RBRX1 Preliminary Manual

DSP FM RE-BROADCAST RECEIVER

Operational Manual
Version 0.90

www.bwbroadcast.com

WARRANTY

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 (2) 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 unit has a manufacturers fault within twenty eight (28) days then BW Broadcast will pay the freight at their discretion.

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 call 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
Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer's invoice. 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 which 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. If the buyer fails to submit a written repair order within 6 weeks after notification, BW Broadcast will return the unit C.O.D. with a separate invoice for freight and packing. Such costs will also be invoiced separately when the buyer has sent in a written repair order.

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.

SAFETY INSTRUCTIONS

CAUTION: To reduce the risk of electrical shock, do not remove the cover. No user serviceable 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.

This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure—voltage that may be sufficient to constitute a risk of shock.

This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.

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 described in the operating instructions or as marked on the appliance.

Grounding or Polarization:

Precautions should be taken so that the grounding or polarization 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.

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

CE CONFORMANCE: This device complies with the requirements of the EEC Council Directives: 93/68/EEC (CE Marking); 73/23/EEC (Safety – low voltage directive); 2004/108/EC (electromagnetic compatibility). Conformity is declared to those standards: EN50081-1, EN50082-1.

WARNING: This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device (pursuant to subpart J of Part 15 FCC Rules), designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, at which case, the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

CANADA WARNING: This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications. Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limits applicables aux brouillage radioelectrique edicte par le ministere des Communications de Canada.

Introduction To The RBRX1

The RBRX1 is unique, totally unique.

Not until now has their been an analogue FM reciever that works as you wanted it too.

Using digitial signal processing technology the RBRX1 is able to recieve signals clearer than you ever thought possible. With its low distortion, greater stereo seperation, strong signal handling and weak signal processing the RBRX1 is the market leading number one choice for FM reception.

The RBRX1 employs an image cancelling high dynamic range front end mixing system for on channel to IF conversion. Together with the digital signal processed steep IF band filtering the RBRX1 achieves excellent adjacent channel filtering, making it ideal for reception of distant fm signals when located on a transmitter site.

The digital demodulator of the RBRX1 is ultimately configurable - providing the user with a degree of flexibility unheard of in FM reception products. RF and audio bandwidths are at the users control and with the adaptive control settings the receiver can be left to adjust itself as neccesary, keeping out the noise from your audio but while keeping to the limits that you have set. For the first time ever you are able to control the behaviour of the radio - you are now the designer of your own products performance.

The RBRX1 has professional level balanced XLR connections for the analogue and AES/EBU outputs. As well as recovering pristine audio the RBRX1 also decodes any transmitted RDS data.

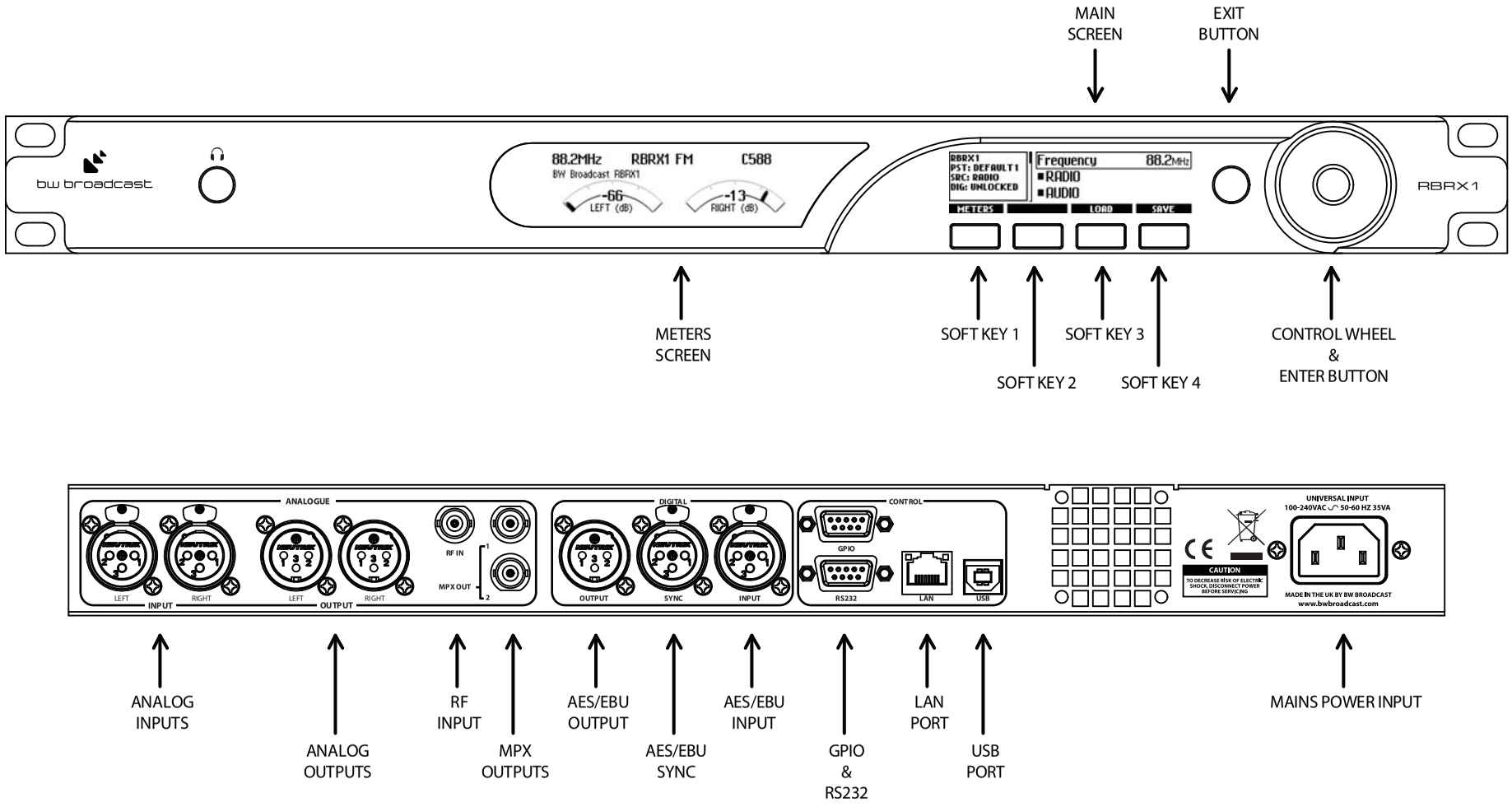
For rebroadcast applications the RBRX1 provides digitally reconstructed MPX signals which are available via back panel BNC connections. The recovered MPX signals are post processed to ensure both amplitude and bandwidth levels are safe for rebroadcast. To help further with rebroadcast transmissions the RBRX1 can mute the audio should an RDS PI code not match that set on the unit, helping to prevent hijacking of the transmission. For ultimate flexability the RBRX1 can function as an RDS encoder, allowing RDS data to be changed or inserted in the multiplex output.

The RBRX1 front panel control system is state of the art, with two Organic LED displays and touch sensitive buttons and a wheel for user input. If placed at a remote site and front panel control not possible the built in web-server allows monitoring and control from anywhere in the world using a web-browser.

The RBRX1 has a real time clock for time and day mode selection, back panel preset trigger ports and more - each facility designed to make the unit flexible and easy to intergrate into any broadcast facility.

We know you love listening to Radio, the RBRX1 loves radio like you do.

Have Fun.



RBRX1 FRONT AND REAR PANELS

RBRX1 METERS

The RBRX1 has a very flexible metering system utilising a 256x64 pixel OLED display to provide detailed metering of all of the units measurements. The RBRX1 provides five screens of meters which can be toggled by pressing the "METERS" soft key.

Summary screen
This screen displays the tuner frequency, PS, PI and radio text in addition to left and right meters of the demodulated received signal.

Audio processing screen
This screen indicates the amount of DSP signal conditioning that is being carried out on the received audio.

HI CUT High frequency attenuation being applied, 0% corresponds to no attenuation, 100% corresponds to maximum attenuation

IF BW kHz IF filter bandwidth.

SOFTMUTE Automatic attenuator, 0% corresponds to no attenuation, 100% corresponds to maximum attenuation.

STEREO BLEND Blending being applied, 0% stereo blending corresponds to maximum stereo separation, 100% stereo blending corresponds to mono.

Radio quality indicators screen
This screen displays the values of the various RF quality indicators that the tuner measures. These indicators are used as inputs to the DSP signal conditioning block.

SIG (dBuV) RF signal level in dBµV.

PILOT (kHz) Stereo pilot level in kHz

USN Ultrasonic noise indicator

MULTIPATH Multipath noise indicator

RDS screen
This screen provides additional RDS decoding not shown on the summary screen, including PTY, traffic status flags and AF information.

I/O metering screen
The input meters show the level of the input audio. The meters are ‘hooked in’ to the DSP code after the input level selection and mode options. The clip indicators represent the onset of the A/D convertors clip-point and these should not light under any circumstances. Adjust the input gain control of the RBRX1 if they do.

Stereo MPX screen
The multiplex output metering represents the composite outputs peak level. This is a representation of the output in relation to the peak composite level of the processing and not the actual level set by the multiplex output level control.

RBRX1 STATUS

The main screen on the RBRX1 is mainly used for parameter adjustment, but when the unit is left idle for a few seconds it displays some useful status indications

PST: Indicates the currently active preset. If the active preset is loaded because of an alarm or trigger, it is prefixed by '*'.

DIG: Indicates the presence of an AES/EBU signal connected to the digital audio input of the RBRX1.

SRC: Indicates which audio source is currently driving the multiplex generator. If the audio source is selected because of an alarm or trigger, it is prefixed by '*'.

Software Update

The RBRX1 is designed to allow features to be added to the unit in the field via a software update mechanism. Software updates are available from www.bwbroadcast.com. To update your unit follow the procedure below.

Updating Software Via USB

1. Connect the RBRX1 to your computer using a USB Type A to USB Type B cable.

2. The RBRX1 will appear as a mass storage device named 'RBRX1'. This can be found in 'My Computer' on computers running Microsoft Windows.

3. Browse the file system of the receiver by double clicking on the 'RBRX1' device, and open the 'upgrade' directory. Place the .dat file in this 'upgrade' directory.

5. Disconnect the electricity supply from the unit by removing the power lead.

6. Wait for unit to power off.

7. Reconnect the electricity supply to the unit.

6. Observe the front LED display to ensure the upgrade completes sucsessfully.

Updating Software Via Ethernet

The RBRX1 can be assigned a static IP address or may be configured to obtain an IP address automatically using DHCP. You should contact your IT administrator for advice on how best to configure the unit for your network.

Static IP Address:

1. Set DHCP to 'OFF'

2. Navigate to the ethernet menu (in system menu).

3. Set the IP address, Default Gateway and Subnet mask

4. It is recommended that you set the port to '80'

DHCP:

1. Set DHCP to 'ON'

2. Within a few minutes the unit should display the IP address, Default Gateway and Subnet mask which the DHCP server has supplied

3. It is recommended that you set the port to '80'

Update Procedure:

1. Configure ethernet connection using chosen method above.

2. Using a web browser on a PC, connect to the IP address that you have configured the RBRX1 to use.

3. Click on 'Upgrade'.

4. Follow the webpage's instructions.

Interface

The RBRX1 is designed to have an intuitive user interface. All of the units features can be accessed using the front panel capacitive sense buttons and wheel.

Navigating the Menu:

Navigating the menu just requires the wheel in combination with the enter and exit keys. Use the wheel to select a menu and then press the enter key to open it. The exit key will return you to the parent menu.

Editing Parameters:

Find the parameter you wish to edit by navigating the menu, then simpling press the enter key to start editing it. While you are editing a parameter the background and text colors of the parameter will be interverted so that it is always clear whether you are in navigate or edit mode. When you are editing a parameter, the wheel will adjust the parameters value. To stop editing a parameter simply press the exit or enter buttons and you will return the navigate mode.

Text Input:

Text input is required to name presets as well as for setting some parameters. By default the text input system has two modes. In letter-edit mode the wheel lets you select a letter/symbol for the current character. In scroll mode the wheel lets you move between characters.

Soft key one toggles between capital, lowercase letters and symbols.

Soft key two lets you switch into quick input mode.

Soft key three lets you delete a character.

Backup Audio

The RBRX1 can provide playback backup audio in the case of the main feed failing. Audio can be loaded onto the unit over USB by saving a standard wavefile as "backup.wav" in the root of the USB disk.

Switching to backup audio is just a matter of changing the MPX source to 'BACKUP', once this source is selected, "backup.wav" will start playing on loop until this source is deselected. This switchover can be automated by the Alarms/Triggers menu options. This allows an external trigger or internal alarm signal to force the unit into backup mode.

QUICK START

1. Install the RBRX1 into the rack.

2. Connect AC power to the unit, and turn on the power.

3. Connect an antenna to RF In connector.

4. Connect the appropriate audio outputs.

4. Set the frequency.

FM REBROADCASTING USE:

5. Turn de-emphasis off (audio menu).

6. If you are using the MPX Output (preferred), navigate to the ‘STEREO MPX’ menu (in outputs menu), set the 'MPX Generator' to 'RADIO' and adjust the ‘MPX LEVEL’ to match the transmitter (or link device) that follows the receiver. Adjust for 100% modulation with audio.

7. Select a factory preset (see Managing presets).

AF USE (OFF-AIR MONITORING):

5. Turn de-emphasis on (audio menu).

6. Connect the audio and/or digital outputs as required, navigate to the Analog or Digital menu (in outputs menu), set the output to 'RADIO' and the output levels for the analogue and digital outputs to match the equipment that the processor is connected to.

7. Select a factory preset (see Managing presets).

NOTE: The front panel headphone jack connects to the analogue outputs so the sound may be excessively bright if de-emphasis is set to 'off'.

DE-EMPHASIS

If you are using the DSPX-FM to process for FM re-broadcast you will need to disable the de-emphasis filter in the RBRX1.

Even though your STL or transmitter may contain pre-emphasis we recommend disabling it, letting the received RF signal remain pre-emphasised throughout the rebroadcast chain. Using de-emphasis and then pre-emphasising again will only degrade performance and possibly casue overshoots, resulting in lower average deviation.

The exception to the rule is when the RBRX1 is feeding discrete left and right outs to a compressed audio STL. Bit rate reduction codec's do not cope with pre-emphasis very gracefully and artifacts will be generated. The best option in this case is enable de-emphasise in the RBRX1 prior to the STL system. At the transmitter site the pre-emphasis can be enabled in the transmitter to restore the processed signal back to normal prior to transmission.

The best solution is always to locate the re-broadcast receiver at the transmission site. This way overshoots are minimised and quality is maintained.

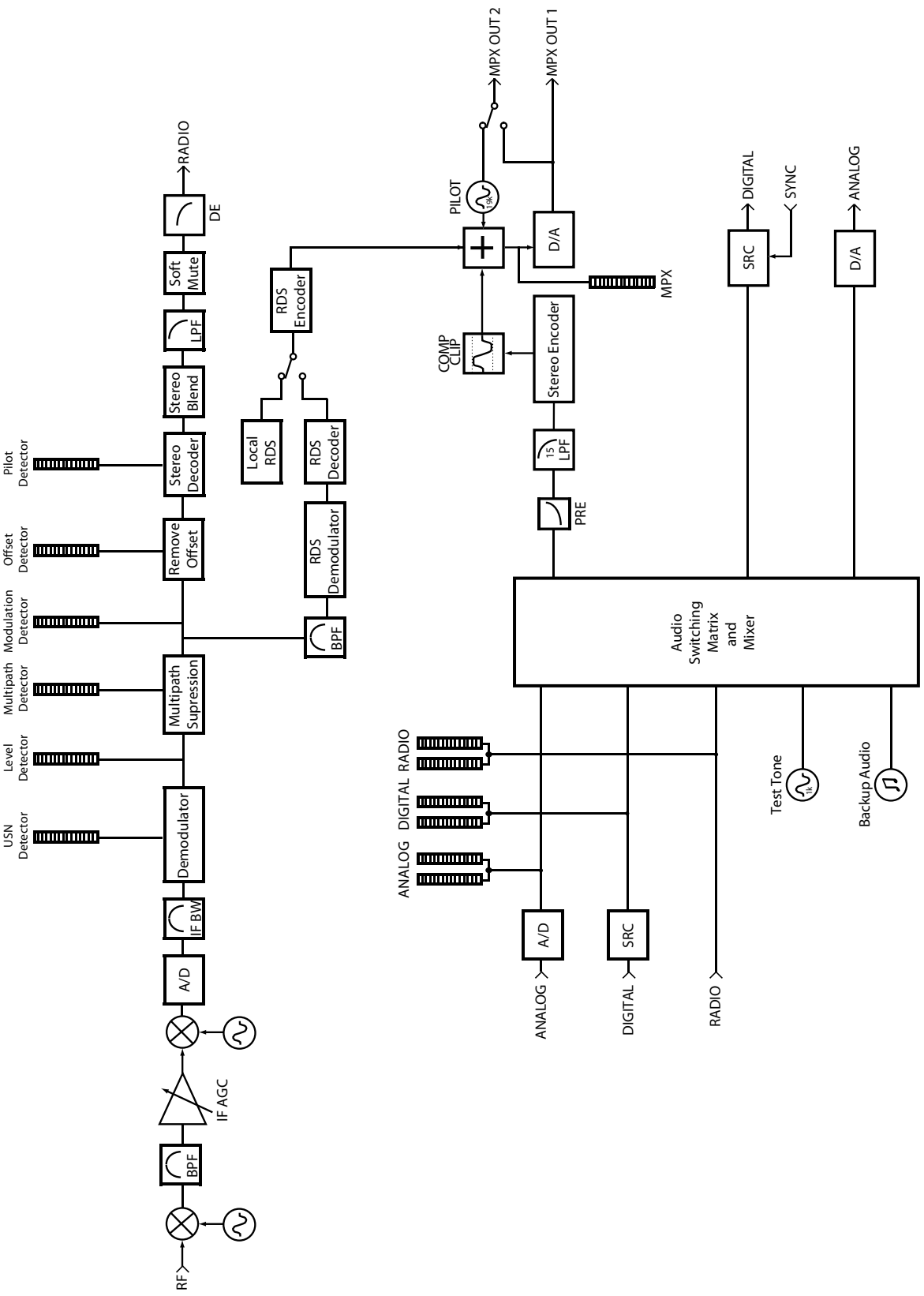
The RBRX1 And Its Processing Structure

The RBRX1 can be used as a high quality off-air reference receiver and as a rebroadcast receiver. The receiver is very sensitive and offers excellent signal selectivity. It is also capable of advanced digital signal processing to produce the best possible audio signal.

At the IF stage the receiver has a automatic or user adjustable filter to provide adjacent channel supression.

After the signal has be demodulated to base band audio the receiver offers three further processing options, stereo blend, high cut and soft mute. Each of these can be controlled by the RF quality indicators of signal, multipath and ultrasonic noise. The stereo blend function can also be controlled by the pilot level indicator.

In addition to these receiver features the RBRX1 offers an RDS generator/repeater and a composite clip protected MPX output protecting you rebroadcasted signal from overshoots. Finally, the RBRX1 has signal quality alarms and features to detect jamming. These control signals can be used to switch in external backup sources (using the analog or digital inputs) or an internal backup audio source.


RBRX1 BLOCK DIAGRAM
RF
BPF
IF AGC
A/D
IF BW
Demodulator
USN Detector
Level Detector
Multipath Detector
Multipath Supression
Modulation Detector
Offset Detector
Remove Offset
Pilot Detector
Stereo Decoder
Stereo Blend
LPF
Soft Mute
DE
RADIO
Local RDS
RDS Encoder
RDS Decoder
RDS Demodulator
BPF
PILOT
COMP CLIP
Stereo Encoder
15 LPF
PRE
MPX
D/A
MPX OUT 2
MPX OUT 1
ANALOG
DIGITAL
RADIO
A/D
SRC
Audio Switching Matrix and Mixer
Test Tone
Backup Audio
SRC
DIGITAL
SYNC
D/A
ANALOG

MENU STRUCTURE

- MENU: RADIO
  - DE-EMPHASIS
  - IF BANDWIDTH
  - MENU: AUTO IF
    - DEFAULT BANDWIDTH
    - MINIMUM BANDWIDTH
    - THRESHOLD EXTENSION
    - MAXIMUM BOOST
    - MULTIPATH SPIKE SENS.
  - MENU: STEREO BLEND
    - STEREO SEPERATION
    - SIGNAL LEVEL START
    - SIGNAL LEVEL ATTACK
    - MULTIPATH START
    - MULTIPATH ATTACK
    - MULTIPATH RELEASE
    - USN START
    - USN ATTACK
    - USN RELEASE
    - PILOT START
    - PILOT ATTACK
    - PILOT RELEASE
  - MENU: HIGH CUT
    - HI CUT LIMIT
    - SIGNAL LEVEL START
    - SIGNAL LEVEL ATTACK
    - MULTIPATH START
    - MULTIPATH ATTACK
    - MULTIPATH RELEASE
    - USN START
    - USN ATTACK
    - USN RELEASE
  - MENU: SOFT MUTE
    - SIGNAL LEVEL START
    - SIGNAL LEVEL ATTACK
    - MULTIPATH START
    - MULTIPATH ATTACK
    - MULTIPATH RELEASE
    - USN START
    - USN ATTACK
    - USN RELEASE
- MENU: AUDIO
  - RADIO VOLUME
  - AUDIO FILTER
  - MENU: MIXER
    - ANALOG
    - DIGITAL
    - RADIO
- MENU: RDS
  - RDS LEVEL
  - SOURCE
  - PS
  - PI
  - PTY
  - RT
- MENU: INPUTS
  - ANALOG GAIN
  - DIGITAL GAIN
- MENU: OUTPUTS
  - HEADPHONE LEVEL
  - MENU: ANALOG
    - ANALOG OUTPUT
  - MENU: DIGITAL
    - DIGITAL OUTPUT
    - SAMPLE RATE
    - LEVEL
  - MENU: STEREO MPX
    - MPX GENERATOR
    - MPX LEVEL
    - PILOT LEVEL
    - PILOT PROTECTION
    - COMPOSITE CLIP
    - OUT2 SOURCE
    - OUT2 LEVEL
- MENU: SCHEDULE (X) REPRESENTS 1-8
  - TIME
  - SYNC TO RDS
  - DAYPARTING ON/OFF
  - MENU: DAYPARTS 1-4
    - DP(X) ON/OFF
    - DP(X) START TIME
    - DP(X) TIME ON (LENGTH)
  - MENU: DAYPARTS 5-8
    - DP(X) ON/OFF
    - DP(X) START TIME
    - DP(X) TIME ON (LENGTH)

- MENU: ALARMS/TRIGGERS (X) REPRESENTS 1-4
  - MENU: TRIGGER INPUTS
    - MENUS: TRIGGER INPUT(X)
      - ACTION
      - PRESET
      - SOURCE
  - MENU: OUTPUTS
    - MENUS: OUTPUT(X)
      - SOURCE
      - DELAY
      - PIN POLARITY
      - THRESHOLD
      - ACTION
      - PRESET
      - SOURCE
- MENU: SYSTEM
  - CODE LOCK
  - MENU: ETHERNET
    - DHCP
    - IP
    - DG (DEFAULT GATEWAY)
    - SM (SUBNET MASK)
    - PORT NUMBER
    - MAC (MAC ADDRESS)
  - SCREEN SAVER
  - CLICKER

RBRX1 PARAMETERS

The 'RADIO' menu contains all of the options and parameters relating to the control and conditioning of the radio signal.

'De-Emphasis' controls the de-emphasis setting of the received audio. Options are Off, 50 µS (Europe) and 75 µS (USA).

'IF Bandwidth' This parameter allows you to manually set the intermediate frequency filter bandwidth, or configure it to be automatically adjusted

The **'AUTO IF'** menu is only available if the IF Bandwidth parameter is set to auto. It allows you to adjust the parameters of the automatic IF adjustment algorithm.

'Default Bandwidth' sets the filter bandwidth that will be used under good signal conditions

'Minimum Bandwidth' sets the minimum filter bandwidth

'Threshold extension' sets the minimum filter bandwidth for low signal strength**s**

'Maximum Boost' For signals with large modulation deviation, the default bandwidth may be too small. This parameter allows the maximum bandwidth boost that will be applied for very heavily modulated signals to be set.

The **'STEREO BLEND'** menu allows you to adjust the parameters of the Stereo Blend algorithm.

'Stereo Seperation' sets the maximum stereo seperation. 100% corresponds to maximum seperation, 0% corresponds to mono.

'Signal Level Start' sets what level the signal needs to drop below to start influencing the amount of stereo blend.

'Signal Level Attack' sets how quickly the stereo blend algorithm responds to the signal level reducing.

'Signal Level Release' sets how quickly the stereo blend algorithm responds to the signal level increasing.

'Multipath Start' sets what level the multipath detector needs to rise to above to start influencing the amount of stereo blend.

'Multipath Attack' sets how quickly the stereo blend algorithm responds to the multipath dectector increasing.

'Multipath Release' sets how quickly the stereo blend algorithm responds to the multipath detector decreasing.

'USN Start' sets what level the ultra-sonic noise detector needs to rise to above to start influencing the amount of stereo blend.

'USN Attack' sets how quickly the stereo blend algorithm responds to the ultra-sonic noise dectector increasing.

'USN Release' sets how quickly the stereo blend algorithm responds to the ultra-sonic noise detector decreasing.

'Pilot Start' sets what level the pilot needs to drop below to start influencing the amount of stereo blend.

'Pilot Attack' sets how quickly the stereo blend algorithm responds to the pilot level reducing.

'Pilot Level Release' sets how quickly the stereo blend algorithm responds to the pilot level increasing.

The **'HIGH CUT'** menu allows you to adjust the parameters of the High Cut algorithm.

'Hi Cut Limit' sets the minimum bandwidth of the high cut filter.

'Signal Level Start' sets what level the signal needs to drop below to start influencing the amount of high cut.

'Signal Level Attack' sets how quickly the hight cut algorithm responds to the signal level reducing.

'Signal Level Release' sets how quickly the hight cut algorithm responds to the signal level increasing.

'Multipath Start' sets what level the multipath detector needs to rise to above to start influencing the amount of hight cut.

'Multipath Attack' sets how quickly the hight cut algorithm responds to the multipath dectector increasing.

'Multipath Release' sets how quickly the hight cut algorithm responds to the multipath detector decreasing.

'USN Start' sets what level the ultra-sonic noise detector needs to rise to above to start influencing the amount of hight cut.

'USN Attack' sets how quickly the hight cut algorithm responds to the ultra-sonic noise dectector increasing.

'USN Release' sets how quickly the hight cut algorithm responds to the ultra-sonic noise detector decreasing.

The **SOFT MUTE'** menu allows you to adjust the parameters of the soft mute.

'Signal Level Start' sets what level the signal needs to drop below to start influencing the amount of soft mute.

'Signal Level Attack' sets how quickly the soft mute responds to the signal level reducing.

'Signal Level Release' sets how quickly the soft mute responds to the signal level increasing.

'Multipath Start' sets what level the multipath detector needs to rise to above to start influencing the amount of soft mute.

'Multipath Attack' sets how quickly the soft mute responds to the multipath dectector increasing.

'Multipath Release' sets how quickly the soft mute responds to the multipath detector decreasing.

'USN Start' sets what level the ultra-sonic noise detector needs to rise to above to start influencing the amount of soft mute.

'USN Attack' sets how quickly the soft mute responds to the ultra-sonic noise dectector increasing.

'USN Release' sets how quickly the soft mute responds to the ultra-sonic noise detector decreasing.

The 'AUDIO' menu contains all of the options and parameters relating to the control and conditioning of the audio signal.

'Radio Volume' allows the volume of the received audio to be adjusted in the range ±3dB.

The **'MIXER'** menu allows you to adjust the volumes of the inputs to the audio mixer.

'Analog' sets the volume of the analog input source.

'Digital' sets the volume of the digital input source.

'Radio' sets the volume of the radio.

The 'RDS' menu contains all of the options and parameters relating to the RDS generator/repeater.

'RDS Level' controls the level of the RDS signal included in the multiplex. Options are Off, 1.5%, 2%, 2.5%, 3%, 3.5%, 4%, 4.5% and 5%.

'Source' controls the source to the RDS generator. Options are Radio, Local, and Radio with local fallback.

'PS' allows the PS (Program Service name) to be set.

'PI' allows the PI (Program Identification) to be set.

'PTY' allows the PTY (Program Type) to be set.

'RT' allows the radiotext to be set

The 'Inputs' menu contains all the controls that affect input level control and signal conditioning.

'Analog Gain' controls the gain applied to the analog signals before they are converted to the digital domain for processing.

'Digital Gain' controls the gain applied to the digital inputs to the unit, enabling calibration of different house reference levels.

The 'Ouputs' menu contains all the controls that affect ouput selection, level control and signal conditioning.

'Headphone Level' sets the output level of the front panel headphone port. Range is 0 to 32 with higher numbers equating to more volume.

The **'ANALOG'** menu contains the controls relevant to the analogue outputs.

'Analog Output' sets which signal will be output on the analog connectors. Options are Radio, AES In, Analog in and Sine.

The **'DIGITAL'** menu contains the controls relevant to the AES/EBU digital outputs.

'Digital Output' sets which signal will be output on the digital connector. Options are Radio, AES In, Analog in and Sine.

'SAMPLE RATE' sets the output sampling rate for the AES/EBU digital output. The available rates are 32 KHz, 44.1 KHz, 48 KHz, follow digital input rate and follow external sync rate.

'Level' controls the peak output level of the digital output. Range is -12dBFS to 0dBFS

The **'STEREO MPX'** menu contains all the controls relevant to the DSP stereo encoder that generates the multiplex signal.

'MPX Generator' sets which signal will be the source of the MPX generator. Options are Radio, AES In, Analog in and Sine.

'MPX Level' controls the output level of the composite MPX output. Range is 0dBu to +12dBu.

'PILOT LEVEL' sets the level of the composite signals 19 Khz pilot tone. The adjustable range is 6% to 12% and an OFF setting for mono applications.

'PILOT PROTECTION' activates a narrow notch filter that protects the pilot in the multiplex signal. If you are using lots of composite clipping, this filter will protect the pilot region from being contaminated with harmonic products. As a consequence, you might need to readjust the MPX output level slightly as activating this filter may increase overshoots slightly (how much will depend on the amount of composite clipping used).

'Composite Clip' controls the drive into the composite clipper which effectively sets the amount of composite clipping. The trange of composite clipping is -0.5dB to +2dB.

'OUT 2 Source' sets which signal will be the source of the second BNC output. Options are MPX generator or Pilot.

'OUT2 Level' controls the output level of the second BNC output. Range is 0dBu to +12dBu.

The 'SCHEDULE' menu contains all the controls for the dayparting (REAL TIME CLOCK) preset switching.

'TIME' Sets the time and day of the RBRX1's Real Time Clock.

'Sync to RDS ON/OFF: Controls whether the RTC is syncronised with time information which arrives over RDS.

'DAYPARTING ON/OFF: Enables or disables the scheduling.

'DP(X) ON/OFF' Enables or disables an individual daypart schedule.

'DP(X)' Sets the preset to switch to when this daypart is triggered.

'DP(X) START' Sets the start time day and time of the daypart. There is also an 'ALL days' option.

'DP(X) LENGTH' Sets the length in minutes that the daypart will run for.

The 'ALARMS/TRIGGERS' menu contains all the controls that affect the alarm outputs, trigger inputs and auto fallback.

The **'TRIGGER INPUTS'** menu contains the controls relevant to the trigger inputs.

The **'TRIGGER INPUT (X)'** menu contains all the controls relevant to the (X)th trigger input

'Action' selects what action the input will trigger. Options are change preset and change source.

'Preset' selects which preset to change to if action is set to change preset.

'Source' selects which source to change to if action is set to change source. Options are Radio, Digital In, Analog in, Mixer, Sine and Backup.

The **'OUTPUTS'** menu contains the controls relevant to the alarm outputs.

The **'OUTPUT (X)'** menu contains all the controls relevant to the (X)th alarm output.

'Source' selects which detector is the source for the alarm. Options are signal, pilot, audio level, USN, Multipath, PI, TA and TP.

'Delay' selects how long the detector has to be in an error state before an alarm is trigger. This also controls how long the detector has to be in a correct state before an alarm is de-activated.

'Pin Polarity' selects whether the output is active high or active low

'Signal' selects the threshold below which the signal will trigger an alarm.

'Pilot' selects the threshold below which the pilot level will trigger an alarm.

'Audio Level' selects the threshold below which the audio level will trigger an alarm.

'USN' selects the threshold above which the USN detector will trigger an alarm.

'Multipath' selects the threshold above which the USN detector will trigger an alarm.

'PI' sets the PI code. If the PI code is different from the one set, an alarm will be triggered

'Action' selects what action the input will trigger. Options are pin only, change preset and change source.

'Preset' selects which preset to change to if action is set to change preset.

'Source' selects which source to change to if action is set to change source. Options are Radio, Digital In, Analog in, Mixer, Sine and Backup.

The 'SYSTEM' menu contains all the system controls (non processing) such as remote control and security

'CODE LOCK' This enables or disables the security code lock. The options are enabled and disabled. More information is available in the code lock section of this manual.

The **'ETHERNET'** menu contains the controls relevant to the LAN/NET port.

'DHCP' Turns on/off the DHCP client, allowing the unit to automatically obtain an IP address, default gateway and subnet mask from a DHCP server.

'IP' Sets the IP address of the LAN port.

'DG' Sets the default gateway of the LAN port.

'PORT' Sets the port number of the webserver.

'Screen saver' This allows the time-out before the screensaver starts to be adjusted between 5 and 30 minutes.

'Clicker' This allows the button click to be turned on/off.

Factory Presets

The factory presets in the RBRX1 should provide excellent results without any modification, but user adjustments to these presets allow some of the trade-offs (for example between bandwidth and noise) to be tweaked.

V1 contains the following factory presets.

F1 Clean
This preset provides a good general purpose set of radio parameters, allowing high quality signals to pass through with very little processing, whilst minimising the increase in noise if the signal deteriorates.

F2 Open
This preset switches out most of the processing, leaving the IF filter open even for very noisy signals.

GPIO

The main menu contains the Triggers/Alarms option from where the GPIO can be configured.

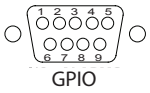
Outputs
The RBRX1 has four opto-coupled outputs, which can be set to provide status outputs when a parameter exceeds a user defined threshold for a longer than a user defined hold time. The outputs can be configured to be active high or low.

Each output is internally connected to a trigger input to facilitate automatic failover.

Trigger Inputs
The RBRX1 has four opto-coupled inputs which allow external signals to change the MPX source or the current preset. The inputs are activated by pulling the pin low. If more than one trigger is active at the same time and configured to produce conflicting behaviour, the lower trigger number gets priority (external triggers are higher priority than internal triggers).

GPIO - Trigger and Alarms D-type connector pinout:

Pin 1 Ground
Pin 2 Alarm C Output
Pin 3 Alarm A Output
Pin 4 Trigger 3 Input
Pin 5 Trigger 1 Input
Pin 6 Alarm D Output
Pin 7 Alarm 2 Output
Pin 8 Trigger 4 Input
Pin 9 Trigger 2 Input



GPIO

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