User Manual

FMTX2

Stereo FM Transmitter with integrated
Audio Processor, Stereo Encoder
and RDS Encoder

WARNING!

This Transmitter is capable of generating RF potential. Touching internal parts, or the connected antenna system, may cause RF burns. Antenna systems should be installed such that exposure by any person to RF fields cannot exceed safe limits. The permitted limits vary from country to country. Expert advice should be sought about the safe installation of this transmission system.

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.

WARNING!

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

IMPORTANT!

Correct operation of the cooling fans in this product is vital to reliable continuous operation. Schedule bi-annual maintenance checks. We strongly advise the use of a standby transmitter system for use during maintenance events or fault conditions, to prevent prolonged breaks in transmission.

IMPORTANT!

When cycling the power off, then on, ensure that the transmitter is off for at least 10 seconds before re-applying power, to allow the internal circuits time to fully reset. Failure to do so may result in no RF output (PLL failsafe mode).

Consideration should be given to fitting a suitably rated UPS if power interruptions are likely. Similarly, telemetry reset of power may be advisable for transmitters in remote areas, or having restricted access arrangements.

IMPORTANT!

Always reduce the RF Output power to minimum before changing the transmission frequency. Once the new frequency is active, slowly increase the RF output power control to provide the required power output level.

Introduction

The FMTX2 is a fully integrated 2W Stereo FM broadcast system with audio processing, stereo encoder and RDS encoder in a single, highly compact product.

The audio processor circuitry has slow gain-riding AGC, 5-band compression/limiting, plus clipping and DSP 15KHz filtering.

The integral RDS encoder uses direct digital waveform synthesis for clean, perfect generation of the 57kHz subcarrier. As well as PS (station name) information, extended features such as RadioTEXT are also broadcast. Being standalone, a dedicated computer or data feed are not required. Periodic content updates are easily performed using a Windows™ Laptop or PC, plugged into a USB port located on the back panel.

At the heart of the FMTX2 is a high quality PLL modulator, and the RF Power Amplifier uses the latest high-gain Enhancement Mode MOSFET device, achieving new levels of efficiency and reliability.

Before operating

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.

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

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.

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.

Ensure antenna system lightning strike protection is in place.

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.

Do not expose this appliance to rain or moisture. The transmitter should not be used near water. Care should be taken so that objects do not fall - and liquids are not spilled - into the enclosure through openings.

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

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 of this appliance is not defeated.

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

The transmitter should be serviced by qualified service personnel if it does not appear to operate normally, exhibits a marked change in

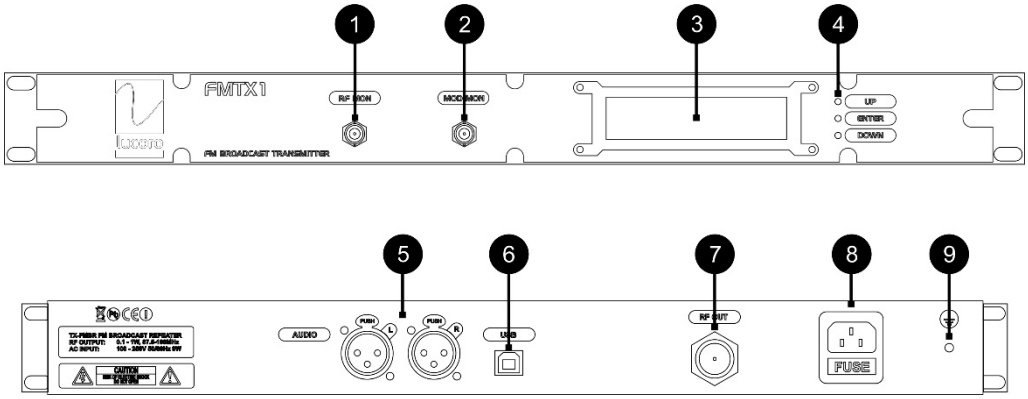
performance, has been subjected to shock, damage, moisture, or if foreign objects have ingressed.

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.

This appliance may become warm under normal operating conditions.

Recycle according to WEEE regulations.

Controls and Connectors



1. RF MON BNC connector for monitoring of the RF output. Output level will be the RF output level attenuated by approximately 40dB. Not to be used for measurement of harmonics.

2. MPX MON BNC connector for monitoring of the input to the modulator (baseband spectrum).

3. DISPLAY G-LCD type display for system readings and settings.

4. UP / ENTER / DOWN Push-buttons. Press this control to navigate the LCD menu.

5. AUDIO IN (LEFT / RIGHT) XLR Sockets. Connect a +8dB 600ohm balanced audio feed to these sockets.

6. USB Port. Connect the to Windows™ PC or Laptop to program the RDS content. Free software can be downloaded at: lucorobroadcast.com/support

7. RF OUT 'N' Socket. Connect a matched, pre-tested antenna system with a return loss of >=14dB to this socket. Ensure all parts of the feeder and antenna system are rated for 3W or above

8. POWER. Connect a power lead with an IEC C13 connector (and a 3 amp fuse in the plug or at the distribution panel) to this socket. Two T2 amp (time delay) fuses are fitted within this connector's Fuse carrier.

9. EARTH. Grounding connection point (M4 stud and bolt).

Installation

Connect a suitable rated test load 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.

Power-up the unit and reduce the RF output power to a low level. See 'Setting the Transmission Power Output'.

Using the front panel display and buttons, set the desired transmission frequency. See 'Setting the Transmission Frequency".

The factory will have set the deviation, RDS and pilot injection levels. They should need no further adjustment. However, if absolutely necessary, these can be changed as follows (NOT recommended):

> ELECTRIC SHOCK AND RF BURN HAZARD! DISCONNECT THE POWER BEFORE REMOVING ANY COVERS.
>
> To adjust the deviation level, remove the unit's top cover and locate the "DEV" preset trimmer control on the internal PCB. Using a suitable trimmer tool carefully adjust the control.
>
> To adjust the RDS level, remove the unit's top cover and locate the "RDS" preset trimmer control on the internal PCB. Using a suitable trimmer tool carefully adjust the control.

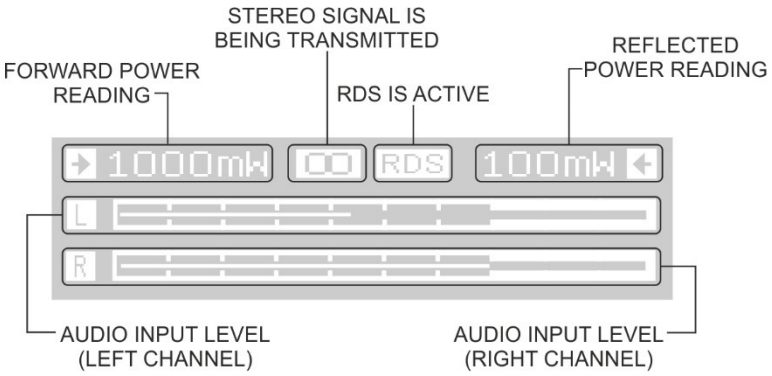
To adjust the 19kHz Pilot level, remove the unit's top cover and locate the "PILOT" preset trimmer control on the internal PCB. Using a suitable trimmer tool carefully adjust the control.

Take GREAT CARE not to adjust any other circuit trimmer controls. Even the slightest adjustment WILL degrade performance and may cause non-compliance to broadcast regulations.

Connect Left and Right Audio to the rear panel XLR connectors, and adjust the source level so that maximum audio peaks register just below the peak section of the front panel audio level bar graph display. Use ordinary programme material, rather than test tones.

Once all settings are correct, power down the unit. Disconnect the test load and connect to the antenna. Power up the unit and increase the RF Power (see Setting the Transmission Power Output) to the desired level, not exceeding 1W.

Operation



The front panel display shows the, forward power level (→) reflected power level (←) audio input levels (ahead of any audio processing) and transmission frequency.

Audio levels will be optimised by the Audio Processor, however regular checks of audio levels entering the transmitter are advised.

Should the RF output fail due to a PLL error in the modulator circuitry, "ALARM!" will show in place of the forward power reading, and the RF output will cease.

Try resetting the FMTX2, by switching the power off, waiting 15 seconds and then switching the power back on.

Should the reflected RF power be too high, “ALARM!” will show in place of the reflected power reading, and the RF output will cease.

> Switch off the power, and remedy the fault with the antenna (or its cabling, connectors, etc) then try powering-up the FMTX2.

Setting the Transmission Output Power

1. Press the **‘ENTER’** button. The Forward Power reading will be selected.

2. Use the **‘UP’** and **‘DOWN’** buttons to select the desired RF power output level.

3. Press ‘**ENTER**’ button to save the new setting. The value on the display will flash rapidly to confirm.

Setting the Transmission Frequency

Broadcast regulators in many countries stipulate that the transmission frequency cannot be easily changed by tampering. This setting can therefore only be changed by using a special key sequence at power-up.

1. If the unit is on, disconnect the power for at least 15 seconds. Then, whilst simultaneously keeping the **‘ENTER’** button depressed for at least two seconds, re-apply power to the FMTX2.

The unit will boot into a special mode, and display the currently programmed transmission frequency.

2. Use the ‘UP’ and ‘DOWN’ buttons to select the desired transmission frequency.

3. Press ‘ENTER’ button to save the new setting. The value will flash rapidly to confirm.

The unit will then begin the normal power-up booting process (‘Wait…’ is displayed on the screen), followed by the normal main screen display.

Enabling or Disabling RDS Transmission

If, for any reason, transmission of RDS is NOT required, the RDS encoder can be defeated by holding both ‘UP’ and ‘DOWN’ buttons pressed whilst simultaneously powering-up the FMTX2. After the boot sequence completes, the RDS icon will no longer be displayed.

This preference will be stored in non-volatile memory, and will therefore remain effective until the setting is once again changed.

To re-enable the RDS, repeat the above procedure at power-up. After the boot sequence completes, the RDS icon will be displayed.

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 product:

FMTX1, FMTX2

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

Technical Specifications

RF:	
Frequency range	87.5 to 108.00MHz
Frequency stability	Better than ±200Hz
Output power	2300 – 2000mW (nominal)
Harmonic & spurious output	-75dBc typical
AM Noise	<0.5% @ ±40kHz deviation
THD	<0.15%@ ±75KHz deviation
RF output connector	'N' type (F)
Monitoring:	
RF	BNC (F) -40dB 50 ohms
MPX	BNC (F) 1V P-P 10K ohms
Audio Interface:	
Audio input level	+8dBu nominal
Audio input impedance	600 Ohms
Audio input connectors	XLR (F)
Audio Processing:	
Type	Broadcast AGC, multiband levelling, clipping
Stereo separation	40dB
19kHz filter	Digital FIR
Controls	Factory fixed
RDS:	
Groups	0A & 2A (others on request)
Power Supply:	
Input AC	110V to 250V (50/60 Hz)
Consumption (maximum RF output)	9W (230V 50Hz)
Mechanical:	
Size (mm)	1U 43 (H) x 482 (W) x 150 (D)
Weight	1kg
Temperature	0°C to +42°C
Humidity	95% (relative non-condensing)

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

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.

IMPORTANT!

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO THIS PRODUCT. Do not misconstrue any information as our recommendation to use any product, process, or equipment in conflict with any regulatory authority or patent.

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.

Lucoro Broadcast shall not be liable for any direct, indirect, incidental, consequential or other damage or loss alleged in connection with the supply or use of this product.

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Lucoro Broadcast
Clay Pit Lane
Roecliffe
York
YO51 9FS

Telephone 01423 313550
Telephone (International) +44 1423 313550

Enquiries: sales@lucorobroadcast.com