



Technical Manual

TX-FMBR1 FM Broadcast Repeater with audio (MPX) and RDS back-up



Index

IMPORTANT!

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Ensure compliance with all applicable safety requirements when installing or using this equipment, and operate in accordance with local laws governing the use of radio transmission equipment.

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1. Introduction

1.1 General

The TX-FMBR1 is a 2W VHF FM Broadcast Exciter Transmitter with integral 87.5-108MHz PLL MPX Broadcast Receiver. An external MPX input is available to allow for back-up during parent signal loss, plus an integral RDS encoder is fitted.

The unit features Analogue to Digital measurement technology, with menu driven LCD screens for monitoring and adjustments.

At the heart of the TX-FMBR1 is a broadcast quality exciter. Carrier frequency and output power is selectable via the front panel LCD menu. The output includes an efficient amplifier stage and RF filter.

The integral PLL receiver has a sensitive Front End and high performance IF section. ensuring a high quality MPX signal is recovered with low Signal to Noise levels, thus providing an accurate rebroadcast of the parent station.

The unit can be controlled directly using the simple rear interface to control audio break-in and muting and to provide basic telemetry alarm functions.

A more comprehensive remote control interface uses a simple two wire RS485 data scheme. The unit can be part of system containing up to 32 other units. Each TX-FMBR1 can be assigned an address allowing independent or group control. The user can select the unit's address using the front panel LCD menu controls.

The TX-FMBR1 is designed to operate continually for many years without maintenance. There are no cooling fans to replace and the carefully specified, quality components ensure ultimate reliability.

2. Safety Information

2.1 General Safety Information

Use of this device into a radiating antenna requires a valid licence from a Spectrum Management Authority in most countries.

Never operate this device without a suitable 50 ohm load connected to the RF OUTPUT socket, or without a suitable antenna. Although the output of this transmitter is protected against antenna mismatches, MIS-OPERATION MAY RESULT IN DAMAGE NOT COVERED BY ANY WARRANTY.

Use of this device as part of a transmission system, or combined transmission system not specified by the manufacturer, may require further testing to ensure that it remains compliant with the essential requirements and other relevant provisions of current EU Low Voltage, EMC and Radio Equipment Directives. Approval and clearance from the Spectrum Management Authority may also be required.

RISK OF FIRE! RF (Radio Frequency) energy could cause ignition of combustible surfaces during fault conditions. Installation should be left to qualified personnel. RF can cause burns to skin. Ensure antenna systems and feeder cables are not situated near – or could fall onto – any combustible surface.

Installation must adhere to safety regulations and the requirements of the relevant authorities. We recommend that at least two people are present during installation. Keep a file containing installation instructions and plans, including details of the transmission system (antennas, feeders, filters, etc) and operating instructions for all equipment at the transmission site at all times. Display posters detailing first aid treatment and treatment for electrical shock, along with telephone numbers for contacting the emergency services in the event of personal injury.

To reduce the risk of electrical shock, do not remove the cover, or any screws. There are no user serviceable parts inside; refer servicing to qualified personnel.

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

To reduce the risk of fire, always replace fuses with the same type and rating.

Do not operate this appliance without a suitable 50 ohm load or a suitably matched antenna connected to the RF OUTPUT socket. Although the output devices used in this transmitter are intended to be open and short circuit tolerant, MIS-OPERATION MAY RESULT IN DAMAGE NOT COVERED BY ANY WARRANTY.

This appliance may become warm under normal operating conditions.

2.2 Before Operating This Unit

These instructions should be read in full before the transmitter is operated.

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

All warnings on the transmitter and in the operating instructions should be adhered to.

All operation and user instructions should be followed.

The transmitter should not be used near water.

The transmitter should be mounted into a well-ventilated standard 19 inch equipment rack. It should be situated so that its location or position does not interfere with its proper ventilation.

The transmitter should be situated away from heat sources.

The transmitter should be connected to a power supply only of the type described in the operating instructions or as marked on the unit.

Precautions should be taken so that the grounding or polarisation means of this appliance is not defeated.

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 and the point where they exit from the transmitter.

The unit should be cleaned only as recommended by the manufacturer.

The power cord of the transmitter should be unplugged from the outlet when left unused for a long period of time.

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

The transmitter 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 it; or - The transmitter has been exposed to rain; or - The transmitter does not appear to operate normally or exhibits a marked change in performance; or - The transmitter has been dropped, or the enclosure damaged.

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

3. Controls & Connections

3.1 Front Panel Controls and Connectors

RF (Radio Frequency) Monitor BNC. Allows monitoring of the RF output. Output level will be the output power attenuated by approximately 50dB.

AF (Audio Frequency) Monitor BNC. For monitoring of the input to the modulator (AF spectrum).

UP Push-button. Press this control to navigate the LCD menu.

DOWN Push-button. Press this control to navigate the LCD menu.

ENTER Push-button. Press this control to navigate the LCD menu.

3.2 Rear Panel Connectors

AC POWER

Connect a power lead with an IEC connector (and a 3 Amp fuse in the plug or at the distribution panel) to this socket. A 2 Amp time delay fuse is fitted in this connector.

MPX IN.

BNC Socket. Unbalanced multiplex input. Connect a +8dB (For 75kHz deviation) unbalanced MPX feed to this socket.

MPX OUT.

BNC Socket. Unbalanced multiplex output. This is a fully buffered loop output for feeding other transmitters with the same audio source. The gain is set to unity.

RF OUTPUT

'N' Socket. Connect a matched, pre-tested antenna system with a return loss of $\geq 14\text{dB}$ to this socket. Use good quality, solid copper screened Feeder systems to ensure best RF input to output isolation and performance.

RF INPUT

'N' Socket. Connect a matched, pre-tested antenna system. Use good quality, solid copper screened Feeder systems to ensure best RF input to output isolation and performance.

CONTROL I/O

9-way Female Socket. Allows monitoring of status alarms and control of input switching and RF output switching.

PIN 1: OUTPUT: RX SIGNAL LOSS (MUTED) - pulls low when active
PIN 2: OUTPUT: FORWARD POWER ALARM - pulls low when active
PIN 3: OUTPUT: REVERSE POWER ALARM - pulls low when active
PIN 4: INPUT: EXTERNAL MPX I/P ('BREAK-IN') CONTROL (Ground to activate)
PIN 5: INPUT: MUTE RF OUTPUT (Ground to activate)
PIN 6: GND
PIN 7: GND
PIN 8: GND
PIN 9: GND

Pins 1, 2 and 3 are 'Open Collector' outputs capable of operation up to 50V and sinking a current of 75mA maximum. Outputs are high, (ie. pull low) when the condition is 'good' provide inherent 'power failure' or 'connector failure' signalling possibilities for the user.

Pin 4 Ground this pin to 'AUX-IN' (MPX input 'Break-in') mode.

Pin 5 Ground this pin to 'mute' the RF Output, if desired.

All signals must be referenced to the unit's chassis ground (PINS 6, 7, 8 and 9).

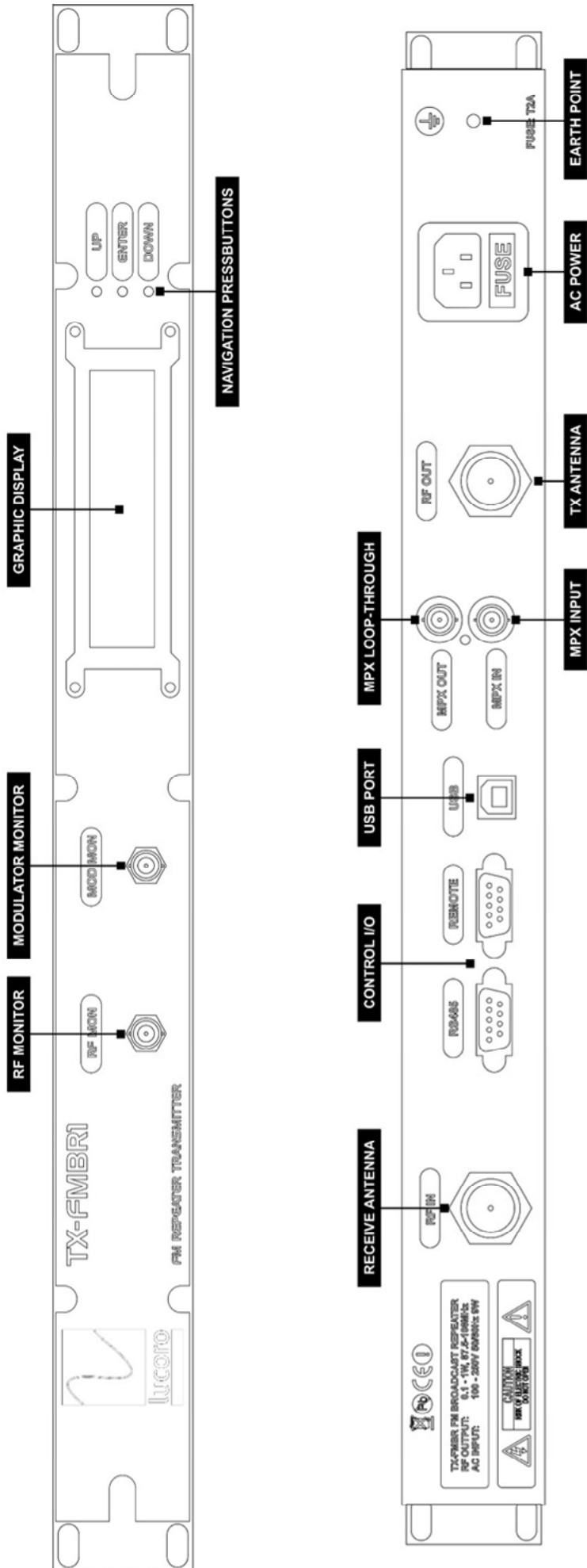
RS485

9-way Female Socket. Allows monitoring and control using an addressable ASCII based 2-wire RS485 control protocol (see section 9 for full details).

PIN 8: DATA +
PIN 9: DATA -

A Ground connection can be made, if desired, to Pins 1 and/or 2.

FRONT AND REAR PANEL CONTROL AND CONNECTORS



4. Installation

4.1 Connections

Connect a matched, pre-tested antenna system to the RF OUPUT socket on the rear of the unit.

Connect an unbalanced +8dB multiplex feed to the MPX IN BNC socket. A buffered 'Loop-through' output is provided by the MPX OUT BNC.

IMPORTANT! For Broadcast Regulator compliance, it is essential that audio connected to the MPX IN BNC socket has been correctly conditioned by a Broadcast Audio Processor, to remove any content over 15KHz in frequency, and level that would exceed ± 75 kHz in deviation.

Connect a 50 Ohm antenna system for reception of FM parent service.



The optimum received signal level is 50dBu. Lower levels will may contain noise which could cause non-compliance with regulatory spectral occupancy limits. Likewise, received signal levels higher than 50dBu will over-load the receiver's front-end circuitry, again causing non-compliance of the spectral occupancy.

If desired, connect a 9-way Male plug to the CONTROL I/O connector in order to monitor and control the unit remotely.


If desired, connect a 9-way Male plug to the RS485 connector in order to monitor and control the unit remotely.


Connect the transmitter to a suitable power source using the supplied IEC connector power lead. Ensure that the appliance is protected by a 3A fuse either at the supply plug or at the distribution panel.

4.2 Switching On

Ensure a suitable load is connected to the RF OUPUT socket before connecting the unit to mains power. **IMPORTANT! FAILURE TO DO SO MAY RESULT IN DAMAGE NOT COVERED BY WARRANTY.**

4.3 Operation

In 'Receiver Mode', the unit will rebroadcast FM signals received via its integral tuner. The display will show the signal strength icon  and the received signal level. If no signal is present on the selected frequency, the RX alarm will be present on the CONTROL I/O of the rear 9-way 'D' I/O CONTROL connector (pin 4), or the relevant notification is sent via the RS485 bus (if used).

When the 'External (break-in) Mode' is activated (by applying a logic or via an RS485 data command), the display will show the audio input icon  and 'MPX'

The display also shows the Forward RF Power and Reflected RF Power in milliwatts, the Receiver and Transmitter frequencies, plus the RS485 address. Like any transmission equipment, all displayed measurements are intended only as a guide. If accurate set-up is required (e.g. for regulatory authority compliance), external

calibrated test equipment should be used, fed via a directional coupler directly connected to the RF Output socket.

4.4 Settings

All setting options can be accessed via the main screen. Press OK and RF Power will flash. Press OK again to select the current option or press the UP or DOWN key to navigate to the following options. Pressing OK will allow for changing the currently highlighted option by using UP and DOWN to select the desired setting. Press OK to save.

SET RF OUTPUT POWER. Once highlighted, press OK. Use the UP and DOWN push-buttons to select the desired RF output power setting. The output power changes with immediate effect and is stored in a non-volatile memory. USE AN EXTERNAL POWER METER TO SET THE RF POWER OUTPUT ACCURATELY, if required.

SET TRANSMITTER FREQ. Once highlighted, press OK. Use the UP and DOWN push-buttons to select the desired Transmission frequency. Press OK to store. The setting will be held in non-volatile memory.

SET RECEIVER FREQ. Once highlighted, press OK. Use the UP and DOWN push-buttons to select the desired Receiver frequency. Press OK to store. The setting will be held in non-volatile memory.

DATA BUS ADDRESS. Once highlighted, press OK. Use the UP and DOWN push-buttons to select the unit's desired RS485 Address. Press OK to store. The setting will be held in non-volatile memory. As a operational precaution, the new address will take effect after the unit has been re-booted (power cycled off, then on again).

4.5 Co-channel Operation

When used to relay signals on the same frequency as the received parent station, it is important to maintain a good isolation between the transmitted signal and the received signal. The transmitted audio will begin to distort at around 20dB difference between desired and unwanted signals, becoming quite noticeable by 10dB.

The internal isolation between the input and output is around 95dB which means that for 800mW (29dBm) output the minimum recommended receiver input should be -50dBm (just under 1mV) in order to provide reasonably clean audio and good RDS decoding.

5. Internal Adjustments

IMPORTANT! REMEMBER THAT HIGH VOLTAGE IS PRESENT INSIDE THE UNIT. ISOLATE THE SUPPLY BEFORE REMOVING ANY COVERS.

Unless requested otherwise, the unit will have left the factory with the modulation level pre-set internally for a 1:1 relay of received signals from the integral receiver. This can be further adjusted internally, if necessary. When using the EXTERNAL (Audio/MPX) input, the level must be set on external equipment providing the MPX signal (e.g. the Multiplex Encoder or Processor output), to achieve the correct AF level. To do this accurately, a calibrated Deviation Meter will be required. This level can be further adjusted internally, if necessary.

5.1 Transmitter Carrier Frequency Trim (Fine Tuning)

Connect a frequency meter to the front panel "RF" BNC socket. Adjust VC1 on the PCB.

5.2 External Audio/MPX Input Modulation Level

Connect a Deviation Meter to the front panel "RF MON" BNC socket. Adjust VR1 on the PCB for desired deviation. The Internal RDS Encoder injection level may need to be updated appropriately. It is, however, preferable to adjust the level of external equipment connected to the unit.

5.3 Internal RDS Encoder Injection Level

Connect a Deviation Meter to the front panel "RF MON" BNC socket. Adjust VR2 on the PCB for desired deviation.

5.4 Receiver Modulation Level

Connect a Deviation Meter to the front panel "RF MON" BNC socket. Adjust VR3 on the PCB for desired deviation (normally 1:1, equal to the parent station).

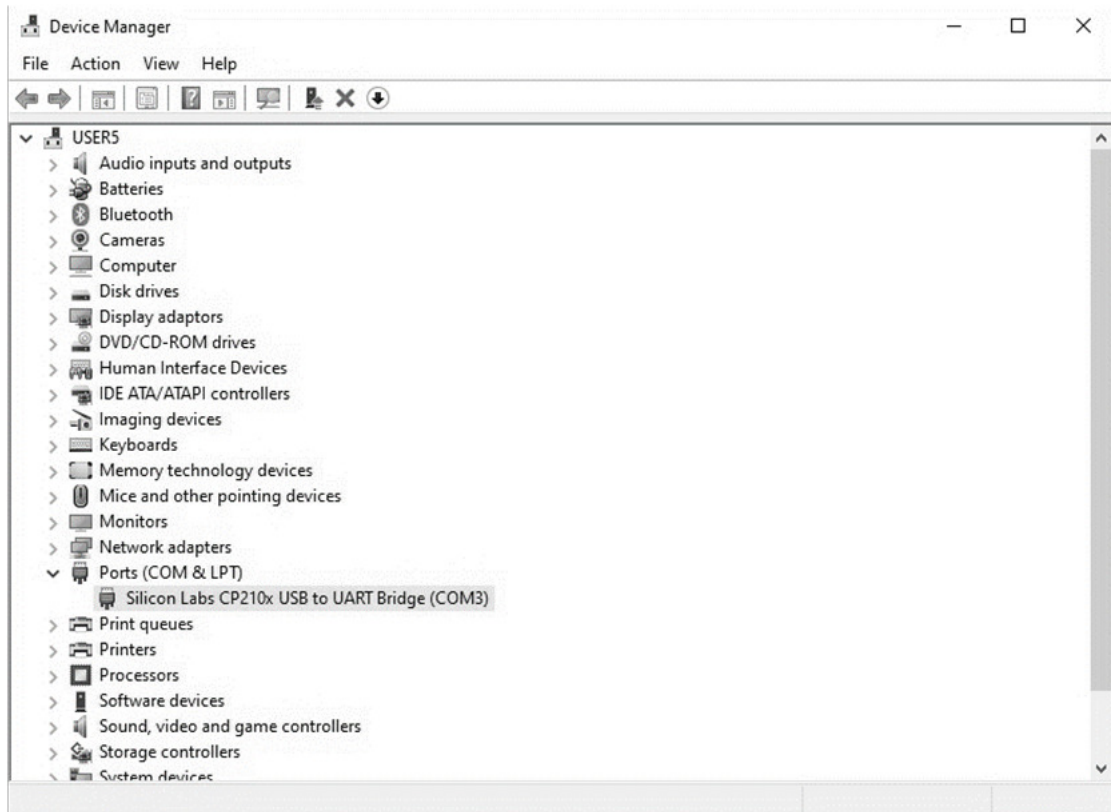
5.5 Updating RDS Content

The RDS can be updated using a standard PC or Laptop running Windows. Download the RDS application from the manufacturer's website. The application is a self-contained 'exe' file, and does not require installation. Connect a USB cable between the PC and the TX-FMBR1 USB port on the rear panel. Ensure the TX-FMBR1 is powered up, with a suitable RF load termination. A driver is required, and should automatically be installed by Windows over an Internet connection (however, if programming is to be achieved at a remote transmission site without an Internet connection, it is advised to ensure that the correct driver is pre-installed).

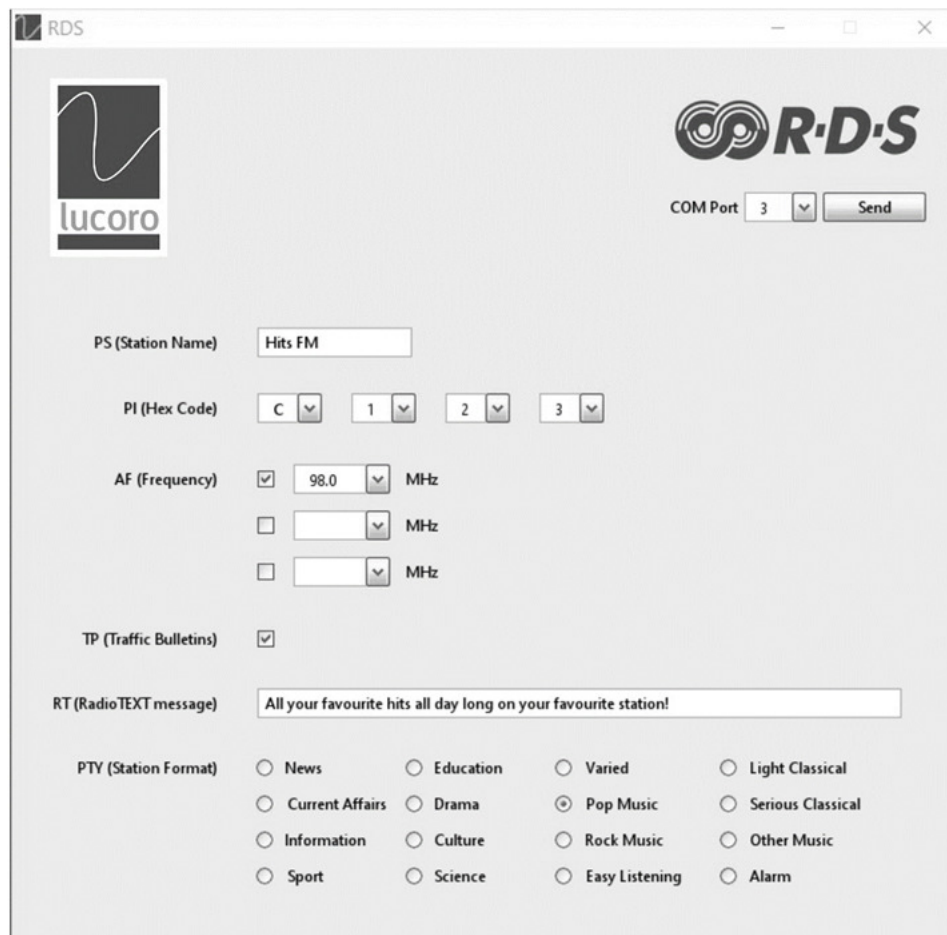
The driver is 'Silicon Labs CP210x USB to UART Bridge VCP Driver' and can be downloaded from <https://www.silabs.com>. The driver files are also available on the TX-FMBR1 manufacturer's web site.

The Windows USB RDS program will require the 'COM Port' number to be selected from a drop-down box. Use Windows Device Manager to find the active COM Port as shown.

Use the internal TA PCB jumper to select whether the RDS TA feature is present during break-in announcements (link pins 1 and 2). Defeat by linking pins 2 and 3.



Load the Windows USB RDS program and enter the required RDS content.



6. RS485 Control

6.1 Protocol

If desired, the unit can be controlled using a simple two wire RS485 data scheme. The unit can be part of system containing up to 32 other units. Each TX-FMBR1 can be assigned an address allowing independent or group control. The user can select the unit's address using the front panel LCD menu controls (see 'Settings' section).

The data protocol is RS485, 9600bps, 8 bits, no parity, 1 stop bit (8N1).

6.2 Message Structure

Message = [AD] [ID] [DATA]

[AD] Is the unit's unique 1 byte address (set by the user on the unit's front panel menu).

[ID] Is the 1 byte identifier.

[DATA] Is the 2 byte data field of the message, the most significant byte is sent first.

The protocol is ASCII oriented.

For the transmission of a message, each byte is ASCII coded, meaning that two ASCII characters are used to transmit one useful byte. For example the message byte 0xF3 will be transmitted as 0x46 ('F' ASCII code) plus 0x33 ('3' ASCII code).

A Complete message is:

[AD] [ID] [DATA] [CRC] [SUFFIX] ['CR LF']

'CR LF' is the 2 ASCII characters Carriage Return (0x0D) and Line Feed (0x0A).

'CRC' is the Cyclic Redundancy Check (error checking) byte.

The following 'read' request can be used, with any ID, to obtain its current status:

Request Message = [AD] [ID] [CRC] [SUFFIX] ['CR LF']

The unit will reply using the following format:

Answer Message = [AD] [ID] [DATA] [CRC] [SUFFIX] ['CR LF']

All units can be addressed and updated simultaneously ('message broadcast mode') using the address 0xFF. All setting data can be sent using this method, but 'read' operations have to be performed addressing each unit individually.

6.3 CRC Cyclic Redundancy Check

To ensure that the data received has not been corrupted during transmission, an error checking byte must be calculated and sent for each message. This byte is a simple Exclusive OR function (XOR) of the useful bytes contained within the message:

Write: [AD] XOR [ID] XOR [DATA] XOR [DATA] = CRC Byte

Read: [AD] XOR [ID] = CRC Byte

Likewise, when the TX-FMBR1 replies, the data will include a CRC byte, calculated in the same way. This can be used to check the integrity of the reply in the same way:

Reply: [AD] XOR [ID] XOR [DATA] XOR [DATA] = CRC Byte

6.4 Read Commands

TXFMBR1 Command Set	Identifier Decimal	Identifier Hex	Data field Byte Size
Get TX Frequency Setting	101	0x65	0
Get RX Frequency Setting	102	0x66	0
Get TX Power Setting	103	0x67	0
Get Voice Break-in Control Setting	104	0x68	0
Get Mute TX RF Control Setting	105	0x69	0
ALARM RX Signal Loss	201	0xC9	0
ALARM TX Forward Power Alarm	202	0xCA	0
ALARM TX Reverse Power Alarm	203	0xCB	0
ALARM PLL	204	0xCC	0

6.5 Write Commands

TXFMBR1 Command Set	Identifier Decimal	Identifier Hex	Data field Byte Size
Reset	0	0x00	2
Set TX Frequency	1	0x01	2
Set RX Frequency	2	0x02	2
Set TX Power	3	0x03	2
Set Voice Break-in Control	4	0x04	2
Set Mute TX RF Control	5	0x05	2

6.6 Command Descriptions

Reset:		
Command Type: Write	Identifier: 0	0x00
Command Description: This command is used to reset the unit to its power-up state		
Byte 1 to 2:	Reset message Byte 1 is the MSB and Byte 2 is the LSB Reset should be coded as 0x00, 0x01	
Notes: Further communication will be inhibited whilst the unit reboots. Allow the process to complete before sending any more data.		

Set TX Frequency:		
Command Type: Write	Identifier: 1	0x01
Command Description: This command is used to set the Transmission Frequency		
Byte 1 to 2:	Value of the centre Frequency expressed in NNNN x100kHz 875 to 1080. Default = 980 Byte 1 is the MSB and Byte 2 is the LSB For example, 98.0 should be coded as 0x03, 0xD4	
Notes: Further communication will be inhibited whilst the unit reboots. Allow the process to complete before sending any more data.		

Set RX Frequency:		
Command Type: Write	Identifier: 2	0x02
Command Description: This command is used to set the Receive Frequency		
Byte 1 to 2:	Value of the Frequency expressed in NNNN x100kHz 875 to 1080. Default = 980 Byte 1 is the MSB and Byte 2 is the LSB For example, 98.0 should be coded as 0x03, 0xD4	
Notes:		

Set RF Output Power:		
Command Type: Write	Identifier: 3	0x03
Command Description: This command is used to set the Transmission RF Output Power		
Byte 1 to 2:	RF Output Power level expressed in mW (milliwatts) 100 to 1100. Default = 500 Byte 1 is the MSB and Byte 2 is the LSB For example, 900 should be coded as 0x03, 0x84	
Notes: Values must be 10mW resolution. For example; 910mW or 920mW, not 915mW. An incorrect value will be ignored.		

Voice Break-in Control:		
Command Type: Write	Identifier: 4	0x04
Command Description: This command is used to activate or deactivate the Voice Break-in feature		
Byte 1 to 2:	0 (Off) or 1 (On). Default = 0 (Off) Byte 1 is the MSB and Byte 2 is the LSB For example, activation of the voice break-in should be coded as 0x00, 0x01	
Notes: RS485 cannot turn off a TLL ON (Control I/O) command.		

Mute RF Output Power:		
Command Type: Write	Identifier: 5	0x05
Command Description: This command is used to mute the Transmission RF Power Output		
Byte 1 to 2:	0 (Off) or 1 (On). Default = 0 (Off) Byte 1 is the MSB and Byte 2 is the LSB For example, activation of the RF mute control should be coded as 0x00, 0x01	
Notes: Upon reactivation, the RF power will return to the previously stored level.		

Read RF Output Power:		
Command Type: Request	Identifier: 103	0x67
Command Description: This command is used to get the current Transmission RF Output Power setting		
Byte 1 to 2:	RF Output Power level expressed in NNNN mW 100 to 1100mW Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read TX Frequency:		
Command Type: Request	Identifier: 101	0x65
Command Description: This command is used to get the current TX Frequency setting		
Byte 1 to 2:	Value of the centre Frequency expressed in NNNN x100kHz 875 to 1080. Default = 98.0 Byte 1 is the MSB and Byte 2 is the LSB For example, 98.0 should be coded as 0x03, 0xD4	
Notes:		

Read RX Frequency:		
Command Type: Request	Identifier: 102	0x66
Command Description: This command is used to get the current Receive Frequency setting		
Byte 1 to 2:	Value of the Frequency expressed in NNNN x100kHz 875 to 1080. Default = 980 Byte 1 is the MSB and Byte 2 is the LSB For example, 98.0 should be coded as 0x03, 0xD4	
Notes:		

Read Voice Break-in Status:		
Command Type: Request	Identifier: 104	0x68
Command Description: This command is used to get the current status of the 'Voice Break-in' feature		
Byte 1 to 2:	0 (Off) or 1 (On) Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read RF Mute Status:		
Command Type: Request	Identifier: 105	0x69
Command Description: This command is used to get the current status of the RF Output Power Mute		
Byte 1 to 2:	0 (Off) or 1 (On). Default = 0 Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read RX Signal Loss Status:		ALARM
Command Type: Request	Identifier: 201	0xC9
Command Description: This command is used to get the current status of the RX mute alarm (Receiver signal loss)		
Byte 1 to 2:	0 (Off) or 1 (Alarm On) Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read Forward Power Status:		ALARM
Command Type: Request	Identifier: 202	0xCA
Command Description: This command is used to get the current status of the Transmitter RF alarm (TX fail)		
Byte 1 to 2:	0 (Off) or 1 (Alarm On) Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read TX Reverse Power Status:		ALARM
Command Type: Request	Identifier: 203	0xCB
Command Description: This command is used to get the current status of the reflected RF power alarm		
Byte 1 to 2:	0 (Off) or 1 (On) Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

Read Alarm TX PLL Status:		ALARM
Command Type: Request	Identifier: 204	0xCC
Command Description: This command is used to get the current status PLL alarm (TX fail)		
Byte 1 to 2:	0 (Off) or 1 (On) Byte 1 is the MSB and Byte 2 is the LSB	
Notes:		

7. RS485 Communication Examples

Please see earlier section “RS485” for full details on data control and communications.

If using a keyboard Terminal program, remember that all ASCII letters are CAPITALS.

Write Command examples (unit address = 0x01)

Command	Address	Identifier	Message	Message	CRC	Suffix	Suffix
Reset	01	00	00	01	00	0D	0A
Reply	01	00	00	01	00	0D*	0A*
Set TX Frequency to 98.0MHz	01	01	03	D4	D7	0D	0A
Reply	01	01	03	D4	D7	0D*	0A*
Set RX Frequency to 103.0MHz	01	02	04	06	01	0D	0A
Reply	01	02	04	06	01	0D*	0A*
Set TX Output Power to 500mW	01	03	01	F4	F7	0D	0A
Reply	01	03	01	F4	F7	0D*	0A*
Set Voice Break-in Control ON	01	04	00	01	04	0D	0A
Reply	01	04	00	01	04	0D*	0A*
Set Voice Break-in Control OFF	01	04	00	00	05	0D	0A
Reply	01	04	00	00	05	0D*	0A*
Set Mute TX RF Control ON	01	05	00	01	05	0D	0A
Reply	01	05	00	01	05	0D*	0A*
Set Mute TX RF Control OFF	01	05	00	00	04	0D	0A
Reply	01	05	00	00	04	0D*	0A*

Read Command examples (unit address = 0x01)

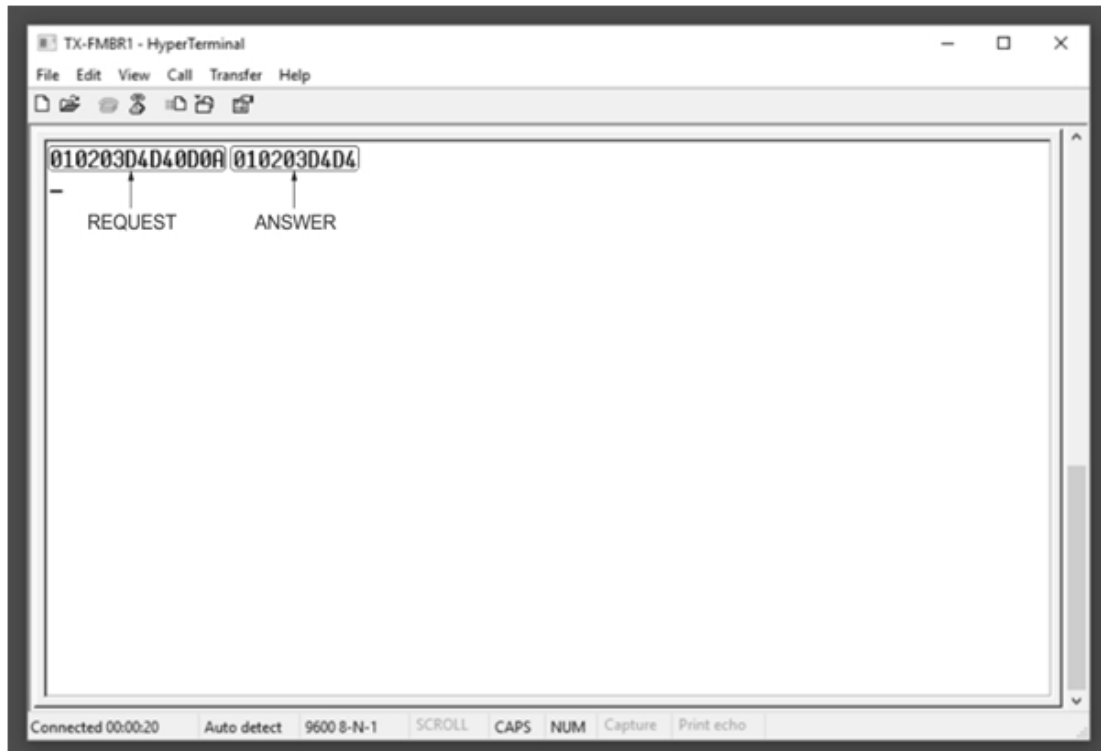
Command	Address	Identifier	Message	Message	CRC	Suffix	Suffix
Get TX Frequency	01	65			64	0D	0A
Reply (example: 98.0MHz)	01	65	03	D4	B3	0D*	0A*
Get RX Frequency	01	66			67	0D	0A
Reply (example: 103.0MHz)	01	66	04	06	65	0D*	0A*
Get TX Output Power	01	67			66	0D	0A
Reply (example 990mW)	01	67	03	DE	BB	0D*	0A*
Get Voice Break-in Status	01	68			69	0D	0A
Reply (if status = ON)	01	68	00	01	68	0D*	0A*
Reply (if status = OFF)	01	68	00	00	69	0D*	0A*
Get Mute TX RF Output Control	01	69			68	0D	0A
Reply (if status = ON)	01	69	00	01	69	0D*	0A*
Reply (if status = OFF)	01	69	00	00	68	0D*	0A*

Read Command ALARM examples (unit address = 0x01)

Command	Address	Identifier	Message	Message	CRC	Suffix	Suffix
Get Alarm Rx Signal Loss	01	C9			C8	0D	0A
Reply (if status = ALARM)	01	C9	00	01	C9	0D*	0A*
Reply (if status = NO ALARM)	01	C9	00	00	C8	0D*	0A*
Get Alarm RF Fwd	01	CA			C8	0D	0A
Reply (if status = ALARM)	01	CA	00	01	CA	0D*	0A*
Reply (if status = NO ALARM)	01	CA	00	00	CB	0D*	0A*
Get Alarm RF Ref	01	CB			CA	0D	0A
Reply (if status = ALARM)	01	CB	00	01	CB	0D*	0A*
Reply (if status = NO ALARM)	01	CB	00	00	CA	0D*	0A*
Get Alarm RF PLL	01	CC			CD	0D	0A
Reply (if status = ALARM)	01	CC	00	01	CB	0D*	0A*
Reply (if status = NO ALARM)	01	CC	00	00	CC	0D*	0A*

* When using a keyboard terminal program, these characters may not appear. Instead, a Line Feed and Carriage Return will result.

The image below shows communication using HyperTerminal(TM) on a Windows(TM) PC. The request is to change the Receiver's frequency to 98.0MHz. The TX-FMBR1's answer is shown, which confirms the request.



8. Declaration Of Conformity

EC Declaration of Conformity to R&TTE Directive 1999/5/EC

We, Lucoro Broadcast
Clay Pit Lane
Roecliffe
York
YO51 9FS

hereby take sole responsibility to confirm that the products:

TX-FMBR1

which this declaration refers to, conforms to all applicable requirements of EU Directive 2014/53/EU and is CE marked accordingly:

Low Voltage Directive 2014/35/EU:

IEC 60950-1:2005/A2:2013
Safety Requirements for equipment < 600V

EMC Directive 2014/30/EU:

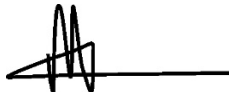
ETSI EN301 489-53 v1.1.0 (ETSI EN301 489-1 v2.1.1
ERM/EMC for Radio Equipment
Specific Conditions for FM Transmitters (Part 11)

Radio Equipment Directive 2014/53/EU:

ETSI EN302018-2 v2.1.1
Transmitting Equipment for FM Radio Broadcasting service

The following operation conditions and installation arrangements have to be presumed:

- (i) According to Operating Instruction Manual
- (ii) Connected lead lengths of 2 metres or less



M. O'Rorke, Director
September 2020

9. Technical Specifications

RF:

Frequency range	87.5 to 108.00MHz in 100KHz steps
Frequency stability	Better than ± 200 Hz
Output power	0.5 - >2.0W
Harmonic & spurious output	-75dBc (9kHz to 1GHz)
AM Noise	<0.5% @ ± 40 kHz deviation
THD	<0.15% @ ± 75 kHz deviation

Audio Interface:

Audio Input Level	+6dBu (adjustable) for ± 75 kHz deviation
Audio Input Impedance	500 Ohms
Audio Loop Out	0dB (unity gain)
Audio Loop Output Impedance	<25 Ohms

Receiver:

Frequency range	87.5 to 108.00MHz in 100KHz steps
Antenna	75 ohms
Useable sensitivity	6dBuV typical
Signal to Noise ratio	65dB @ 98MHz typical
IF rejection	90dB @ 98MHz typical
AM suppression ratio	50dB typical
Effective selectivity	75dB @ ± 400 kHz typical
Mute Level	-70dBm

Power Supply:

Input AC	90V to 250V (50/60 Hz)
Consumption	9W (at 230V 50Hz)

Mechanical:

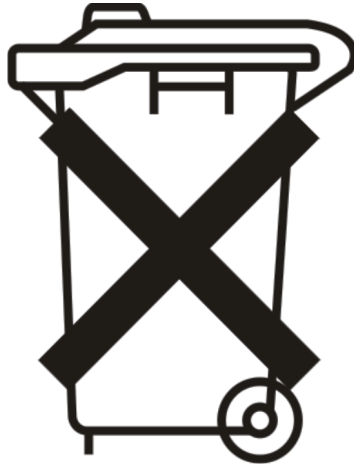
Size (mm)	Size 43 (H) x 483 (W) x 150 (D) mm
Weight	1.0kg
Temperature	0°C to +40°C
Humidity	95% (relative non-condensing)

We reserve the right to alter specifications without notice. E&OE.

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WEEE - Waste Electrical and Electronic Equipment

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration. You can also contact us for more information on the environmental performances of our products.