that of the pre-emphasised limiting employed in the audio

processor. Set to suit that used in your part of the world; generally 75uS in the US and 50uS rest of world.

Processing Preset: Allows selection of one of the presets. Those available are:

Bypass
AC
CHR
Tight
Hot
Loud
Smooth
Clean
Bright
Rock 'n' Roll
Low Bass
Urban
Talk
Classic Bright
Classic Bright 2

The presets have been designed to represent processing texture appropriate to the format after which they are named; However don't be afraid to use a differently-named preset to your format, if it sounds better!

The content and function of the presets is similar to those used in the BW audio processor DSPXmini Encore. Please refer to the manual for that product for a fuller description of audio processing techniques and applications.

Audio Mode: Stereo / Mono L+R / Mono L / Mono R / Swap L/R.

Audio Trim: Allows fine trim of overall audio level, and right channel only, to compensate for L/R imbalance.

Note that if you set **MPX Source** (in **RF Settings)** to be MPX Input 1 or 2, or Digital MPX, the exciter is fed directly from these rear-panel connectors, and the output of the audio processor and internal *MPX* generator is ignored. However, the audio processor and MPX generator are still running, and the generated MPX signal can still be routed to the MPX 1 and or 2 output connectors.

Bearing this in mind, if you wish to use an external RDS generator which needs to be fed with an MPX signal, you can route the MPX output from the MPX OUT 1 connector to the external unit, and loop back to the V3 transmitter's MPX 1 input connector. In this case, you would set **Input Source** to MPX Input 1 or 2 as appropriate.

The following diagram may help to explain the audio routing available:

Audio Routing diagram
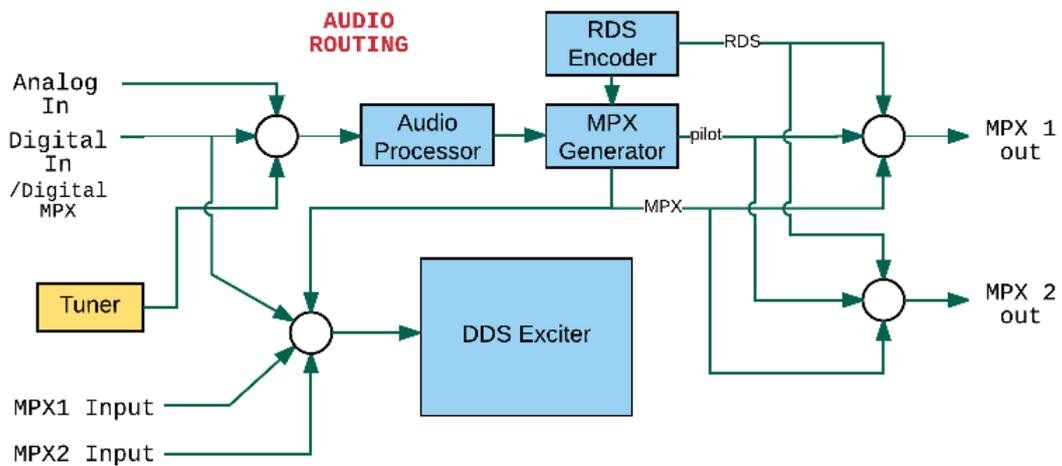
7.3   MPX

The V3 transmitter incorporates a stereo coder, otherwise known as an MPX generator ('MPX' meaning multiplex, sometimes known as 'composite').

The stereo generator includes a composite clipper. With a drive setting of 0dB, this has no effect; above that it will become active and clip the MPX signal. The clipper contains RDS/SCA protection filters, also there is a pilot protection filter option.

The audio clipper protects the MPX generator from peak excursions and overshoots in the source audio. It is distortion-cancelling and anti-aliased.

Furthermore, there is an 'overshoot compensator' which handles any overshoots from the main clipper, and restricts the audio bandwidth to 15kHz.

Note: The MPX generator is fed from the audio processor; the selection of which input to use is made within the **Audio Settings** menu (see section 7.2).

Web remote MPX pane

7.3.1   MPX generator settings

The MPX generator menu contains the following sub-menus:

Inputs/Outputs

MPX1 In Level	Adjustment for external MPX input 1 level;
MPX2 In Level	As above, for MPX input 2;
Digital MPX in level	As above, for the Digital MPX input level;
MPX1 Out Source	Determines what signal is available on the MPX1 Output bnc connector: MPX (internally generated, including RDS if used), Pilot (the 19kHz stereo pilot), RDS (the internally generated RDS signal, Ext 1 and 2 – a loop of the signals being presented to the MPX 1 and 2 input connectors;
MPX1 Out Level	Level adjustment of this output;

These menu items are reproduced for the MPX 2 outputs.

Generator

Pilot Level	Level of the 19kHz stereo pilot, in % of total deviation;
RDS Level	Level of the 57kHz RDS sub-carrier, in % of total deviation; If you don't wish to use the internal RDS encoder, please set this to '0' (zero).
	Note that these two settings are based on the **100% Modulation** setting, in **RF Settings**. This is usually, in FM radio, 75kHz. Therefore a standard value of 9% pilot will produce 6.75kHz deviation, a setting of 3% RDS level will add a further 2.25kHz deviation, leaving 88% for audio. If your jurisdiction allows greater than 100% modulation for sub-carriers above 38kHz, you will need to increase the **100% Modulation** setting and recalculate these figures.

comp (composite) clipper drive: -0.5 to 2dB

Pilot protection: on/off

7.4   RDS Encoder

The V3 transmitter incorporates an RDS (RBDS in the US) encoder as standard.

This module allows full dynamic control of all RDS parameters, such as PI, PS and RT (Program Identifier, Program Service – station name, and Radio Text).

Web remote RDS pane

7.4.1   RDS settings

encoding:	rds/rbds (rbds for the US, rds for rest of world)
pi:	enter local PI code.
ps:	enter default PS.
stereo:	off/on
dynamic pty:	off/on
ta:	off/on
tp:	off/on
ms:	music/speech
pty:	default program type code.
ptyn:	allows entry of more specific pty name.
rt:	Radio Text.
af:	allows entry of alternative frequency list.

7.4.2   Dynamic RDS

The V3 Transmitter's RDS encoder can be used in static mode, by setting the above parameters upon installation.

Or, the transmitter's RDS parameters can be controlled dynamically, receiving data input from an external source such as a playout system or 3rd-party 'middleware' such as Magic RDS or RDS-Studio.

The RDS coder is UECP compliant (a standard protocol designed specifically to control RDS encoders), and can receive data via the RS232 serial port or via the LAN connection.

Control of this is possible from the 'Dynamic RDS' sub-menu, or via the web remote's 'RDS' pane as shown above.

To use the RS232 (serial) connection to instruct the RDS coder, please switch '**RS232**' to 'enabled' on the unit, or 'on' in the web remote.

Note: When this is switched on, the RS232 port cannot be used to control any other parameters of the transmitter simultaneously.

When using the LAN connection to provide dynamic data to the RDS encoder, it is possible to set up two IP ports, in case you wish to send data from two separate sources. These ports can be specified in the Ethernet 1 and Ethernet 2 sub-menus, or via the web remote 'RDS' pane as above.

The setting '**is UDP**' should be switched on if your data source does not require a response from the transmitter.

If you wish to formulate your own software for externally controlling the V3's RDS Encoder, please contact BW Broadcast support – we will be happy to furnish you with the UECP command set.

A brief 101 on RDS:

With the RDS (RBDS in the US) system you can get listener's radios to display your station name or call-letters, up to 8 characters. This is what's entered in the 'PS' field. PS is one of the obligatory settings in RDS. One other is PI – an RDS encoder will not work without this.

PI means 'Program Identifier', and is a 4-digit hexadecimal number (0-9, then A-F) which is unique to your station certainly in your region if not in your country. This number is usually allocated by your country's regulatory authority, and will look something like 2E3F, for example.

In the US, there is an online calculator which allows the PI to be derived from the call-letters at http://www.w9wi.com/articles/rdsreverse.htm

(If you're setting the V3 transmitter for use as a translator, the PI code is derived from the parent station's call letters.)

Once you've entered these, a useful starting point for the other parameters is:

Stereo Flag	ON (If you're a stereo station, OFF if not)
Artificial Head	OFF
Compressed	OFF
Dynamic PTY	OFF
TA	OFF
TP	ON

(An explanation: TP means 'this station sometimes broadcasts traffic information'. A lot of consumer car receivers will only stop a search on a station with this flag set ON. TA means 'this station is transmitting a traffic announcement now', and will cause radios to stop playing a CD and play the radio audio instead.

Therefore even if you don't carry traffic information, it's a good idea to have TP ON, but TA OFF unless you're carrying a traffic report right now).

MS Flag:	MUSIC (speech if you're a talk-only station)
PTY:	Select whichever is closest to your format
PTYN:	Leave empty
RT:	This is where the Now Playing information appears if that data is being sent to the RDS encoder, or you can just enter your slogan.
AF:	Alternate frequency – this is a list of frequencies your station is also broadcasting on. If you have more than one transmitter, select the number of transmitters here and then full in their frequencies in the boxes that appear below. All your transmitters should carry the same AF list – or at least those frequencies in neighbouring areas. If you have just one transmitter, leave this at zero.

Once these basic entries are made, you're good to go – except for one thing: You need to set the **RDS sub-carrier level**. There is no real standard for this, but it's good to start at 3.5kHz which is 4.5% - so in the MPX Generator section, set RDS Level to 4.5%.

Bear in mind that whatever percentage of RDS you use is deviation that you can't use for program audio – there is really no point in running more than 6% RDS level.

Note that if you are feeding dynamic data to the V3's RDS encoder, the entries on the front panel and the web remote will *not* show this data, but will continue to show the static data you've programmed in manually.

The TA flag – which tells receivers you're running a Traffic Announcement currently, can be asserted via the Alarms/Triggers rear panel connector. See section 7.6 of this tome.

7.5   **Tuner Module** (optional)

This optional module allows the V3 transmitter to be used as a translator.

(If the tuner module is not fitted, this menu item is not available).

The high quality, digital tuner module features DSP processing of receive signals, to ensure the highest quality reception, and best stereo reproduction – even during poor signal conditions.

7.5.1 Tuner module menu

frequency: Set the receive frequency.

deemphasis: Set de-emphasis to suit your region, 50 or 75µS. For test and measurement purposes, it's also possible to select 'off'.

channel eq: An adaptive filter to improve reception when multipath interference is being encountered. On/Off.

mpath suppression: Reduced audibility of distortion caused by multipath interference. On/off.

noise blanker: Detects and supresses noise pulses. On/off.

audio trim: Fine adjust of the tuner's audio level to account for discrepancies in the deviation level of the received signal.

IF bandwidth: Manual setting of bandwidth, or 'auto'.

IF filter: on/ off.

FMSI: FM Stereo Improvement - a complex, proprietary dsp-based processing system which improves stereo performance in less than perfect signal conditions. On/off – we recommend 'on'.

When the tuner module is installed, and you wish to use the V3 transmitter as a translator, please select 'tuner' in the **MPX Source** in the **RF Settings** menu.
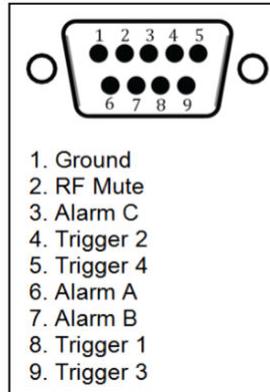
7.6   Triggers & Alarms
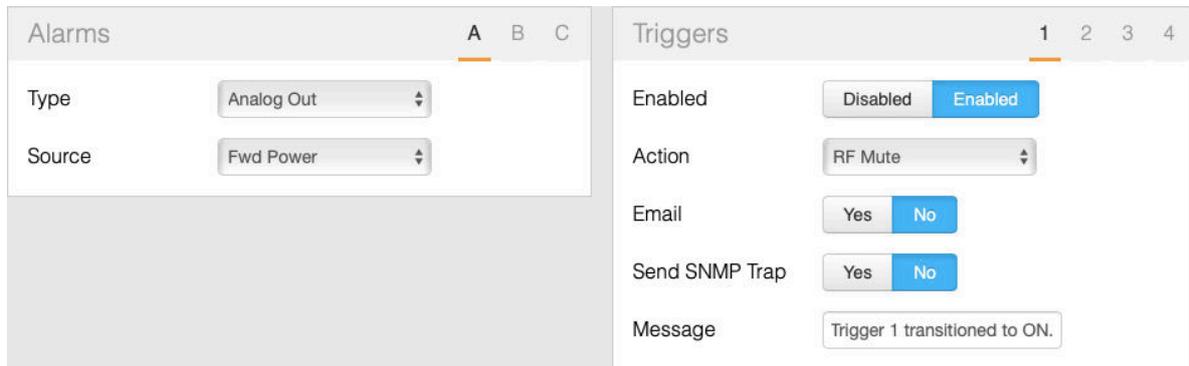
Web remote 'Alarms & Triggers' pane

BW Broadcast V3 transmitters feature a comprehensive monitoring and control system consisting of 3 alarms and 4 triggers.

Pin 2 of the connector is hardwired to RF mute. Connecting this pin to ground will mute the transmitter. The alarms and triggers port can also be used to control the unit through a telemetry interface system.

Trigger pins are designed to work with relay contacts to ground or 5 V drivers able to sink 15 mA (per trigger pin).

1. Ground
2. RF Mute
3. Alarm C
4. Trigger 2
5. Trigger 4
6. Alarm A
7. Alarm B
8. Trigger 1
9. Trigger 3

GPIO / Parallel remote control port pinouts

Triggers are used to control certain parameters in the V3 transmitter using pins on the GPIO / Parallel Remote Control connector (see page 10).

To fire a trigger, the pin must be pulled low.

There is an option in the Triggers menu, **RF Mute Mode**. This allows an external trigger to mute the RF to be either toggle (i.e. a momentary signal) or level – a continuous signal which while held, will keep the transmitted RF muted.

7.6.1   Setting up a trigger

1. Connect the required trigger pin to the required source. Make sure that the voltage and current levels are compatible.

2. Navigate to the **Triggers** menu item and enter the required trigger (**Trigger1**,...,**Trigger 4**).

3. Set **Enable** to on.

4. Select the **Action** that the trigger will perform. Options are: Frequency Up, Frequency Down, Power Up, Power Down, RF Mute and Reboot. Frequency Up, Frequency Down, Power Up, Power Down and reboot will perform the action on falling edges of the signal on the trigger pin.

    There is also an option 'RDS TA' – this will assert the RDA TA ('Traffic Announcement') flag if you're using the internal RDS encoder. See section 7.4 for more details.

5. If you require email alerts, set **Send e-mail** to Yes. Make sure e-mails are setup correctly (Refer to the e-mails section in this manual).

6. If **Send e-mail** is set to Yes, enter the **(ON) Message** that the trigger will send when fired.

7. **Send SNMP Trap** will cause an SNMP trap to be set, per the settings in the **System | SNMP** menu.

Alarms on the V3 transmitter indicate that a failure condition exists. They can be set to activate on modulation level, forward power, reverse power and PLL lock fail.

Upon triggering, they will toggle the relevant pin on the GPIO/Parallel connector. They write to the system log and send an e-mail if required.

Alarm pins can be configured as open-collector outputs (when working as alarms) or as analog outputs (for reporting system parameters as analog voltages). When used as alarms, 10k-ohm external pull-up resistors to 12v should be placed on each pin to be able observe voltage changes on the pins.

7.6.2   Setting up an alarm pin as alarm

1. If required, connect the required alarm pin to the external measuring equipment. Observe correct current and voltage ratings. Note that an external pull-up resistor may be required.

2. Navigate to the Alarms folder and then enter the Alarm folder that you require (Alarm A, B, or C).

3. Set **Type** to Alarm.

4. Set the source for the **Alarm**. For a detailed description consult the parametric guide section on Alarms.

5. Set the **Threshold** for the selected fail condition.

6. Set the Pin Polarity

7. Set the **On Delay**

8. Set the Off Delay

If an e-mail notification is required, set **Send e-mail** to Yes.

Please ensure that e-mails are set up correctly.

7.6.3   Setting up an alarm pin as an analog output

1. Connect the required alarm pin to the external measuring equipment. Observe correct current and voltage ratings. Note that an external pull-up resistor may be required.

2. Navigate to the Alarms folder and enter the Alarm folder that you require (Alarm A, B, C, ..)

3. Set **Type** to Analog Out. Set the **Source** for the Analog Out.

7.7 System

7.7.1 Basic settings

Time | Allows setting of system time, and displays system uptime.

Unit Information | Set **Location** – a brief description of the physical location of the unit.

Set **Contact** – the name of the person who manages the unit.

Screen Saver | **Sets the time-out before the screensaver starts.**

Enable or disable **Screen Lock** as required. If enabled, enter the desired 4 digit **Screen Lock Code**. This code will be requested in order to exit the screen saver.

There are two types of screensaver: Normal – in which the model, forward and reflected power are shown meandering about the screen, and Stealth in which nothing is shown.

Users | Enter the Username for the remote login, used when accessing the unit via the web remote.

Enter the Password for the remote login.

Ethernet | Enable or Disable **DHCP** as required. When DHCP is set to off, enter the static IP details:

Enter the static IP

Enter the subnet mask

Enter the gateway

Enter DNS 1

Enter DNS 2

The **MAC address** of the unit is displayed here, and may be required for setting up access to your network.

With DHCP set to on (dynamic IP), the system will take some time (usually a few seconds) to gather the required IP configuration from the DHCP server.

Once the unit has received the IP configuration information, it will display it in the following parameters: DHCP IP, DHCP SM, DHCP GW, DHCP DNS 1, DHCP DNS 2.

7.7.2   E-Mail

The V3 transmitter can send e-mails to provide notifications of alarms or external triggers becoming active.
Please note that SSL email server authentication is not supported by the unit.

To set up:

1. Enter the email address of the sender in **From**.

2. Enter the email address(es) of the receiver(s) in **Recipient(s)**. Separate receivers by commas.

3. For ease of setup, you can choose to send emails via the BW secure server. In this case, please set **Send Via** to BW. If you wish to use another server, set this to SMTP. In this case you will also need to enter the details below in points 4 through 7.

4. Enter the IP address of the SMTP server in **Host**.

5. Enter the Port number of the SMTP server in **Port**.

6. Enter the **Username** for SMTP authentication. If no authentication is required, this field must be left blank.

7. Enter the **Password** for the SMTP authentication. If no authentication is required, this field must be left blank.

8. Set **Max emails a day** to the maximum number of emails allowed to be sent by the unit in a single day. Enter the **Test** folder and set the **Recipient(s)** for a test email.

9. Set **Test** to Yes. Check if the e-mail has been received.

Web remote 'Email', 'Comms' and 'System' pane

7.7.3   HTTP

BW Broadcast V3 transmitters provide a graphical web based interface for ease of use and control. This can be accessed by navigating to the IP address of the unit in any standard web browser. The Web Remote uses HTML5 and is mobile-friendly – so will display correctly on web-enabled cellular telephones or tablets.

After entering the login details for the unit, the user can then read and write all parameters and also perform firmware upgrades. All parameters are saved and updated dynamically as they are changed in the remote.

Ensure the unit is connected to a network outlet and Ethernet is set up correctly to use this feature.

By default, HTTP is enabled and running on port 80. In order to change these settings:

1. Navigate to **System** > **HTTP**.

2. Set **Enable** to off.

3. Set the Webserver TCP port number in **Port**.

4. Set **Enable** to On.

The **Remote Control Indication** parameter can be set to Enabled or Disabled. If set to Enabled, the system will show a message on the screen when being controlled through the web remote. This can be useful as an indication to personnel who are at the transmitter site that the unit is currently being controlled from elsewhere.

You can set the **timeout** for this authenticated web remote session here.

Please see section 7.8, below, for a detailed explanation of the Web Remote.

7.7.4   Telnet

BW Broadcast V3 transmitters offer many options for remote monitoring and control. All parameters available on the front panel are available remotely.

For text based access via a local network or the internet, Telnet can be used to connect to the unit.

By default, Telnet is enabled on port 23. In order to change these settings:

1. Navigate to **System** > **Telnet**.

2. Set **Enable** to Disabled.

3. Set the required **Port** number.

4. Set **Enable** to Enabled.

For further information on how to use the Telnet remote, refer to the **"Text Based Access"** section, 7.9.

7.7.5   RS232

V3 transmitters offer many options for remote monitoring and control. All parameters available on the front panel are available remotely.

To connect to the unit via RS232 connection, connect a standard serial cable between the transmitter and the PC, and use the following settings for the COM port:

- Baud rate - Selected baudrate set in the unit (default: 19200bps)
- DataBits: 8
- Parity: None
- Stop bits: 1
- Flow control: Hardware

In order to change these settings in the unit:

1. Navigate to **System** > **RS232**.

2. Enable or disable the feature by changing the **Enable** parameter.

3. Select the required **Baudrate** for the connection.

7.7.6   Logging

Web remote 'Logging' pane

The V3 transmitter has three methods of logging. Regardless of the log location, the format is the same.

The transmitter will output a list of important parameters, all meter settings and alarm and trigger statuses 2 minutes after a parameter change and then at hourly intervals.

These can be either received via RS232, UDP or saved to a file on the internal memory of the transmitter, which can then be accessed via the Web Remote (see below).

Each method can be enabled or disabled. In order to enable/disable the different logging methods, navigate to **System** > **Log** and set the different methods to Enabled or Disabled.

UDP will send the log messages via UDP to an IP address. To change the UDP settings:

- Navigate to **System** > **Log** > **UDP**.
- Set **Enable** to Disabled.
- Set the **IP** address where the log message should be sent via UDP.

- Set the **Port** number.
- Set **Enable** to Enabled.

Ensure that the unit is connected to a network outlet and Ethernet is set up correctly to use this feature.

Logging to a file in internal memory

If enabled, the system will keep logs of the last 31 days. These logs can be accessed through the web remote.

An example section from a log file is shown below:

2018-04-22 11:40:06

DTLG > M: exciter_locked = 1
DTLG > M: peak_deviation = 75kHz
DTLG > M: fwd_power = 250W
DTLG > M: rev_power = 3W
DTLG > M: pa_voltage = 30.1V
DTLG > M: aux_voltage = 15.1V
DTLG > M: pa_temp = 30.0*C
DTLG > M: cpu_temp = 25.0*C
DTLG > M: tx_input_l = -21dB
DTLG > M: tx_input_r = -21dB
DTLG > M: agc1 = 0dB
DTLG > M: agc2 = 0dB
DTLG > M: agc3 = 0dB
DTLG > M: agc4 = 0dB
DTLG > M: lim1 = -22dB
DTLG > M: lim2 = -6dB
DTLG > M: lim3 = -6dB
DTLG > M: lim4 = -6dB
DTLG > M: tx_output_l = -6dB
DTLG > M: tx_output_r = -8dB
DTLG > M: tx_output_mpx = 20dB
DTLG > P: transmitter.frequency = 98.00MHz
DTLG > Alarm status [3-0]: Off Off On Off
DTLG > Trigger status [3-0]: On On On On

7.7.7   About

The about menu contains the version numbers of the different parts of the system. These values should be available when contacting support.

7.7.8 Reboot

This parameter will reboot the unit.

7.7.9 Factory Reset

Performs a factory reset, setting all the parameters to its default value except for the network settings. All user changes will be lost.

7.8 Web Remote

The V3 transmitter provides a graphical web based interface for ease of use and control. This can be accessed by navigating to the IP address of the unit in any standard web browser.

After entering the login details for the unit, the user can then read and write all parameters and also perform firmware upgrades.

All parameters are saved and updated dynamically as they are changed in the remote.

The system serves a mobile-optimized version when accessed from a mobile web browser.

7.8.1 Authentication

Browse to the IP of the unit (navigate to **System** > **Ethernet**. Refer to the Ethernet section in this manual to set up Ethernet). You will be required to authenticate by entering the password. This password must match the one selected in the **System** > **Users** > **Password**.

The default password is 'pass'.
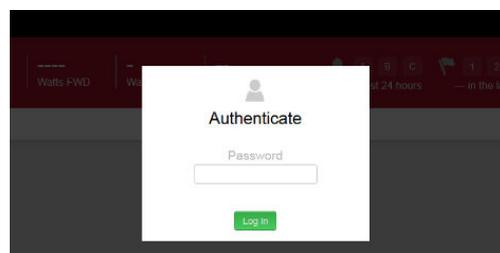
7.8.2 Web Remote Interface

The user interface is divided into several sections: Status Bar, Alarms and Notifications, Navigation Bar and Transmitter Controls.

TX Model and Serial Number:
>The transmitter and product serial number are displayed on the top right of the page.

Status Bar:
>Displays the current status of the transmitter (frequency, FWD power in watts, REV power in watts, peak deviation in kHz, current temp, VSWR and if the tx is in power foldback).

Alarms and Notifications:
>Displays the status of the alarms and the number of times that the alarms were activated in the last 24 hours. The Notifications section reports the number of emails sent by the unit within the last 24 hours.

Navigation Bar:

>Contains shortcuts that activate pop-ups displaying:

Status/Config:
>The relevant status and configuration settings. These are: RF Status, Audio Status, Unit Status, Trigger Status, Trigger Config, Alarm Status, Alarm Config, Location,

Contact, Date and Time, Uptime, Network, Web Portal, Telnet, RS232, System Details.

Audio Meters:
A graphical representation of the Audio Meters - Input, AGC, Limiters, Output, MPX.Log Files:
This brings up a box with a collection of all the logs stored in the unit. The latest log (today's log) is displayed by default.

Older logs can be selected from the list. If the unit has been switched on all the time, LX.log.1 corresponds to yesterday's log, LX.log.2 corresponds to the log written two days ago and so on.

Note that if the unit is switched off, It will not write to the log and it will not create a new log file for the number of days it is off, so the older log files in this case will correspond to previous logs (written several days ago).

Another way of accessing the logs, which may be useful in some cases where the log file contents need to be copied, is by browsing to a specific URL:

http://IPAddress/TX.log
For example, for today's log: http://192.168.5.32/TX.log
Yesterday's   log: http://192.168.5.32/TX-V3.log.1
Previous logs: http://192.168.5.32/TX-V3.log.x

Reboot:
This will reboot the unit.

Update Firmware:
This option allows you to upgrade the firmware of the unit. Click on 'Choose File' and select the desired upgrade file. Then click update and wait while the unit receives the new SW and upgrades the system. The webpage will refresh in less than 5 minutes. The upgrading process may be finished in 2-3 minutes so try refreshing the page after this time.

Software upgrade files can be downloaded from http://www.bwbroadcast.com

Factory Reset:
This option resets the unit, bringing all parameters to their default value. Network settings are not affected.

Disconnect:
Clicking this button closes the active web remote session.

Transmitter Controls:
All the controls in the transmitter can be found in this section. These are the same options that can be found in the front panel control system on the transmitter itself. Click on the help icon (?) located on the top left of the screen or refer to the relevant sections of this manual to understand any particular feature.

The main part of the web remote screen is divided into the following panes, which can be accessed by scrolling down the page:

RF Settings

Frequency Set
105.000 MHz 🔒

Power Set
100 W 🔒

RF Mute
Mute RF 🔒

RF Mute on Silence
Off

FSK
Off | FSK ID

MPX Source
Internal | MPX Input 1 | MPX Input 2 | Digital MPX

100% Modulation
75 kHz 🔒

Power Schedule
Disabled | Enabled

Power Set
100 W

Start Time
00:00:00

Finish Time
00:00:00

External 10MHz Ref
Off | On

Internal 10MHz trim
0 ppm

1PPS Sync
Off | On

Audio Delay
0 us

Pilot Phase
0.00 deg

MPX Delay
0 us

Audio

Audio Input
Analog | Digital

Pre-Emphasis
Off | 50us | 75us

Analog Ref Lvl
4.0 dBu

Digital Ref Lvl
-14.0 dBFS

Input Channels
Stereo | Swap L/R | Mono L+R | Mono L | Mono R

Processing Preset
CHR

Audio Processor
Off | On

MPX

MPX 1 In Lvl
4.0 dBu

MPX 2 In Lvl
4.0 dBu

Digital MPX In Level
-14.0 dBu

MPX 1 Out Src
MPX

MPX 1 Out Lvl
4.0 dBu

MPX 2 Out Src
MPX

MPX 2 Out Lvl
4.0 dBu

Pilot Level
0.0 %

Rds Level
4.0 %

Comp Clip Drive
0.0 dB

Pilot Protection
Off | On

RDS

Ethernet 1
Off | On

Is UDP
Off | On

Port
1000

Ethernet 2
Off | On

Is UDP
Off | On

Port
1000

RS232
Off | On

BAUD
19200

Encoding
RBDS (US)

PI
8E36

PS
W248DB

Stereo Flag
Off | On

Artificial Head Flag
Off | On

Compressed Flag
Off | On

Dynamic PTY Flag
Off | On

TA Flag
Off | On

TP Flag
Off | On

MS Flag
Music

PTY (RBDS)
SOFT R & B

PTYN
PTYN

RT
RT

AF
0

Alarms

A   B   C

Type	Analog Out ⇕
Source	Fwd Power ⇕

Triggers

1   2   3   4

Enabled	Disabled / **Enabled**
Action	RF Mute ⇕
Email	Yes / **No**
Send SNMP Trap	Yes / **No**
Message	Trigger 1 transitioned to ON.

Logging

RS232	File	UDP	IP Address	Port
Disabled / Enabled	Disabled / **Enabled**	**Disabled** / Enabled	192.168.2.119	514

SNMP

SNMP	Port	Community	Read Only	Name
Disabled / **Enabled**	161	public	**Off** / On	

Object ID	Description
	TX V3

Trap Destination [1] IP	Trap Destination [1] Port	Trap Destination [2] IP	Trap Destination [2] Port
192.168.0.98	162	0.0.0.0	162

Test SNMP

Email

Email	**SMTP** / BW Broadcast
From	V3-test@bwbroadcast.com
To	andy@bwbroadcast.com
Host	123.123.123.123
Port	25
Username	
Password	
Max Daily Emails	100 ⇕

0 e-mails sent today

Test Email

Comms

RS232	Disabled / **Enabled**
Baud	19200 ⇕
Telnet	Disabled / **Enabled**
Port	23

System

Date	2018-10-31
Time	09:50:51

Sync with PC

Location	
Contact	
Screen Saver	1m ⇕
Front Panel Lock	**Off** / On
Screen Saver Type	Normal ⇕

The functions of the controls in these screens are described earlier, in section 7.8 of this manual.

7.9   Text Based Access (Telnet or RS232)

The V3 Transmitters offer text based access via a local network or the internet through Telnet or serial RS232.

7.9.1   Commands

The following commands are available:

help   This command (without any arguments) displays a list of the
                commands the unit understands.

help parameter_id This command displays a short description of the requested
                parameter, e.g. V3> help transmitter.power will return:

                V3>transmitter.power (Sets the output power level in watts.
                This parameter accepts values from 0 to 600.)

get parameter_id
                This command returns the current value of the parameter
                requested. e.g. V3> get transmitter.frequency will return :
                V3> 98.00MHz

set parameter_id parameter_value
                This command sets the parameter requested to the value
                specified. e.g. V3> set transmitter.power 150 OK

reboot   This command reboots the unit.

Please note - there will be no confirmation stage, if you send this command the unit will reboot immediately, taking your transmitter temporarily off-air.

FactoryReset
                This command resets all values to their default apart from the Ethernet
                settings of the unit.

As above, there is no confirmation required, the action is immediate.

A complete list of parameters viewable and controllable in the V3 transmitter can be downloaded via a web browser by entering the following in the address bar:

[ipaddress]/api/getparameters.js

7.10   SNMP

The V3 transmitters may be monitored using a suitable SNMP (Simple Network Monitoring Protocol) system.

The mib file may be downloaded (for loading into the SNMP client if required) by clicking on 'mib file' in the web remote's navigation bar.

The V3's front panel menu **System | SNMP** and the web remote offers the following settings:

SNMP	Enabled/Disabled
Port	Port number the SNMP server will respond to, 161 by default
Community	…effectively the password for SNMP access
Read Only	off/on allows or disallows SNMP *control* of settings
Name	Name of the transmitter, for ID purposes in an SNMP monitoring system
Trap Destination	Destination IP of SNMP system to accept traps – two are available
Trap ports	Ports to use for sending traps – default 162.

Web remote SNMP pane

7.11   V3 Transmitter Power Supplies
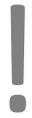
> **!** *This section refers to the 2U-sized V3 transmitters – that is to say the 150, 300, 600 and 1000W RF output versions. It does not apply to the 1U-sized 5, 30, and 50W variants.*

The BW Broadcast V3 transmitters are powered by high-quality digitally-controlled switched mode power supplies.

Each transmitter features an internal 15v DC supply which runs the front panel and the combination DDS Exciter/Audio Processing module, plus either one or two slide-in PA power supplies which run the Power Output stage.

These PA PSUs are hot-swappable – that is to say they may be safely removed or inserted while the transmitter is powered on.

150/300W transmitters require one PA PSU, but a second can optionally be fitted to provide redundancy; Both power supplies will then run in parallel with their loads balanced by the internal Power Supply Controller.

600W transmitters require one PA PSU if operated on a 220v AC supply, or two if operated on a 110v AC supply. Again, a second may be used for optional redundancy.

The Power Supply Controller module automatically detects the presence or absence of the power supplies; They may be fitted in either bay.

The 1000W transmitter requires two power supplies.

The PA power supplies are supplied *not* fitted to the transmitter. Please slide them in before use, ensuring you gently push them fully home so they make proper contact and the small silver locking lever clicks into place.

The PA power supplies feature four LEDs on their front panels, which may be used to check the operation of the PSU.

TX300/600/1000 V3 Transmitters - power supply indicators

🟩🟥	OK	Green = PSU ON, Red = PSU inhibited
🟩	COM	Flashing green = comms link being established, static green = link OK
🟨	LD	Off = PSU off or PSU unable to control current. Flashing yellow = on load
🟥	STA	Red = PSU inhibited, off = PSU on.

RF ON normal indication:

🟩	OK	Static green
🟩	COM	Static green
⭐	LD	Flashing yellow
⬜	STA	Off

RF OFF normal indication:

🟥	OK	Static red
🟩	COM	Static green
⬜	LD	Off
🟥	STA	Static red

In addition, more comprehensive details about the current status of the power supplies can be found on the front-panel PSU Status screen, accessible by multiple presses of the bottom button, and via the web remote, log files, TelNet and SNMP monitoring.

Front panel PSU Status screen

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Menu Tree

RF Settings

Frequency	MHz
Power	(model dependent)
100% Modulation	10-250kHz
MPX Source	Internal/MPX Input 1/MPX Input 2/Digital MPX
RF Mute On Silence	off/1m/10m/30m/1h
RF Mute	on/off
FSK	on/off
FSK ID	

Power Scheduler

Enable	enabled/disabled
Power W	
Start time	hh:mm
Finish time	hh:mm
Enable	on/off
Current time	Select to set

Synchronisation

External 10MHz ref	off/on
Internal 10MHz trim	+/- 10ppm
1pps Synch	off/on
Audio Delay	0-20mS
Pilot phase	0-359 degrees
MPX Delay	0-500uS

Audio Settings

Input source	Analog/Digital/Tuner
Analog ref level	0-24dBu
Digital ref level	-30 – 0dBFS
Audio Processor	on/off
Preemphasis	off/50/75uS
Processing Preset	List of presets
Audio mode	Stereo/Mono L+R/Mono L/Mono R /Swap L/R

Gain Trimming

Audio Trim	0-1dB
Audio Right Trim	0-1dB

MPX

Inputs/Outputs

MPX1 In Level	0-12dBu
MPX2 In Level	0-12dBu
Digital MPX in Level	-30 – 0dBFS
MPX1 Out Source	MPX/Pilot/RDS/Ext MPX 1/Ext MPX 2
MPX1 Out Level	0-12dBu
MPX2 Out Source	MPX/Pilot/RDS/Ext MPX 1/Ext MPX 2
MPX2 Out Level	0-12dBu
Trimming	
Tuner MPX Level Trim	0-1dB
MPX1 In Trim	0-1dB
MPX2 In Trim	0-1dB

MPX1 Out Trim	0-1dB
MPX2 Out Trim	0-1dB

Generator
Pilot Level	0-12%
RDS Level	0-6%
Comp Clip Drive	0-2dB
Pilot Protection	off/on

RDS

Dynamic RDS
    Ethernet 1

Enabled	off/on
Is UDP	off/on
Port	

    Ethernet 2

Enabled	off/on
Is UDP	off/on
Port	

RS232

Enabled	off/on
Baud	
Encoding	rds/rbds
PI	4 digit hex
PS	alphanumeric, 8-char
Dynamic PS	on/off
Stereo	on/off
Dynamic pty	on/off
TA	on/off (enables remote activation)
TP	on/off
MS	music/speech
PTY	2 digit
PTYN	alphanumeric
RT	alphanumeric, 64-char
AF	

Count	(number of AFs)
1B – 13B	up to 25 x 3-digit frequencies

Tuner (optional)

Frequency	MHz
De-emphasis	50uS/75uS/off
Channel eq	on/off
mpath suppression	on/off
noise blanker	on/off
audio trim	0-1dB
IF bandwidth	
IF filter	on/off
FMSI	on/off

Triggers

Trigger1..4

Enable	on/off
Action	Freq up/Freq down/Power Up/Power Down/RF Mute/Reboot/RDS TA
Send Email	yes/no
Email text	alphanumeric

```
                Send SNMP Trap      Yes/No
    RF Mute Mode            Level/toggle


Alarms
    Alarm A..C
                Pin type        Alarm/Analog
                Pin Polarity    +ve / -ve
                Source          Modulation/FWD Power/REV Power/Temp
                Threshold
                On Delay        1-60s
                Off Delay       1-60s
                Email           Yes/no
                Email text      alphanumeric

System
    Time
                Date            mm/dd/yyyy
                Time            hh:mm:ss
                Uptime          displays duration unit powered up


    Unit info
                Location        alphanumeric
                Contact         alphanumeric


    Screensaver
                Timeout         10s, 1m, 10m, 1h
                Screenlock      off/on
                (lock code      ****)
                Screen Saver type      Normal/Stealth


    Users
                Username        admin
                Password        pass


    Ethernet
                DHCP            yes/no
                Static IP       nnn.nnn.nnn.nnn
                Subnet          nnn.nnn.nnn.nnn
                Gateway         nnn.nnn.nnn.nnn
                DNS1            nnn.nnn.nnn.nnn
                DNS2            nnn.nnn.nnn.nnn
    MAC Address             displayed


    Email
                Test
                        recipient(s)
                        test    no/yes (immediate)
                Send Via        SMTP/BW
                From            alphanumeric
                Recipients      email1@address.com,email2@address.com, < 8
                Host            alphanumeric
                Port            numeric
                Username        alphanumeric
                Password        alphanumeric
                Max per day     n
                Emails Sent Today
```

HTTP
	Enabled			yes/no
	TCP Port			numeric
	Remote Control Indication Enabled/Disabled
	Session Timeout		Mins up to 120

Telnet
	Enabled		yes/no
	Port		default 23

RS232
	Enabled		yes/no
	Baud		1200/9600/19200/38400

SNMP
	Enable		Enabled/Disabled
	Port		Default 161
	Community	public
	Read Only	Yes/No
	Name		alphanumeric
	Object ID
	Description	alphanumeric
	Trap Destination(1) IP
	Trap Destination(1) Port
	Trap Destination(2) IP
	Trap Destination(2) IP
	Test		Sends test trap

Log
	UDP enable	yes/no
	UDP address	nnn.nnn.nnn.nnn
	UDP Port		numeric
	Int log		yes/no

About			Unit details display

Reboot			yes/no (sure?)
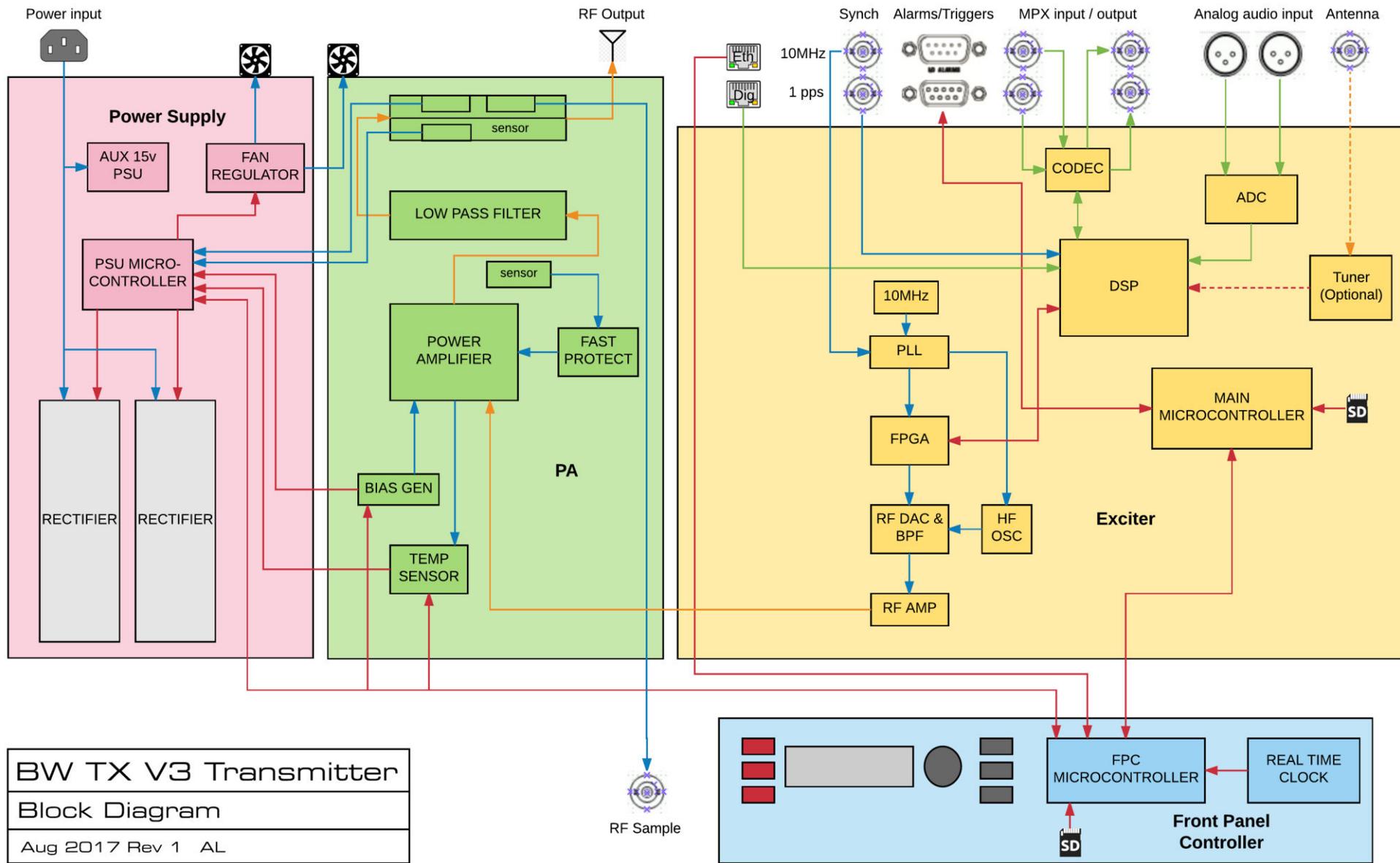Factory reset		yes/no (sure?)

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Block Diagram

Please see next page for a system block diagram of the BW Broadcast V3 transmitter:

BW TX V3 Transmitter

Block Diagram

Aug 2017 Rev 1   AL

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Technical Specification

Output Power	TX5	TX30	TX50	
Nominal (watts)	5	30	50	
Range (watts)	5	5 - 30	5 - 50	
RF Output connector	N-Type	N-Type	N-Type	
Electrical				
AC input V @ 5-60Hz	90-277	90-277	90-277	
Power Connector	IEC 13A	IEC 13A	IEC 13A	
Power consumption	typ 10.5w @nom pwr	typ 59w @nom pwr	typ 109w@nom pwr	
AC-RF efficiency typ	50%	51%	55%	
Number of fans	2	2	2	
Number of power supplies	1	2 (1 PA, 1 aux)	2 (1 PA, 1 aux)	
Dims inches WxDxH	19x15x1RU (1.75")	19x15x1RU (1.75")	19x15x1RU (1.75")	
Dims cm WxDxH	48.3x38x4.45	48.3x38x8.4.45	48.3x38x4.45	
Weight (w/psu modules)	3.7kg / 8.14lb	3.7kg / 8.14lb	3.7kg / 8.14	

Output Power	TX150	TX300	TX600	TX1000
Nominal (watts)	150	300	600	1000
Range (watts)	15-165	30-330	60-618	100-1050
RF Output connector	N-Type	N-Type	N-Type	7/16" DIN
Electrical			* max power limited when at low voltage	
AC input V @ 5-60Hz	90-277	90-277	90-277*	90-277*
Power Connector	IEC 13A	IEC 13A	IEC 13A	IEC 13A
Power consumption	typ 185w @nom pwr	typ 510w @nom pwr	typ 775 @nom pwr	typ 1275 @nom pwr
AC-RF efficiency typ	55%	59%	77%	78%
Number of fans	2	2	2	2
Number of power supplies	1(optionally 2)	1(optionally 2)	1 (2 for 110v op)	2
Dims inches WxDxH	19x17.7x2RU (3.5")	19x17.7x2RU (3.5")	19x17.7x2RU (3.5")	19x17.7x2RU (3.5")
Dims cm WxDxH	48.3x45x8.9	48.3x45x8.9	48.3x45x8.9	48.3x45x8.9
Weight (w/psu modules)	17.16lbs / 7.8kg	17.16lbs / 7.8kg	17.16lbs / 7.8kg	18.48lbs / 8.4kg
General Specifications				
Transmitter type	Solid-state FM stereo analog broadcast transmitter			
Exciter	Direct-digital Synthesis, direct-to-channel modulator			
RF Output Frequency Range	VHF Band II, 87.5-108MHz, 50kHz steps			
Frequency Stability	150Hz <10-6 O-50 degrees C using high accuracy internal TCXO. 10MHz input for synchronisation to external (GPS) reference			
FM Modulation Capability	Adjustable nominal (100%) deviation to 200kHz, default 75kHz. 320kHz maximum deviation			
Pre-emphasis	Selectable, 0, 50 or 75 uS			

Power stability	≤ ± 0.25dB
Asynchronous AM s/n ratio	65dB minimum (>70dB typical) below equivalent 100% amplitude modulation @400Hz.
Synchronous AM s/n ratio	60dB rms minimum (>70dB typical) below equivalent 100% amplitude modulation @400Hz with 75uS deemphasis and 400Hz HP filter (dev ±75kHz with 1kHz sine wave). Measured at wideband input.
RF Harmonic and Spurious Suppression	Meets or exceeds ETSI requirements
VSWR operation	Up to 1.5:1. Proportional foldback threshold from 1.5:1. Continued operation with foldback to infinite VSWR. Protected against sudden short and open-circuit conditions with mute to remove sustained arcing conditions, at all phase angles.

Environmental	
Altitude	15,000 ft, 4,420m AMSL
Ambient Temperature Range	0 to +45ºC. Inlet air temperature must not exceed 45ºC at sea level, de-rated at 2ºC per 1000ft (300m) AMSL
Humidity	95%, non-condensing

Stereo Performance	
Modes	Selectable: Stereo, Swap L/R, Mono L+R, Mono L, Mono R
Pre-emphasis	Selectable: 0, 50 or 75uS
Audio low-pass filter	80dB at 19kHz
Stereo pilot tone	19kHz ±0.1Hz; injection level adjustable
38kHz, 57kHz, 76kHz, 95kHz suppression	>70dB below ±75kHz deviation
Stereo separation	>80dB AES, >75dB analog 10Hz to 15kHz
Stereo signal to noise ratio	>90dB AES, 86dB analog below 100% modulation at 400Hz; measured in 10Hz to 15kHz bandwidth with 75uS pre-emphasis and DIN 'A' weighting
Stereo total harmonic distortion	<0.03% THD+N, 10Hz to 15kHz, with 75uS deemphasis

Audio Processing	
AGC stage	Wideband and four-band AGCs, with intelligent gating
Limiter stage	Four-band program-dependent limiter
Equalization	Parametric and shelf bass enhancement
Clipping	Multiband distortion-controlled, and composite clipper with pilot protection
Processing modes	Multiple user-selectable presets

Program Inputs	
Audio Inputs - Digital	RJ45, 110 ohms balanced. Range -24dBFS to 0dBFS, up to 192kb/s, 16, 24, 32 bits (MPX over AES ready)
Audio Inputs - Digital	2 XLR, 10k ohms balanced. Range 0dBu to +15dBu max
Analog MPX (composite) Inputs	2 BNC floating, unbalanced, 18k ohms. Range -10dBu to +12dBu max, can be configured as MPX, SCA, RDS.
Analog MPX (composite) Outputs	2 BNC floating, unbalanced >600ohms. Range 0dBu to +12dBu max. Can be configured as MPX, RDS or pilot outputs.
Internal RDS generator	Dynamic RDS/RBDS generator.

Reference I/O	
External 10MHz clock input	BNC, unbalanced 50 ohms
External 1PPS clock input	BNC, unbalanced, 50 ohms TTL level
RF sample output	1 x SMC front panel -50dB. Not suitable for harmonic measurements
Remote I/O	
Ethernet port	RJ45 100Mb/s ethernet/IP rear-panel, with static or dynamic IP address client for LAN/WAN access to web GUI and SNMP
RS232	Telnet control
Parallel GPI/O	DB9 female standard remote control I/O with user-selectable command inputs and status outputs active low, 5v 100mA.
Internal Options	
FM Rebroadcast Receiver	Input frequency range 87.5-108.0MHz, 50kHz steps. Dynamic multipath, noise and control, FM Stereo Improvement. RDS PI code checking to prevent unauthorised access.
Compliance	
Compliance standards	Radio Equipment Directive 2014/53/EU Low Voltage Directive 2014/35/EU Electromagnetic Compatibility Directive 2014/30/EU RoHS 2 Directive 2011/65/EU ETSI EN302 018 v2.1.1 – Radio ETSI EN301 489-53 v1.1.0 (ETSI EN301 489-1 v2.1.1) – EMC IEC 60950-1:2005/A2:2013 – Safety. FCC Part 73 (LPFM Type Acceptance) Industry Canada (IC)