



R V R ELETTRONICA TEX150-LCD-S FM Transmitters User Manual

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R V R ELETTRONICA TEX150-LCD-S FM Transmitters



Product Information

The TEX150-LCD/S is a FM transmitter manufactured by R.V.R. Elettronica SpA in Italy. It is a device used for FM audio broadcasting and operates on frequencies that are not harmonized in the intended countries of use. Therefore, it is necessary for the user to obtain a license before using the product in the intended country of use.

The product is compliant with the essential requirements and provisions of Directive 1999/5/EC.

Preliminary Instructions

- This manual is written as a general guide for those having previous knowledge and experience with this kind of equipment, well conscious of the risks connected with the operation of electrical equipment.
- It is not intended to contain a complete statement of all safety rules which should be observed by personnel in using this or other electronic equipment.
- The installation, use and maintenance of this piece of equipment involve risks both for the personnel performing them and for the device itself, that shall be used only by trained personnel.
- R.V.R. Elettronica SpA does not assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.
- Please observe all local codes and fire protection standards in the operations of this unit.
- **WARNING:** always disconnect power before opening covers or removing any part of this unit. Use appropriate grounding procedures to short out capacitors and high voltage points before servicing.
- **WARNING:** this device can irradiate radio frequency waves, and if it's not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications. This is a "CLASS A" equipment. In a residential place this equipment can cause hash. In this case can be requested to user to take the necessary measures.
- R.V.R. Elettronica SpA reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

Warranty

Any product of R.V.R. Elettronica is covered by a 24 (twenty-four) month warranty. For components like tubes for power amplifiers, the original manufacturer warranty applies. R.V.R. Elettronica SpA extends to the original end-user purchaser all manufacturers warranties which are transferrable and all claims are to be made directly to R.V.R. per indicated procedures.

Warranty shall not include:

1. Damage while the equipment is being shipped to R.V.R. for repairs;
2. Any unauthorized repair/modification;
3. Incidental/consequential damages as a result of any defect
4. Nominal non-incidental defects
5. Re-shipment costs or insurance of the unit or replacement units/parts

Any damage to the goods must be reported to the carrier in writing on the shipment receipt. Any discrepancy or damage discovered subsequent to delivery, shall be reported to R.V.R. Elettronica within 5 (five) days from delivery date. To claim your rights under this warranty, you should follow this procedure

1. Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected.

Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.

2. If your dealer cannot help you, contact R.V.R. Elettronica and explain the problem. If it is decided to return the

unit to the factory, R.V.R. Elettronica will mail you a regular authorization with all the necessary instructions to send back the goods.

3. When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e., R.V.R. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by R.V.R.'s service manager on the authorization

DO NOT RETURN UNITS WITHOUT OUR AUTHORIZATION AS THEY WILL BE REFUSED

4. Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty.

Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

R.V.R. Elettronica SpA

Via del Fonditore, 2/2c

40138 BOLOGNA

ITALY

Tel. +39 051 6010506

First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

Treatment of electrical shocks

1. If the victim is not responsive

Follow the A-B-C's of basic life support

- Place victim flat on his back on a hard surface.
- **Open airway:** lift up neck, push forehead back (Figure 1).
- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (Figure 2): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

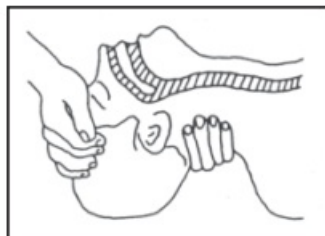


Figure 1



Figure 2

- Check carotid pulse (Figure 3); if pulse is absent, begin artificial circulation (Figure 4) depressing sternum (Figure 5)

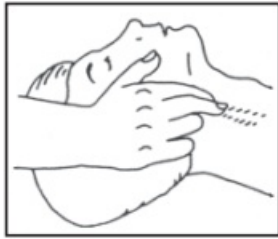


Figure 3

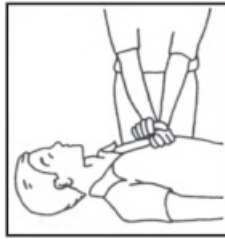


Figure 4

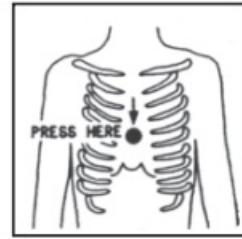


Figure 5

- In case of only one rescuer, 15 compressions alternated to two breaths.
- If there are two rescuers, the rhythm shall be of one breath each 5 compressions.
- Do not interrupt the rhythm of compressions when the second person is giving breath.
- Call for medical assistance as soon as possible.

2. If victim is responsive

- Keep them warm
- Keep them as quiet as possible
- Loosen their clothing (a reclining position is recommended)
- Call for medical help as soon as possible

Treatment of electrical Burns

1. Extensive burned and broken skin

- Cover area with clean sheet or cloth
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold). Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes. Discontinue fluid if vomiting occurs. DO NOT give alcohol

2. Less severe burns

- Apply cool (not ice cold) compresses using the cleansed available cloth article.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- Apply clean dry dressing if necessary.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible
- If arms or legs are affected keep them elevated.

Removing the Packing

Package

The package contains the following:

- TEX150-LCD/S

- User's Manual
- Connection cables to other equipment
- Power Mains Cables

The following accessories for the machine are also available at your R.V.R. dealer:

- /10MHz (10MHz external reference)
- Accessories and cables

General description

- The TEX150-LCD/S, manufactured by R.V.R. Elettronica SpA, is a frequency modulated audio radiodiffusion exciter able to transmit in the band ranging from 87.5 to 108 MHz in 10kHz steps, with output RF power adjustable up to a maximum of 150 W on a 50Ohm standard load.
- The TEX150-LCD/S includes a built-in stereo coder; a switch for Mono mode.
- The exciter features a pass low filter that reduces harmonic emissions below the limits permitted by international standards (CCIR or FCC), and can therefore be used as a transmitter connected directly to the antenna.
- The important audio characteristics of this device are low distortion and intermodulation levels and a high noise signal ratio.
- Substantial qualities of the TEX150-LCD/S are its compact size and its ease of use. The machine features a modular design: the various functions are performed by modules connected mostly with male and female connectors or with flat cables terminating in connectors. This type of design makes maintenance operations and module replacement easier.
- The RF power section uses MOSFET modules able to deliver 150W.
- The working frequency is guaranteed by a reference oscillator with compensated temperature maintained by a PLL (Phase Locked Loop) system. The TEX150-LCD/S achieves frequency lock in a maximum time of thirty seconds from switch-on.
- The TEX150-LCD/S is able to work on the entire frequency band without the need for calibration or setting.

The microprocessor control system includes an LCD on the front panel and a user keyboard, and implements the following functions:

- Output power setting
- Working frequency setting
- Power delivery enabling and disabling
- Exciter work parameter measurement and display
- Communication with external devices

The status of the machine is indicated by four LEDs located on the front panel: ON, LOCK, FOLDBACK, RF MUTE. The exciter management software features a menu system. The user can scroll through the menus using the four keys: ESC, LEFT/UP, RIGHT/DOWN, and ENTER. The back panel includes the mains input connectors, the RF audio input and output connectors, the telemetry connector, the protection fuse, two inputs for modulated signals on subcarriers from specially provided external coders, usually used in Europe for RDS (Radio Data System) transmission. The exciter features an input for a 24 VDC external power supply. This auxiliary power source, which can be created by the user with buffer batteries, is used automatically if mains power is cut off.

NOTE: When using the 24 VDC external power supply the machine is not able to deliver the maximum 150W output power.

Quick Installation and Use Guide

This chapter contains the instructions necessary for installing and using the machine. Should any part not be completely clear, for example when the machine is used for the first time, we recommend you carefully read the complete description contained in this manual.

Preparation

- Unpack the exciter and before carrying out any other operation make sure no damage has been caused during transport. In particular, make sure all connectors are in perfect condition. Check that the power supply voltage value matches the available mains voltage. The protection fuses can be accessed externally through the back panel (see fig. 6.2). To check its condition or if replacement is required, remove the fuseholder with a screwdriver. Use the following type of fuse: 6.3 A5x20

Make sure the TEX150-LCD/S switches are in the OFF position. The exciter features two switches: one built into the VDE base for the mains power supply cable, which cuts off mains power completely, and the second is located on the front panel and bypasses the machine's switching power supply. Connect the exciter RF output to the antenna cable or to a fictitious load able to dissipate the power generated by the TEX150-LCD/S.

- **CAUTION:** if no load is present, do not touch the output RF connector during machine operation to avoid electric shock and electrocution.
- Connect the mains cable to the MAINS connector located on the back panel (see fig. 6.2).
- **CAUTION:** the power connector is a terminal board; make sure that the cable is not live when making the connection.
- **CAUTION:** the mains system must feature grounding to ensure both the safety of the operators and correct operation of the device.
- Connect the audio signals and RDS/SCA of their sources to the TEX150-LCD/S input connectors following the instructions contained in the diagram in fig. 6.2.

Use

- To power the exciter, set the switch located on the front panel to "ON".
- Enter the "Set" menu and set the desired working frequency. For a description of the various menus, see paragraph 5.4.
- Use the switches and trimmers located on the back panel to set the characteristics (impedance, pre-emphasis, stereo/mono) and the audio input and RDS (if used) levels.
- NOTE: Before delivery, the device is factory preset with output power adjustment at minimum and to "OFF". In any case, we recommend you check the set level before delivering power, especially if the machine is used as a modulator for a power amplifier.
- From the preset menu, set the desired power level.
- From the "Fnc" menu, enable power delivery.

Settings and calibration

The only manual adjustments required for the TEX150-LCD/S are those related to the levels and the audio operation mode. The back panel of the device features a trimmer for each exciter input; the labels indicate which

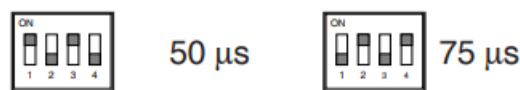
trimmer refers to each input. The sensitivity of each input can be adjusted with the trimmer within the range described in the following table:

Input sensitivity in Stereo mode:

Ingresso	Figura 6.1	Trimmer	Sensibilita	Note
RDS	[13]	[14]	-13 -: +13 dBu	Livello in ingresso per deviazione complessiva 7,5 kHz (0 dB)
SCA1	[29]	[15]	-8 -: +13 dBu	Livello in ingresso per deviazione complessiva 7,5 kHz (-20 dB)
SCA2	[30]	[31]	-8 -: +13 dBu	
Left	[33]	[32]	-13 -: +13 dBu	Livello in ingresso per deviazione complessiva 7,5 kHz (0 dB)
Right	[17]	[16]	-13 -: +13 dBu	

To adjust the input sensitivity level, remember that the preset menu contains the instantaneous modulation level and that an indicator reads a level of 75 kHz. For a correct adjustment, we therefore recommend you apply to the machine input a level equal to the maximum level of your audio program and adjust the related trimmer until the instantaneous deviation coincides with 75 kHz. To adjust the level of the subcarrier inputs, you can follow a similar procedure, with the help of option “x10” selected from the “Fnc” menu. With this option, the indicated modulation level is multiplied by 10, therefore the broken-line indication of the preset menu coincides with the 7.5 kHz deviation value. For the stereophonic version, there is a specific menu separately indicating the Left and Right channel levels with related nominal level indicators for the maximum deviation of 75 kHz.

- Preemphasis (switch [6] Fig. 6.2):



- L and R (XLR type) input impedance (switch [16] Fig. 6.2):



- **Switch 1:** impedenza ingresso R XLR ON = 600 Ω, OFF = 10 kΩ
- **Switch 2:** impedenza ingresso L XLR ON = 600 Ω, OFF = 10 kΩ

- Modalità di funzionamento/impedenza ingresso MPX (switch [7] Figura 6.2):



- **Switch 1:** Modo di funzionamento ON = Mono, OFF = Stereo
- **Switch 2:** impedenza ingresso MPX ON = 50 Ω, OFF = 10 kΩ

Software

The machine features a 2-line LCD which displays a series of menus. An overall view of the machine menus is shown in fig. 5.1. On the left-hand side of the display, depending on the case, there may be one or more symbols:

- The parameter indicated with the arrow can be modified.
- The arrow indicates the current line, whose parameter cannot be modified. This symbol is found in menus consisting of more than two lines as help with scrolling the menu.

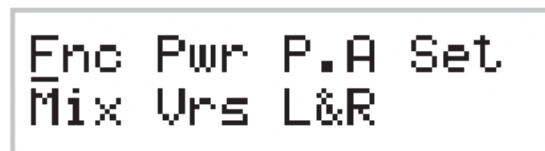
When the machine is switched on, the LCD displays the default screen, with a graphic representation of the instantaneous modulation level and an indication of the direct power value delivered:



The bar to the right of "Mod" indicates the modulation progress in real time; the broken bar indicates the maximum nominal modulation of 75 kHz (100%). To vary the set power level, select the line pertaining to power with the DOWN key and keep the ENTER key pressed until you have entered "modify" mode. The screen that will appear in "modify" mode is similar to the one shown below:



The lower line shows the instantaneous power reading (in this example 97W), while the bar indicates the set level. To increase the level, press the RIGHT/DOWN key, to decrease it press LEFT/UP. As the set level increases or decreases, the bar will become either longer or shorter to display the current setting. Once you have reached the desired level, press ENTER to confirm and exit the preset menu. Note that the set value is always saved. Therefore if you press ESC or if the timeout time elapses without pressing any key, the power will remain on the last set value. If you press ESC while you are in the preset menu, the following selection screen will be displayed, from which you can access all the other menus:



To enter one of the submenus, select the name (which will be underlined by a flashing cursor) with the LEFT or RIGHT keys and press ENTER. If, on the other hand, you wish to return to the preset menu, simply press ESC again. Fig. 5.1 shows the complete set of machine menus.

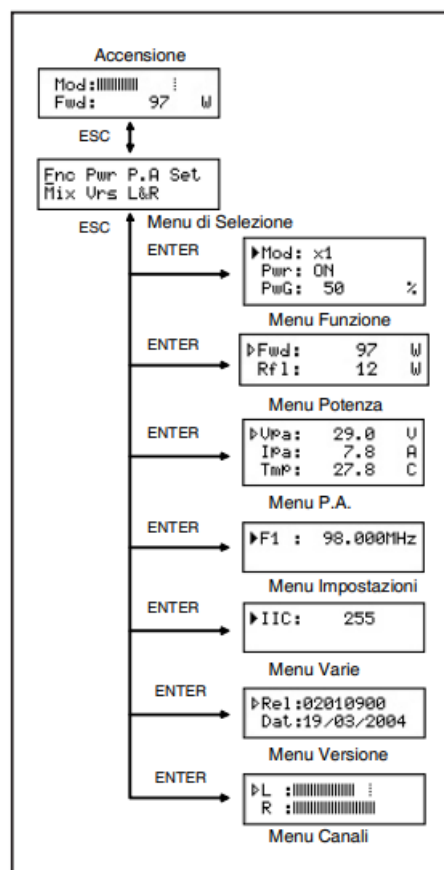
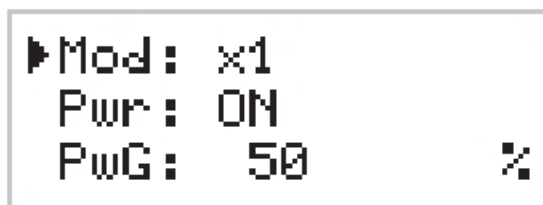


Figure 5.1

1. Function menu (Fnc)



```
▶Mod: x1
Pwr: ON
PwG: 50 %
```

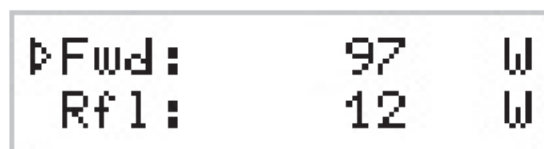
From this menu you can set the deviation display mode, enable or disable power delivery by the exciter and set the power percentage of Power Good. To set one of the items, select the related line with the UP and DOWN keys and then press and keep pressed ENTER until the command has been accepted. In this way the Pwr setting will change from On to Off or vice versa and the Mod setting will change from “x1” to “x10” or vice versa. To change the Power Good percentage value, after having selected PWG, simply change its value with the UP and DOWN keys and confirm by pressing ENTER. In “x10” mode the indication of the instantaneous deviation is multiplied by 10, therefore the broken line on the preset menu will coincide with 7.5 kHz instead of 75 kHz. This display mode is useful when you wish to view low deviation levels, e.g. those due to the pilot tone or the subcarriers.

Power Good is a control and alarm function of the delivered power. When the output power goes below the Power Good threshold value, the machine changes the status of a pin contained in the DB15 “Remote” connector located on the back panel (fig. 6.2 note [14]). The Power Good percentage value refers to the machine nominal power, i.e. 150W, and not to the direct delivered power. Therefore if it is set on 80%, it will correspond to 120W regardless of the set power.

2. Power menu (Pwr)

This screen shows the user the measurements related to the exciter power delivery:

- Direct power (Fwd)
- Reflected power (Rfl)



```
▶Fwd: 97 W
Rfl: 12 W
```

The values shown are “readings”, and therefore cannot be changed (notice the empty triangle). To change the power setting, use the preset menu as described previously.

3. Power Amplifier menu (P.A)

This screen, consisting of three lines which can be scrolled with the UP and DOWN keys, shows the user the measurements related to the device’s final power:

- Voltage (VPA)
- Absorbed current (IPA)
- Temperature (TMP)



```
▶UPa: 29.0 V
IPa: 7.8 A
TmP: 27.8 C
```

4. Setting menu (Set)

This menu lets you read and set the working frequency.

A monochrome LCD screen displaying the text 'F1 : 98.000MHz' in a pixelated font. The screen is enclosed in a rectangular frame.

By pressing and keeping pressed ENTER, you can change the set frequency with the UP (frequency increases) and DOWN keys. After having set the new frequency value, press ENTER to confirm your choice; the exciter will unlock from the current frequency (the “LOCK” LED goes off) and will lock on a new working frequency (“LOCK” goes on again). By pressing ESC or allowing the timeout to elapse, the frequency will remain set on the previous value.

5. **Mix menu (Mix)**

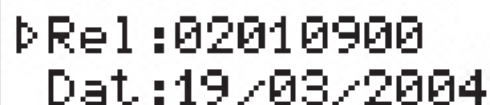
This menu lets you set the machine address in an I2C type serial bus connection:

A monochrome LCD screen displaying the text 'IIC: 255' in a pixelated font. The screen is enclosed in a rectangular frame.

The address of the I2C line is important when the exciter is connected in an R.V.R. transmitting system that uses this type of protocol. However, we recommend you not change it for no reason.

6. **Versions menu (Vrs)**

This screen shows you the software version and release date.

A monochrome LCD screen displaying two lines of text: 'Rel:02010900' on the top line and 'Dat:19/03/2004' on the bottom line. The screen is enclosed in a rectangular frame.

7. **Channels menu (L&R)**

The right and left channel input levels are depicted with horizontal bars, as shown in the following figure.

A monochrome LCD screen displaying two lines of text: 'L : [horizontal bars]' on the top line and 'R : [horizontal bars]' on the bottom line. The horizontal bars represent the input levels for the left and right channels. The screen is enclosed in a rectangular frame.

The hatched pointer indicates the level that corresponds with the total deviation at 100%, and is useful to regulate the input levels of the audio channels.

External Description

This chapter describes the elements found on the front and back panels of the TEX150-LCD/S.

Front Panel

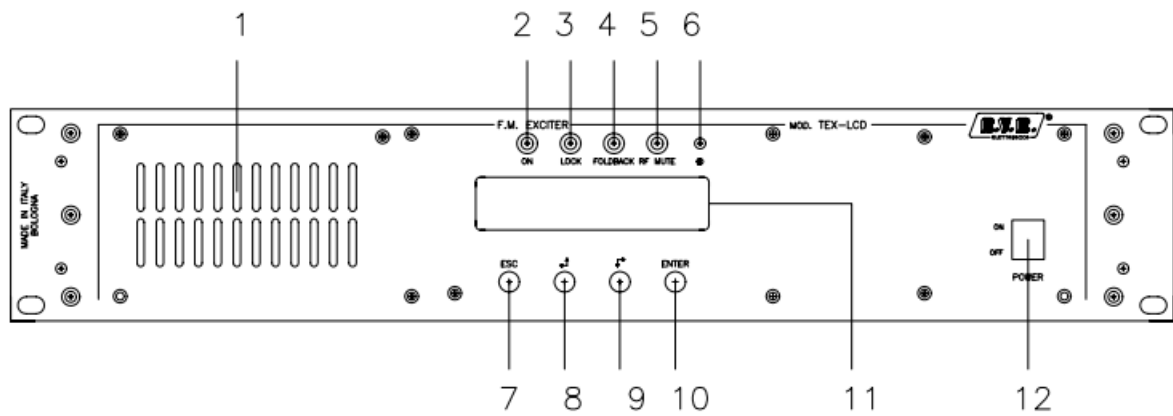


Figure 6.1

1. **AIR FLOW** Air flow passage grid
2. **ON** Green LED, lit when the exciter is powered
3. **LOCK** If on, it means that the PLL is locked to the reference frequency
4. **FOLDBACK** Yellow LED, if on, it means that the foldback function is enabled (automatic reduction of delivered power)
5. **R.F. MUTE** if on it indicates that the exciter is not delivering power to because it is bypassed by an external interlock
6. **CONTRAST** Display contrast adjustment trimmer
7. **ESC** Key to press to exit menu
8. **LEFT/UP** Key for scrolling the menu system and for changing parameters
9. **RIGHT/DOWN** Key for scrolling the menu system and for changing parameters
10. **ENTER** Key for confirming a parameter and entering menus
11. **DISPLAY** Liquid crystal display
12. **POWERON/OFF** key. Switches off the exciter without disconnecting the mains power

Back Panel

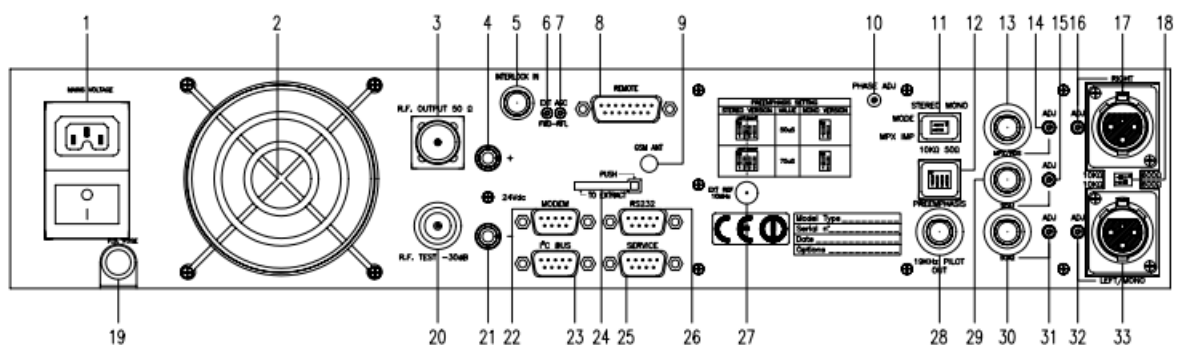


Figure 6.2

1. **PLUG** Standard IEC socket for mains power supply, 90-260V 50-60Hz.
2. **AIR FLOW** Air flow passage grid.
3. **R.F. OUT RF** output connector, N-type.
4. **24VDC IN** + 24V external power supply connector. Positive pole.
5. **INTERLOCK IN** BNC interlock connector: by grounding the central conductor the transmitter is forced in stand-

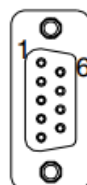
by mode.

6. **FWD EXT. AGC** Trimmer for controlling the power delivered depending on the fold FWD input.
7. **RFL EXT. AGC** Trimmer for controlling the power delivered depending on the fold RFL input.
8. **REMOTE** DB15 connector for device telemetry.
9. **GSM ANT** Reserved for future use.
10. **PHASE ADJ** Adjustment trimmer for the pilot tone phase.
11. **MODE/MPX IMP** Dip-switch for selecting both the transmission mode (STEREO or MONO) and the MPX impedance input, either 50W or 10kW.
12. **PREEMPHASIS** Dip-switch for setting 50 or 75 ms preemphasis. Preemphasis affects the right and left inputs in stereo mode and the mono input. MPX inputs are not affected by the preemphasis setting.
13. **MPX/RDS** Unbalanced MPX input BNC connector.
14. **MPX/RDS ADJ** Trimmer for adjusting MPX input levels.
15. **SCA1 ADJ** Trimmer for adjusting SCA1 input level.
16. **RIGHT ADJ** Trimmer for adjusting Right input levels.
17. **RIGHT XLR** connector for Right channel audio input.
18. **IMPEDANCE** Dip-switch for selecting the impedance of the balanced audio inputs, either 600 W or 10 kW.
19. **P.S. FUSE** Mains power supply fuse.
20. **R.F. TEST** -30 dB output referred to output power level, suitable for monitoring modulation. Cannot be used for spectral analysis.
21. **24VDC IN** – Connector for 24V external power supply. Negative pole.
22. **MODEM** DB9 connector for interconnection with external modem.
23. **I2C BUS** DB9 connector for I2C standard communication.
24. **GSM SLOT-IN** Reserved for future use.
25. **SERVICE** DB9 connector for programming factory parameters.
26. **RS232** DB9 connector for interfacing with telemetry equipment or the GSM modem.
27. **EXT. REF** 10MHZ Auxiliary input for 10MHz external reference for advanced application in isofrequency.
28. **19KHZ PILOT OUT** Pilot tone output BNC connector, used for synchronizing external devices such as the RDS coder.
29. **SCA1 BNC** connector, unbalanced SCA1 input.
30. **SCA2 BNC** connector for SCA2 input
31. **SCA2 ADJ** Trimmer for adjusting the SCA2 input levels.
32. **LEFT-MONO ADJ** Trimmer for adjusting LEFT-MONO input levels.
33. **LEFT-MONO XLR** connector for LEFT-MONO channel audio input.

Connectors description

1. RS232

Type: DB9 Male

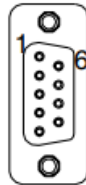


1. NC
2. TX_D

3. RX_D
4. Connected internally with 6
5. GND
6. Connected internally with 4
7. Connected internally with 8
8. Connected internally with 7
9. NC

2. Service (for factory parameter programming)

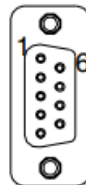
Type: DB9 female



1. NC
2. TX_D
3. RX_D
4. Connected internally with 6
5. GND
6. Connected internally with 4
7. Connected internally with 8
8. Connected internally with 7
9. NC

3. I2C Bus

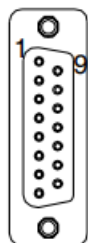
Type: DB9 male



1. NC
2. SDA Serial Data
3. SCL Serial Clock
4. NC
5. GND GND
6. NC
7. NC
8. NC
9. NC

4. Remote

Type: DB15 female



Pin	Name	Type	Meaning
1	Interlock	IN	Bypasses power if closed at GND
2	Ext AGC FWD	IN	Ext. signal for power limitation (AGC)
3	GND		Ground
4	SDA IIC	I/O	IIC communication serial data
5	VPA TIm	OUT anal.	PA power supply voltage: 5 V for 62 V
6	FWD tIm	OUT anal.	Direct power: 3 V for 600 W
7	Power Good	OUT digit.	Open collector, enabled when power exceeds set threshold (par. 5.4.1)
8	GND		Ground
9	GND		Ground
10	Ext AGC RFL	IN	Ext. signal for power limitation (AGC)
11	SCL IIC	I/O	IIC communication clock
12	IPA TIm	OUT anal.	PA power supply current: 5 V for 46 A
13	RFL TIm	OUT anal.	Reflected power: 3 V for 100 W
14	On cmd	IN digit.	One grounded pulse (500 ms) enables power delivery
15	OFF cmd	IN digit.	One grounded pulse (500 ms) disables power delivery

5. Left (MONO) / Right

Type: XLR female



1. GND
2. Positive
3. Negative

Technical Specifications

Mechanical characteristics

- **Panel size** 483 mm (19") x 132.5 mm (2 HE)
- **Chassis depth** 389 mm (15.32")
- **Total depth** 400 mm (15.75")
- **Weight** Aprox. 6.5 Kg
- **Operating temperature** -10 °C 50 °C

Electrical characteristics

- **General**
 - **Output RF power** 0-150 W adjustable with continuity
 - **Frequency band** 87.5MHz 108MHz, 10kHz step (it is possible to specify different steps when ordering)
 - **Frequency programming** Direct via software
 - **Frequency stability** ± 1 ppm from -10°C to 50°C
 - **Modulation type** Direct carrier modulation
 - **Spurious and harmonic suppression** Complies with or exceeds FCC and CCIR standards < 75dBc

(typical 80dBc)

- **Modulation capacity** Complies with or exceeds FCC and CCIR 180kHz MPX or Mono, 150 KHz Stereo
- **Residual asynchronous AM modulation** $\geq 65\text{dB}$ or lower compared to 100% AM, without deemphasis (typical 70dB)
- **Residual synchronous AM modulation** $\geq 50\text{dB}$ or lower compared to 100% AM, modulation FM 75 kHz at 400Hz, without deemphasis (typical 60dB)
- **AC power supply connector** Standard IEC
- **AC power supply** 115/230 V $\pm 15\%$
- **Power Factor** 0.6
- **Apparent AC power absorption** 440VA
- **Active power absorption** 260W
- **Consumption** at 150 W RF $\approx 0.85\text{ kVA}$
- **Ventilation** Forced, with internal fan
- **Acoustic disturbance** $< 58\text{dBA}$

• Inputs

- **MPX/Left inputs** XLR female, externally balanced or unbalanced
- **Right input** XLR female, externally balanced or unbalanced
- **MPX/RDS input** Unbalanced BNC
- **SCA/RDS input** Unbalanced BNC
- **Input impedance** 10kOhm or 600Ohm, XLR MPX/Left – Right 10kOhm or 50Ohm BNC MPX/RDS selectable via DIP-switch
- **Input level** -13dBu +13dBu, continuous fine adjustment with trimmer
- **Preemphasis**
 - **Selectable:** 0 /50 us (CCIR) /75 us (FCC)
- **SCA/RDS inputs** Unbalanced BNC
- **SCA/RDS input impedance** 10 kOhm
- **SCA/RDS input level** -8dBu +13dBu, continuous fine adjustment with trimmer

• Outputs

- **RF Out** N-type female connector with 50 Ohm impedance
- **RF Monitor** BNC connector, approx. level -60dB compared to RF output, 50 Ohm impedance
- **Pilot Out** BNC female connector
- **19 KHz pilot tone** 1 Vpp

• Funzionamento MONO

- **S/N FM**
 - 80dB (typical 85dB) compared to $\pm 75\text{kHz}$ peak, measured in the 20Hz – 23kHz band with 50 us deemphasis, RMS detector
 - 73dB compared to $\pm 75\text{kHz}$ peak, CCIR not weighed with 50 us deemphasis, Qpk detector
 - 68dB compared to $\pm 40\text{kHz}$ peak, CCIR weighed with 50 us deemphasis, Qpk detector
- **Amplitude/frequency response** better than $\pm 0.5\text{dB}$ (typical $\pm 0.2\text{dB}$), 30Hz – 15KHz
- **Total Harmonic Distortion (THD)** $< 0.1\%$ (typical 0.07%), THD+N 30Hz – 15KHz
- **Intermodulation distortion** $< 0.02\%$, measured with 1KHz and 1.3KHz tones, 1:1 ratio, at 75KHz
- **Transient intermodulation distortion** $< 0.1\%$ (typical 0.05%), measured with 3.18KHz square wave and 15KHz sinusoidal wave, at 75KHz

• MPX operation

- **S/N FM** > 80dB (typical 85dB) compared to $\pm 75\text{kHz}$ peak, measured in the 20Hz – 100kHz band with 50 μs deemphasis, RMS detector
- **Amplitude/frequency response** $\pm 0.2\text{dB}$, 30Hz – 53Khz / $\pm 0.5\text{dB}$, 30Hz – 100Khz
- **Total Harmonic Distortion (THD)** < 0.1%, 30Hz – 53Khz < 0.15%, 30Hz – 100Khz
- **Intermodulation distortion** < 0.05%, measured with 1KHz and 1.3KHz tones, 1:1 ratio, at 75KHz
- **Transient intermodulation distortion** < 0.1% (typical 0.05%), measured with 3.18KHz square wave 15KHz sinusoidal wave, at 75KHz
- **Stereo separation** > 50 dB (typical 60dB), 30Hz – 53Khz
- **Stereo operation**
 - **S/N FM**
 - 75dB (typical 78dB) compared to $\pm 75\text{kHz}$ peak, measured in the 20Hz – 23kHz band with 50 μs deemphasis, demodulated L&R, RMS detector
 - 65dB compared to $\pm 75\text{kHz}$ peak, CCIR not weighed with 50 μs deemphasis, demodulated L&R, Qpk detector
 - 58dB compared to $\pm 40\text{kHz}$ peak, CCIR weighed with 50 μs deemphasis, demodulated L&R, Qpk detector
 - **Amplitude/frequency response** $\pm 0.5\text{dB}$, 30Hz – 15Khz
 - **Total Harmonic Distortion (THD)** < 0.05%, THD+N 30Hz – 15Khz
 - **Intermodulation distortion** $\leq 0.03\%$, measured with 1KHz and 1.3KHz tones, 1:1 ratio, at 75KHz
 - **Transient intermodulation distortion** < 0.1% (typical 0.05%), measured with 3.18KHz square wave and 15KHz sinusoidal wave, at 75KHz
 - **Stereo separation** > 50 dB (typical 55 dB)
 - **Main/Sub ratio** > 40 dB (typical 45 dB)
- **SCA operation**
 - **Amplitude/frequency response** $\pm 0.5\text{dB}$, 40Hz – 100Khz
 - **Main or stereo channel diaphony**
 - 75 dB (typical 78 dB) compared to $\pm 75\text{kHz}$ peak, measured in the entire band with 0 μs deemphasis, with 67KHz tone on SCA input, at 7.5KHz deviation
 - 78 dB (typical 80 dB) compared to $\pm 75\text{kHz}$ peak, measured in the entire band with 0 μs deemphasis, with 67KHz tone on SCA input, at 7.5KHz deviation
- **Auxiliary connections**
 - **Interlock** 2 BNC female connectors: by grounding the central conductor the transmitter is forced in stand-by mode.
 - **Ext. ref.** 10MHz SMA
 - **RS232** DB9 female
 - **Service** DB9 female
 - **I2C Bus** DB9 female
 - **Modem** DB9 female
 - **Remote interface** DB15 female
 - **Telemetry interface** DB15 female, provides indications on the condition of the machine
- **Options**
 - **/10MHZ** 10MHz input

Basic Functions

A schematic view of the modules and connections that make up the TEX150-LCD/S is shown in fig. 8.1.

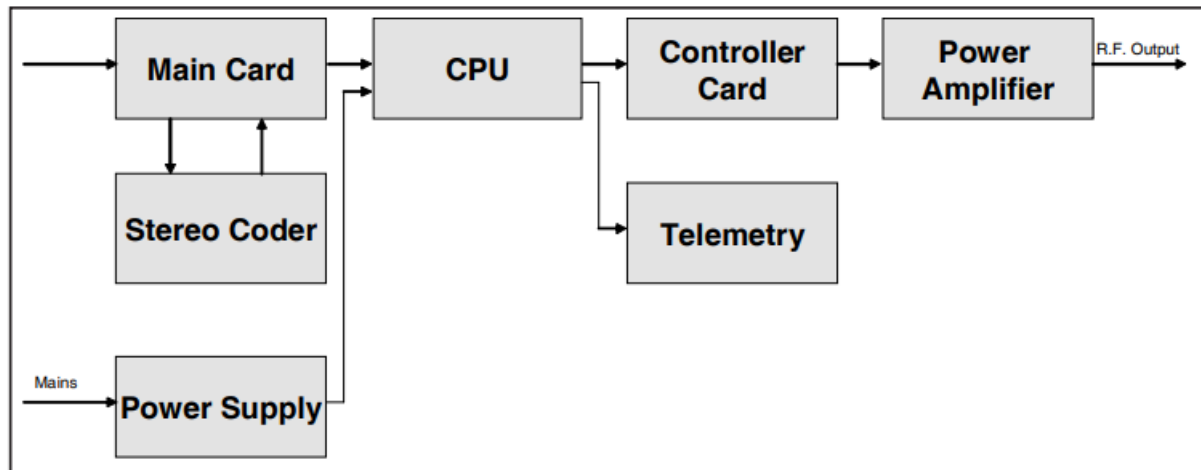


Figure 8.1

Following is a brief description of the functions of each module. The complete diagrams and module layouts are contained in the “Technical Appendix” Vol.2.

Power supply unit

The TEX150-LCD/S power supply unit is a switching-type unit whose +28 V main output powers the machine’s RF amplifier. The power supply also features stabilizers for generating continuous +5 V, -15V, +8V and +18 V voltages for powering the other device circuits. The power supply unit is also connected to 24 V auxiliary continuous voltage inputs used to automatically buffer the mains power cutoff.

Panel board

The panel board contains the microcontroller (PIC16F877) which implements the machine control software, the display and the other elements used to interface with the user. The board interfaces with the other machine modules both to distribute power and for checks and measures.

Main board

The main board does the following:

- Audio and SCA input treatment
- Carrier generation
- Modulation
- RF amplification (Driver)

The board also features a stereophonic coder.

1. Audio input section

The audio input section contains the circuits that perform the following functions:

- Input impedance selection
- 15 kHz filtering of the mono channel
- Mono channel preemphasis
- Mono, MPX and SCA channel mixing
- Clipper (limits the modulating signal level so that the frequency deviation does not exceed 75 kHz)
- Modulating signal measurement

The board also features two 15 kHz filters for filtering both the L and R channels, and a built-in stereophonic generator.

2. PLL/VCO section

This section of the board generates the modulated radiofrequency signal. It is based on a PLL scheme that uses an integrated MB15E06 PLL.

3. Driver section

Before passing to the final power amplifier, the RF signal is preamplified in this section by a BFR540 transistor. When the exciter is placed on stand-by, the driver is bypassed.

Power amplifier

The final power stage is enclosed in a fully shielded metal container fixed to the central part of the device. The RF signal coming from the main board reached the pilot, is amplified and then sent to the final stage which takes care of final amplification up to 150W. Amplification occurs in two stages, the first done with the BLF244, and the second with a BLF147. Besides actual RF amplification, this circuit performs other functions:

- Checks output power level depending on the setting
- Reduces delivered power in presence of high-level reflected power
- Measures direct and reflected power by means of directional couplers
- Measures the current absorbed by the power amplifier
- Measures temperature
- Filters the pass low of the output RF signal

This board also features an RF sampling of approximately -30dB RF with respect to the output, which is available on a BNC connector below the transmitter output connector. Sampling is useful for verifying the characteristics of the carrier, but not for checking those of the upper harmonics.

Telemetry board

This device is designed to inform the user of the condition of machine operation. All available machine input and output signals are shown on the DB15 connector. The same board also features the "INTERLOCK" BNC connector for disabling the device. By grounding the central pin, output power is reduced to zero until the connection is removed. When an R.V.R. amplifier is used, this connector is connected to the power amplifier REMOTE or INTERLOCK by means of a BNC-BNC connector. In case of amplifier faults, the central conductor is grounded thus forcing the machine to enter stand-by mode.

Control board

The main function of this board is to check and correct the MOSFET polarization voltage of the RF amplifier section. It also provides the measurement of the absorbed current and contains a circuit for signaling power supply unit faults. If no alarms are present, the voltage is adjusted only depending on the set output power, with a feedback mechanism based on the reading of the power actually delivered (AGC).

The voltage is also affected by other factors, such as:

- Too much reflected power
- External AGC signals (Ext. AGC FWD, Ext. AGC RFL)
- Too high temperature
- Too much current absorbed by the RF module.

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TEX150-LCD/S – User Manual

Version 1.0

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Notification of intended purpose and limitations of product use

This product is a FM transmitter intended for FM audio broadcasting. It utilises operating frequencies not harmonised in the intended countries of use. The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with. Limitations of use can apply in respect of operating frequency, transmitter power and/or channel spacing.

Declaration of Conformity

Hereby, R.V.R. Elettronica SpA, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Documents / Resources

	<p>R V R ELETTRONICA TEX150-LCD-S FM Transmitters [pdf] User Manual TEX150-LCD-S, TEX150-LCD-S FM Transmitters, FM Transmitters, Transmitters</p>
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References

-  [R.V.R. Elettronica - Broadcast Systems](#)